Campylobacter infections in EU/EEA and related AMR

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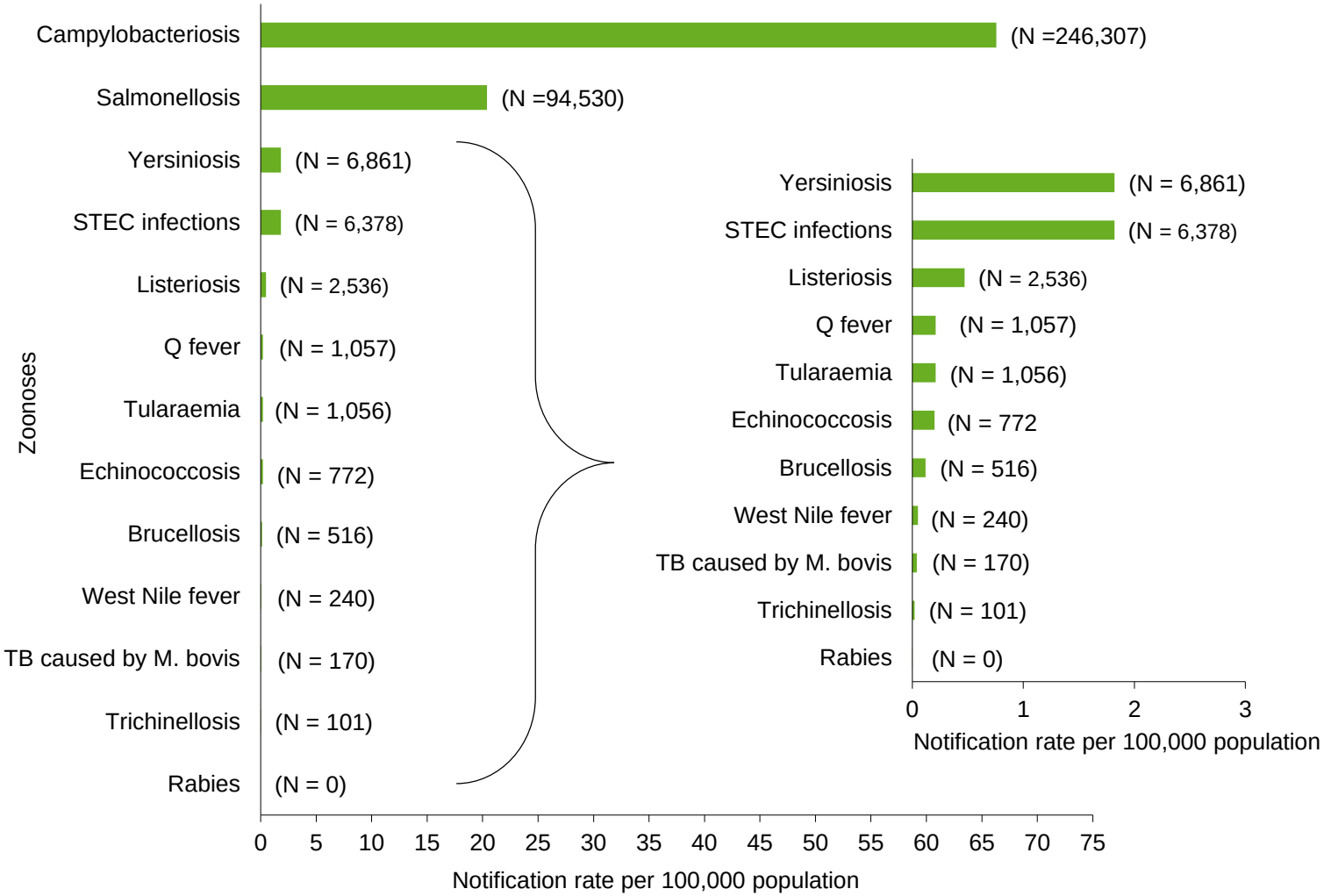
EURL – *Campylobacter* workshop, Uppsala, Sweden, 9 October 2018

