

Annex E - Data on presumptive ESBL-, AmpC- and/or carbapenemase-producing microorganisms and their resistance occurrence (routine and specific monitoring)

Annex to:

EFSA (European Food Safety Authority) and ECDC (European Centre for Disease Prevention and Control), 2021. **The European Union Summary Report on Antimicrobial Resistance in zoonotic and indicator bacteria from humans, animals and food in 2018/2019**. EFSA Journal 2021;19(4):6490, doi:10.2903/j.efsa.2021.6490

© 2021 European Food Safety Authority. *EFSA Journal* published by John Wiley and Sons Ltd on behalf of European Food Safety Authority.

Table of contents

Annex E - Data on presumptive ESBL-, AmpC- and/or carbapenemase-producing microorganisms and their resistance occurrence (routine and specific monitoring)	1
E.1. ESBL-, AmpC-producers prevalence maps	3
E.2. ESBL-, AmpC-, carbapenemase-producers prevalence and occurrence tables – poultry 2018	11
E.3. ESBL-, AmpC-producers prevalence and occurrence tables – pigs and cattle and meat thereof, 2019	26
E.5. Key outcome indicator of prevalence of ESBL- and/or AmpC- producing <i>E. coli</i> , food-producing animals, 2015-2019.....	44
E.4. Specific carbapenemase-producing <i>E. coli</i> monitoring 2018-2019.....	45

According to Commission Implementing Decision 2013/652/EU¹, MSs determined the susceptibility of *Salmonella* spp., and indicator commensal *E. coli* to selected antimicrobials belonging to different classes (Panel 1). All *Salmonella* spp. and indicator *E. coli* isolates, that after testing with Panel 1 were found to be resistant to cefotaxime, ceftazidime or meropenem, were further tested with a second panel of different beta-lactams that included among others, third generation cephalosporins and carbapenems (Panel 2) in order to phenotypically detect presumptive ESBL- AmpC- and/or carbapenemase producers. All isolates collected within the specific monitoring for ESBL/AMPC/carbapenemase-producing *E. coli* and/or carbapenemase-producing microorganisms, were tested for their susceptibility to both Panel 1 and Panel 2. More information is provided in Annex A, materials and methods, available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).

For this report, the categorisation of isolates resistant to third-generation cephalosporins and/or carbapenems in presumptive ESBL, AmpC or carbapenemase producers was carried out primarily based on the EUCAST guidelines for detection of resistance mechanisms and specific resistances of clinical and/or epidemiological importance (EUCAST, 2017) and consulted experts' knowledge. In total, for the third generation cephalosporin- and/or carbapenem-resistant isolates, five main categorizations are made: 1. ESBL phenotype; 2. AmpC phenotype; 3. ESBL + AmpC phenotype; 4. CP-phenotype; and 5. Other phenotypes.

For the occurrence and prevalence tables, as well as the maps and graphics shown in the 2019 EUSR-AMR Section 5 'ESBL/AmpC/CP producers monitoring', presumptive ESBL producers were considered as those exhibiting an ESBL and/or ESBL + AmpC phenotype, and presumptive AmpC producers, those with an AmpC and ESBL + AmpC phenotype.

More information is provided in Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).

¹ Commission Implementing Decision 2013/652/EU of 12 November 2013 on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria. OJ L 303, 14.11.2013, p. 26–39.

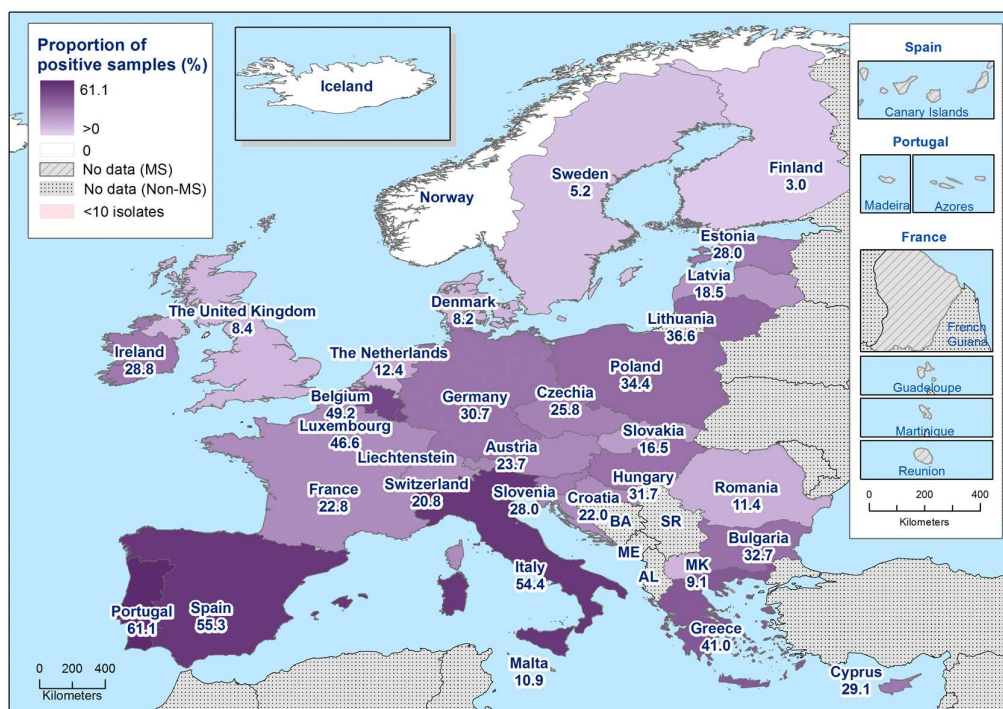
E.1. ESBL-, AmpC-producers prevalence maps

Marked variations among MSs in the prevalence of presumptive *E. coli* ESBL and/or AmpC-producers (*E. coli* showing an ESBL, AmpC or ESBL+AmpC phenotype) in samples from healthy animals and meat derived thereof are demonstrated by data presented in chapter 5 of this report. These variations withstand also when assessing the occurrence of isolates with ESBL or AmpC phenotypes separately in the different matrices.

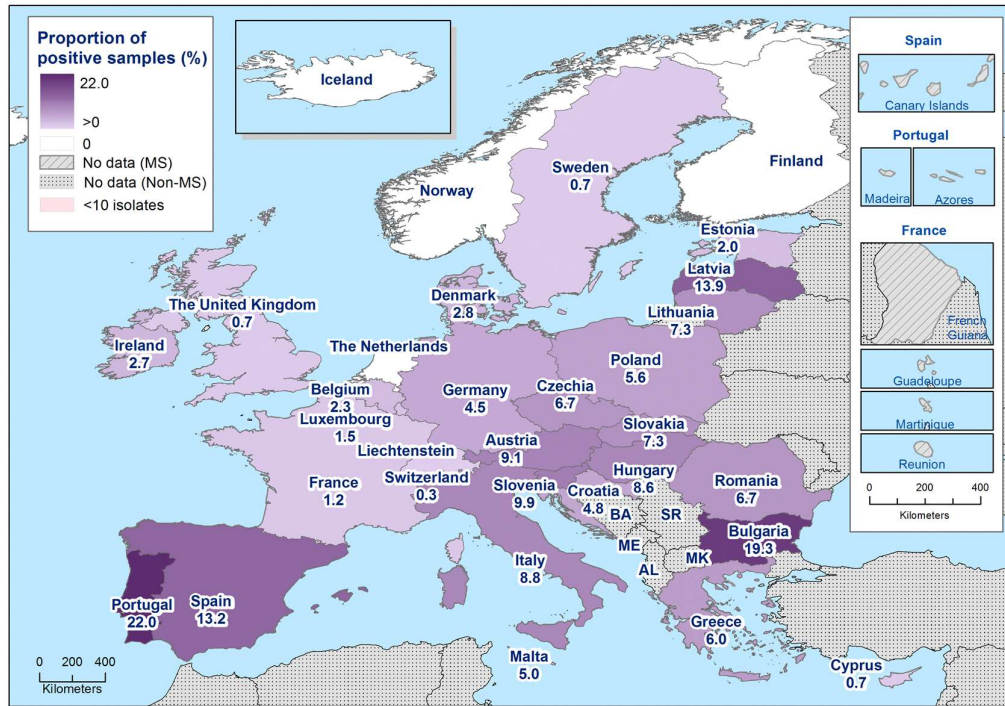
More precisely, the prevalence of presumptive *E. coli* ESBL-producers (*E. coli* showing an ESBL phenotype) ranges from 0.3% (Finland) to 71.4% (Spain) in fattening pigs; from 4.2% (Denmark) to 98.5% (Italy) in calves under 1 year of age; from 1.7% (Finland) to 81.2% (Malta) in broilers; and from 0% (Sweden) to 89.9% (Spain in fattening turkeys. Likewise, the prevalence of presumptive *E. coli* AmpC-producers (*E. coli* showing an AmpC phenotype) ranges from 0% (Cyprus) to 24.3% (Romania) in fattening pigs; from 2.2% (Italy and Portugal) to 8.6% (France) in calves under 1 year of age; from 2.5% (Latvia) to 38.0% (Lithuania) in broilers; and from 0% (Sweden) to 38.9% (Romania) in fattening turkeys.

Furthermore, the prevalence of presumptive *E. coli* ESBL-producers (*E. coli* showing an ESBL phenotype) ranges from 0% (Finland and the Netherlands) to 22.0% (Portugal) in meat from pigs; from 0% (France and Ireland) to 23.3% (Bulgaria) in meat from bovine animals; from 3% (Finland) to 61.1% (Portugal) in meat from broilers. Likewise, the prevalence of presumptive *E. coli* AmpC-producers (*E. coli* showing an AmpC phenotype) ranges from 0% (Bulgaria, Finland, Greece, Luxembourg, the Netherlands and Sweden) to 6.0% (Slovenia) in meat from pigs; from 0% (Austria, Estonia, Finland, Latvia, Slovakia, Slovenia and United Kingdom) to 4.5% (Luxembourg) in meat from bovine animals; from 0% (Luxembourg) to 44.8% (Hungary) in meat from broilers.

a)



b)



c)

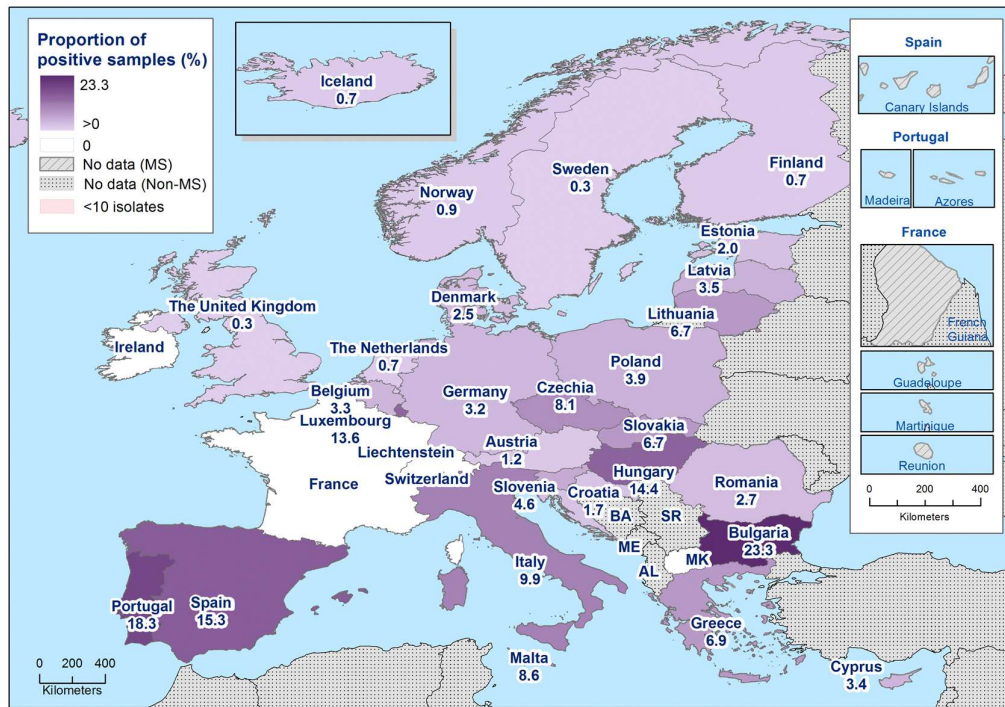
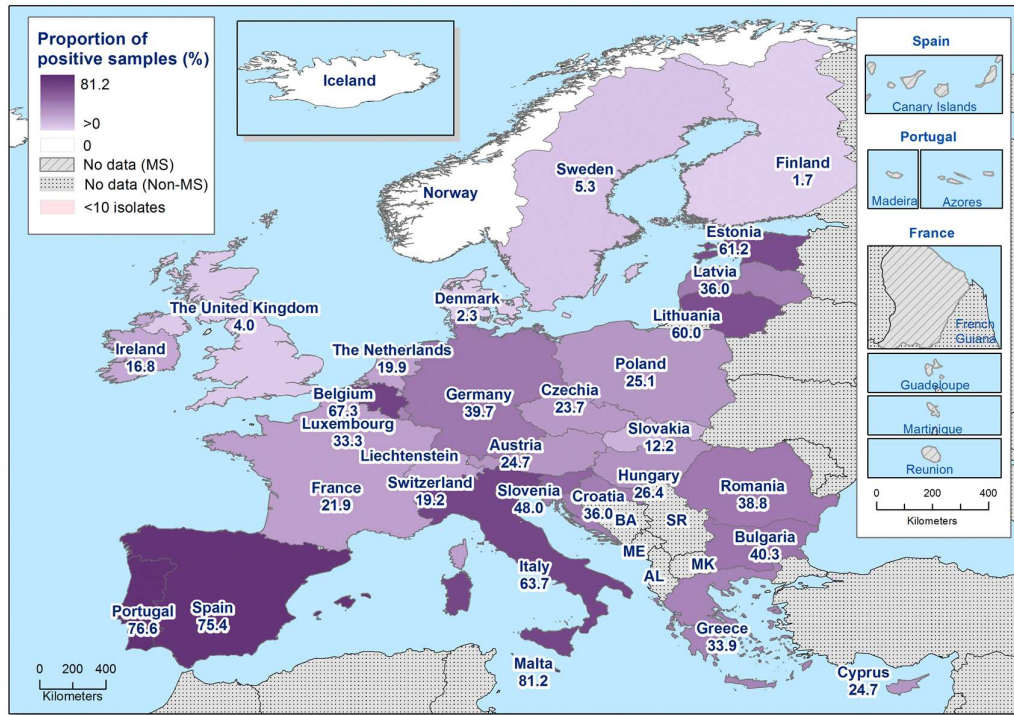
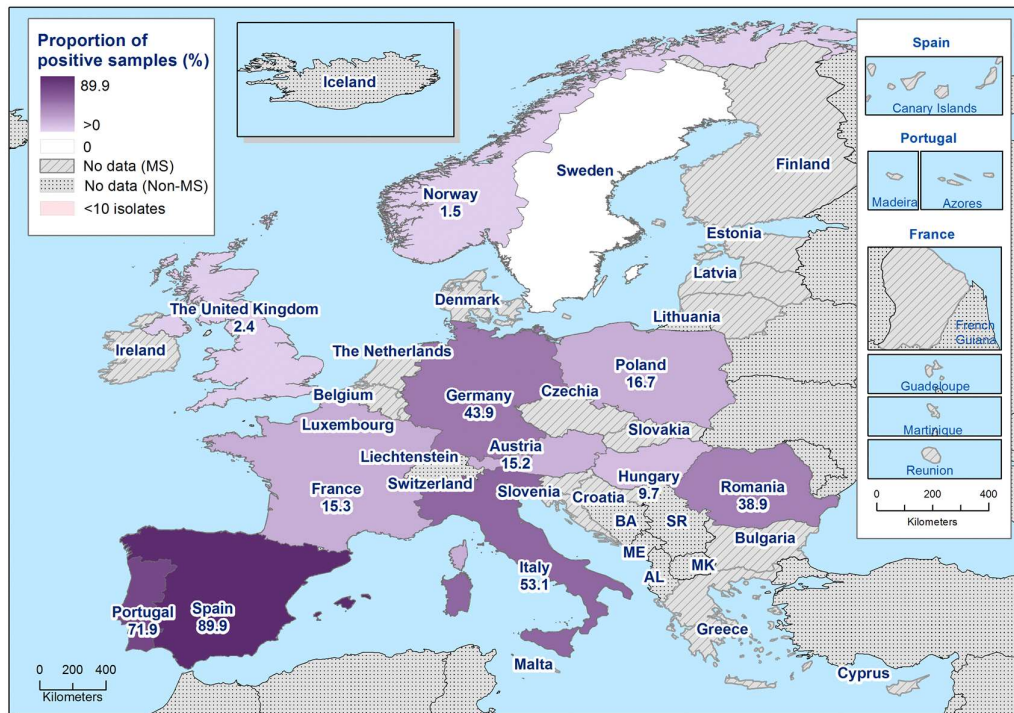


