Web annex

DANMAP 2019

DANMAP 2019 - Use of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from food animals, food and humans in Denmark

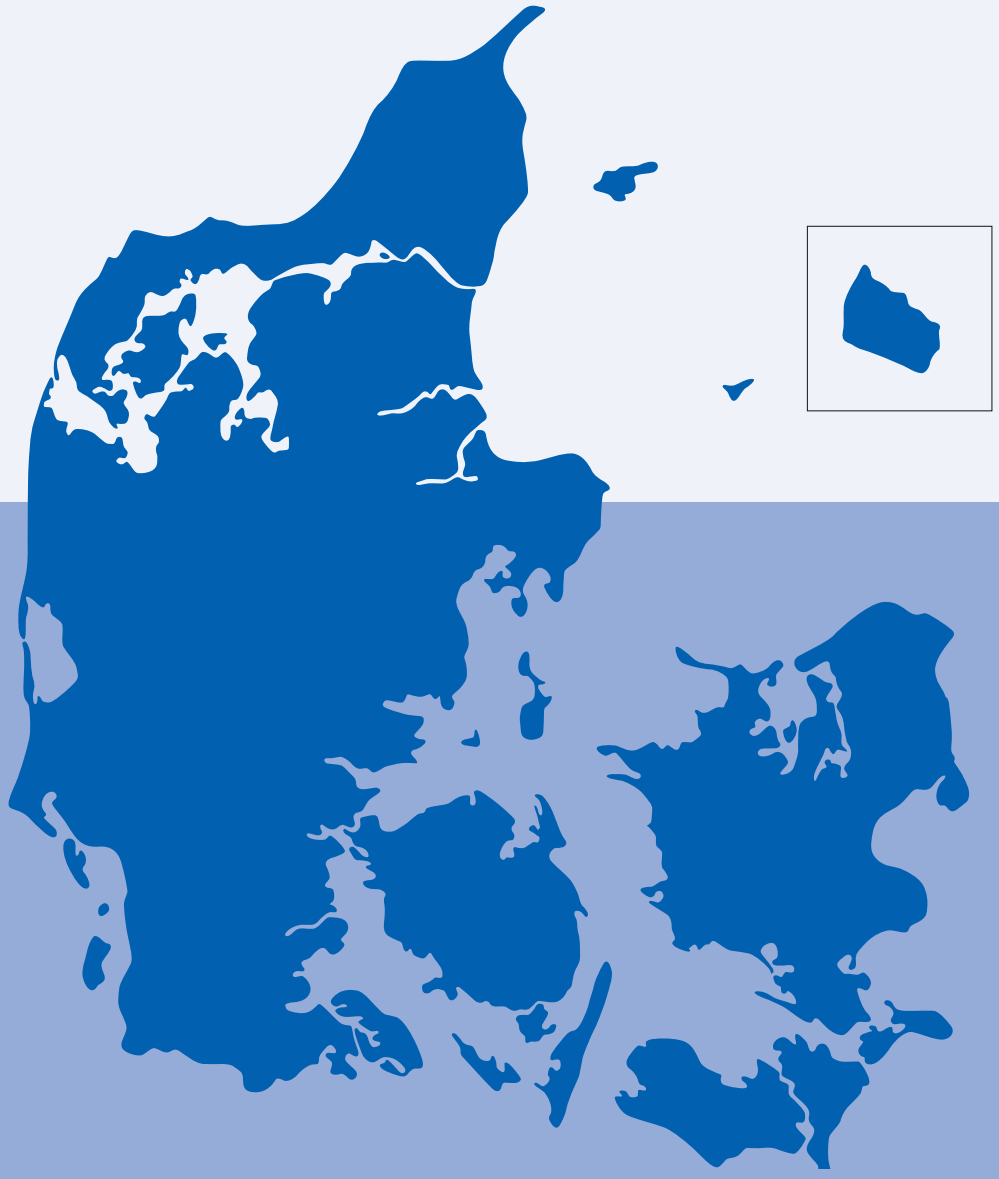

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Table A4.1 Use of antimicrobial agents in pigs (mill. kg-doses), estimated total live biomass (mill. tonnes) and total DAPD per age group per year, Denmark

DANMAP 2019

Year	Aminoglycosides (a)	Amphenicols	Cephalosporins	Colistin	Fluoroquinolones	Lincosamides (b)	Macrolides	Penicillins, b-lactamase sensitive	Penicillins, others (c)	Pleuromutilins	Sulfonamides and trimethoprim	Tetracyclines	Total kg-doses (mill.)	Estimated live biomass (mill. tonnes)	DAPD
Sows and piglets															
2010	149	15	23	20	0	89	265	558	298	228	418	298	2362	*100*	*23.5*
2011	131	20	<1	17	1	63	206	481	250	103	350	211	1835	*98*	*18.7*
2012	134	18	<1	17	2	57	237	482	239	99	352	226	1864	*96*	*19.5*
2013	130	28	<1	18	3	59	279	520	235	133	361	251	2021	*96*	*21.1*
2014	129	27	<1	26	1	62	285	516	230	87	338	248	1951	*97*	*20.2*
2015	126	33	<1	29	0	57	274	499	235	117	315	227	1913	*96*	*19.8*
2016	116	34	<1	31	<1	56	288	488	226	144	291	200	1874	*94*	*19.9*
2017	114	37	<1	10	<1	59	318	502	232	107	286	150	1815	*96*	*19.0*
2018	123	37	<1	<1	0	58	331	523	231	140	283	133	1859	*98*	*19.1*
2019	120	38	0	<1	0	56	299	519	218	124	270	124	1768	*95*	*18.6*
Weaners															
2010	92	3	3	122	0	249	896	71	169	580	58	1263	3506	*30*	*117.7*
2011	89	3	<1	98	<1	204	701	68	144	412	46	1069	2834	*31*	*91.7*
2012	88	3	<1	107	<1	239	807	67	152	424	55	1233	3174	*30*	*105.3*
2013	99	3	<1	102	0	236	806	72	173	482	93	1256	3324	*30*	*110.4*
2014	101	4	<1	169	0	217	737	75	186	457	89	1146	3183	*31*	*102.6*
2015	96	9	<1	215	0	213	726	81	193	447	75	1077	3132	*32*	*98.5*
2016	86	12	<1	228	0	215	747	71	222	416	70	1051	3120	*33*	*95.7*
2017	179	11	<1	84	0	272	945	82	250	442	73	721	3059	*32*	*96.7*
2018	308	12	<1	<1	0	242	959	85	254	418	56	642	2976	*33*	*91.2*
2019	300	16	<1	0	0	237	962	99	252	390	57	597	2911	*33*	*89.2*
Finishers															
2010	13	1	1	2	0	137	640	453	86	784	6	899	3022	*120*	*25.1*
2011	12	4	<1	<1	<1	123	467	406	62	596	7	750	2427	*121*	*20.1*
2012	14	<1	<1	<1	0	119	507	386	69	588	9	782	2474	*112*	*22.1*
2013	10	<1	<1	<1	0	108	453	397	71	701	17	836	2595	*111*	*23.4*
2014	8	<1	<1	3	0	100	438	399	58	638	12	746	2402	*113*	*21.3*
2015	6	2	<1	6	0	93	382	413	51	580	8	632	2173	*110*	*19.7*
2016	4	<1	<1	3	0	80	383	369	47	568	11	562	2029	*110*	*18.5*
2017	6	<1	<1	1	0	85	439	370	46	578	9	376	1910	*106*	*18.1*
2018	6	1	<1	0	0	79	476	388	43	555	10	282	1840	*109*	*16.8*
2019	7	1	<1	0	0	68	462	401	44	530	9	246	1767	*101*	*17.6*

Note: A 'kg dose' is the defined daily dose (DADD) in kg active compound per kg live biomass per day. The DADDs are defined for each antimicrobial agent, administration route and animal species. Total DAPDs are calculated as the total estimated number of kg doses used per year divided by the estimated live biomass in the age group (in tonnes, cummulated over the 365 days in a year)

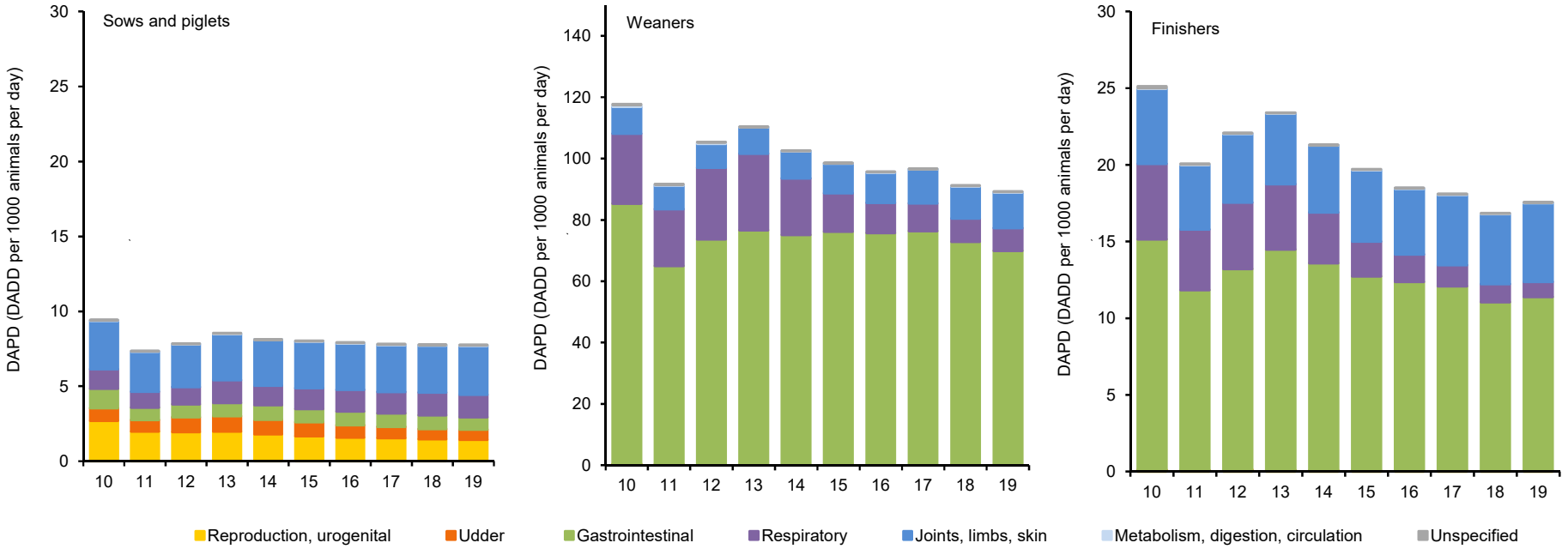
a) Aminoglycosides/benzylpenicillinprocain combinations comprise 60% of this group in 2019

b) Lincosamides/spectinomycin combinations comprise 57% of this group in 2019

c) Penicillins with extended spectrum and combination penicillins, incl. b-lactamase inhibitors, mainly amoxicillin and ampicillin

Figure A4.1 Indications for use of antimicrobial agents in pigs as recorded in Vetstat, DAPD, Denmark

DANMAP 2019



Note: The figure includes all antimicrobial agents registered for use in pigs in specific age-groups except intramammaries, gynecologicals and topical drugs. The DAPD is calculated as the number of standard doses for one kg animal divided by the estimated live biomass in the age group or the total population (in tonnes)

Please note the five-fold difference in scale on the y-axis for weaners

Table A4.2 Use of antimicrobial agents in cattle (mill. kg-doses), estimated total live biomass (mill. tonnes) and total DAPD per age group per year, Denmark

