8-9 October 2024

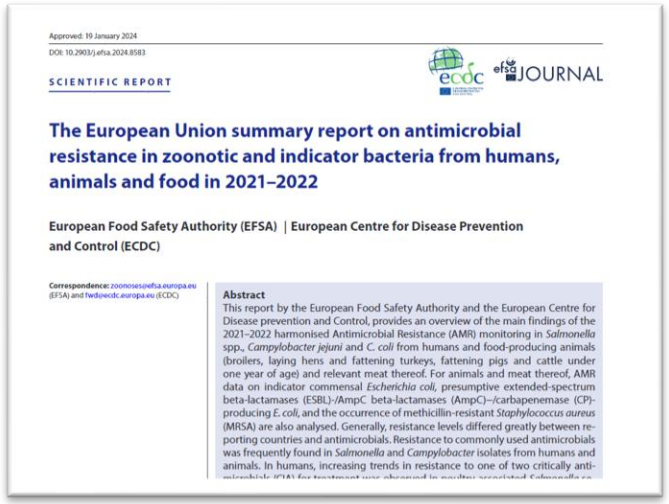
18th EURL-AR Workshop

Monitoring AMR in food-producing animals and food in the EU - 2022 EUSR on AMR

Raquel García Fierro

efsa
EUROPEAN FOOD SAFETY AUTHORITY

2022 EUSR on AMR : New Requirements in the new AMR legislation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SCIENTIFIC REPORT

The European Union summary report on antimicrobial resistance in zoonotic and indicator bacteria from humans, animals and food in 2021–2022

European Food Safety Authority (EFSA) | European Centre for Disease Prevention and Control (ECDC)

Abstract

This report by the European Food Safety Authority and the European Centre for Disease prevention and Control, provides an overview of the main findings of the 2021–2022 harmonised Antimicrobial Resistance (AMR) monitoring in *Salmonella* spp., *Campylobacter jejuni* and *C. coli* from humans and food-producing animals (broilers, laying hens and fattening turkeys, fattening pigs and cattle under one year of age) and relevant meat thereof. For animals and meat thereof, AMR data on indicator commensal *Escherichia coli*, presumptive extended-spectrum beta-lactamases (ESBL)-/AmpC beta-lactamases (AmpC)–/carbapenemase (CP)-producing *E. coli*, and the occurrence of methicillin-resistant *Staphylococcus aureus* (MRSA) are also analysed. Generally, resistance levels differed greatly between reporting countries and antimicrobials. Resistance to commonly used antimicrobials was frequently found in *Salmonella* and *Campylobacter* isolates from humans and animals. In humans, increasing trends in resistance to one of two critically anti-

https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2024.8583

Publication date: 28th of February 2024

Commission Implementing Decision 2020/1729/EU

Lays down specific tech. requirements **2021 - 2027**

Mandatory AMR data for *Salmonella* spp. isolates from:

- Samples of **caecal content** taken at **slaughter** for fattening pigs
- Samples of **caecal content** taken at **slaughter** from bovine animals <1 year of age

Imported fresh **meat** at **Border Control Post** (BCPs) for *E.coli* & *Salmonella (poultry meat)*

New antimicrobial substances

- **Amikacin** → Salmonella spp. and indicator *E.coli*
- **Chloramphenicol** and **Ertapenem** → *Campylobacter* spp.

WGS results

Data on AMR addressed

- AMR data received from 27 MSs, United Kingdom (Northern Ireland) and 4 non-Mss
- 2021 AMR from fattening pigs and calves and derived meat
- 2022 AMR data from poultry flocks and derived meat

AMR MONITORING

AMR **monitoring** is performed on a **biennial basis** and the **sampling** in a **rotating basis**

Good compromise between scientific needs and MSs capacities

Harmonisation contributes to representativeness and reliability of AMR data

. Harmonised Representative **Sampling Designs**

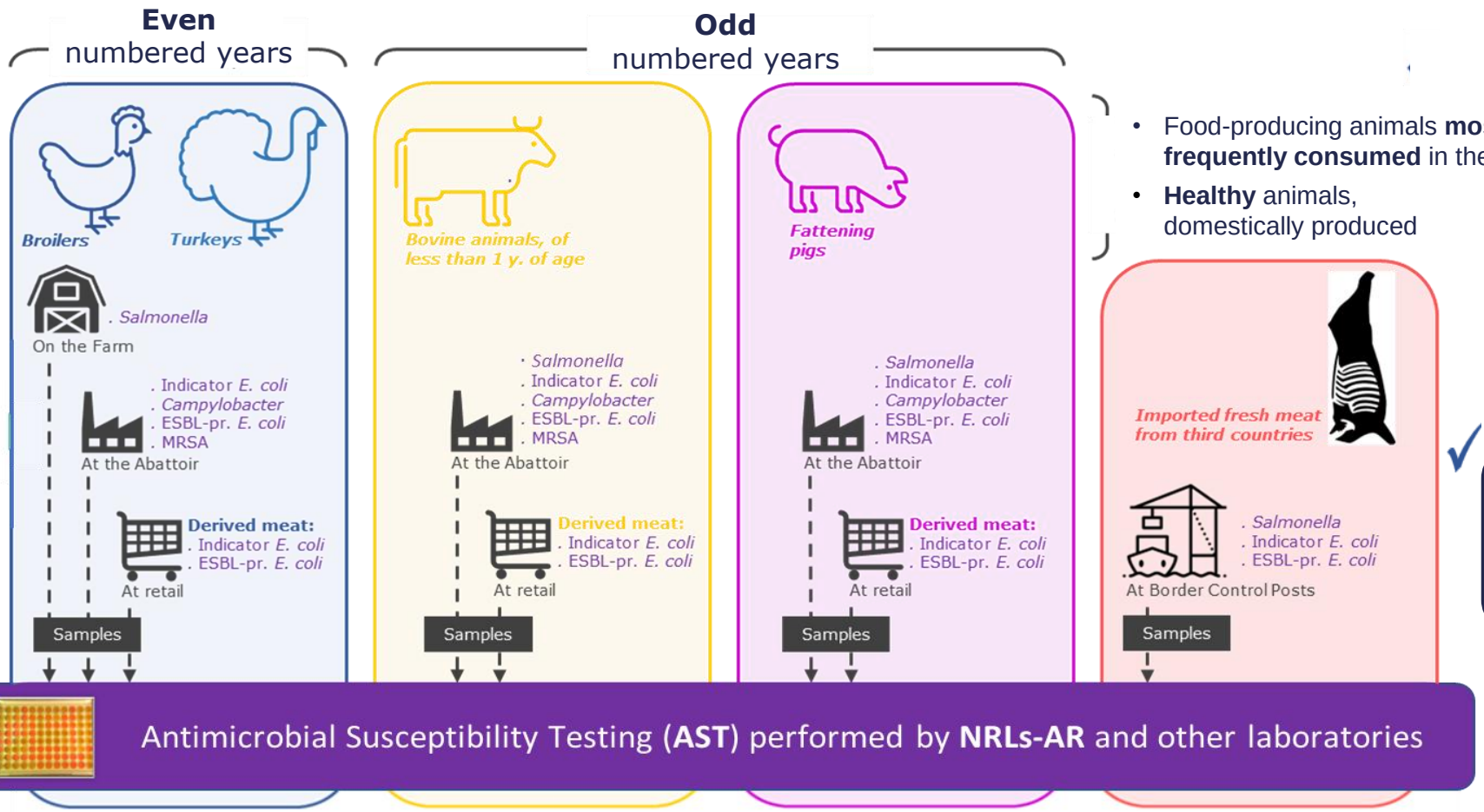
. Harmonised **isolation and identification methods**

. Harmonised AST: **microdilution**

. Harmonised **Panels of Antimicrobials**

. Harmonised Interpretative Criteria of Resistance: **ECOFFs**

. Harmonised **WGS protocols** used on a voluntary basis in 2021 onwards



- Food-producing animals **most frequently consumed** in the EU
- **Healthy** animals, domestically produced

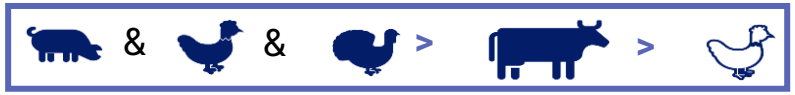
The collection and reporting of data is performed at the **isolate level**

Salmonella spp.