Zoonotic infections in the EU, 2016

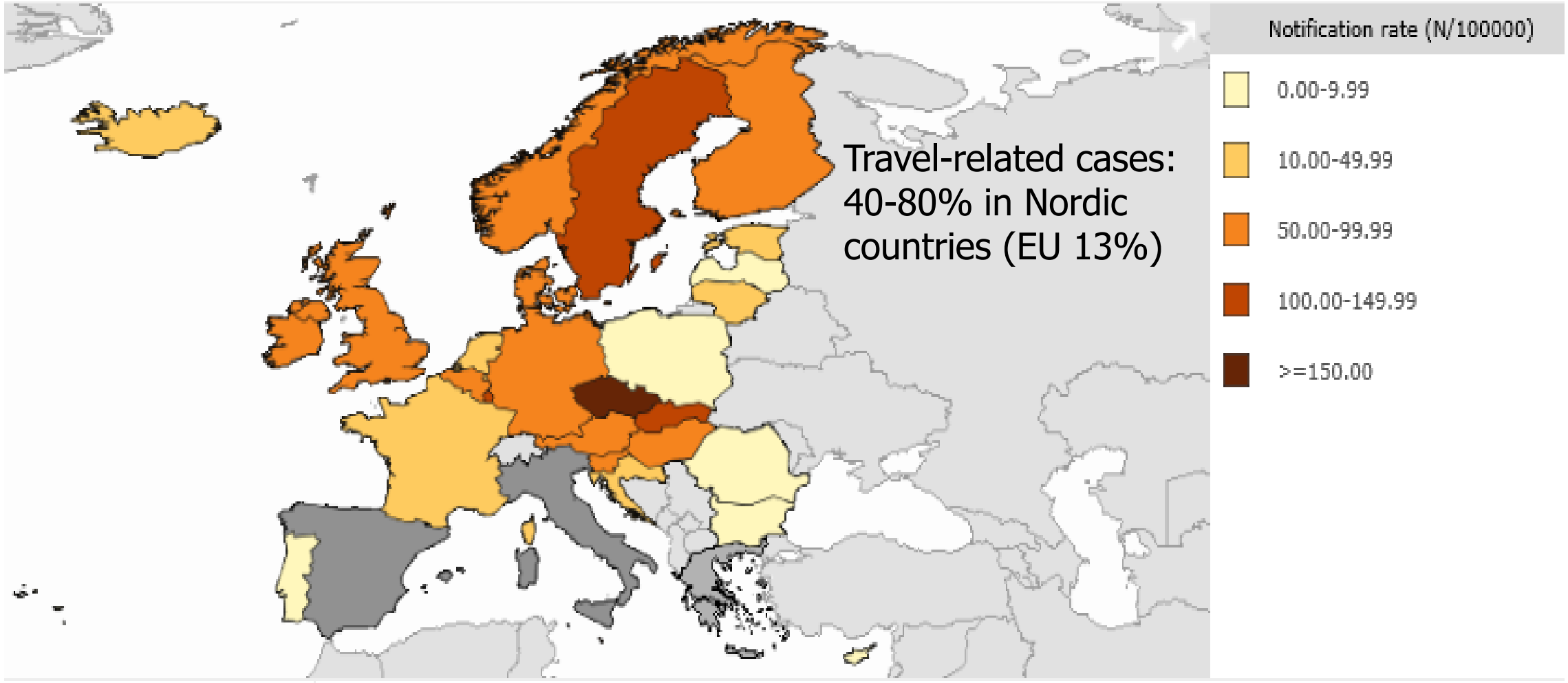


Severity of zoonotic infections, 2016

Disease	Number of confirmed[a] human cases	Hospitalisation				Deaths			
		Status available (%)	Number of reporting MSs[b]	Reported hospitalised cases	Proportion hospitalised (%)	Outcome available (%)	Number of reporting MSs[b]	Reported deaths	Case fatality (%)
Campylobacteriosis	246,307	27.4	17	19,265	28.5	72.6	16	62	0.03
Salmonellosis	94,530	33.5	14	12,182	38.4	55.2	16	128	0.25
Yersiniosis	6,861	24.1	14	521	31.5	63.5	15	5	0.11
STEC infections	6,378	42.6	18	940	34.6	58.9	20	10	0.27
Listeriosis	2,536	38.8	18	962	97.7	60.1	20	247	16.2
Q-fever	1,057	NA[c]	NA	NA	NA	54.3	15	3	0.30
Tularaemia	1,056	12.3	11	130	54.6	15.8	12	0	0.0
Echinococcosis	772	26.2	14	119	58.9	25.4	13	1	0.51
Brucellosis	516	39.7	12	146	71.2	26.0	12	1	0.75
West Nile fever[a]	240	65.1	7	147	93.6	99.2	9	28	11.7
Trichinellosis	101	45.5	7	30	65.2	50.5	8	0	0.0
Rabies	0	NA[c]	NA	NA	NA	0.0	0	0	0.0

(a): Exception: West Nile fever where total number of cases were included.
(b): Not all countries observed cases for all diseases
(c): NA-not applicable as the information is not collected for this disease.

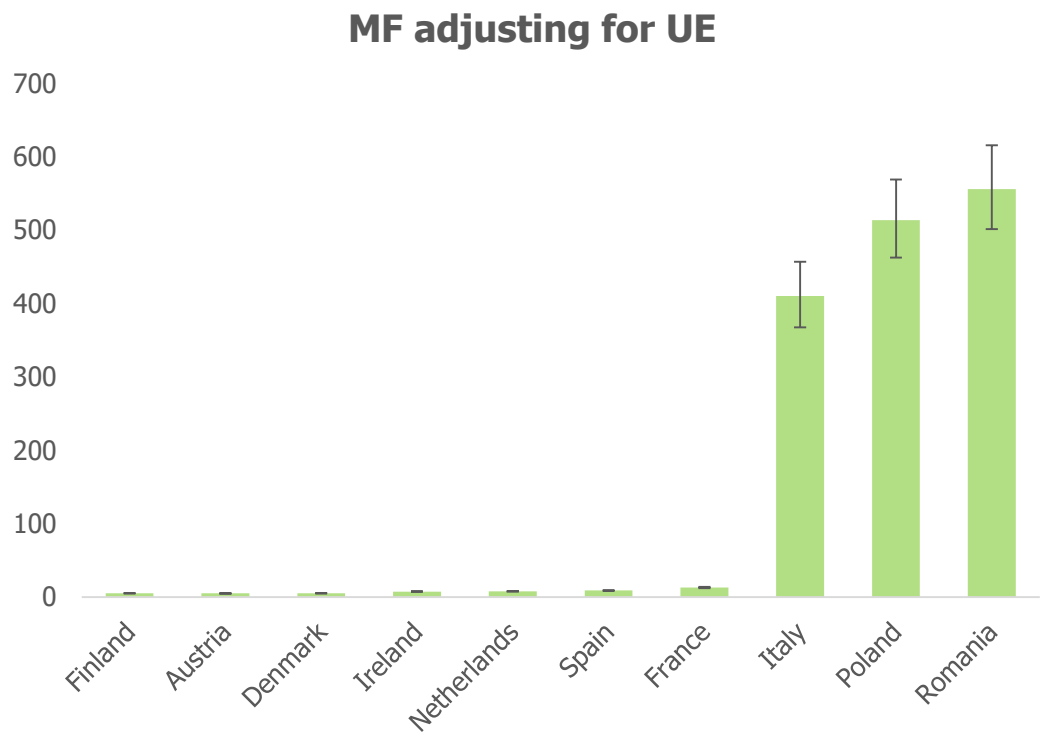
Campylobacter notification rates, 2017



ECDC 2018. Surveillance Atlas of Infectious Diseases. https://atlas.ecdc.europa.eu/public/index.aspx

Multiplication factors adjusting for under-estimation in campylobacteriosis (from ECDC seroincidence study and burden study)

Country	MF adjusting for UE
Finland	5.1 (4.6-5.7)
Austria	5.1 (4.5-5.7)
Denmark	5.3 (5-5.7)
Ireland	7.5 (7-8.2)
Netherlands	7.8 (7.3-8.4)
Spain	9.1 (8.4-9.8)
France	13 (12-13.9)
Italy	410.2 (367.4-457.1)
Poland	513.7 (462.8-569.2)
Romania	555.9 (501.4-615.9)



Real incidence of symptomatic illness: 7 to 13 times the notified EU rate
Two-fold difference in seroincidence by countries

Cassini et al. Impact of food and water-borne diseases on European population health. Current Opinion in Food Science, 2016

Long-term trend in the EU, 2008-2016

- Significantly increasing trend 2008–2016
- In the last five years (2012-2016) no significant increase or decrease
- Half of the MS reported increasing trends both long term (2008–2016) and short term (2012–2016)

New EU case definition
(Commission Implementing Decision 2018/945/EU)

Important changes for campylobacteriosis

- Detection of nucleic acid valid as the laboratory confirmation of a human *Campylobacter* infection (earlier only isolation)
- Antimicrobial susceptibility testing of *Campylobacter* spp. should be performed on a representative subset of isolates
- If the national surveillance system is not capturing clinical symptoms, all laboratory-confirmed individuals should be reported as confirmed cases

Commission Implementing Decision (EU) 2018/945 of 22 June 2018 on the communicable diseases and related special health issues to be covered by epidemiological surveillance as well as relevant case definitions

Campylobacteriosis in food and animals, EU, 2016

Few MS report, both from fresh meat and animals, and the sampling and reporting rules are not harmonised. This prevents inference being made on trends or sources of *Campylobacter* in foods or animals