Figure 1: Spatial distribution of the prevalence of presumptive ESBL-producing *E. coli* from a) meat from broilers in 2018, b) meat from pigs in 2019 and c) bovine meat in 2019, EU MSs and non- MSs, 2018/2019

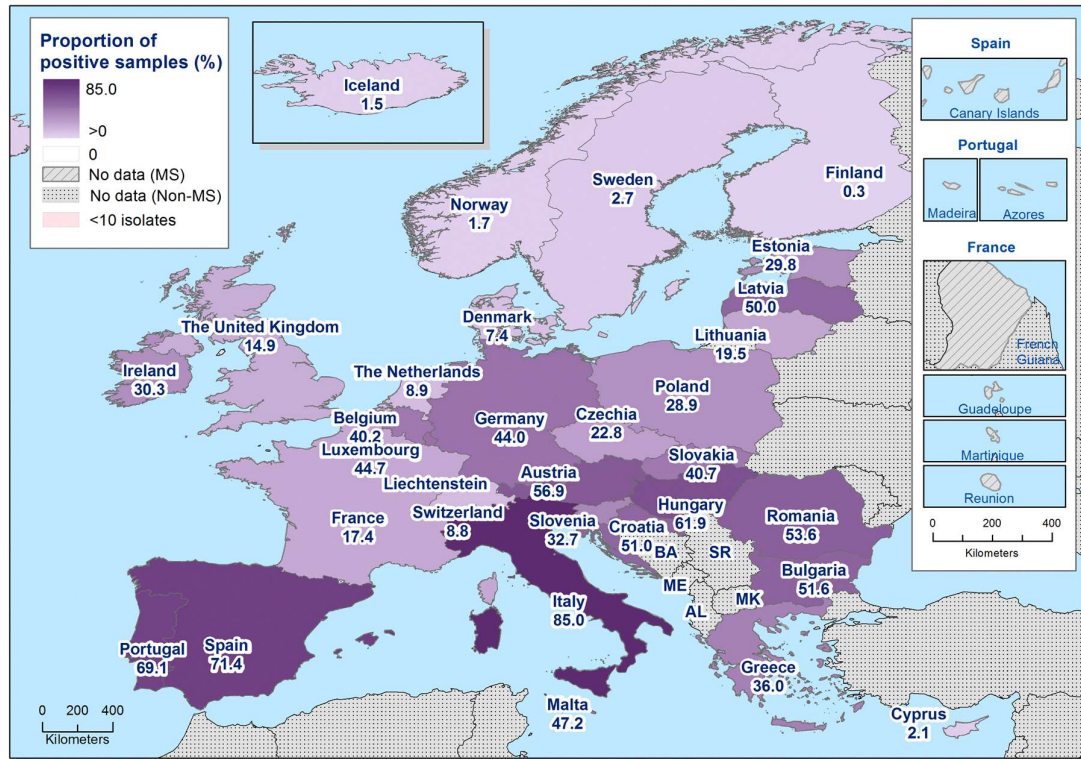
a)



b)



c)



d)

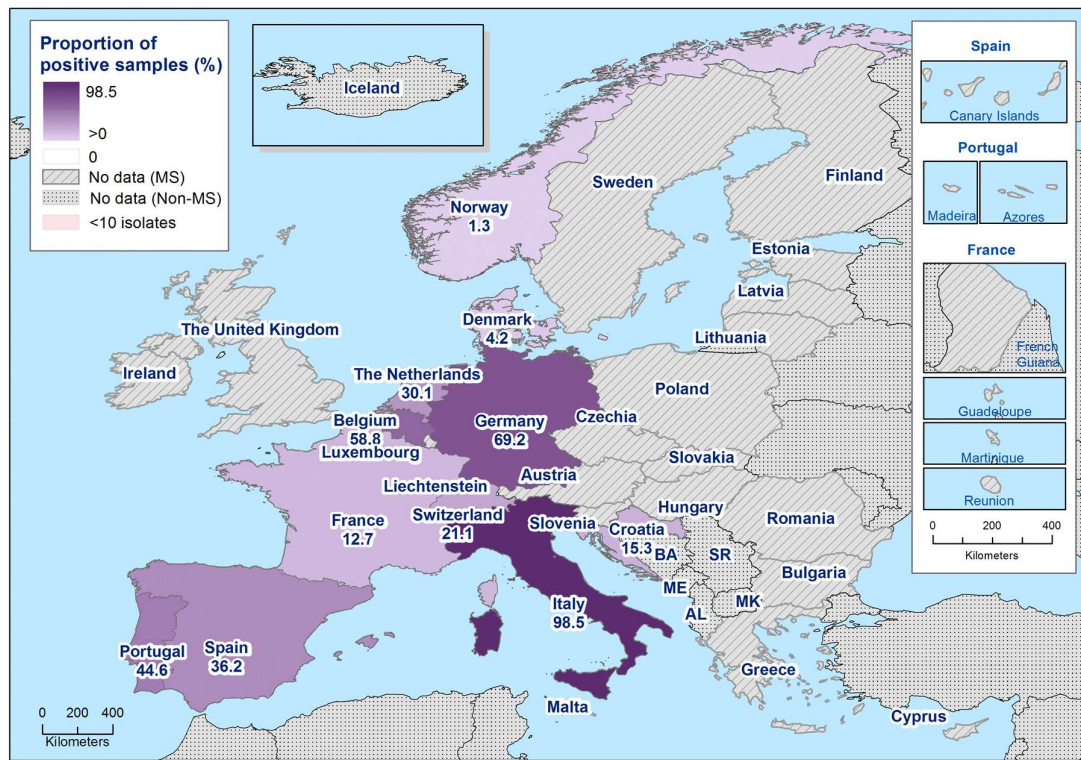


Figure 2: Spatial distribution of the prevalence of presumptive ESBL-producing *E. coli* from a) broilers in 2018, b) fattening turkeys in 2018, c) fattening pigs in 2019, and d) calves under 1 year of age in 2019, EU MSs and non- MSs, 2018/2019

c)

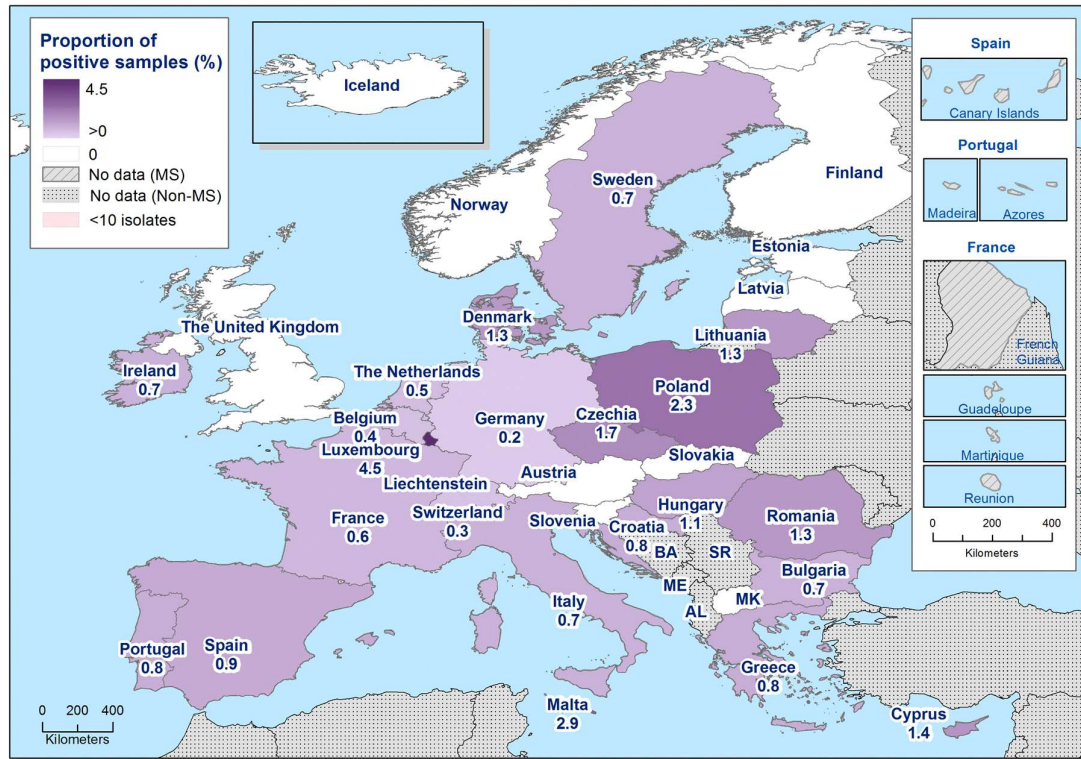
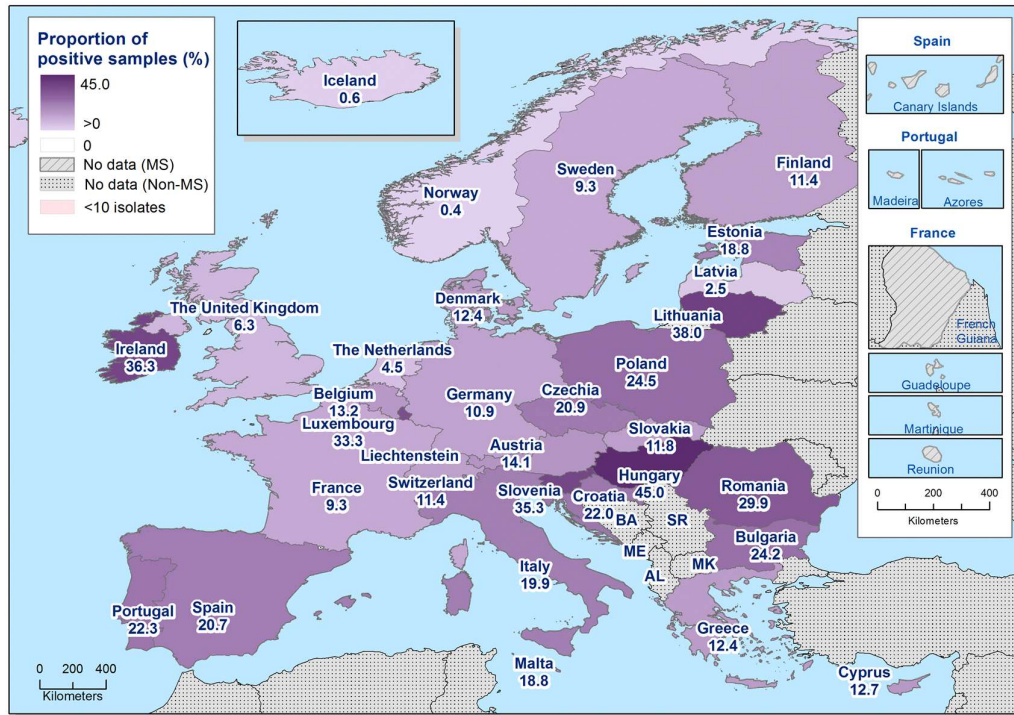
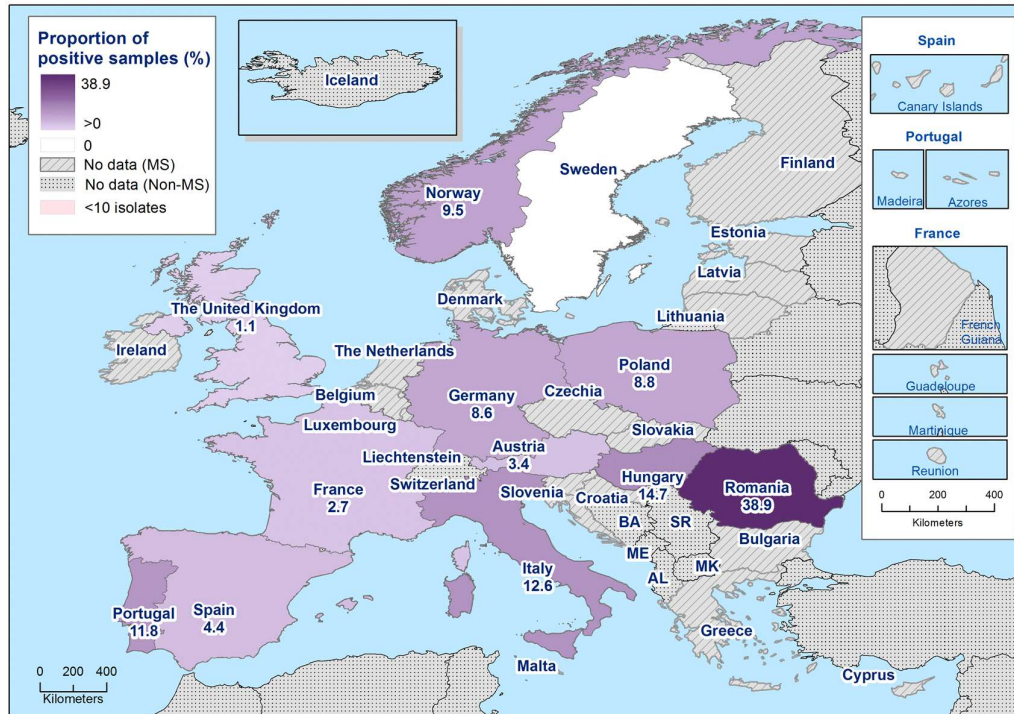


Figure 3: Spatial distribution of prevalence of presumptive AmpC-producing *E. coli* from a) meat from broilers in 2018, b) meat from pigs in 2019, and c) bovine meat in 2019, EU MSs and non-MSs, 2018/2019

a)



b)



E.2. ESBL-, AmpC-, carbapenemase-producers prevalence and occurrence tables – poultry 2018

Table 1: Presumptive ESBL- and AmpC-producing *Salmonella* spp. isolates from meat from broilers (carcasses), broilers, meat from turkeys (carcasses), fattening turkeys and laying hens collected within the routine monitoring and subjected to supplementary testing (panel 2) in 2018

Country	N _{P1}	N _{P2} ^(a)	ESBL and/or AmpC		ESBL ^(b)		ESBL only CLA/CTX SYN ^(c)		ESBL only CLA/CAZ SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
			n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Meat from broilers																
Portugal	6	1	1	16.7	1	16.7	0	0.0	0	0.0	1	16.7	1	16.7	0	0.0
Total (1 MS)	6	1	1	16.7	1	0.1	0	0.0	0	0.0	1	0.1	1	0.1	0	0.0
Broilers																
Hungary	170	4	4	2.4	2	1.2	0	0	0	0	2	1.2	0	0	0	0
Ireland	22	1	1	4.5	0	0	0	0	0	1	4.5	0	0	0	0	0
Italy ⁽ⁱ⁾	121	30	30	24.8	30	24.8	2	1.7	0	0	6	5	6	5	0	0
Malta	65	4	4	6.2	4	6.2	0	0	0	0	0	0	0	0	0	0
Netherlands	7	1	1	14.3	1	14.3	0	0	0	0	0	0	0	0	0	0
Romania	170	1	1	0.6	1	0.6	0	0	0	0	0	0	0	0	0	0
Spain	170	2	2	1.2	2	1.2	1	0.6	0	0	0	0	0	0	0	0
Total (8 MSs)	725	43	43	5.9	40	5.5	3	0.4	0	0	9	1.2	6	0.8	0	0
Fattening turkeys																
Italy ⁽ⁱ⁾	49	13	13	26.5	13	26.5	0	0	0	0	2	4.1	2	4.1	0	0
Poland	20	1	1	5	1	5	0	0	0	0	1	5	1	5	0	0
Spain	170	7	7	4.1	7	4.1	3	1.8	0	0	0	0	0	0	0	0
Total (3 MSs)	239	21	21	8.8	21	8.8	3	1.3	0	0	3	1.3	3	1.3	0	0
Laying hens																
Belgium	31	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hungary	53	1	1	1.9	0	0	0	0	0	0	1	1.9	0	0	0	0
Italy ⁽ⁱ⁾	179	1	1	0.6	1	0.6	0	0	0	0	0	0	0	0	0	0
Total (3 MSs)	263	3	2	0.8	1	0.4	0	0	0	0	1	0.4	0	0	0	0
Republic of North Macedonia	9	1	1	11.1	0	0	0	0	0	0	1	11.1	0	0	0	0

ESBL: extended-spectrum β-lactamase; n: isolates with this phenotype; %: percentage of isolates with this phenotype from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate. MSs: Member States. N_{P1} and N_{P2}: total number of isolates tested in Panel 1 and 2, respectively.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered for further classification (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>). Thus, some of the isolates tested in Panel 2 do not show presumptive resistance phenotypes compatible with those defined for the present report.
- (b): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with activity.

