

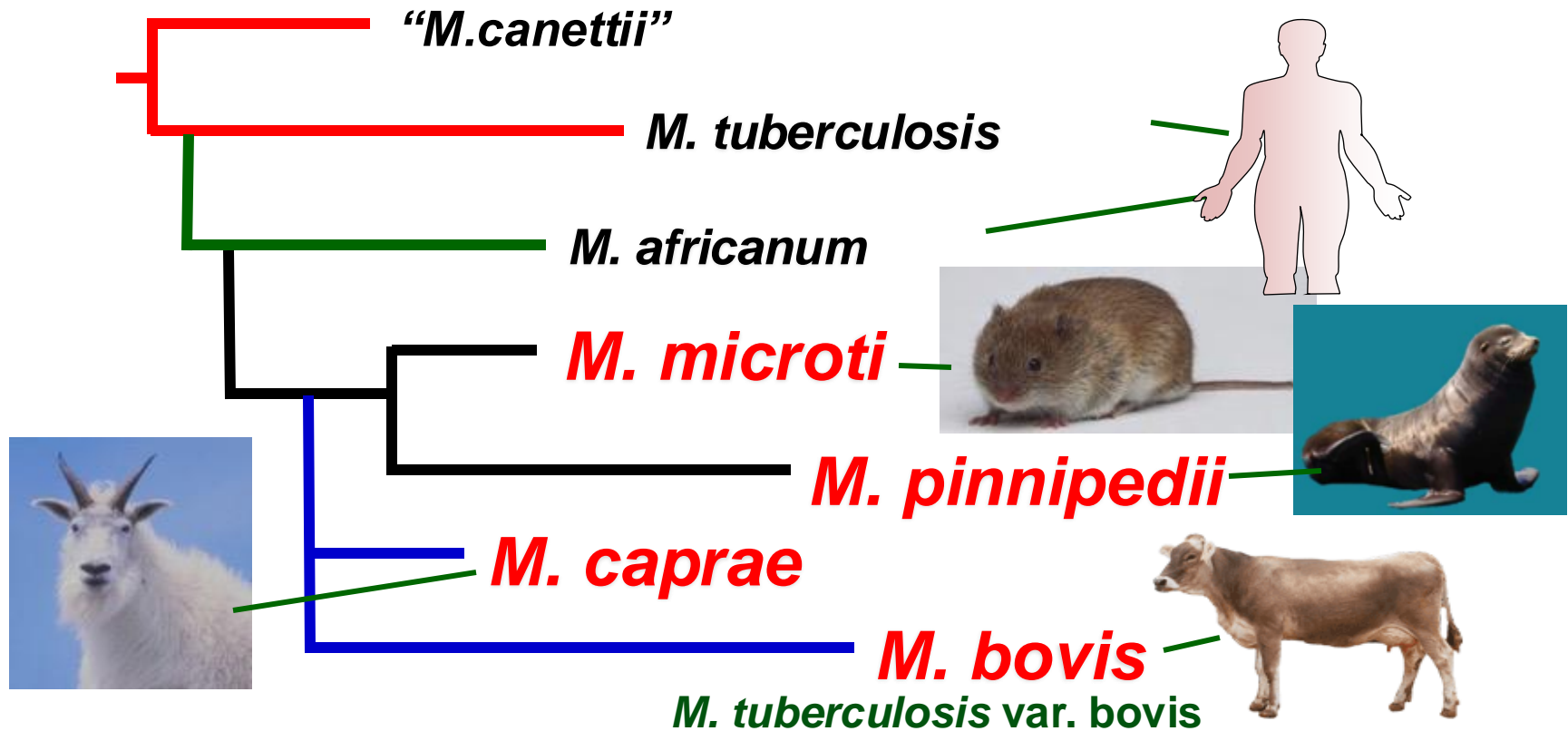
# **Disease epidemiology and regional situation of bovine tuberculosis in the context of zoonotic tuberculosis**

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# *Mycobacterium tuberculosis* complex

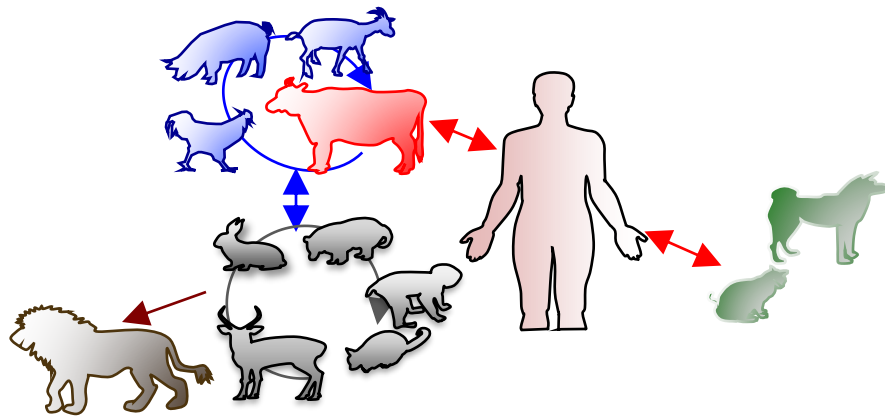
- Closely related species
  - House keeping genes: almost identical
- Causative agents of tuberculosis in mammals



