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WOAH Reference Laboratory
for Brucellosis



Trends in spread, diagnostic approaches, control, and prevention measures.

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Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise**

Joint online seminar for veterinary authorities of the EAEU member-states on the topic " WOAH standards and recommendations on brucellosis: trends in spread, diagnostic approaches, control and prevention measures." 27 March 2026, 10:00 Moscow time

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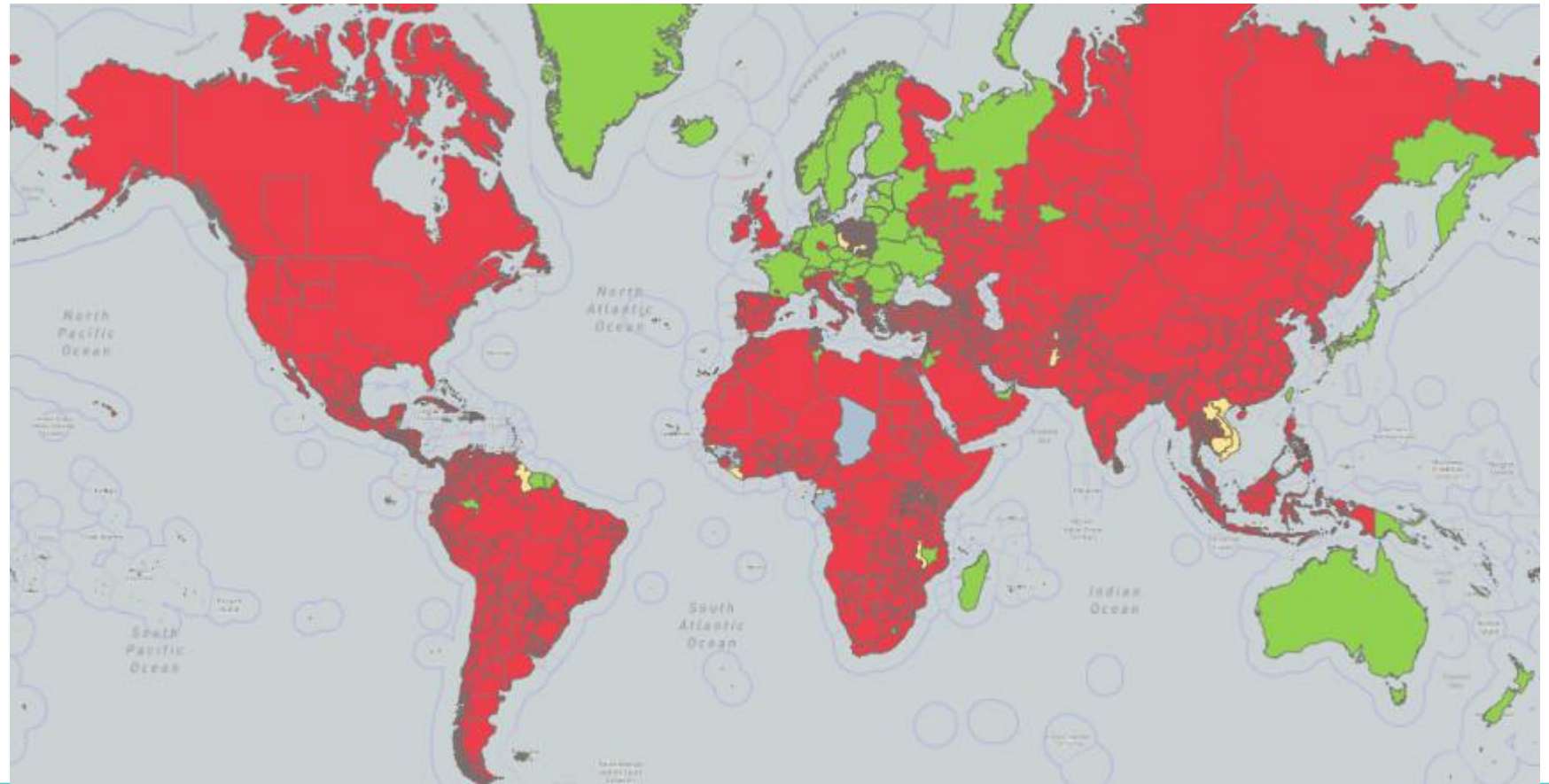


