

Overview of animal and human brucellosis in EU: a controlled disease ?

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Brucella genus

Gram-negative bacteria



Multispecies infectious disease

≠ host species with « preferred hosts »
~10 *Brucella* species

Zoonosis : ≠ pathogenicity for human

B. abortus

bv 1-6, 9



B. melitensis

bv 1-3



B. suis

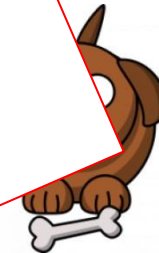
bv 1-5



B. ovis



B. canis



B. neotomae



B. ceti



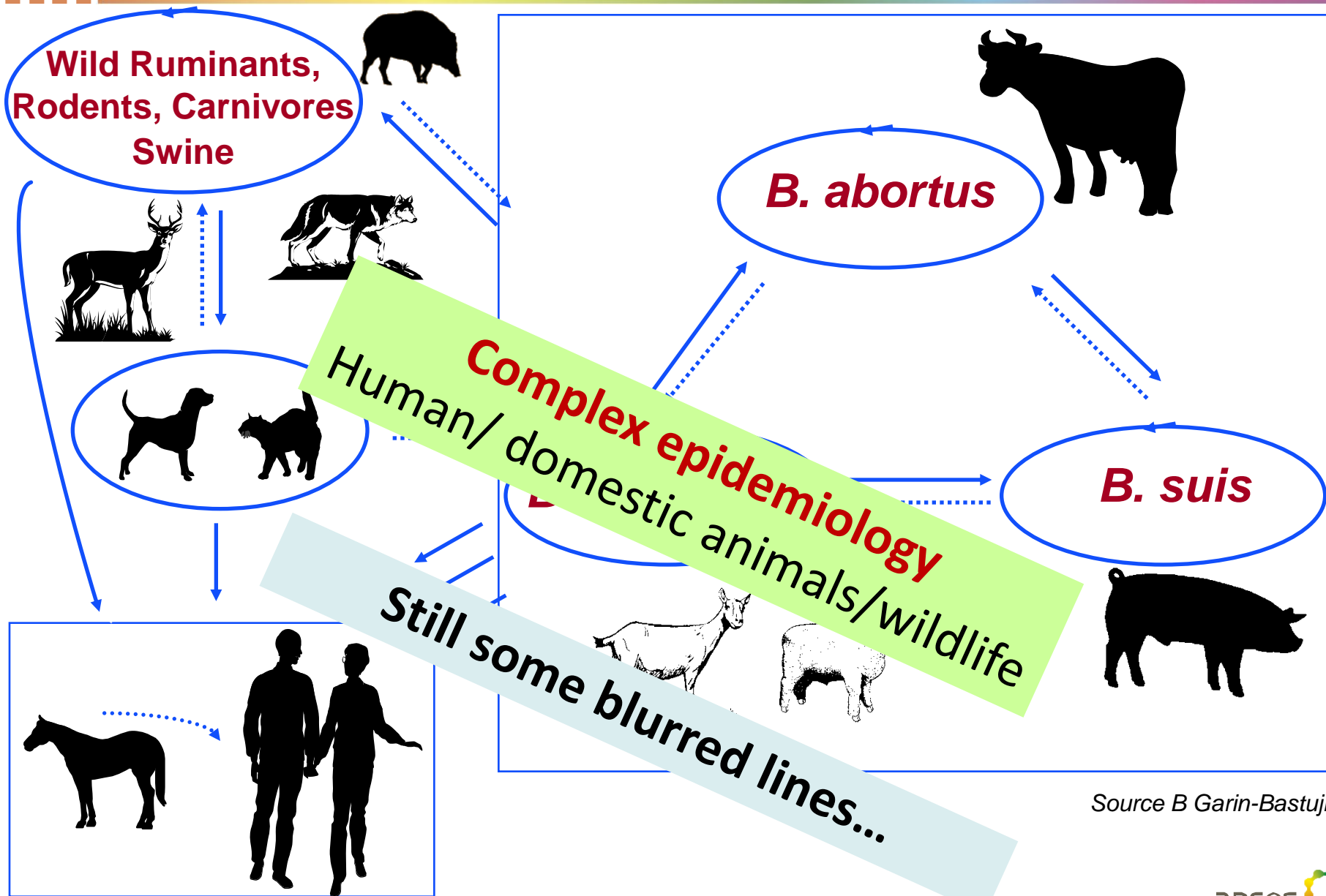
Classification:
➤ Phenotypical or biochemical
➤ Relative host specificity

B. microti



B. inopinata

Brucellosis, a “multi-species” disease



Brucellosis a zoonosis of worldwide importance

Animal infection



❖ Mostly **fertility** troubles in ♂ and ♀

❖ **Easily** transmissible among susceptible species

- **Huge excretion** (abortions)
- Many **transmission** routes
- **Survival** in environment

❖ Consequences : **Trade restriction**



Economic losses in livestock production



Human infection



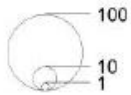
cases/year (WHO)
times more !

