

Annex B- Data reported on antimicrobial resistance in *Campylobacter* spp.

Annex to:

EFSA (European Food Safety Authority) and ECDC (European Centre for Disease Prevention and Control), 2023. The European Union Summary Report on Antimicrobial Resistance in zoonotic and indicator bacteria from humans, animals and food in 2020/2021. EFSA Journal 2023;21(3):7867, 232 pp. <https://doi.org/10.2903/j.efsa.2023.7867>

© 2023 European Food Safety Authority and European Centre for Disease Prevention and Control. EFSA Journal published by Wiley-VCH GmbH on behalf of European Food Safety Authority

Table of Contents

Section B.1. Antimicrobial resistance in <i>Campylobacter</i> spp. from humans	3
Section B.2. Antimicrobial resistance in <i>Campylobacter</i> spp. from food producing animals and derived meat	8

List of Figures

Figure 1: Trends in ciprofloxacin (CIP), erythromycin (ERY), streptomycin (STR) and tetracycline (TET) resistance in (a) *C. jejuni* and (b) *C. coli* from broilers, 2009–2020. 23

Figure 2: Trends resistance in *C. jejuni* to ciprofloxacin (CIP), erythromycin (ERY), streptomycin (STR) and tetracycline (TET) from fattening turkeys, 2014–2020. 24

List of Tables

Table 1: Antimicrobial resistance in <i>Campylobacter jejuni</i> from humans per country in 2021	3
Table 2: Antimicrobial resistance in <i>Campylobacter coli</i> from humans per country in 2021	4
Table 3: Proportion of <i>Campylobacter jejuni</i> isolates from humans resistant to both ciprofloxacin (CIP) and erythromycin (ERY) per country in 2021	5
Table 4: Proportion of <i>Campylobacter coli</i> isolates from humans resistant to both ciprofloxacin (CIP) and erythromycin (ERY) per country in 2021	6
Table 5: Complete susceptibility and multiresistance in <i>Campylobacter jejuni</i> from humans in 2021...	7
Table 6: Complete susceptibility and multiresistance in <i>Campylobacter coli</i> from humans in 2021	7
Table 7: Overview of the data reported in 2020/2021	8
Table 8: Overview of data reported in 2021 for <i>C. coli</i> isolates from legislative categories	9
Table 9: Overview of data reported in 2021 for <i>C. jejuni</i> isolates from legislative categories	9
Table 10: Overview of data reported in 2021 for <i>C. jejuni</i> isolates from non-legislative categories ...	10
Table 11: Overview of data reported in 2021 for <i>C. coli</i> isolates from non-legislative categories	10
Table 12: Occurrence of resistance (%) to selected antimicrobials in <i>Campylobacter jejuni</i> from fattening pigs, using harmonised ECOFFs, 12 EU MSs and 1 non-MS, 2021	11
Table 13: Occurrence of resistance (%) to selected antimicrobials in <i>Campylobacter coli</i> from pigs, using harmonised ECOFFs, 27 EU MSs and 3 non-MSs, 2021	11
Table 14: Occurrence of resistance (%) to selected antimicrobials in <i>Campylobacter coli</i> from calves, using harmonised ECOFFs, 10 EU MSs, 2021	12

Table 15: Occurrence of resistance (%) to selected antimicrobials in <i>Campylobacter jejuni</i> from calves, using harmonised ECOFFs, 10 EU MSs and 2 non-MSs, 2021.....	12
Table 16: Occurrence of resistance (%) to selected antimicrobials in <i>Campylobacter jejuni</i> from broilers, using harmonised ECOFFs, 27 EU MSs and 3 non-MSs, 2020.....	13
Table 17: Occurrence of resistance (%) to selected antimicrobials in <i>Campylobacter jejuni</i> from fattening turkeys using harmonised ECOFFs, 9 EU MSs and 2 non-MSs, 2020.....	14
Table 18: Occurrence of resistance (%) to selected antimicrobials in <i>Campylobacter coli</i> from broilers using harmonised ECOFFs, 7 EU MSs and 1 non-MSs, 2020	14
Table 19: Occurrence of resistance (%) to selected antimicrobials in <i>Campylobacter coli</i> from fattening turkeys using harmonised ECOFFs, 3 EU MSs, 2020.....	15
Table 20: Number and proportion positive (%) of <i>Campylobacter coli</i> caecal samples from fattening pigs, 2021.....	15
Table 21: Prevalence of resistance (%) to selected antimicrobials in <i>C. coli</i> from fattening pigs using harmonised ECOFFs, 2021	16
Table 22: Percentage of <i>Campylobacter jejuni</i> isolates from broilers completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2020 .	17
Table 23: Percentage of <i>Campylobacter coli</i> isolates from broilers completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2020 .	18
Table 24: Percentage of <i>Campylobacter jejuni</i> isolates from fattening turkey flocks completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2020.....	18
Table 25: Percentage of <i>Campylobacter coli</i> isolates from fattening turkey flocks completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2020.....	19
Table 26: Percentage of <i>Campylobacter coli</i> isolates from fattening pigs susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2021	19
Table 27: Percentage of <i>Campylobacter coli</i> isolates from calves completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2021	20
Table 28: Percentage of <i>Campylobacter jejuni</i> isolates from calves completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2021 .	20
Table 29: Percentage of <i>Campylobacter jejuni</i> isolates from fattening pigs completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2021 .	21
Table 30: Number of countries with significantly increasing or decreasing trends in resistance to selected antimicrobials for <i>C. jejuni</i> and <i>C. coli</i> in broilers (2009-2020), for <i>C. jejuni</i> in fattening turkeys (2014-2020) and for <i>C. coli</i> in pigs (2009-2021)	21
Table 31: Number of isolates exhibiting different levels of erythromycin resistance (low and high) in broilers, fattening turkeys, pigs and calves in reporting EU MSs and non-EU MSs, 2020–2021.....	24

Section B.1. Antimicrobial resistance in *Campylobacter* spp. from humans

Table 1: Antimicrobial resistance in *Campylobacter jejuni* from humans per country in 2021

Country	Gentamicin		Coamoxiclav		Ciprofloxacin		Erythromycin		Tetracycline	
	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res
Austria	419	0	-	-	419	85.2	419	0	419	59.2
Bulgaria	4	NA	-	-	20	75.0	19	0	20	40.0
Cyprus	-	-	-	-	25	84	25	0	25	76.0
Denmark	285	0	-	-	285	49.1	285	0	285	27.0
Estonia	184	0	-	-	184	85.9	184	0.5	184	54.9
Finland	-	-	-	-	991	37.1	997	0.6	412	11.2
France	5,842	0.3	6,802	0.2	6,807	61	6,797	0.4	6,792	46.5
Germany	1,295	0.2	1311	41.9	1312	66.6	1302	2.2	1312	46.5
Hungary	-	-	-	-	415	88.9	414	0.2	414	51.5
Ireland	-	-	-	-	174	27.6	184	0.5	184	17.4
Italy	105	0	-	-	105	75.2	105	0	105	57.1
Lithuania	-	-	-	-	206	92.2	206	1.9	97	48.5
Luxembourg	187	0	187	0	187	64.7	187	0.5	187	43.3
Malta	3	NA	3	NA	200	79	200	0	4	NA
Netherlands	-	-	-	-	1,311	55.2	1,297	1.9	1,162	40.7
Poland	14	0	1	0	30	100	72	0	30	60
Portugal	278	0.4	-	-	278	92.5	278	5.4	278	77.3
Romania	2	NA	2	NA	2	NA	2	NA	2	NA
Slovakia	3	NA	193	1	1115	74.7	1104	0.1	922	38
Slovenia	-	-	-	-	797	81.1	797	0.4	797	46.4
Spain	436	9.6	27	3.7	450	86.9	458	14.2	459	72.6
Sweden	244	0	-	-	244	44.3	244	0	244	13.5
Total (22 MSs)	9,301	0.7	8526	6.6	15,557	64.5	15,576	1.1	14,334	45.3
Iceland	-	-	-	-	36	8.3	36	0	-	-
Norway	266	0	-	-	266	15	266	0.8	266	12.4

N: number of isolates tested; % Res: percentage of resistant isolates; -: no data reported; NA: not applicable – if fewer than 10 isolates were tested in an individual member state; MSs: Member States.

