

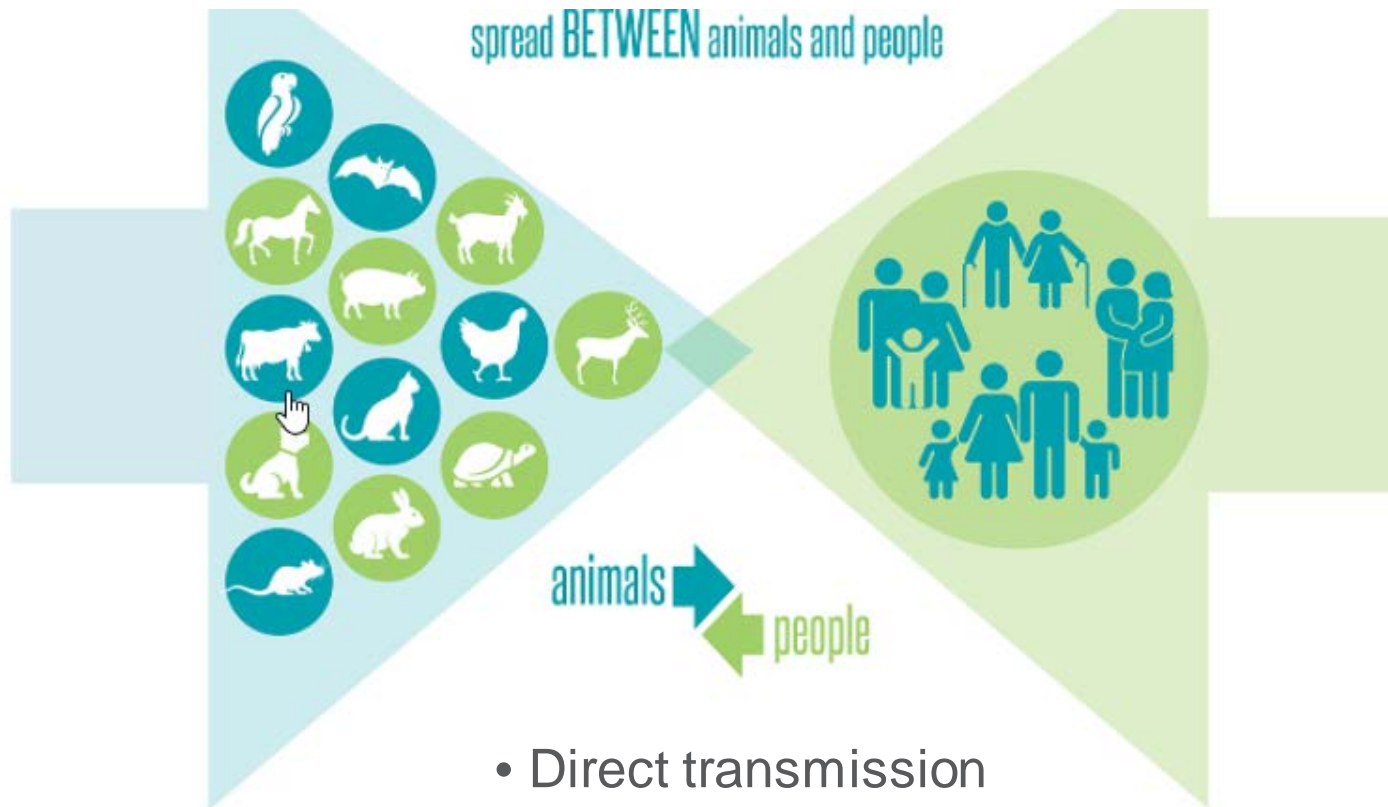
OVERVIEW OF THE MAIN FOODBORNE PATHOGENS AND THEIR ZOOONOTIC ORIGIN

6th Symposium on Animal Health, 23 September 2021

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(NRL Foodborne Outbreaks)

Zoonoses

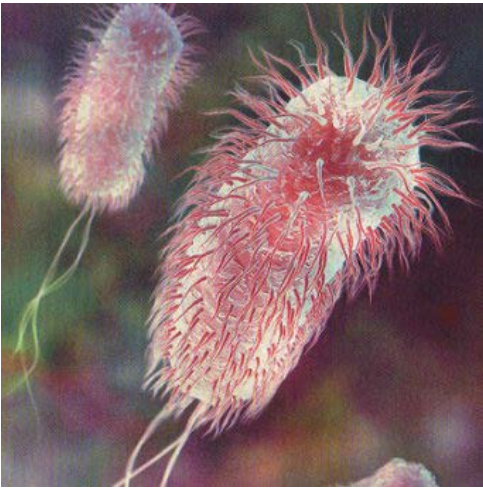
- Diseases or infections naturally transmitted from animals to humans