aches, arthritis
tonic



Human brucellosis in EU - 2013

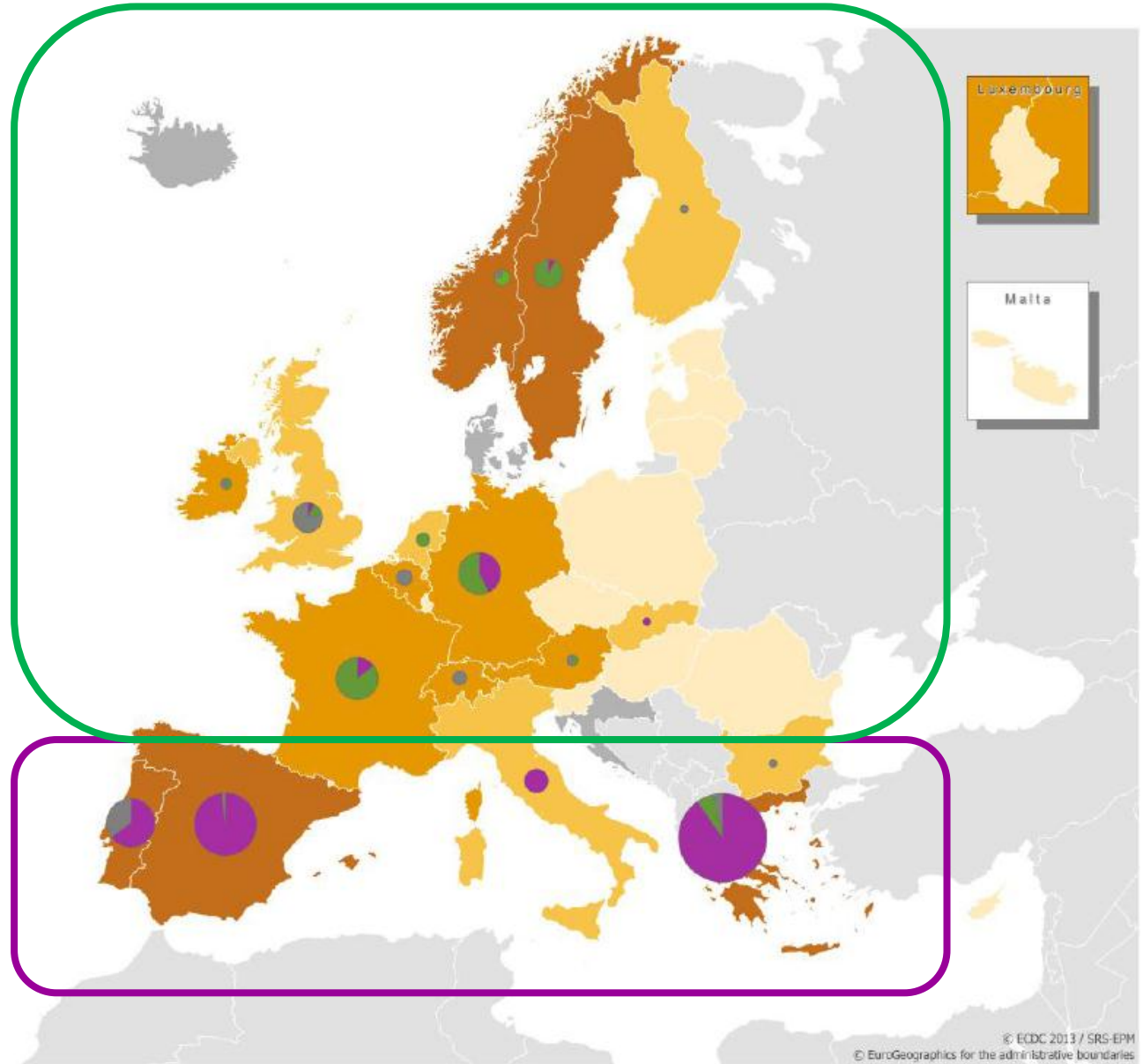
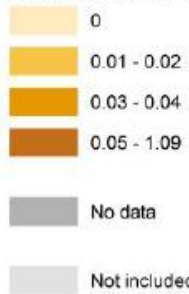
Number of cases



Origin of infection



Notification rate per 100 000



* Note: The map shows the distribution of human cases shaded according to incidence rate per 100 000, based on quartile classification method (EUROSTAT population data 2012).

© ECDC 2013 / SRS-EPM
© EuroGeographics for the administrative boundaries

In ruminants/swine : historically endemic in Europe...

North:



dairy

B. abortus (*B. suis*?)



- Sedentary breeding system
- Small ruminants apart
- Individual identification
- Industrialization
- AI

South:



B. melitensis & *B. abortus* (*B. suis*?)

- Transhumance
- Species mixed
- Males exchange
- Identification implemented lately

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A regulated disease in EU in ruminants and swine

Council Directives 64/432/EEC,
91/68/EEC, 90/429/EEC...