World Organisation
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Brucellosis Epidemiology

World Geographical distribution: *B. abortus*

Country having reported *B. abortus* to the OIE at least once since 2005

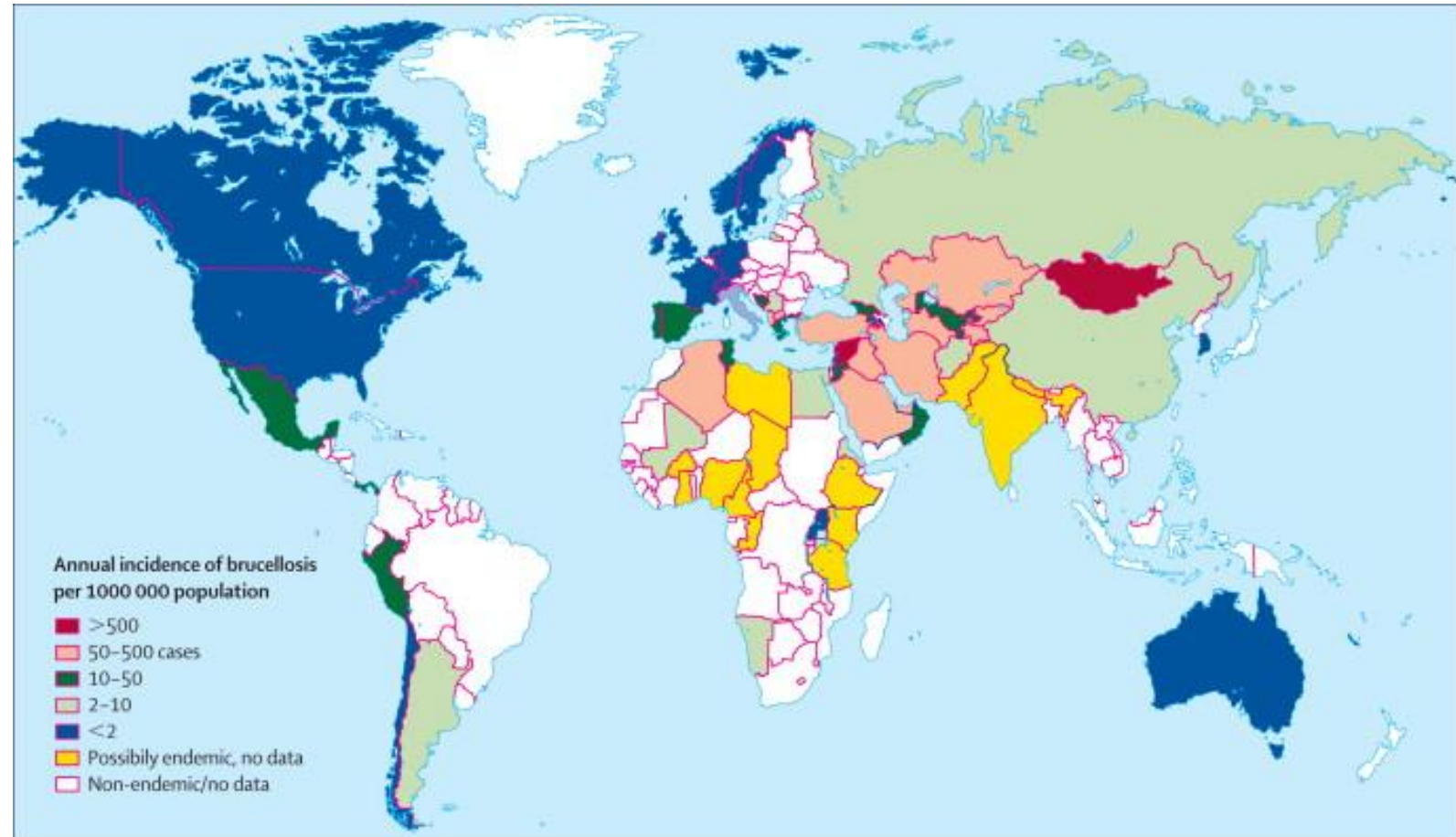


World Geographical distribution: *B. melitensis*