Table 2: Antimicrobial resistance in *Campylobacter coli* from humans per country in 2021

Country	Gentamicin		Co-amoxiclav		Ciprofloxacin		Erythromycin		Tetracycline	
	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res
Austria	49	0	-	-	49	75.5	49	2	49	44.9
Cyprus	-	-	-	-	7	NA	7	NA	7	NA
Denmark	14	0	-	-	14	50.0	14	14.3	14	50
Estonia	27	0	-	-	27	100	27	25.9	27	77.8
Finland	-	-	-	-	35	82.9	33	24.2	19	42.1
France	897	0.6	996	0.8	998	60.3	997	7.5	995	76.7
Germany	234	6	234	44	234	70.9	233	6.	234	72.2
Hungary	-	-	-	-	137	83.9	137	0.7	137	48.9
Ireland	-	-	-	-	18	22.2	18	0	18	16.7
Italy	34	2.9	-	-	34	79.4	34	23.5	34	64.7
Lithuania	-	-	-	-	11	72.7	11	9.1	5	NA
Luxembourg	21	0	21	28.6	21	61.9	21	14.3	21	57.1
Malta	1	NA	1	NA	44	77.3	44	2.3	1	NA
Netherlands	-	-	-	-	92	71.7	91	5.5	83	66.3
Poland	1	NA	-	-	1	NA	4	NA	1	NA
Portugal	47	2.13	-	-	47	100	47	55.3	47	100
Slovakia	-	-	27	3.7	125	72.8	123	2.4	105	41.9
Slovenia	-	-	-	-	57	86.0	57	0	57	52.6
Spain	109	11.9	4	NA	109	93.6	112	17.0	112	91.1
Sweden	6	NA	-	-	6	NA	6	NA	6	NA
Total (20 MSs)	1440	2.4	1283	9.2	2066	69.6	2065	12.6	1972	60.6
Iceland	-	-	-	-	1	NA	1	NA	-	-
Norway	3	NA	-	-	3	NA	3	NA	3	NA

N: number of isolates tested; % Res: percentage of resistant isolates; -: no data reported; NA: not applicable – if fewer than 10 isolates were tested in an individual member state; MSs: Member States.

Table 3: Proportion of *Campylobacter jejuni* isolates from humans resistant to both ciprofloxacin (CIP) and erythromycin (ERY) per country in 2021

Country	Tested for CIP and ERY (N)	Resistant to both CIP and ERY (%)
Austria	419	0
Bulgaria	20	0
Cyprus	25	0
Denmark	285	0
Estonia	184	0
Finland	981	0.4
France	6,793	0.3
Germany	1,302	1.5
Hungary	414	0.2
Ireland	174	0.6
Italy	105	0
Lithuania	206	1.9
Luxembourg	187	0.5
Malta	200	0
Netherlands	1,292	1.0
Poland	30	0
Portugal	278	3.6
Romania	2	NA
Slovakia	1090	0.1
Slovenia	797	0.3
Spain	449	11.1
Sweden	244	0
Total (22 MSs)	15,477	0.8
Iceland	36	0
Norway	266	0

N: number of isolates tested; NA: not applicable – if fewer than 10 isolates were tested in an individual member state, resistance for that individual MS was not reported; MSs: Member States.

Table 4: Proportion of *Campylobacter coli* isolates from humans resistant to both ciprofloxacin (CIP) and erythromycin (ERY) per country in 2021

Country	Tested for CIP and ERY (N)	Resistant to both CIP and ERY (N (%))
Austria	49	2
Cyprus	7	NA
Denmark	14	7.1
Estonia	27	25.9
Finland	33	21.2
France	997	6.4
Germany	233	5.2
Hungary	137	0.7
Ireland	18	0
Italy	34	20.6
Lithuania	11	9.1
Luxembourg	21	14.3
Malta	44	2.3
Netherlands	91	3.3
Poland	1	NA
Portugal	47	55.3
Slovakia	122	2.5
Slovenia	57	0
Spain	109	17.4
Sweden	6	NA
Total (20 MSs)	2058	7.6
Iceland	1	NA
Norway	3	NA

N: number of isolates tested; NA: not applicable – if fewer than 10 isolates were tested in an individual member state, resistance for that individual MS was not reported; MSs: Member States.

Table 5: Complete susceptibility and multiresistance in *Campylobacter jejuni* from humans in 2021

Country	Susceptible to all (%)	Multi-resistant (%)
Austria (N=419)	14.3	0
Bulgaria (N=4)	NA	0
Denmark (N=285)	49.8	0
Estonia (N=184)	13.6	0
France (N=5822)	32	0.2
Germany (N=1286)	29.5	1.1
Italy (N=105)	15.2	0
Luxembourg (N=187)	31.6	0.5
Malta (N=3)	NA	0
Poland (N=13)	0	0
Portugal (N=278)	4.7	3.6
Romania (N=2)	NA	0
Spain (N=430)	7.4	14.0
Sweden (N=244)	53.3	0
Norway (N=266)	80.5	0
Total (14 MSs+1 Non-MS) (N=9528)	30.9	1.0

N: number of isolates tested; NA: not applicable – if fewer than 10 isolates were tested in an individual member state; MSs: Member States. Complete susceptibility is defined as susceptibility to ciprofloxacin, erythromycin, gentamicin and tetracycline. MDR is defined as resistance to at least three antimicrobial classes (panel of antimicrobial tested: ciprofloxacin, erythromycin, gentamicin, tetracycline).

Table 6: Complete susceptibility and multiresistance in *Campylobacter coli* from humans in 2021

Country	Susceptible to all (%)	Multi-resistant (%)
Austria (N=49)	16.3	2
Denmark (N=14)	35.7	7.1
Estonia (N=27)	0	25.9
France (N=895)	15.3	6.4
Germany (N=233)	9.9	6.9
Italy (N=34)	14.7	23.5
Luxembourg (N=21)	28.6	14.3
Malta (N=1)	0	NA
Poland (N=1)	0	0
Portugal (N=47)	0	55.3
Spain (N=106)	2.8	19.8
Sweden (N=6)	NA	NA
Norway (N=3)	NA	0
Total (12 MSs+1 Non-MS) (N=1437)	13.2	9.9

N: number of isolates tested; NA: not applicable – if fewer than 10 isolates were tested in an individual member state; MSs: Member States. Complete susceptibility is defined as susceptibility to ciprofloxacin, erythromycin, gentamicin and tetracycline. MDR is defined as resistance to at least three antimicrobial classes (panel of antimicrobial tested: ciprofloxacin, erythromycin, gentamicin, tetracycline).

Section B.2. Antimicrobial resistance in *Campylobacter* spp. from food producing animals and derived meat

Table 7: Overview of the data reported in 2020/2021

Year	<i>Campylobacter</i> Species	Origin	MSs	Non-MSs	Total
2020	<i>C. jejuni</i>	Caecal samples of broilers ^m	27 (N=3,382)	3 (N=441)	30 (N=3,823)
		Caecal samples of fattening turkeys ^m	9 (N=1,066)	2 (N=174)	11 (N=1,240)
		Carcase from broilers	4 (N=361)	1 (N=4)	5 (N=365)
		Fresh broiler meat	5 (N=343)	1 (N=112)	6 (N=455)
		Broiler meat preparation	2 (N=35)		2 (N=35)
	<i>C. coli</i>	Caecal samples of broilers	7 (N=388)	1 (N=68)	8 (N=456)
		Caecal samples of fattening turkeys	3 (N=567)		3 (N=567)
		Carcase from broilers	4 (N=76)		4 (N=76)
		Fresh broiler meat	5 (N=99)	1 (N=16)	6 (N=115)
		Broiler meat preparation	1 (N=17)		1 (N=17)
2021	<i>C. jejuni</i>	Caecal samples of broilers	2 (N=275)		2 (N=275)
		Caecal samples of pigs ^m	12 (N=60)	1 (N=17)	13 (N=77)
		Caecal samples of calves ^m	10 (N=1,198)	2 (N=270)	12 (N=1468)
		Carcase from broilers	2 (N=67)		2 (N=67)
		Fresh broiler meat	3 (N=115)		3 (N=115)
		Broiler meat preparation	2 (N=25)		2 (N=25)
	<i>C. coli</i>	Caecal samples of broilers	2 (N=89)		2 (N=89)
		Caecal samples of pigs ^m	26 + XI (N=3,546)	3 (N=624)	30 (N=4,170)
		Caecal samples of calves ^m	10 (N=443)		10 (N=443)
		Carcase from broilers	2 (N=52)		2 (N=52)
		Fresh broiler meat	3 (N=28)		3 (N=28)
Broiler meat preparation	1 (N=14)		1 (N=14)		