# Maintenance host and Spill over host

## Maintenance host

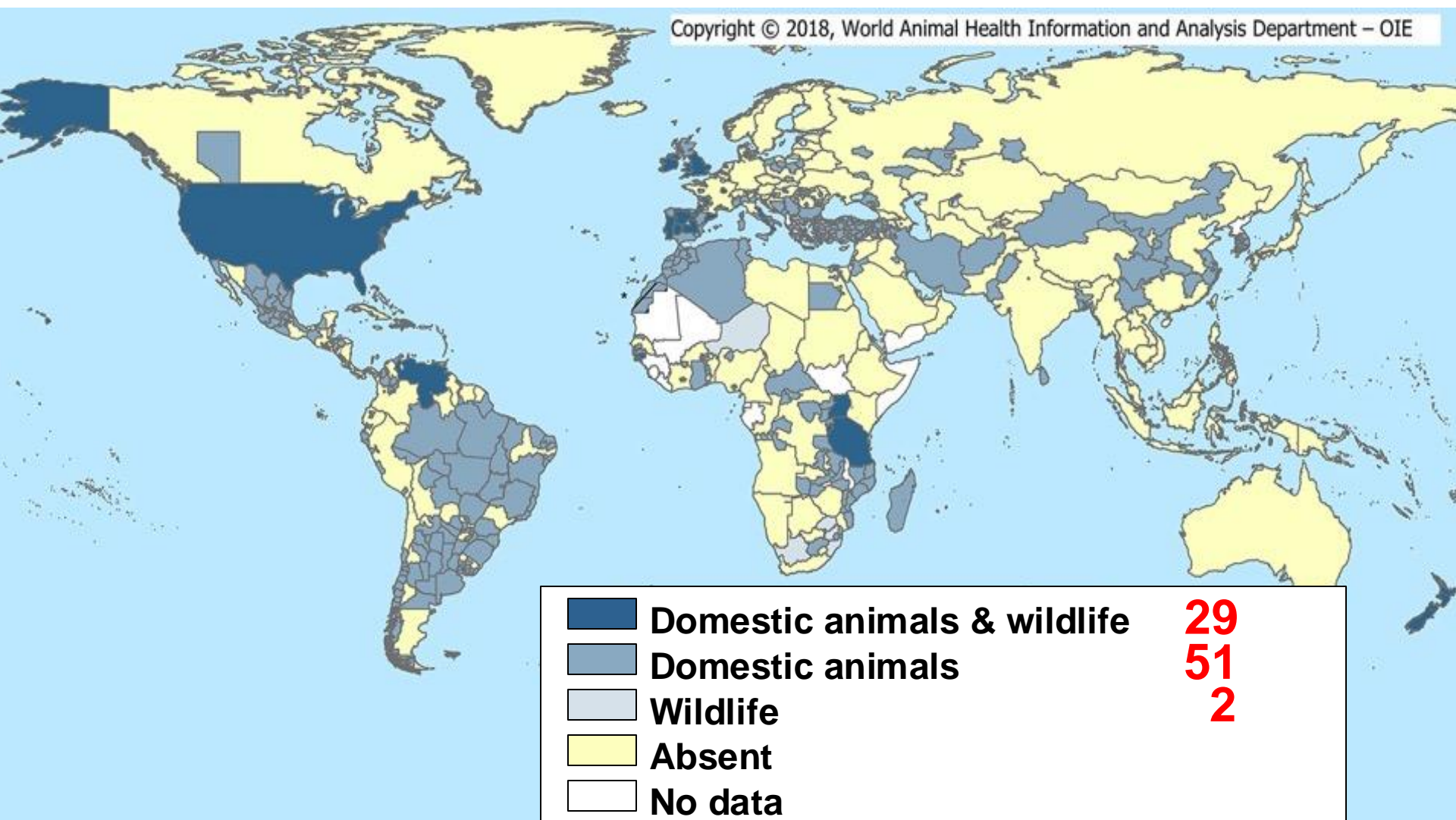
Animal species	Transmission route
Cow	Respiratory
Goat	Respiratory
African buffalo	Respiratory
Bison	Respiratory
Badger	Respiratory
Brush-tail Possum	Respiratory
Deer	Respiratory
Feral Pig	Oral
Ferret	Oral



## Spill over host

Animal species	Transmission route
Human	Oral/Respiratory
Baboon	Oral/Respiratory
Black Bear	Oral
Bobcat	Oral
Cheetah	Oral/Respiratory
Leopard	Oral/Respiratory
Lion	Oral/Respiratory
Coyote	Oral
Deer	Oral/Respiratory
White-tailed Deer	Oral
Feral Pig	Oral
Warthog	Oral/Respiratory
Ferret	Oral
Greater Kudu	Scarification/Oral
Raccoon	Oral
Red Fox	Oral
Cat (Pet animal)	Oral/Respiratory
Dog (Pet animal)	Oral/Respiratory

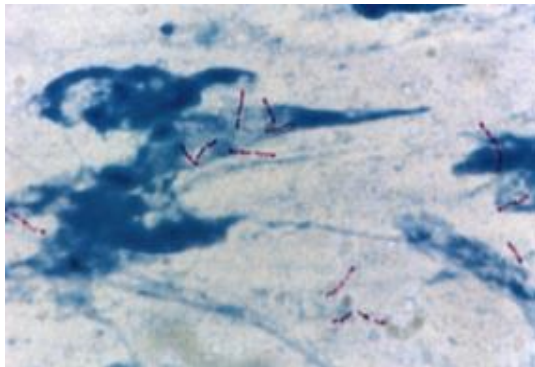
# Reports on animal TB



# Diagnosis by detecting agents

	Population freedom from infection	Individual animal freedom from infection prior to movement	Contribute to eradication policies	Confirmation of clinical cases	Prevalence of infection – surveillance
Acid-fast staining and microscopy	-	-	-	+	-
Bacterial isolation	++	-	++	+++	++
Histopathology and antigen detection	+	-	+	+	-
Real-time PCR (direct from specimens)	++	-	++	+++	++

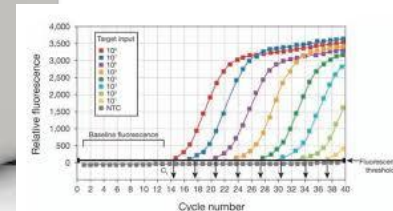
+++ : recommended, ++ : recommended but has limitations, + : suitable in very limited circumstances, - : not appropriate



**ZN staining**



**TB culture**



**Real-time PCR**



# Diagnosis by detecting immune responses

	Population freedom from infection	Individual animal freedom from infection prior to	Contribute to eradication policies	Confirmation of clinical cases	Prevalence of infection – surveillance
Delayed hypersensitivity skin test	+++	+++	+++	++	+++
Interferon gamma release assay	++	++	+++	+	+++
ELISA antibody test	+	+	+	-	+
Lateral flow antibody test	+	+	+	-	+