DANMAP 2019

Year	Aminoglycosides (a)	Amphenicols	Cephalosporins	Colistin	Fluoroquinolones	Lincosamides (b)	Macrolides	Penicillins, b-lactamase sensitive	Penicillins, others (c)	Pleuromutilins	Sulfonamides and trimethoprim	Tetracyclines	Total kg-doses (mill.)	Estimated live biomass (mill. tonnes)	DAPD
Calves <12 months															
2010	22	36	2	2	<1	1	46	17	13	<1	19	64	223	*43*	*5.2*
2011	22	47	2	2	<1	<1	48	17	13	0	18	55	225	*42*	*5.3*
2012	20	48	2	2	<1	<1	66	18	12	<1	13	49	229	*42*	*5.4*
2013	19	48	2	4	<1	<1	65	17	13	0	9	54	231	*41*	*5.7*
2014	16	52	1	6	<1	<1	59	17	13	0	8	59	231	*41*	*5.7*
2015	21	55	<1	4	<1	<1	61	19	12	0	8	63	244	*41*	*6.0*
2016	26	63	<1	3	<1	<1	59	24	10	0	7	68	261	*41*	*6.4*
2017	25	71	<1	1	0	<1	58	23	9	0	6	66	261	*41*	*6.4*
2018	34	80	<1	<1	<1	<1	58	29	8	0	6	73	289	*41*	*7.0*
2019	30	85	<1	<1	0	<1	53	26	7	0	6	80	289	*40*	*7.3*
Cattle >12 months															
2010	29	3	41	<1	<1	<1	23	514	56	<1	47	171	883	*226*	*3.9*
2011	27	4	41	<1	0	<1	25	501	52	<1	45	172	867	*225*	*3.9*
2012	26	3	43	<1	0	<1	24	479	43	<1	44	158	821	*223*	*3.7*
2013	20	2	37	<1	0	<1	22	459	38	<1	39	149	767	*222*	*3.5*
2014	20	1	27	<1	0	<1	22	482	39	<1	42	154	788	*216*	*3.7*
2015	22	1	9	<1	<1	<1	18	471	38	0	43	151	754	*215*	*3.5*
2016	20	2	10	<1	<1	<1	19	462	35	0	45	133	725	*215*	*3.4*
2017	18	3	9	<1	<1	<1	19	445	33	0	39	122	689	*214*	*3.2*
2018	20	3	9	<1	<1	<1	17	452	32	0	39	120	693	*211*	*3.3*
2019	19	3	7	<1	<1	<1	14	431	30	0	42	114	661	*207*	*3.2*

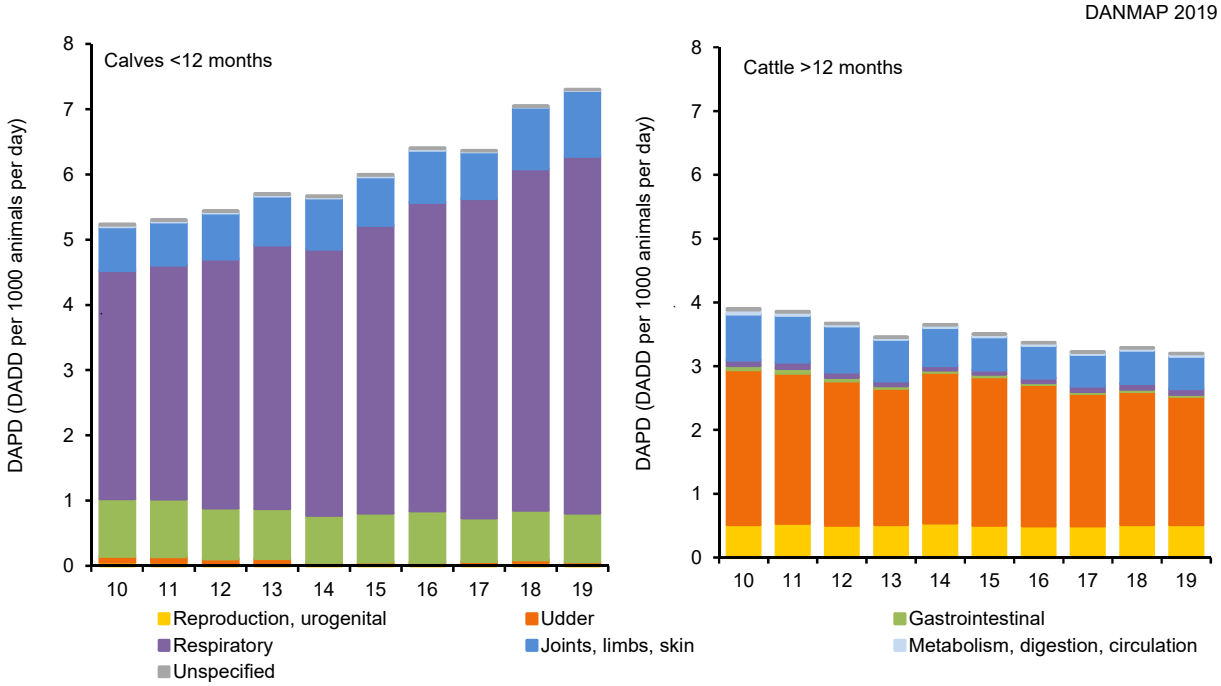
Note: A 'kg dose' is the defined daily dose (DADD) in kg active compound per kg live biomass per day. The DADDs are defined for each antimicrobial agent, administration route and animal species. Total DAPDs are calculated as the total estimated number of kg doses used per year divided by the estimated live biomass in the age group (in tonnes, cummulated over the 365 days in a year)

a) Aminoglycosides/benzylpenicillinprocain combinations comprise 67% of this group in 2019

b) Lincosamides/spectinomycin combinations comprise 76% of this group in 2019

c) Penicillins with extended spectrum and combination penicillins, incl. b-lactamase inhibitors

Figure A4.2 Indications for use of antimicrobial agents in cattle as recorded in Vetstat, DAPD, Denmark



Note: The figure includes all antimicrobial agents registered for use in cattles in specific age-groups except intramammaries, gynecologicals and topical drugs. The DAPD is calculated as the number of standard doses for one kg animal divided by the estimated live biomass in the age group or the total population (in tonnes)

Table A4.3 Use of antimicrobial agents in fur animals (mill. kg-doses), estimated total live biomass (mill. tonnes) and total DAPD per year, Denmark

DANMAP 2019

Year	Aminoglycosides (a)	Amphenicols	Cephalosporins	Colistin	Fluoroquinolones	Lincosamides (b)	Macrolides	Penicillins, b-lactamase sensitive	Penicillins, others	Pleuromutilins (c)	Sulfonam./trimeth.	Tetracyclines	Total kg-doses (mill.)	Estimated live biomass (mill. tonnes)	DAPD
							Mink								
2010	1	<1	<1	<1	0	40	63	<1	80	0	13	77	275	*7*	*41*
2011	<1	<1	<1	<1	<1	55	76	<1	95	0	23	100	350	*7*	*49*
2012	<1	<1	<1	<1	<1	61	75	<1	110	0	42	75	364	*8*	*47*
2013	<1	<1	<1	<1	0	56	69	<1	99	0	39	57	321	*9*	*37*
2014	<1	<1	0	1	0	37	52	<1	78	0	39	60	267	*9*	*29*
2015	<1	<1	<1	3	<1	56	66	<1	108	0	35	67	335	*10*	*34*
2016	<1	<1	<1	<1	0	48	80	<1	100	<1	41	80	349	*9*	*38*
2017	11	<1	0	0	0	40	94	<1	132	0	31	96	404	*10*	*40*
2018	3	<1	0	0	0	18	47	<1	100	0	13	48	231	*10*	*23*
2019	6	3	0	<1	0	27	49	<1	95	0	19	43	243	*8*	*32*

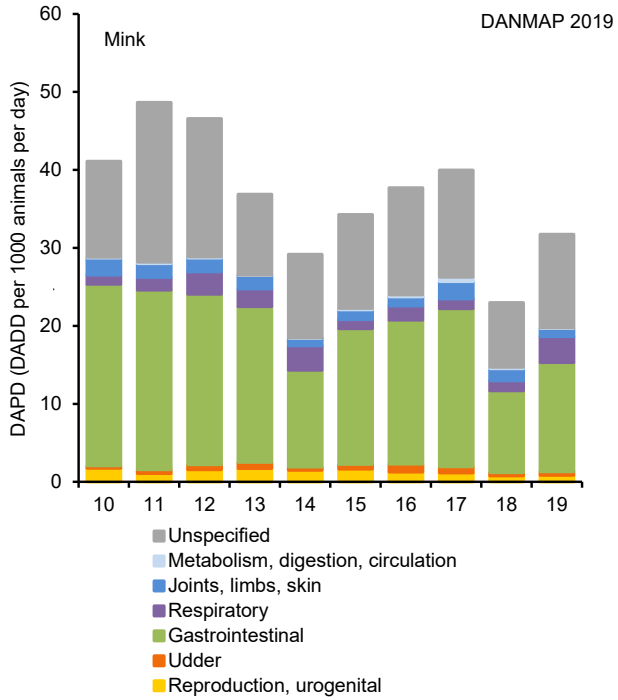
Note: A 'kg dose' is the defined daily dose (DADD) in kg active compound per kg live biomass per day. The DADDs are defined for each antimicrobial agent, administration route and animal species. Total DAPDs are calculated as the total estimated number of kg doses used per year divided by the estimated live biomass in the age group (in tonnes, cummulated over the 365 days in a year)

a) Aminoglycosides/benzylpenicillinprocain combinations comprise 0.3% of this group in 2019

b) Lincosamides/spectinomycin combinations comprise 99.98% of this group in 2019

c) Penicillins with extended spectrum and combination penicillins, incl. b-lactamase inhibitors, amoxicillin/clavulanic acid comprises 35% of this group in 2019

Figure A4.3 Indications for use of antimicrobial agents in fur animals as recorded in Vetstat, DAPD, Denmark



Note: The DAPD is calculated as the number of standard doses for one kg animal divided by the estimated live biomass in the age group or the total population (in tonnes)

Table A5.1 Total consumption of antimicrobial agents for systemic use in humans, kg active compound, Denmark DANMAP 2019

ATC group	Therapeutic group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
J01AA	Tetracyclines	2,165	2,206	2,214	2,253	2,015	1,790	1,740	1,650	1,508	1,526
J01CA	Penicillins with extended spectrum	6,345	6,384	6,003	6,001	6,044	6,203	6,250	6,510	6,556	6,498
J01CE	Beta-lactamase sensitive penicillins	22,312	22,668	20,282	20,223	19,187	19,013	18,463	17,532	16,485	15,743
J01CF	Beta-lactamase resistant penicillins	5,438	5,713	5,667	6,126	6,421	6,520	6,920	7,291	7,649	7,829
J01CR	Comb. of penicillins, including beta-lactamase inhibitors	2,617	3,710	5,380	6,322	7,359	8,312	8,664	7,254	8,210	8,453
J01D	Cephalosporins and related substances	2,095	2,541	2,363	2,167	1,910	1,820	1,662	3,104	1,619	1,533
J01EA	Trimethoprim and derivatives	418	414	431	442	464	467	473	132	456	389
J01EB	Short-acting sulfonamides	2,165	1,992	1,860	1,838	1,729	1,478	1,383	21	1,176	1,122
J01EE	Comb. of sulfonamides and trimethoprim, including derivatives	169	251	277	357	385	406	409	421	445	499
J01FA	Macrolides	2,467	2,535	2,118	1,837	1,712	1,640	1,631	1,456	1,323	1,373
J01FF	Lincosamides	124	137	143	162	160	165	174	177	180	195
J01G	Aminoglycosides	24	27	30	29	21	21	26	29	27	28
J01MA	Fluoroquinolones	1,465	1,457	1,413	1,359	1,314	1,279	1,220	1,140	1,068	929
J01XA	Glycopeptides	90	108	108	112	98	90	89	107	102	104
J01XB	Polymyxins	164	163	153	149	152	151	171	164	169	12
J01XC	Steroid antibacterials (fusidic acid)	65	55	48	41	37	31	27	20	19	15
J01XD	Imidazoles	258	260	269	270	289	268	282	288	264	246
J01XE	Nitrofuran derivatives (nitrofurantoin)	208	208	205	202	199	189	182	113	68	116
J01XX01	Fosfomycin	0	0	0	0	0	0	0	0	0	0
J01XX05	Methenamine	1,078	1,053	1,040	993	993	1,042	1,131	1,197	1,228	1,340
J01XX08+09	Linezolid, daptomycin	14	17	18	20	19	24	20	20	28	28
J01XX11	Tedizolid	0	0	0	0	0	0	0	0	0	0
P01AB01	Nitroimidazole derivatives	1,323	1,352	1,353	1,332	1,336	1,346	1,344	1,225	1,165	1,158
A07AA09	Intestinal antiinfectives (vancomycin)	29	43	47	47	48	42	43	45	43	45
J01, P01AB01 and A07AA09	Antibacterial agents (total)	51,032	53,296	51,424	52,282	51,890	52,300	52,303	49,897	49,786	49,183