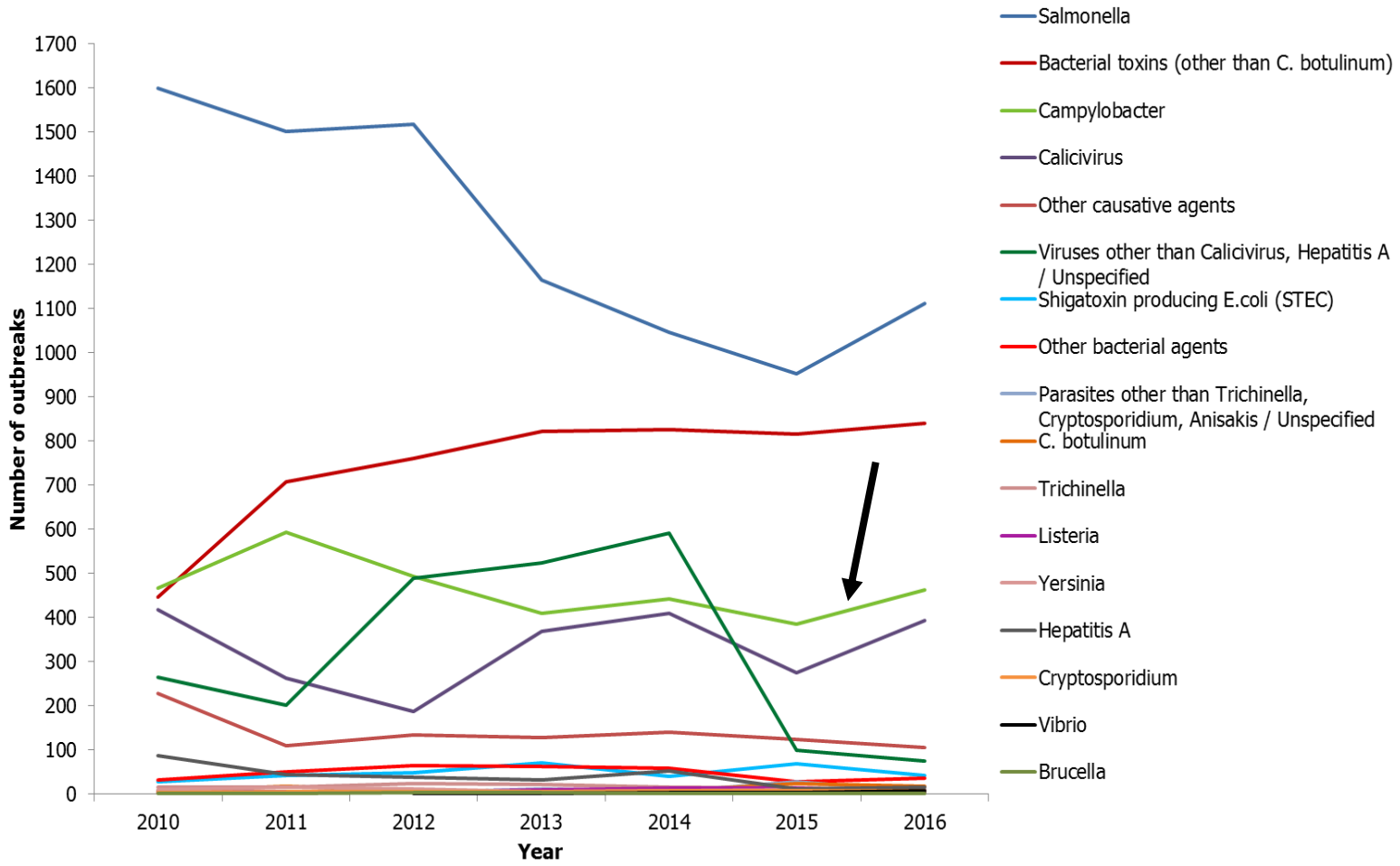
		Number of reporting MS/non-MS	Number of tested units, EU	Proportion (%) of positive units, EU
Fresh meat	Broilers	14/0	11,495	36.7
	Turkey	7/0	1,505	11.0
	Pig	6/0	554	2.9
	Bovine	7/0	1,220	1.0
Meat products, RTE	Broilers	1/0	54	1.9
	Turkey	1/0	16	0
	Pig	4/0	44	0
	Bovine	2/0	64	1.6
	Unspecified	7/0	116	0.9
Milk and milk products	milk	9/0	1,327	1.2
	cheese	5/0	289	1.0
Animals	Broilers	14/0	13,558	27.3
	Turkeys	5/1	2,894	65.3
	Pigs	1/0	50	0.7
	Bovine animals	6/0	6,469	1.1
	Cats and dogs	5/2	1,196	5.5
	Other animals[(a)]	3/0	1,031	12.4

RTE: ready-to-eat.

a) 'Other animals' include: sheep, goats, water buffalos, pigeons, magpies, foxes, deer, birds and pet animals.

Foodborne outbreak surveillance data by causative agent, EU, 2016

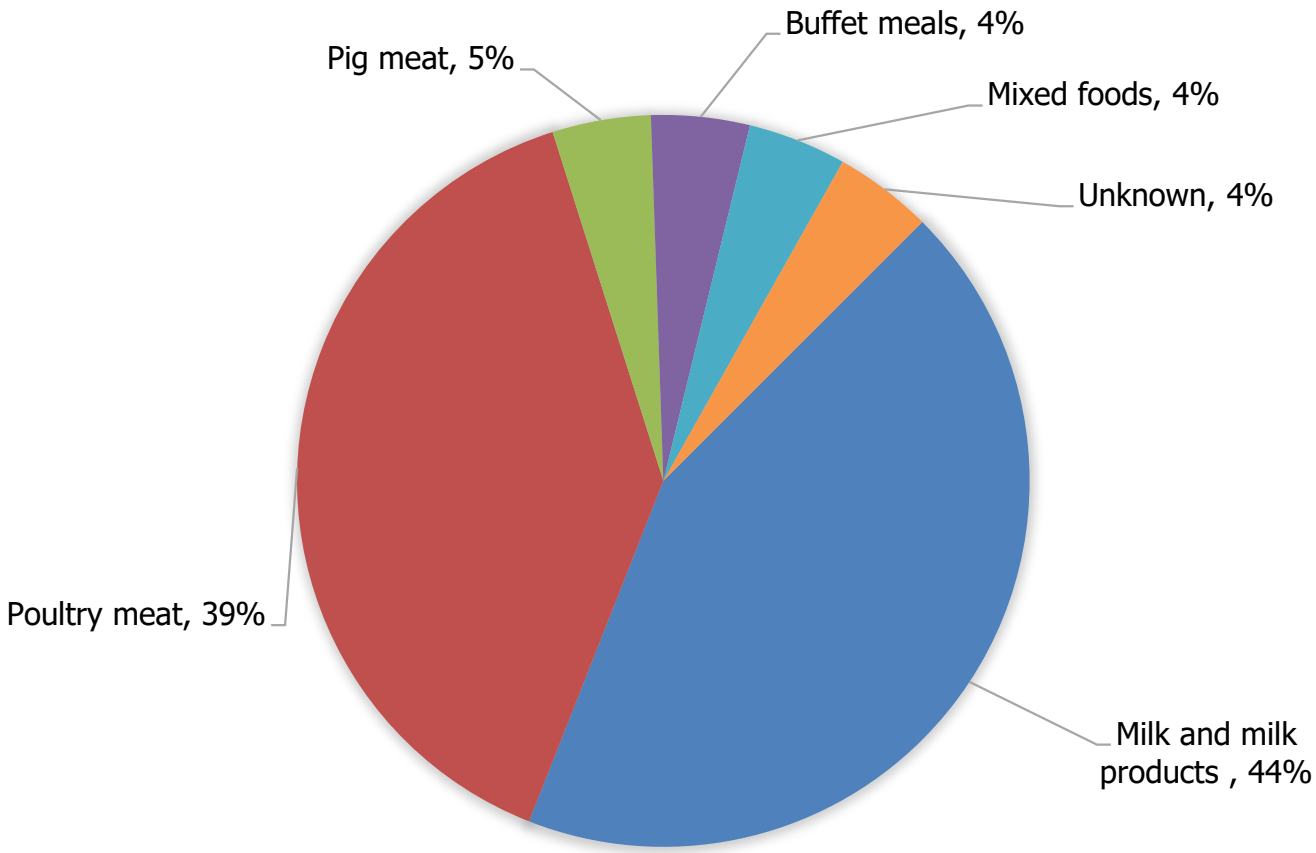
- The causative agent was known for 64% of foodborne outbreaks in 2016
- *Campylobacter* accounted for 9.6% of the outbreaks
- Compared to 2015, 74 outbreaks more were reported, corresponding to an increase of 19.1%
- The largest food-borne outbreak was reported by Sweden and involved more than 3,000 domestic cases. The source was contaminated poultry meat.