+++ : recommended, ++ : recommended but has limitations, + : suitable in very limited circumstances, - : not appropriate



**Tuberculin skin test**



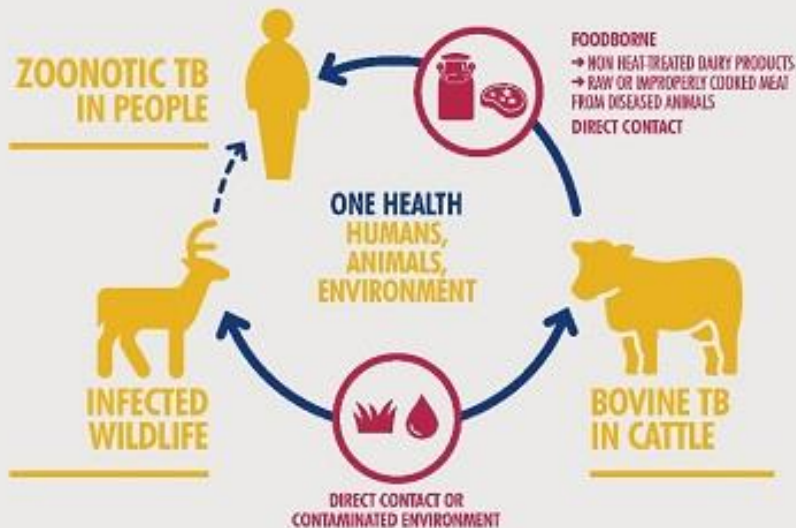
**BOVIGAM™ 2G TB Kit**



**DPP Assay**

# Impacts of zoonotic TB

## BREAKING THE CHAIN OF TRANSMISSION STOPPING ZOOONOTIC AND BOVINE TUBERCULOSIS IN THEIR TRACKS



**ACT NOW** TO SAVE LIVES AND SECURE LIVELIHOODS

## ZOOONOTIC TUBERCULOSIS IS A MAJOR PUBLIC HEALTH THREAT

In 2019

**140,000**

NEW CASES



**11,400**

DEATHS  
IN PEOPLE



POOR  
HEALTH  
AND  
WELFARE



REDUCED  
ECONOMIC  
PRODUCTIVITY  
OF LIVESTOCK

**ACT NOW** TO SAVE LIVES AND SECURE LIVELIHOODS

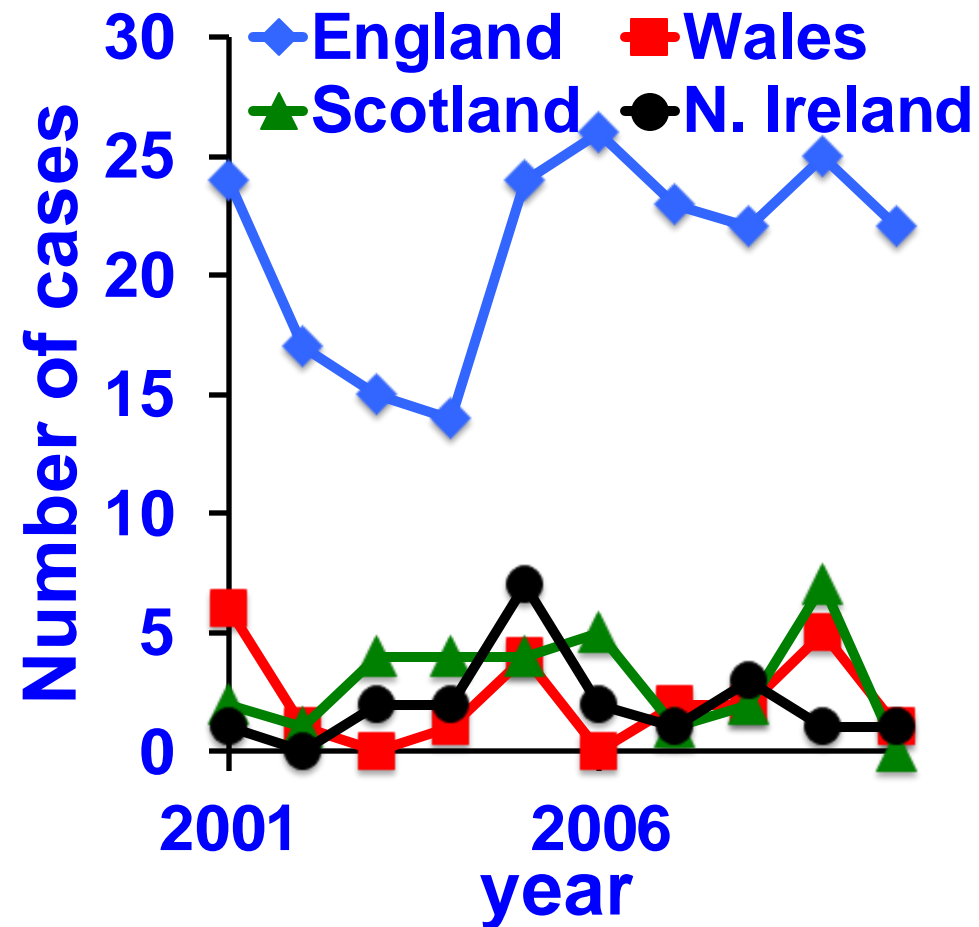
# Animal and zoonotic tuberculosis In United Kingdom