- (e): Isolates with microbiological resistance to cefoxitin, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to cefoxitin, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.
- (g): Isolates with microbiological meropenem resistance.
- (h): Percentage of the total number of *Salmonella* spp. isolates tested (with panel 1).
- (i): Molecular data were provided by Italy; broilers: 30 CTX-M, fattening turkey: 13 CTX-M, laying hens: 1 CTX-M.

Table 2: Presumptive ESBL and AmpC-producing indicator *E. coli* isolates from broiler flocks collected within the routine monitoring and subjected to supplementary testing (panel 2) in 2018

Country	N _{P1}	N _{P2} ^(a)	ESBL and/or AmpC		ESBL ^(b)		ESBL only CLA/CTX SYN ^(c)		ESBL only CLA/CAZ SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
			N	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Belgium	146	26	17	11.6	16	11.0	5	3.4	3	2.1	2	1.4	1	0.7	0	0.0
Bulgaria	100	5	5	5.0	2	2.0	1	1.0	0	0.0	3	3.0	0	0.0	0	0.0
Croatia	85	1	1	1.2	1	1.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Cyprus	101	8	8	7.9	5	5.0	0	0.0	0	0.0	3	3.0	0	0.0	0	0.0
Finland	173	1	1	0.6	0	0.0	0	0.0	0	0.0	1	0.6	0	0.0	0	0.0
France	221	5	5	2.3	5	2.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Germany	214	3	2	0.9	2	0.9	0	0.0	0	0.0	1	0.5	1	0.5	0	0.0
Greece	170	1	1	0.6	1	0.6	1	0.6	0	0.0	0	0.0	0	0.0	0	0.0
Hungary	170	5	4	2.4	1	0.6	1	0.6	0	0.0	3	1.8	0	0.0	0	0.0
Ireland	200	2	1	0.5	1	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Italy ⁽ⁱ⁾	170	4	3	1.8	2	1.2	0	0.0	1	0.6	1	0.6	0	0.0	0	0.0
Latvia ⁽ⁱ⁾	200	2	2	1.0	2	1.0	1	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Lithuania	93	28	27	29.0	16	17.2	3	3.2	0	0.0	14	15.1	3	3.2	0	0.0
Malta	85	8	8	9.4	7	8.2	1	1.2	1	1.2	1	1.2	0	0.0	0	0.0
Netherlands	209	1	1	0.5	1	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Poland	181	4	4	2.2	3	1.7	1	0.6	0	0.0	1	0.6	0	0.0	0	0.0
Portugal	161	6	6	3.7	5	3.1	0	0.0	0	0.0	1	0.6	0	0.0	0	0.0
Romania	170	8	8	4.7	4	2.4	2	1.2	1	0.6	4	2.4	0	0.0	0	0.0
Spain	170	6	6	3.5	6	3.5	1	0.6	1	0.6	0	0.0	0	0.0	0	0.0
Sweden ⁽ⁱ⁾	178	1	1	0.6	0	0.0	0	0.0	0	0.0	1	0.6	0	0.0	0	0.0
United Kingdom	183	4	4	2.2	2	1.1	2	1.1	0	0.0	2	1.1	0	0.0	0	0.0
Total (21 MSs)	3,380	129	115	3.4	82	2.4	19	0.6	7	0.2	38	1.1	5	0.1	0	0.0

ESBL: extended-spectrum β-lactamase; n: isolates with this phenotype; %: percentage of isolates from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States; N_{P1}: Total number of isolates tested by panel 1; N_{P2}: Total number of isolates tested by panel 2.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered for further classification (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>). Thus, some of the isolates tested in Panel 2 do not show presumptive resistance phenotypes compatible with those defined for the present report.
- (b): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to ceftoxitin, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftoxitin, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.

- (g): Isolates with microbiological meropenem resistance.
- (h): Percentage of the total number of *E. coli* isolates tested (with panel 1).
- (i): Molecular data were provided by:
 - Italy (1 CTX-M, 2 SHV, and 1 AmpC-genotype/phenotype),
 - Latvia (1 ESBL-genotype/phenotype),
 - Sweden (1 CMY-2).

Table 3: Presumptive ESBL and AmpC-producing indicator *E. coli* isolates from fattening turkeys collected within the routine monitoring and subjected to supplementary testing (Panel 2) in 2018

Country	N _{P1}	N _{P2} ^(a)	ESBL and/or AmpC		ESBL ^(b)		ESBL only CLA/CTX SYN ^(c)		ESBL only CLA/CAZ SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
			n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Austria	176	1	1	0.6	1	0.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
France	214	3	3	1.4	2	0.9	0	0.0	0	0.0	2	0.9	1	0.5	0	0.0
Germany	199	5	4	2.0	4	2.0	1	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Hungary	170	1	1	0.6	1	0.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Italy ⁽ⁱ⁾	170	2	2	1.2	2	1.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Poland	184	6	6	3.3	3	1.6	1	0.5	0	0.0	3	1.6	0	0.0	0	0.0
Portugal	132	6	6	4.5	6	4.5	2	1.5	0	0.0	0	0.0	0	0.0	0	0.0
Spain	170	12	12	7.1	12	7.1	0	0.0	2	1.2	0	0.0	0	0.0	0	0.0
Total (8 MSs)	1,415	36	35	2.5	31	2.2	4	0.3	2	0.1	5	0.4	1	0.1	0	0.0

ESBL: extended-spectrum β-lactamase; n: isolates with this phenotype; %: percentage of isolates from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered for further classification (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>). Thus, some of the isolates tested in Panel 2 do not show presumptive resistance phenotypes compatible with those defined for the present report.
- (b): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to ceftazidime, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftazidime, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.
- (g): Isolates with microbiological meropenem resistance.
- (h): Percentage of the total number of *E. coli* isolates tested (with panel 1).
- (i): Molecular data were provided by Italy (1 CTX-M).

Table 4: Prevalence of presumptive ESBL- and AmpC-producing *E. coli* isolates from broiler meat collected within the specific ESBLs-/AmpC-/carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2018

Country	N _s	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
		%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI
Austria	304	38.2	32.7-43.9	23.7	19-28.9	4.6	2.5-7.6	0	0-1.2	15.5	11.6-20	1	0.2-2.9	0	0-1.2
Belgium	300	59.9	51.9-63.3	49.2	41.6-53.2	16.3	11.7-20.3	3.4	1.6-6	14.9	10.6-18.8	4.1	2.1-6.9	0	0-1.2
Bulgaria	150	57.4	49-65.4	32.7	25.2-40.8	23.3	16.8-30.9	0	0-2.4	25.3	18.6-33.1	0.6	0-3.7	0	0-2.4
Croatia	139	37.4	28.7-45.3	22	15.1-29.4	8.8	4.5-14.6	1.5	0.2-5.1	15.4	9.6-22.2	0	0-2.6	0	0-2.6
Cyprus	134	44.8	36.2-53.6	29.1	21.6-37.6	6	2.6-11.4	0	0-2.7	20.1	13.7-27.9	4.5	1.7-9.5	0	0-2.7
Czechia	291	47.4	41.6-53.3	25.8	20.8-31.2	6.2	3.7-9.6	0.3	0-1.9	22	17.4-27.2	0.3	0-1.9	0	0-1.3
Denmark	293	18.4	14.2-23.4	8.2	5.3-11.9	3.4	1.6-6.2	0	0-1.3	10.9	7.6-15.1	0.7	0.1-2.4	0	0-1.3
Estonia	75	50.7	38.9-62.4	28	18.2-39.6	9.3	3.8-18.3	0	0-4.8	22.6	13.8-33.8	0	0-4.8	0	0-4.8
Finland	300	15.3	11.4-19.9	3	1.4-5.6	0.3	0-1.8	0	0-1.2	12.3	8.8-16.6	0	0-1.2	0	0-1.2
France	333	25.2	20.6-30.2	22.8	18.4-27.7	1.8	0.7-3.9	0.6	0.1-2.2	7.2	4.7-10.5	4.8	2.8-7.7	0	0-1.1
Germany	444	35.1	29.6-38.6	30.7	25.5-34.2	3.3	1.7-5.2	0.5	0.1-1.6	8.8	6.1-11.6	4.4	2.6-6.6	0	0-0.8
Greece	307	51.8	46-57.5	41	35.5-46.8	16.6	12.6-21.3	0	0-1.2	14	10.3-18.4	3.3	1.6-5.9	0	0-1.2
Hungary	221	74.7	68.4-80.3	31.7	25.6-38.2	15.4	10.9-20.8	1.3	0.3-3.9	44.8	38.1-51.6	1.8	0.5-4.6	0	0-1.7
Ireland	299	59.8	54.1-65.5	28.8	23.7-34.3	14.7	10.9-19.2	1	0.2-2.9	31.8	26.5-37.4	0.7	0.1-2.4	0	0-1.2
Italy	316	68.4	62.9-73.4	54.4	48.8-60	14.6	10.9-18.9	1	0.2-2.7	17.1	13.1-21.7	3.1	1.5-5.7	0	0-1.2
Latvia	235	38.3	31.6-44.4	18.5	13.6-23.8	6.9	3.9-10.8	0	0-1.6	20.6	15.5-26.2	0.9	0.1-3	0	0-1.6
Lithuania	150	61.3	53-69.2	36.6	29-44.9	14.7	9.4-21.4	0.7	0-3.7	26	19.2-33.8	1.4	0.2-4.7	0	0-2.4
Luxembourg	60	46.6	32.1-58.4	46.6	32.1-58.4	15.5	7.1-26.6	5.2	1-13.9	0	0-6	0	0-6	0	0-6
Malta	550	11.6	9.1-14.6	10.9	8.4-13.8	3.3	2-5.1	0.4	0-1.3	0.9	0.3-2.1	0.2	0-1	0	0-0.7
Netherlands	291	14.1	10.3-18.6	12.4	8.8-16.7	1.7	0.6-4	0	0-1.3	4.1	2.1-7.1	2.4	1-4.9	0	0-1.3
Poland	314	65.3	59.7-70.5	34.4	29.2-39.9	11.5	8.2-15.5	0.3	0-1.8	35.4	30.1-40.9	4.5	2.5-7.4	0	0-1.2
Portugal	149	69.8	61.7-77	61.1	52.8-68.9	9.4	5.2-15.3	0	0-2.4	12.1	7.3-18.4	3.4	1.1-7.7	0	0-2.4
Romania	297	33	27.7-38.7	11.4	8.1-15.6	4.7	2.6-7.8	0	0-1.2	23.2	18.5-28.5	1.7	0.5-3.9	0	0-1.2
Slovakia	425	24	20-28.4	16.5	13.1-20.3	7.8	5.4-10.7	1.7	0.7-3.4	8.5	6-11.5	0.9	0.3-2.4	0	0-0.9
Slovenia	150	57.4	49-65.4	28	21-35.9	3.3	1.1-7.6	8.6	4.7-14.4	30	22.8-38	0.6	0-3.7	0	0-2.4
Spain	300	78	72.9-82.6	55.3	49.5-61	10.7	7.4-14.7	0.3	0-1.8	26.4	21.4-31.7	3.7	1.8-6.5	0	0-1.2
Sweden	288	14.9	11-19.6	5.2	2.9-8.4	1.4	0.4-3.5	0	0-1.3	10.1	6.8-14.1	0.3	0-1.9	0	0-1.3
United Kingdom	309	13.6	10-17.9	8.4	5.6-12.1	2.3	0.9-4.6	0	0-1.2	6.1	3.7-9.4	1	0.2-2.8	0	0-1.2
Total (28 MSs)	7,424	39.8	38.5-40.8	25.7	24.5-26.5	7.6	7-8.2	0.7	0.5-0.9	16.1	15.2-16.9	1.9	1.6-2.3	0	0-0
Iceland	134	1.5	0.2-5.3	0	0-2.7	0	0-2.7	0	0-2.7	1.5	0.2-5.3	0	0-2.7	0	0-2.7
Norway	251	0.4	0-2.2	0	0-1.5	0	0-1.5	0	0-1.5	0.4	0-2.2	0	0-1.5	0	0-1.5
Republic of North Macedonia	11	9.1	0.2-41.3	9.1	0.2-41.3	0	0-28.5	0	0-28.5	0	0-28.5	0	0-28.5	0	0-28.5

Switzerland	312	34.9	29.7-40.5	20.8	16.5-25.8	5.1	3-8.2	1.3	0.4-3.2	14.4	10.7-18.8	0.3	0-1.8	0	0-1.2
-------------	-----	------	-----------	------	-----------	-----	-------	-----	---------	------	-----------	-----	-------	---	-------

ESBL: extended-spectrum β -lactamase; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States; N_s: total number of samples tested.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered for further classification (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>). Thus, some of the isolates tested in Panel 2 do not show presumptive resistance phenotypes compatible with those defined for the present report.
- (b): All isolates showing clavulanate synergy with CTX or CAZ or synergy with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with CTX only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with CAZ only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to FOX, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with CTX or CAZ and microbiological resistance to FOX, suggesting ESBL and AmpC enzymes in the same isolate. ESBL and AmpC columns include those isolates.
- (g): Isolates with microbiological meropenem resistance.