MSs: Member States; N: Total number of isolates reported by all MSs; m= mandatory; XI=United Kingdom (Northern Ireland)

Table 8: Overview of data reported in 2021 for *C. coli* isolates from legislative categories

EU / Non-EU	AMR species type	Origin	Origin detailed	N countries	Countries (number of isolates)
EU	Animal	Pigs	Pigs - fattening pigs	27	AT (191), BE (165), BG (20), HR (85), CY (24), DK (121), EE (140), FI (170), FR (203), DE (258), EL (37), HU (170), IE (170), IT (197), LV (115), LT (85), LU (203), MT (34), NL (287), PL (180), PT (30), RO (146), SK (62), SI (85), ES (170), SE (174), XI (24)
EU	Animal	Cattle (bovine animals) - calves (under 1 year)	Cattle (bovine animals) - calves (under 1 year)	10	BE (72), HR (38), DK (10), FR (32), DE (41), IT (78), NL (137), PT (6), RO (8), ES (21)
Non-EU	Animal	Pigs	Pigs - fattening pigs	3	IS (145), NO (288), CH (191)
Non-EU	Animal	Cattle (bovine animals) - calves (under 1 year)	Cattle (bovine animals) - calves (under 1 year)	0	

Table 9: Overview of data reported in 2021 for *C. jejuni* isolates from legislative categories

EU / Non-EU	AMR species type	Origin	Origin detailed	N countries	Countries (number of isolates)
EU	Animal	Pigs	Pigs - fattening pigs	12	BG (4), CY (3), DK (4), DE (3), IE (1), IT (6), LV (1), LT (6), LU (3), MT (27), NL (1), PT (1)
EU	Animal	Cattle (bovine animals) - calves (under 1 year)	Cattle (bovine animals) - calves (under 1 year)	10	BE (146), HR (47), DK (177), FR (127), DE (133), IT (146), NL (222), PT (23), RO (39), ES (138)
Non-EU	Animal	Pigs	Pigs - fattening pigs	1	NO (17)
Non-EU	Animal	Cattle (bovine animals) - calves (under 1 year)	Cattle (bovine animals) - calves (under 1 year)	2	NO (127), CH (143)

Table 10: Overview of data reported in 2021 for *C. jejuni* isolates from non-legislative categories

AMR species type	Origin	Origin detailed	N countries	Countries (number of isolates)
Animal	<i>Gallus gallus</i> (fowl)	<i>Gallus gallus</i> (fowl) - broilers	2	FI (144) NL (131)
Food	Meat from broilers (<i>Gallus gallus</i>)	Meat from broilers (<i>Gallus gallus</i>)	1	PT (8)
		Meat from broilers (<i>Gallus gallus</i>) - carcase	2	NL (65), RO (2)
		Meat from broilers (<i>Gallus gallus</i>) - fresh - chilled	3	BE (6), LU (7), NL (102)
		Meat from broilers (<i>Gallus gallus</i>) - meat preparation	2	LU (1), NL (24)
	Meat from turkey	Meat from turkey - fresh	2	LU (1), NL (3)
		Meat from turkey - meat preparation	2	LU (1), NL (1)
	Meat from poultry, unspecified	Meat from poultry, unspecified-fresh	1	BE (39)
	Meat from duck	Meat from duck - fresh	1	NL (13)
	Ready-to-eat salad	Ready-to-eat salad	1	NL (1)

Table 11: Overview of data reported in 2021 for *C. coli* isolates from non-legislative categories

AMR species type	Origin	Origin detailed	N countries	Countries (number of isolates)
Animal	<i>Gallus gallus</i> (fowl)	<i>Gallus gallus</i> (fowl) - broilers	2	FI (5) NL (84)
Food	Meat from broilers (<i>Gallus gallus</i>)	Meat from broilers (<i>Gallus gallus</i>)	1	PT (10)
		Meat from broilers (<i>Gallus gallus</i>) - carcase	2	NL (24), RO (28)
		Meat from broilers (<i>Gallus gallus</i>) - fresh - chilled	3	BE (4), LU (3), NL (21)
		Meat from broilers (<i>Gallus gallus</i>) - meat preparation	1	NL (14)
	Meat from turkey	Meat from turkey - fresh	1	LU (1)
		Meat from turkey - meat preparation	1	NL (1)
	Meat from poultry, unspecified	Meat from poultry, unspecified-fresh	1	BE (18)
	Meat from duck	Meat from duck - fresh	1	NL (3)

Table 12: Occurrence of resistance (%) to selected antimicrobials in *Campylobacter jejuni* from fattening pigs, using harmonised ECOFFs, 12 EU MSs and 1 non-MS, 2021

Reporting country	N	GEN (%)	CHL (%)	ETP (%)	CIP (%)	ERY (%)	TET (%)
Bulgaria	4	0.0	0.0	0.0	25.0	0.0	50.0
Cyprus	3	33.3	0.0	0.0	100.0	0.0	100.0
Denmark	4	0.0	0.0	0.0	0.0	0.0	25.0
Germany	3	0.0	0.0	0.0	0.0	0.0	0.0
Ireland	1	0.0	0.0	0.0	0.0	0.0	0.0
Italy	6	0.0	0.0	0.0	83.3	0.0	33.3
Latvia	1	0.0	0.0	0.0	0.0	0.0	0.0
Lithuania	6	0.0	0.0	0.0	66.7	16.7	66.7
Luxembourg	3	0.0	0.0	0.0	33.3	0.0	33.3
Malta	27	0.0	0.0	0.0	33.3	0.0	40.7
Netherlands	1	0.0	0.0	0.0	100.0	0.0	100.0
Portugal	1	0.0	0.0	0.0	100.0	0.0	100.0
Total (12 MSs)	60	1.7	0.0	0.0	41.7	1.7	43.3
Norway	17	0.0	0.0	0.0	5.9	0.0	0.0

Table 13: Occurrence of resistance (%) to selected antimicrobials in *Campylobacter coli* from pigs, using harmonised ECOFFs, 27 EU MSs and 3 non-MSs, 2021

Reporting country	N	GEN (%)	CHL (%)	ETP (%)	CIP (%)	ERY (%)	TET (%)
Austria	191	0.0	0.0	1.6	55.5	5.2	86.4
Belgium	165	1.2	0.0	6.1	43.6	9.1	83.6
Bulgaria	20	0.0	0.0	0.0	55.0	25.0	90.0
Croatia	85	0.0	0.0	1.2	63.5	11.8	76.5
Cyprus	24	8.3	4.2	4.2	62.5	58.3	87.5
Denmark	121	0.0	0.0	0.8	19.8	5.8	25.6
Estonia	140	0.0	0.0	0.0	26.4	6.4	83.6
Finland	170	0.0	0.0	0.0	33.5	0.6	0.0
France	203	1.0	0.0	0.0	40.9	17.7	85.2
Germany	258	0.4	0.0	0.0	57.8	10.5	71.7
Greece	37	2.7	0.0	0.0	62.2	29.7	94.6
Hungary	170	2.9	0.0	0.0	54.1	5.3	65.9
Ireland	170	0.0	0.0	0.0	37.1	9.4	58.8
Italy	197	31.0	7.6	4.1	79.2	44.7	89.3
Latvia	115	1.7	0.0	0.0	52.2	1.7	63.5
Lithuania	85	2.4	0.0	0.0	69.4	4.7	78.8
Luxembourg	203	0.5	0.0	1.0	61.1	7.4	88.7
Malta	34	0.0	0.0	0.0	58.8	0.0	61.8
Netherlands	287	0.7	0.0	2.8	17.8	3.5	77.4
Poland	180	0.0	0.0	0.6	65.6	7.8	72.8
Portugal	30	3.3	0.0	0.0	70.0	66.7	100.0
Romania	146	2.1	0.7	4.1	74.7	24.0	83.6
Slovakia	62	0.0	0.0	3.2	66.1	0.0	90.3

Slovenia	85	1.2	0.0	3.5	84.7	2.4	54.1
Spain	170	3.5	0.0	0.0	90.6	43.5	90.6
Sweden	174	0.0	0.0	0.0	32.2	0.0	0.0
United Kingdom (Northern Ireland)	24	0.0	0.0	4.2	29.2	8.3	79.2
Total (27 MSs)	3,546	2.6	0.5	1.3	51.7	12.3	69.3
Iceland	145	0.0	0.0	0.0	75.9	0.0	0.0
Norway	288	0.0	0.0	0.0	18.4	0.0	0.0
Switzerland	191	0.0	0.0	0.0	53.9	0.0	66.5