- Direct transmission
- Indirect transmission
- Cyclic transmission

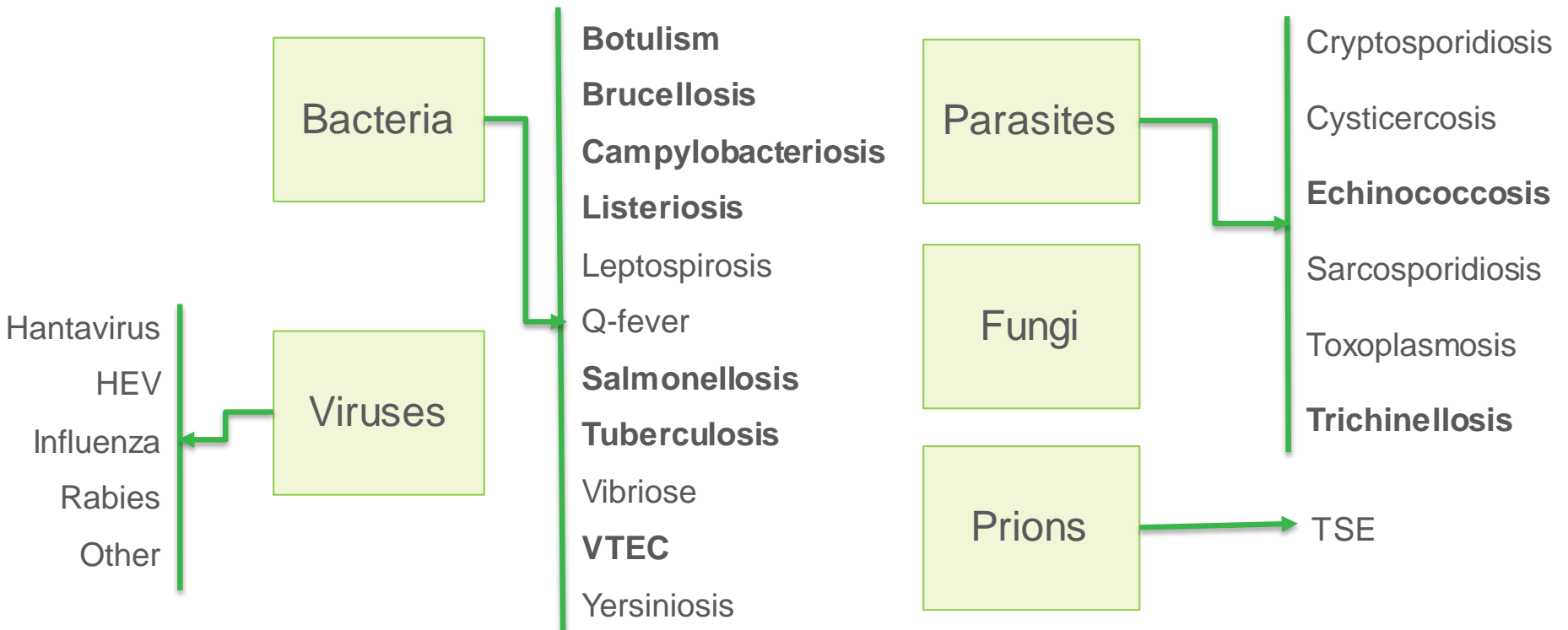
Zoonoses

- Some figures
 - Of all human pathogens, 60% are zoonotic
 - ~ 75% of emerging infectious diseases of human concern are of animal origin
 - In total ~ 200 zoonotic pathogens
- Classification of zoonoses (causative agent, type of transmission, high risk population)



Zoonoses

- Reported zoonotic infections are caused by



How to prevent zoonosis?

- Eliminating the pathogen from its animal reservoir(s)
 - Vaccination (eg, rabies),
 - treatment of clinical cases,
 - periodic testing for enteric parasites or other pathogens
- Vector control
- Human vaccination



How to prevent zoonosis?

- Protective equipment (gloves and mask)
- Health education
 - General prevention messages
 - High-risk groups
- Modern water treatment procedures
- Good sanitation and hygiene during food preparation



Why monitoring of zoonoses?



- Legislation

European Directive
§9
2003/99/EC



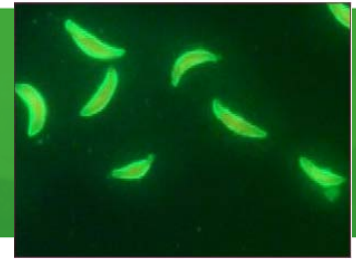
Monitoring of
zoonoses
and zoonotic
agents

