

Annex C - Antimicrobial resistance in indicator *Escherichia coli* from food-producing animals

Annex to:

EFSA (European Food Safety Authority) and ECDC (European Centre for Disease Prevention and Control), 2022. **The European Union Summary Report on Antimicrobial Resistance in zoonotic and indicator bacteria from humans, animals and food in 2019/2020**. EFSA Journal 2022;20(3):7209, 198 pp. <https://doi.org/10.2903/j.efsa.2022.7209>

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Table 1: Occurrence of resistance (%) to selected antimicrobials in indicator *Escherichia coli* from fattening pigs, using harmonised ECOFFs, 28 EU MSs and 4 non-MSs, 2019

Country	N	GEN	CHL	AMP	CTX	CAZ	MEM	TGC	NAL	CIP	AZM	COL	SMX	TMP	TET	CS	MDR	Resistance to both CIP/CTX, applying ECOFFs	Resistance to both CIP/CTX, applying CBPs
Austria	174	2.3	6.9	24.1	1.1	1.1	0	0	0.6	2.3	0.6	0	29.9	17.2	43.7	39.7	20.1	0	0
Belgium	175	0.6	19.4	38.9	0.6	0.6	0	0	2.3	9.1	1.7	0	39.4	35.4	36	41.7	34.3	0.6	0
Bulgaria	104	1	36.5	59.6	0	0	0	0	10.6	16.3	1	0	66.3	36.5	75	11.5	58.7	0	0
Croatia	85	2.4	11.8	38.8	1.2	1.2	0	0	11.8	16.5	2.4	0	41.2	31.8	47.1	42.4	37.6	0	0
Cyprus	34	2.9	44.1	73.5	0	0	0	0	2.9	5.9	14.7	0	88.2	85.3	94.1	0	85.3	0	0
Czechia	313	0.3	7	31.6	1.3	1.3	0	0	1.6	2.6	1.3	0	23.3	14.4	36.7	46.3	20.4	0	0
Denmark	190	1.1	5.8	35.3	0	0	0	0	1.1	2.6	1.1	0	44.2	28.9	34.7	42.1	31.1	0	0
Estonia	71	0	2.8	25.4	1.4	1.4	0	0	0	5.6	0	0	22.5	25.4	32.4	57.7	21.1	0	0
Finland	174	0	1.7	9.2	0.6	0.6	0	0	1.1	1.7	0	0	12.6	8	13.8	77.6	8	0	0
France	188	2.7	7.4	30.3	1.1	1.1	0	0	3.7	4.3	0.5	1.1	35.1	29.8	51.1	29.8	28.2	0	0
Germany	246	0.8	10.2	35.4	3.3	2.8	0	0	4.9	8.5	1.6	0	32.5	26.8	35.4	47.2	29.3	1.6	0
Greece	146	4.8	46.6	65.8	1.4	1.4	0	0	8.9	17.8	4.1	3.4	67.8	58.2	81.5	14.4	69.9	1.4	0
Hungary	170	4.7	11.2	48.8	1.8	1.2	0	0	6.5	12.9	0.6	1.2	31.8	24.1	51.2	29.4	30	0	0
Ireland	170	2.4	6.5	35.9	1.2	1.2	0	0	4.1	5.3	2.4	0	45.3	37.6	57.1	32.4	38.2	0	0
Italy	169	11.2	45.6	71.6	0.6	0.6	0	0	12.4	24.3	1.2	0.6	68.6	59.2	74.6	10.7	70.4	0.6	0
Latvia	152	2.6	7.2	28.9	0.7	0.7	0	0	2	11.2	0	0	34.2	22.4	31.6	46.1	23	0	0
Lithuania	99	3	5.1	24.2	0	0	0	0	10.1	14.1	0	0	27.3	19.2	32.3	56.6	23.2	0	0
Luxembourg	37	0	16.2	45.9	0	0	0	0	0	10.8	0	0	35.1	21.6	45.9	37.8	27	0	0
Malta	71	7	14.1	23.9	1.4	1.4	0	2.8	7	19.7	2.8	0	45.1	35.2	71.8	18.3	38	1.4	1.4
Netherlands	304	2	11.8	21.4	0	0	0	0	0.7	1	0.7	0	31.9	26	41.8	44.7	24.3	0	0
Poland	175	3.4	21.7	52.6	0.6	0.6	0	0	12	20.6	0	0	47.4	37.7	60	27.4	43.4	0.6	0
Portugal	156	3.2	47.4	73.1	5.1	4.5	0	0	14.7	26.3	14.1	8.3	71.2	56.4	89.7	3.8	74.4	4.5	1.9
Romania	170	7.1	40.6	74.1	5.9	5.9	0	0	17.1	39.4	5.3	0	62.9	44.7	61.2	14.1	67.6	2.9	0.6
Slovakia	85	3.5	23.5	61.2	0	0	0	0	9.4	12.9	1.2	0	55.3	49.4	74.1	20	55.3	0	0