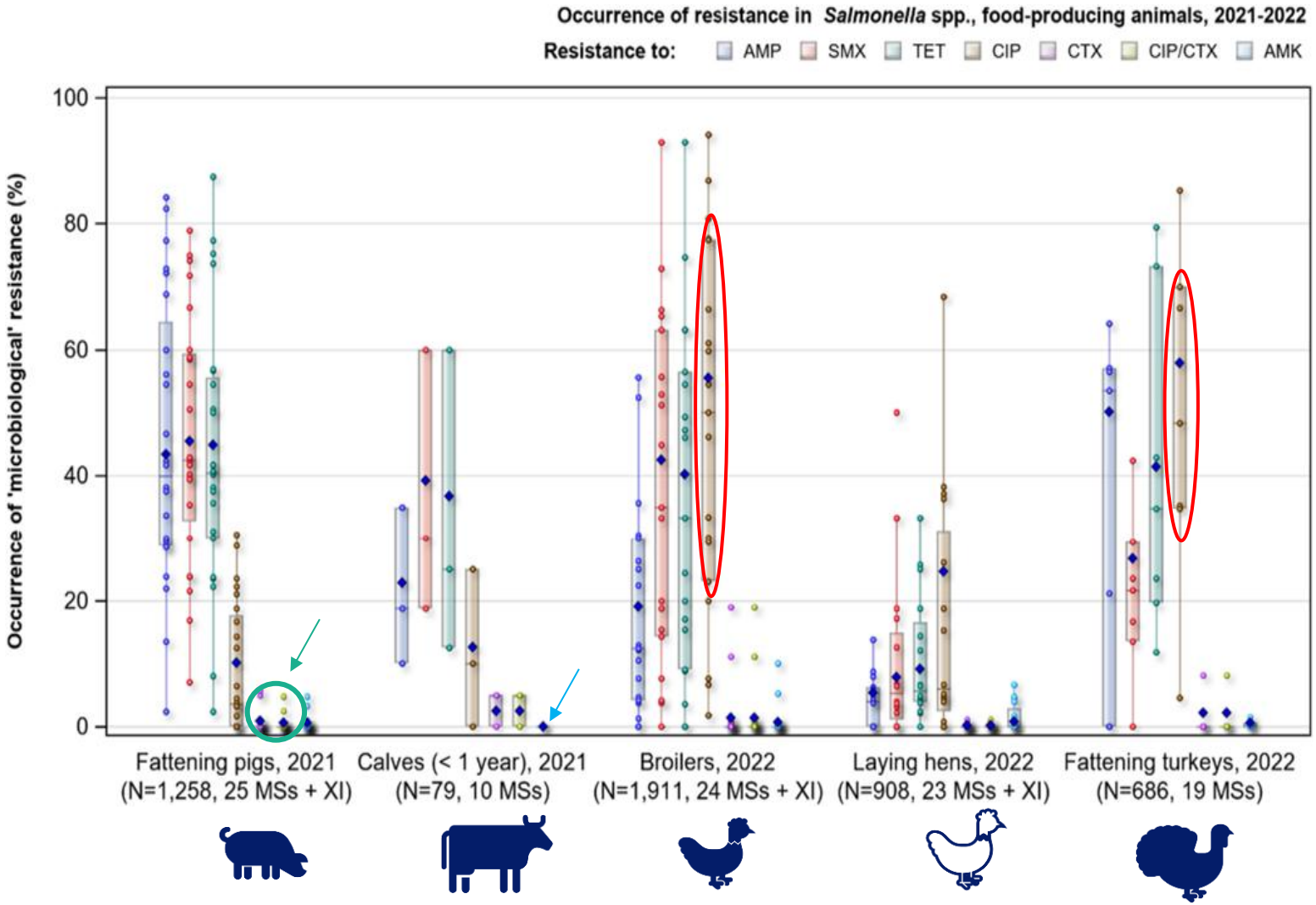
1. AMR - *Salmonella* spp.

1.1 Levels of resistance

- From low (laying hens) to high resistance to AMP, SUL and TET

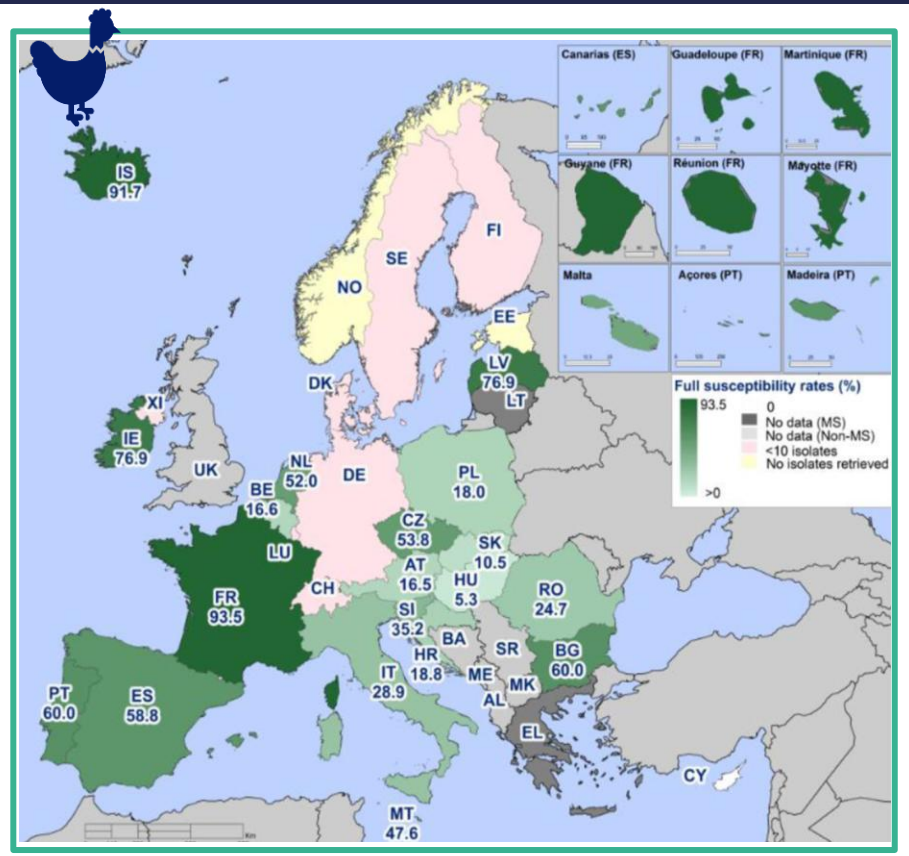


- From moderate (laying hens, pigs and calves) to very high (broilers & turkeys) resistance to *flouroquinolones (CIP)*
- Very low/low resistance to *third generation cephalosporins (CTX) in animals*
- From very low (pigs, turkeys and laying hens) to low (broilers and calves) *combined resistance to CIP/CTX*
- Very low resistance to AMK in all animal populations *and not detected in calves*