Note: The consumption in 2019 includes consumption on special delivery at the hospitals (347 kg)

Table A5.2 Consumption of antimicrobial agents on special delivery at hospitals, DDD, Denmark DANMAP 2019

Antimicrobial agent	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
J01AA01 Demeclocyclin	-	104	48	40	-	-	-	-	-	-
J01AA02 Doxycyclin	690	525	655	685	900	700	801	252	286	312
J01AA08 Minocyclin	-	25	-	-	-	-	-	-	-	125
J01BA01 Chloramphenicol	106	35	170	129	70	35	35	110	109	45
J01CA01 Ampicillin	-	-	-	-	-	-	-	-	77	101
J01CA04 Amoxicillin	55	180	135	125	163	253	302	172	162	122
J01CA11 Mecillinam	-	-	-	-	2,226	909	1,085	4,110	17	-
J01CA17 Temocillin	-	-	-	-	64	30	271	1,666	-	30
J01CE01 Benzylpenicillin	-	-	-	-	-	-	-	5,085	417	-
J01CE02 Phenoxymethylpenicillin	40	-3	5	-	-	-	-	-	-	-
J01CE08 Benzathin benzylpenicillin	218	324	335	326	316	562	372	1,514	618	538
J01CF01 Dicloxacillin	6,290	-	-	-	-	-	-	-	-	-
J01CF02 Cloxacillin		18,495	8,620	1,160	11,960		22,745	46,360	830	151,543
J01CF05 Flucloxacillin	2,200	2,318	2,328	2,745	2,690	2,313	2,275	2,200	1,783	1,790
J01CR02 Amoxicillin og beta-lactamaseinhibitor	33	-	-	-	721	10,743	3,276	2,579	3,882	4,348
J01CR05 Piperacillin og beta-lactamaseinhibitor	-	-	-	-	-	-	-	16,465	4,457	-
J01DB04 Cefazolin	7	-	-	-	-	-	-	-	-	-
J01DC01 Cefoxitin	-	18	150	430	263	724	467	10,191	553	100
J01DC02 Cefuroxim	-	-	-	-	100	330	355	215	638	492
J01DD13 Cefpodoxime	-	-	-	-	10	-	-	-	-	-
J01DE01 Cefepim	8	11	233	-	6	43	-	-	-	-
J01DF01 Aztreonam	52	-	-	-	12	-	6	41	-	74
J01DH02 Meropenem	-	-	-	-	57,528	2,483	60	773	-	-
J01DH04 Doripenem	-	-	-	-	17	-	-	-	-	-
J01DH51 Imipenem og cilastatin	1,577	2,055	2,942	1,355	1,524	2,659	788	885	1,181	1,754
J01DH52 Meropenem og vaborbactam	-	-	-	-	-	-	-	-	-	56
J01EC02 Sulfadiazin	-	-	-	-	-	-	-	4,775	7,633	567
J01EE01 Sulfamethoxazol og trimethoprim	32,545	27,064	22,341	5,237	6,820	6,590	6,704	8,188	7,596	7,136
J01FA02 Spiramycin	15	-	-	15	80		35	51	743	120
J01FA09 Clarithromycin	-	-	-	-	-	624	414	1,085	-	-
J01FF01 Clindamycin	19	42	88	77	85	41	107	361	127	283
J01FG01 Pristinamycin	-	-	-	-	-	60	160	160	200	425
J01GB01 Tobramycin	6,633	6,764	20	-	-	-	-	-	-	6,895
J01GB03 Gentamicin	546	396	435	407	19,107	19,582	463	435	392	412
J01GB06 Amikacin	565	995	1,908	1,985	1,795	3,218	1,682	1,768	3,013	3,225
J01MA01 Ofloxacin	-	-	-	260	-	370	460	340	-	-
J01MA02 Ciprofloxacin	1,105	1,028	600	745	710	1,155	1,195	690	766	726
J01MA12 Levofloxacin	-	10	-	140	4,470	7,240	8,080	8,180	6,710	7,360
J01XA01 Vancomycin	-	-	-	-	-	3,325	-	-	-	-
J01XB01 Colistin	6,931	6,314	5,845	6,368	1,397	776	-	-	-	-
J01XC01 Fusidinsyre	-	-	4	5	-	-	-	-	-	-
J01XX01 Fosfomycin	-	13	185	-	32	9	11	8	359	25
J01XX08 Linezolid	-	-	-	-	900	-	-	-	-	-
P01AB01 Metronidazol	-	-	-	-	-	-	175	200	-	8
Antimicrobial agents (total)	**59,634**	**66,713**	**47,045**	**22,233**	**113,966**	**64,770**	**52,323**	**118,857**	**42,549**	**188,609**

Figure A5.3 Bed-days and admissions to hospitals in Denmark, 2010-2019 DANMAP 2019

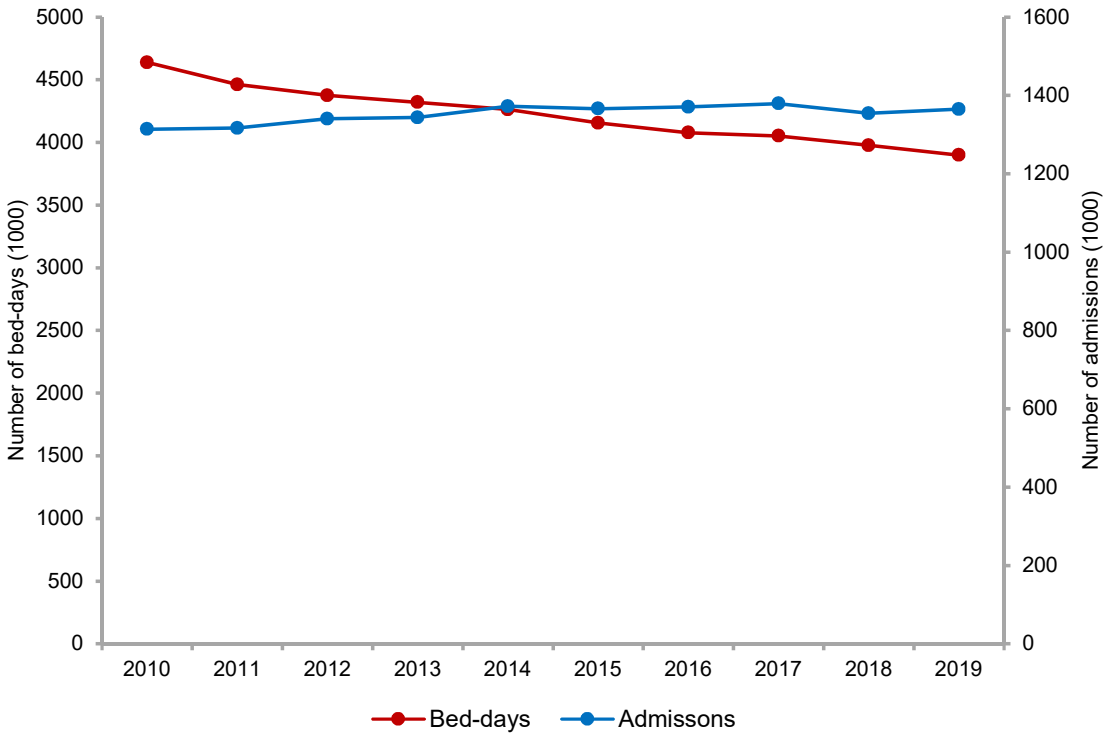


Figure A5.4 Ratio between bed-days and admissions at regional level, Denmark DANMAP 2019

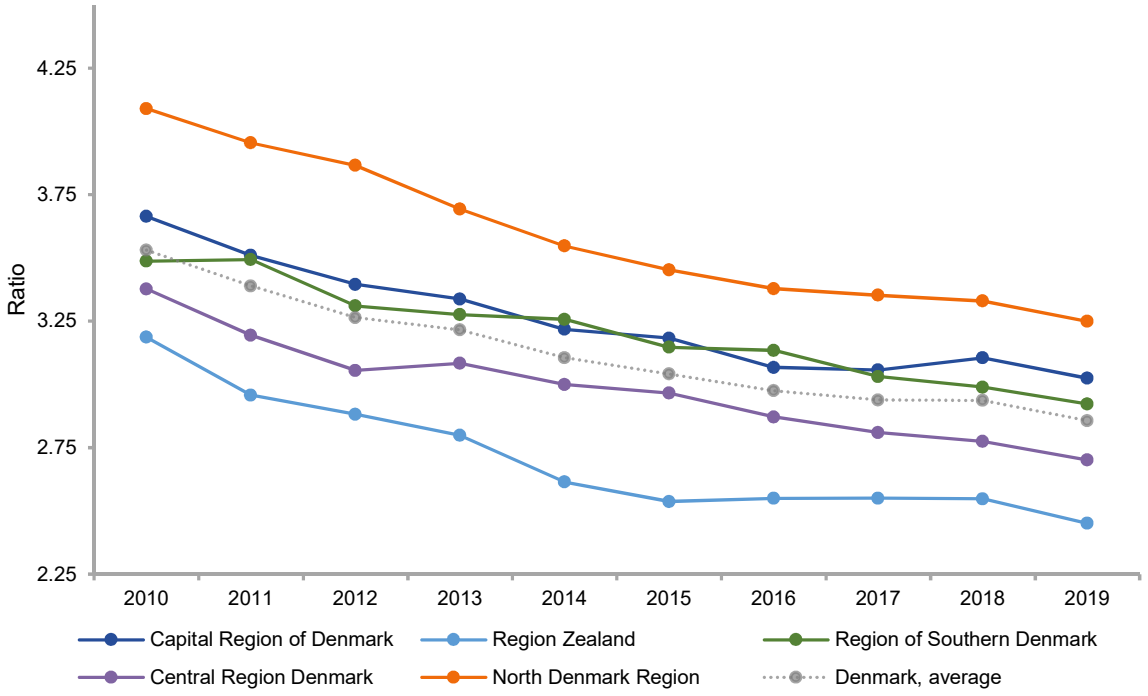


Figure A5.5 Distribution of penicillins used in different age groups, percent of total in DDD per 1000 inhabitants per day, 2010 and 2019, Denmark

DANMAP 2019

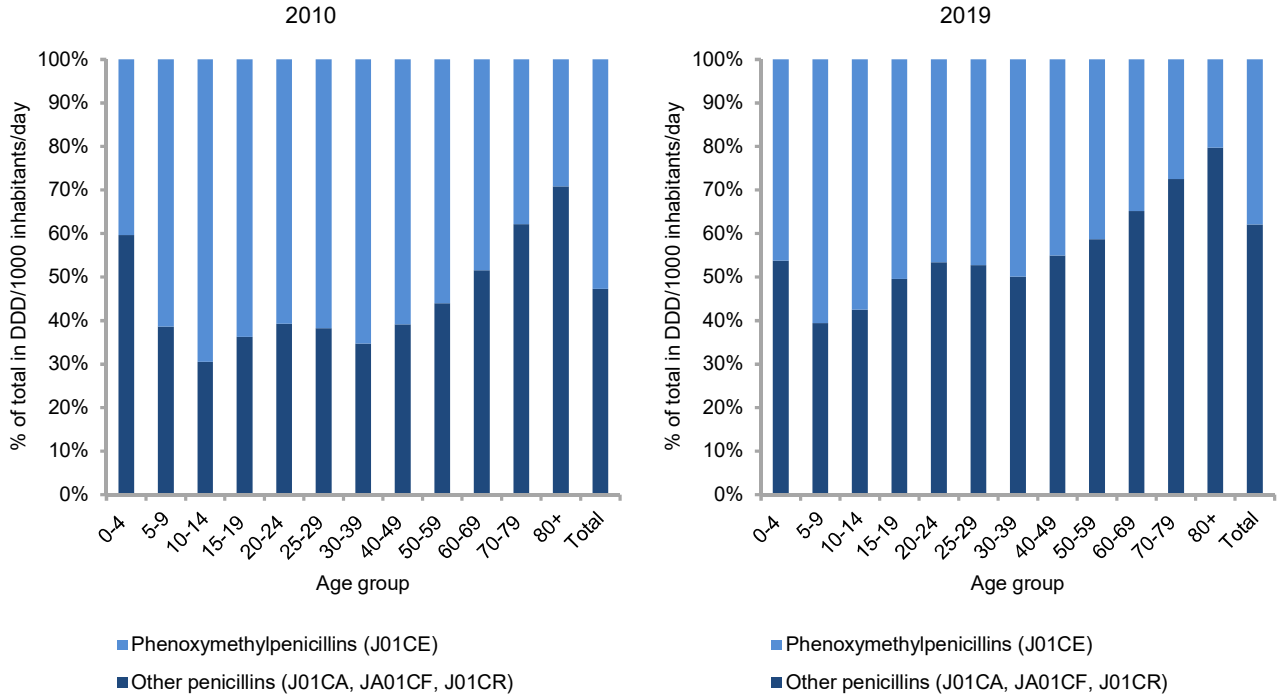


Figure A5.6 Distribution of fluoroquinolones in primary health care prescribed by medical specialities, based on DDD, Denmark