Table 5: Occurrence of presumptive ESBL- and AmpC-producing *E. coli* isolates from broiler meat collected within the specific ESBLs-/AmpC-/carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2018

Country	N _{p2}	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CLA/CTX SYN ^(c)		ESBL only CLA/CAZ SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
		n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Austria	116	116	100.0	72	62.1	14	12.1	0	0.0	47	40.5	3	2.6	0	0.0
Belgium	181	173	95.6	142	78.5	47	26.0	10	5.5	43	23.8	12	6.6	0	0.0
Bulgaria	87	86	98.9	49	56.3	35	40.2	0	0.0	38	43.7	1	1.1	0	0.0
Croatia	51	51	100.0	30	58.8	12	23.5	2	3.9	21	41.2	0	0.0	0	0.0
Cyprus	60	60	100.0	39	65.0	8	13.3	0	0.0	27	45.0	6	10.0	0	0.0
Czechia	139	138	99.3	75	54.0	18	12.9	1	0.7	64	46.0	1	0.7	0	0.0
Denmark ⁽ⁱ⁾	54	54	100.0	24	44.4	10	18.5	0	0.0	32	59.3	2	3.7	0	0.0
Estonia	38	38	100.0	21	55.3	7	18.4	0	0.0	17	44.7	0	0.0	0	0.0
Finland	46	46	100.0	9	19.6	1	2.2	0	0.0	37	80.4	0	0.0	0	0.0
France	85	84	98.8	76	89.4	6	7.1	2	2.4	24	28.2	16	18.8	0	0.0
Germany	152	151	99.3	132	86.8	14	9.2	2	1.3	38	25.0	19	12.5	0	0.0
Greece	159	159	100.0	126	79.2	51	32.1	0	0.0	43	27.0	10	6.3	0	0.0
Hungary	165	165	100.0	70	42.4	34	20.6	3	1.8	99	60.0	4	2.4	0	0.0
Ireland	180	179	99.4	86	47.8	44	24.4	3	1.7	95	52.8	2	1.1	0	0.0
Italy ⁽ⁱ⁾	216	216	100.0	172	79.6	46	21.3	3	1.4	55	25.5	11	5.1	0	0.0
Latvia ⁽ⁱ⁾	93	89	95.7	43	46.2	16	17.2	0	0.0	48	51.6	2	2.2	0	0.0
Lithuania	93	92	98.9	55	59.1	22	23.7	1	1.1	39	41.9	2	2.2	0	0.0
Luxembourg	28	27	96.4	27	96.4	9	32.1	3	10.7	0	0.0	0	0.0	0	0.0
Malta	65	64	98.5	60	92.3	18	27.7	2	3.1	5	7.7	1	1.5	0	0.0
Netherlands ⁽ⁱ⁾	42	41	97.6	36	85.7	5	11.9	0	0.0	12	28.6	7	16.7	0	0.0
Poland	206	205	99.5	108	52.4	36	17.5	1	0.5	111	53.9	14	6.8	0	0.0
Portugal	104	104	100.0	91	87.5	14	13.5	0	0.0	18	17.3	5	4.8	0	0.0
Romania	99	98	99.0	34	34.3	14	14.1	0	0.0	69	69.7	5	5.1	0	0.0
Slovakia	105	102	97.1	70	66.7	33	31.4	7	6.7	36	34.3	4	3.8	0	0.0
Slovenia	87	86	98.9	42	48.3	5	5.7	13	14.9	45	51.7	1	1.1	0	0.0
Spain	234	234	100.0	166	70.9	32	13.7	1	0.4	79	33.8	11	4.7	0	0.0
Sweden ⁽ⁱ⁾	43	43	100.0	15	34.9	4	9.3	0	0.0	29	67.4	1	2.3	0	0.0
UK	42	42	100.0	26	61.9	7	16.7	0	0.0	19	45.2	3	7.1	0	0.0
Total (28 MSs)	2,970	2,943	99.1	1,896	63.8	562	18.9	54	1.8	1,190	40.1	143	4.8	0	0.0
Iceland ⁽ⁱ⁾	2	2	100.0	0	0.0	0	0.0	0	0.0	2	100.0	0	0.0	0	0.0
Norway	1	1	100.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0

Republic of North Macedonia	1	1	100.0	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Switzerland	109	109	100.0	65	59.6	16	14.7	4	3.7	45	41.3	1	0.9	0	0.0

ESBL: extended-spectrum β -lactamase; n: isolates with this phenotype; %: percentage of isolates from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered for further classification (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>). Thus, some of the isolates tested in Panel 2 do not show presumptive resistance phenotypes compatible with those defined for the present report.
- (b): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to ceftazidime, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftazidime, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.
- (g): Isolates with microbiological meropenem resistance.
- (h): Percentage of the total number of *E. coli* isolates tested (with panel 1).
- (i): Molecular data were provided by:
 - Denmark (2 TEM-52),
 - Italy (83 CTX-M-1, 1 CTX-M-2, 7 CTX-M-14, 3 CTX-M-15, 9 CTX-M-55, 64 SHV-12, 48 CMY-2, 1 DHA-1, and 5 AmpC-genotype/phenotype),
 - Iceland (1 CMY-2 and 1 AmpC-genotype/phenotype).
 - Latvia (44 ESBL-genotype/phenotype, and 49 AmpC-genotype/phenotype),
 - The Netherlands (8 CTX-M-1, 3 CTX-M-1+TEM-1, 1 CTX-M-15+TEM-1, 1 CTX-M-32, 7 SHV-12, 3 SHV-12+TEM-1, 1 TEM-135, 1 SHV-2a, 2 TEM-1, 5 TEM-52, 5 TEM-52+TEM-1, 5 CMY-2, and 1 AmpC mutation or insertion),
 - Sweden (13 CTX-M-1, 1 TEM-52, 20 CMY-2, and 7 AmpC-genotype/phenotype with mutations confirmed by WGS as communicated by Sweden).

Table 6: Prevalence of presumptive ESBL- and AmpC-producing *E. coli* isolates from broilers collected within the specific ESBLs/AmpC/Carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2018

Country	N _s	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
		%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI
Austria	314	36.3	30.7-41.6	24.7	19.9-29.7	6.8	4.2-10	0	0-1.2	14.1	10.4-18.4	2.6	1.1-5	0	0-1.2
Belgium	273	78.2	54.7-82.8	67.3	46.3-72.9	15.6	8.5-16.6	3.3	1-5.2	13.2	6.9-14.5	2.4	0.6-4.2	0	0-1.3
Bulgaria	425	62.6	33.7-67.2	40.3	20.7-45.1	25.7	12.4-30.1	0.4	0-1.3	24.2	11.6-28.6	1.9	0.4-2.7	0	0-0.9
Croatia	300	57.4	27.7-63	36	16.2-41.7	14.5	5.5-19.2	0.6	0-1.8	22	9.1-27.1	0.6	0-1.8	0	0-1.2
Cyprus	150	31.3	24-39.4	24.7	18-32.4	3.3	1.1-7.6	0	0-2.4	12.7	7.8-19.1	6	2.8-11.1	0	0-2.4
Czechia	316	44.6	39.1-50.3	23.7	19.2-28.8	4.1	2.2-6.9	0.6	0.1-2.3	20.9	16.5-25.8	0	0-1.2	0	0-1.2
Denmark	837	14.6	12.3-17.2	2.3	1.4-3.5	1.1	0.5-2	0	0-0.4	12.4	10.3-14.9	0.1	0-0.7	0	0-0.4
Estonia	85	78.8	68.6-86.9	61.2	50-71.6	8.2	3.4-16.2	2.4	0.3-8.2	18.8	11.2-28.8	1.1	0-6.4	0	0-4.2
Finland	289	13.1	9.5-17.6	1.7	0.6-4	0	0-1.3	0	0-1.3	11.4	8-15.7	0	0-1.3	0	0-1.3
France	301	24.9	20.1-30.2	21.9	17.4-27	3	1.4-5.6	0	0-1.2	9.3	6.3-13.2	6.3	3.8-9.7	0	0-1.2
Germany	575	46.8	28.2-51	39.7	23.5-43.8	2	0.6-2.7	0.5	0-1.3	10.9	5.5-13.8	3.8	1.5-4.3	0	0-0.6
Greece	378	45	39.9-50.1	33.9	29.1-38.9	16.1	12.6-20.2	0.3	0-1.5	12.4	9.3-16.2	1.3	0.4-3.1	0	0-1
Hungary	300	69	63.4-74.2	26.4	21.4-31.7	10.4	7.1-14.3	0.3	0-1.8	45	39.3-50.8	2.3	0.9-4.7	0	0-1.2
Ireland	298	53	47.2-58.8	16.8	12.7-21.5	7.1	4.4-10.6	1	0.2-2.9	36.3	30.8-42	0	0-1.2	0	0-1.2
Italy	512	79.9	76.1-83.3	63.7	59.3-67.8	20.5	17.1-24.3	0	0-0.7	19.9	16.5-23.6	3.7	2.2-5.7	0	0-0.7
Latvia	200	38.5	31.2-45.1	36	28.9-42.6	6.6	3.5-10.9	0	0-1.8	2.5	0.8-5.7	0	0-1.8	0	0-1.8
Lithuania	150	94	88.9-97.2	60	51.7-67.9	17.3	11.6-24.4	1.3	0.2-4.7	38	30.2-46.3	4	1.5-8.5	0	0-2.4
Luxembourg	15	33.3	0.2-61.6	33.3	0.2-61.6	0	0-21.8	0	0-21.8	33.3	0.2-61.6	33.3	0.2-61.6	0	0-21.8
Malta	85	100	95.8-100	81.2	71.2-88.8	22.4	14-32.7	9.4	4.2-17.7	18.8	11.2-28.8	0	0-4.2	0	0-4.2
Netherlands	296	23	18-27.8	19.9	15.2-24.6	3.1	1.4-5.7	0.3	0-1.9	4.5	2.4-7.4	1.4	0.4-3.4	0	0-1.2
Poland	315	44.1	38.6-49.8	25.1	20.4-30.2	7.6	4.9-11.1	1	0.2-2.8	24.5	19.8-29.6	5.4	3.2-8.5	0	0-1.2
Portugal	364	85.4	59.1-88.9	76.6	52.4-80.9	8.4	4-9.3	0.3	0-1.5	22.3	13.1-26.9	13.5	7.3-13.7	0	0-1
Romania	838	65.5	62.2-68.7	38.8	35.5-42.2	20.9	18.2-23.8	0.3	0.1-1	29.9	26.9-33.2	3.2	2.1-4.7	0	0-0.4
Slovakia	425	23.8	19.8-28.1	12.2	9.3-15.7	5.7	3.7-8.3	0.9	0.3-2.4	11.8	8.9-15.2	0.2	0-1.3	0	0-0.9
Slovenia	150	82.7	75.6-88.4	48	39.8-56.3	10	5.7-16	2.7	0.7-6.7	35.3	27.7-43.5	0.7	0-3.7	0	0-2.4
Spain	256	91	86.8-94.2	75.4	69.6-80.5	12.1	8.4-16.7	1.6	0.4-4	20.7	15.9-26.2	5.1	2.7-8.5	0	0-1.4
Sweden	300	14	10.3-18.4	5.3	3.1-8.5	2.3	0.9-4.7	0.7	0.1-2.4	9.3	6.3-13.2	0.7	0.1-2.4	0	0-1.2
United Kingdom	302	10.3	7.1-14.3	4	2.1-6.8	0.7	0.1-2.4	0	0-1.2	6.3	3.8-9.7	0	0-1.2	0	0-1.2
Total (28 MSs)	9,049	48.3	43-49.3	31.9	28.1-32.9	9.5	8.1-10.1	0.6	0.4-0.8	18.9	16.4-19.7	2.5	2-2.6	0	0-0
Iceland	156	0.6	0-3.5	0	0-2.3	0	0-2.3	0	0-2.3	0.6	0-3.5	0	0-2.3	0	0-2.3
Norway	279	0.4	0-2	0	0-1.3	0	0-1.3	0	0-1.3	0.4	0-2	0	0-1.3	0	0-1.3
Switzerland	307	30.3	25.2-35.8	19.2	15-24.1	6.5	4-9.9	0.6	0.1-2.3	11.4	8.1-15.5	0.3	0-1.8	0	0-1.2

ESBL: extended-spectrum β -lactamase; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; P: prevalence; CI: confidence interval; MSs: Member States; N_s: total number of samples tested.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered for further classification (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>). Thus, some of the isolates tested in Panel 2 do not show presumptive resistance phenotypes compatible with those defined for the present report.
- (b): All isolates showing clavulanate synergy with CTX or CAZ or synergy with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to FOX, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with CTX or CAZ and microbiological resistance to FOX, suggesting ESBL and AmpC enzymes in the same isolate. ESBL and AmpC columns include those isolates.
- (g): Isolates with microbiological meropenem resistance.

Table 7: Occurrence of presumptive ESBL- and AmpC-producing *E. coli* isolates from broilers collected within the specific ESBLs-/AmpC-/carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2018

Country	N _{P2}	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CLA/CTX SYN ^(c)		ESBL only CLA/CAZ SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
		n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Austria	113	113	100.0	77	68.1	21	18.6	0	0.0	44	38.9	8	7.1	0	0.0
Belgium	175	166	94.9	143	81.7	33	18.9	7	4.0	28	16.0	5	2.9	0	0.0
Bulgaria	163	163	100.0	105	64.4	67	41.1	1	0.6	63	38.7	5	3.1	0	0.0
Croatia	100	99	99.0	62	62.0	25	25.0	1	1.0	38	38.0	1	1.0	0	0.0
Cyprus	47	47	100.0	37	78.7	5	10.6	0	0.0	19	40.4	9	19.1	0	0.0
Czechia	141	141	100.0	75	53.2	13	9.2	2	1.4	66	46.8	0	0.0	0	0.0
Denmark	124	122	98.4	19	15.3	9	7.3	0	0.0	104	83.9	1	0.8	0	0.0
Estonia	69	67	97.1	52	75.4	7	10.1	2	2.9	16	23.2	1	1.4	0	0.0
Finland	38	38	100.0	5	13.2	0	0.0	0	0.0	33	86.8	0	0.0	0	0.0
France	76	75	98.7	66	86.8	9	11.8	0	0.0	28	36.8	19	25.0	0	0.0
Germany	184	184	100.0	156	84.8	8	4.3	2	1.1	43	23.4	15	8.2	0	0.0
Greece	170	170	100.0	128	75.3	61	35.9	1	0.6	47	27.6	5	2.9	0	0.0
Hungary	207	207	100.0	79	38.2	31	15.0	1	0.5	135	65.2	7	3.4	0	0.0
Ireland	158	158	100.0	50	31.6	21	13.3	3	1.9	108	68.4	0	0.0	0	0.0
Italy ⁽ⁱ⁾	410	409	99.8	326	79.5	105	25.6	0	0.0	102	24.9	19	4.6	0	0.0
Latvia ⁽ⁱ⁾	76	76	100.0	71	93.4	13	17.1	0	0.0	5	6.6	0	0.0	0	0.0
Lithuania	141	141	100.0	90	63.8	26	18.4	2	1.4	57	40.4	6	4.3	0	0.0
Luxembourg	1	1	100.0	1	100.0	0	0.0	0	0.0	1	100.0	1	100.0	0	0.0
Malta	85	85	100.0	69	81.2	19	22.4	8	9.4	16	18.8	0	0.0	0	0.0
Netherlands ⁽ⁱ⁾	67	67	100.0	58	86.6	9	13.4	1	1.5	13	19.4	4	6.0	0	0.0
Poland	144	139	96.5	79	54.9	24	16.7	3	2.1	77	53.5	17	11.8	0	0.0
Portugal	234	234	100.0	210	89.7	23	9.8	1	0.4	61	26.1	37	15.8	0	0.0
Romania	574	549	95.6	325	56.6	175	30.5	3	0.5	251	43.7	27	4.7	0	0.0
Slovakia	105	101	96.2	52	49.5	24	22.9	4	3.8	50	47.6	1	1.0	0	0.0
Slovenia	125	124	99.2	72	57.6	15	12.0	4	3.2	53	42.4	1	0.8	0	0.0
Spain	237	233	98.3	193	81.4	31	13.1	4	1.7	53	22.4	13	5.5	0	0.0
Sweden ⁽ⁱ⁾	42	42	100.0	16	38.1	7	16.7	2	4.8	28	66.7	2	4.8	0	0.0
United Kingdom	31	31	100.0	12	38.7	2	6.5	0	0.0	19	61.3	0	0.0	0	0.0
Total (28 MSs)	4,037	3,982	98.6	2,628	65.1	783	19.4	52	1.3	1,558	38.6	204	5.1	0	0.0
Iceland ⁽ⁱ⁾	1	1	100.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0
Norway	1	1	100.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0
Switzerland	94	93	98.9	59	62.8	20	21.3	2	2.1	35	37.2	1	1.1	0	0.0

ESBL: extended-spectrum β -lactamase; n: isolates with this phenotype; %: percentage of isolates from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered for further classification (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>). Thus, some of the isolates tested in Panel 2 do not show presumptive resistance phenotypes compatible with those defined for the present report.
- (b): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to ceftazidime, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftazidime, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.
- (g): Isolates with microbiological meropenem resistance.
- (h): Percentage of the total number of *E. coli* isolates tested (with panel 2).
- (i): Molecular data were provided by:
 - Iceland (1 CMY-2),
 - Italy (137 CTX-M-1, 4 CTX-M-2, 10 CTX-M-8, 31 CTX-M-14, 9 CTX-M-15, 3 CTX-M-32, 9 CTX-M-55, 3 CTX-M-65, 114 SHV-12, 77 CMY-2, and 6 AmpC-genotype/phenotype),
 - Latvia (71 ESBL-genotype/phenotype and 5 AmpC-genotype/phenotype),
 - The Netherlands (22 CTX-M-1, 6 CTX-M-1+TEM-1, 1 CTX-M-2+TEM-1, 1 CTX-M-3+TEM-1, 1 CTX-M-15+TEM-1, 1 CTX-M-22, 1 CTX-M-32, 1 CTX-M-32+TEM-1, 15 SHV-12, 1 SHV-2, 6 TEM-52, 2 TEM-52+TEM-1, and 9 CMY-2),
 - Sweden (13 CTX-M-1, 1 TEM-52, and 24 CMY-2, 4 AmpC-genotype/phenotype with mutations confirmed by WGS as communicated).