EURS on AMR in zoonotic and indicator bacteria from humans, animals and food 2019/2020

Slovenia	85	2.4	16.5	23.5	3.5	3.5	0	0	3.5	14.1	1.2	0	23.5	11.8	36.5	48.2	22.4	0	0
Spain	170	5.9	45.9	74.7	1.8	1.8	0	0	20	45.9	4.1	0.6	65.9	63.5	77.6	5.9	76.5	1.2	0.6
Sweden	174	0	1.7	19	0	0	0	0	1.1	1.1	0	0	18.4	14.9	12.6	71.3	10.9	0	0
United Kingdom	208	1.4	16.3	36.1	2.4	2.4	0	0	1	3.4	0.5	0	42.8	39.9	58.7	29.3	39.4	0.5	0
Total (MSs)	4295	2.7	17.7	40.5	1.4	1.3	0	0	5.8	11.8	1.9	0.6	41.1	32.5	49.4	35.6	37.3	0.6	0.1
Median (MSs)	-	2.4	12.95	36	1.1	1.1	0	0	3.9	11	1.15	0	40.3	30.8	49.1	35.1	32.7	0	0
Iceland	14	0	7.1	21.4	0	0	0	0	0	0	0	0	21.4	28.6	28.6	64.3	21.4	0	0
Norway	285	0.4	0.4	4.2	0	0	0	0	0	0	0	0	4.9	4.6	2.5	91.2	2.8	0	0
Rep. of North Macedonia	19	0	15.8	36.8	0	0	0	0	5.3	21.1	0	0	26.3	10.5	63.2	31.6	31.6	0	0
Switzerland	189	1.1	1.6	12.7	0	0	0	0	2.6	2.6	0	0	30.2	12.7	21.2	58.7	12.2	0	0
Total (MSs and non-MSs)	4802	2.5	16	37.2	1.2	1.2	0	0	5.3	10.7	1.7	0.5	38.4	29.9	45.5	39.8	34.2	0.5	0.1
Median (MSs and non-MSs)	-	2.4	11.8	35.7	0.7	0.7	0.0	0.0	3.6	10.0	0.9	0.0	35.1	28.8	46.5	38.8	30.6	0.0	0.0

ECOFFs: epidemiological cut-off values; MS: Member States; N: number of isolates tested; GEN: gentamicin, CHL: chloramphenicol; AMP: ampicillin; CTX: cefotaxime; CAZ: Ceftazidime; MEM: meropenem; TGC: tigecycline, NAL: nalidixic acid; CIP: ciprofloxacin; AZM: azithromycin; COL: colistin; SMX: sulfamethoxazole; TMP: trimethoprim; TET: tetracycline. CS: complete susceptibility; MDR: multidrug resistance (MDR). For descriptions of the analysis of MDR, CS and co-resistance see Appendix F. Materials and Methods available at <https://doi.org/10.2903/j.efsa.2022.7209>

Table 2: Occurrence of resistance (%) to selected antimicrobials in indicator *Escherichia coli* from calves under 1 year of age, using harmonised ECOFFs, 10 EU MSs, 2019