Belgian Royal
Decree
22/5/2005

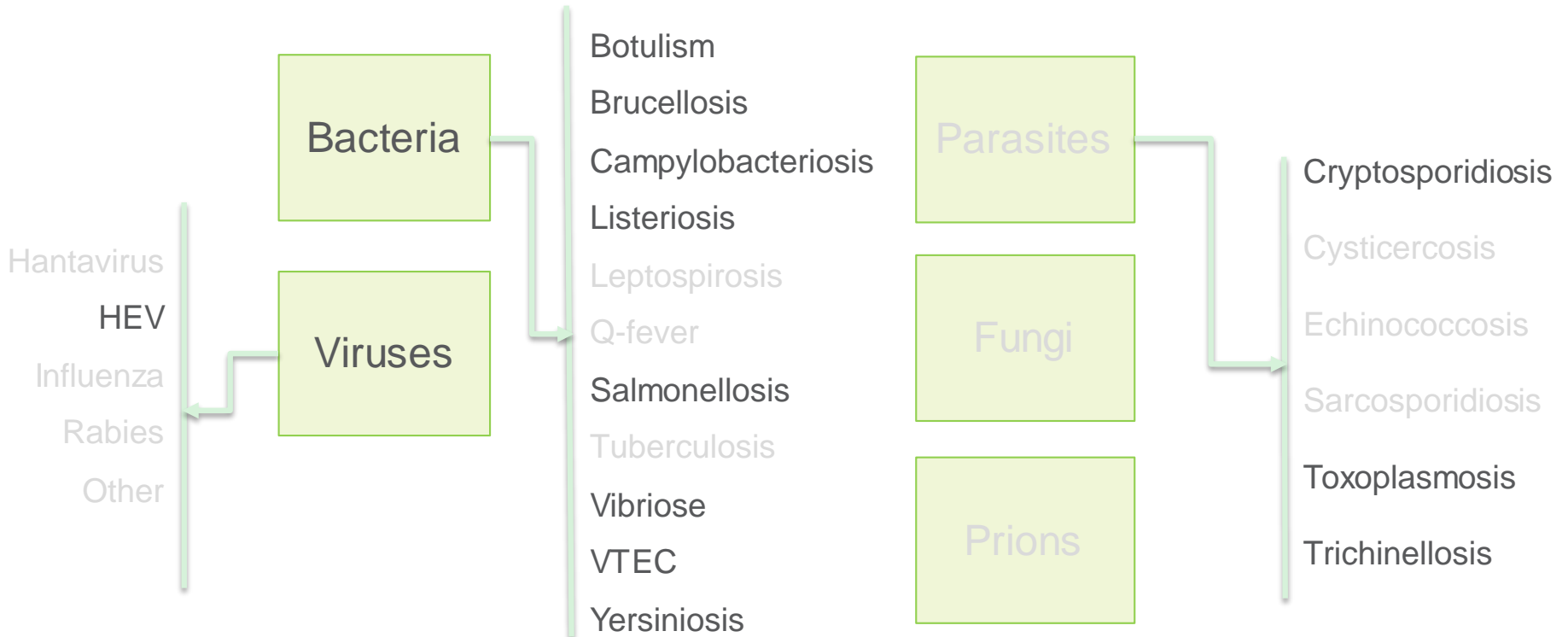


Measures for the
monitoring and the
protection against
certain zoonoses
and zoonotic
agents

Foodborne zoonotic agents

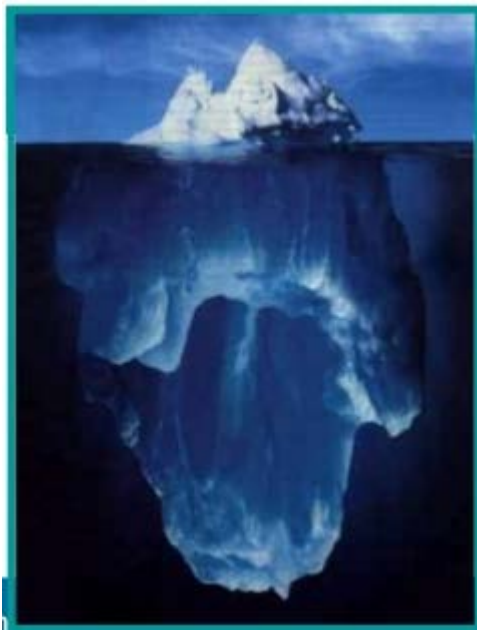


- Foodborne outbreaks are caused by consumption of food or water contaminated by pathogenic microorganisms