ECOFFs: epidemiological cut-off values; MS: Member States; N: number of isolates tested; GEN: gentamicin; CHL: chloramphenicol; ETP: ertapenem; CIP: ciprofloxacin; ERY: erythromycin; TET: tetracycline

Table 14: Occurrence of resistance (%) to selected antimicrobials in *Campylobacter coli* from calves, using harmonised ECOFFs, 10 EU MSs, 2021

Reporting country	N	GEN (%)	CHL (%)	ETP (%)	CIP (%)	ERY (%)	TET (%)
Belgium	72	12.5	11.1	55.6	93.1	77.8	100.0
Croatia	38	2.6	15.8	13.2	63.2	21.1	65.8
Denmark	10	0.0	0.0	10.0	30.0	10.0	40.0
France	32	12.5	0.0	9.4	71.9	25.0	87.5
Germany	41	2.4	0.0	29.3	73.2	24.4	92.7
Italy	78	42.3	0.0	10.3	92.3	30.8	94.9
Netherlands	137	3.7	0.7	39.4	77.4	33.6	95.6
Portugal	6	0.0	0.0	16.7	83.3	0.0	83.3
Romania	8	0.0	0.0	37.5	62.5	0.0	50.0
Spain	21	9.5	0.0	9.5	85.7	23.8	95.2
Total (10 MSs)	443	12.4	3.4	29.1	79.7	35.7	90.5

ECOFFs: epidemiological cut-off values; MSs: Member States; N: number of isolates tested; GEN: gentamicin; CHL: chloramphenicol; ETP: ertapenem; CIP: ciprofloxacin; ERY: erythromycin; TET: tetracycline

Table 15: Occurrence of resistance (%) to selected antimicrobials in *Campylobacter jejuni* from calves, using harmonised ECOFFs, 10 EU MSs and 2 non-MSs, 2021

Reporting country	N	GEN (%)	CHL (%)	ETP (%)	CIP (%)	ERY (%)	TET (%)
Belgium	146	0.0	0.7	4.1	66.4	4.8	88.4
Croatia	47	0.0	0.0	4.3	70.2	4.3	42.6
Denmark	177	0.0	0.0	0.0	24.9	0.0	9.0
France	127	0.0	0.0	0.0	48.0	1.6	81.1
Germany	133	0.0	0.0	0.0	65.4	0.0	84.2
Italy	146	4.1	0.0	0.0	63.7	0.0	84.3
Netherlands	222	0.0	0.0	0.5	53.2	0.0	91.0
Portugal	23	0.0	0.0	4.4	43.5	0.0	60.9
Romania	39	0.0	0.0	2.6	71.8	2.6	41.0
Spain	138	0.0	0.0	0.7	60.9	0.0	64.5

Total (10 MSs)	1,198	0.5	0.1	1.0	54.7	1.0	68.8
Norway	127	0.0	0.0	2.4	13.4	0.0	4.7
Switzerland	143	0.0	0.0	1.4	58.0	0.0	46.2

ECOFFs: epidemiological cut-off values; MSs: Member States; N: number of isolates tested; GEN: gentamicin; CHL: chloramphenicol; ETP: ertapenem; CIP: ciprofloxacin; ERY: erythromycin; TET: tetracycline

Table 16: Occurrence of resistance (%) to selected antimicrobials in *Campylobacter jejuni* from broilers, using harmonised ECOFFs, 27 EU MSs and 3 non-MSs, 2020

Reporting country	N	GEN (%)	STR (%)	NAL (%)	CIP (%)	ERY (%)	TET (%)
Austria	177	0.0	22.6	72.3	78.0	0.0	45.2
Belgium	92	0.0	15.2	64.1	64.1	0.0	54.4
Bulgaria	85	0.0	21.2	77.7	76.5	0.0	48.2
Croatia	85	0.0	16.5	84.7	84.7	0.0	47.1
Cyprus	74	0.0	16.2	77.0	87.8	6.8	58.1
Czechia	174	0.0	14.9	78.2	80.5	1.2	40.8
Denmark	163	0.0	17.2	38.0	38.0	0.0	34.4
Estonia	10	0.0	20.0	80.0	80.0	0.0	10.0
Finland	87	0.0	0.0	3.4	3.4	0.0	2.3
France	171	0.0	0.0	65.5	67.8	0.0	63.7
Germany	217	0.0	35.0	82.0	83.4	0.0	67.7
Greece	98	0.0	10.2	75.5	94.9	0.0	59.2
Hungary	170	0.0	13.5	91.8	91.8	0.0	60.0
Ireland	165	0.0	0.6	24.9	24.9	0.0	38.2
Italy	178	0.0	0.0	63.5	89.9	1.7	69.1
Latvia	47	0.0	53.2	100.0	100.0	0.0	19.2
Lithuania	84	0.0	40.5	86.9	88.1	1.2	66.7
Luxembourg	2	0.0	50.0	100.0	100.0	0.0	50.0
Malta	2	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	167	0.0	24.6	67.1	68.9	0.0	56.3
Poland	179	0.0	41.3	95.5	95.5	0.0	77.7
Portugal	110	0.0	6.4	90.0	93.6	6.4	89.1
Romania	322	1.2	9.9	80.4	82.0	2.2	57.5
Slovakia	85	0.0	28.2	87.1	88.2	1.2	58.8
Slovenia	85	0.0	11.8	67.1	82.4	0.0	45.9
Spain	170	0.0	8.2	84.1	84.7	0.0	68.2
Sweden	183	0.0	0.0	20.8	20.8	0.0	4.9
Total (27 MSs)	3,382	0.1	15.6	69.2	72.8	0.8	52.7
Norway	83	0.0	4.8	6.0	4.8	0.0	1.2
Switzerland	179	0.0	4.5	48.0	47.5	0.0	30.2
United Kingdom	179	0.0	0.6	59.8	59.2	0.6	66.5

ECOFFs: epidemiological cut-off values; MSs: Member States; N: number of isolates tested; GEN: gentamicin; STR: streptomycin; NAL: nalidixic acid; CIP: ciprofloxacin; ERY: erythromycin; TET: tetracycline

Table 17: Occurrence of resistance (%) to selected antimicrobials in *Campylobacter jejuni* from fattening turkeys using harmonised ECOFFs, 9 EU MSs and 2 non-MSs, 2020

Reporting country	N	GEN (%)	STR (%)	NAL (%)	CIP (%)	ERY (%)	TET (%)
Austria	77	0.0	9.1	54.6	61.0	0.0	29.9
France	163	0.0	1.8	56.4	60.1	0.0	56.4
Germany	189	0.0	15.3	70.9	73.0	0.0	46.6
Hungary	170	0.0	9.4	87.7	88.2	0.0	57.7
Italy	168	0.6	1.8	50.0	75.6	1.8	72.0
Poland	180	0.0	27.8	89.4	93.3	0.0	62.2
Portugal	37	0.0	10.8	70.3	83.8	16.2	86.5
Romania	6	0.0	0.0	100.0	100.0	0.0	83.3
Spain	76	0.0	13.2	82.9	85.5	0.0	69.7
Total (9 MSs)	1,066	0.1	11.4	71.0	77.9	0.8	58.5
Norway	5	0.0	20.0	0.0	0.0	0.0	0.0
United Kingdom	169	0.0	1.8	35.5	36.7	0.6	39.6

ECOFFs: epidemiological cut-off values; MSs: Member States; N: number of isolates tested; GEN: gentamicin; STR: streptomycin; NAL: nalidixic acid; CIP: ciprofloxacin; ERY: erythromycin; TET: tetracycline

Table 18: Occurrence of resistance (%) to selected antimicrobials in *Campylobacter coli* from broilers using harmonised ECOFFs, 7 EU MSs and 1 non-MSs, 2020

Reporting country	N	GEN (%)	STR (%)	NAL (%)	CIP (%)	ERY (%)	TET (%)
Czechia	86	0.0	24.4	80.2	84.9	12.8	60.5
France	170	0.0	10.0	47.1	46.5	2.4	90.6
Ireland	42	0.0	21.4	16.7	16.7	0.0	7.1
Latvia	3	0.0	0.0	100.0	100.0	33.3	66.7
Luxembourg	2	0.0	50.0	100.0	100.0	0.0	100.0
Netherlands	60	0.0	10.0	91.7	91.7	1.7	61.7
Slovenia	25	0.0	40.0	84.0	84.0	0.0	44.0
Total (7 MSs)	388	0.0	16.5	61.1	61.9	4.4	67.3
Switzerland	68	2.9	48.5	52.9	51.5	7.4	52.9