Country	N	GEN	CHL	AMP	CTX	CAZ	MEM	TGC	NAL	CIP	AZM	COL	SMX	TMP	TET	CS	MDR	Resistance to both CIP/CTX, applying ECOFFs	Resistance to both CIP/CTX, applying CBPs
Belgium	172	5.2	31.4	66.9	2.3	2.3	0	0	12.2	24.4	4.1	2.3	61	50	73.3	19.8	62.2	1.2	0
Croatia	84	3.6	10.7	13.1	0	0	0	0	7.1	7.1	0	0	32.1	11.9	27.4	63.1	15.5	0	0
Denmark	172	0.6	5.8	6.4	0	0	0	0	0	0	0	0	9.3	1.2	11.6	87.2	6.4	0	0
France	153	6.5	20.3	35.3	0	0	0	0	5.9	6.5	3.9	0.7	45.8	28.8	54.9	39.9	40.5	0	0
Germany	217	2.8	10.1	33.6	2.3	1.8	0	0	5.5	12.4	2.8	0.5	27.6	27.2	37.3	53	30.9	0.5	0
Italy	169	20.1	36.1	63.9	4.1	4.1	0	0	21.9	46.2	3	1.8	71	65.1	79.9	14.8	73.4	3	0.6
Netherlands	294	1.7	12.6	20.1	0	0	0	0	1.4	3.4	0	0	20.7	16.7	43.2	54.8	20.7	0	0
Portugal	174	1.7	10.9	9.8	2.3	1.7	0	0	4	5.7	0	0	14.9	5.2	21.8	77	12.1	2.3	1.1
Spain	170	3.5	16.5	21.8	0.6	0.6	0	0	5.3	8.2	0.6	0.6	41.8	18.2	51.8	44.1	31.2	0.6	0
Total (MSs)	1605	4.8	16.9	30.2	1.3	1.2	0	0	6.5	12.3	1.6	0.6	34.6	24.9	45	50.3	32.3	0.8	0.2
Median (MSs)	-	3.5	12.6	21.8	0.6	0.6	0.0	0.0	5.5	7.1	0.6	0.5	32.1	18.2	43.2	53.0	30.9	0.5	0.0
Norway	314	0.3	0.3	2.2	0.3	0.3	0	0	0	0	0.3	0	3.2	0.6	2.2	93.6	0.3	0	0
Rep. of North Macedonia	18	5.6	11.1	22.2	5.6	5.6	0	0	0	5.6	0	0	33.3	5.6	38.9	44.4	11.1	5.6	5.6
Switzerland	199	4	7	26.1	1	1	0	0	4	4.5	0.5	0	31.2	13.1	36.2	60.3	25.6	0	0
Total (MSs and non-MSs)	2136	4.1	13.5	25.7	1.2	1.1	0	0	5.3	9.7	1.3	0.5	29.7	20.1	37.8	57.6	26.8	0.7	0.2
Median (MSs and non-MSs)	-	3.6	11.0	22.0	0.8	0.8	0.0	0.0	4.7	6.1	0.4	0.0	31.7	14.9	38.1	53.9	23.2	0.3	0.0

ECOFFs: epidemiological cut-off values; MSs: Member States; N: number of isolates tested; GEN: gentamicin, CHL: chloramphenicol; AMP: ampicillin; CTX: cefotaxime; CAZ: Ceftazidime; MEM: meropenem; TGC: tigecycline, NAL: nalidixic acid; CIP: ciprofloxacin; AZM: azithromycin; COL: colistin; SMX: sulfamethoxazole; TMP: trimethoprim; TET: tetracycline. CS: complete susceptibility; MDR: multidrug resistance (MDR). For descriptions of the analysis of MDR, CS and co-resistance see Appendix F. Materials and Methods available at <https://doi.org/10.2903/j.efsa.2022.7209>

Table 3: Occurrence of resistance (%) to selected antimicrobials in indicator *Escherichia coli* from broilers, using harmonised ECOFFs, 26 EU MSs and 5 non-MS, 2020