DANMAP 2019

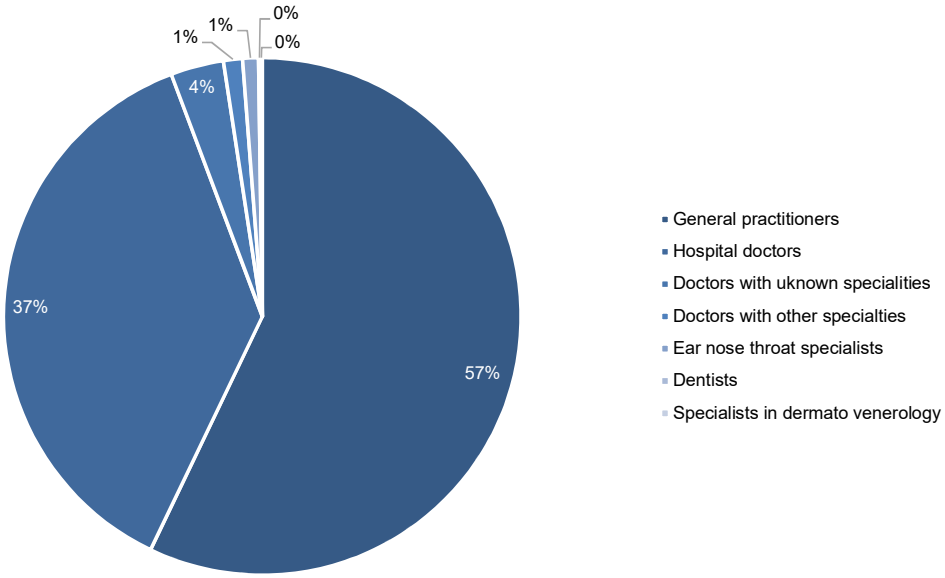


Table A5.7 Indication for use of fluoroquinolones prescribed in primary health care, DDD, Denmark

DANMAP 2019

Indication	2015	2016	2017	2018	2019
Acute exacerbation of chronic bronchitis	-	-	-	52	38
Against gonorrhea	1273	1073	965	608	458
Against bacterial infection in bones and joints	4941	5982	9515	14750	13264
Against chronic urinary tract infection	5505	3863	3935	5238	4063
Against diarrhea	152215	137045	116724	109014	92414
Against infection in abdominal cavity	3070	3642	6126	10825	12348
Against infection in epididymis	41388	41075	43338	47471	53222
Against infection in prostate	9160	8863	10105	12235	11103
Against lung infection by cystic fibrosis	755	2111	10213	15355	13803
Against otitis media	1055	1315	1385	1023	1505
Against pelvic inflammatory disease	1109	1138	1426	1514	1797
Against pneumonia	59322	54473	52711	48557	41782
Against skin and soft tissue infection	35550	36526	38812	42848	45094
Against excerbation of chronic obstructive pulmonary disease (COPD)	5154	6117	5271	5093	3587
Against urinary tract infection	270362	248590	228650	205400	168491
Against infection (used instead of specific indication)	221207	258514	256786	238053	213595
Other indications	8666	8870	12559	13924	13150
Unknown indication	183009	168455	119264	88619	78715
Total	1003738	987649	917781	860574	768424

Table A6.1 Distributions of MICs and resistance (%) in *Campylobacter jejuni* from broilers (n=195) and cattle (n=101), Denmark

DANMAP 2019

Antimicrobial agent	Animal species	% Resistant	95% Confidence interval	Distribution (%) of MICs											
				0.125	0.25	0.5	1	2	4	8	16	32	64	128	>128
Ciprofloxacin	Broilers	44.6	[32.4-57.6]	51.8	3.6					30.4	8.9	5.4			
	Cattle	20.2	[13.8-28.5]	74.6	5.3					7.9	11.4	0.9			
Erythromycin	Broilers	0	[0-6.4]				100								
	Cattle	0	[0-3.3]				100								
Gentamicin	Broilers	0	[0-6.4]		5.4	60.7	33.9								
	Cattle	0	[0-3.3]			42.1	57.0	0.9							
Nalidixic acid	Broilers	42.9	[30.8-55.9]					8.9	42.9	5.4				42.9	
	Cattle	20.2	[13.8-28.5]					0.9	56.1	21.9	0.9		0.9	19.3	
Streptomycin	Broilers	1.8	[0.3-9.4]			5.4	37.5	48.2	7.1			1.8			
	Cattle	2.6	[0.9-7.5]				14.0	69.3	14.0			2.6			
Tetracycline	Broilers	39.3	[27.6-52.4]			60.7				1.8	1.8		7.1	28.6	
	Cattle	10.5	[6.1-17.5]			89.5						0.9	0.9	8.8	

Vertical solid lines indicate EUCAST epidemiological cut-off values. EUCAST clinical breakpoints are indicated as vertical dotted lines if different from the corresponding epidemiological cut-off values

Confidence intervals are calculated as 95% binomial proportions presenting Wilson intervals

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A6.2 Distribution of MICs and resistance (%) in *Campylobacter jejuni* from human cases reported as domestically acquired (n=94) and associated with travel abroad (n=59), Denmark

DANMAP 2019

Antimicrobial agen	Animal species	% Resistant	95% Confidence interval	Distribution (%) of MICs											
				0.125	0.25	0.5	1	2	4	8	16	32	64	128	>128
Ciprofloxacin	Domestically acquired	39.4	[29.7-49.1]	59.6	1.1				2.1	18.1		19.1			
	Travel abroad reported	83.1	[73.6-92.5]	16.9					6.8	23.7		52.5			
Erythromycin	Domestically acquired	0.0	[0-2]				95.7	4.3							
	Travel abroad reported	0.0	[0-3.1]				86.4	13.6							
Gentamicin	Domestically acquired	0.0	[0-2]	23.4	69.1	7.4									
	Travel abroad reported	0.0	[0-3.1]	32.2	64.4	3.4									
Nalidixic acid	Domestically acquired	0.0	[28.7-47.9]					7.4	48.9	5.3		1.1		37.2	
	Travel abroad reported	0.0	[73.6-92.5]					6.8	10.2			1.7		81.4	
Streptomycin	Domestically acquired	0.0	[0-8.6]		1.1	10.6	71.3	12.8				4.3			
	Travel abroad reported	0.0	[3.5-20.2]			16.9	67.8	1.7	1.7	1.7		10.2			
Tetracycline	Domestically acquired	0.0	[24.6-43.5]			64.9	1.1		1.1		2.1	5.3		25.5	
	Travel abroad reported	0.0	[50.7-74.7]			33.9	3.4			3.4	3.4	6.8		49.2	

Vertical solid lines indicate EUCAST epidemiological cut-off values. EUCAST clinical breakpoints are indicated as vertical dotted lines if different from the corresponding epidemiological cut-off values

Confidence intervals are calculated as 95% binomial proportions presenting Wilson intervals

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A6.3 Distributions (n, %) of AMR profiles in *Campylobacter jejuni* from broilers, cattle and human cases, Denmark

DANMAP 2019

	Broilers	Broiler meat	Cattle	Human	
AMR profiles 2019	Danish	Danish	Danish	Domestically acquired	Travel abroad reported
FS	31 (55%)	73 (35%)	81 (71%)	55 (35%)	10 (12%)
CIP	1 (2%)			1 (1%)	
CIP NAL	2 (4%)	73 (35%)	18 (16%)	33 (21%)	17 (20%)
CIP NAL TET	21 (38%)	55 (26%)	5 (4%)	58 (37%)	40 (48%)
NAL STR TET					1 (1%)
CIP NAL STR TET	1 (2%)	7 (3%)		5 (3%)	11 (13%)
CIP ERY NAL TET					2 (2%)
CIP ERY NAL STR TET					1 (1%)
STR		1 (0%)	3 (3%)		
TET			7 (6%)	2 (1%)	2 (2%)
Number of isolates	56	209	114	155	83

Note:FS=Fully suscpetable; CIP=Ciprofloxacin; ERY=Erythromycin; NAL=Nalidixan; STR=Streptomycin; TET=Tetracycline

Table A6.4 Distribution of MICs and resistance (%) in *Salmonella* Typhimurium from Danish pigs (45) and pork (n=59), Denmark

DANMAP 2019

Antimicrobial agent		% Resistant	95% Confidence	Distribution (%) of MICs																
				0.02	0.03	0.064	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	>1024
Ampicillin	Pigs	75.6	[63-88.1]							11.1	11.1	2.2				2.2	73.3				
	Pork	78.0	[67.4-88.5]							10.2	10.2	1.7					78.0				
Azithromycin	Pigs	0	[0-14]									53.3	44.4	2.2							
	Pork	3.4	[0-8]								1.7	33.9	57.6	3.4	1.7		1.7				
Cefotaxime	Pigs	0	[0-14]					100													
	Pork	0	[0-10.7]					98	2												
Ceftazidime	Pigs	0	[0-14]						100												
	Pork	0	[0-10.7]						95	5.1											
Chloramphenicol	Pigs	11.1	[1.9-20.3]										84.4	4.4				11.1			
	Pork	11.9	[3.6-20.1]										84.7	3.4		5.1	3.4	3.4			
Ciprofloxacin	Pigs	0	[0-14]	13.3	84.4	2.2															
	Pork	0	[0-10.7]	6.8	89.8	3.4															
Colistin	Pigs	0	[0-14]							37.8	62.2										
	Pork	0	[0-10.7]							40.7	59.3										
Gentamicin	Pigs	15.6	[5-26.1]						75.6	6.7	2.2	4.4		2.2	6.7	2.2					
	Pork	6.8	[0.4-13.2]						81.4	10.2	1.7					6.8					
Meropenem	Pigs	0	[0-14]		86.7	13.3															
	Pork	0	[0-10.7]		89.8	10.2															
Nalidixic acid	Pigs	0	[0-14]									77.8	20.0	2.2							
	Pork	0	[0-10.7]									79.7	20.3								
Sulfonamide	Pigs	80.0	[68.3-91.7]										2.2	6.7	11.1						80.0
	Pork	83.1	[73.5-92.6]										1.7	6.8	8.5						83.1
Tetracycline	Pigs	80.0	[68.3-91.7]								17.8	2.2			2.2		77.8				
	Pork	72.9	[61.5-84.2]								27.1				1.7		71.2				
Tigecycline	Pigs	0	[0-14]					66.7	31.1	2.2											
	Pork	0	[0-10.7]					79.7	16.9	3.4											
Trimethoprim	Pigs	17.8	[6.6-28.9]					80.0	2.2							17.8					
	Pork	11.9	[3.6-20.1]					88.1								11.9					

Includes isolates verified as monophasic variants of *S*. Typhimurium with antigenic formulas S. 4,[5],12:i:-.