Reporting foodborne outbreaks

Reported human cases

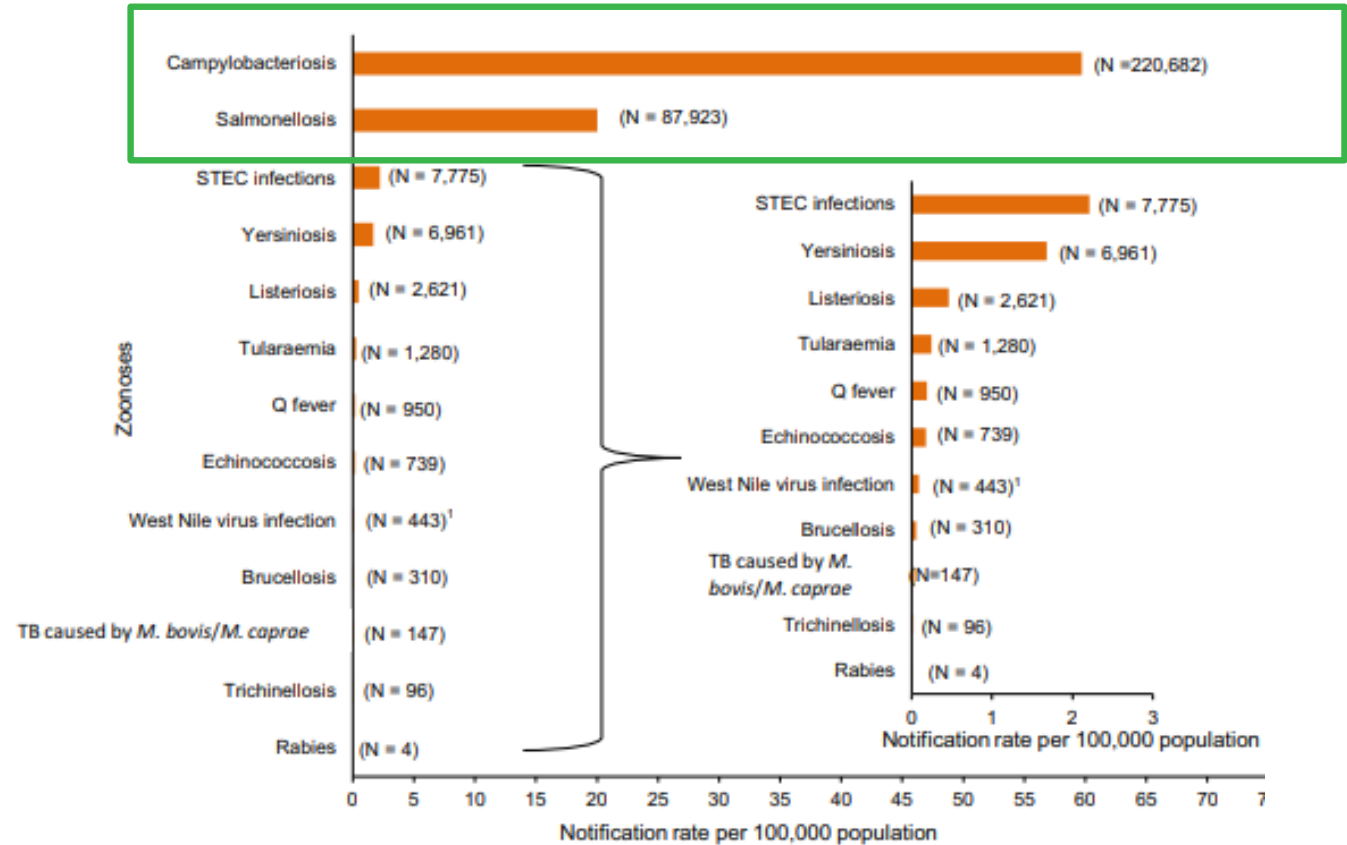


Known from surveillance

What we should know



Human cases in the EU



Note: The total number of confirmed cases is indicated between parentheses at the end of each bar.

¹ Exception: West Nile virus infection for which the total number of cases was used.



Figure 1: Reported numbers and notification rates of confirmed human zoonoses in the EU, 2019



Micro-organisms in food

RAW MATERIALS, WATER

(*Salmonella*, *Campylobacter*)



ENVIRONMENT

(*Listeria*) machines, air, knives, ...



COLD CHAIN

(spoilage, *Pseudomonas*)



FOOD HANDLER

(*Staphylococcus*, *Norovirus*)



Campylobacteriosis

Most common gastrointestinal disease in humans since 2005 in the EU
Mild to severe illness (diarrhea, cramps, fever → Guillain-Barré syndrome)

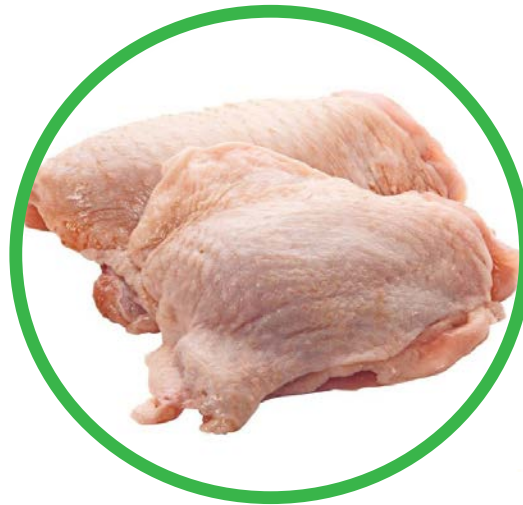
Thermotolerant *Campylobacter* spp.
(widespread)
Campylobacter jejuni, *C. coli* and *C. lari*

Reservoir: alimentary tracts of wild and domesticated birds and mammals (mostly asymptomatic carriers)