Table 8: Prevalence of presumptive ESBL- and AmpC-producing *E. coli* isolates from fattening turkeys collected within the specific ESBLs-/AmpC-/carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2018

Country	N _s	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
		%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI
Austria	204	16.2	11.4-22	15.2	10.6-20.9	1.5	0.3-4.2	0	0-1.8	3.4	1.4-6.9	2.5	0.8-5.6	0	0-1.8
France	255	16.9	12.5-22	15.3	11.1-20.3	1.6	0.4-4	0	0-1.4	2.7	1.1-5.6	1.2	0.2-3.4	0	0-1.4
Germany	484	48.6	28.3-53.1	43.9	25.3-48.4	4	1.4-4.5	0	0-0.8	8.6	3.9-11.5	4	1.4-4.5	0	0-0.8
Hungary	300	23.7	19-28.9	9.7	6.6-13.6	2.3	0.9-4.7	0	0-1.2	14.7	10.9-19.2	0.7	0.1-2.4	0	0-1.2
Italy ⁽ⁱ⁾	484	62.6	58.1-66.9	53.1	48.5-57.6	11.8	9-15	0	0.1-1.5	12.6	9.8-15.9	3.1	1.7-5.1	0	0-0.8
Poland	305	22.6	18-27.7	16.7	12.7-21.4	1.3	0.4-3.3	0	0-1.8	8.8	5.9-12.6	3	1.4-5.5	0	0-1.2
Portugal	153	76.5	68.9-82.9	71.9	64.1-78.9	9.8	5.6-15.7	0	0-2.4	11.8	7.1-18	7.2	3.6-12.5	0	0-2.4
Romania	18	72.2	46.5-90.3	38.9	17.3-64.3	0	0-18.5	0	0-18.5	38.9	17.3-64.3	5.6	0.1-27.3	0	0-18.5
Spain	278	91	87-94.1	89.9	85.8-93.2	4.4	2.3-7.4	1	0.2-3.1	4.4	2.3-7.4	3.2	1.5-6.1	0	0-1.3
Sweden	72	0	0-5	0	0-5	0	0-5	0	0-5	0	0-5	0	0-5	0	0-5
United Kingdom	373	3.5	1.9-5.9	2.4	1.1-4.5	1.6	0.6-3.5	0	0-1	1.1	0.3-2.7	0	0-1	0	0-1
Total (11 MSs)	2,926	39.3	34.9-41.1	33.9	29.9-35.7	4.4	3.4-4.9	0	0.1-0.4	7.9	6.4-8.4	2.5	1.8-2.9	0	0-0.1
Norway	137	9.5	5.1-15.7	1.5	0.2-5.2	0	0-2.7	0	0-2.7	9.5	5.1-15.7	1.5	0.2-5.2	0	0-2.7

ESBL: extended-spectrum β-lactamase; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; P: prevalence; CI: confidence interval; MSs: Member States; N_s: total number of samples tested.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered for further classification (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>). Thus, some of the isolates tested in Panel 2 do not show presumptive resistance phenotypes compatible with those defined for the present report.
- (b): All isolates showing clavulanate synergy with CTX or CAZ or synergy with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to FOX, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with CTX or CAZ and microbiological resistance to FOX, suggesting ESBL and AmpC enzymes in the same isolate. ESBL and AmpC columns include those isolates.
- (g): Isolates with microbiological meropenem resistance.

Table 9: Occurrence of presumptive ESBL- and AmpC-producing *E. coli* isolates from fattening turkeys collected within the specific ESBLs/AmpC/Carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2018

Country	N _{P2}	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CLA/CTX SYN ^(c)		ESBL only CLA/CAZ SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
		n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Austria	33	33	100.0	31	93.9	3	9.1	0	0.0	7	21.2	5	15.2	0	0.0
France	43	43	100.0	39	90.7	4	9.3	0	0.0	7	16.3	3	7.0	0	0.0
Germany	157	157	100.0	142	90.4	13	8.3	0	0.0	28	17.8	13	8.3	0	0.0
Hungary	71	71	100.0	29	40.8	7	9.9	0	0.0	44	62.0	2	2.8	0	0.0
Italy ⁽ⁱ⁾	305	303	99.3	257	84.3	57	18.7	2	0.7	61	20.0	15	4.9	0	0.0
Poland	71	69	97.2	51	71.8	4	5.6	1	1.4	27	38.0	9	12.7	0	0.0
Portugal	117	117	100.0	110	94.0	15	12.8	0	0.0	18	15.4	11	9.4	0	0.0
Romania	13	13	100.0	7	53.8	0	0.0	0	0.0	7	53.8	1	7.7	0	0.0
Spain	258	253	98.1	250	96.9	12	4.7	3	1.2	12	4.7	9	3.5	0	0.0
United Kingdom	14	13	92.9	9	64.3	6	42.9	0	0.0	4	28.6	0	0.0	0	0.0
Total (10 MSs)	1,082	1,072	99.1	925	85.5	121	11.2	6	0.6	215	19.9	68	6.3	0	0.0
Norway	13	13	100.0	2	15.4	0	0.0	0	0.0	13	100.0	2	15.4	0	0.0

ESBL: extended-spectrum β-lactamase; n: isolates with this phenotype; %: percentage of isolates from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered for further classification (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>). Thus, some of the isolates tested in Panel 2 do not show presumptive resistance phenotypes compatible with those defined for the present report.
- (b): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to ceftazidime, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftazidime, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.
- (g): Isolates with microbiological meropenem resistance.
- (h): Percentage of the total number of *E. coli* isolates tested (with panel 2).
- (i): Molecular data were provided by Italy (12 CTX-M, 113 CTX-M-1, 1 CTX-M-8, 13 CTX-M-14, 63 CTX-M-15, 5 CTX-M-27, 3 CTX-M-32, 5 CTX-M-55, 1 CTX-M-65, 42 SHV-12, 1 TEM-52, TEM-135, and 27 CMY-2, 1 CMY-94, 1 DHA-1, and 16 isolates with AmpC phenotype/genotype).

E.3. ESBL-, AmpC-producers prevalence and occurrence tables – pigs and cattle and meat thereof, 2019

The 2019 tables included in this Annex were published in EFSA and ECDC, 2021².

Table 10: Presumptive ESBL- and AmpC-producing *Salmonella* spp. isolates from meat from fattening pigs (carcasses) collected within the routine monitoring and subjected to supplementary testing (panel 2) in 2019

Country	N _{P1}	N _{P2}	ESBL and/or AmpC (a)		ESBL (b)		ESBL only CTX/CLA SYN (c)		ESBL only CAZ/CLA SYN (d)		AmpC (e)		AmpC + ESBL (f)		CPs (g)	
			n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Czechia	11	1	1	9.1	0	0	0	0	0	0	1	9.1	0	0	0	0
Italy ⁽ⁱ⁾	197	2	2	1	2	1	0	0	0	0	0	0	0	0	0	0
Romania	3	1	1	33.3	1	33.3	0	0	0	0	0	0	0	0	0	0
Total (3 MSs)	211	4	4	1.9	3	1.4	0	0	0	0	1	0.5	0	0	0	0

ESBL: extended-spectrum β-lactamase; n: isolates with this phenotype; %: percentage of isolates with this phenotype from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States; N_{P1} and N_{P2}: Total number of isolates tested with panel 1 and panel 2, respectively.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).
- (b): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to ceftazidime, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftazidime, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.
- (g): Isolates with microbiological meropenem resistance.
- (h): Percentage of the total number of *Salmonella* spp. isolates tested (with panel 1).
- (i): Molecular data were provided by Italy (1 CTX-M, 1 SHV).

² <https://efsa.onlinelibrary.wiley.com/doi/10.2903/j.efsa.2021.6490>

Table 11: Presumptive ESBL- and AmpC-producing indicator *E. coli* isolates from fattening pigs collected within the routine monitoring and subjected to supplementary testing (panel 2) in 2019

Country	N _{P1}	N _{P2}	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
			n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Austria	174	2	2	1.1	2	1.1	1	0.6	0	0	0	0	0	0	0	0
Belgium	175	3	1	0.6	1	0.6	1	0.6	0	0	0	0	0	0	0	0
Croatia	85	1	1	1.2	1	1.2	1	1.2	0	0	0	0	0	0	0	0
Czechia	313	3	3	1	1	0.3	0	0	0	0	2	0.6	0	0	0	0
Estonia	71	1	1	1.4	0	0	0	0	0	1	1.4	0	0	0	0	0
Finland	174	1	1	0.6	0	0	0	0	0	1	0.6	0	0	0	0	0
France	188	2	2	1.1	2	1.1	0	0	0	0	0	0	0	0	0	0
Germany	246	8	7	2.8	7	2.8	1	0.4	0	0	0	0	0	0	0	0
Greece	146	2	2	1.4	2	1.4	1	0.7	0	0	0	0	0	0	0	0
Hungary	170	3	3	1.8	3	1.8	3	1.8	0	0	0	0	0	0	0	0
Ireland	170	2	2	1.2	1	0.6	0	0	0	1	0.6	0	0	0	0	0
Italy ⁽ⁱ⁾	169	1	1	0.6	1	0.6	0	0	1	0.59	0	0	0	0	0	0
Latvia ⁽ⁱ⁾	152	1	1	0.7	1	0.7	1	0.7	0	0	0	0	0	0	0	0
Malta	71	1	1	1.4	1	1.4	0	0	0	0	0	0	0	0	0	0
Poland	175	1	1	0.6	1	0.6	0	0	0	0	0	0	0	0	0	0
Portugal	156	8	7	4.5	7	4.5	0	0	0	0	0	0	0	0	0	0
Romania	170	10	10	5.9	4	2.4	4	2.4	0	6	3.5	0	0	0	0	0
Slovenia	85	3	3	3.5	1	1.2	1	1.2	0	2	2.4	0	0	0	0	0
Spain	170	4	3	1.8	3	1.8	0	0	0	0	0	0	0	0	0	0
United Kingdom	208	5	5	2.4	4	1.9	0	0	0	1	0.5	0	0	0	0	0
Total (20 MSs)	3,268	62	57	1.7	43	1.3	14	0.4	1	0.03	14	0.4	0	0	0	0

ESBL: extended-spectrum β-lactamase; n: isolates with this phenotype; %: percentage of isolates from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States; N_{P1} and N_{P2}: Total number of isolates tested with panel 1 and panel 2, respectively.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).
- (b): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to ceftazidime, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftazidime, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.

- (g): Isolates with microbiological meropenem resistance.
- (h): Percentage of the total number of *E. coli* isolates tested (with panel 1).
- (i): Molecular data were provided by:
 - Italy (1 CTX-M),
 - Latvia (1 ESBL-phenotype/genotype).

Table 12: Presumptive ESBL and AmpC-producing indicator *E. coli* isolates from calves under 1 year of age collected within the routine monitoring and subjected to supplementary testing (panel 2) in 2019

Country	N _{P1}	N _{P2}	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)		
			n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	
			Belgium	172	6	3	1.7	3	1.7	0	0	2	1.2	0	0	0	0
Germany	217	5	4	1.8	3	1.4	1	0.5	0	0	1	0.5	0	0	0	0	0
Italy ⁽ⁱ⁾	169	7	7	4.1	7	4.1	4	2.4	0	0	0	0	0	0	0	0	0
Portugal	174	4	3	1.7	3	1.7	0	0	0	0	0	0	0	0	0	0	0
Spain	170	1	1	0.6	1	0.6	0	0	0	0	0	0	0	0	0	0	0
Total (5 MSs)	902	23	18	2	17	2	5	1	2	0	1	0	0	0	0	0	0
Norway	314	1	1	0.3	0	0	0	0	0	0	1	0.3	0	0	0	0	0
Rep. of North Macedonia	18	1	1	5.6	1	5.6	1	5.6	0	0	0	0	0	0	0	0	0
Switzerland	199	2	2	1	2	1	1	0.5	0	0	0	0	0	0	0	0	0

ESBL: extended-spectrum β-lactamase; n: isolates with this phenotype; %: percentage of isolates from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States. N_{P1} and N_{P2}: Total number of isolates tested with panel 1 and panel 2, respectively.

(a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).

- (a): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (b): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (c): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (d): Isolates with microbiological resistance to ceftazidime, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (e): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftazidime, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.
- (f): Isolates with microbiological meropenem resistance.
- (g): Percentage of the total number of *E. coli* isolates tested (with panel 1).
- (h): Percentage of the total number of *E. coli* isolates tested (with panel 1).
- (i): Molecular data were provided by Italy (7 CTX-M).