Vertical solid lines indicate EUCAST epidemiological cut-off values. For *Salmonella*, EUCAST ECOFF are not available for all compounds and complementary cutoff's er set for azithromycin (MIC > 16) and sulfonamide (MIC > 256). EUCAST clinical breakpoints are indicated as vertical dotted lines if different from the corresponding epidemiological cut-off values

Confidence intervals are calculated as 95% binomial proportions presenting Wilson intervals

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A6.5 Distribution of MICs and resistance (%) in *Salmonella* Derby from Danish pigs (67) and pork (n=56), Denmark

DANMAP 2019

Antimicrobial agent		% Resistant	95% Confidence interval	Distribution (%) of MICs																
				0.02	0.03	0.064	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	>1024
Ampicillin	Pigs	13.4	[5.3-21.6]							65.7	20.9						13.4				
	Pork	16.1	[6.5-25.7]							71.4	12.5						16.1				
Azithromycin	Pigs	0	[0-9.4]								1.5	37.3	55.2	6.0							
	Pork	0	[0-11.3]									30.4	66.1	3.6							
Cefotaxime	Pigs	0	[0-9.4]					99	1												
	Pork	0	[0-11.3]					98	2												
Ceftazidime	Pigs	0	[0-9.4]						96	4.5											
	Pork	0	[0-11.3]						95	5.4											
Chloramphenicol	Pigs	4.5	[0-9.4]										89.6	6.0			3.0	1.5			
	Pork	1.8	[0-5.3]										96.4	1.8		1.8					
Ciprofloxacin	Pigs	0	[0-9.4]	56.7	40.3	3.0															
	Pork	0	[0-11.3]	57.1	42.9																
Colistin	Pigs	0	[0-9.4]							35.8	64.2										
	Pork	0	[0-11.3]							41.1	58.9										
Gentamicin	Pigs	1.5	[0-4.4]						88.1	9.0	1.5	1.5									
	Pork	1.8	[0-5.3]						89.3	8.9				1.8							
Meropenem	Pigs	0	[0-9.4]		94.0	6.0															
	Pork	0	[0-11.3]		94.6	5.4															
Nalidixic acid	Pigs	0	[0-9.4]									98.5	1.5								
	Pork	0	[0-11.3]									100.0									
Sulfonamide	Pigs	20.9	[11.2-30.6]										11.9	35.8	29.9	1.5					20.9
	Pork	25.0	[13.7-36.3]										8.9	39.3	23.2	3.6				1.8	23.2
Tetracycline	Pigs	31.3	[20.2-42.5]								68.7						31.3				
	Pork	21.4	[10.7-32.2]								78.6						21.4				
Tigecycline	Pigs	0	[0-9.4]					92.5	7.5												
	Pork	0	[0-11.3]					87.5	12.5												
Trimethoprim	Pigs	20.9	[11.2-30.6]					76.1	3.0							20.9					
	Pork	23.2	[12.2-34.3]					76.8								23.2					

Vertical solid lines indicate EUCAST epidemiological cut-off values. For *Salmonella*, EUCAST ECOFF are not available for all compounds and complementary cutoff's er set for azithromycin (MIC > 16) and sulfonamide (MIC > 256). EUCAST clinical breakpoints are indicated as vertical dotted lines if different from the corresponding epidemiological cut-off values

Confidence intervals are calculated as 95% binomial proportions presenting Wilson intervals

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A6.6 Distribution of MICs and resistance (%) in *Salmonella* Typhimurium from human cases reported as domestically acquired (n=97), associated with travel abroad (n=65) and of unknown origin (n=109), Denmark

DANMAP 2019

Antimicrobial agen	Animal species	% Resistant	95% Confidence interval	Distribution (%) of MICs																
				0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	>1024
Ampicillin	Domestically acquired	77.3	[69,1-85,6]							18.6	4.1						77.3				
	Travel abroad reported	63.1	[51,7-74,5]							26.2	10.8						63.1				
	Unknown origin	74.3	[66,2-82,4]							20.2	5.5						74.3				
Azithromycin	Domestically acquired	2.1	[0-5,4]									57.7	36.1	4.1	1.0		1.0				
	Travel abroad reported	0.0	[0-2,8]									52.3	46.2	1.5							
	Unknown origin	0.0	[0-1,7]								0.9	54.1	41.3	3.7							
Cefotaxime	Domestically acquired	0.0	[0-1,9]					96.9	3.1												
	Travel abroad reported	1.5	[0-5,5]					95.4	3.1			1.5									
	Unknown origin	0.0	[0-1,7]					99.1	0.9												
Ceftazidime	Domestically acquired	0.0	[0-1,9]						100.0												
	Travel abroad reported	1.5	[0-5,5]						96.9	1.5			1.5								
	Unknown origin	0.0	[0-1,7]						96.3												
Chloramphenicol	Domestically acquired	7.2	[1,9-12,5]										89.7	3.1		3.1		4.1			
	Travel abroad reported	12.3	[4,3-20,3]										86.2	1.5	1.5			10.8			
	Unknown origin	3.7	[0-7,5]										92.7	2.8		0.9	0.9	2.8			
Ciprofloxacin	Domestically acquired	4.1	[0-8,4]	17.5	75.3	3.1	2.1		2.1												
	Travel abroad reported	13.8	[5,4-22,3]	16.9	67.7	1.5		1.5	10.8	1.5											
	Unknown origin	1.8	[0-4,8]	17.4	76.1	4.6	0.9		0.9												
Colistin	Domestically acquired	2.1	[0-5,4]								97.9	1.0	1.0								
	Travel abroad reported	4.6	[0-10,2]								95.4	4.6									
	Unknown origin	0.0	[0-1,7]								100.0										

Continue next page

Table A6.6 Distribution of MICs and resistance (%) in *Salmonella* Typhimurium from human cases reported as domestically acquired (n=97), associated with travel abroad (n=65) and of unknown origin (n=109), Denmark - continued

DANMAP 2019

Antimicrobial agen	Animal species	% Resistant	95% Confidence interval	Distribution (%) of MICs																
				0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	>1024
Gentamicin	Domestically acquired	2.1	[0-5,4]						79.4	18.6		1.0			1.0						
	Travel abroad reported	6.2	[0-12,3]						80.0	12.3	1.5				1.5	4.6					
	Unknown origin	0.0	[0-1,7]						81.7	15.6	2.8										
Meropenem	Domestically acquired	0.0	[0-1,9]		88.7	11.3															
	Travel abroad reported	0.0	[0-2,8]		75.4	24.6															
	Unknown origin	0.0	[0-1,7]		79.8	20.2															
Nalidixic acid	Domestically acquired	3.1	[0-6,9]									88.7	7.2	1.0	2.1			1.0			
	Travel abroad reported	3.1	[0-7,9]									76.9	10.8	9.2	1.5			1.5			
	Unknown origin	0.9	[0-3,3]									89.0	11.0	1.8				0.9			
Sulfonamide	Domestically acquired	73.2	[64,5-81,9]											1.0	12.4	12.4	1.0				73.2
	Travel abroad reported	55.4	[43,6-67,1]											1.5	15.4	20.0	7.7				55.4
	Unknown origin	66.1	[57,3-74,8]										1.8	2.8	12.8	10.1	6.4				66.1
Tetracycline	Domestically acquired	75.3	[66,8-83,7]								24.7				1.0		74.2				
	Travel abroad reported	56.9	[45,2-68,6]								43.1					1.5	55.4				
	Unknown origin	74.3	[66,2-82,4]								24.8	0.9				1.8	72.5				
Tigecycline	Domestically acquired	4.1	[0-8,4]					73.2	17.5	5.2	4.1										
	Travel abroad reported	0.0	[0-2,8]					61.5	35.4	3.1											
	Unknown origin	0.9	[0-3,3]					72.5	22.9	3.7	0.9										
Trimethoprim	Domestically acquired	12.4	[5,8-19]					78.4	8.2	1.0					1.0	11.3					
	Travel abroad reported	12.3	[4,3-20,3]					80.0	7.7							12.3					
	Unknown origin	3.7	[0-7,5]					89.9	5.5	0.9						3.7					

Vertical solid lines indicate EUCAST epidemiological cut-off values. EUCAST clinical breakpoints are indicated as vertical dotted lines if different from the corresponding epidemiological cut-off values

Confidence intervals are calculated as 95% binomial proportions presenting Wilson intervals

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A6.7 Distributions (n, %) of AMR profiles in *Salmonella* Typhimurium from pigs, pork and humans, Denmark

DANMAP 2019

2019 AMR profiles	Pigs	Pork	Human		
	Danish	Danish	Domestically acquired	Travel abroad reported	No travel information
FS	6 (13%)	7 (12%)	14 (14%)	20 (31%)	22 (20%)
AMP SMX TET	16 (36%)	27 (46%)	49 (%)	21 (32%)	62 (57%)
AMP				2 (3%)	2 (2%)
AMP AZM CHL GEN SMX TET		1 (2%)			
AMP AZM SMX TET			1 (1%)		
AMP AZM SMX TET TMP			1 (1%)		
AMP CHL CIP GEN SMX TET			1 (1%)		
AMP CHL CIP NAL SMX TET			1 (1%)		1 (1%)
AMP CHL CIP NAL SMX TET TMP				1 (2%)	
AMP CHL CIP NAL TET TGC TMP			1 (1%)		
AMP CHL CIP SMX TET TMP				3 (5%)	
AMP CHL GEN				1 (2%)	
AMP CHL GEN SMX TET	1 (2%)				
AMP CHL GEN TET		1 (2%)			
AMP CHL SMX TET	2 (4%)	2 (3%)			
AMP CHL SMX TET				1 (2%)	1 (1%)
AMP CHL SMX TET TGC TMP			2 (2%)		1 (1%)
AMP CHL SMX TET TMP	2 (4%)	1 (2%)			
AMP CHL SMX TET TMP			2 (2%)	1 (2%)	1 (1%)
AMP CHL SMX TMP					1 (1%)
AMP CIP COL SMX TET				1 (2%)	
AMP CIP GEN SMX TET				1 (2%)	
AMP CIP SMX TET					1 (1%)
AMP CIP SMX TMP				1 (2%)	
AMP COL SMX			1 (1%)		
AMP COL SMX TET			1 (1%)		
AMP CTX CAC CHL CIP COL GEN TET				1 (2%)	
AMP GEN SMX			1 (1%)		
AMP GEN SMX TET	5 (11%)	2 (3%)			
AMP GEN SMX TET TMP				1 (2%)	
AMP SMX	3 (7%)	8 (14%)			
AMP SMX			4 (%)	2 (3%)	3 (3%)
AMP SMX TET TMP	5 (11%)	3 (5%)			
AMP SMX TET TMP			3 (%)	1 (2%)	1 (1%)
AMP SMX TMP		1 (2%)			
AMP SMX TMP			1 (1%)		
AMP TET			6 (%)	3 (5%)	7 (6%)
AZM SMX TET		1 (2%)			
CHL SMX TET		1 (2%)			
CHL SMX TET TMP		1 (2%)			
CIP NAL			1 (1%)	1 (2%)	
COL				1 (2%)	
GEN SMX TET TMP	1 (2%)				
SMX			1 (1%)		
SMX TET	1 (2%)			2 (3%)	
SMX TET TGC TMP			1 (1%)		
SMX TET TMP		1 (2%)			
SMX TMP			1 (1%)		
TET	3 (7%)	2 (3%)	4 (4%)		6 (6%)
Number of isolates	45	59	97	65	109

Note:FS=Fully suscpetable; AMP=Ampicillin; AZI=Azithromycin; CAC=Ceftazidime; CHL=Chloramphenicol; CIP=Ciprofloxacin; CTX=Cefotaxime; GEN=Gentamicin; NAL=Nalidixan; SMX=Sulphamethoxazole; TCG=Tigecyclin; TET=Tetracycline; TMP=Trimethoprim

Table A6.8 Distribution of MICs and resistance (%) among haemolytic *Escherichia coli* from pigs (n=262), Denmark