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## Animal TB



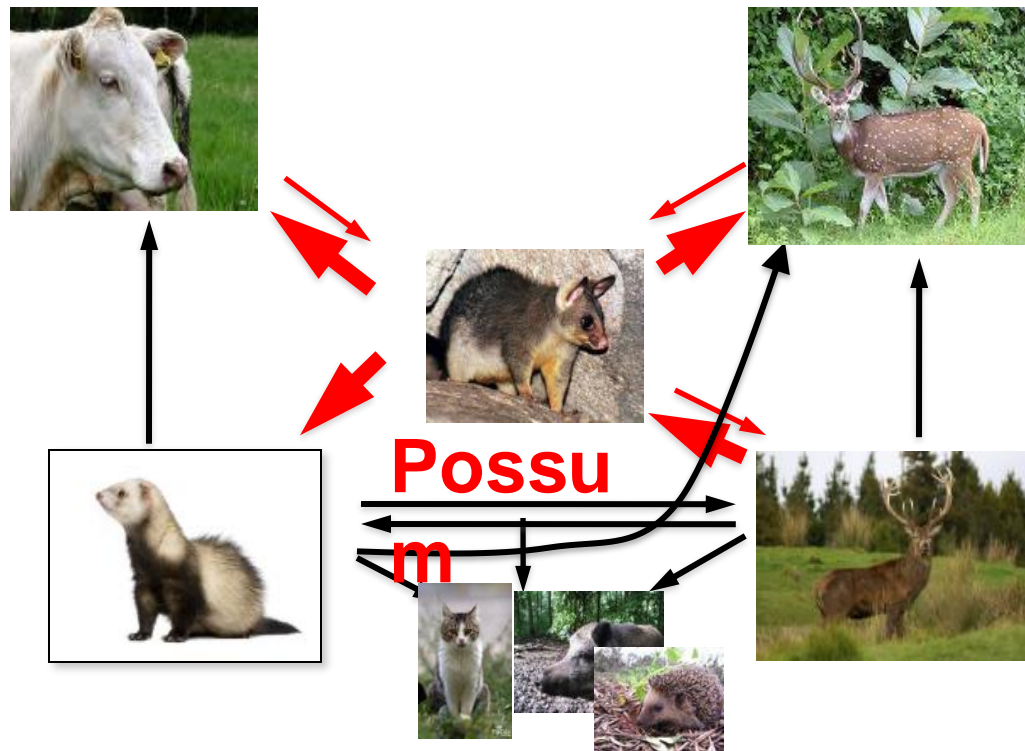
## Zoonotic TB



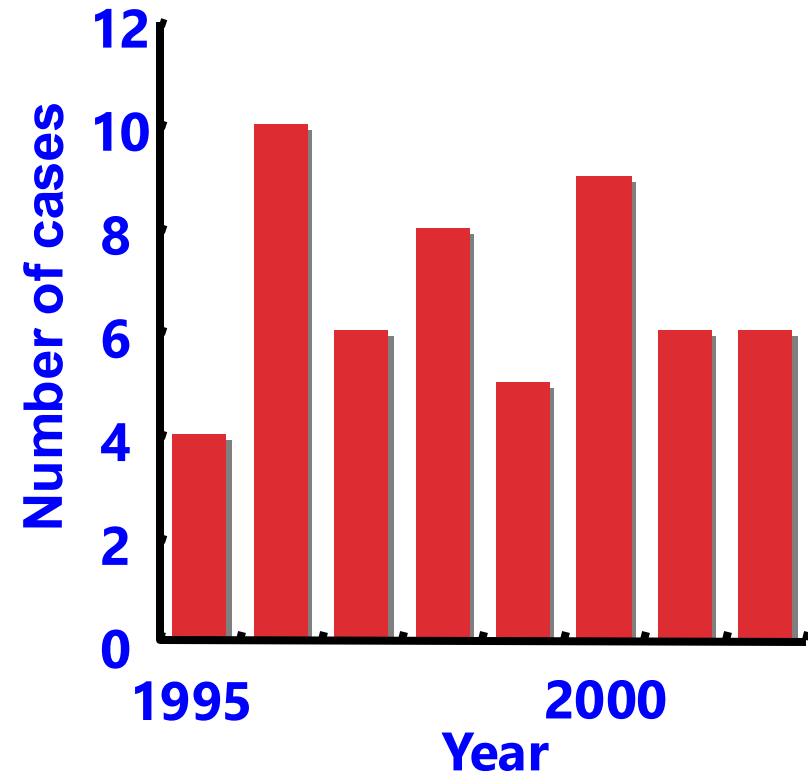


# Animal and zoonotic tuberculosis in New Zealand

## Animal TB



## Zoonotic TB

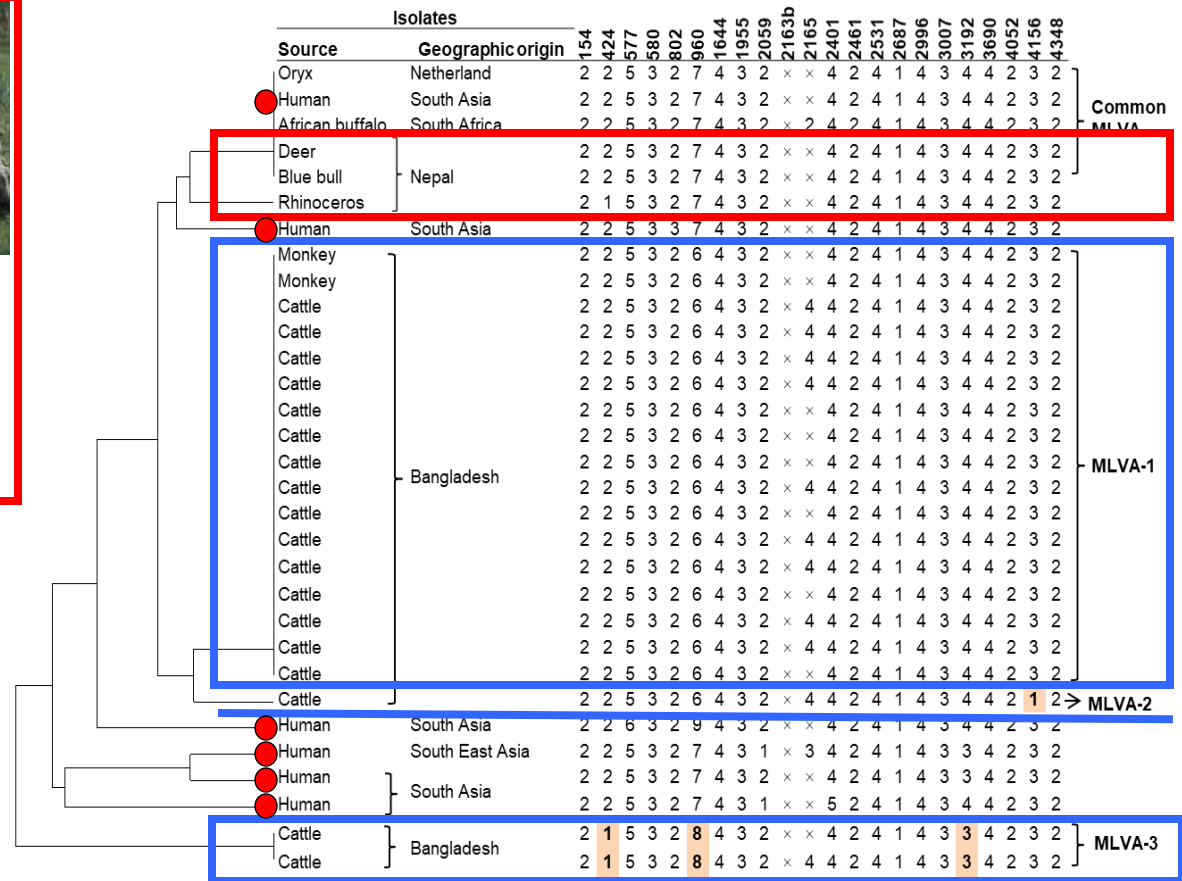




# Nepal



# Bangladesh



 Nepal/animal  Bangladesh/animal  Human

- **M. orygis is causing zoonotic tuberculosis in South and South East Asia**

# Systematic review of bovine and zoonotic tuberculosis in the Western Pacific and the Southeast Asia regions of the World Health Organization

Country	WHO region	Bovine	Bovine and Wildlife	Bovine, Ovine and Wildlife	Bovine, Swine and Wildlife	Camel	Canine	Caprine	Feline	Humans	Humans and Bovine	Humans and Wildlife	Humans, Canine and wildlife	Swine	Wildlife	Total
Australia	WP	3						1		8		1			5	18
Bangladesh	SEA	5	1													6