FBOs due to *Campylobacter*, EU, 2016

461 FBO due to ***Campylobacter***

- 24 with strong evidence
- 437 with weak evidence
- 4,606 illnesses
- 140 persons hospitalised
- no deaths



N=24

Note: Data from 24 outbreaks are included: Denmark (2), Finland (3), Germany (11), Luxembourg (1), Slovakia (1), Sweden (1), United Kingdom (4).

Proposal for ECDC strategic framework on molecular and genomic typing 2019-2021

Campylobacter jejuni/Campylobacter coli

Priorities in 2019-21: In 2019, capacities and practice of WGS-based typing of *C. jejuni* and *C. coli* will be mapped. ECDC will offer WGS support during the high season (summer months) to assess the existence/absence of possible cross-border events.

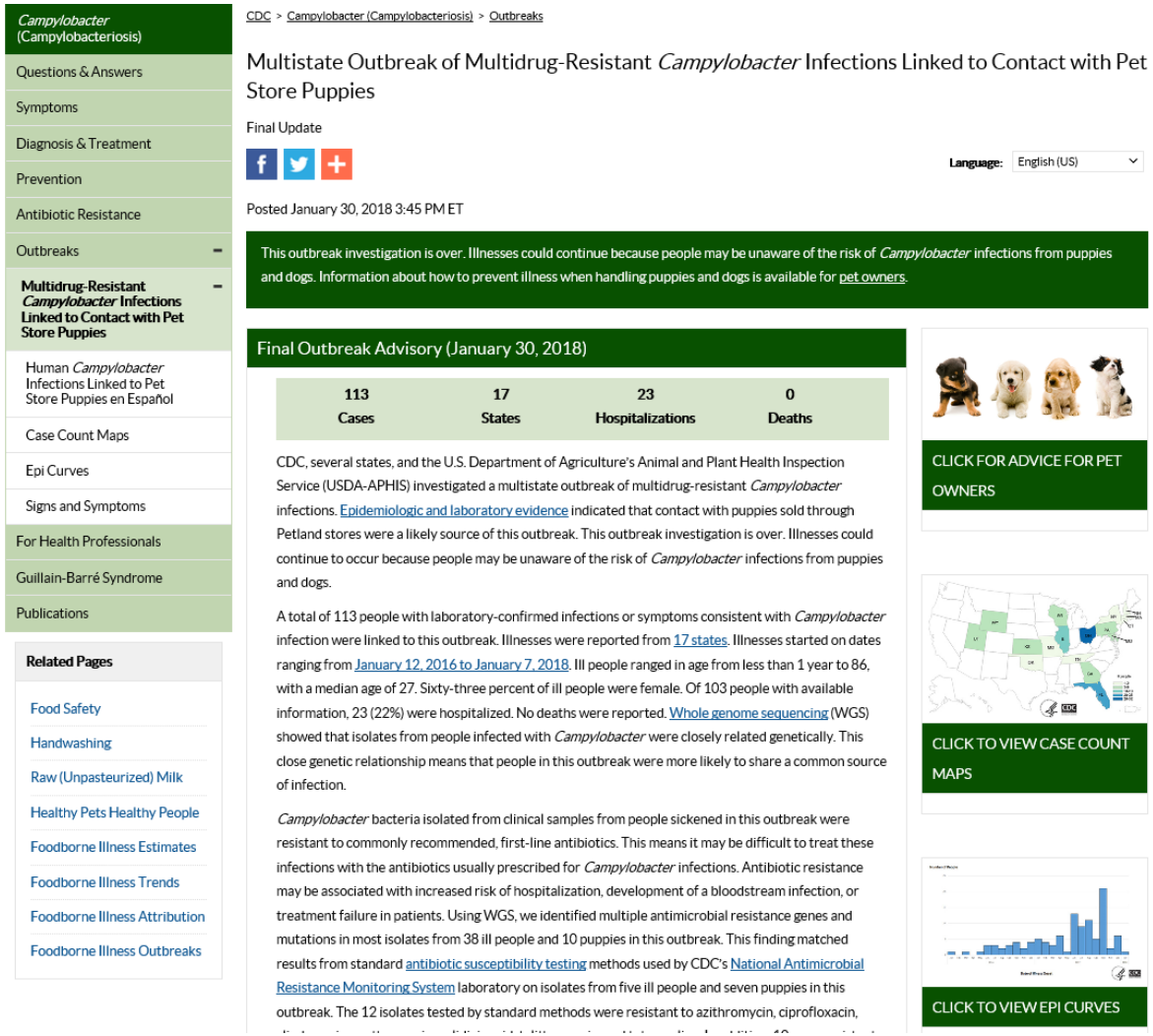
Rationale: While no evidence is available of human cross-border outbreaks in Europe, countries applying whole genome MLST on *Campylobacter* infections report clusters in time and space and also persistent outbreaks across states

Method: cgMLST/wgMLST, SNP phylogenomic analysis

International typing schemes and resources: cgMLST allele nomenclature and global genome library to be selected after evaluation

Multistate outbreak of multidrug-resistant *Campylobacter* infections after contact with pet store puppies, US, 2016-2018