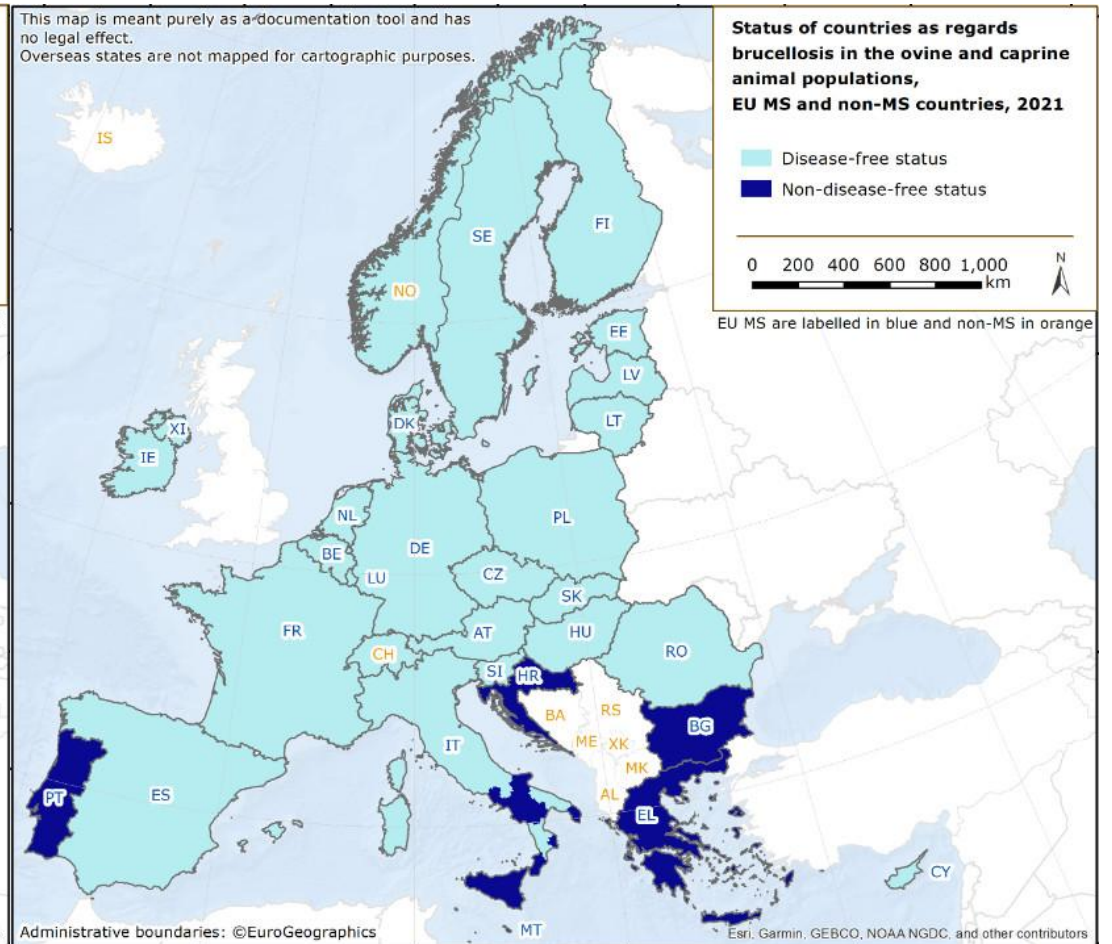
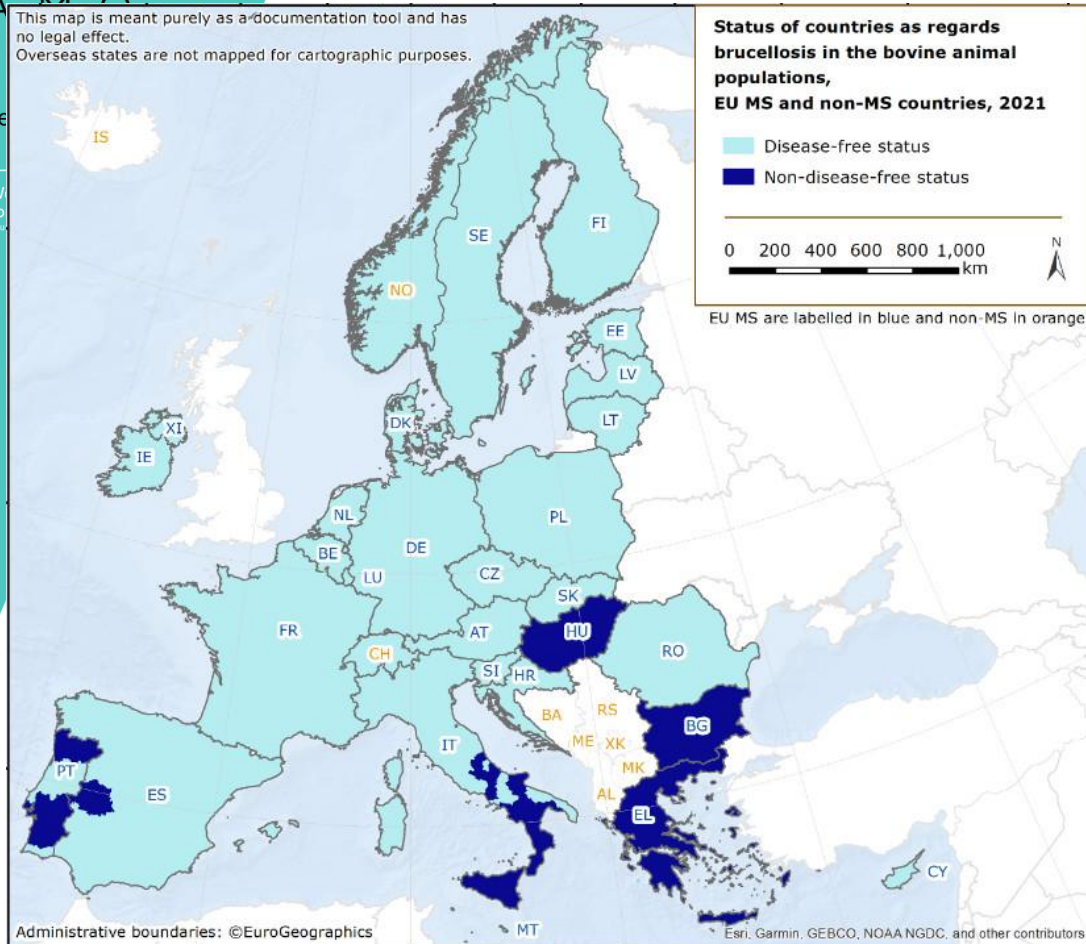
Country having reported *B. melitensis* to the OIE at least once since 2005