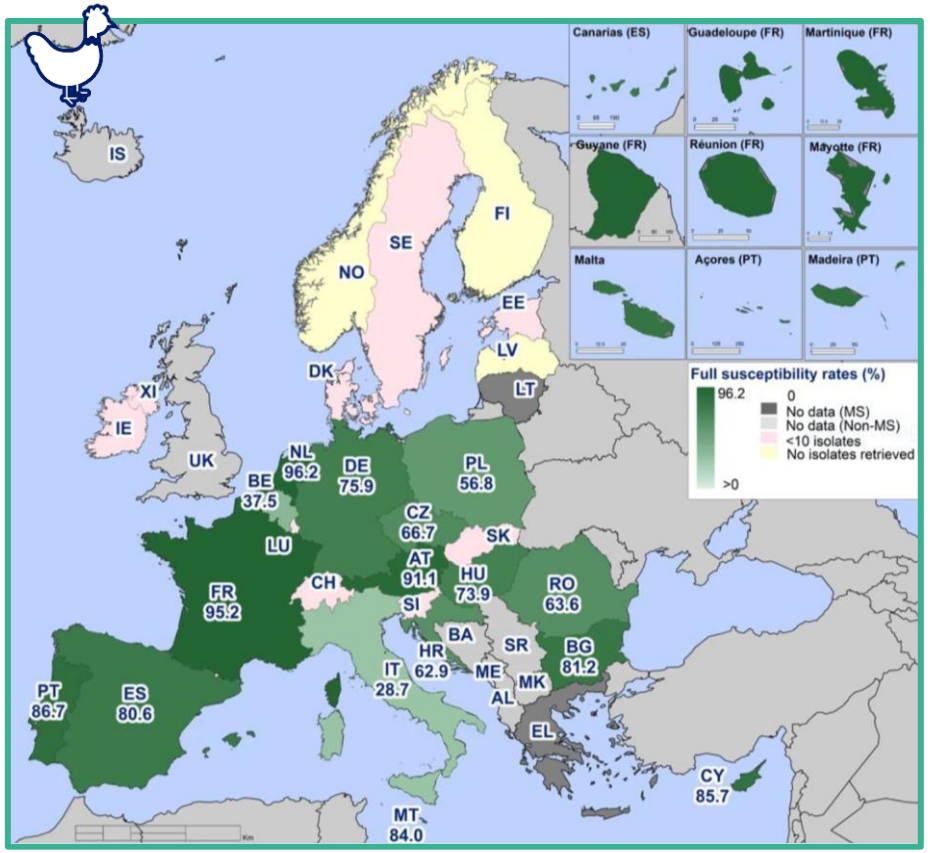


1. AMR - *Salmonella* spp.

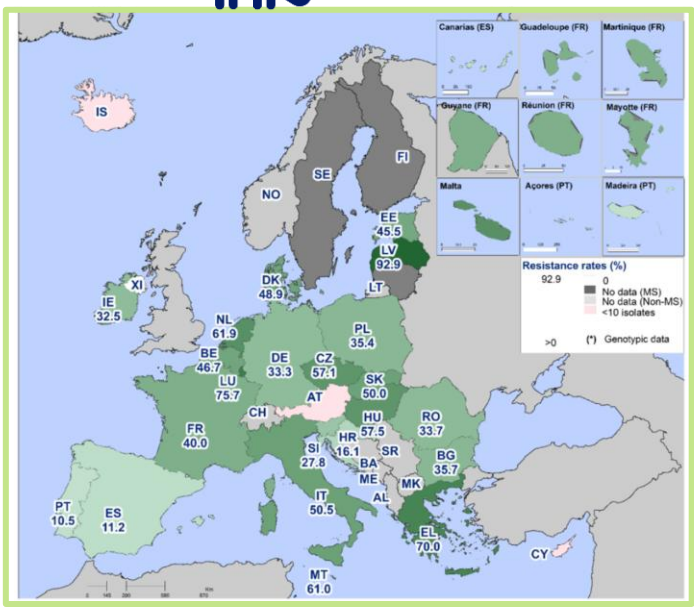
1.2 Complete susceptibility (CS)



2022



2021



- ✓ **Marked variations** in the levels of **CS** between reporting countries, particularly in pigs and broilers and turkeys
- ✓ Generally, **CS** spanned **higher levels** among isolates from laying hens

1. AMR - *Salmonella* spp.

1.3 Phenotypic characterisation

Resistance to 3rd Generation cephalosporins

- **Presumptive ESBL- and/or AmpC-producers were observed at very low levels in pigs, and laying hens**
- **Presumptive ESBL and/or AmpC-producers were observed at low levels in broilers, turkeys and bovines**

Carbapenem resistance

In 2020 and 2021:

- **None of the *Salmonella* isolates recovered from any of the animal populations exhibited 'microbiological' resistance to meropenem**

TABLE 6 Summary of the presumptive ESBL-, AmpC- or CP-producing *Salmonella* spp. from humans and food-producing animals, subjected to supplementary testing (panel 2) or whole genome sequencing, EU MSs, 2021–2022.

Matrix	ESBL and/or AmpC[a] *n* (% R)	ESBL[b] *n* (% R)	AmpC[c] *n* (% R)	ESBL + AmpC[d] *n* (% R)	CP[e] *n* (% R)
Humans 2021 (*N* = 9787, 14 MSs)	88 (0.9)	76 (0.8)	12 (0.1)	0 (0)	0 (0)
Humans 2022 (*N* = 14,058, 26 MSs)	150 (1.1)	122 (0.9)	24 (0.2)	4 (< 0.1)	4 (< 0.1)
Fattening pigs, 2021 (*N* = 1258, 25 MSs + XI)	11 (0.9)	9 (0.7)	0 (0)	2 (0.2)	0 (0)
Calves, 2021 (*N* = 79, 10 MSs)	2 (2.5)	1 (1.3)	0 (0)	1 (1.3)	0 (0)
Broilers, 2022 (*N* = 1911, 24 MSs + XI)	26 (1.4)	26 (1.4)	0 (0)	0 (0)	0 (0)
Fattening turkeys, 2022 (*N* = 686, 19 MSs)	15 (2.2)	15 (2.2)	0 (0)	0 (0)	0 (0)
Laying hens, 2022 (*N* = 908, 23 MSs + XI)	2 (0.2)	2 (0.2)	0 (0)	0 (0)	0 (0)

Abbreviations: AmpC, AmpC beta- lactamase; CP, carbapenemase; ESBL, extended- spectrum beta- lactamase; N, total number of isolates reported; n, number of isolates with the correspondent phenotype; %R, percentage of isolates resistant

[a] According to EUCAST guidelines (EUCAST, 2017), only isolates showing MIC > 1 mg/L for CTX and/or CAZ or reported presence of ESBL-/AmpC- encoding gene were considered (see Appendix F).

[b] All isolates showing clavulanate synergy with CTX or CAZ or both, suggesting ESBL phenotype, or reported presence of ESBL- encoding gene.

[c] Isolates with cefoxitin resistance, suggesting AmpC phenotype, or reported presence of AmpC- encoding gene.

[d] Isolates showing synergy with CTX or CAZ and cefoxitin resistance, suggesting ESBL- and AmpC- enzymes in the same isolates, or both ESBL- and AmpC- encoding genes reported.

[e] Isolates with meropenem resistance or CP- encoding gene reported.

Campylobacter spp.