- Identified trough the use of wgMLST
- From Jan 2016 to Feb 2018, 118 cases in 18 States
- Isolates resistant to azithromycin, ciprofloxacin, clindamycin, erythromycin, nalidixic acid, telithromycin, and tetracycline. Some also to gentamicin and two to florfenicol.
- 95% of investigated puppies had been treated with antibiotics



Campylobacter (Campylobacteriosis)
Questions & Answers
Symptoms
Diagnosis & Treatment
Prevention
Antibiotic Resistance
Outbreaks
Multidrug-Resistant *Campylobacter* Infections Linked to Contact with Pet Store Puppies
Human *Campylobacter* Infections Linked to Pet Store Puppies en Español
Case Count Maps
Epi Curves
Signs and Symptoms
For Health Professionals
Guillain-Barré Syndrome
Publications

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Food Safety
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Foodborne Illness Attribution
Foodborne Illness Outbreaks

CDC > Campylobacter (Campylobacteriosis) > Outbreaks

Multistate Outbreak of Multidrug-Resistant *Campylobacter* Infections Linked to Contact with Pet Store Puppies

Final Update

Language: English (US)

Posted January 30, 2018 3:45 PM ET

This outbreak investigation is over. Illnesses could continue because people may be unaware of the risk of *Campylobacter* infections from puppies and dogs. Information about how to prevent illness when handling puppies and dogs is available for pet owners.

Final Outbreak Advisory (January 30, 2018)

113 Cases	17 States	23 Hospitalizations	0 Deaths

CDC, several states, and the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) investigated a multistate outbreak of multidrug-resistant *Campylobacter* infections. Epidemiologic and laboratory evidence indicated that contact with puppies sold through Petland stores were a likely source of this outbreak. This outbreak investigation is over. Illnesses could continue to occur because people may be unaware of the risk of *Campylobacter* infections from puppies and dogs.

A total of 113 people with laboratory-confirmed infections or symptoms consistent with *Campylobacter* infection were linked to this outbreak. Illnesses were reported from 17 states. Illnesses started on dates ranging from January 12, 2016 to January 7, 2018. Ill people ranged in age from less than 1 year to 86, with a median age of 27. Sixty-three percent of ill people were female. Of 103 people with available information, 23 (22%) were hospitalized. No deaths were reported. Whole genome sequencing (WGS) showed that isolates from people infected with *Campylobacter* were closely related genetically. This close genetic relationship means that people in this outbreak were more likely to share a common source of infection.

Campylobacter bacteria isolated from clinical samples from people sickened in this outbreak were resistant to commonly recommended, first-line antibiotics. This means it may be difficult to treat these infections with the antibiotics usually prescribed for *Campylobacter* infections. Antibiotic resistance may be associated with increased risk of hospitalization, development of a bloodstream infection, or treatment failure in patients. Using WGS, we identified multiple antimicrobial resistance genes and mutations in most isolates from 38 ill people and 10 puppies in this outbreak. This finding matched results from standard antibiotic susceptibility testing methods used by CDC's National Antimicrobial Resistance Monitoring System laboratory on isolates from five ill people and seven puppies in this outbreak. The 12 isolates tested by standard methods were resistant to azithromycin, ciprofloxacin,

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Montgomery MP, Robertson S, Koski L, et al. Multidrug-Resistant Campylobacter jejuni Outbreak Linked to Puppy Exposure — United States, 2016–2018. MMWR Morb Mortal Wkly Rep 2018;67:1032–1035. DOI: http://dx.doi.org/10.15585/mmwr.mm6737a3

Monitoring of AMR in zoonotic bacteria

Legal basis

- Directive 2003/99/EC on the monitoring of zoonoses and zoonotic agents
- Commission Implementing Decision 2013/652/EU on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria
- Commission Implementing Decision 2018/945/EU on the communicable diseases and related special health issues to be covered by epidemiological surveillance as well as relevant case definitions

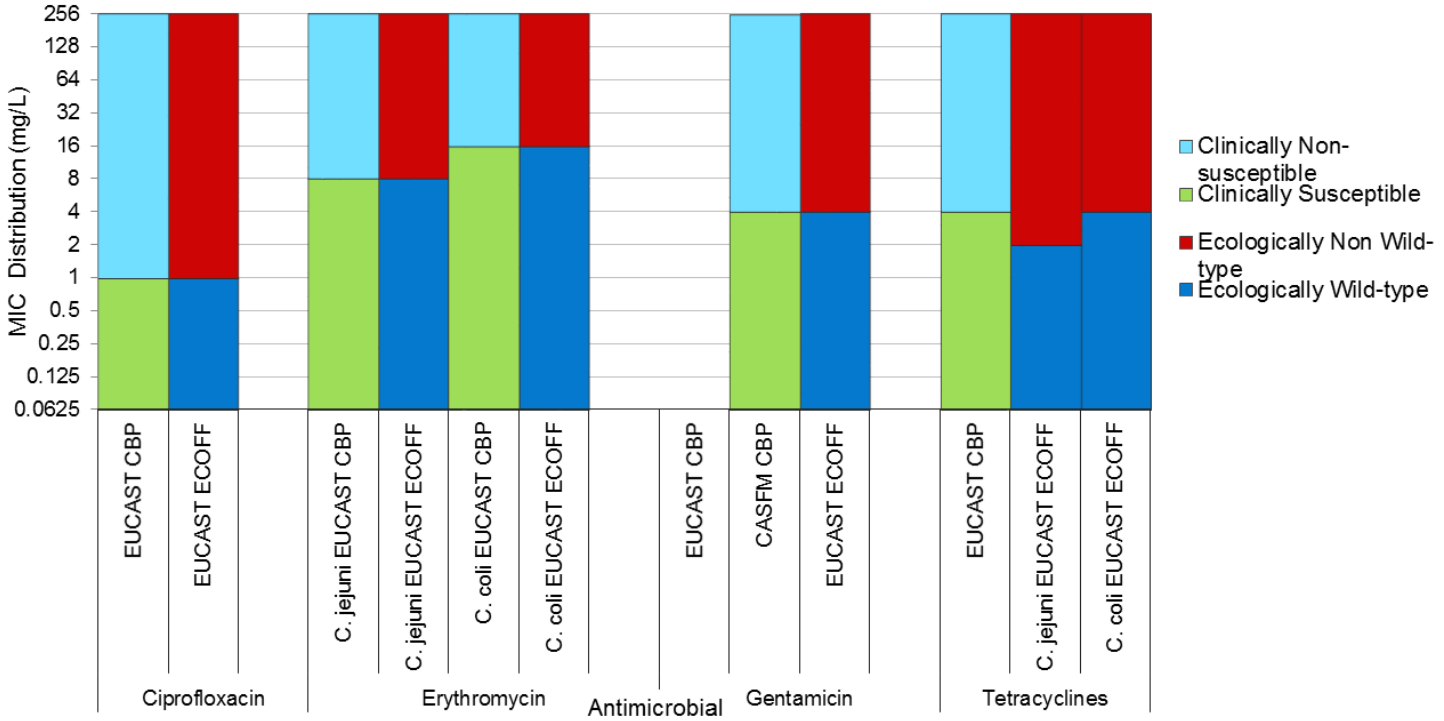
In animals and food, reported to European Food Safety Agency