Surveillance/control
system



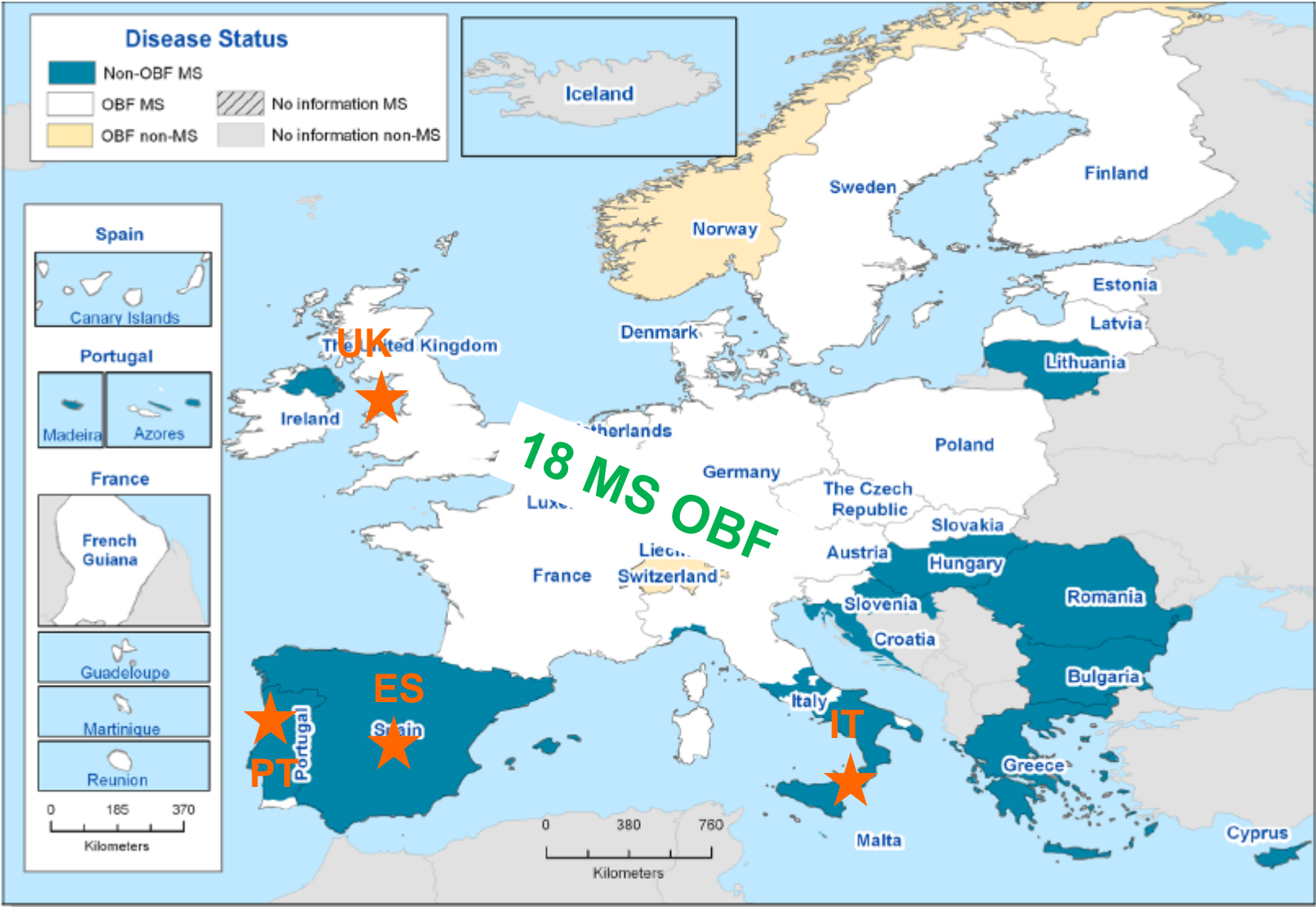
Networks : laboratories (EUPL, NPLs), vet services, veterinarians, FI agencies



- Favorable annual serological surveillance
- Mandatory notification of abortions
- Controlled introduction
- Individual identification



Bovine brucellosis in EU (status) - 2013



★ Regional status

Bovine brucellosis in EU (positive cattle herds > 0.1%) - 2013



- EU Co-financed eradication programme onwards 2013
- EU Co-financed eradication programme 2005-2009

Bovine brucellosis in EU...surveillance is required

Eradication mostly achieved (except in certain areas)

Lesson learned:

- resources (compensation)
- political commitment
- good network of vet. services & labs
 - breeders organisation
- Adapted use of control tools



Premature relaxation of surveillance measures

Overall very low number of infected herds

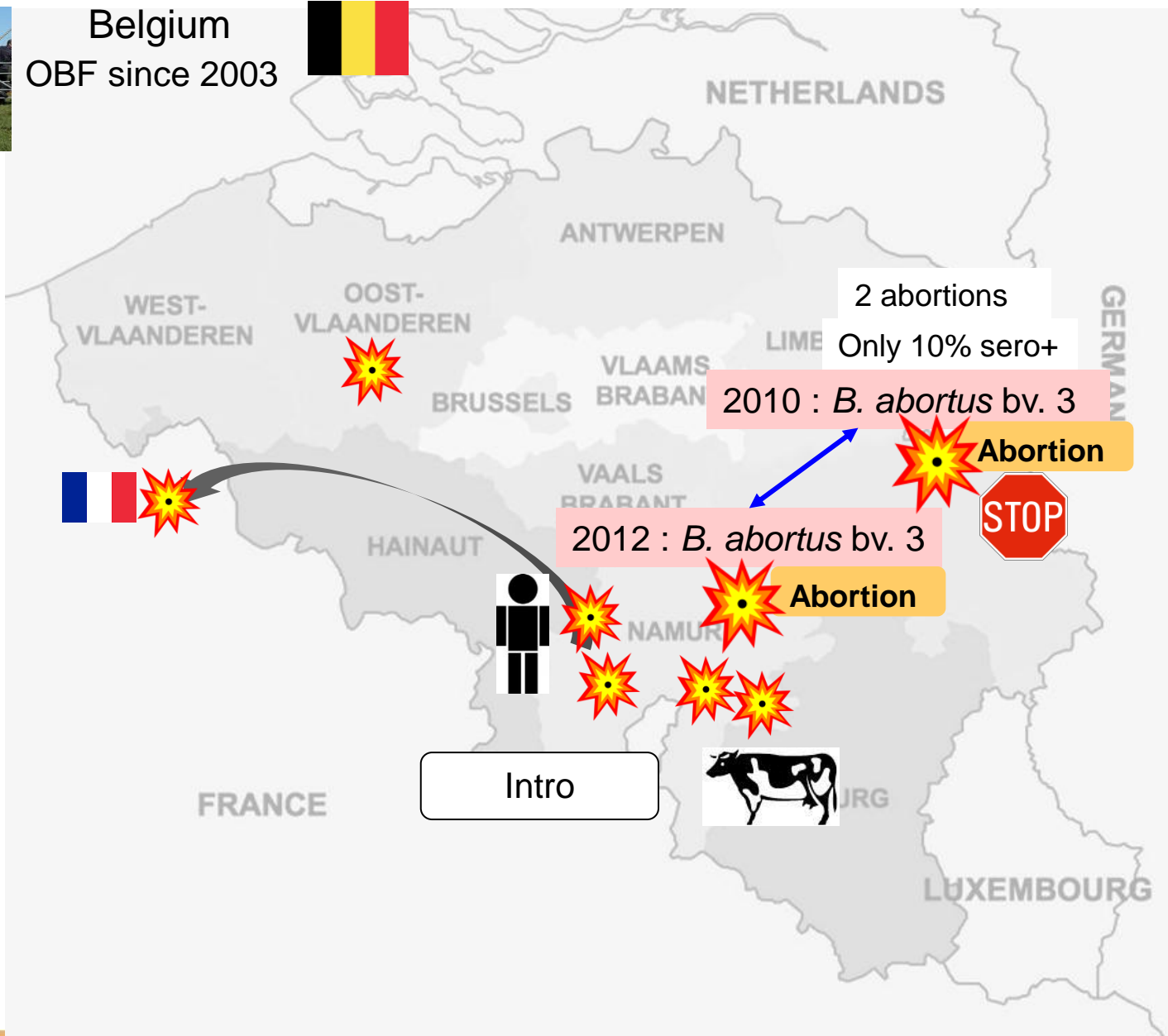
- Threat of reintroduction in free regions/countries
- Surveillance is required...both clinical and serological