ECOFFs: epidemiological cut-off values; MSs: Member States; N: number of isolates tested; GEN: gentamicin; STR: streptomycin; NAL: nalidixic acid; CIP: ciprofloxacin; ERY: erythromycin; TET: tetracycline

Table 19: Occurrence of resistance (%) to selected antimicrobials in *Campylobacter coli* from fattening turkeys using harmonised ECOFFs, 3 EU MSs, 2020

Reporting country	N	GEN (%)	STR (%)	NAL (%)	CIP (%)	ERY (%)	TET (%)
France	171	0.0	6.4	46.8	46.8	2.9	91.2
Germany	302	0.0	6.6	94.7	94.7	28.8	85.8
Spain	94	1.1	36.2	94.7	95.7	31.9	96.8
Total (3)	567	0.2	11.5	80.2	80.4	21.5	89.2

ECOFFs: epidemiological cut-off values; MSs: Member States; N: number of isolates tested; GEN: gentamicin; STR: streptomycin; NAL: nalidixic acid; CIP: ciprofloxacin; ERY: erythromycin; TET: tetracycline

Table 20: Number and proportion positive (%) of *Campylobacter coli* caecal samples from fattening pigs, 2021.

Reporting country	Total samples tested	N of <i>C. coli</i> -positive samples	% positive
Austria	215	202	94
Belgium	286	167	58.4
Bulgaria	191	24	12.6
Croatia	261	159	60.9
Cyprus	64	24	37.5
Denmark	272	126	46.3
Estonia	158	140	88.6
Finland	307	301	98
France	483	203	42
Germany	385	273	70.9
Greece	74	37	50
Hungary	362	170	47
Ireland	421	299	71
Italy	301	197	65.4
Latvia	152	115	75.7
Lithuania	150	122	81.3
Luxembourg	208	203	97.6
Malta	128	61	47.7
Netherlands	300	287	95.7
Poland	249	180	72.3
Portugal	99	59	59.6
Romania	239	213	89.1
Slovakia	149	62	41.6
Slovenia	104	96	92.3
Spain	422	201	47.6
Sweden	184	174	94.6
United Kingdom (Northern Ireland)	68	24	35.3
Total (26 MSs+XI)	6,232	4,119	66.1
Iceland	152	145	95.4
Norway	326	288	88.3
Switzerland	289	191	66.1

XI: United Kingdom (Northern Ireland)

Table 21: Prevalence of resistance (%) to selected antimicrobials in *C. coli* from fattening pigs using harmonised ECOFFs, 2021

Reporting country	Total samples tested	CIP		ERY		GEN		TET		CHL		ETP	
		Prev.	95% CI	Prev.	95% CI	Prev.	95% CI	Prev.	95% CI	Prev.	95% CI	Prev.	95% CI
Austria	215	52.1	42.4 - 56.2	4.9	2.3 - 8.4	0	0 - 1.7	81.2	70.5 - 82.2	0	0 - 1.7	1.5	0.3 - 4
Belgium	286	25.5	20.3 - 30.6	5.3	3 - 8.5	0.7	0.1 - 2.5	48.8	42.3 - 54.2	0	0 - 1.3	3.5	1.7 - 6.3
Bulgaria	191	6.9	2.9 - 10.1	3.1	0.9 - 6	0	0 - 1.9	11.3	5.7 - 14.5	0	0 - 1.9	0	0 - 1.9
Croatia	261	38.7	15.9 - 44.9	7.2	1.9 - 11.1	0	0 - 1.4	46.6	19.8 - 53	0	0 - 1.4	0.7	0 - 2.1
Cyprus	64	21.9	12.5 - 34.0	23.4	13.8 - 35.7	1.6	0.1 - 8.4	32.8	21.6 - 45.7	0	0 - 5.6	0	0 - 5.6
Denmark	272	9.2	5.7 - 12.8	2.7	1 - 5.2	0	0 - 1.3	11.9	7.9 - 15.8	0	0 - 1.3	0.4	0 - 2
Estonia	158	23.4	17.1 - 30.8	5.7	2.6 - 10.5	0	0 - 2.3	74.1	66.5 - 80.7	0	0 - 2.3	0	0 - 2.3
Finland	307	32.9	14.4 - 38.5	0.6	0 - 1.8	0	0 - 1.2	0	0 - 1.2	0	0 - 1.2	0	0 - 1.2
France	483	17.2	13.9 - 20.9	7.5	5.3 - 10.2	0.4	0.1 - 1.5	35.8	31.5 - 40.3	0	0 - 0.8	0	0 - 0.8
Germany	385	41	33.8 - 43.8	7.4	4.7 - 10	0.3	0 - 1.4	50.8	43 - 53.2	0	0 - 1	0	0 - 1
Greece	74	31.1	20.8 - 42.9	14.9	7.7 - 25	1.4	0 - 7.3	47.3	35.6 - 59.3	0	0 - 4.9	0	0 - 4.9
Hungary	362	25.4	21 - 30.2	2.5	1.1 - 4.7	1.4	0.4 - 3.2	30.9	26.2 - 36	0	0 - 1	0	0 - 1
Ireland	421	26.3	11.7 - 30.9	6.7	2.2 - 9.5	0	0 - 0.9	41.8	19.8 - 46.7	0	0 - 0.9	0	0 - 0.9
Italy	301	51.8	46 - 57.6	29.2	24.2 - 34.7	20.3	15.9 - 25.3	58.5	52.7 - 64.1	5	2.8 - 8.1	2.7	1.2 - 5.2
Latvia	152	39.5	31.6 - 47.7	1.3	0.2 - 4.7	1.3	0.2 - 4.7	48	39.9 - 56.3	0	0 - 2.4	0	0 - 2.4
Lithuania	150	56.5	31.5 - 64.7	3.8	0.7 - 6.7	1.9	0.2 - 4.7	64.1	36.6 - 71.7	0	0 - 2.4	0	0 - 2.4
Luxembourg	208	59.6	52.6 - 66.3	7.2	4.1 - 11.6	0.5	0 - 2.6	86.5	81.1 - 90.9	0	0 - 1.8	1	0.1 - 3.4
Malta	128	28.0	9.8 - 36.8	0	0 - 2.8	0	0 - 2.8	29.4	10.5 - 38.4	0	0 - 2.8	0	0 - 2.8
Netherlands	300	17	12.9 - 21.7	3.3	1.6 - 6	0.7	0.1 - 2.4	74	68.6 - 78.9	0	0 - 1.2	2.7	1.2 - 5.2
Poland	249	47.4	41.1 - 53.8	5.6	3.1 - 9.3	0	0 - 1.5	52.6	46.2 - 58.9	0	0 - 1.5	0.4	0 - 2.2
Portugal	99	41.7	13.6 - 51.8	39.7	12.8 - 49.7	2	0 - 5.5	59.6	21.5 - 69.3	0	0 - 3.7	0	0 - 3.7
Romania	239	66.5	39.2 - 72.5	21.4	10.4 - 27.1	1.8	0.3 - 3.6	74.5	44.5 - 79.9	0.6	0 - 2.3	3.7	0.9 - 5.4
Slovakia	149	27.5	20.5 - 35.4	0	0 - 2.4	0	0 - 2.4	37.6	29.8 - 45.9	0	0 - 2.4	1.3	0.2 - 4.8
Slovenia	104	78.2	59.4 - 85.4	2.2	0.2 - 6.8	1.1	0 - 5.2	50	34.5 - 54.3	0	0 - 3.5	3.3	0.6 - 8.2
Spain	422	43.1	31.9 - 48	20.7	14 - 21.5	1.7	0.5 - 3.1	43.1	31.9 - 48	0	0 - 0.9	0	0 - 0.9
Sweden	184	30.4	23.9 - 37.6	0	0 - 2	0	0 - 2	0	0 - 2	0	0 - 2	0	0 - 2
United Kingdom (Northern Ireland)	68	10.3	4.2 - 20.1	2.9	0.4 - 10.2	0	0 - 5.3	27.9	17.7 - 40.1	0	0 - 5.3	1.5	0 - 7.9
Iceland	152	72.4	64.5 - 79.3	0	0 - 2.4	0	0 - 2.4	0	0 - 2.4	0	0 - 2.4	0	0 - 2.4
Norway	326	16.3	12.4 - 20.7	0	0 - 1.1	0	0 - 1.1	0	0 - 1.1	0	0 - 1.1	0	0 - 1.1
Switzerland	289	35.6	30.1 - 41.5	0	0 - 1.3	0	0 - 1.3	43.9	38.1 - 49.9	0	0 - 1.3	0	0 - 1.3