- *Salmonella,* including ESBL/AmpC- and carbapenemase producers
- *Campylobacter*
- Indicator bacteria - *Escherichia coli,* including ESBL/AmpC- and carbapenemase producers
- Methicillin-resistance in *Staphylococcus aureus*

In humans, reported to ECDC, AST data from cases of

- Salmonellosis, including ESBL/AmpC- and carbapenemase producers
- Campylobacteriosis (accounting for 22% and 24% of human *C. jejuni* and *C. coli* infections reported in 2016)

Harmonising interpretive criteria for *Campylobacter*



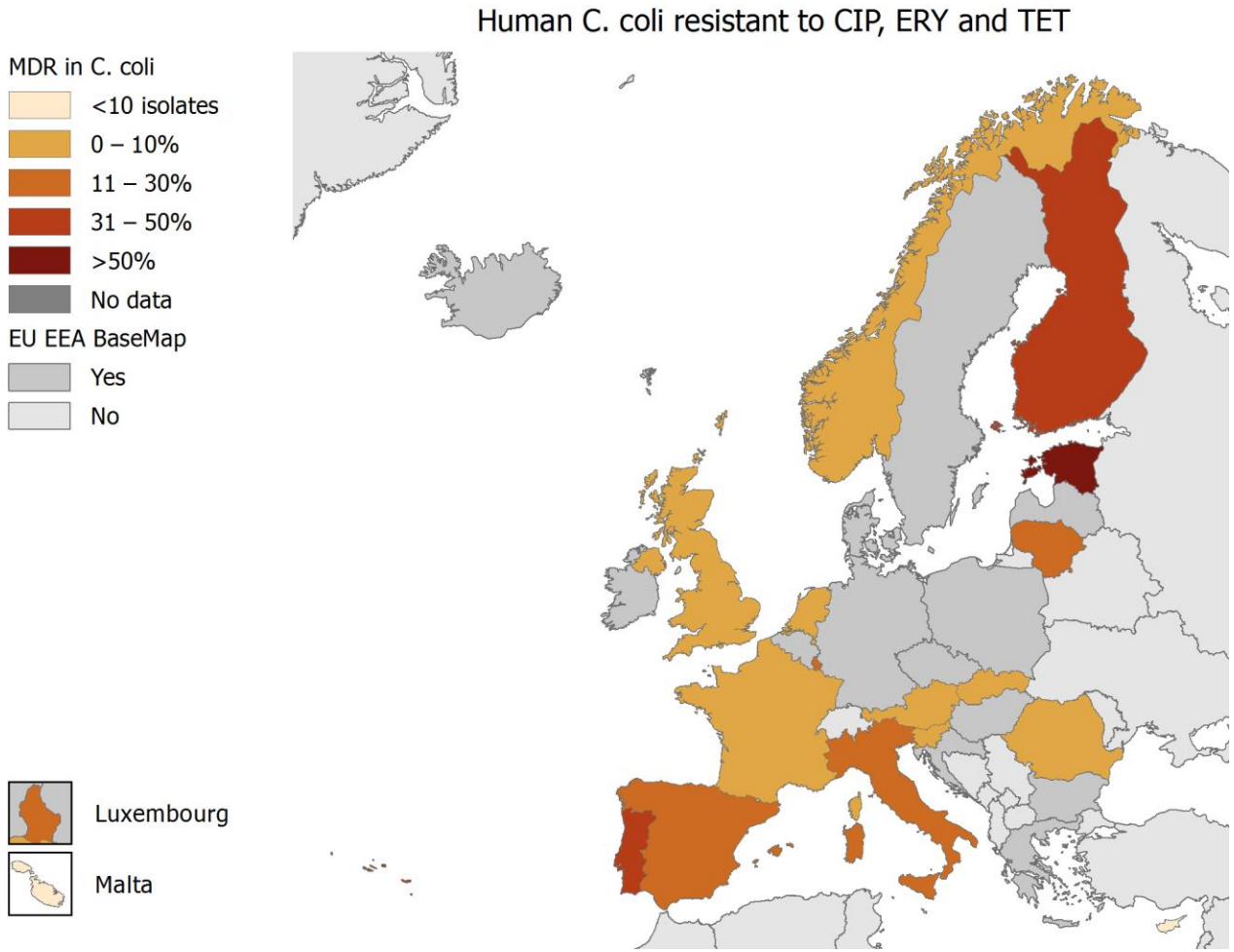
Quantitative data (zone mm or MIC) from clinical isolates interpreted with epidemiological cut-off values (ECOFFs) for enhanced comparability with veterinary sector

When only interpreted (SIR) results are available, 'resistant' and 'intermediate resistant' results are combined. Good alignment with ECOFF.

Antimicrobial resistance in *Campylobacter* from humans and animals

- Resistance common to antimicrobials used for a long time in humans and animals
- High resistance to fluoroquinolones (ciprofloxacin)
  - *C. jejuni* in human isolates 55% (range 33-94%), broilers 67% (8-98%)
  - *C. coli* in human isolates 64% (44-100%), broilers 88% (76-100%), pigs 62% (24-94%)
- Multi-drug resistance and resistance to both critically important antimicrobials generally at low (<1%) level in *C. jejuni* but significantly higher in *C. coli*