China	WP	8								1	1				2	12
Fiji	WP	1														1
India	SEA	15				1				5	1				3	25
Japan	WP	1								1			1			3
Lao PDR	WP	1														1
Malaysia	WP									1					1	2
Nepal	SEA	3													2	5
New Zealand	WP	2	1				1		1	2					16	23
Republic of Korea	WP	4	1	1	1									1	3	11
Sri Lanka	SEA	1														1
Thailand	SEA	3													2	5
Total		47	3	1	1	1	1	1	1	18	2	1	1	1	34	113

- Totally 47 cases of bovine tuberculosis and 22 cases of suspected zoonotic tuberculosis were reported before 2022.

# Conclusion by the Systematic review

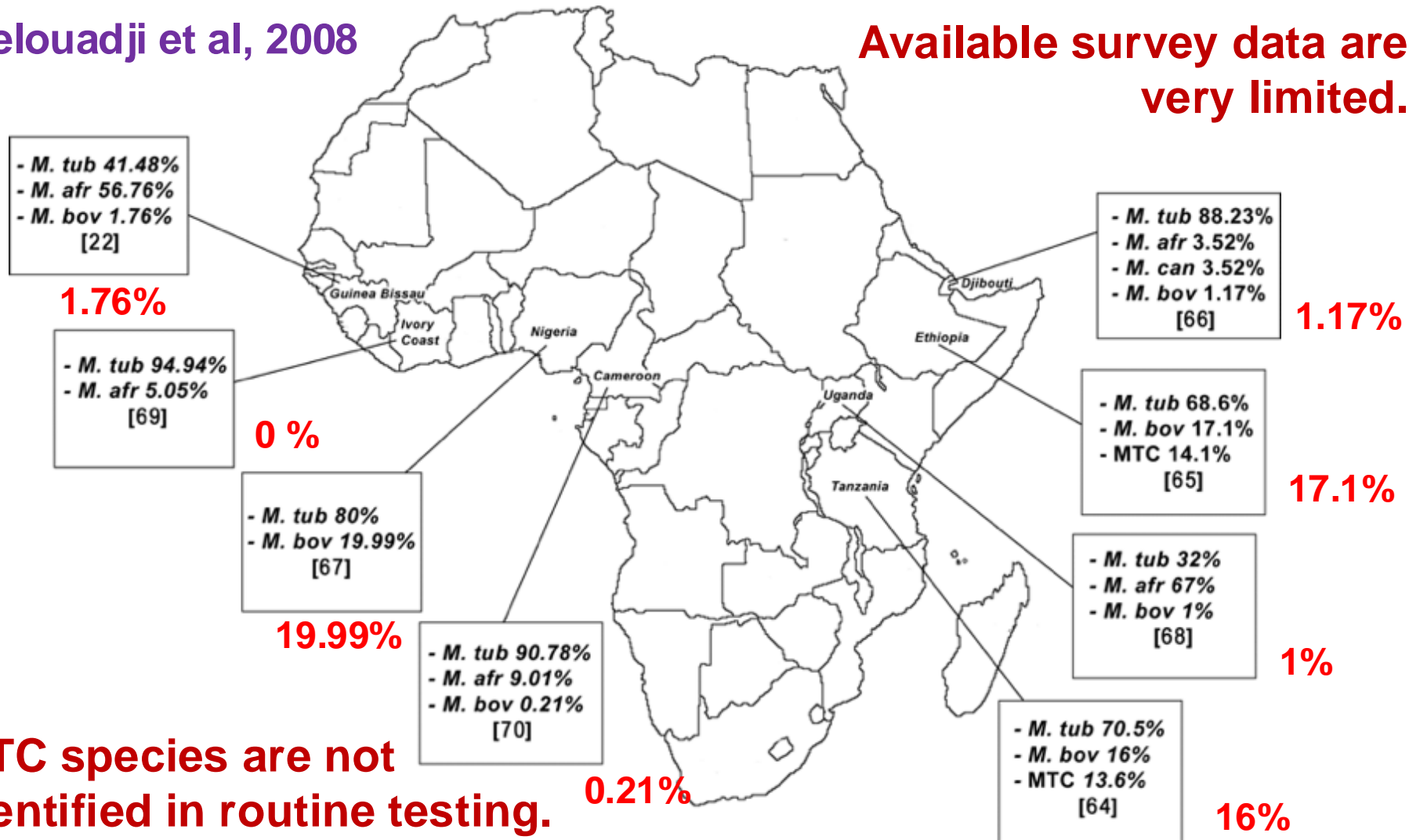
**The available data suggests under-reporting of zoonotic TB in the regions.** Efforts are required to strengthen zoonotic TB surveillance systems from both animal and human health sides to better understand the impact of zoonotic TB in order to take appropriate action to achieve the goal of ending the TB epidemic.