Table 22: Percentage of *Campylobacter jejuni* isolates from broilers completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2020

Country	N	n completely susceptible	%	n multiresistant	%	n co-resistant to CIP and ERY	%
Austria	177	36	20.3	0	0.0	0	0.0
Belgium	92	28	30.4	0	0.0	0	0.0
Bulgaria	85	15	17.7	0	0.0	0	0.0
Croatia	85	8	9.4	0	0.0	0	0.0
Cyprus	74	4	5.4	4	5.4	4	5.4
Czechia	174	30	17.2	2	1.2	2	1.2
Denmark	163	96	58.9	0	0.0	0	0.0
Estonia	10	2	20.0	0	0.0	0	0.0
Finland	87	82	94.3	0	0.0	0	0.0
France	171	30	17.5	0	0.0	0	0.0
Germany	217	31	14.3	0	0.0	0	0.0
Greece	98	3	3.1	0	0.0	0	0.0
Hungary	170	9	5.3	0	0.0	0	0.0
Ireland	165	86	52.1	0	0.0	0	0.0
Italy	178	15	8.4	3	1.7	3	1.7
Latvia	47	0	0.0	0	0.0	0	0.0
Lithuania	84	10	11.9	1	1.2	1	1.2
Luxembourg	2	0	0.0	0	0.0	0	0.0
Malta	2	2	100.0	0	0.0	0	0.0
Netherlands	167	51	30.5	0	0.0	0	0.0
Poland	179	7	3.9	0	0.0	0	0.0
Portugal	110	3	2.7	7	6.4	7	6.4
Romania	322	44	13.7	8	2.5	7	2.2
Slovakia	85	8	9.4	1	1.2	1	1.2
Slovenia	85	15	17.7	0	0.0	0	0.0
Spain	170	19	11.2	0	0.0	0	0.0
Sweden	183	144	78.7	0	0.0	0	0.0
Total (27 MSs)	3,382	778	23.0	26	0.8	25	0.7
Norway	83	77	92.8	0	0.0	0	0.0
Switzerland	179	81	45.3	0	0.0	0	0.0
United Kingdom	179	45	25.1	0	0.0	0	0.0

N: total number of isolates; n: number of isolates Complete susceptibility is defined as susceptibility to ciprofloxacin, nalidixic acid, erythromycin, gentamicin and tetracycline. MDR (multidrug resistance) is defined as resistance to at least three antimicrobial substances (ciprofloxacin or nalidixic acid/ erythromycin/ gentamicin/ tetracycline).

Table 23: Percentage of *Campylobacter coli* isolates from broilers completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2020

Country	N	n completely susceptible	%	n multiresistant	%	n co-resistant to CIP and ERY	%
Czechia	86	3	3.5	11	12.8	11	12.8
France	170	12	7.1	3	1.8	3	1.8
Ireland	42	33	78.6	0	0.0	0	0.0
Latvia	3	0	0.0	0	0.0	1	33.3
Luxembourg	2	0	0.0	0	0.0	0	0.0
Netherlands	60	3	5.0	1	1.7	1	1.7
Slovenia	25	2	8.0	0	0.0	0	0.0
Total (7 MSs)	388	53	13.7	15	3.9	16	4.1
Switzerland	68	19	27.9	5	7.4	5	7.4

N: total number of isolates; n: number of isolates Complete susceptibility is defined as susceptibility to ciprofloxacin, nalidixic acid, erythromycin, gentamicin and tetracycline. MDR (multidrug resistance) is defined as resistance to at least three antimicrobial substances (ciprofloxacin or nalidixic acid/ erythromycin/ gentamicin/ tetracycline).

Table 24: Percentage of *Campylobacter jejuni* isolates from fattening turkey flocks completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2020

Country	N	n completely susceptible	%	n multiresistant	%	n co-resistant to CIP and ERY	%
Austria	77	28	36.4	0	0.0	0	0.0
France	163	46	28.2	0	0.0	0	0.0
Germany	189	47	24.9	0	0.0	0	0.0
Hungary	170	8	4.7	0	0.0	0	0.0
Italy	168	29	17.3	3	1.8	2	1.2
Poland	180	10	5.6	0	0.0	0	0.0
Portugal	37	4	10.8	6	16.2	6	16.2
Romania	6	0	0.0	0	0.0	0	0.0
Spain	76	7	9.2	0	0.0	0	0.0
Total (9 MSs)	1,066	179	16.8	9	0.8	8	0.8
Norway	5	5	100.0	0	0.0	0	0.0
United Kingdom	169	91	53.9	0	0.0	0	0.0

N: total number of isolates; n: number of isolates Complete susceptibility is defined as susceptibility to ciprofloxacin, nalidixic acid, erythromycin, gentamicin and tetracycline. MDR (multidrug resistance) is defined as resistance to at least three antimicrobial substances (ciprofloxacin or nalidixic acid/ erythromycin/ gentamicin/ tetracycline).

Table 25: Percentage of *Campylobacter coli* isolates from fattening turkey flocks completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2020

Country	N	n completely susceptible	%	n multiresistant	%	n co-resistant to CIP and ERY	%
France	171	13	7.6	5	2.9	5	2.9
Germany	302	10	3.3	84	27.8	85	28.2
Spain	94	2	2.1	30	31.9	30	31.9
Total (3 MSs)	567	25	4.4	119	21.0	120	21.2

N: total number of isolates; n: number of isolates Complete susceptibility is defined as susceptibility to ciprofloxacin, nalidixic acid, erythromycin, gentamicin and tetracycline. MDR (multidrug resistance) is defined as resistance to at least three antimicrobial substances (ciprofloxacin or nalidixic acid/ erythromycin/ gentamicin/ tetracycline).

Table 26: Percentage of *Campylobacter coli* isolates from fattening pigs susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2021

Country	N	n susceptible	%	n multiresistant	%	n co-resistant to CIP and ERY	%
Austria	191	9	4.7	6	3.1	6	3.1
Belgium	165	21	12.7	11	6.6	11	6.7
Bulgaria	20	2	10.0	3	15.0	3	15.0
Croatia	85	10	11.8	4	4.7	4	4.7
Cyprus	24	0	0.0	6	25.0	6	25.0
Denmark	121	74	61.2	2	1.7	2	1.7
Estonia	140	17	12.1	4	2.9	5	3.6
Finland	170	112	65.9	0	0.0	0	0.0
France	203	20	9.9	16	7.9	16	7.9
Germany	258	41	15.9	20	7.8	19	7.4
Greece	37	1	2.7	7	18.9	7	18.9
Hungary	170	37	21.8	9	5.3	6	3.5
Ireland	170	53	31.2	7	4.1	9	5.3
Italy	197	12	6.1	97	49.2	81	41.1
Latvia	115	28	24.4	2	1.7	2	1.7
Lithuania	85	7	8.2	4	4.7	4	4.7
Luxembourg	203	12	5.9	14	6.9	13	6.4
Malta	34	8	23.5	0	0.0	0	0.0
Netherlands	287	57	19.9	4	1.4	4	1.4
Poland	180	29	16.1	9	5.0	10	5.6
Portugal	30	0	0.0	15	50.0	15	50.0
Romania	146	14	9.6	30	20.6	32	21.9
Slovakia	62	5	8.1	0	0.0	0	0.0
Slovenia	85	4	4.7	2	2.4	1	1.2
Spain	170	8	4.7	70	41.2	71	41.8
Sweden	174	118	67.8	0	0.0	0	0.0
United Kingdom (Northern Ireland)	24	5	20.8	1	4.2	1	4.2
Total (26+XI)	3,546	704	19.9	343	9.7	328	9.3
Iceland	145	35	24.1	0	0.0	0	0.0
Norway	288	235	81.6	0	0.0	0	0.0
Switzerland	191	31	16.2	0	0.0	0	0.0

XI: United Kingdom (Northern Ireland)

Table 27: Percentage of *Campylobacter coli* isolates from calves completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2021