Country	N	GEN	CHL	AMP	CTX	CAZ	MEM	TGC	NAL	CIP	AZM	COL	SMX	TMP	TET	CS	MDR	Resistance to both CIP/CTX, applying ECOFFs	Resistance to both CIP/CTX, applying CBPs
Austria	170	3.5	2.9	34.7	0.0	0.0	0.0	0.0	46.5	47.6	0.6	0.0	37.1	25.9	26.5	32.4	32.9	0	0
Belgium	165	6.1	18.2	82.4	6.7	6.7	0.0	0.0	45.5	49.7	6.1	0.0	69.1	64.8	56.4	6.1	70.3	5.5	0
Bulgaria	100	16.0	25.0	60.0	1.0	0.0	0.0	0.0	74.0	77.0	6.0	6.0	81.0	40.0	52.0	2.0	72	1	1
Croatia	85	8.2	8.2	50.6	0.0	0.0	0.0	0.0	56.5	62.4	0.0	0.0	42.4	28.2	45.9	24.7	45.9	0	0
Cyprus	99	7.1	24.2	81.8	7.1	7.1	0.0	0.0	72.7	87.9	3.0	11.1	67.7	56.6	73.7	5.1	79.8	7.1	5.1
Czechia	195	1.0	3.1	36.4	0.0	0.0	0.0	0.0	66.2	71.8	0.0	0.0	21.5	14.4	19.0	15.9	23.1	0	0
Denmark	172	2.3	0.0	20.3	0.0	0.0	0.0	0.0	14.5	16.3	0.6	0.0	19.8	10.5	9.3	58.1	12.8	0	0
Estonia	82	0.0	4.9	39.0	0.0	0.0	0.0	0.0	48.8	51.2	0.0	0.0	19.5	15.9	13.4	37.8	24.4	0	0
Finland	170	0.6	0.0	4.1	0.0	0.0	0.0	0.0	4.7	4.7	0.0	0.0	3.5	1.8	9.4	82.9	2.4	0	0
France	222	2.7	3.6	37.4	0.5	0.5	0.0	0.0	29.7	30.6	0.5	0.9	36.9	31.5	41.9	30.6	38.3	0.5	0
Germany	214	9.3	5.1	64.0	2.3	2.3	0.0	0.0	52.3	60.7	2.8	8.9	50.9	38.8	31.8	15.4	49.5	1.4	0
Greece	170	17.6	29.4	72.9	0.6	0.6	0.0	0.0	68.2	72.9	5.9	0.6	58.8	53.5	61.8	9.4	68.8	0.6	0.6
Hungary	170	8.8	14.7	51.2	1.2	1.2	0.0	0.0	82.4	88.8	0.6	0.0	34.7	20.6	37.6	6.5	45.3	1.2	0.6
Ireland	170	0.0	5.3	50.0	0.0	0.0	0.0	0.0	15.9	17.1	0.6	0.0	32.4	27.1	31.2	31.8	28.2	0	0
Italy	170	2.9	21.2	55.9	1.2	1.2	0.0	0.0	48.2	54.1	1.2	0.0	46.5	37.1	47.6	24.1	52.4	0.6	0.6
Latvia	150	0.0	2.7	41.3	0.7	0.7	0.0	0.0	57.3	60.7	0.0	0.0	28.0	30.7	26.7	22	37.3	0.7	0.7
Lithuania	100	12.0	33.0	86.0	5.0	5.0	0.0	0.0	75.0	92.0	5.0	0.0	76.0	63.0	62.0	1	86	5	1
Luxembourg	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100	0	0	0
Malta	3	0.0	33.3	33.3	33.3	33.3	0.0	0.0	33.3	33.3	0.0	0.0	33.3	33.3	33.3	100	0	0	0
Netherlands	305	3.0	3.6	43.6	0.3	0.0	0.0	0.0	29.2	34.4	0.0	0.0	41.0	30.8	30.2	31.8	38	0.3	0
Poland	175	9.1	24.0	77.7	2.3	1.7	0.0	0.0	70.3	85.1	1.7	1.7	57.1	53.1	52.0	7.4	71.4	1.7	0.6
Portugal	156	9.6	21.8	64.1	3.2	3.2	0.0	0.0	69.2	74.4	5.8	0.0	46.2	34.0	50.6	10.3	54.5	3.2	1.9
Romania	168	17.3	25.6	63.1	3.6	3.0	0.0	0.0	82.1	87.5	11.3	4.2	57.1	42.3	56.5	6	71.4	3.6	3.6
Slovakia	84	10.7	14.3	82.1	0.0	0.0	0.0	0.0	88.1	96.4	1.2	0.0	50.0	39.3	59.5	2.4	64.3	0	0
Slovenia	85	0.0	2.4	56.5	1.2	1.2	0.0	0.0	51.8	63.5	0.0	0.0	25.9	24.7	34.1	17.6	34.1	0	0