Bovine brucellosis in EU...surveillance is required



Belgium
OBF since 2003



Bovine brucellosis in EU...surveillance is required

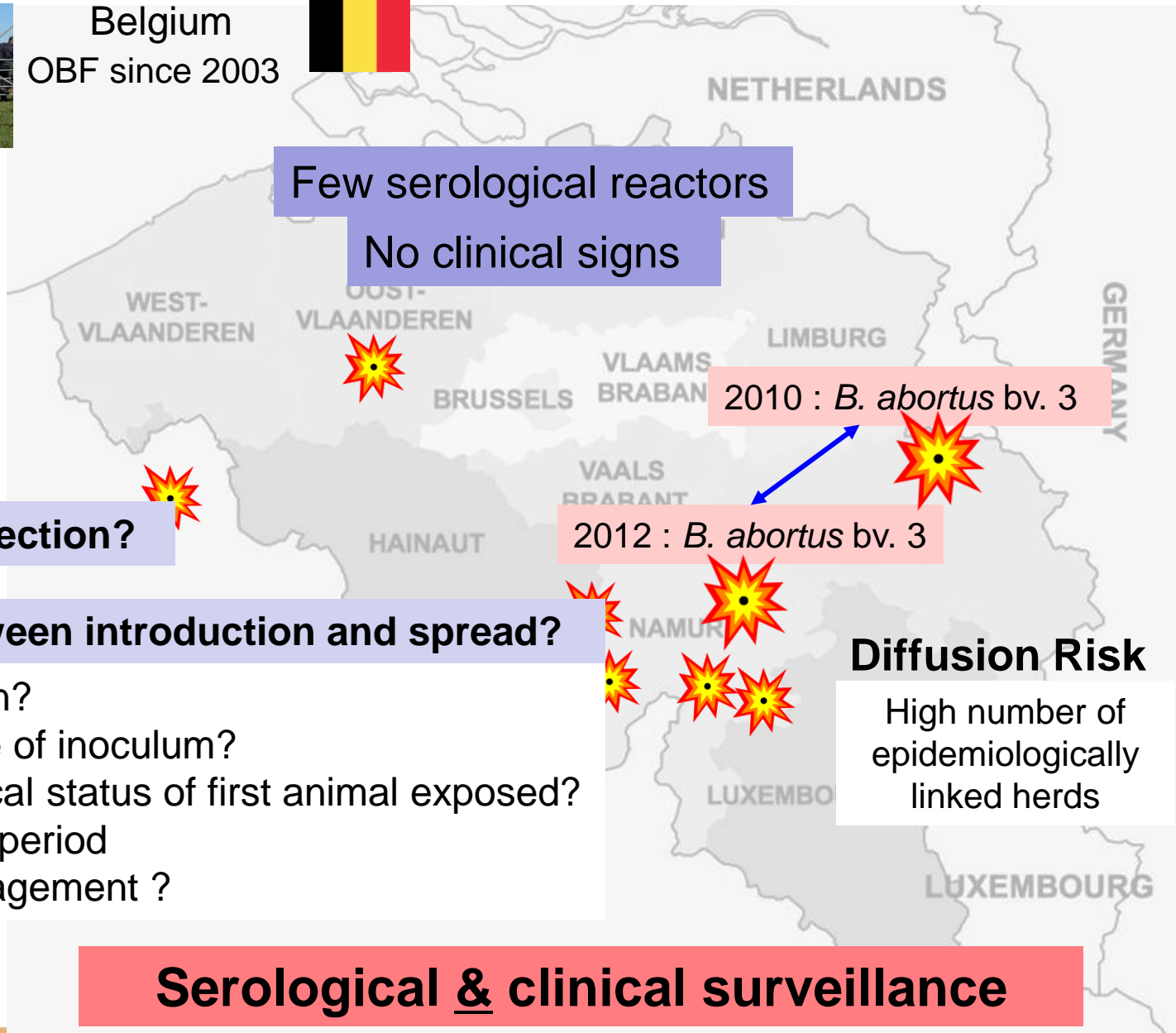


Belgium
OBF since 2003



Few serological reactors

No clinical signs



Early detection?

Gap between introduction and spread?

- Introduction?
- Importance of inoculum?
- Physiological status of first animal exposed?
- Incubation period
- Farm management ?