SEGES/DTU-Vet 2019

Antimicrobial agent	% Resistant	95% Confidence	Distribution (%) of MICs																	
			0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048
Tetracycline	68.7	[63-74]								30.5	0.4	0.4	1.1	5.3	62.2					
Chloramphenicol	18.3	[14-23]								3.1	50.8	24.8	3.1	6.5	5.3	6.5				
Florfenicol	9.9	[6-14]								17.2	58.0	14.5	0.4	0.4		9.5				
Ampicillin	62.2	[56-68]							5.7	24.0	7.6		0.4	1.1	61.1					
Amoxicillin/clavulanic acid	3.8	[1-6]								26.7	15.3	43.9	10.3	2.3	1.5					
Ceftiofur	0.4	[0-1.4]						97.3	1.5	0.8			0.4							
Cefotaxime (FOT)	0.4	[0.6-5]				95.8	1.5	0.8	0.4	1.1		0.4								
Trimethoprim	55.7	[50-62]							43.1	0.4	0.8				55.7					
Sulfonamide (SMX)	75.2	[70-80]													24.4	0.4				75.2
Streptomycin	77.5	[72-83]										19.8	2.7	5.3	8.8	15.6	47.7			
Gentamicin	9.2	[6-13]						59.2	26.0	1.1		4.6	3.8	5.3						
Neomycin	19.8	[15-25]								73.7	5.0	1.5	0.4	0.4	19.1					
Apramycin	12.2	[8-16]									76.0	11.8	0.8		11.5					
Ciprofloxacin	0.8	[0-0.7]	77.1	13.4	1.5	3.8	3.4	0.4			0.4									
Nalidixic acid	6.1	[3-9]									92.4	1.1	0.4		1.5	4.6				
Colistin	0	[0-0.7]							94.3	5.7										
Spectinomycin	50.8	[45-57]											31.3	11.8	6.1	6.5	10.7	33.6		

Note: Isolates from the routine diagnostic laboratory investigation of isolates from dead and diseased pigs submitted to SEGES Pig Research Centre's Laboratory for Pig Diseases in Kjellerup. Occurrences of resistant isolates are presented according to the clinical breakpoints that are currently in use at both DTU National Veterinary Institute and Laboratory for Pig Diseases. The MIC value given is the concetration of amoxacillin. The concentration of clavulanic acid is half the concentration of amoxacillin

Vertical solid lines indicate microbiological breakpoint values for antimicrobial resistance (preferably CLSI); vertical stippled lines indicate breakpoints for intermediate sensitivity

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A6.9 Distribution of MICs and resistance (%) among *Actinobacillus pleuropneumoniae* from pigs (n=116), Denmark

SEGES/DTU-Vet 2019

Antimicrobial agent	% Resistant	95% Confidence interval	Distribution (%) of MICs														
			0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256
Tetracycline	0	[0-1.6]					1	36	63								
Florfenicol	0	[0-1.6]					94	5	1								
Penicillin	0.9	[0-3.1]	1	1	9	17	33	38	1				1				
Ampicillin	0.9	[0-3.1]						99				1					
Ceftiofur (XNL)	0	[0-1.6]		96	3			1									
Sulfa-TMP (SXT)	0	[0-1.6]		54	41	3	1	1									
Erythromycin	100	[100-100]							3	31	66						
Tulathromycin	0	[0-1.6]								3	32	65					
Tilmicosin	0	[0-1.6]									28	72					
Ciprofloxacin	0	[0-1.6]				99			1								
Spectinomycin	0	[0-1.6]											11	89			
Tiamulin	0	[0-1.6]									5	75	20				

Note: Isolates from the routine diagnostic laboratory investigation of isolates from dead and diseased pigs submitted to SEGES Pig Research Centre's Laboratory for Pig Diseases in Kjellerup. Occurrences of resistant isolates are presented according to the clinical breakpoints that are currently in use at both DTU National Veterinary Institute and Laboratory for Pig Diseases. The MIC value given is the concetration of trimethoprim. The concentration of sulfonamide is 19 times the concentration of trimethoprim

Vertical solid lines indicate microbiological breakpoint values for antimicrobial resistance (preferably CLSI); vertical stippled lines indicate breakpoints for intermediate sensitivity

Confidence intervals are calculated as 95% binomial proportions presenting Wilson intervals

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A6.10 Distribution of MICs and resistance (%) among *Streptococcus suis* (n=147) from pigs, Denmark

SEGES/DTU-Vet 2019

Antimicrobial agent	% Resistant	95% Confidence interval	Distribution (%) of MICs															
			0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	
Tetracycline	68.7	[61.3-76.1]				14	17	20	10	1	1	9	29					
Chloramphenicol	0.7	[0-2.5]						9	83	7	1							
Florfenicol	0.7	[0-2.5]					20	75	5			1						
Penicillin	3	[0-5.6]	91	2	1	3	3											
Cefoxithin (FOX)	13.6	[8.1-19.2]				20	33	25	9	6	3	1	3					
Trimethoprim	8.2	[3.7-12.7]				80	1	3	5	3	1	3	3					
Sulfonamide (SMX)	85.7	[80.1-91.4]										14						85.71
Sulfa-TMP (SXT)	3.4	[0.3-6.5]			82	4	7	3	1	1	1	1						
Erythromycin	61.2	[53.4-69]			39		1	1	1	1	1	57						
Streptomycin	36.7	[29-44.4]							10	29	24	14	3	20				
Ciprofloxacin	0	[0-1.3]		4	16	48	29	3										
Spectinomycin	27.2	[20.1-34.3]									55	18			1	26		
Tiamulin	15.6	[9.8-21.5]			6	15	18	26	10	3	7	7	8					

Note: Isolates from the routine diagnostic laboratory investigation of isolates from dead and diseased pigs submitted to SEGES Pig Research Centre's Laboratory for Pig Diseases in Kjellerup. Occurrences of resistant isolates are presented according to the clinical breakpoints that are currently in use at both DTU National Veterinary Institute and Laboratory for Pig Diseases. The MIC value given is the concetration of trimethoprim. The concentration of sulfonamide is 19 times the concentration of trimethoprim

Vertical solid lines indicate microbiological breakpoint values for antimicrobial resistance (preferably CLSI); vertical stippled lines indicate breakpoints for intermediate sensitivity

Confidence intervals are calculated as 95% binomial proportions presenting Wilson intervals

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A7.1 Distributions of MICs and resistance (%) in *Escherichia coli* from broilers (n=159), cattle (n=175) and pigs (n=190), Denmark

DANMAP 2019

Antimicrobial agent	Source	% Resistant	95% Confidence interval	Distribution (%) of MICs																	
				0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	>1024
Ampicillin	Broilers	15.1	[10.4-21.5]							3.1	38.4	40.9	2.5				15.1				
	Cattle	6.4	[3.6-11.1]							3.5	28.5	57.6	4.1				6.4				
	Pigs	35.3	[28.8-42.3]							3.7	27.4	30.0	3.7				35.3				
Azithromycin	Broilers	0	[0-2.4]								1.9	44.7	48.4	5.0							
	Cattle	0	[0-2.2]								8.1	62.8	28.5	0.6							
	Pigs	1.1	[0.3-3.8]								7.9	58.4	31.6	1.1			1.1				
Cefotaxime	Broilers	0.6	[0.1-3.5]					99					0.6								
	Cattle	0	[0-2.2]					100													
	Pigs	0	[0-2]					100													
Ceftazidime	Broilers	0.6	[0.1-3.5]						99	0.6											
	Cattle	0	[0-2.2]						100												
	Pigs	0	[0-2]						100												
Chloramphenicol	Broilers	0.6	[0.1-3.5]										96.9	2.5	0.6						
	Cattle	5.8	[3.2-10.4]										93.6	0.6		1.2	4.1	0.6			
	Pigs	5.8	[3.3-10.1]										91.1	3.2	1.6	1.6	1.1	1.6			
Ciprofloxacin	Broilers	15.7	[10.9-22.2]	69.2	15.1		0.6	11.9	1.3		1.3	0.6									
	Cattle	0	[0-2.2]	83.7	16.3																
	Pigs	2.6	[1.1-6]	84.2	13.2			1.6				0.5	0.5								
Colistin	Broilers	0	[0-2.4]							98.7	1.3										
	Cattle	0	[0-2.2]							97	3.5										
	Pigs	0	[0-2]							98	2.1										
Gentamicin	Broilers	3.1	[1.4-7.1]						50.3	40.3	6.3			2.5	0.6						
	Cattle	0.6	[0.1-3.2]						61.0	34.9	3.5	0.6									
	Pigs	1.6	[0.5-4.5]						59.5	34.2	4.7		1.1			0.5					
Meropenem	Broilers	0	[0-2.4]		100																
	Cattle	0	[0-2.2]		100																
	Pigs	0	[0-2]		100																
Nalidixic acid	Broilers	15.1	[10.4-21.5]									84.9				2.5	8.2	4.4			
	Cattle	0	[0-2.2]									99	1.2								
	Pigs	1.1	[0.3-3.8]									96.8	2.1				0.5	0.5			
Sulfonamide	Broilers	15.7	[10.9-22.2]										73.0	10.7	0.6						15.7
	Cattle	9.3	[5.8-14.6]										75.6	14.0	1.2						9.3
	Pigs	44.2	[37.3-51.3]										44.7	10.5	0.5						44.2
Tetracycline	Broilers	10.7	[6.8-16.5]								81.1	8.2			0.6	7.5	2.5				
	Cattle	11.6	[7.7-17.3]								82.6	5.8		0.6	0.6	4.7	5.8				
	Pigs	34.7	[28.3-41.7]								59.5	5.3	0.5		4.7	15.8	14.2				
Tigecycline	Broilers	0	[0-2.4]					99.4		0.6											
	Cattle	0	[0-2.2]					99	0.6												
	Pigs	0	[0-2]					96.3	3.7												
Trimethoprim	Broilers	9.4	[5.8-15]					70.4	19.5	0.6						9.4					
	Cattle	1.2	[0.3-4.1]					85.5	13.4							1.2					
	Pigs	28.9	[23-35.8]					63.7	7.4							28.9					

Vertical solid lines indicate EUCAST epidemiological cut-off values. For *Salmonella* , EUCAST ECOFF are not available for all compounds and complementary cutoff's er set for Azithromycin (MIC > 16 mg/l) and sulfonamide (MIC>246 mg/l)

Confidence intervals are calculated as 95% binomial proportions presenting Wilson intervals

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A7.2 Distribution (n, %) of AMR profiles in indicator *Escherichia coli* from broilers (n=159), cattle (n=172) and pigs (n=190), Denmark

DANMAP 2019

2018 AMR profiles	Broilers	Cattle	Pigs
FS	101 (64%)	150 (87%)	80 (42%)
AMP	2 (1%)		1 (1%)
AMP AZM CHL SMX TET			1 (1%)
AMP AZM SMX			1 (1%)
AMP CAC CTX FEP SMX TET	1 (1%)		
AMP CHL CIP SMX TET			1 (1%)
AMP CHL SMX			1 (1%)
AMP CHL SMX TET		8 (5%)	
AMP CHL SMX TET TMP	1 (1%)		2 (1%)
AMP CHL SMX TMP			1 (1%)
AMP CIP NAL	2 (1%)		
AMP CIP NAL SMX TET	1 (1%)		
AMP CIP NAL SMX TET TMP			2 (1%)
AMP CIP NAL TMP	1 (1%)		
AMP CIP TMP			1 (1%)
AMP GEN SMX TET TMP			1 (1%)
AMP SMX	2 (1%)		7 (4%)
AMP SMX TET		1 (1%)	7 (4%)
AMP SMX TET TMP	3 (2%)	1 (1%)	16 (8%)
AMP SMX TMP	9 (6%)		16 (8%)
AMP TET	2 (1%)	1 (1%)	6 (3%)
AMP TET TMP			1 (1%)
AMP TMP			2 (1%)
CHL		1 (1%)	
CHL SMX			1 (1%)
CHL SMX TET		1 (1%)	3 (2%)
CHL SMX TET TMP			1 (1%)
CIP	1 (1%)		
CIP GEN			1 (1%)
CIP GEN NAL	4 (3%)		
CIP NAL	15 (9%)		
CIP NAL SMX TET	1 (1%)		
GEN SMX	1 (1%)		
Total number of isolates	159	172	190

Note:FS=Fully suscpetable; AMP=Ampicillin; AZI=Azithromycin; CHL=Chloramphenicol; CIP=Ciprofloxacin; GEN=Gentamicin; NAL=Nalidixan; SMX=Sulphamethoxazole; TET=Tetracycline; TMP=Trimethoprim

Table A7.3 Distribution of MICs and resistance (%) in ESBL/AmpC-producing Escherichia coli from cattle (n=25) and pigs (n=9) recovered by selective enrichment, Denmark