2. AMR – *Campylobacter* spp.

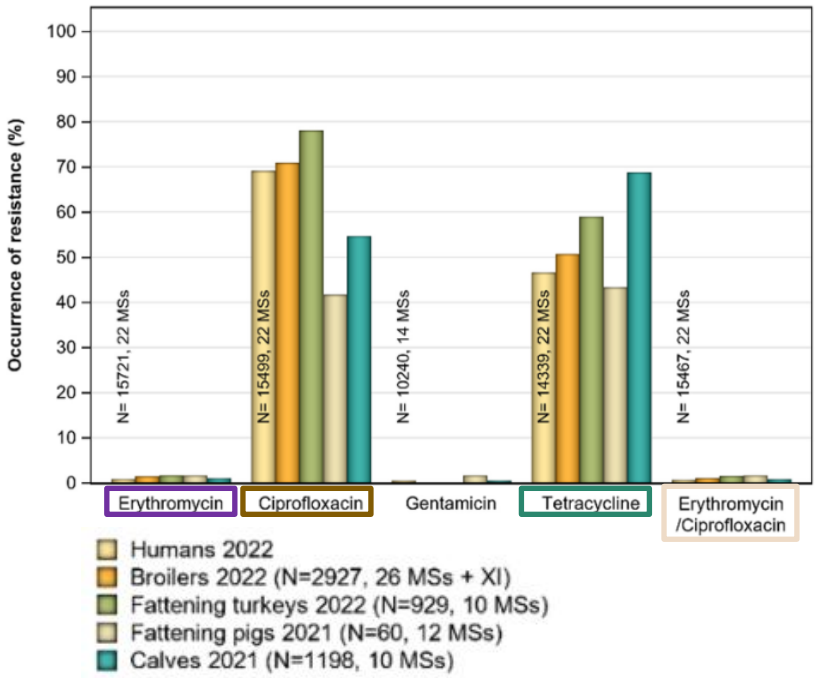
2.1. Levels of resistance

- The level of overall resistance to **TET** ranged from **high** to **extremely high** in food-producing animals in ***C. jejuni*** *and* ***C. coli***
- **Very high** resistance levels to **CIP** in ***C.jejuni*** and ***C.coli*** in food-producing animals
- Resistance to **ERY** at **low** levels in ***C.jejuni*** in animals, while higher levels of resistance detected in ***C. coli***
- Combined resistance to **CIP/ERY**:

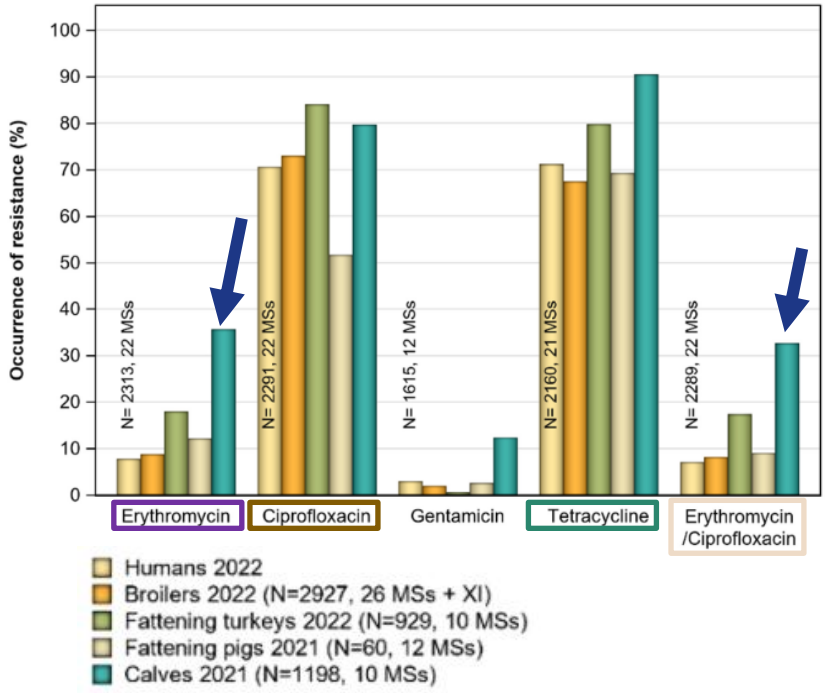
Rare to **low** in ***C. jejuni*** from poultry, pigs and calves

Low in ***C. coli*** from pigs and broilers, and **moderate** in ***C. coli*** isolated from fattening turkeys and calves

C. jejuni



C. coli

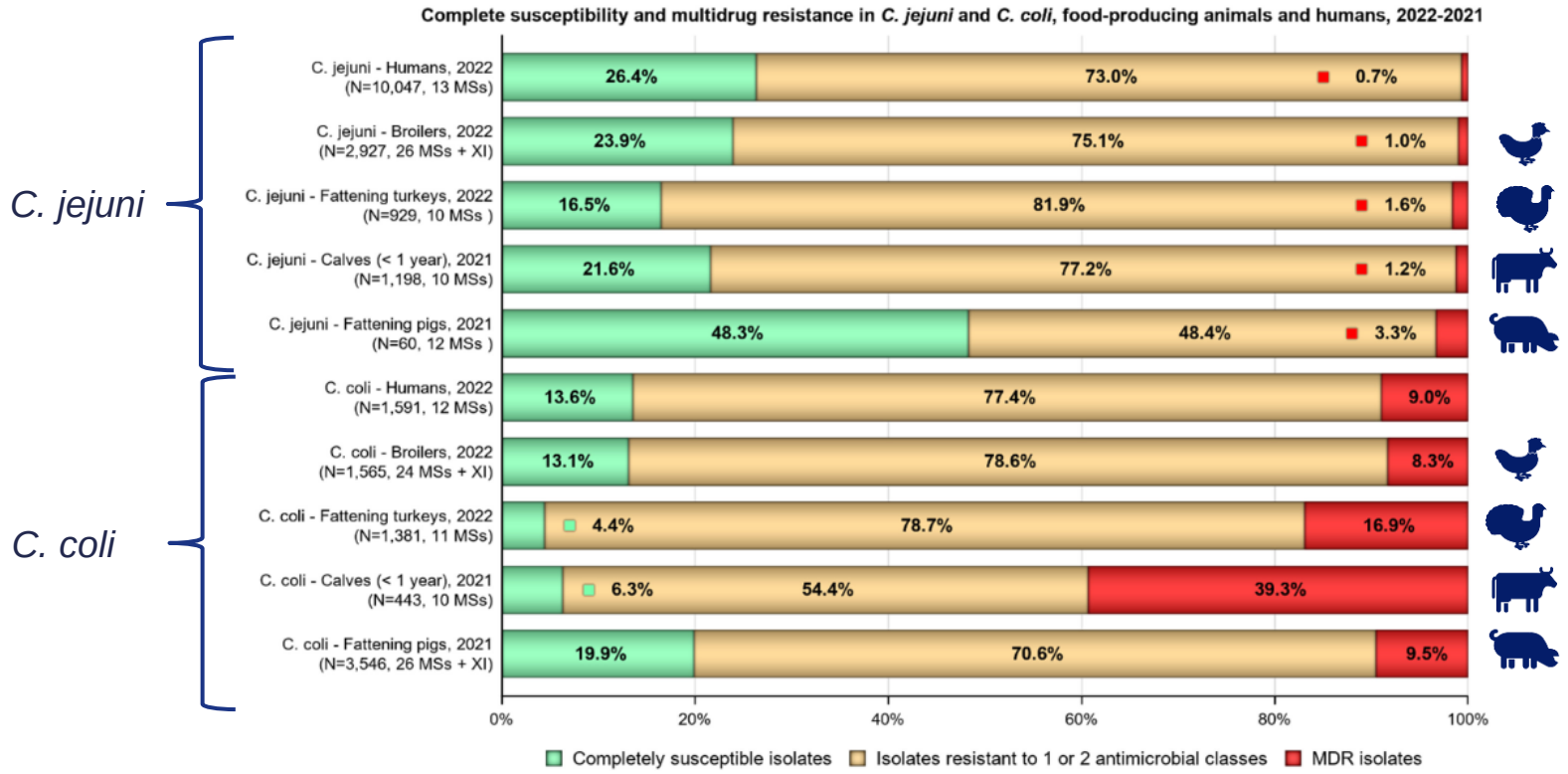


- Resistance to **chloramphenicol** and **ertapenem** in isolates from pigs and calves was either **absent** or **very low**, except for an **unexpected higher level of resistance to ertapenem** reported in ***C. coli*** **isolated from calves** in 2021

2. AMR – *Campylobacter* spp.

2.2. MDR and CS

- **Multidrug resistance**: generally low for ***C. jejuni*** from animals, while it was markedly higher in ***C. coli*** isolated from calves, pigs and turkeys. These results agree with the higher levels of resistance to selected antimicrobials seen in *C. coli* isolates.
- Overall, **complete susceptibility** (i.e. defined in the report as susceptibility to CIP, ERY, TET and GEN) was higher in ***C. jejuni*** than in ***C. coli*** isolates in food-producing animals.