Serological & clinical surveillance

Diffusion Risk

High number of epidemiologically linked herds

Ovine and caprine brucellosis in EU (status) - 2013

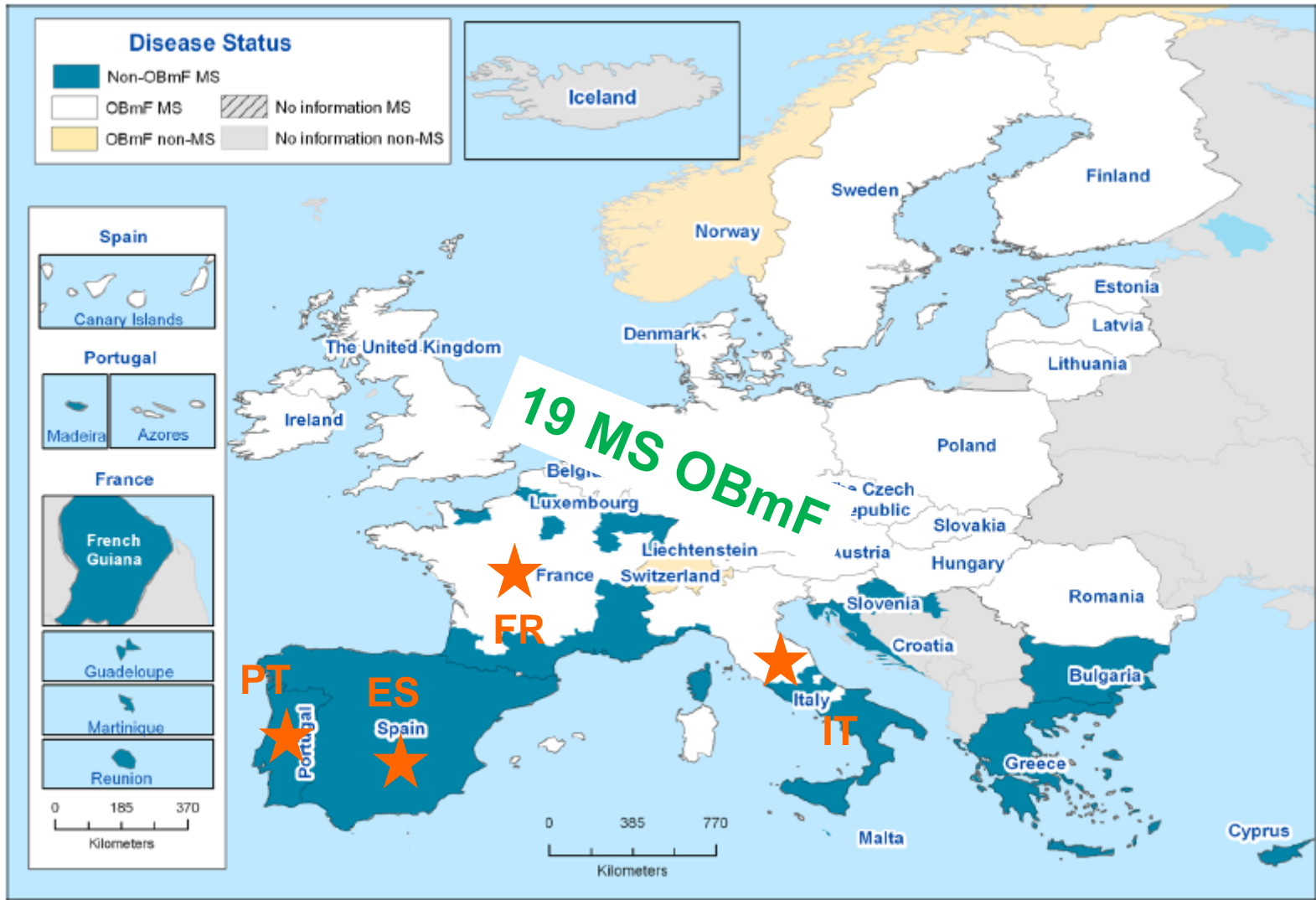


Figure 25. Status of countries regarding ovine and caprine brucellosis, 2013

Ovine and caprine brucellosis in EU (positive cattle herds > 0.1%) - 2013



○ EU Co-financed eradication programme onwards 2013

Caprine & Ovine brucellosis in EU

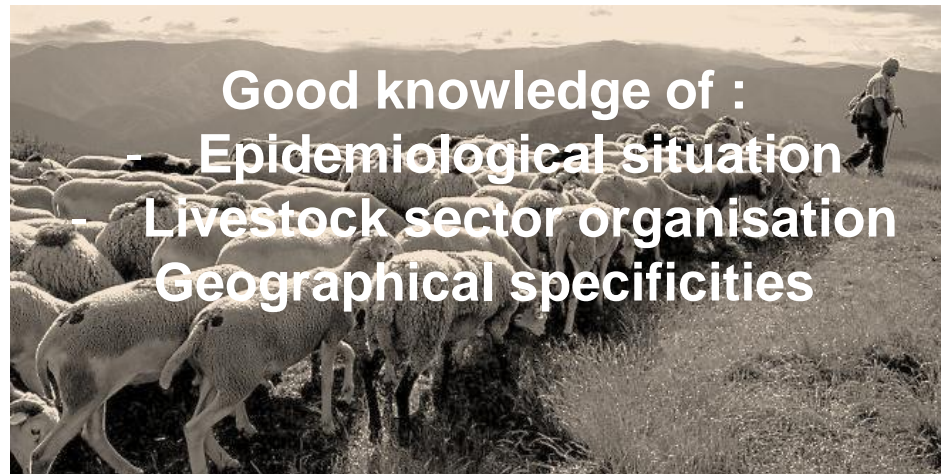
Control in progress

Still some pockets with high level of infection

- **Risk practices**

Farm management : males lending, shared pastures, transhumance,...

- **Unadapted measures/resources ?**



Implementation of the control programme

Disease controlled in ruminants...and wildlife?

- Up to recently no wild reservoir identified in EU for abortus & melitensis
- Few sporadic contaminations in wild ruminants



Dead-end hosts

Godfroid *et al.* 2013; Munoz *et al.* 2010; Ferroglio *et al.* 1998

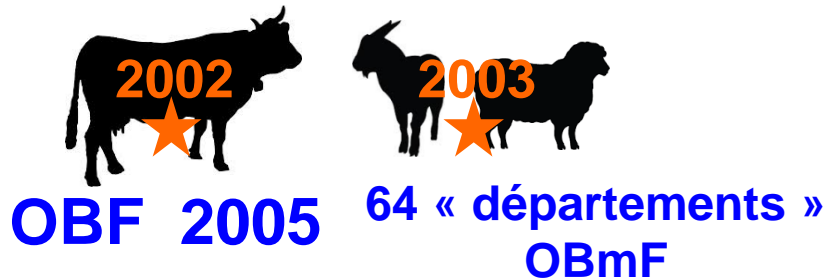
Primary reservoir identified in Alpine Ibex in French Alps

~10 y after eradication of the disease in domestic animals...