Table 13: Prevalence of presumptive ESBL- and/or AmpC-producing *E. coli* isolates in meat from pigs (retail) collected within the specific ESBLs-/AmpC-/carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2019

Country	N _s	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
		%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI
Austria	318	9.8	6.7-13.6	9.1	6.2-12.8	3.5	1.7-6.1	0	0-1.2	0.6	0.1-2.3	0	0-1.2	0	0-1.2
Belgium	300	2.7	0.9-4.7	2.3	0.7-4.3	1.1	0.2-2.9	0	0-1.2	0.8	0.1-2.4	0.4	0-1.8	0	0-1.2
Bulgaria	150	19.3	13.3-26.6	19.3	13.3-26.6	7.3	3.7-12.7	0.7	0-3.7	0	0-2.4	0	0-2.4	0	0-2.4
Croatia	126	7.1	3.3-13.1	4.8	1.8-10.1	1.6	0.2-5.6	0	0-2.9	2.4	0.5-6.8	0	0-2.9	0	0-2.9
Cyprus	149	1.3	0.2-4.8	0.7	0-3.7	0	0-2.4	0	0-2.4	1.3	0.2-4.8	0.7	0-3.7	0	0-2.4
Czechia	297	9.4	6.4-13.3	6.7	4.2-10.2	4.4	2.4-7.4	0	0-1.2	2.7	1.2-5.2	0	0-1.2	0	0-1.2
Denmark	353	6.8	4.4-9.9	2.8	1.4-5.1	1.7	0.6-3.7	0	0-1	4	2.2-6.6	0	0-1	0	0-1
Estonia	150	3.3	1.1-7.6	2	0.4-5.7	0.7	0-3.7	0	0-2.4	1.3	0.2-4.7	0	0-2.4	0	0-2.4
Finland	306	0	0-1.2	0	0-1.2	0	0-1.2	0	0-1.2	0	0-1.2	0	0-1.2	0	0-1.2
France	322	1.2	0.3-3.1	1.2	0.3-3.1	0.6	0.1-2.2	0	0-1.1	0.3	0-1.7	0.3	0-1.7	0	0-1.1
Germany	512	5.7	3-6.9	4.5	2.2-5.7	1.4	0.4-2.5	0	0-0.7	1.2	0.3-2.3	0	0-0.7	0	0-0.7
Greece	216	6	3.2-10.1	6	3.2-10.1	0.5	0-2.6	0	0-1.7	0	0-1.7	0	0-1.7	0	0-1.7
Hungary	278	10.8	7.4-15	8.6	5.6-12.6	2.2	0.8-4.6	0	0-1.3	2.5	1-5.1	0.4	0-2	0	0-1.3
Ireland	300	3.3	1.6-6	2.7	1.2-5.2	1.7	0.5-3.8	0	0-1.2	1	0.2-2.9	0.3	0-1.8	0	0-1.2
Italy	340	10	7-13.7	8.8	6-12.4	2.4	1-4.6	0	0-1.1	1.2	0.3-3	0	0-1.1	0	0-1.1
Latvia	152	15.8	10.9-23.3	13.9	9.3-21.1	5.7	2.7-10.9	0	0-2.4	1.9	0.4-5.7	0	0-2.4	0	0-2.4
Lithuania	150	8.7	4.7-14.4	7.3	3.7-12.7	1.3	0.2-4.7	0	0-2.4	1.3	0.2-4.7	0	0-2.4	0	0-2.4
Luxembourg	66	1.5	0-8.2	1.5	0-8.2	0	0-5.4	0	0-5.4	0	0-5.4	0	0-5.4	0	0-5.4
Malta	101	5	1.6-11.2	5	1.6-11.2	0	0-3.6	0	0-3.6	2	0.2-7	2	0.2-7	0	0-3.6
Netherlands	296	0	0-1.2	0	0-1.2	0	0-1.2	0	0-1.2	0	0-1.2	0	0-1.2	0	0-1.2
Poland	305	6.9	4.3-10.3	5.6	3.3-8.8	2	0.7-4.2	0	0-1.2	2	0.7-4.2	0.7	0.1-2.3	0	0-1.2
Portugal	127	24.4	17.2-32.8	22	15.2-30.3	5.5	2.2-11	0	0-2.9	5.5	2.2-11	3.1	0.9-7.9	0	0-2.9
Romania	300	7.3	4.7-10.9	6.7	4.1-10.1	0.3	0-1.8	0	0-1.2	1	0.2-2.9	0.3	0-1.8	0	0-1.2
Slovakia	150	11.3	6.7-17.5	7.3	3.7-12.7	2.7	0.7-6.7	0	0-2.4	4	1.5-8.5	0	0-2.4	0	0-2.4
Slovenia	151	15.9	10.5-22.7	9.9	5.7-15.9	4	1.5-8.4	0	0-2.4	6	2.8-11	0	0-2.4	0	0-2.4
Spain	300	15.3	6.6-19.9	13.2	5.5-17.7	4.2	1.2-5.2	0	0-1.2	2.6	0.5-3.8	0.5	0-1.8	0	0-1.2
Sweden	293	0.7	0.1-2.4	0.7	0.1-2.4	0	0-1.3	0	0-1.3	0	0-1.3	0	0-1.3	0	0-1.3
United Kingdom	285	1.1	0.2-3	0.7	0.1-2.5	0.7	0.1-2.5	0	0-1.3	0.4	0-1.9	0	0-1.3	0	0-1.3
Total (28 MSs)	6,793	6.8	5.9-7.1	5.6	4.8-5.9	1.9	1.5-2.1	0	0-0.1	1.5	1.2-1.7	0.2	0.1-0.4	0	0-0.1
Iceland	148	0	0-2.5	0	0-2.5	0	0-2.5	0	0-2.5	0	0-2.5	0	0-2.5	0	0-2.5
Norway	352	0	0-1	0	0-1	0	0-1	0	0-1	0	0-1	0	0-1	0	0-1
Switzerland	311	0.6	0.1-2.3	0.3	0-1.8	0	0-1.2	0	0-1.2	0.3	0-1.8	0	0-1.2	0	0-1.2

ESBL: extended-spectrum β -lactamase; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States; N_s: total number of samples tested.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for CTX and/or CAZ (screening breakpoint) were considered (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).
- (b): All isolates showing clavulanate synergy with CTX or CAZ or synergy with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with CTX only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with CAZ only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to FOX, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with CTX or CAZ and microbiological resistance to FOX, suggesting ESBL and AmpC enzymes in the same isolate. ESBL and AmpC columns include those isolates.
- (g): Isolates with microbiological meropenem resistance.

Table 14: Occurrence of presumptive ESBL- and/or AmpC-producing *E. coli* isolates in meat from pigs (retail) collected within the specific ESBLs-/AmpC-/carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2019

Country	N	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
		n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Austria	32	31	96.9	29	90.6	11	34.4	0	0	2	6.3	0	0	0	0
Belgium	7	7	100	6	85.7	3	42.9	0	0	2	28.6	1	14.3	0	0
Bulgaria	29	29	100	29	100	11	37.9	1	3.4	0	0	0	0	0	0
Croatia	9	9	100	6	66.7	2	22.2	0	0	3	33.3	0	0	0	0
Cyprus	2	2	100	1	50	0	0	0	0	2	100	1	50	0	0
Czechia	28	28	100	20	71.4	13	46.4	0	0	8	28.6	0	0	0	0
Denmark	24	24	100	10	41.7	6	25	0	0	14	58.3	0	0	0	0
Estonia	5	5	100	3	60	1	20	0	0	2	40	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	4	4	100	4	100	2	50	0	0	1	25	1	25	0	0
Germany	24	24	100	19	79.2	6	25	0	0	5	20.8	0	0	0	0
Greece	13	13	100	13	100	1	7.7	0	0	0	0	0	0	0	0
Hungary	30	30	100	24	80	6	20	0	0	7	23.3	1	3.3	0	0
Ireland	10	10	100	8	80	5	50	0	0	3	30	1	10	0	0
Italy ⁽ⁱ⁾	34	34	100	30	88.2	8	23.5	0	0	4	11.8	0	0	0	0
Latvia ⁽ⁱ⁾	25	25	100	22	88	9	36	0	0	3	12	0	0	0	0
Lithuania	13	13	100	11	84.6	2	15.4	0	0	2	15.4	0	0	0	0
Luxembourg	1	1	100	1	100	0	0	0	0	0	0	0	0	0	0
Malta	5	5	100	5	100	0	0	0	0	2	40	2	40	0	0
Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poland	21	21	100	17	81	6	28.6	0	0	6	28.6	2	9.5	0	0
Portugal	31	31	100	28	90.3	7	22.6	0	0	7	22.6	4	12.9	0	0
Romania	22	22	100	20	90.9	1	4.5	0	0	3	13.6	1	4.5	0	0
Slovakia	17	17	100	11	64.7	4	23.5	0	0	6	35.3	0	0	0	0
Slovenia	24	24	100	15	62.5	6	25	0	0	9	37.5	0	0	0	0
Spain	29	29	100	25	86.2	8	27.6	0	0	5	17.2	1	3.4	0	0
Sweden ⁽ⁱ⁾	2	2	100	2	100	0	0	0	0	0	0	0	0	0	0
United Kingdom	3	3	100	2	66.7	2	66.7	0	0	1	33.3	0	0	0	0
Total (28 MSs)	444	443	99.8	361	81.3	120	27	1	0.2	97	21.8	15	3.4	0	0
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Switzerland	2	2	100	1	50	0	0	0	0	1	50	0	0	0	0

ESBL: extended-spectrum β -lactamase; n: isolates with this phenotype; %: percentage of isolates from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSS: Member States. N_{P2}: Total number of isolates tested with panel 2.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).
- (b): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to ceftazidime, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftazidime, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.
- (g): Isolates with microbiological meropenem resistance.
- (h): Percentage of the total number of *E. coli* isolates tested (with panel 2).
- (i): Molecular data were provided by:
 - Italy (1 CTX-M and ACT-6, 11 CTX-M-1, 3 CTX-M-8, 2 CTX-M-14, 7 CTX-M-15, 1 CTX-M-32, 1 CTX-M-55, 5 SHV-12, and 1 CMY-2, 2 AmpC phenotype/genotype),
 - Latvia (22 ESBL phenotype/genotype, and 3 AmpC phenotype/genotype).
 - Sweden (1 CTX-M-1, 1 SHV-12).

Table 15: Prevalence of presumptive ESBL- and/or AmpC-producing *E. coli* isolates from fattening pigs collected within the specific ESBLs-/AmpC-/carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2019

Country	N _s	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC+ESBL ^(f)		CPs ^(g)	
		%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI
Austria	313	61.3	55.7-66.8	56.9	51.2-62.4	13.7	10.1-18.1	0.3	0-1.8	5.1	2.9-8.2	0.6	0.1-2.3	0	0-1.2
Belgium	297	48.7	40.4-52	40.2	32.5-43.8	17	12.2-20.9	1.8	0.5-3.9	9.3	5.8-12.6	0.7	0.1-2.4	0	0-1.2
Bulgaria	153	51.6	43.4-59.8	51.6	43.4-59.8	17	11.4-23.9	0.6	0-3.6	0.6	0-3.6	0.6	0-3.6	0	0-2.4
Croatia	393	64.9	17.4-69.6	51	13.2-55.9	22.4	5-26.8	0.8	0-1.4	14.7	2.9-18.7	0.8	0-1.4	0	0-0.9
Cyprus	140	2.1	0.4-6.1	2.1	0.4-6.1	0	0-2.6	0	0-2.6	0	0-2.6	0	0-2.6	0	0-2.6
Czechia	320	33.8	28.6-39.2	22.8	18.3-27.8	8.7	5.9-12.4	0	0-1.1	11.2	8-15.2	0.3	0-1.7	0	0-1.1
Denmark	330	27	22-31.8	7.4	4.7-10.6	3.7	1.9-6.3	0	0-1.1	19.6	15.3-24.1	0	0-1.1	0	0-1.1
Estonia	74	48.7	36.9-60.6	29.8	19.7-41.5	2.7	0.3-9.4	0	0-4.9	18.9	10.7-29.7	0	0-4.9	0	0-4.9
Finland	288	2.4	1-4.9	0.3	0-1.9	0.3	0-1.9	0	0-1.3	2.1	0.8-4.5	0	0-1.3	0	0-1.3
France	299	21.7	17.2-26.9	17.4	13.3-22.2	2.7	1.2-5.2	0.3	0-1.8	5	2.8-8.1	0.7	0.1-2.4	0	0-1.2
Germany	391	50.6	45.6-55.7	44	39-49.1	5.6	3.6-8.4	0	0-0.9	7.1	4.8-10.2	0.5	0.1-1.8	0	0-0.9
Greece	153	39.2	31.4-47.4	36	28.4-44.1	2	0.4-5.6	0	0-2.4	3.9	1.5-8.3	0.7	0-3.6	0	0-2.4
Hungary	294	66.3	60.6-71.7	61.9	56.1-67.5	16	12-20.7	0.3	0-1.9	6.4	3.9-9.9	2.1	0.8-4.4	0	0-1.2
Ireland	300	43.3	37.6-49.1	30.3	25.2-35.9	12	8.5-16.2	0	0-1.2	14	10.3-18.4	1	0.2-2.9	0	0-1.2
Italy	266	99.2	97.3-99.9	85	80.1-89	17.7	13.3-22.8	0.8	0.1-2.7	15	11-19.9	0.8	0.1-2.7	0	0-1.4
Latvia	152	54	45.7-62.1	50	41.8-58.2	12.5	7.7-18.8	0	0-2.4	3.9	1.5-8.4	0	0-2.4	0	0-2.4
Lithuania	159	23.3	16.9-30.6	19.5	13.6-26.5	3.8	1.4-8	0	0-2.3	3.8	1.4-8	0	0-2.3	0	0-2.3
Luxembourg	38	52.6	35.8-69	44.7	28.6-61.7	15.8	6-31.3	0	0-9.3	7.9	1.7-21.4	0	0-9.3	0	0-9.3
Malta	72	48.6	35.3-59.3	47.2	34-58	7.1	2.3-15.5	1.4	0-7.5	1.4	0-7.5	0	0-5	0	0-5
Netherlands	304	16.8	12.8-21.5	8.9	5.9-12.7	2.3	0.9-4.7	0	0-1.2	7.9	5.1-11.5	0	0-1.2	0	0-1.2
Poland	308	43.8	38.2-49.6	28.9	23.9-34.3	6.2	3.8-9.5	1.3	0.4-3.3	17.8	13.7-22.6	2.9	1.3-5.5	0	0-1.2
Portugal	239	74.5	63.6-75.6	69.1	58.4-70.9	10.3	6.2-14.1	0	0-1.5	13.9	9-17.9	8.5	4.9-12.1	0	0-1.5
Romania	222	75.7	69.5-81.2	53.6	46.8-60.3	16.2	11.6-21.7	0	0-1.6	24.3	18.8-30.5	2.3	0.7-5.2	0	0-1.6
Slovakia	150	52	43.7-60.2	40.7	32.7-49	17.3	11.6-24.4	0.7	0-3.7	12	7.3-18.3	0.7	0-3.7	0	0-2.4
Slovenia	150	60.7	52.4-68.5	32.7	25.2-40.8	15.3	10-22.1	0	0-2.4	28	21-35.9	0	0-2.4	0	0-2.4
Spain	378	77.8	73.2-81.9	71.4	66.6-75.9	13.2	10-17.1	0.2	0-1.5	12.2	9-15.9	5.5	3.5-8.4	0.2	0-1.5
Sweden	301	13	9.4-17.3	2.7	1.2-5.2	0.7	0.1-2.4	0	0-1.2	10.3	7.1-14.3	0	0-1.2	0	0-1.2
United Kingdom	308	18.5	14.3-23.3	14.9	11.1-19.4	2.9	1.3-5.5	0.3	0-1.8	3.9	2-6.7	0.3	0-1.8	0	0-1.2
Total (28 MSs)	6,792	42.7	41.5-43.9	34.1	33-35.3	8.6	7.9-9.3	0.3	0.2-0.5	9.7	9-10.5	1.2	0.9-1.4	0	0-0.1
Iceland	134	12.7	7.6-19.5	1.5	0.2-5.3	0.7	0-4.1	0.7	0-4.1	11.9	7-18.7	0.7	0-4.1	0	0-2.7
Norway	287	18.8	14.5-23.8	1.7	0.6-4	0.4	0-1.9	0	0-1.3	17.1	12.9-21.9	0	0-1.3	0	0-1.3
Switzerland	306	13.1	9.5-17.4	8.8	5.9-12.6	2.6	1.1-5.1	0	0-1.2	4.6	2.5-7.6	0.3	0-1.8	0	0-1.2

ESBL: extended-spectrum β -lactamase; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; P: prevalence; CI: confidence interval; MSs: Member States; N_s: total number of samples tested.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for FOX and/or CAZ (screening breakpoint) were considered (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).
- (b): All isolates showing clavulanate synergy with CTX or CAZ or synergy with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to FOX, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with CTX or CAZ and microbiological resistance to FOX, suggesting ESBL and AmpC enzymes in the same isolate. ESBL and AmpC columns include those isolates.
- (g): Isolates with microbiological meropenem resistance.