Country	N	n completely susceptible	%	n multiresistant	%	n co-resistant to CIP and ERY	%
Belgium	72	0	0.00	57	79.17	56	77.8
Croatia	38	6	15.8	2	5.26	1	2.6
Denmark	10	3	30.0	0	0.00	0	0.0
France	32	4	12.5	10	31.25	8	25.0
Germany	41	3	7.3	10	24.39	10	24.4
Italy	78	2	2.6	43	55.13	23	29.5
Netherlands	137	6	4.4	47	34.31	42	30.7
Portugal	6	1	16.7	0	0.00	0	0.0
Romania	8	3	37.5	0	0.00	0	0.0
Spain	21	0	0.0	5	23.81	5	23.8
Total (10 MSs)	443	28	6.3	174	39.3	145	32.7

Table 28: Percentage of *Campylobacter jejuni* isolates from calves completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2021

Country	N	n completely susceptible	%	n multiresistant	%	n co-resistant to CIP and ERY	%
Belgium	146	10	6.9	7	4.8	7	4.8
Croatia	47	10	21.3	0	0.0	0	0.0
Denmark	177	129	72.9	0	0.0	0	0.0
France	127	14	11.0	1	0.8	1	0.8
Germany	133	16	12.0	0	0.0	0	0.0
Italy	146	13	8.9	5	3.4	0	0.0
Netherlands	222	16	7.2	0	0.0	0	0.0
Portugal	23	6	26.1	0	0.0	0	0.0
Romania	39	11	28.2	1	2.6	1	2.6
Spain	138	34	24.6	0	0.0	0	0.0
Total (10 MSs)	1,198	259	21.6	14	1.2	9	0.8
Norway	127	110	86.6	0	0.0	0	0.0
Switzerland	143	41	28.7	0	0.0	0	0.0

Table 29: Percentage of *Campylobacter jejuni* isolates from fattening pigs completely susceptible, multiresistant and co-resistant to both ciprofloxacin and erythromycin, per reporting country, 2021

Country	N	n completely susceptible	%	n multiresistant	%	n co-resistant to CIP and ERY	%
Bulgaria	4	2	50.0	0	0.0	0	0.0
Cyprus	3	0	0.0	1	33.3	0	0.0
Denmark	4	3	75.0	0	0.0	0	0.0
Germany	3	3	100.0	0	0.0	0	0.0
Ireland	1	1	100.0	0	0.0	0	0.0
Italy	6	1	16.7	0	0.0	0	0.0
Latvia	1	1	100.0	0	0.0	0	0.0
Lithuania	6	1	16.7	1	16.7	1	16.7
Luxembourg	3	2	66.7	0	0.0	0	0.0
Malta	27	15	55.6	0	0.0	0	0.0
Netherlands	1	0	0.0	0	0.0	0	0.0
Portugal	1	0	0.0	0	0.0	0	0.0
Total (12 MSs)	60	29	48.3	2	3.3	1	1.7
Norway	17	16	94.1	0	0.0	0	0.0

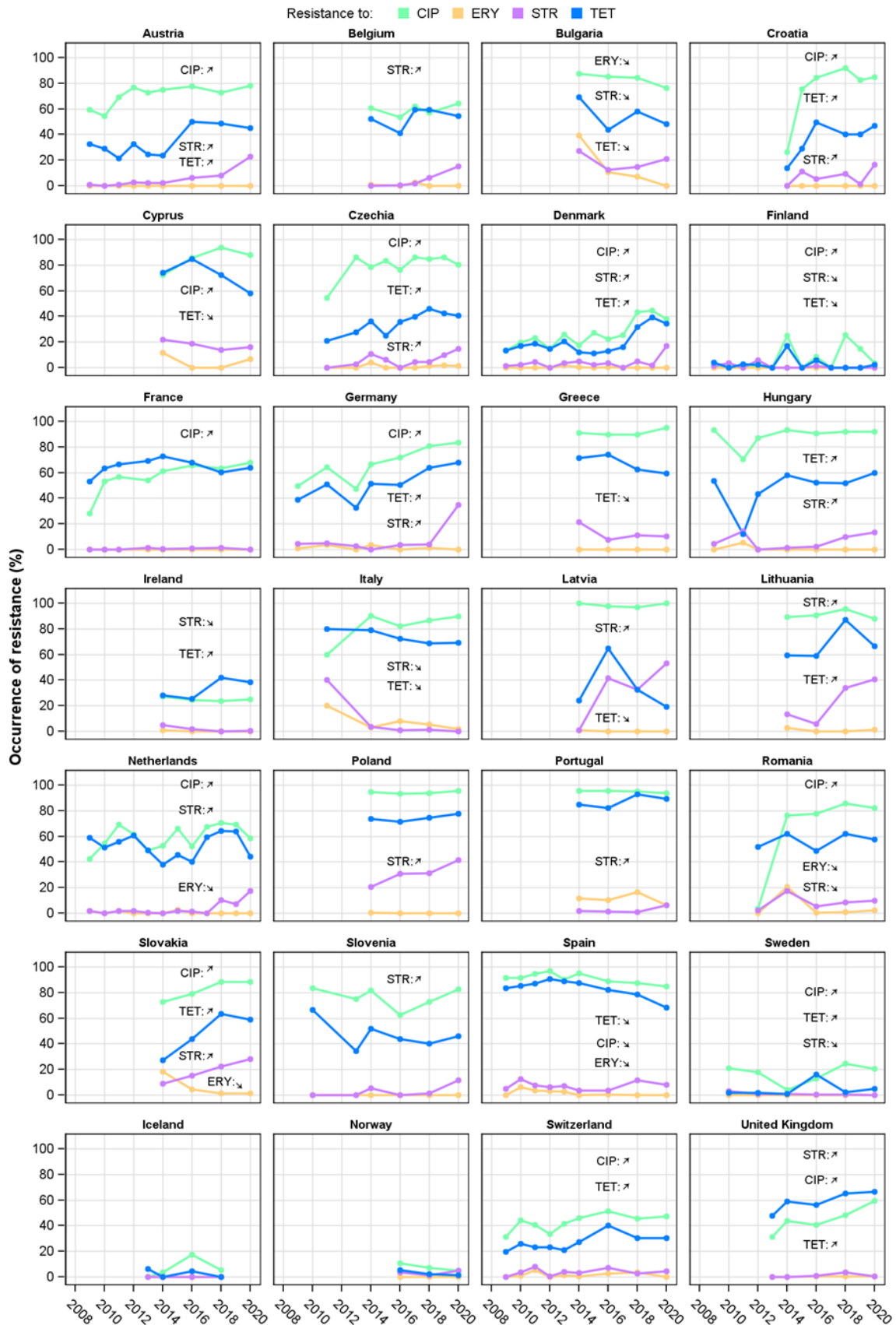
Table 30: Number of countries with significantly increasing or decreasing trends in resistance to selected antimicrobials for *C. jejuni* and *C. coli* in broilers (2009-2020), for *C. jejuni* in fattening turkeys (2014-2020) and for *C. coli* in pigs (2009-2021)

Origin	Campylobacter species	Ciprofloxacin		Erythromycin		Tetracycline	
		Increase	Decrease	Increase	Decrease	Increase	Decrease
Broilers	<i>C. jejuni</i> (24 MSs + 4 non-MSs)	14 (AT, CY, CZ, DE, DK, FI, FR, HR, NL, RO, SE, SK, CH, UK)	1 (ES)	-	5 (BG, NL, RO, SK, ES)	12 (AT, HR, CZ, DK, DE, HU, IE, LT, SK, SE, CH, UK)	7 (BG, CY, FI, EL, IT, LV, ES)
	<i>C. coli</i> (4 MSs + 1 non-MS)	2 (DE, NL)	-	1 (CZ)	1 (NL)	3 (CZ, DE, CH)	-
Turkeys	<i>C. jejuni</i> (8 MSs + 1 non-MS)	2 (DE, PL)	2 (HU, IT)	-	3 (DE, PL, ES)	1 (HU)	4 (DE, ES, FR, UK)
Pigs	<i>C. coli</i> (6 MSs + 2 non-MS)	4 (DE, NL, CH, NO)	-	-	4 (CZ, ES, NL, CH)	2 (EE, CH)	2 (NL, ES)

Note: According with Decision 2020/1729, streptomycin was excluded from the panels of antimicrobials for *Campylobacter* and therefore no resistant data are provided on this substance starting from 2021. Trend for resistance to streptomycin was only assessed until 2020 and corresponding results are not presented in this table. For details on trend results related to streptomycin see 'The European Union Summary Report on Antimicrobial Resistance in zoonotic and indicator bacteria from humans, animals and food in 2019/2020' (<https://doi.org/10.2903/j.efsa.2022.7209>). Trends resistance to streptomycin are also presented in figures 1 and 2 of this Annex, as these trend graphs only present data up to 2020.