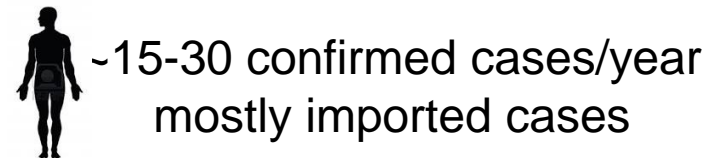


France

Animals



Humans



Exemple of primary reservoir in wildlife

French Alps, France

2012-...

2012  **1 human case**
without risk factor



Bovine brucellosis outbreak
B. melitensis biovar 3

Fresh raw cheese consumption

Extensive survey in domestic Protected species

Transmission **from wildlife** to domestic animals

Ibex = Réservoir

Hunted species

Red deer Roe deer Chamois

All negative

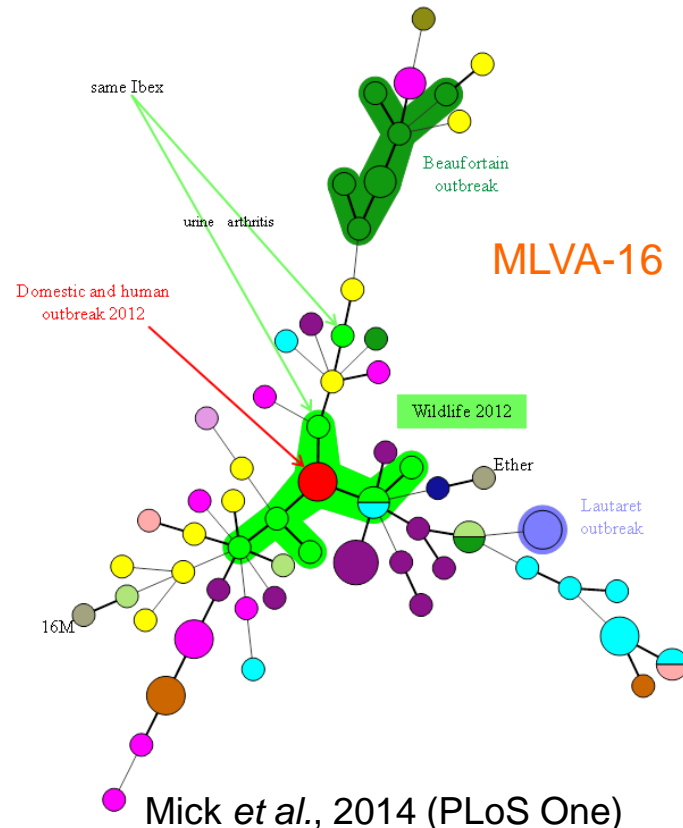
2 +

n=56

n=65

n=154

- Domestic and human outbreak 2012
- Wildlife 2012
- Beaufortain outbreak (1996-2001)
- Lautaret outbreak (1982-1993)
- Dpt. 04
- Dpt. 05
- Dpt. 06
- Dpt. 26
- Dpt. 38
- Dpt. 69
- Dpt. 73
- Dpt. 74
- Italy
- Switzerland
- Reference strains




Mick et al., 2014 (PLoS One)



Garin-Bastuji et al., 2014 (EID)

Alpine ibex (*Capra ibex*)