Table 16: Occurrence of presumptive ESBL- and/or AmpC-producing *E. coli* isolates from fattening pigs collected within the specific ESBLs-/AmpC-/carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2019

Country	N _{p2}	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
		n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Austria ⁽ⁱ⁾	192	192	100	178	92.7	43	22.4	1	0.5	16	8.3	2	1	0	0
Belgium	144	137	95.1	113	78.5	48	33.3	5	3.5	26	18.1	2	1.4	0	0
Bulgaria	81	79	97.5	79	97.5	26	32.1	1	1.2	1	1.2	1	1.2	0	0
Croatia	84	84	100	66	78.6	29	34.5	1	1.2	19	22.6	1	1.2	0	0
Cyprus	3	3	100	3	100	0	0	0	0	0	0	0	0	0	0
Czechia	108	108	100	73	67.6	28	25.9	0	0	36	33.3	1	0.9	0	0
Denmark	89	88	98.9	24	27	12	13.5	0	0	64	71.9	0	0	0	0
Estonia	37	36	97.3	22	59.5	2	5.4	0	0	14	37.8	0	0	0	0
Finland	7	7	100	1	14.3	1	14.3	0	0	6	85.7	0	0	0	0
France	66	65	98.5	52	78.8	8	12.1	1	1.5	15	22.7	2	3	0	0
Germany	198	198	100	172	86.9	22	11.1	0	0	28	14.1	2	1	0	0
Greece	60	60	100	55	91.7	3	5	0	0	6	10	1	1.7	0	0
Hungary	195	195	100	182	93.3	47	24.1	1	0.5	19	9.7	6	3.1	0	0
Ireland	133	130	97.7	91	68.4	36	27.1	0	0	42	31.6	3	2.3	0	0
Italy ⁽ⁱ⁾	266	264	99.2	226	85	47	17.7	2	0.8	40	15	2	0.8	0	0
Latvia ⁽ⁱ⁾	83	82	98.8	76	91.6	19	22.9	0	0	6	7.2	0	0	0	0
Lithuania	37	37	100	31	83.8	6	16.2	0	0	6	16.2	0	0	0	0
Luxembourg	20	20	100	17	85	6	30	0	0	3	15	0	0	0	0
Malta	34	34	100	33	97.1	5	14.7	1	2.9	1	2.9	0	0	0	0
Netherlands ⁽ⁱ⁾	51	51	100	27	52.9	7	13.7	0	0	24	47.1	0	0	0	0
Poland	136	135	99.3	89	65.4	19	14	4	2.9	55	40.4	9	6.6	0	0
Portugal	167	167	100	155	92.8	23	13.8	0	0	31	18.6	19	11.4	0	0
Romania	168	168	100	119	70.8	36	21.4	0	0	54	32.1	5	3	0	0
Slovakia	80	78	97.5	61	76.3	26	32.5	1	1.3	18	22.5	1	1.3	0	0
Slovenia	92	91	98.9	49	53.3	23	25	0	0	42	45.7	0	0	0	0
Spain	295	294	99.7	270	91.5	50	16.9	1	0.3	46	15.6	21	7.1	1	0.3
Sweden ⁽ⁱ⁾	39	39	100	8	20.5	2	5.1	0	0	31	79.5	0	0	0	0
United Kingdom	58	57	98.3	46	79.3	9	15.5	1	1.7	12	20.7	1	1.7	0	0
Total (28 MSs)	2,923	2,899	99.2	2,318	79.3	583	19.9	20	0.7	661	22.6	79	2.7	0	0
Iceland ⁽ⁱ⁾	17	17	100	2	11.8	1	5.9	1	5.9	16	94.1	1	5.9	0	0
Norway	54	54	100	5	9.3	1	1.9	0	0	49	90.7	0	0	0	0
Switzerland	40	40	100	27	67.5	8	20	0	0	14	35	1	2.5	0	0

ESBL: extended-spectrum β -lactamase; n: isolates with this phenotype; %: percentage of isolates from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States. N_{P2}: Total number of isolates tested with panel 2.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).
- (b): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to ceftazidime, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftazidime, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.
- (g): Isolates with microbiological meropenem resistance.
- (h): Percentage of the total number of *E. coli* isolates tested (with panel 2).
- (i): Molecular data were provided by:
 - Austria (1 CTX-M-1, 1 CTX-M-1+TEM-1, and 1 T-32A AmpC mutation, 6 C-42T AmpC mutation),
 - Iceland (1 CTX-M-1, and 16 AmpC phenotype/genotype),
 - Italy (1 CTX-M, 139 CTX-M-1, 5 CTX-M-8, 8 CTX-M-14, 30 CTX-M-15, 7 CTX-M-32, 18 CTX-M-55, 1 CTX-M-65, 2 CTX-M-122, 14 SHV-12, and 15 CMY-2, 2 DHA-1, 20 AmpC phenotype/genotype and 1 CTX-M+CMY-2, 2 CTX-M+AmpC phenotype/genotype, 1 CTX-M-1+DHA-1),
 - Latvia (76 ESBL phenotype/genotype, and 7 AmpC phenotype/genotype),
 - Netherlands (14 CTX-M-1, 4 CTX-M-1+TEM-1, 1 CTX-M-8, 1 CTX-M-14, 1 CTX-M-14+TEM-1, 1 CTX-M-115+TEM-1, 5 TEM-52, and 3 CMY-2, 21 AmpC phenotype/genotype),
 - Sweden (4 CTX-M-14, 3 CTX-M-15, 1 CTX-M-55, and 31 AmpC mutation or insertion).

Table 17: Prevalence of presumptive ESBL- and/or AmpC-producing *E. coli* isolates from bovine meat (retail) collected within the specific ESBLs/AmpC/Carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2019

Country	N _s	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC +ESBL ^(f)		CPs ^(g)	
		%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI
Austria	340	1.2	0.3-3	1.2	0.3-3	0.9	0.2-2.6	0	0-1.1	0	0-1.1	0	0-1.1	0	0-1.1
Belgium	300	3.7	1.6-6	3.3	1.4-5.6	1.1	0.2-2.9	0	0-1.2	0.4	0-1.8	0	0-1.2	0	0-1.2
Bulgaria	150	24	17.4-31.6	23.3	16.8-30.9	6.7	3.2-11.9	0	0-2.4	0.7	0-3.7	0	0-2.4	0	0-2.4
Croatia	121	2.5	0.5-7.1	1.7	0.2-5.8	0.8	0-4.5	0	0-3	0.8	0-4.5	0	0-3	0	0-3
Cyprus	147	4.8	1.9-9.6	3.4	1.1-7.8	1.4	0.2-4.8	0	0-2.5	1.4	0.2-4.8	0	0-2.5	0	0-2.5
Czechia	298	9.7	6.6-13.7	8.1	5.2-11.7	3.4	1.6-6.1	0	0-1.2	1.7	0.5-3.9	0	0-1.2	0	0-1.2
Denmark	319	3.8	2-6.5	2.5	1.1-4.9	0.3	0-1.7	0	0-1.1	1.3	0.3-3.2	0	0-1.1	0	0-1.1
Estonia	150	2	0.4-5.7	2	0.4-5.7	0.7	0-3.7	0	0-2.4	0	0-2.4	0	0-2.4	0	0-2.4
Finland	297	0.7	0.1-2.4	0.7	0.1-2.4	0	0-1.2	0	0-1.2	0	0-1.2	0	0-1.2	0	0-1.2
France	317	0.6	0.1-2.3	0	0-1.2	0	0-1.2	0	0-1.2	0.6	0.1-2.3	0	0-1.2	0	0-1.2
Germany	471	3.4	1.8-5.2	3.2	1.6-4.9	0.7	0.1-1.9	0	0-0.8	0.2	0-1.2	0	0-0.8	0	0-0.8
Greece	131	7.6	3.7-13.6	6.9	3.2-12.6	0.8	0-4.2	0	0-2.8	0.8	0-4.2	0	0-2.8	0	0-2.8
Hungary	174	15.5	10.5-21.8	14.4	9.5-20.5	5.2	2.4-9.6	0	0-2.1	1.1	0.1-4.1	0	0-2.1	0	0-2.1
Ireland	300	0.7	0.1-2.4	0	0-1.2	0	0-1.2	0	0-1.2	0.7	0.1-2.4	0	0-1.2	0	0-1.2
Italy	152	10.5	6.1-16.5	9.9	5.6-15.8	3.9	1.5-8.4	0	0-2.4	0.7	0-3.6	0	0-2.4	0	0-2.4
Latvia	144	3.5	0.8-7	3.5	0.8-7	3.5	0.8-7	0	0-2.5	0	0-2.5	0	0-2.5	0	0-2.5
Lithuania	150	8	4.2-13.6	6.7	3.2-11.9	0.7	0-3.7	0	0-2.4	1.3	0.2-4.7	0	0-2.4	0	0-2.4
Luxembourg	22	13.6	2.9-34.9	13.6	2.9-34.9	9.1	1.1-29.2	0	0-15.4	4.5	0.1-22.8	4.5	0.1-22.8	0	0-15.4
Malta	70	8.6	3.2-17.7	8.6	3.2-17.7	0	0-5.1	0	0-5.1	2.9	0.3-9.9	2.9	0.3-9.9	0	0-5.1
Netherlands	495	1.2	0.3-2.3	0.7	0.1-1.8	0.2	0-1.1	0	0-0.7	0.5	0-1.5	0	0-0.7	0	0-0.7
Poland	306	5.9	3.5-9.1	3.9	2-6.7	0.3	0-1.8	0	0-1.2	2.3	0.9-4.7	0.3	0-1.8	0	0-1.2
Portugal	120	18.3	11.9-26.4	18.3	11.9-26.4	3.3	0.9-8.3	0	0-3	0.8	0-4.6	0.8	0-4.6	0	0-3
Romania	150	4	1.5-8.5	2.7	0.7-6.7	0.7	0-3.7	0	0-2.4	1.3	0.2-4.7	0	0-2.4	0	0-2.4
Slovakia	150	6.7	3.2-11.9	6.7	3.2-11.9	2.7	0.7-6.7	0	0-2.4	0	0-2.4	0	0-2.4	0	0-2.4
Slovenia	151	4.6	1.9-9.3	4.6	1.9-9.3	3.3	1.1-7.6	0	0-2.4	0	0-2.4	0	0-2.4	0	0-2.4
Spain	300	15.3	3.3-19.9	15.3	3.3-19.9	2.7	0.2-2.9	0	0-1.2	0.9	0-1.8	0.9	0-1.8	0	0-1.2
Sweden	294	1	0.2-3	0.3	0-1.9	0	0-1.2	0	0-1.2	0.7	0.1-2.4	0	0-1.2	0	0-1.2
United Kingdom	289	0.3	0-1.9	0.3	0-1.9	0.3	0-1.9	0	0-1.3	0	0-1.3	0	0-1.3	0	0-1.3
Total (28 MSs)	6,308	5.2	4.1-5.2	4.5	3.6-4.6	1.4	1-1.5	0	0-0.1	0.8	0.5-0.9	0.1	0-0.2	0	0-0.1
Iceland	139	0.7	0-3.9	0.7	0-3.9	0	0-2.6	0	0-2.6	0	0-2.6	0	0-2.6	0	0-2.6
Norway	349	0.9	0.2-2.5	0.9	0.2-2.5	0.6	0.1-2.1	0	0-1.1	0	0-1.1	0	0-1.1	0	0-1.1
Rep. of North Macedonia	10	0	0-30.8	0	0-30.8	0	0-30.8	0	0-30.8	0	0-30.8	0	0-30.8	10	0.3-44.5

Switzerland	309	0.3	0-1.8	0	0-1.2	0	0-1.2	0	0-1.2	0.3	0-1.8	0	0-1.2	0	0-1.2
-------------	-----	-----	-------	---	-------	---	-------	---	-------	-----	-------	---	-------	---	-------

ESBL: extended-spectrum β -lactamase; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; P: prevalence; CI: confidence interval; N_s: total number of samples.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing MIC > 1 mg/L for CTX and/or CAZ (screening breakpoint) were considered (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).
- (b): All isolates showing clavulanate synergy with CTX or CAZ or synergy with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to FOX, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with FOX or CAZ and microbiological resistance to FOX, suggesting ESBL and AmpC enzymes in the same isolate. ESBL and AmpC columns include those isolates.
- (g): Isolates with microbiological MEM resistance.

Table 18: Occurrence of presumptive ESBL- and/or AmpC-producing *E. coli* isolates from bovine meat (retail) collected within the specific ESBLs/AmpC/Carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2019

Country	N _{p2}	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC+ESBL ^(f)		CPs ^(g)	
		n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Austria	4	4	100	4	100	3	75	0	0	0	0	0	0	0	0
Belgium	10	10	100	9	90	3	30	0	0	1	10	0	0	0	0
Bulgaria	36	36	100	35	97.2	10	27.8	0	0	1	2.8	0	0	0	0
Croatia	3	3	100	2	66.7	1	33.3	0	0	1	33.3	0	0	0	0
Cyprus	7	7	100	5	71.4	2	28.6	0	0	2	28.6	0	0	0	0
Czechia	29	29	100	24	82.8	10	34.5	0	0	5	17.2	0	0	0	0
Denmark	12	12	100	8	66.7	1	8.3	0	0	4	33.3	0	0	0	0
Estonia	3	3	100	3	100	1	33.3	0	0	0	0	0	0	0	0
Finland	2	2	100	2	100	0	0	0	0	0	0	0	0	0	0
France	2	2	100	0	0	0	0	0	0	2	100	0	0	0	0
Germany	15	15	100	14	93.3	3	20	0	0	1	6.7	0	0	0	0
Greece	10	10	100	9	90	1	10	0	0	1	10	0	0	0	0
Hungary	27	27	100	25	92.6	9	33.3	0	0	2	7.4	0	0	0	0
Ireland	2	2	100	0	0	0	0	0	0	2	100	0	0	0	0
Italy ⁽ⁱ⁾	16	16	100	15	93.8	6	37.5	0	0	1	6.3	0	0	0	0
Latvia ⁽ⁱ⁾	4	4	100	4	100	4	100	0	0	0	0	0	0	0	0
Lithuania	12	12	100	10	83.3	1	8.3	0	0	2	16.7	0	0	0	0
Luxembourg	3	3	100	3	100	2	66.7	0	0	1	33.3	1	33.3	0	0
Malta	6	6	100	6	100	0	0	0	0	2	33.3	2	33.3	0	0
Netherlands ⁽ⁱ⁾	5	5	100	3	60	1	20	0	0	2	40	0	0	0	0
Poland	18	18	100	12	66.7	1	5.6	0	0	7	38.9	1	5.6	0	0
Portugal	22	22	100	22	100	4	18.2	0	0	1	4.5	1	4.5	0	0
Romania	6	6	100	4	66.7	1	16.7	0	0	2	33.3	0	0	0	0
Slovakia	10	10	100	10	100	4	40	0	0	0	0	0	0	0	0
Slovenia	7	7	100	7	100	5	71.4	0	0	0	0	0	0	0	0
Spain	17	17	100	17	100	3	17.6	0	0	1	5.9	1	5.9	0	0
Sweden ⁽ⁱ⁾	3	3	100	1	33.3	0	0	0	0	2	66.7	0	0	0	0
United Kingdom	1	1	100	1	100	1	100	0	0	0	0	0	0	0	0
Total (28 MSs)	292	292	100	255	87.3	77	26.4	0	0	43	14.7	6	2.1	0	0
Iceland ⁽ⁱ⁾	1	1	100	1	100	0	0	0	0	0	0	0	0	0	0
Norway	3	3	100	3	100	2	66.7	0	0	0	0	0	0	0	0
Rep. of North Macedonia	1	0	0	0	0	0	0	0	0	0	0	0	0	1	100
Switzerland	1	1	100	0	0	0	0	0	0	1	100	0	0	0	0

ESBL: extended-spectrum β -lactamase; n = isolates with this phenotype; %: percentage of isolates from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; MSs: Member States. N_{P2}: Total number of isolates tested with panel 2.