DANMAP 2019

Antimicrobial agent	Source	% Resistant	95% Confidence interval	Distribution (%) of MICs																
				0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	>1024
Ampicillin	Cattle	100	[100-100]													100.0					
	Pigs	100	[100-100]													100.0					
Azithromycin	Cattle	8	[0-19]									32.0	56.0	4.0	4.0	4.0					
	Pigs	4	[0-9]									57.3	37.1	1.1	1.1	3.4					
Cefepime	Cattle	60.0	[42-78]			8.0	32.0	4.0	4.0	4.0	8.0	8.0	12.0	12.0	8.0						
	Pigs	36.0	[26-46]			5.6	58.4	6.7	2.2			2.2	13.5	6.7	4.5						
Cefotaxime	Pigs	100	[100-100]						1.1	5.6	49.4	43.8									
	Pigs	100	[100-100]						1.1	12.4	30.3	28.1		2.2		25.8					
Cefoxitin	Cattle	52.0	[34-70]								8.0	40.0		32.0	16.0	4.0					
	Pigs	73.0	[64-82]								3.4	14.6	9.0	22.5	31.5	19.1					
Ceftazidime	Pigs	100	[100-100]							16.9	11.2	32.6	39.3								
	Pigs	100.0	[100-100]							14.6	12.4	30.3	32.6	7.9	2.2						
Chloramphenicol	Cattle	20.0	[5-35]										80.0				20.0				
	Pigs	9.0	[3-15]										91.0				9.0				
Ciprofloxacin	Cattle	16.0	[2-30]	72.0	12.0			8.0	4.0				4.0								
	Pigs	2.2	[0-6]	65.2	31.5	1.1		1.1	1.1												
Colistin	Cattle	0	[0-7]							100											
	Pigs	0.0	[0-2]							100.0											
Ertapenem	Cattle	0.0	[0-7]	84.0	16.0																
	Pigs	0.0	[0-2]	62.9	34.8	2.2															
Gentamicin	Cattle	4	[0-13]						32.0	48.0	16.0				4.0						
	Pigs	10.1	[4-16]						59.6	25.8	4.5	1.1		1.1	7.9						
Imipenem	Cattle	0	[0-7]				16.0	84.0													
	Pigs	0	[0-2]				16.9	79.8	3.4												
Meropenem	Pigs	0	[0-2]		100.0																
	Pigs	0	[0-2]		97.8	2.2															
Sulfonamide	Cattle	56.0	[38-74]										36.0	4.0	4.0					56.0	
	Pigs	53.9	[44-64]										28.1	14.6	2.2	1.1				53.9	
Tetracycline	Cattle	36.0	[18-54]								64.0					36.0					
	Pigs	50.6	[40-61]								47.2	2.2			4.5	46.1					
Tigecycline	Cattle	0	[0-7]					100.0													
	Pigs	0	[0-2]					96.6	3.4												
Trimethoprim	Cattle	36.0	[18-54]					44.0	20.0						36.0						
	Pigs	42.7	[33-53]					42.7	12.4	2.2					42.7						

Vertical solid lines indicate EUCAST epidemiological cut-off values. For *E. coli* , EUCAST ECOFF are not available for all compounds and complementary cutoff's are set for Azithromycin (MIC > 16) and Sulfamethoxazole (MIC > 64). EUCAST clinical breakpoints are indicated as vertical dotted lines if different from the corresponding epidemiological cut-off values

Confidence intervals are calculated as 95% binomial proportions presenting Wilson intervals

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A7.4 Distribution of MICs and resistance (%) in ESBL/AmpC-producing *Escherichia coli* from broiler meat (Danish n=14; Import n=15), beef (Danish n=3; Import n=9) and pork (Danish n=9; Import n=15) recovered by selective enrichment, Denmark

DANMAP 2019

Antimicrobial agent	Panel	Origin	% Resistant	95% Confidence interval	Distribution (%) of MICs																
					0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	>1024
Ampicillin	Broiler meat	Danish	100	[100-100]													100					
	Broiler meat	Import	100	[100-100]													100					
	Beef	Danish	100	[100-100]													100					
	Beef	Import	100	[100-100]													100					
	Pork	Danish	100	[100-100]													100					
	Pork	Import	100	[100-100]													100					
Azithromycin	Broiler meat	Danish	0	[0-41]									42.9	57.1								
	Broiler meat	Import	0	[0-42]								13.3	73.3	13.3								
	Beef	Danish	0	[0-49]									100									
	Beef	Import	0	[0-47]								11.1	22.2	66.7								
	Pork	Danish	0	[0-47]									66.7	33.3								
	Pork	Import	0	[0-46]									53.3	46.7								
Cefepime	Broiler meat	Danish	64.3	[16-100]			14.3	21.4	7.1					35.7	21.4							
	Broiler meat	Import	53.3	[5-100]			6.7	40.0	13.3	6.7	6.7		6.7	13.3	6.7							
	Beef	Danish	0.0	[0-49]				100														
	Beef	Import	88.9	[40-100]				11.1					22.2	11.1		55.6						
	Pork	Danish	33.3	[0-83]			11.1	55.6	11.1	11.1						11.1						
	Pork	Import	86.7	[38-100]				13.3	20.0	6.7			13.3	40.0		6.7						
Cefotaxime	Broiler meat	Danish	100	[100-100]							14.3	21.4		7.1			57.1					
	Broiler meat	Import	100	[100-100]								26.7	26.7	6.7	13.3	6.7	20.0					
	Beef	Danish	100	[100-100]							33.3	66.7										
	Beef	Import	100	[100-100]									11.1				88.9					
	Pork	Danish	100	[100-100]								22.2	55.6	11.1			11.1					
	Pork	Import	100	[100-100]								13.3	20.0	6.7		6.7	53.3					
Cefoxitin	Broiler meat	Danish	42.9	[0-93]								14.3	21.4	21.4	7.1	28.6	7.1					
	Broiler meat	Import	66.7	[17-100]								6.7	13.3	13.3	6.7	20.0	40.0					
	Beef	Danish	100.0	[100-100]											66.7	33.3						
	Beef	Import	11.1	[0-61]								11.1	55.6	22.2		11.1						
	Pork	Danish	88.9	[39-100]										11.1		55.6	33.3					
	Pork	Import	40.0	[0-90]								20.0	33.3	6.7		20.0	20.0					
Ceftazidime	Broiler meat	Danish	100	[100-100]							42.9	35.7	7.1	7.1	7.1							
	Broiler meat	Import	93	[44-100]						6.7			13.3	53.3	13.3	13.3						
	Beef	Danish	100	[100-100]								33.3	66.7									
	Beef	Import	100	[100-100]							11.1	44.4	11.1	33.3								
	Pork	Danish	100	[100-100]									33.3	33.3	33.3							
	Pork	Import	100.0	[100-100]							40.0	13.3	13.3	13.3	13.3	6.7						

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Table A7.4 Distribution of MICs and resistance (%) in ESBL/AmpC-producing *Escherichia coli* from broiler meat (Danish n=14; Import n=15), beef (Danish n=3; Import n=9) and pork (Danish n=9; Import n=15) recovered by selective enrichment, Denmark - continued

DANMAP 2019

Antimicrobial agent	Panel	Origin	% Resistant	95% Confidence interval	Distribution (%) of MICs																
					0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	>1024
Chloramphenicol	Broiler meat	Danish	0.0	[0-50]										92.9	7.1							
	Broiler meat	Import	0.0	[0-50]										100								
	Beef	Danish	0.0	[0-50]										100								
	Beef	Import	33.3	[0-83]										66.7				33.3				
	Pork	Danish	0.0	[0-50]										100								
	Pork	Import	0.0	[0-50]										93.3	6.7							
Ciprofloxacin	Broiler meat	Danish	57.1	[7-100]	28.6	14.3		14.3	21.4				7.1	14.3								
	Broiler meat	Import	86.7	[37-100]	6.7		6.7	13.3	26.7	40.0				6.7								
	Beef	Danish	0.0	[0-50]	66.7	33.3																
	Beef	Import	55.6	[6-100]	44.4					22.2				33.3								
	Pork	Danish	11.1	[0-61]	88.9					11.1												
	Pork	Import	0.0	[0-50]	66.7	26.7	6.7															
Colistin	Broiler meat	Danish	0	[0-50]							93	7.1										
	Broiler meat	Import	0	[0-50]							100											
	Beef	Danish	0	[0-50]							100											
	Beef	Import	0	[0-50]							100											
	Pork	Danish	0	[0-50]							100											
	Pork	Import	0.0	[0-50]							100											
Ertapenem	Broiler meat	Danish	0.0	[0-50]	64.3	35.7																
	Broiler meat	Import	0.0	[0-50]	80.0	6.7	13.3															
	Beef	Danish	0.0	[0-50]	66.7	33.3																
	Beef	Import	0.0	[0-50]	88.9	11.1																
	Pork	Danish	0.0	[0-50]	44.4	44.4	11.1															
	Pork	Import	0.0	[0-50]	66.7	26.7	6.7															
Gentamicin	Broiler meat	Danish	0	[0-50]						57.1	28.6	14.3										
	Broiler meat	Import	7	[0-56]						53.3	40.0				6.7							
	Beef	Danish	0	[0-50]						66.7	33.3											
	Beef	Import	11	[0-61]						33.3	44.4	11.1				11.1						
	Pork	Danish	11	[0-61]						66.7	22.2			11.1								
	Pork	Import	6.7	[0-56]						60.0	26.7	6.7				6.7						
Imipenem	Broiler meat	Danish	0	[0-50]				14.3	78.6	7.1												
	Broiler meat	Import	0	[0-50]				6.7	86.7	6.7												
	Beef	Danish	0	[0-50]				33.3	66.7													
	Beef	Import	0	[0-50]				44.4	55.6													
	Pork	Danish	0	[0-50]					100													
	Pork	Import	0	[0-50]				13.3	86.7													

Continue next page

Table A7.4 Distribution of MICs and resistance (%) in ESBL/AmpC-producing *Escherichia coli* from broiler meat (Danish n=14; Import n=15), beef (Danish n=3; Import n=9) and pork (Danish n=9; Import n=15) recovered by selective enrichment, Denmark - continued

DANMAP 2019

Antimicrobial agent	Panel	Origin	% Resistant	95% Confidence interval	Distribution (%) of MICs																
					0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	>1024
Meropenem	Broiler meat	Danish	0	[0-50]		100																
	Broiler meat	Import	0	[0-50]		93.3	6.7															
	Beef	Danish	0	[0-50]		100																
	Beef	Import	0	[0-50]		100																
	Pork	Danish	0	[0-50]		100																
	Pork	Import	0	[0-50]		100																
Sulfonamide	Broiler meat	Danish	28.6	[0-78]										64.3		7.1					28.6	
	Broiler meat	Import	93.3	[44-100]										6.7							93.3	
	Beef	Danish	66.7	[17-100]											33.3						66.7	
	Beef	Import	33.3	[0-83]										44.4	22.2						33.3	
	Pork	Danish	44.4	[0-94]										33.3	11.1	11.1					44.4	
	Pork	Import	60.0	[10-100]										33.3		6.7					60.0	
Tetracycline	Broiler meat	Danish	21.4	[0-71]								64.3	14.3			14.3	7.1					
	Broiler meat	Import	86.7	[37-100]								6.7	6.7			6.7	80.0					
	Beef	Danish	33.3	[0-83]								66.7					33.3					
	Beef	Import	88.9	[39-100]										11.1		11.1	77.8					
	Pork	Danish	33.3	[0-83]								66.7				11.1	22.2					
	Pork	Import	33.3	[0-83]								60.0	6.7				33.3					
Tigecycline	Broiler meat	Danish	0	[0-50]					92.9	7.1												
	Broiler meat	Import	0	[0-50]					86.7	13.3												
	Beef	Danish	0	[0-50]					100													
	Beef	Import	0	[0-50]					88.9	11.1												
	Pork	Danish	0	[0-50]					100													
	Pork	Import	0	[0-50]					93.3	6.7												
Trimethoprim	Broiler meat	Danish	7.1	[0-57]					85.7		7.1					7.1						
	Broiler meat	Import	33.3	[0-83]					66.7							33.3						
	Beef	Danish	33.3	[0-83]					66.7							33.3						
	Beef	Import	55.6	[6-100]					33.3	11.1						55.6						
	Pork	Danish	44.4	[0-94]					55.6							44.4						
	Pork	Import	46.7	[0-96]					40.0	13.3						46.7						