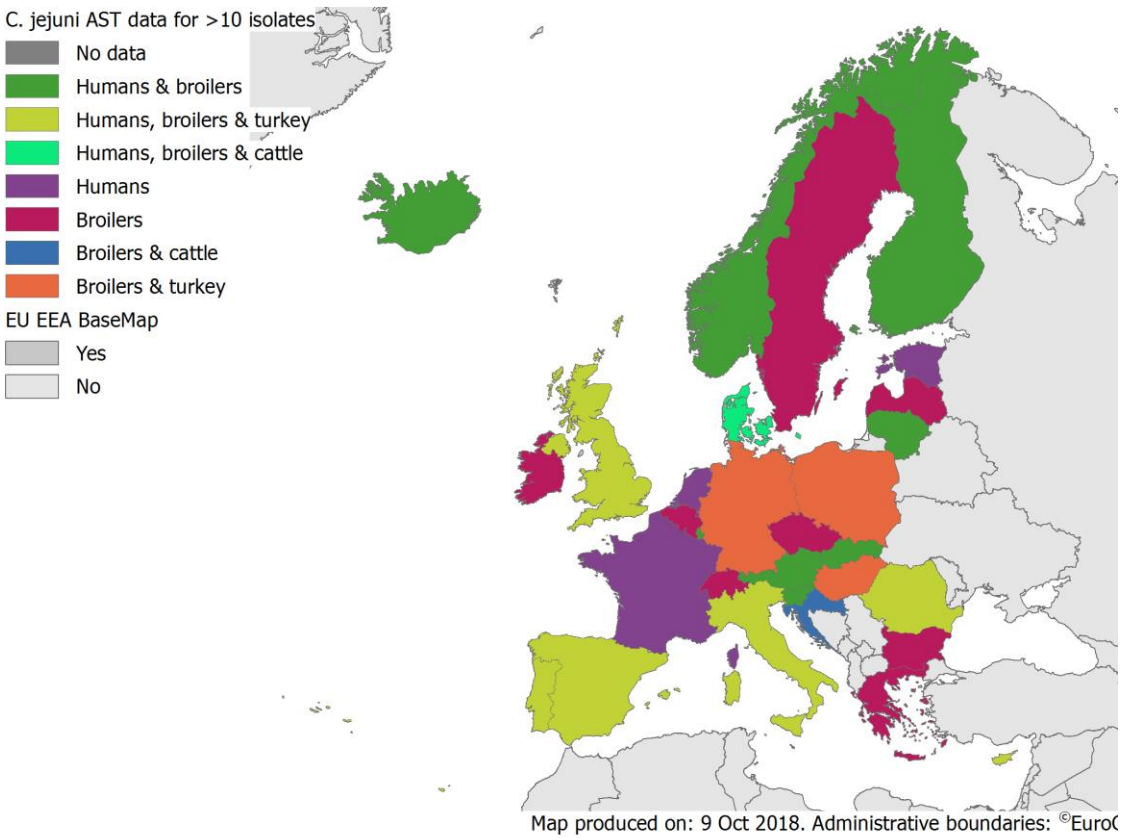
Multidrug resistance in *C. coli* from humans, 2016



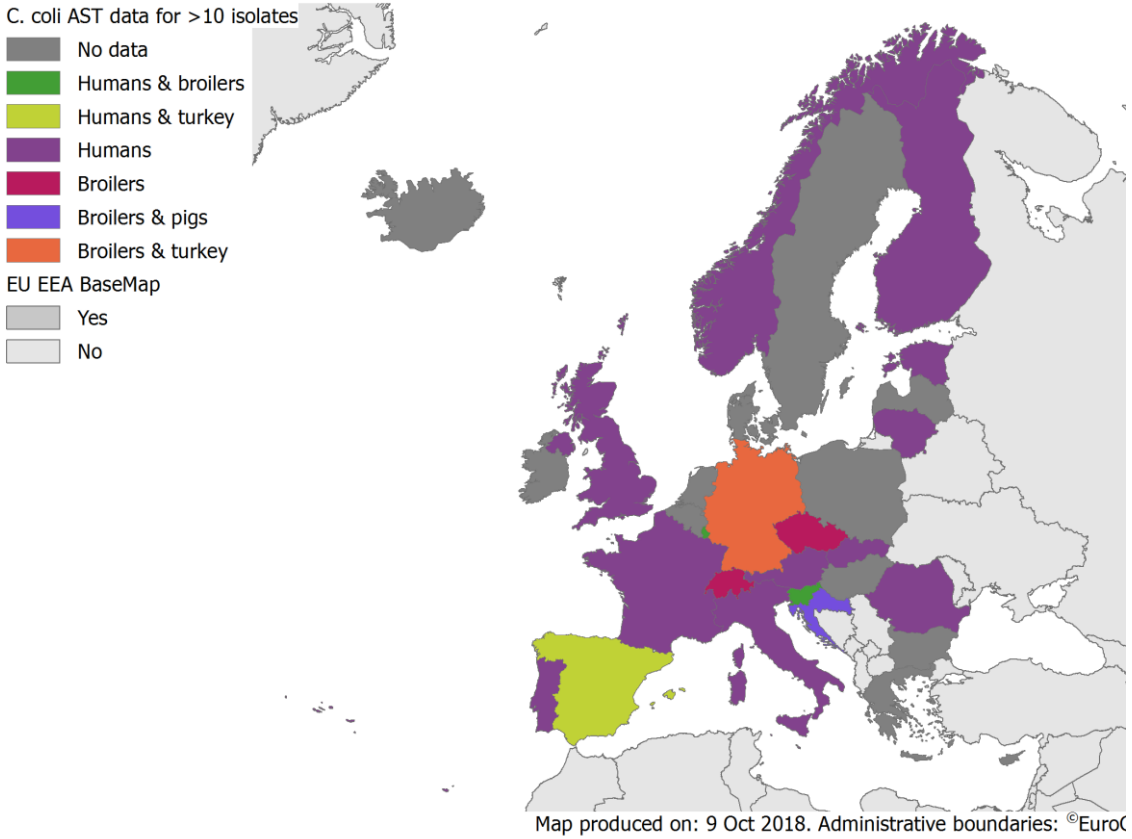
High MDR in some countries to the three antimicrobials commonly used for treatment of severe *Campylobacter* infections

Availability of AMR data 2016 (poultry monitoring year)

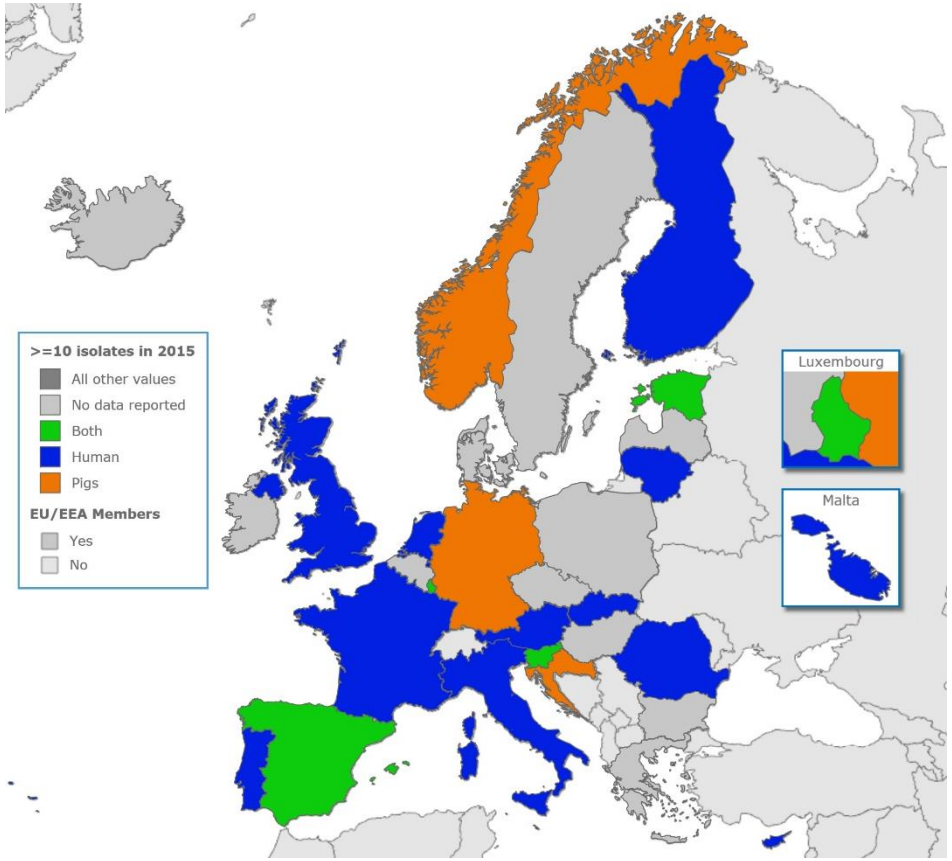
C. jejuni



C. coli



Availability of *C. coli* AMR data 2015 (pigs and cattle monitoring year)