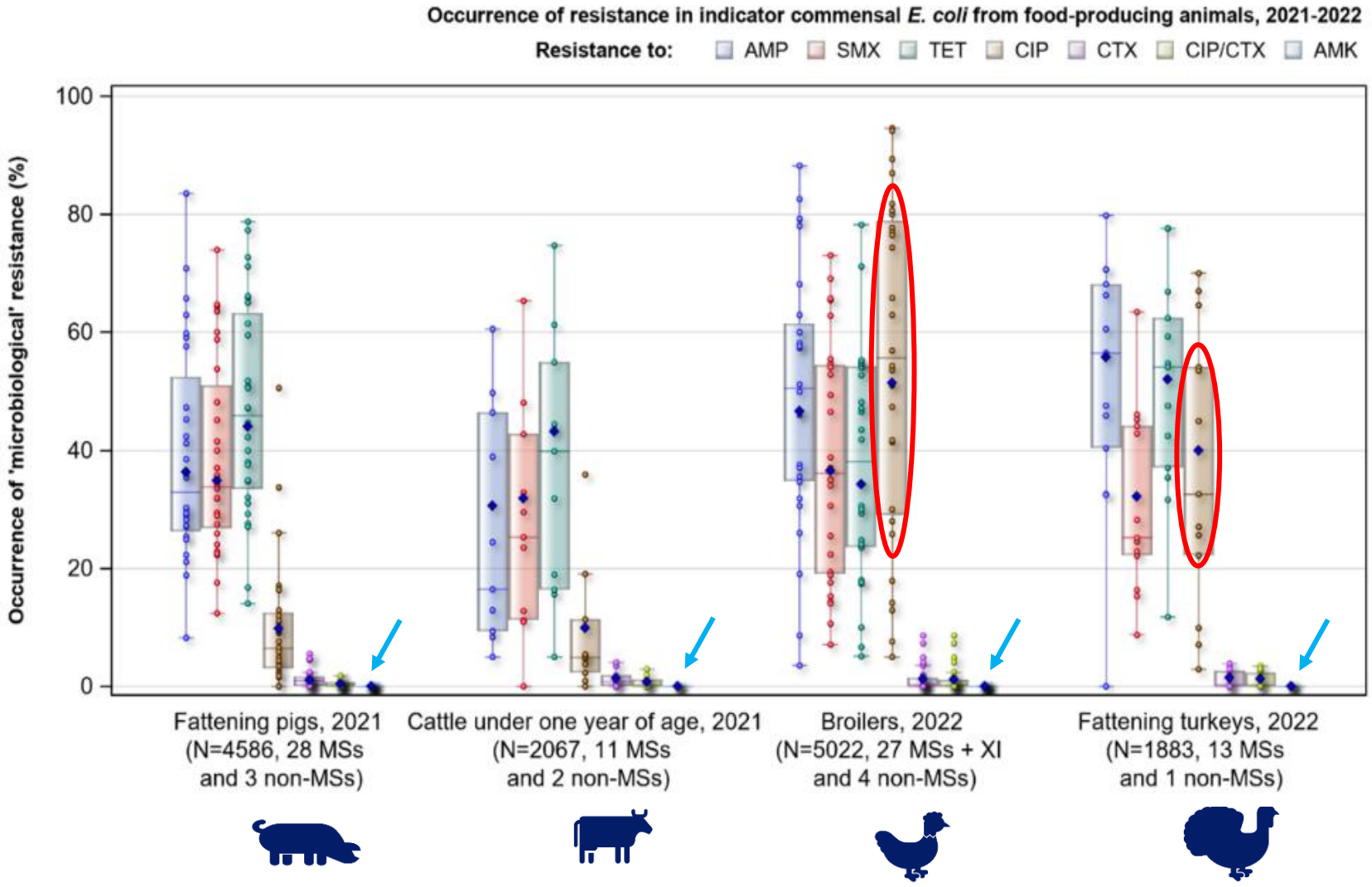


Indicator E. coli

3. AMR - Indicator *E.coli*

3.1 Levels of resistance

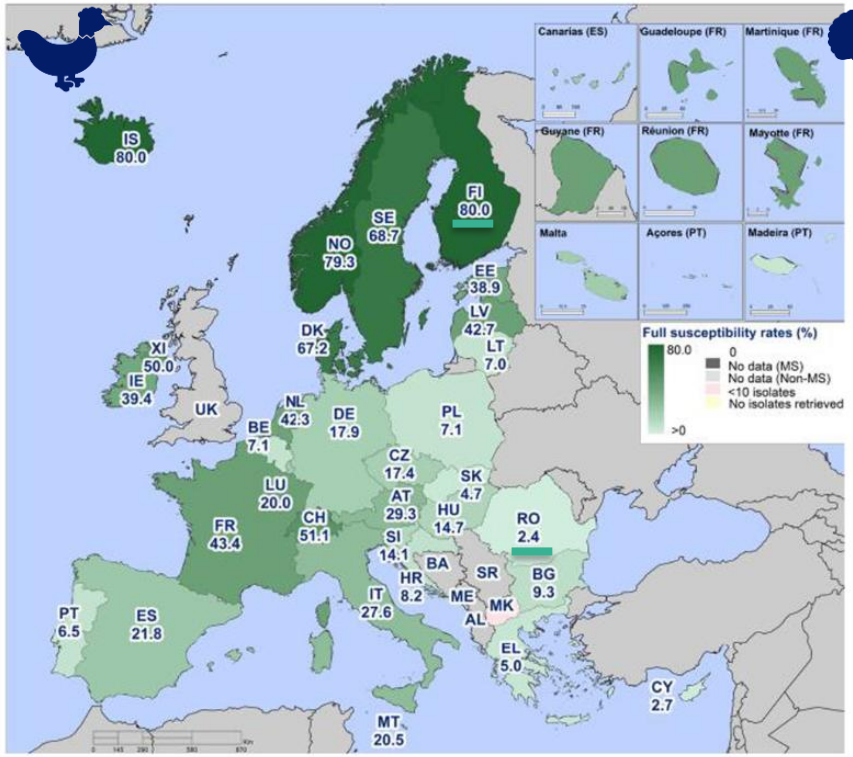
- **High** levels of resistance to commonly used antimicrobials (AMP, SMX, TET)
- **Important resistance** to fluoroquinolones (***CIP***) in broilers and turkeys
- Low resistance to cefotaxime (**CTX**)
- Combined resistance to **third-generation cephalosporins** and **fluoroquinolones** (***CIP/CTX***) was generally **uncommon** in all animal categories.
- Resistance to high priority critically important antimicrobials (HPCIA) was **uncommon** for colistin and azithromycin
- Very low levels of resistance to **AMK**