- (a): Several countries reported only a few isolates. For countries reporting less than 10 isolates, occurrence data should be carefully considered.
- (b): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).
- (c): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (d): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (e): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (f): Isolates with microbiological resistance to ceftazidime, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (g): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftazidime, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.
- (h): Percentage of the total number of *E. coli* isolates tested (with panel 2).
- (i): Molecular data were provided by:
 - Iceland (1 CTX-M-32),
 - Italy (5 CTX-M-1, 1 CTX-M-3, 1 CTX-M-14, 4 CTX-M-15, 1 CTX-M-32, 1 CTX-M-55, 1 SHV-12, 1 TEM-52, and 1 CMY-2),
 - Latvia (4 ESBL phenotype/genotype),
 - Netherlands (2 CTX-M-1, 1 TEM-52, and 1 CMY-3),
 - Sweden (1 CTX-M-1, 2 AmpC mutation or insertion).

Table 19: Prevalence of presumptive ESBL- and/or AmpC-producing *E. coli* isolates from cattle under 1 year of age collected within the specific ESBLs/AmpC/Carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2019

Country	N _s	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLA SYN ^(c)		ESBL only CAZ/CLA SYN ^(d)		AmpC ^(e)		AmpC + ESBL ^(f)		CPs ^(g)	
		%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI	%P	95% CI
Belgium	300	62.5	49.5-68.2	58.8	46.2-64.3	9.8	5.7-12.4	1.2	0.2-2.9	6	3.1-8.5	2.2	0.7-4.3	0	0-1.2
Croatia	170	23.5	17.4-30.6	15.3	10.2-21.6	4.7	2.1-9.1	0	0-2.1	8.2	4.6-13.4	0	0-2.1	0	0-2.1
Denmark	306	7.8	5.1-11.4	4.2	2.3-7.2	2	0.7-4.2	0	0-1.2	3.9	2-6.7	0.3	0-1.8	0	0-1.2
France	244	20.1	15.2-25.7	12.7	8.8-17.5	2.5	0.9-5.3	0	0-1.5	8.6	5.4-12.9	1.2	0.3-3.6	0	0-1.5
Germany	407	70.8	62.8-72.1	69.2	61.3-70.7	8.2	5.4-10.9	0	0-0.9	3.3	1.7-5.4	1.8	0.7-3.5	0	0-0.9
Italy	268	99.6	97.9-100	98.5	96.2-99.6	23.1	18.2-28.7	0.4	0-2.1	2.2	0.8-4.8	1.1	0.2-3.2	0	0-1.4
Netherlands	297	32.3	29.3-40.4	30.1	27-38	3.1	1.6-6.1	0	0-1.2	4.1	2.4-7.4	1.9	0.7-4.3	0	0-1.2
Portugal	298	45.3	36.6-48.1	44.6	36-47.4	2.9	1.2-5.2	0	0-1.2	2.2	0.7-4.3	1.4	0.4-3.4	0	0-1.2
Spain	398	38.9	34.1-43.9	36.2	31.5-41.1	9.8	7.1-13.2	0	0-0.9	4.8	2.9-7.4	2	0.9-3.9	0	0-0.9
Total (9 MSs)	2,688	46.2	42.9-46.7	43	39.9-43.7	7.5	6.4-8.4	0.1	0-0.4	4.6	3.7-5.3	1.4	1-1.9	0	0-0.1
Norway	319	4.1	2.2-6.9	1.3	0.3-3.2	0	0-1.1	0	0-1.1	2.8	1.3-5.3	0	0-1.1	0	0-1.1
Switzerland	298	30.6	25.4-36.1	21.1	16.6-26.2	5	2.8-8.2	0	0-1.2	10.1	6.9-14.1	0.7	0.1-2.4	0	0-1.2

ESBL: extended-spectrum β-lactamase; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate; P: prevalence; CI: confidence interval; MSs: Member States; N_s: total number of samples.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing MIC > 1 mg/L for CTX and/or CAZ (screening breakpoint) were considered (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).
- (b): All isolates showing clavulanate synergy with CTX or CAZ or synergy with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to ceftazidime, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with CTX or CAZ and microbiological resistance to FOX, suggesting ESBL and AmpC enzymes in the same isolate. ESBL and AmpC columns include those isolates.
- (g): Isolates with microbiological meropenem resistance.

Table 20: Occurrence of presumptive ESBL- and/or AmpC-producing *E. coli* isolates from cattle under 1 year of age collected within the specific ESBLs/AmpC/Carbapenemase-producing monitoring and subjected to supplementary testing (panel 2) in 2019

Country	N _{p2}	ESBL and/or AmpC ^(a)		ESBL ^(b)		ESBL only CTX/CLASYN ^(c)		ESBL only CAZ/CLASYN ^(d)		AmpC ^(e)		AmpC+ESBL ^(f)		CPs ^(g)	
		n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)	n	% ^(h)
Belgium	170	166	97.6	156	91.8	26	15.3	3	1.8	16	9.4	6	3.5	0	0
Croatia	40	40	100	26	65	8	20	0	0	14	35	0	0	0	0
Denmark	25	24	96	13	52	6	24	0	0	12	48	1	4	0	0
France	51	49	96.1	31	60.8	6	11.8	0	0	21	41.2	3	5.9	0	0
Germany	275	275	100	269	97.8	32	11.6	0	0	13	4.7	7	2.5	0	0
Italy ⁽ⁱ⁾	268	267	99.6	264	98.5	62	23.1	1	0.4	6	2.2	3	1.1	0	0
Netherlands ⁽ⁱ⁾	103	103	100	96	93.2	10	9.7	0	0	13	12.6	6	5.8	0	0
Portugal	126	126	100	124	98.4	8	6.3	0	0	6	4.8	4	3.2	0	0
Spain	157	155	98.7	144	91.7	39	24.8	0	0	19	12.1	8	5.1	0	0
Total (9 MSs)	1,215	1,205	99.2	1,123	92.4	197	16.2	4	0.3	120	9.9	38	3.1	0	0
Norway	14	13	92.9	4	28.6	0	0	0	0	9	64.3	0	0	0	0
Switzerland	98	91	92.9	63	64.3	15	15.3	0	0	30	30.6	2	2	0	0

ESBL: extended-spectrum β-lactamase; n = isolates with this phenotype; %: percentage of isolates from the total tested; SYN: synergy; CTX: cefotaxime; CAZ: ceftazidime; CLA: clavulanate. MSs: Member States. N_{p2}: Total number of isolates tested with panel 2.

- (a): According to EUCAST Guidelines (EUCAST, 2017), only isolates showing an MIC > 1 mg/L for cefotaxime and/or ceftazidime (screening breakpoint) were considered (see Annex A 'Materials and methods' available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).
- (b): All isolates showing clavulanate synergy with cefotaxime, ceftazidime or with both compounds, suggesting the presence of an ESBL (independently of the presence of other mechanisms).
- (c): Isolates showing synergy with cefotaxime only, suggesting the presence of an ESBL with cefotaximase activity.
- (d): Isolates showing synergy with ceftazidime only, suggesting the presence of an ESBL with ceftazidimase activity.
- (e): Isolates with microbiological resistance to ceftoxitin, suggesting the presence of an AmpC enzyme (independently of the presence of other mechanisms).
- (f): Isolates showing synergy with cefotaxime or ceftazidime and with microbiological resistance to ceftoxitin, suggesting the presence of ESBL and AmpC enzymes in the same isolate. These isolates are also included in the ESBL and AmpC columns.
- (g): Isolates with microbiological meropenem resistance.
- (h): Percentage of the total number of *Salmonella* spp. isolates tested (with panel 2).
- (i): Molecular data were provided by:
 Italy (123 CTX-M-1, 1 CTX-M-3, 14 CTX-M-14, 102 CTX-M-15, 1 CTX-M-22, 4 CTX-M-32, 9 CTX-M-55, 11 SHV-12, and 3 AmpC phenotype/genotype),
 Netherlands (23 CTX-M-1, 8 CTX-M-1+TEM-1, 1 CTX-M-1+TEM-176, 1 CTX-M-2, 2 CTX-M-2+TEM-1, 2 CTX-M-9, 4 CTX-M-14, 1 CTX-M-14+TEM-1, 1 CTX-M-27+TEM-1, 2 CTX-M-32, 2 CTX-M-32+TEM-1, 1 CTX-M-65, 21 CTX-M-115, 22 CTX-M-115+TEM-1, 1 CTX-M-115+TEM-176, 1 CTX-M-155, 1 SHV-12+TEM-1, 2 TEM-52+TEM-1, and 7 AmpC phenotype/genotype).

E.5. Key outcome indicator of prevalence of ESBL- and/or AmpC-producing *E. coli*, food-producing animals, 2015-2019

Table 21: Changes in key outcome indicator of ESBL- and/or AmpC- producing indicator *E. coli* (KOI_{ESC}), 2015-2019

Country	Period ^(a)			
	2015-2016	2016-2017	2017-2018	2018-2019
Austria	52.1	59.9	56.4	56.2
Belgium	65.8	71.9	68.2	55.6
Bulgaria	64.4	55.3	51.9	55.7
Croatia	38.9	46.8	48.1	60.6
Cyprus	24.6	22.1	9.4	8.5
Czechia	40.5	42.1	37.6	38.0
Denmark	27.3	24.0	23.9	26.0
Estonia	36.7	35.3	38.2	50.5
Finland	6.3	6.3	6.2	6.1
France	39.6	32.8	26.6	22.1
Germany	47.2	47.5	47.0	50.1
Greece	54.4	59.1	42.5	42.5
Hungary	60.6	67.5	65.8	63.4
Ireland	42.3	47.6	40.1	45.6
Italy	-	88.7	82.3	88.9
Latvia	62.4	60.6	43.6	48.8
Lithuania	49.7	67.9	69.3	55.8
Luxembourg	58.9	40.9	40.7	52.3
Malta	-	-	45.7	66.9
Netherlands	23.7	23.9	19.1	19.5
Poland	44.7	51.1	44.5	41.9
Portugal	61.3	56.5	71.4	77.6
Romania	60.8	65.6	66.0	69.4
Slovakia	62.1	66.7	35.0	38.9
Slovenia	71.6	79.0	72.2	75.6
Spain	86.4	85.7	85.7	79.0
Sweden	20.7	22.0	12.3	13.2
United Kingdom	27.1	24.8	14.3	13.3
Total (MSs)	49.2	49.9	46.8	45.2
Iceland	-	5.3	4.0	6.4
Norway	10.9	12.8	9.5	12.7
Switzerland	30.3	25.1	21.1	19.6
Total (MSs and non-MSs)	48.7	49.3	46.2	44.7

(a): Proportions (in percent) of samples from broilers, fattening turkeys, fattening pigs and bovines under 1 year, weighted by PCU, that are identified as positive for presumptive ESBL- and/or AmpC-producing indicator *E. coli* in the framework of the specific monitoring for ESBL-/AmpC-/carbapenemase-producing indicator *E. coli* according to Commission Implementing Decision 2013/652/EU.

E.4. Specific carbapenemase-producing *E. coli* monitoring 2018-2019³

Table 22: Number of samples investigated and number of presumptive carbapenemase-producing *E. coli* in the voluntary specific carbapenemase-producing monitoring in 2018-2019

Reporting country	Animal population/Meat													
	Pig Meat 2019		Fattening Pigs 2019		Bovine Meat 2019		Cattle, <1 year old 2019		Broiler Meat 2018		Broilers 2018		Fattening Turkeys 2018	
	N _s	n _{CP}	N _s	n _{CP}	N _s	n _{CP}	N _s	n _{CP}	N _s	n _{CP}	N _s	n _{CP}	N _s	n _{CP}
Austria	313	0	313	0	2	0	–	–	295	0	305	0	193	0
Belgium	300	0	297	0	300	0	300	0	300	0	291	0	–	–
Bulgaria	150	0	153	0	150	0	–	–	–	–	–	–	–	–
Croatia	126	0	393	0	121	0	170	0	139	0	300	0	–	–
Czechia	1	0	319	0	5	0	–	–	291	0	319	0	–	–
Denmark	317	0	329	0	2	0	306	0	293	0	837	0	–	–
Estonia	4	0	74	0	2	0	–	–	75	0	85	0	–	–
Finland	7	0	288	0	287	0	–	–	300	0	289	0	–	–
France	322	0	299	0	317	0	244	0	333	0	301	0	255	0
Germany	501	2	–	–	–	0	–	–	384	0	300	0	300	0
Greece	1	0	153	0	1	0	–	–	307	0	378	0	–	–
Hungary	279	0	295	0	175	0	–	–	223	0	300	0	300	0
Ireland	300	0	300	0	300	0	–	–	300	0	298	0	–	–
Italy	–	–	266	1	–	–	–	–	316	0	512	0	484	0
Malta	–	–	51	0	–	–	–	–	–	–	–	–	–	–
Poland	305	0	308	0	306	0	–	–	–	–	315	0	305	0
Portugal	116	0	152	0	109	0	141	0	–	–	–	–	–	–
Romania	–	–	222	1	–	–	–	–	–	–	–	–	–	–
Slovakia	2	0	150	0	1	–	–	–	–	–	–	–	–	–
Slovenia	27	0	150	0	2	0	–	–	150	0	150	0	–	–
Sweden	12	0	300	0	4	0	–	–	288	0	300	0	72	0
United Kingdom	285	0	308	0	289	0	–	–	309	0	302	0	373	0
Total (18 MSs)	3,368	2	5,120	2	2,373	0	1,161	0	4,303	0	5,582	0	2,282	0
Norway	352	0	286	0	349	0	319	0	–	–	279	0	137	0

³ his monitoring programme was performed and reported on a voluntary basis. For the specific monitoring of carbapenemase-producing microorganisms, isolation required the use of non-selective pre-enrichment and subsequent selective plating on carbapenem-containing media, in accordance with the most recent version of the detailed protocol of the EURL-AR (<https://www.eurl-ar.eu/protocols.aspx>). More information is provided in Annex A, Materials and methods, available on the EFSA Knowledge Junction community on Zenodo at: <https://doi.org/10.5281/zenodo.4557180>).

EUSR on AMR in zoonotic and indicator bacteria from humans, animals and food 2018/2019

Switzerland	1	0	306	0	7	0	298	0	312	0	307	0	-	-
-------------	---	---	-----	---	---	---	-----	---	-----	---	-----	---	---	---

N_s: number of fresh meat samples collected at retail. n_{cp}: number of positive isolates. For 2018 and 2019, the Netherlands also reported data on additional specific monitoring of carbapenemase-producing *E. coli* in broilers, fattening pigs and bovines under 1 year using a different isolation protocol (EFSA and ECDC, 2019). All these samples (n=1,814) were negative. In addition, for 2019, using samples collected on farms (not at the slaughterhouse) Germany detected two additional suspected carbapenemase-producing *E. coli* from fattening pigs that were reported under OTHER CARBA MON.