EUR on AMR in zoonotic and indicator bacteria from humans, animals and food 2019/2020

Spain	170	12.4	8.8	32.9	1.8	1.8	0.0	0.0	60.6	65.9	6.5	0.0	26.5	18.8	30.0	19.4	31.2	1.2	1.2
Sweden	172	0.6	0.0	12.8	0.0	0.0	0.0	0.0	10.5	12.2	0.0	0.0	15.1	9.3	7.0	71.5	10.5	0	0
Total (MSs)	3,924	6.1	11.1	49.8	1.5	1.4	0.0	0.0	49.7	55.1	2.3	1.2	40.5	31.7	36.9	-	-	-	-
Median (MSs)	-	3.5	8.2	50.6	0.7	0.6	0	0	52.3	60.7	0.6	0	37.1	30.8	34.1	19.4	38.3	0.5	0
Iceland	85	1.2	0.0	7.1	0.0	0.0	0.0	0.0	7.1	7.1	0.0	0.0	4.7	10.6	3.5	78.8	3.5	0	0
Norway	247	0.0	0.4	2.0	0.0	0.0	0.0	0.0	12.1	12.6	0.0	0.0	0.4	2.8	3.6	79.8	0.4	0	0
Republic of North Macedonia	2	0.0	0.0	50.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	50.0	50	50	0	0
Switzerland	208	1.4	0.5	19.7	0.0	0.0	0.0	0.0	40.4	41.3	0.5	0.0	16.8	12.0	13.0	44.2	16.8	0	0
United Kingdom	250	4.0	3.2	40.4	0.4	0.4	0.0	0.0	10.0	10.4	0.4	0.0	31.2	24.0	22.0	42.4	27.2	0	0
Total (MSs and non-MSs)	4,715	5.4	9.5	44.7	1.2	1.1	0	0	44.5	49	2	1	36.2	28.5	32.7	-	-	-	-
Median (MSs and non-MSs)	-	3.0	5.0	46.8	0.5	0.2	0.0	0.0	49.4	52.7	0.6	0.0	34.0	27.7	32.6	24.4	37.7	0.0	0.0

ECOFFs: epidemiological cut-off values; MSs: Member States; N: number of isolates tested; GEN: gentamicin, CHL: chloramphenicol; AMP: ampicillin; CTX: cefotaxime; CAZ: Ceftazidime; MEM: meropenem; TGC: tigecycline, NAL: nalidixic acid; CIP: ciprofloxacin; AZM: azithromycin; COL: colistin; SMX: sulfamethoxazole; TMP: trimethoprim; TET: tetracycline. CS: complete susceptibility; MDR: multidrug resistance (MDR). For descriptions of the analysis of MDR, CS and co-resistance see Appendix F Materials and Methods available at <https://doi.org/10.2903/j.efsa.2022.7209>

Table 4: Occurrence of resistance (%) to selected antimicrobials in indicator *Escherichia coli* from fattening turkeys, using harmonised ECOFFs, 11 EU MSs and 2 non-MS, 2020