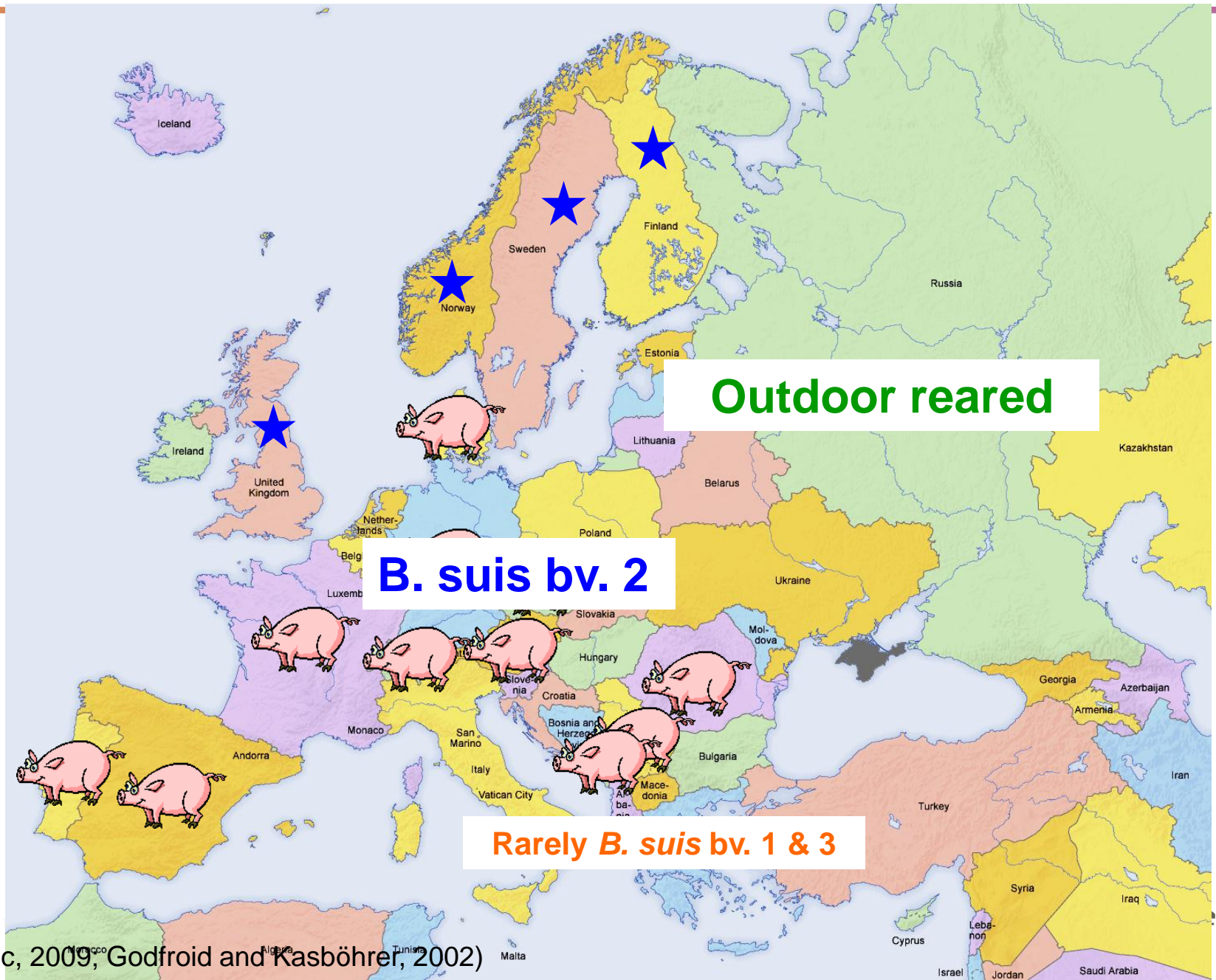


Clinical signs ?

n=77

High prevalence (38%)

Swine brucellosis in EU



Outdoor reared

B. suis bv. 2

Rarely *B. suis* bv. 1 & 3

Swine brucellosis in EU – main features

Mostly *B. suis* biovar 2 in Europe

Domestic pigs



Spill over

Reservoir

Wildlife



Variable prevalence in many EU countries

Seroprevalence up to 50%

Low pathogenicity in humans?



Porcine EU regulation: trade living animals, semen, embryos

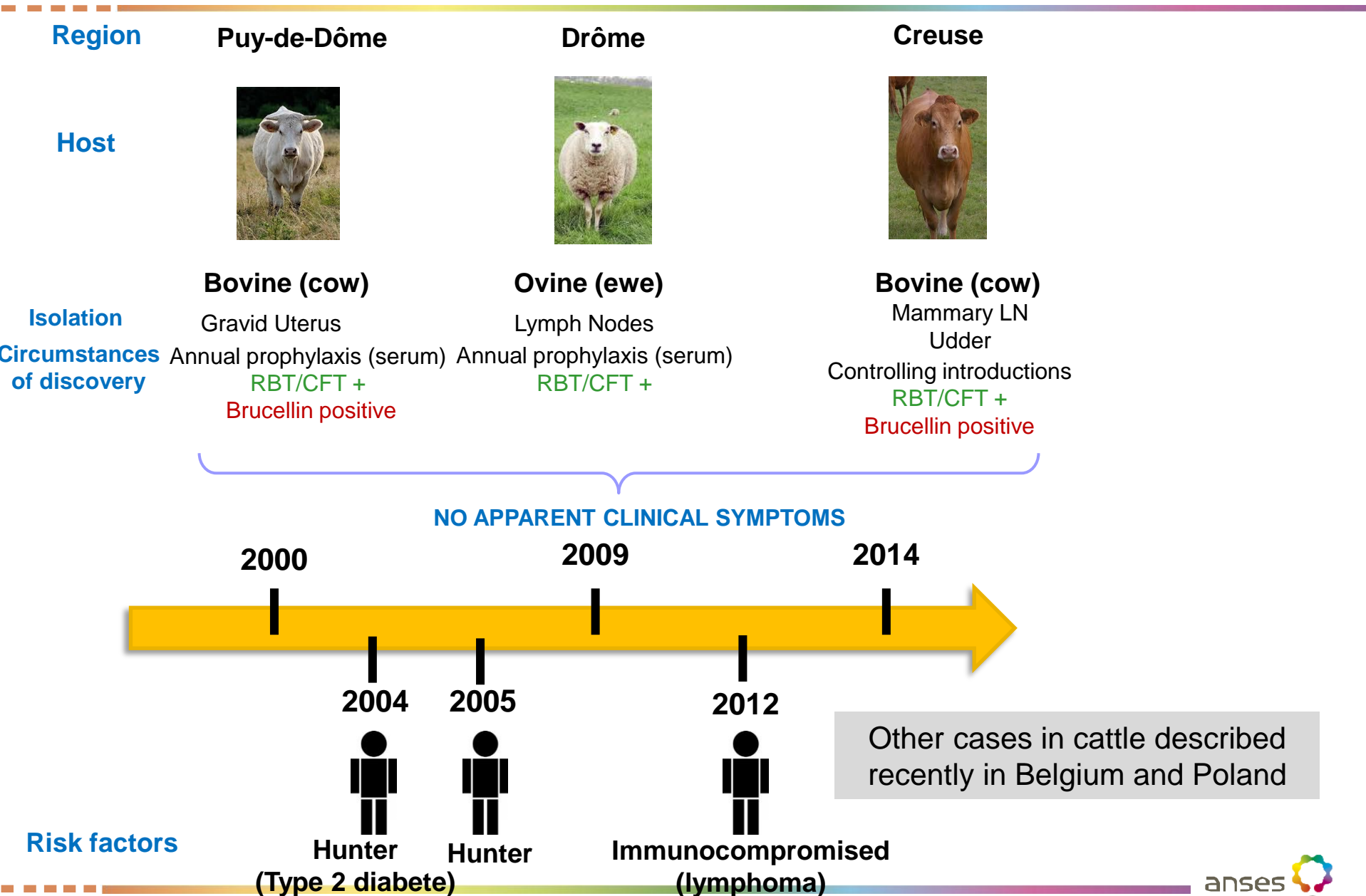


No mandatory surveillance...
No harmonized basis monitoring

Issues

- Clinical diagnosis?
- Serological diagnosis :
 - FPSR ≠ Infected
 - Rate of positive reactors?
- Control policy? Slaughter ?