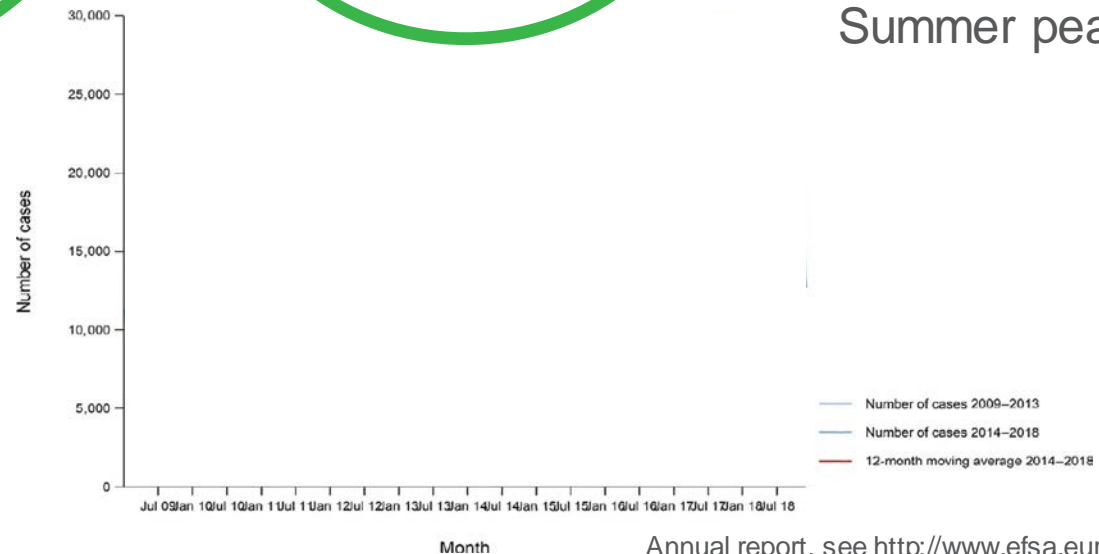
Campylobacter

Foodborne outbreaks:



50-80% originate from poultry

Summer peaks



Salmonellosis

Most common gastrointestinal disease in humans up to 2005 in the EU

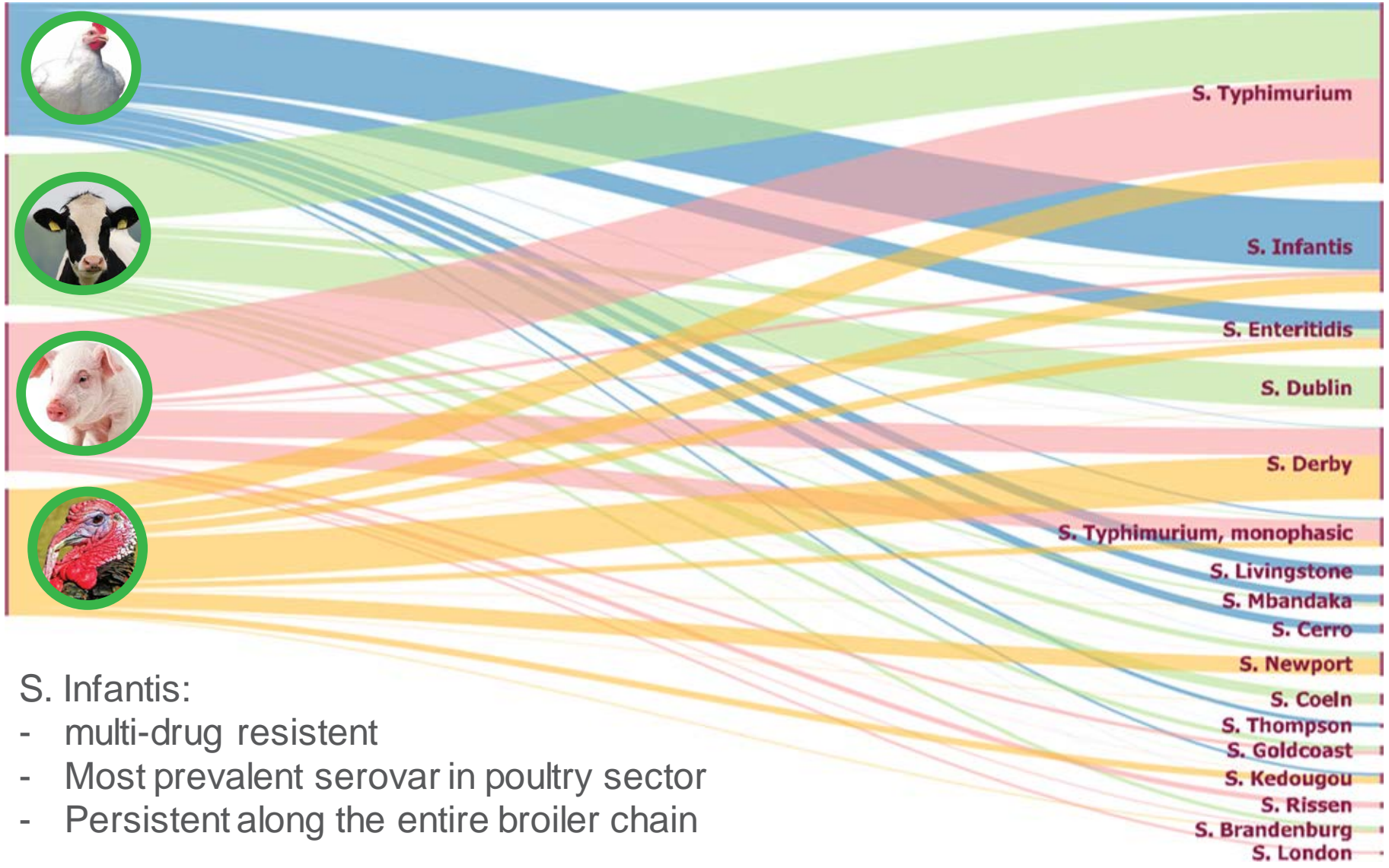
High fever, cramps, vomiting, diarrhea

Salmonella enterica subsp. *enterica*
2500 serovars of zoonotic *Salmonella*

Reservoir: domesticated birds and mammals (fever and diarrhea in cattle)



Salmonella

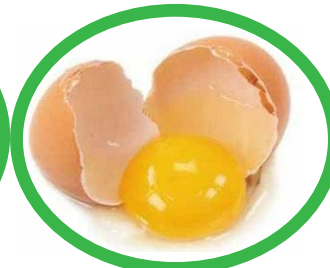


S. Infantis:

- multi-drug resistant
- Most prevalent serovar in poultry sector
- Persistent along the entire broiler chain

Salmonella

Foodborne outbreaks:



Most associated with FBO:

- Used raw
- Vertical transmission

Low a_w
High fat

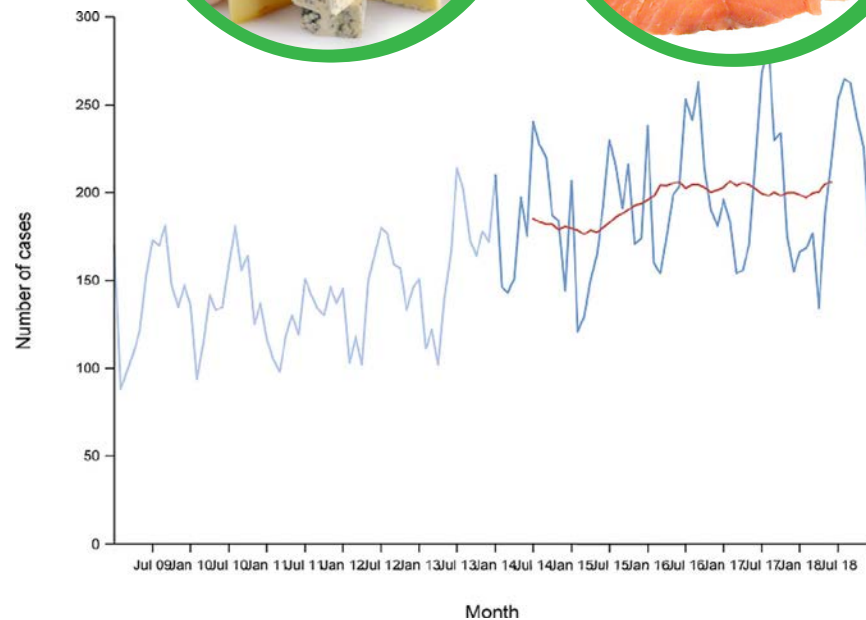
Listeriosis

Severe illness in unborn child, infants, elderly and immunocompromised
Diarrhea & Flu-like symptoms to life threatening infections
High mortality, highest hospitalisations

Listeria monocytogenes
Ubiquitous
Multiplies at 4°C

Reservoir: soil, forage, water
Domesticated and wild animals

Listeria monocytogenes



— Number of cases 2009–2013
— Number of cases 2014–2018
— 12-month moving average 2014–2018

Yersiniosis

Diarrhea, abdominal pain (mostly in children); pseudo-appendicitis
Symptoms last 1-3 weeks, complications

11 species, 2 are foodborne pathogens
Y. enterocolitica (& *Y. pseudotuberculosis*)
Serovars pathogenic to H (O:3, O:9)
Psychrotroph

Primary reservoir: pigs
Other : healthy animals like bovine, cats and dogs (pets)

Yersiniosis



4th most commonly reported zoonosis in humans in 2019

Trends : stable 2015-2019

Indirect transmission

- undercooked pork meat

- raw milk cheese

- untreated water

Direct transmission (rare)

- contact with animals

- person-to-person

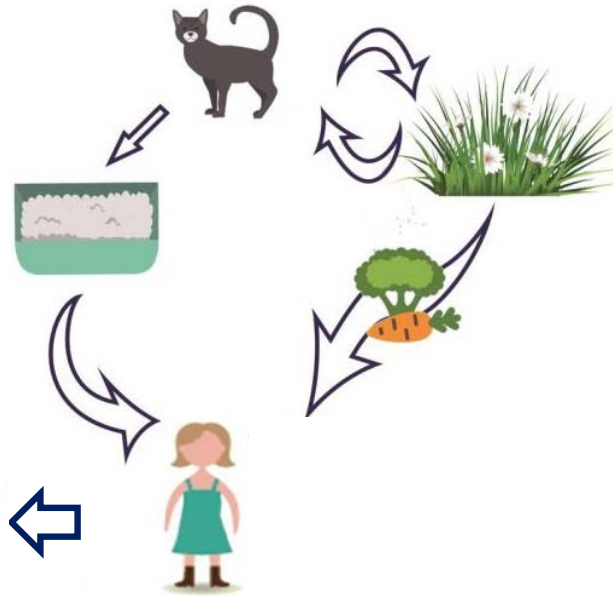
Toxoplasmose

Usually no symptoms (flu-like)
Risk for the immunocompromised and for the foetus (abortion and malformations)