World Geographical distribution : Human Brucellosis



Animal Brucellosis in EU



Source: EFSA and ECDC (European Food Safety Authority and European Centre for Disease Prevention and Control), 2022.

The European Union One Health 2021 Zoonoses Report.

EFSA Journal 2022;20(12):7666. <https://doi.org/10.2903/j.efsa.2022.7666>

Human Brucellosis in EU

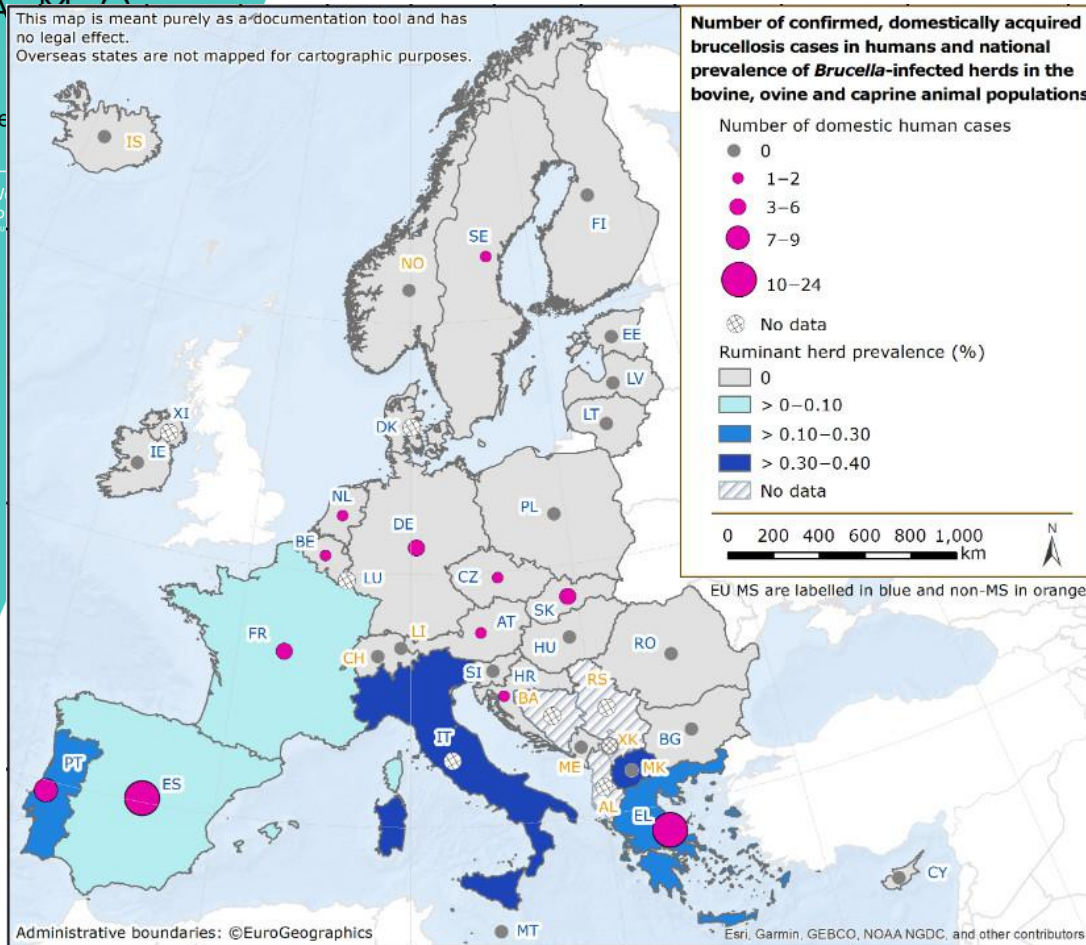


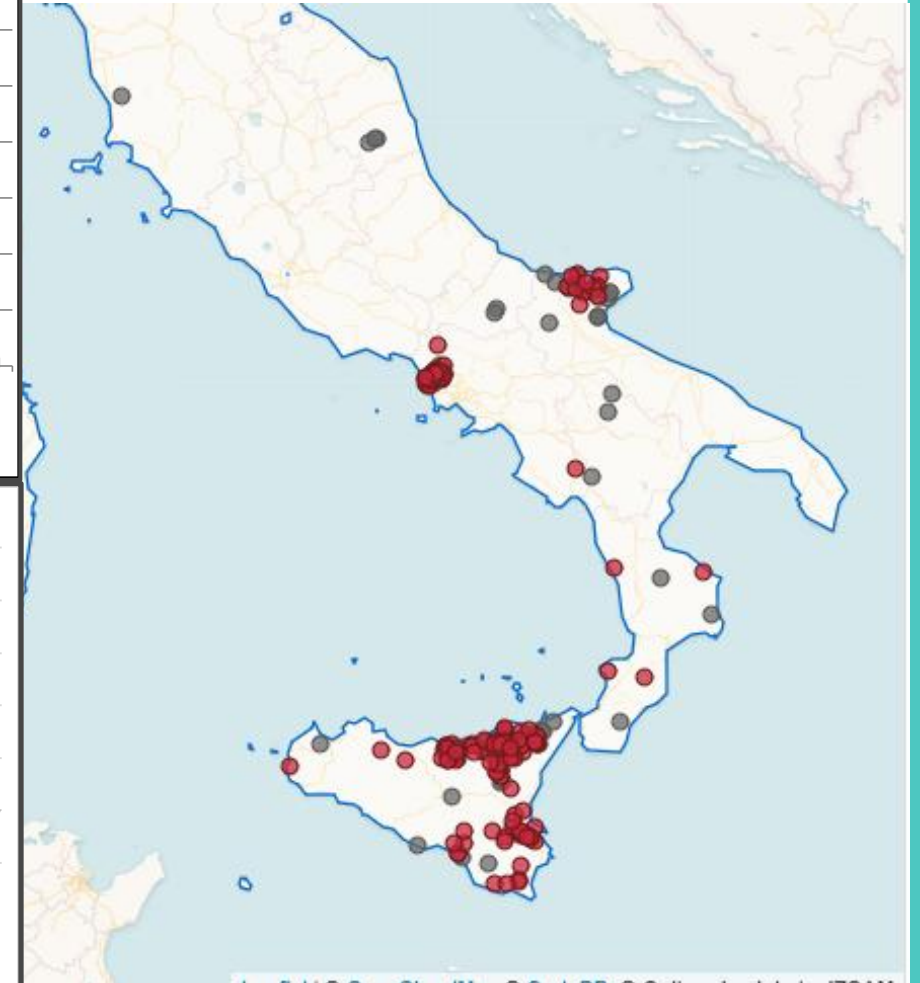
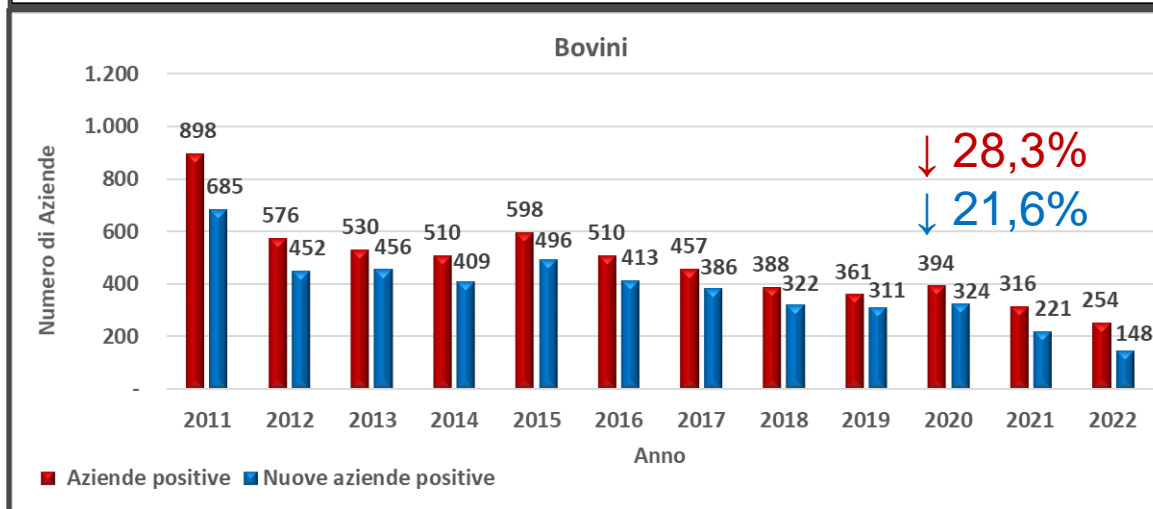
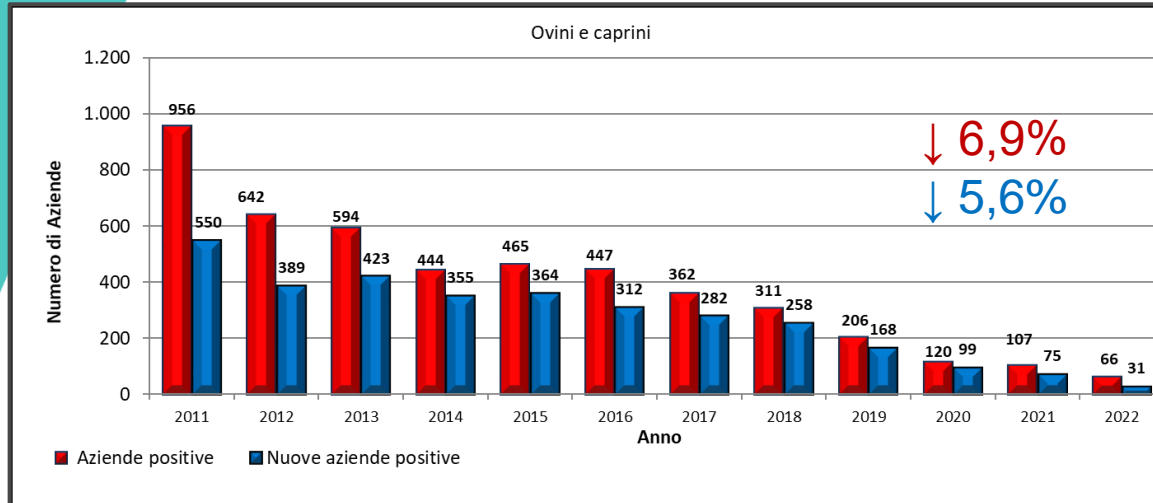
Table 47: Summary of *Brucella* statistics related to humans, major food categories and main animal species (stratified by disease-free status^(a) and non-disease-free status zones), EU, 2017–2021