# Zoonotic *M. bovis* infection in Africa

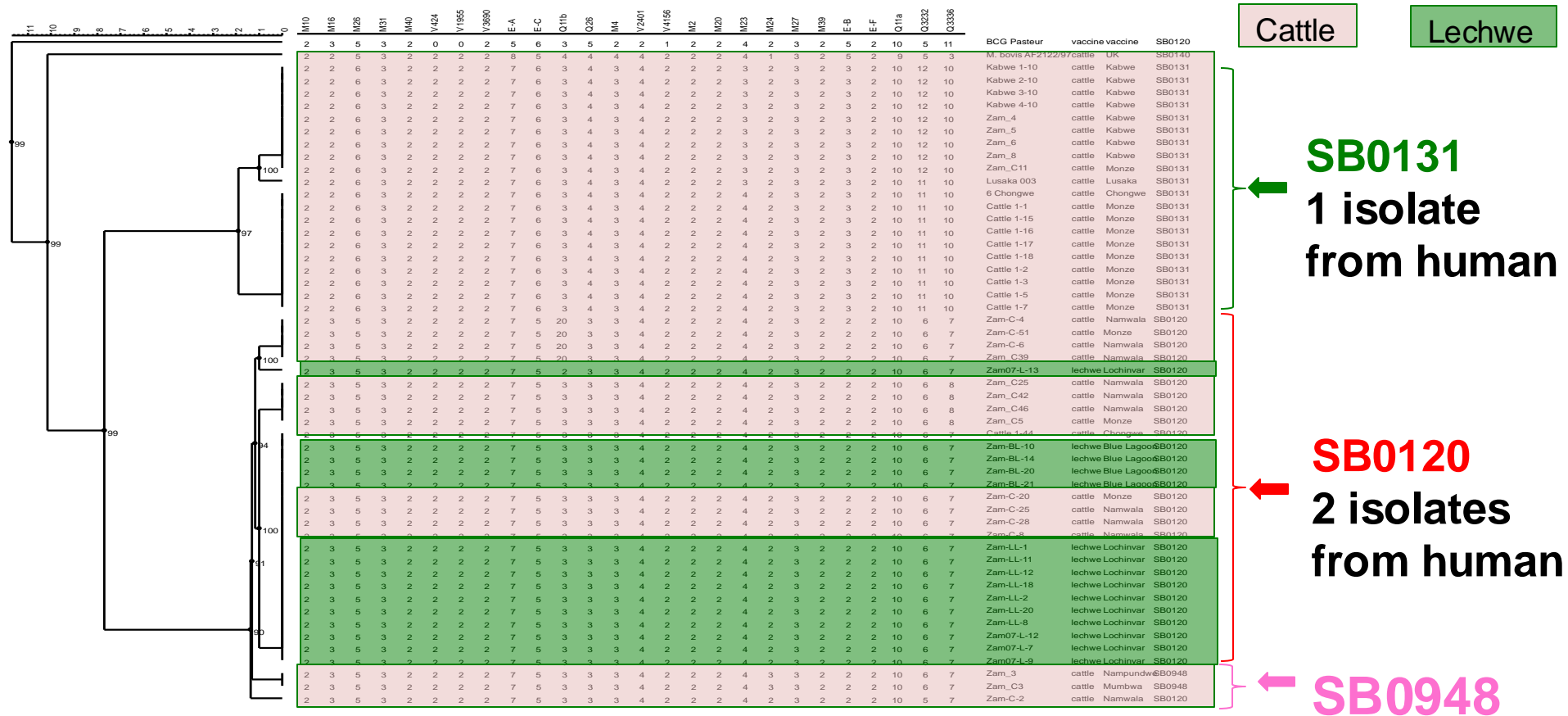
Djelouadji et al, 2008

Available survey data are very limited.