Country	N	GEN	CHL	AMP	CTX	CAZ	MEM	TGC	NAL	CIP	AZM	COL	SMX	TMP	TET	CS	MDR	Resistance to both CIP/CTX, applying ECOFFs	Resistance to both CIP/CTX, applying CBPs
Austria	170	1.2	2.9	40.6	0.0	0.0	0.0	0.0	13.5	21.8	0.0	0.6	11.8	11.8	30.6	44.1	15.9	0.0	0.0
Belgium	95	6.3	26.3	69.5	6.3	7.4	0.0	0.0	24.2	34.7	1.1	0.0	41.1	31.6	67.4	17.9	50.5	2.1	0.0
France	171	0.6	10.5	54.4	0.6	0.6	0.0	0.0	9.9	15.2	0.6	2.9	32.2	31.0	52.6	31.6	38.6	0.0	0.0
Germany	213	2.8	11.3	54.5	1.4	0.9	0.0	0.0	20.2	32.4	0.0	7.5	25.4	12.7	39.0	27.7	33.3	0.5	0.0
Hungary	170	2.9	24.7	54.7	0.0	0.0	0.0	0.0	38.8	58.2	2.9	1.8	38.2	22.4	68.2	18.2	50.6	0.0	0.0
Italy	170	2.4	15.9	52.4	1.8	1.8	0.0	0.0	22.9	33.5	1.2	0.0	44.1	45.3	47.1	31.2	47.6	0.6	0.0
Poland	182	8.8	25.3	74.2	2.2	1.6	0.0	0.0	45.1	73.6	1.1	12.1	45.6	39.6	67.6	13.2	64.8	1.6	1.1
Portugal	142	3.5	31.7	69.7	3.5	3.5	0.0	0.7	64.8	72.5	7.0	23.9	51.4	37.3	71.8	14.1	69.0	3.5	2.1
Romania	31	41.9	74.2	93.5	0.0	0.0	0.0	0.0	64.5	87.1	22.6	3.2	80.6	54.8	90.3	3.2	90.3	0.0	0.0
Spain	170	2.4	21.8	60.0	3.5	3.5	0.0	0.0	36.5	56.5	1.8	0.0	37.6	30.0	59.4	18.2	53.5	3.5	1.2
Sweden	44	0.0	2.3	9.1	0.0	0.0	0.0	0.0	4.5	4.5	0.0	0.0	9.1	2.3	9.1	79.5	4.5	0.0	0.0
Total (MSs)	1,558	4.0	18.9	57.4	1.8	1.7	0.0	0.1	30.1	43.8	2.0	5.3	35.8	28.2	54.1	25.7	46.0	1.2	0.4
Median (MSs)	-	2.8	21.8	54.7	1.4	0.9	0	0	24.2	34.7	1.1	1.8	38.2	31	59.4	18.2	50.5	0.5	0
Norway	120	0.8	1.7	18.3	1.7	1.7	0.0	0.0	1.7	2.5	0.0	0.0	5.8	6.7	8.3	75.0	5.0	0.0	0.0
United Kingdom	197	1.5	4.1	59.9	1.0	1.0	0.0	0.0	6.6	14.2	1.0	0.0	16.8	14.7	55.3	28.9	24.4	0.5	0.5
Total (MSs and non-MSs)	1,875	3.5	16.2	55.2	1.7	1.6	0	0.1	25.8	38.1	1.8	4.4	31.9	25.4	51.3	29.2	41	1	0.4
Median (MSs and non-MSs)	-	2.4	15.9	54.7	1.4	1	0	0	22.9	33.5	1.1	0.6	37.6	30	55.3	27.7	47.6	0.5	0

ECOFFs: epidemiological cut-off values; MSs: Member States; N: number of isolates tested; GEN: gentamicin, CHL: chloramphenicol; AMP: ampicillin; CTX: cefotaxime; CAZ: Ceftazidime; MEM: meropenem; TGC: tigecycline, NAL: nalidixic acid; CIP: ciprofloxacin; AZM: azithromycin; COL: colistin; SMX: sulfamethoxazole; TMP: trimethoprim; TET: tetracycline. CS: complete susceptibility; MDR: multidrug resistance (MDR). For descriptions of the analysis of MDR, CS and co-resistance see Appendix F Materials and Methods available at <https://doi.org/10.2903/j.efsa.2022.7209>