Toxoplasma gondii
Intracellular parasite

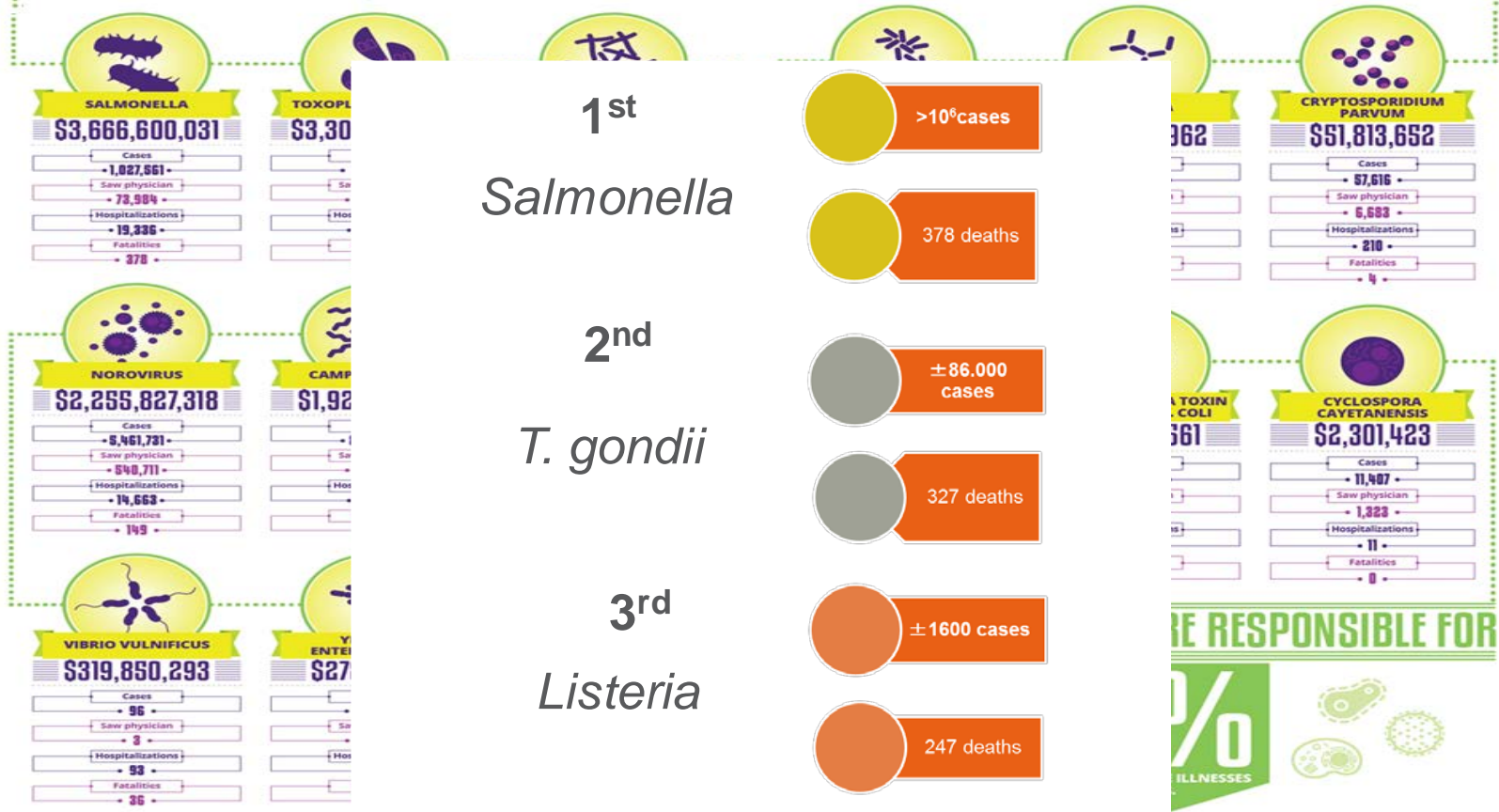
All homeothermic animals can be intermediate hosts (mammals and birds)