	2021 ^(b)	2020	2019 ^(c)	2018 ^(c)	2017 ^(c)	Data source
Humans						
Total number of confirmed cases	162	132	309	332	378	ECDC
Total number of confirmed cases/100,000 population (notification rates)	0.03	0.03	0.06	0.08	0.09	ECDC
Number of reporting MSs	26	26	27	26	26	ECDC
Infection acquired in the EU	76	68	126	133	148	ECDC
Infection acquired outside the EU	21	14	50	51	46	ECDC
Unknown travel status or unknown country of infection	65	50	133	148	184	ECDC
Number of outbreak-related cases	2	2	2	0	2	EFSA
Total number of outbreaks	1	1	1	0	1	EFSA
Food						
Milk and milk products						
Number of sampling units	320	275	586	1,005	1,338	EFSA
Number of reporting MSs	3	3	2	3	3	EFSA

Source: EFSA and ECDC (European Food Safety Authority and European Centre for Disease Prevention and Control), 2022. The European Union One Health 2021 Zoonoses Report.

EFSA Journal 2022;20(12):7666. <https://doi.org/10.2903/j.efsa.2022.7666>

Animal Brucellosis in Italy



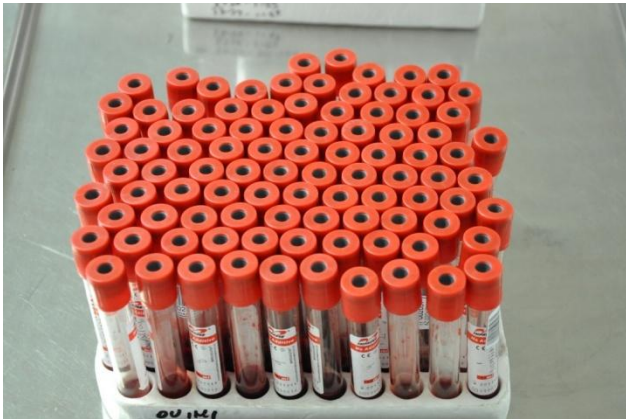
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Brucellosis Diagnosis



Diagnostic Tests Available

Direct Diagnosis:
(Isolation and Identification of the Agent)

Culturing and Molecular *are the preferred test methods*

Indirect Diagnosis:
(Detection of the antibody response of the host against the Agent)

Serological assays *are the preferred test methods*



Serum

- Rose bengal Test (RBT)
- Complement Fixation Test (CFT)
- Serum Agglutination test (SAT)
- Indirect ELISA (I-ELISA)
- Competitive ELISA (C-ELISA)
- Fluorescence Polarization Assay (FPA)

Indirect Diagnosis

Milk

- Indirect ELISA (I-ELISA)
- Milk Ring Test (MRT)



Live Animals

- Brucellin Skin Test (BST)



Table 1. Test methods available for the diagnosis of infection with *Brucella abortus*, *melitensis* or *suis*

Method	Purpose					
	Population freedom from infection	Individual animal freedom from infection ^a	Contribute to eradication policies ^b	Confirmation of suspect or clinical cases ^c	Herd/flock prevalence of infection – surveillance	Immune status in individual animals or populations post-vaccination
Agent identification						
Staining methods	–	–	–	+	–	n/a
Culture	–	–	–	+++	–	n/a
PCR^d	–	–	–	+ / +++	–	n/a
Detection of immune response						
BBAT (RBT or BPAT)	+++	++	+++	+	+++	n/a
FPA	++	++	+	++	++	n/a
CFT	++	++	+++	++	+++	n/a
I-ELISA	+++	++	+++	++	+++	n/a
C-ELISA	++	+	+	+	++	n/a
BST	++	–	+	+++	++	n/a
SAT	++	+	+	–	+	n/a
NH and cytosol protein-based tests^e	–	–	+	++	–	n/a
Bulk milk tests^f Milk I-ELISA or Milk ring-test	+++	–	+++	+	+++	n/a

Serological Tests for Brucellosis

- No single serological test is appropriate in all epidemiological situations and all animal species
- all tests have limitations especially when testing individual animals
- Consideration should be given to all factors that impact on the relevance of the test method and test results to a specific diagnostic interpretation or application.