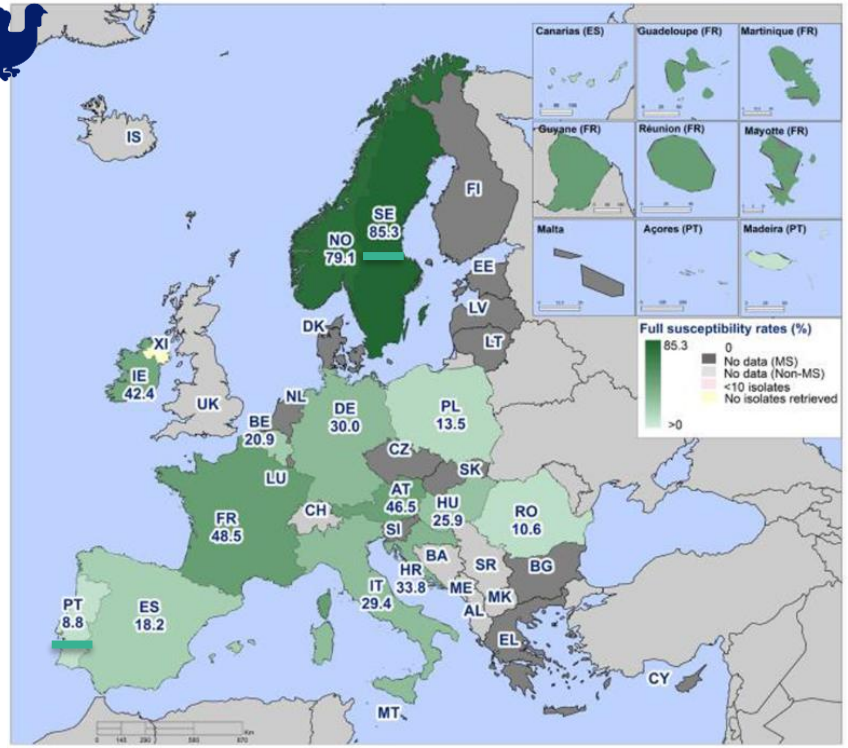


3. AMR- Indicator *E.coli*

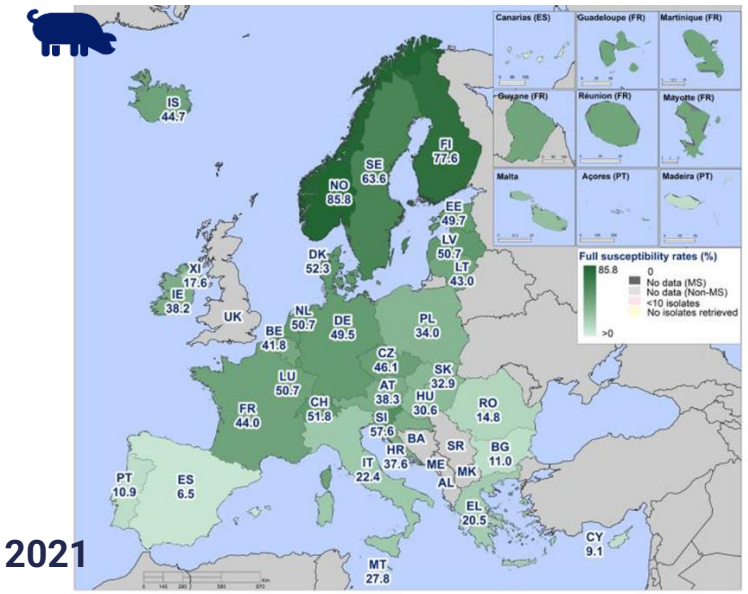
3.2 Complete susceptibility (CS)