a)

Trends in resistance to selected antimicrobials in *C. jejuni* from broilers, 2009-2020



b)

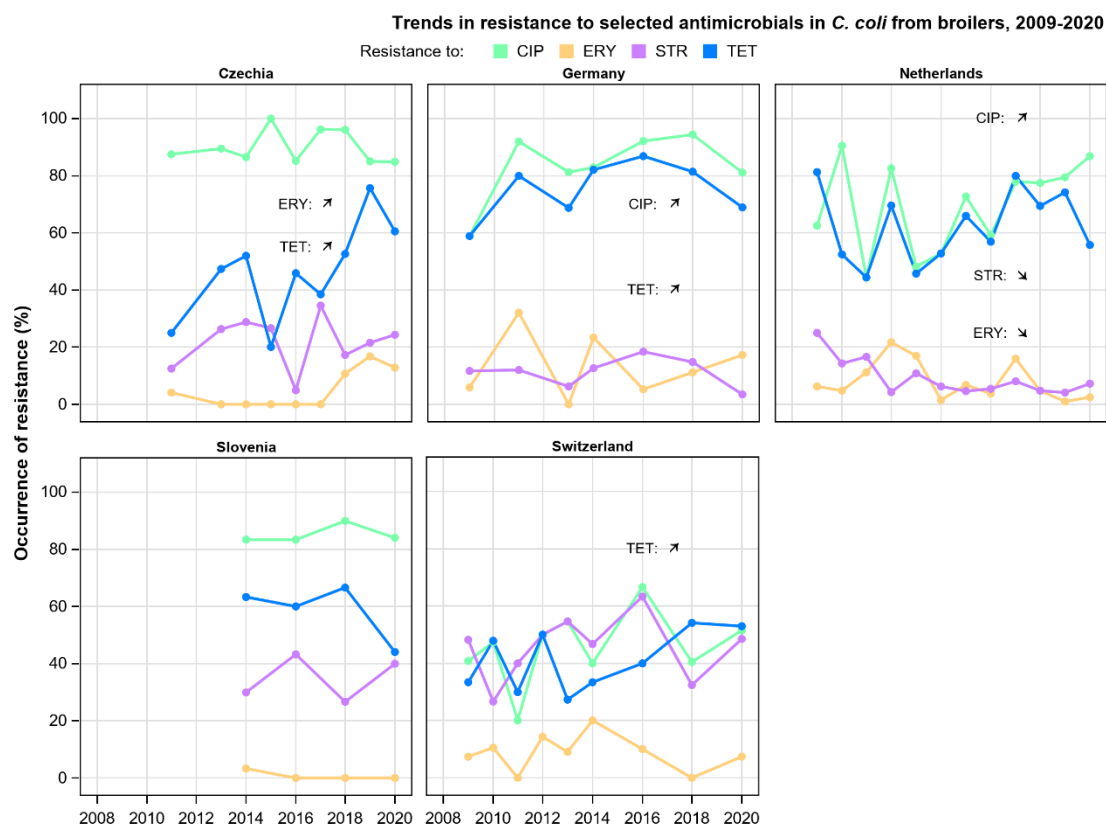
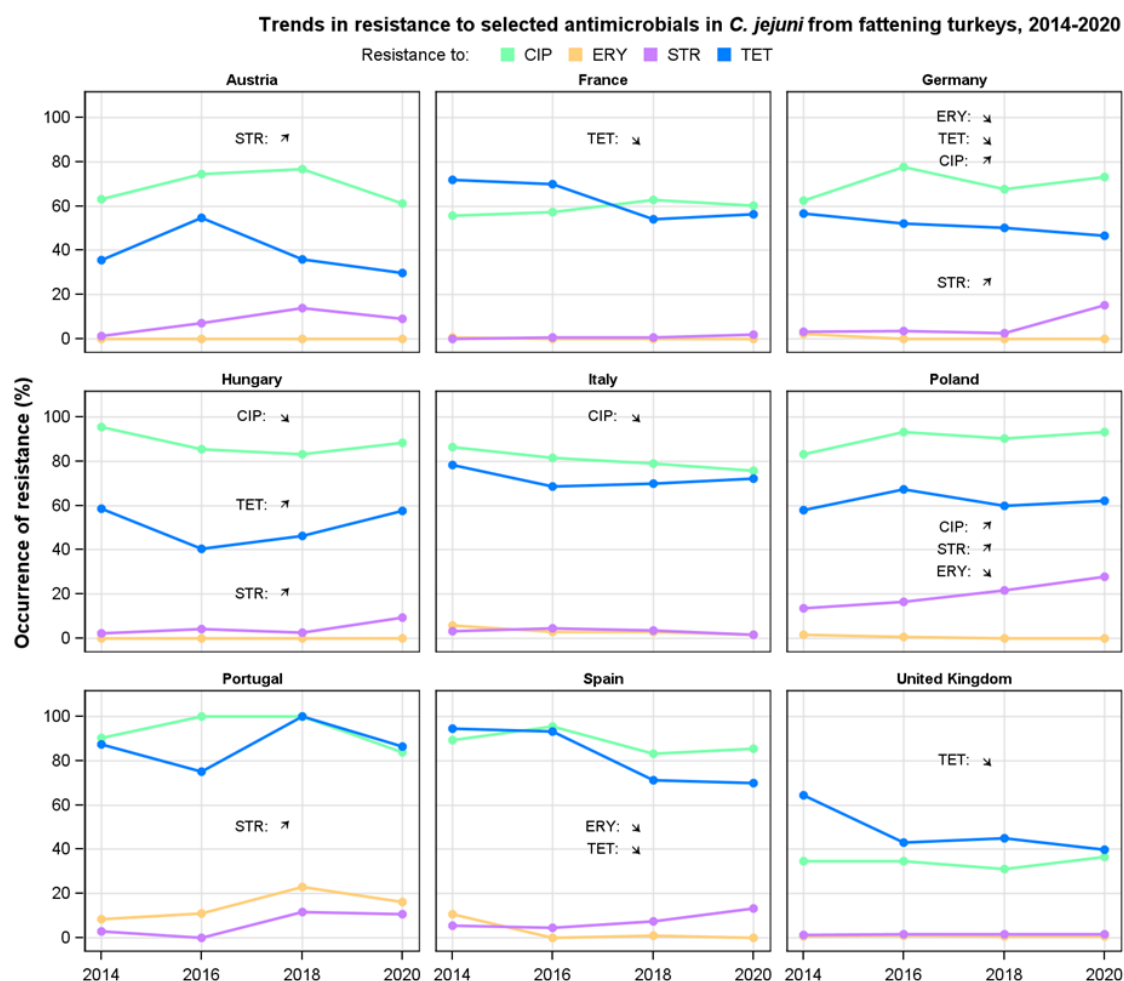


Figure 1: Trends in ciprofloxacin (CIP), erythromycin (ERY), streptomycin (STR) and tetracycline (TET) resistance in (a) *C. jejuni* and (b) *C. coli* from broilers, 2009–2020.



CIP: ciprofloxacin; ERY: erythromycin; STR: streptomycin; TET: tetracycline. Arrows indicate significant increasing (up) or decreasing (down) trend over the entire period.

Figure 2: Trends in ciprofloxacin (CIP), erythromycin (ERY), streptomycin (STR) and tetracycline (TET) resistance in *C. jejuni* from fattening turkeys, 2014–2020

Table 31: Number of isolates exhibiting different levels of erythromycin resistance (low and high) in broilers, fattening turkeys, pigs and calves in reporting EU MSs and non-EU MSs, 2020–2021.

<i>C. Species</i>	Animals	N total isolates exhibiting ERY resistance	Ecoff < MIC ≤ 128 mg/L	MIC > 128 mg/L	128 mg/L < MIC ≤ 512 mg/L	MIC > 512 mg/L
<i>C. jejuni</i> 2020	Broilers	27	13	14	-	-
	Turkeys	10	4	6	-	-
<i>C. jejuni</i> 2021	Pigs	1	-	-	1	0
	Calves	12	1	-	3	8
<i>C. coli</i> 2020	Broilers	22	13	9	-	-
	Turkeys	122	8	114	-	-
<i>C. coli</i> 2021	Pigs	433	84	-	214	135
	Calves	158	14	-	23	121