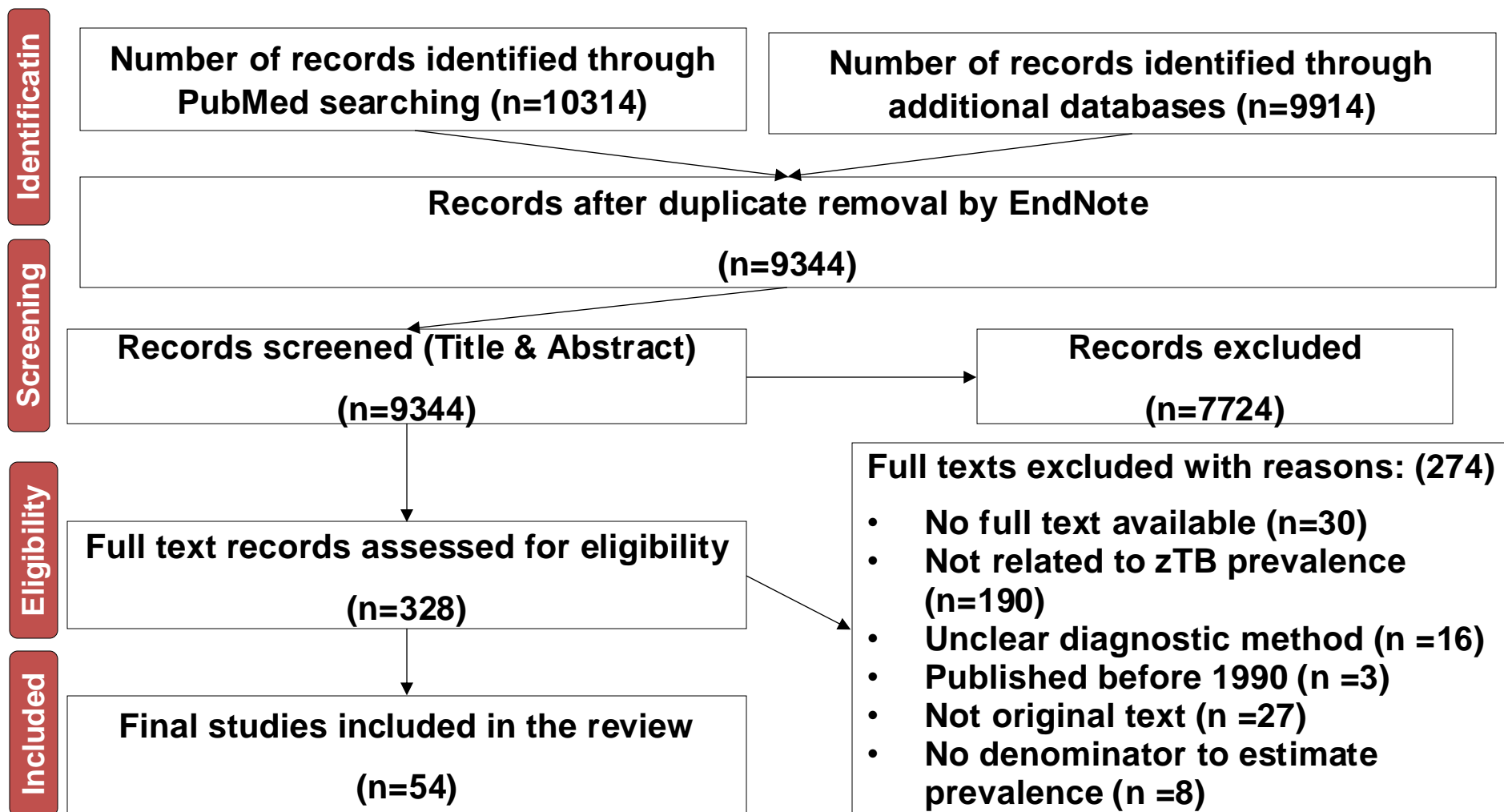
MTC species are not identified in routine testing.

# Zoonotic *M. bovis* infection in Zambia



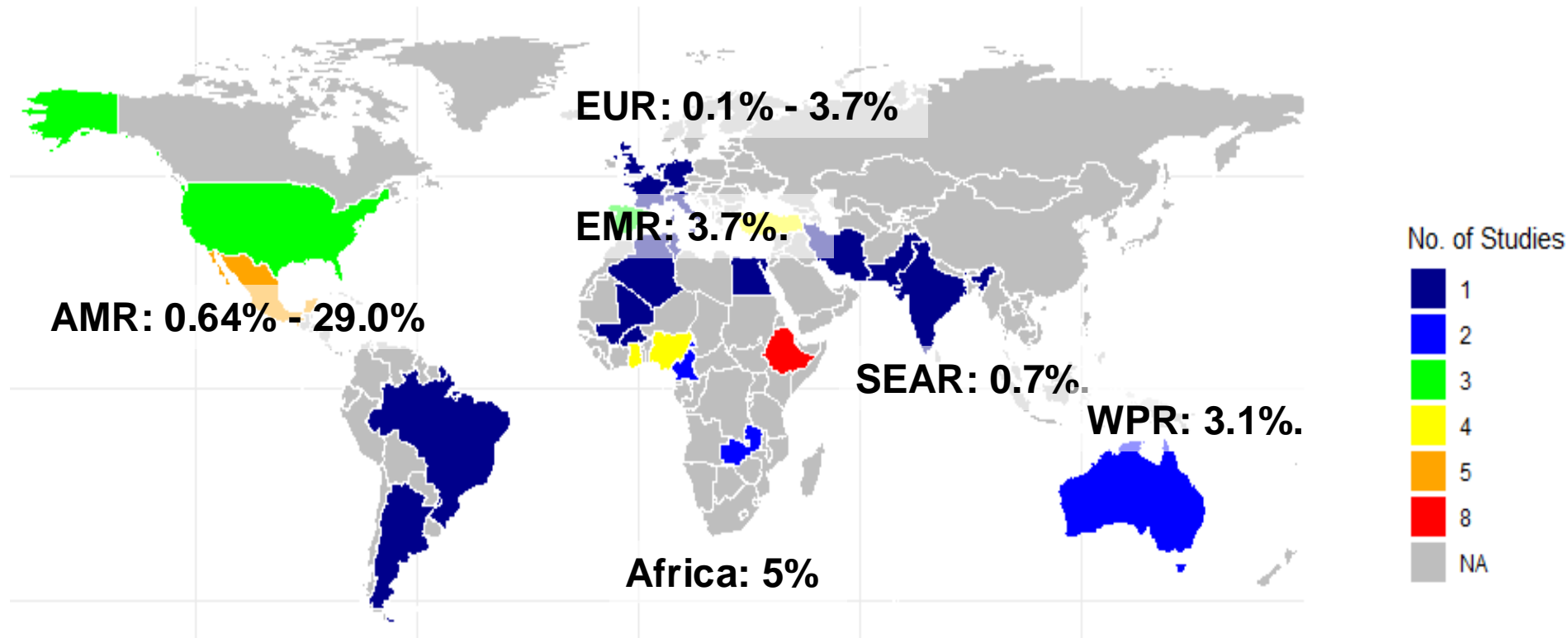
- 3/100 analyzed human *M. tuberculosis* complex isolates were *M. bovis*
- M. bovis* with identical genotype were found from human and animals

# A systematic review of zoonotic tuberculosis:<sup>15</sup> The strategy



- From totally 20,228 publication, 54 were selected for the review.