2nd ECDC/EMA/EFSA joint report on antimicrobial consumption and resistance

Comparison consumption of antimicrobials in animals and humans and corresponding resistance

Statistically significant associations between use in animals and resistance in *Campylobacter* from animals and humans to:

- Fluoroquinolones
- Tetracyclines
- Macrolides (particularly *C. coli* but lacking data from pigs)

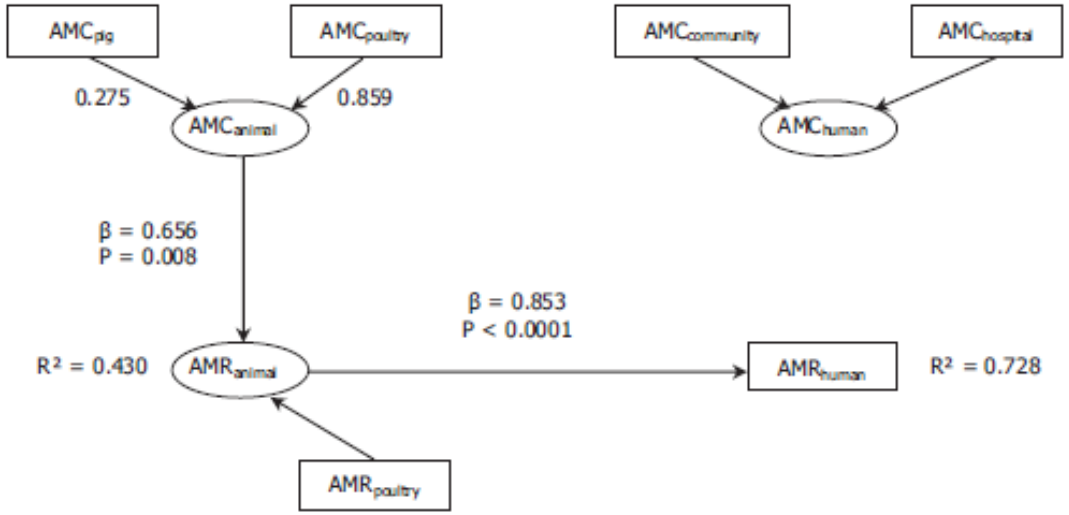
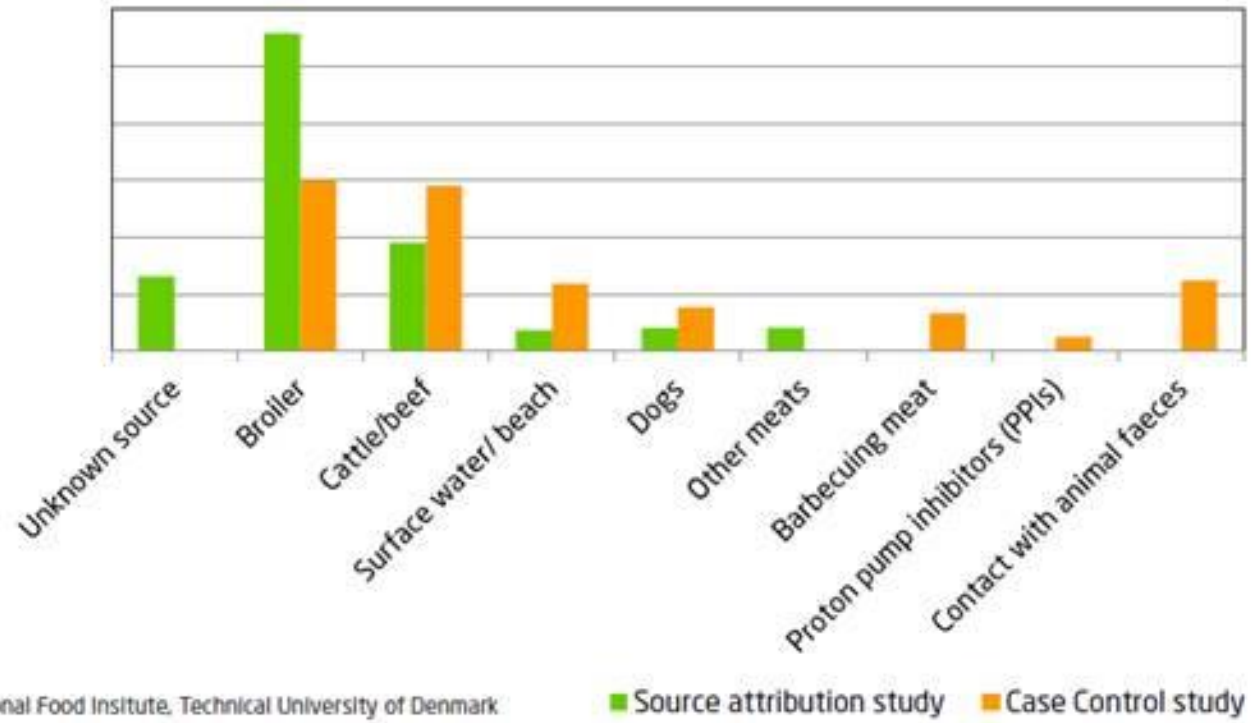


Figure 28. PLS-PM model fluoroquinolones and *C. jejuni*

Source-attribution and case-control study in Denmark

Figure 3.3. The relative importance of each source or risk factor for Campylobacter *assigned by a source attribution study and a case-control study*



Source: National Food Institute, Technical University of Denmark

- Campylobacter control measures implemented in broilers had not had the intended effect on reducing campylobacteriosis
- Large source attribution study, using MLST types, and a large case-control study
- Broiler meat was the largest risk factor, as expected
- Cattle/beef (particularly minced meat) had a much higher impact that previously thought
- Pigs (at least in the source attribution study) only accounted for 1% of cases

Anonymous, 2018. Annual Report on Zoonoses in Denmark 2017, National Food Institute, Technical University of Denmark.

Acknowledgement

Frank Boleart, EFSA, for providing slides on the EUSR 2016

Thank you for your attention!

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