Brucella suis biovar 2 infection in atypical hosts in France

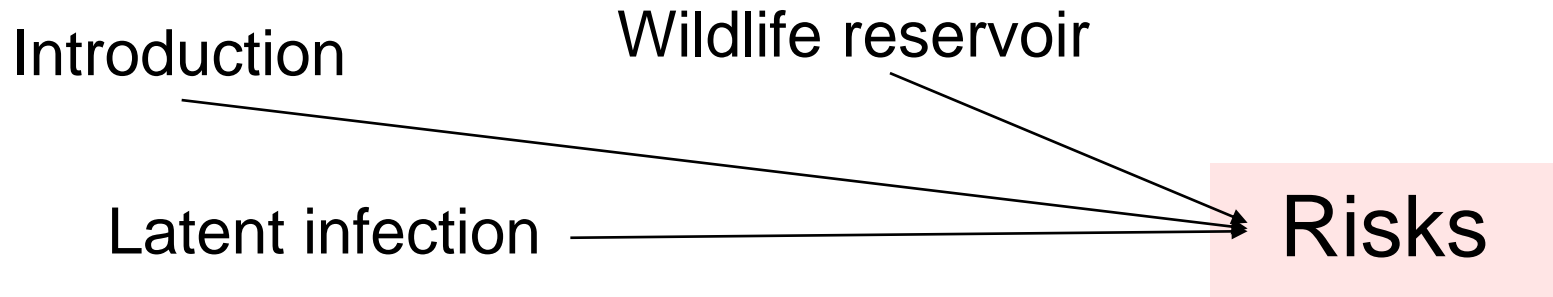


Risk factors

Conclusion

Huge improvement of the situation, but...

Close of after eradication



- ❖ Maintenance of efficient & reactive surveillance systems
- ❖ Reliable diagnostic tools – adapted strategy (tests associations)

👉 Improvement of the situation / increasing efforts

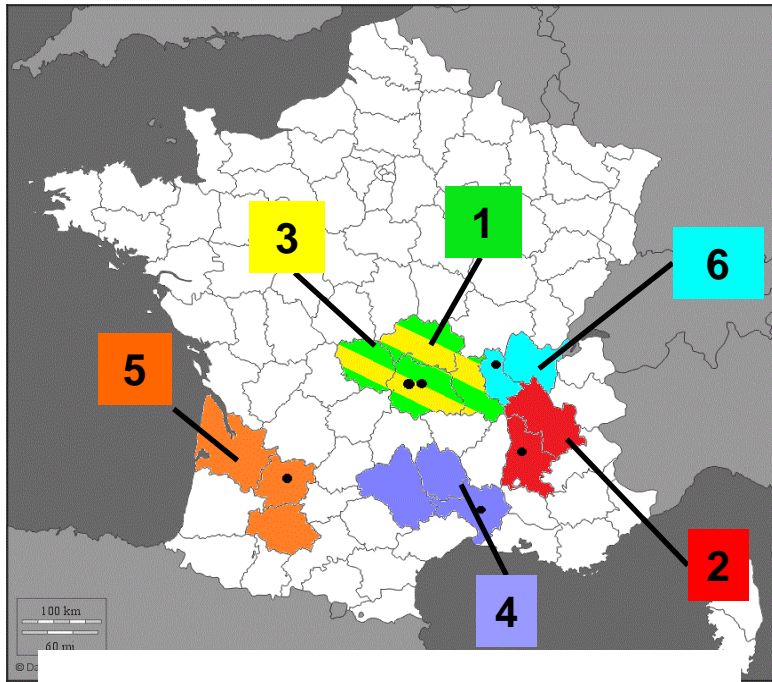
👉 Long-term stakeholders involvement

Thanks for your attention



Grazie per l'attenzione

Brucella suis biovar 2 infection in atypical hosts in France



Location of strains studied in France

Wildlife reservoir: population ↑

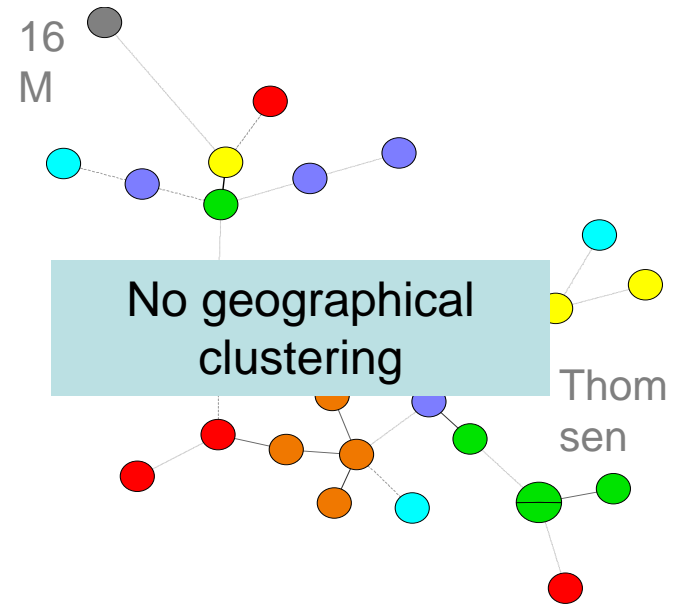


Fig. 3: MST of MLVA-16 genotypes of the atypical strains

Underestimated infection in atypical hosts?