Toxoplasma gondii



US's *T. gondii* costs and deaths estimation

THE 15 MOST DANGEROUS PATHOGENS ARE



Conclusions & Acknowledgments





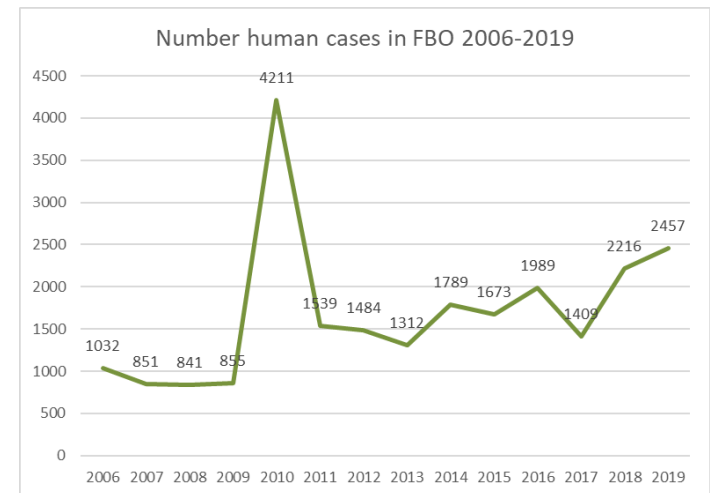
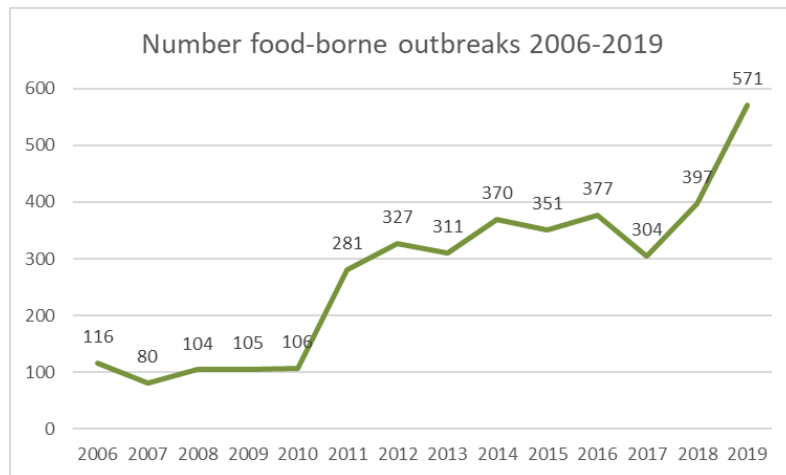
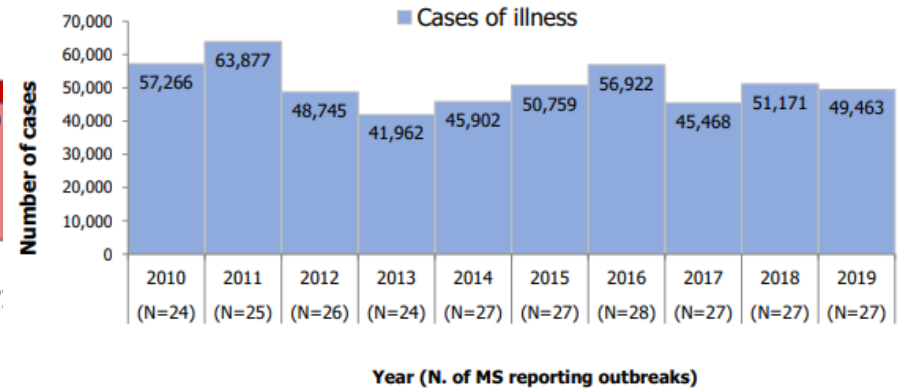
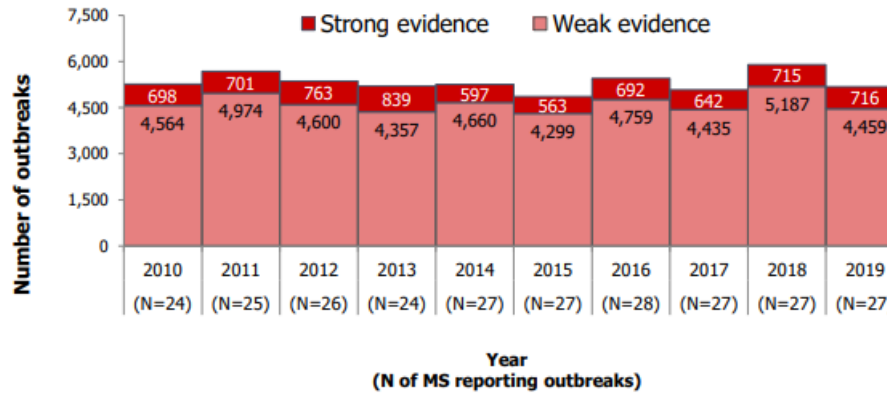
THANK YOU FOR YOUR ATTENTION

ACKNOWLEDGEMENTS

Food Pathogens service (Sciensano)

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Trends in food-borne outbreaks and illnesses due to food-borne outbreaks



Trends in human Listeriosis in the EU

The notification rate of human listeriosis increasing trend since 2009, with 2621 human cases in 2019



Listeria monocytogenes highest proportion hospitalisations (97%) as compared to other pathogens

Listeria seldom exceeding the EU food safety limit in ready-to-eat food.