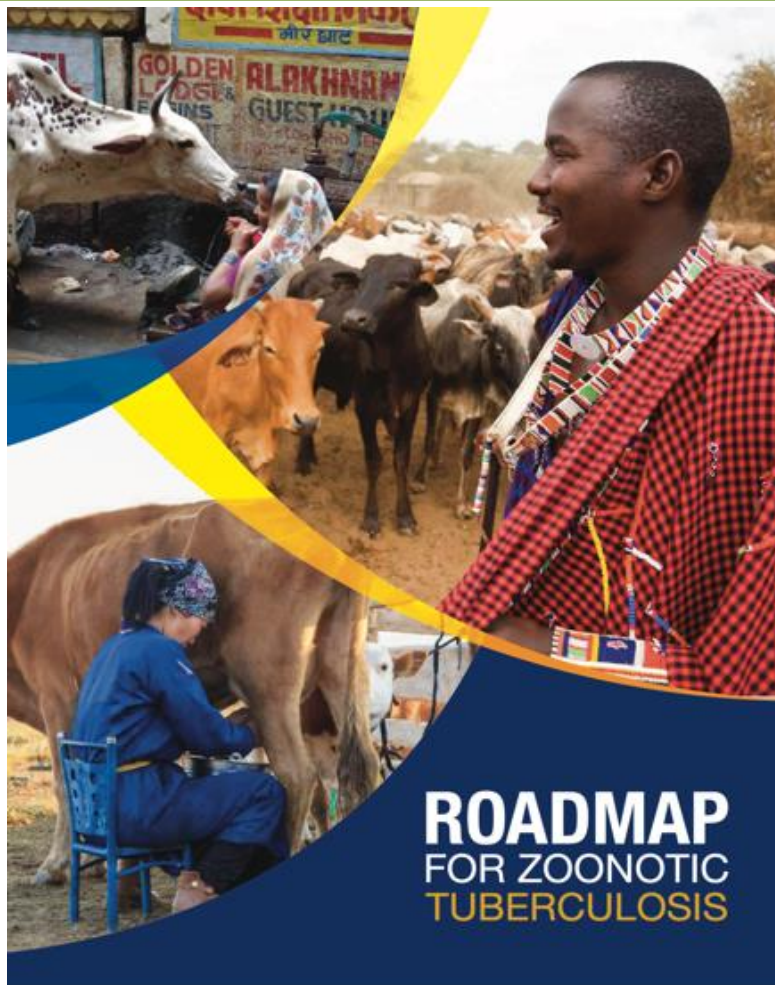
# A systematic review of zoonotic tuberculosis: The map



***M. bovis* (2659 cases, 99.3%), *M. caprae* (10 cases, 0.37%),  
*M. orygis* (0.26%)**



# Roadmap for Zoonotic Tuberculosis



- Improve the scientific evidence base
- Reduce transmission at the animal-human interface
- Strengthen intersectoral and collaborative approaches



WORLD ORGANISATION FOR ANIMAL HEALTH  
Protecting animals, guaranteeing our future



Food and Agriculture  
Organization of the  
United Nations



International Centre for  
Zoonoses Control



Hokkaido University  
International Institute  
for Zoonosis Control



北海道大学

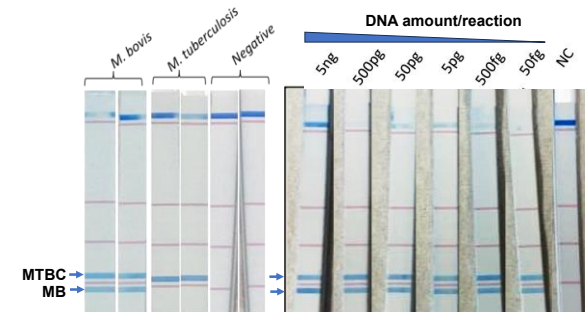
# Improve the scientific evidence base

By 2020

- Joint guidance developed for surveillance and management of zoonotic and bovine TB, at global and national levels
- Improved detection, recording and reporting of zoonotic and bovine TB within countries to allow more accurate estimations of disease burden
- Capacity of national healthcare and laboratory services strengthened for diagnosing and treating zoonotic TB

By 2025

- **New, rapid diagnostic tools available for diagnosing zoonotic TB** and rolled-out to high risk groups
- Appropriate drug regimens defined for effective treatment of zoonotic TB
- Anti-TB vaccine available for people and rolled-out



**Isothermal DNA amplification-based dip stick**

# Reduce transmission at the animal-human interface

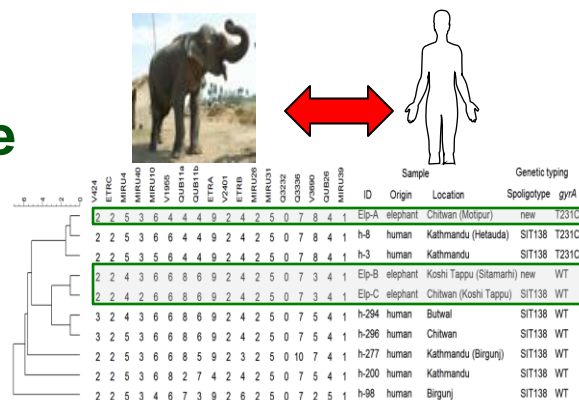
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## By 2020

- Capacity of national veterinary services strengthened for improving animal health, including detecting and controlling bovine TB in livestock and wildlife
- Efforts scaled-up to improve national food safety standards
- Community education campaigns implemented nationally to raise awareness of foodborne diseases and promote behavioural change
- Targeted surveys conducted to identify high-risk populations

## By 2025

- **New diagnostics assays available for livestock**
- Effective bovine TB vaccines available for livestock and rolled-out in endemic settings
- **Multi-species transmission pathways and sources of infection better characterized and used to inform the design of appropriate interventions**



**Global surveillance of zoonotic TB**

# Strengthen intersectoral and collaborative approaches

## By 2020

- Zoonotic and bovine TB properly addressed by government authorities and other stakeholders, in light of available evidence
- Intersectoral and multidisciplinary collaborations established to build mechanisms and policies for One Health coordination and communication, within and between countries
- Global case for investment and business plan developed, providing rationale for investing in zoonotic and bovine TB and detailing the activities and resources needed

- Global advocacy strengthened to promote a research agenda that addresses knowledge gaps

## By 2025

- **Mainstreaming of One Health approaches into efforts to improve human and animal health at global, national and community levels**





**Thank you very much  
for your kind attention**