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Brucellosis Control Strategies

Strategic objective

- The choice of one of the possible general **strategies** against a disease condition
- In zoonoses:
 - **Prevention** of human infection
 - **Control** of the disease in animal populations
 - **Eradication** of the disease in animal populations

The choice of a strategy

- The choice of a strategy depends on a number of factors:
 - **Epidemiology**
 - Patterns of the disease within animal and human populations
 - **Economy**
 - Available resources
 - **Organization**
 - Organization and skills of veterinary services
 - Animal husbandry practices
 - Infrastructures
 - Social customs

The choice of a strategy

- Whatever the strategy adopted, it is extremely important to implement an effective **surveillance system** to:
 - **Monitor the program**
 - Prevalence and incidence at individual/herd level
 - Incidence of human infection
 - Performance of Veterinary Services
 - **Take corrective actions**
 - **Support decision making**

Brucellosis control strategies

Strategy	Advantages	Disadvantages
Heat treatment of milk (without any action in animal populations)	The lowest cost	Unable to prevent infection in workers at risk
	No need for efficient veterinary services	
	Only basic technology required	Unable to prevent economic losses due to brucellosis in animals
	Prevention of human infection acquired from the milk	
Mass vaccination (young and adult animals)	Lower cost	Rev1 is a pathogen for humans : -vaccine induced abortions (public health risk) -excretion of vaccine strain in the milk (public health risk)
	Easy to manage	Economic losses (vaccine induced abortions)
	Herd immunity quickly established	Need for annual vaccination campaigns Serological test not able to differentiate infected/vaccinated -need for a long transition period before starting any animal testing -impossibility to monitor the dynamics of infection occurrence

Vaccination of young animals

Strategy	Advantages	Disadvantages
Vaccination of young animals	Abortions minimized	Herd immunity slowly established
	Lower cost	Need for efficient veterinary services : -no testing (vaccination has to occur before pregnancy) -multiple access of the veterinary services to the flocks, longer window than the previous strategy to vaccinate animals
	No need for technological infrastructure	
Vaccination of young animals and elimination of the infected	Abortions minimized	Herd immunity slowly established
	The herd immunity reduces the incidence of infection and the costs for the elimination of reactors	Need for a very efficient veterinary services : -need to differentiate vaccinated/infected animals: access has to occur before puberty
	Serological test are able to differentiate infected/vaccinated	
	Need for a basic technological infrastructure (laboratory support)	-frequent access of the veterinary services to the flocks are needed, short window to vaccinate young animals

Elimination of infected animals

Strategy	Advantages	Disadvantages
Elimination of Infected animals: control of infection by test and slaughter of reactors	Elimination of the sources of infection for other animals and for humans	High cost in short and long term: usually it is an intermediate phase leading to eradication
		Need for efficient veterinary services : -movement control
		Need for advanced technological infrastructure : -individual animal identification -laboratory support
Elimination of Infected animals: eradication of infection	Elimination of the sources of infection for other animals and for humans	The highest cost for short term, possible long term economic advantages
		Need for efficient veterinary services : -movement control -epidemiological investigation capabilities
		Need for advanced technological infrastructure : -individual animal identification -laboratory support -epidemiological support tools and facilities

Evolution of control programs

- When a **significant reduction in flock prevalence** has been achieved, the control program should be reviewed
 - and **alternative strategies** may be considered

- **A central co-ordination structure** is needed to co-ordinate the vaccination campaigns and of follow-up activities, the surveillance, the evaluation of data and the re-planning of the program

- **A long-term planning is always necessary** to decide the phases of brucellosis control and the transition between phases.
 - The management of such a long-term control campaign usually needs the improvement of the veterinary information and reporting systems

Main Requirements for Brucellosis Control

- **Long-term commitment** from all parties
- Application of **appropriate policies and control strategies**
- Reliable and science-based **data and information**
- **Estimation** of the real prevalence and incidence both in humans and animals

Main Constraints in Brucellosis Control

- **Weak veterinary capacity** (laboratory, epidemiology)
- Absence (or non adapted) **legal framework** for brucellosis control
- Lack of accurate and **reliable information** on the disease (both in humans and animals)
- **Control strategies** not well defined and programmes **not monitored** for progress
- Uncontrolled cross border and internal **movement** of animals
- Lack of **intersectorial collaboration**

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