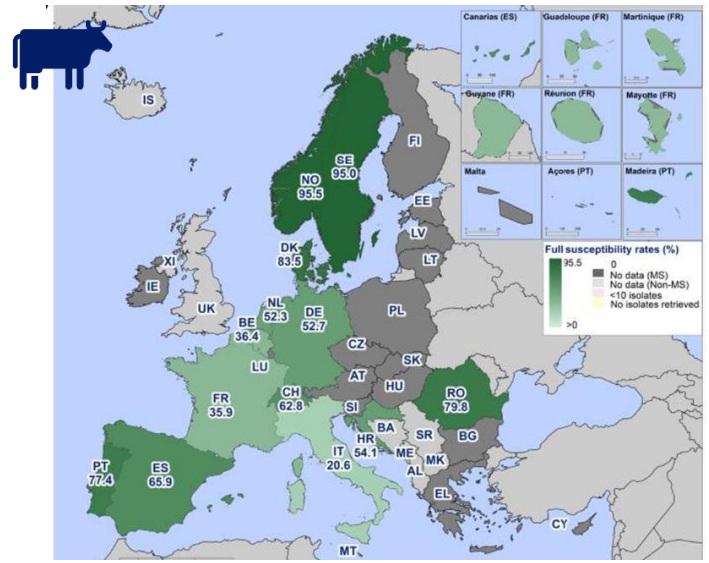
2022





2021



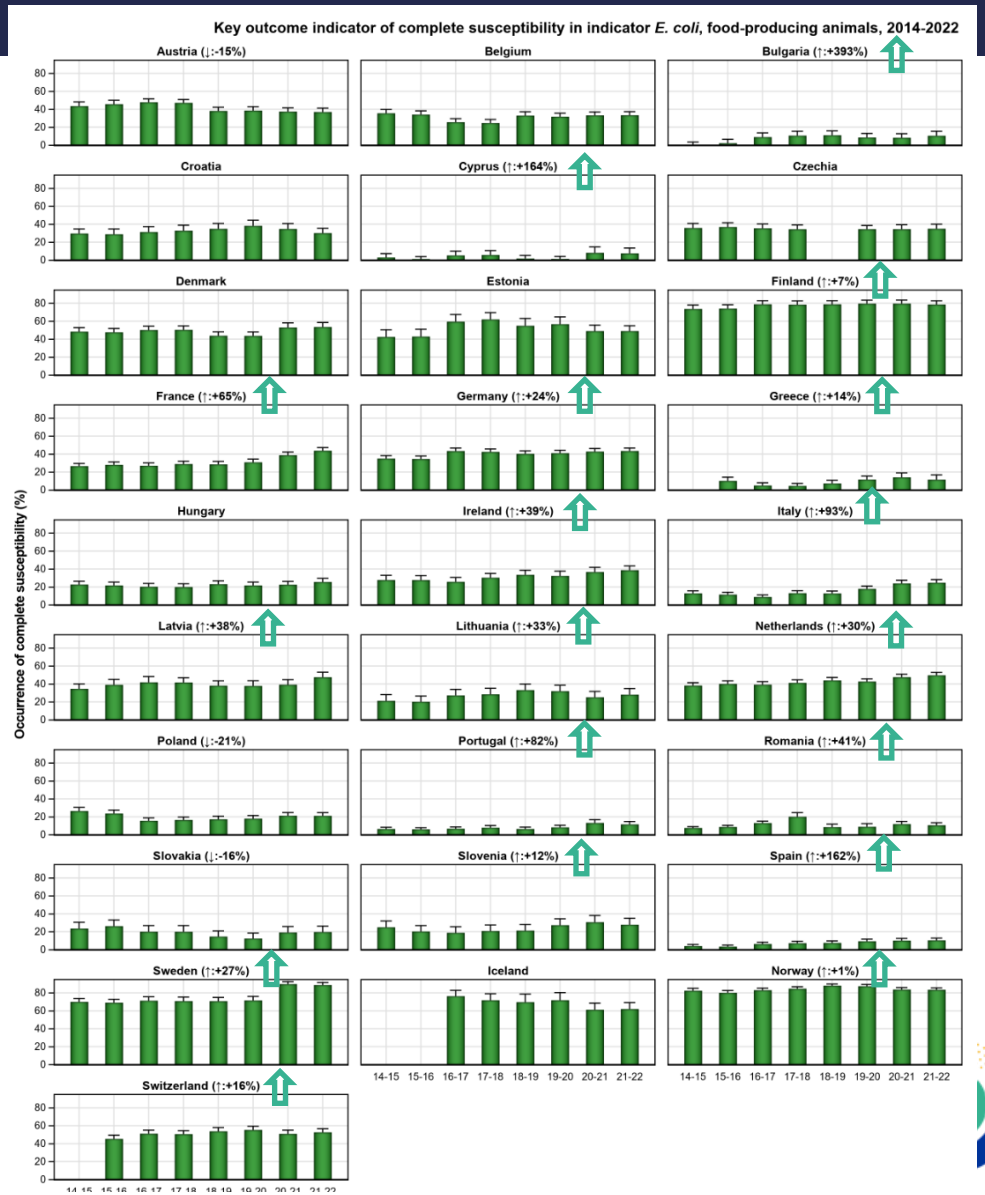


- **CS** more common in **fattening pigs** and **calves** than in broilers and fattening turkeys
- **Marked variations between countries**: a North to South gradient / an East to West gradient

3. AMR- Indicator *E.coli*

3.2 Key Outcome indicator on Complete susceptibility (KOI_{CS})

- Marked variations among the 28 reporting countries.
- **Lower KOI_{CS}** were generally observed in countries **in eastern and southern Europe** and the **highest** in countries in the northern Europe
- Levels of KOI_{CS} were:
  <20% in six countries,
  20-40% in eleven countries,
  40-60% in seven countries,
  60-80% in two countries (FI, IS) and
  >80% in two countries (SE, NO)
- Statistically significant **decreasing** trends in 3 countries
- Statistically significant **increasing** trends (from 2014-2022) in **18 countries → 64% of reporting countries**



3. AMR- Indicator *E.coli*

3.2 Key Outcome indicator on prevalence of ESBL-/AmpC- E.coli

- Marked variations in the prevalence of presumptive ESBL and/or AmpC-producers among the 31 reporting countries
- **Lower KOI_{ESBL} were generally observed in countries in northern Europe** and the highest in countries in the eastern and southern Europe
- Levels of KOI_{ESBL} were:
  <20% in nine countries,
  20-40% in five countries,
  40-60% in twelve countries,
  60-80% in four countries (SE) and
  >80% no countries
- Statistically significant **increasing** trends in 3 countries
- Statistically significant **decreasing** trends in 23 countries → **77% of reporting countries**

Genotypic data:
Austria
Czechia
Germany
Finland
Italy
Ireland
Sweden

3. AMR- Indicator *E.coli*

3.2 Key Outcome indicators KOIs - Key messages

- **Increase** in the proportion of indicator *E. coli* exhibiting '**complete susceptibility**' **or 'zero resistance' to a harmonised set of important antimicrobials**

From 2014-2022 increasing trend in 64% of the reporting countries

- A **decline** in the **prevalence of ESBL-/AmpC-producing *E. coli***

From 2015-2022 decreasing trend in 77% of the reporting countries

… **reveal significant progress** in the reduction of AMR in food-producing animals in several countries and in the EU group

4. AMR - ESBL and/or AMPC- producing *E.coli*

4.2 WGS results

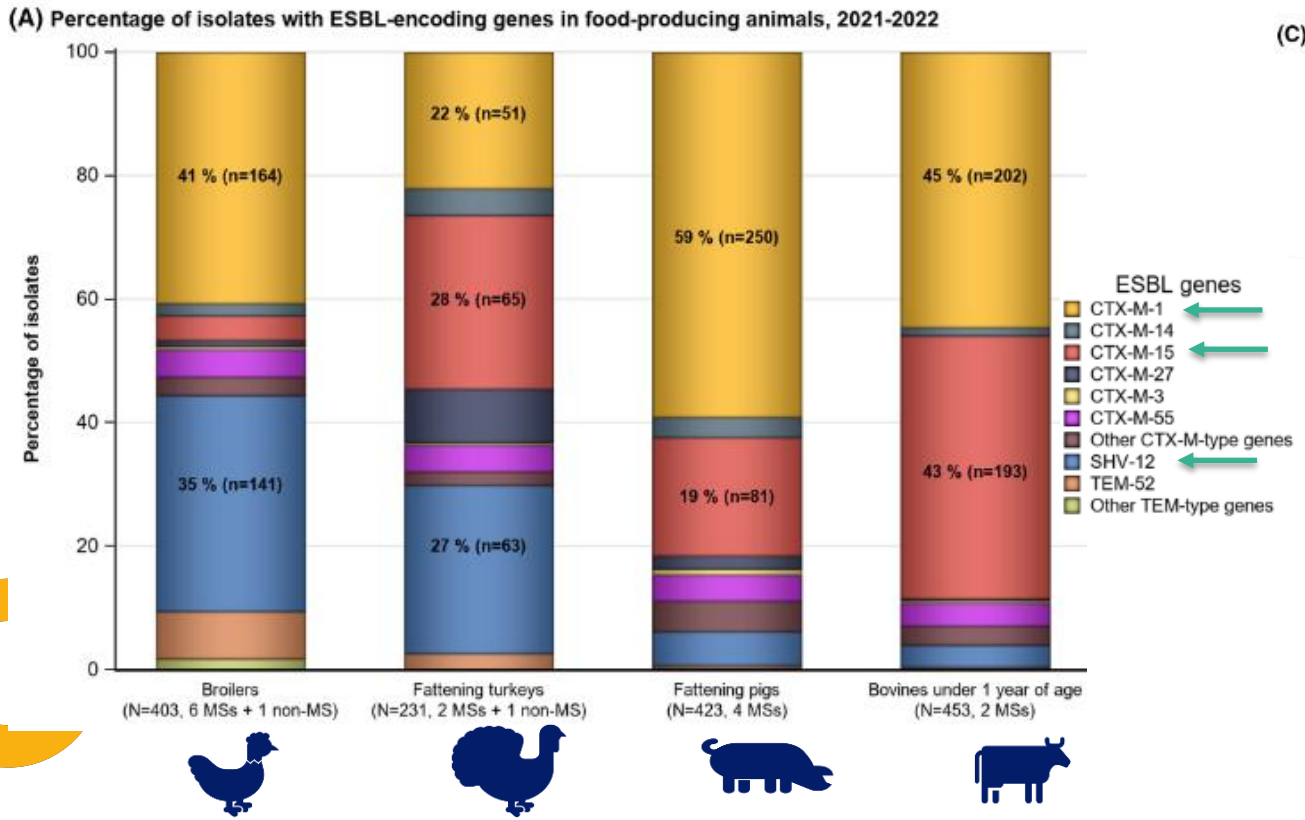
Genotypic data from:

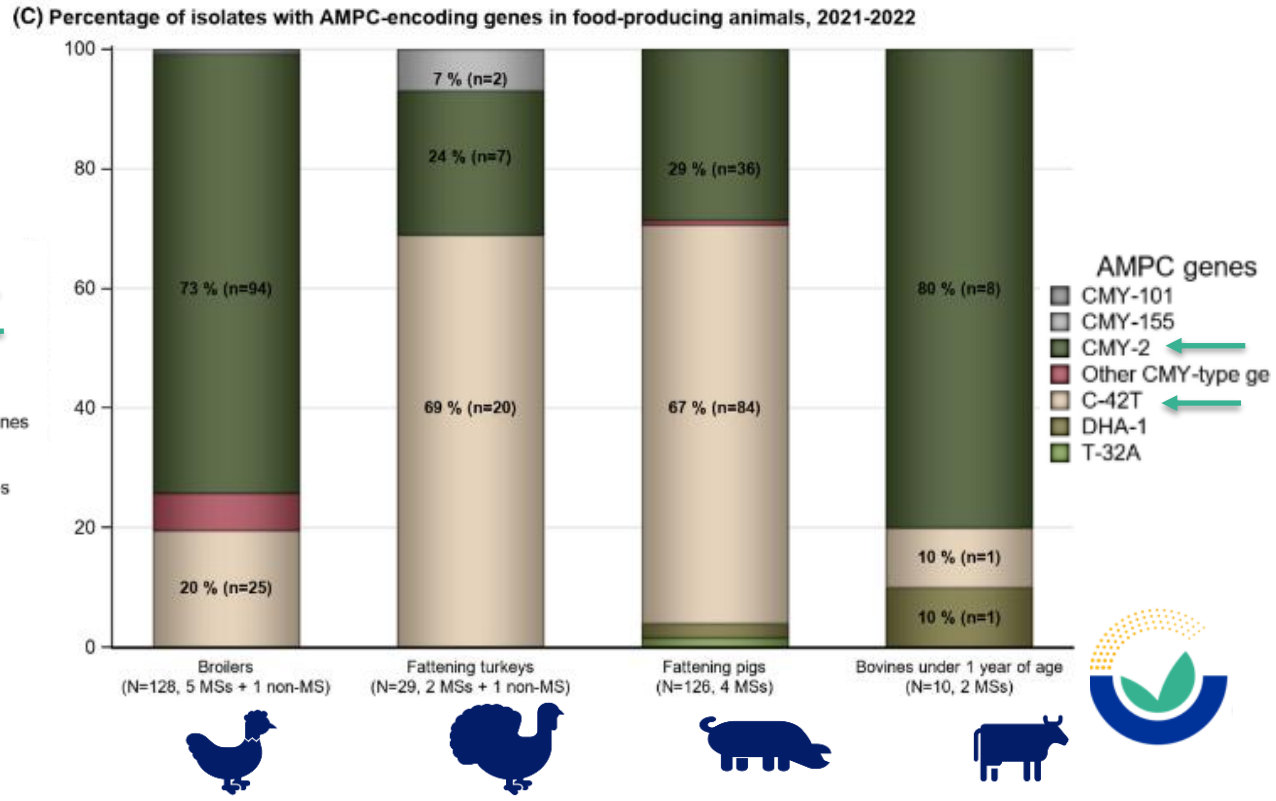
Austria
Czechia
Germany
Finland
Italy
Ireland
Sweden

Genotypic data reported

2021 ➡ Provided by 4 MSs

2022 ➡ Provided by 7 MSs





CP-producers specific monitoring

5. AMR – CP- producing *E.coli*

4.2 WGS results

4.Carbapenems a last resort antibiotics:

Salmonella spp.: **Carbapenem-R** was found in humans (4 confirmed isolates (*bla*$_{OXA-48}$)) but **not** in food-producing animals

E. coli: **Carbapenem-R** was detected in food-producing animals

Occurrence of carbapenem-R is still reported at **very low** levels

BUT

Presence of carbapenemase-producing bacteria in humans and in food-producing animals in

- Several countries
- Several animal species
- Several genes

… **requires attention and further investigation**

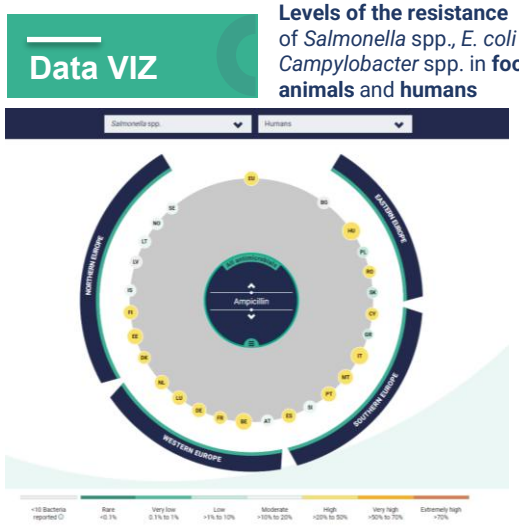
Table 20: Summary table on carbapenemase-encoding genes reported in *Escherichia coli* sampled in the routine monitoring, the specific monitoring of ESBL-/AmpC-/CP-producers and the specific monitoring of CP-producers in 2021 and 2022.

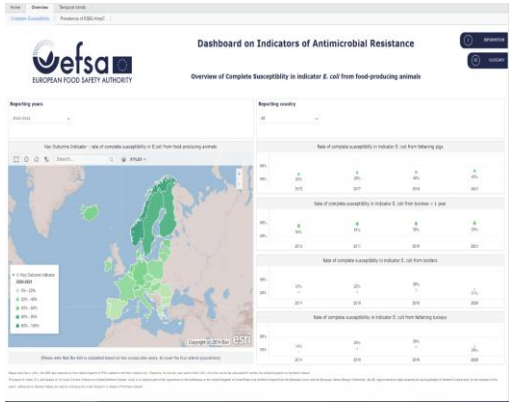
Year	Matrix	Gene	Number of isolates	Number of countries detecting the isolates
Routine monitoring of indicator *E. coli*				
2022	Fattening turkeys	*bla*$_{OXA-181}$	1	1 (IT)
Specific monitoring of ESBL-/AmpC-/CP-producing *E. coli*				
2021	Pig meat at retail	*bla*$_{NDM-5}$	1	1 (HU)
	Cattle meat at retail	*bla*$_{NDM-5}$	2	1 (HU)
2022	Broilers	*bla*$_{VIM-1}$	3	2 (AT, IT)
Specific monitoring of CP-producing *E. coli*				
2021	Fattening pigs	*bla*$_{OXA-48}$	3	2 (ES, IT)
		bla$_{OXA-181}$	20	1 (IT)
		bla$_{NDM-5}$	3	1 (CZ)
	Cattle under one year of age	*bla*$_{NDM-5}$	1	1 (IT)
		bla$_{OXA-181}$	4	1 (IT)
2022	Fattening turkeys	*bla*$_{OXA-181}$	1	1 (IT)

Online Visualisation tools

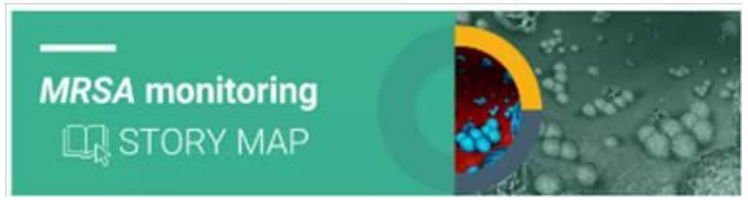
MODERNISATION - ONLINE VISUALISATION TOOLS: DASHBOARDS & STORY MAPS

- **2021 visualisation tools**

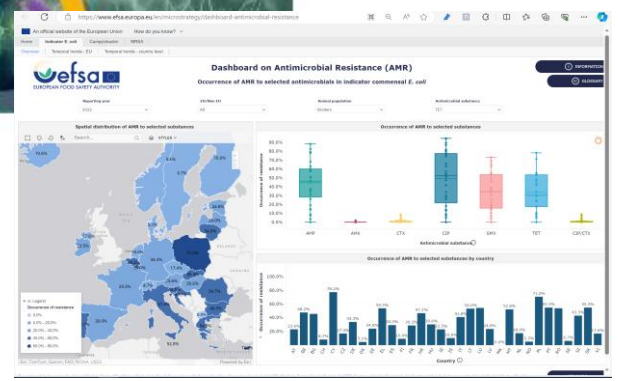




- **2022 Visualisation tools**



Monitoring AMR in indicator *E. coli* *(update)*



Thanks for your attention!

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