Vertical solid lines indicate EUCAST epidemiological cut-off values. For *E. coli*, EUCAST ECOFF are not available for all compounds and complementary cutoff's are set for Azithromycin (MIC > 16) and Sulfamethoxazole (MIC > 64). EUCAST clinical breakpoints are indicated as vertical dotted lines if different from the corresponding epidemiological cut-off values

Confidence intervals are calculated as 95% binomial proportions presenting Wilson intervals

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A7.5 Distribution (n, %) of AMR profiles in *Escherichia coli* from animals and meat recovered by selective enrichment, Denmark

DANMAP 2019

2019 AMR profiles	Broiler meat		Cattle	Beef		Pigs	Pork	
	Danish	Import	Danish	Danish	Import	Danish	Danish	Import
AMP AZM CHL CIP CTX FEP NAL SMX TET			1 (4%)					
AMP AZM CHL CTX FEP SMX TET						1 (1%)		
AMP AZM CHL CTX FEP SMX TET TMP						1 (1%)		
AMP AZM CTX FEP GEN TET						1 (1%)		
AMP AZM CTX FEP SMX TMP			1 (4%)			1 (1%)		
AMP CEC CHL CTX FEP FOX SMX T/C TET TMP			1 (4%)					
AMP CEC CHL CTX FOX GEN SMX T/C TMP						1 (1%)		
AMP CEC CHL CTX FOX SMX T/C TET						2 (2%)		
AMP CEC CHL CTX FOX SMX T/C TET TMP						2 (2%)		
AMP CEC CIP CTX FEP FOX NAL SMX T/C TET		1 (7%)						
AMP CEC CIP CTX FEP FOX NAL SMX T/C TET		1 (7%)						
AMP CEC CIP CTX FOX NAL SMX T/C TET		6 (40%)						
AMP CEC CIP CTX FOX NAL T/C	3 (21%)	1 (7%)						
AMP CEC CIP CTX FOX NAL T/C TET	1 (7%)							
AMP CEC CTX FEP FOX GEN SMX T/C TET		1 (7%)						
AMP CEC CTX FEP FOX GEN SMX T/C TET TMP						1 (1%)		
AMP CEC CTX FEP FOX SMX T/C TET						1 (1%)		
AMP CEC CTX FEP FOX SMX T/C TET TMP								2 (13%)
AMP CEC CTX FEP FOX SMX T/C TMP						1 (1%)	1 (11%)	
AMP CEC CTX FEP FOX T/C	1 (7%)		1 (4%)			1 (1%)	1 (11%)	2 (13%)
AMP CEC CTX FEP FOX T/C TET						1 (1%)		
AMP CEC CTX FEP FOX T/C TMP						3 (3%)		
AMP CEC CTX FOX GEN SMX T/C						1 (1%)		
AMP CEC CTX FOX GEN SMX T/C TET TMP						2 (2%)		
AMP CEC CTX FOX GEN T/C TET							1 (11%)	
AMP CEC CTX FOX SMX T/C						2 (2%)		
AMP CEC CTX FOX SMX T/C TET			3 (12%)	1 (33%)		5 (6%)		
AMP CEC CTX FOX SMX T/C TET TMP			1 (4%)			12 (13%)	1 (11%)	
AMP CEC CTX FOX SMX T/C TMP				1 (33%)		1 (1%)	1 (11%)	
AMP CEC CTX FOX SMX TET						1 (1%)		
AMP CEC CTX FOX T/C	1 (7%)		6 (24%)	1 (33%)		21 (24%)	3 (33%)	1 (7%)
AMP CEC CTX FOX T/C TET					1 (11%)	4 (4%)		
AMP CEC CTX FOX T/C TMP						3 (3%)		1 (7%)
AMP CHL CIP CTX FEP GEN NAL SMX TET					1 (11%)			
AMP CHL CIP CTX FEP GEN SMX TET						1 (1%)		
AMP CHL CIP CTX FEP NAL TET TMP					1 (11%)			
AMP CHL CIP CTX FEP SMX TET TMP			1 (4%)					
AMP CHL CIP CTX FEP TET TMP					1 (11%)			
AMP CHL CTX FEP			1 (4%)					
AMP CHL CTX FEP GEN SMX TMP			1 (4%)					
AMP CIP CTX FEP			1 (4%)					
AMP CIP CTX FEP GEN TET						1 (1%)		
AMP CIP CTX FEP NAL	3 (21%)							
AMP CIP CTX FEP NAL SMX TET TMP		3 (20%)			2 (22%)			
AMP CIP CTX FEP NAL SMX TMP	1 (7%)	1 (7%)						
AMP CIP CTX FEP SMX TET TMP			1 (4%)				1 (11%)	
AMP CTX FEP	1 (7%)		2 (8%)		1 (11%)	3 (3%)		1 (7%)
AMP CTX FEP FOX SMX TET TMP			1 (4%)					
AMP CTX FEP GEN SMX TET						1 (1%)		
AMP CTX FEP GEN TET								1 (7%)
AMP CTX FEP NAL SMX TET		1 (7%)						
AMP CTX FEP SMX	1 (7%)		1 (4%)			2 (2%)		2 (13%)
AMP CTX FEP SMX TET	2 (14%)					1 (1%)		1 (7%)
AMP CTX FEP SMX TET TMP						6 (7%)		1 (7%)
AMP CTX FEP SMX TMP			2 (8%)			2 (2%)		3 (20%)
AMP CTX FEP TET					1 (11%)	1 (1%)		
AMP CTX FEP TET TMP					1 (11%)			
AMP CTX FEP TMP						2 (2%)		
Number of isolates	14	15	25	3	9	89	9	15

Note: AMP=Ampicillin; AZI=Azithromycin; CAC=Ceftazidime; CEC=Cefotaxime/clavulansyre; CHL=Chloramphenicol; CIP=Ciprofloxacin; CST=Colistin; CTX=Cefotaxime; ETP=Ertapenem; FEP=Cefepime; FOX=Cefoxitin; GEN=Gentamicin; NAL=Nalidixan; SMX=Sulphamethoxazole; T/C=Ceftazidime/clavulansyre; TET=Tetracycline; TMP=Trimethoprim

Table A7.6 Distibution (number of isolates) of MLST and ESBL/AmpC Enzymes combinations detected in the ESBL/AmpC producing *E. coli* isolates from animals and meat recoved by selective enrichment, Denmark

DANMAP 2019

		Broiler meat		Cattle	Beef		Pigs	Pork	
MLST types		Danish	Import	Danish	Danish	Danish	Danish	Danish	Import
ST-10	CTX-M-15		2	1					
ST-20	C-42T						1		
ST-23	CTX-M-1						2		
	C-42T						7	1	
ST-34	CTX-M-14			2					
ST-40	CTX-M-1	1							
ST-50	CTX-M-15			1					
ST-56	C-42T			4			1		
ST-58	CTX-M-1						3		2
	CTX-M-14								1
	CTX-M-55						1		
	C-42T						3		
	CTX-M-1, CTX-M-175						1		
ST-69	T-32A				1				
ST-75	CTX-M-1						1		
	C-42T			1	1		6		
ST-88	CMY-2						1		
	CTX-M-1						3	1	
	CTX-M-14						1		
	C-42T	1		1		1	16	1	2
	CTX-M-1, SHV-12								1
ST-101	CMY-2	1							
	CTX-M-1						1		1
	C-42T						5		
ST-117	CTX-M-1					1			
ST-120	C-42T			1					
ST-155	CTX-M-14			1					
ST-156	CTX-M-1						1		
	C-42T						2		2
ST-165	CTX-M-1								1
ST-189	CTX-M-65					1			
ST-278	C-42T				1				
ST-297	C-42T						1		
ST-300	CTX-M-2			1					
ST-345	C-42T						3		
ST-348	C-42T						1		
ST-410	CTX-M-1								1
ST-446	CTX-M-1					1			
	CTX-M-14			1					
	C-42T			1					
ST-942	C-42T						2		
ST-1080	CTX-M-1					1			
ST-1139	CTX-M-14			1					
ST-1158	SHV-12		1						
ST-1196	CTX-M-14	1							
ST-1266	CTX-M-1			1					
ST-1508	CTX-M-1			1					
ST-1611	C-42T			1					
ST-1640	CTX-M-1	2							
ST-2016	C-42T						2		
ST-2496	CTX-M-1						1		
ST-2539	C-42T						1		
ST-4121	CTX-M-14						1		
ST-4151	C-42T			1					
ST-4373	CTX-M-1						2		
ST-4580	C-42T						2	1	
ST-4663	C-42T	4							
ST-4710	C-42T		5						
ST-4981	CTX-M-15					2			
ST-6257	C-42T						1		
ST-6665	CTX-M-1	1							
ST-8863	CTX-M-1			1					
ST-10*	CTX-M-32		1						
ST-1795*	C-42T			1					
ST-23!	CTX-M-1						1		
ST-4580*	C-42T						1		
ST-50!	CTX-M-15			1					
ST-58!	CMY-2							1	
ST-6525*	T-32A						1		
ST-Unknown	CTX-M-1						1		
	CTX-M-14						1		
	C-42T			1			1	1	
Not available	Not available	3	6			1	2	2	2
Total		14	15	25	3	9	90	9	15

Note: Isolates recovered by the selective enrichment methods described in the EURL-AR laboratory protocol (February 2018). MLST type and ESBL/AmpC enzymes are determind by WGS

Table A7.7 Distribution of MICs and resistance (%) in *Enterococcus faecalis* (n=91) and *Enterococcus faecium* (n=100) from pigs, Denmark

DANMAP 2019

Antimicrobial agent	Bacteria	% Resistant	95% Confidence interval	0.03	0.06	0.13	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	>1024
Ampicillin	*E. faecalis*	0	[0-2]					1.1	91.2	7.7										
	E.faecium	12.0	[6-18]					6.0	31.0	12.0	39.0	8.0	1.0	1.0	2.0					
Chloramphenicol	*E. faecalis*	33.0	[23-42]								3.3	51.6	11.0	1.1	1.1	31.9				
	E.faecium	2.0	[0-5]								7.0	82.0	7.0	2.0	1.0	1.0				
Ciprofloxacin	*E. faecalis*	2.2	[0-6]				1.1	6.6	79.1	11.0			2.2							
	E.faecium	5.0	[0-10]				4.0	15.0	24.0	25.0	27.0	5.0								
Daptomycin	*E. faecalis*	3.3	[0-7]				1.1	2.2	19.8	60.4	13.2	3.3								
	E.faecium	0	[0-2]				1.0	7.0	10.0	26.0	53.0	3.0								
Erythromycin	*E. faecalis*	62.6	[53-72]						30.8	6.6						62.6				
	E.faecium	20.0	[12-28]						15.0	57.0	8.0					20.0				
Gentamicin	*E. faecalis*	11.0	[4-17]									56.0	30.8	2.2			2.2		8.8	
	E.faecium	1.0	[0-4]									89.0	8.0	2.0					1.0	
Linezolid	*E. faecalis*	0	[0-2]						18.7	75.8	5.5									
	E.faecium	0	[0-2]						4.0	51.0	45.0									
Quinopristin/Dalfopristin	*E. faecalis*	-	-								1.1	46.2	48.4	4.4						
	E.faecium	6.0	[1-11]					23.0	4.0	6.0	61.0	5.0	1.0							
Teicoplanin	*E. faecalis*	0	[0-2]					98	2.2											
	E.faecium	0	[0-2]					91	9.0											
Tetracycline	*E. faecalis*	91.2	[85-97]						8.8					6.6	31.9	52.7				
	E.faecium	54.0	[44-64]						46.0			1.0	2.0	1.0	31.0	19.0				
Tigecycline	*E. faecalis*	0	[0-2]	1.1	16.5	48.4	34.1													
	E.faecium	0	[0-2]	25.0	33.0	41.0	1.0													
Vancomycin	*E. faecalis*	0	[0-2]						78.0	19.8	2.2									
	E.faecium	0	[0-2]						89.0	11.0										

Vertical solid lines indicate EUCAST epidemiological cut-off values. EUCAST clinical breakpoints are indicated as vertical dotted lines if different from the corresponding epidemiological cut-off values. For daptomycin, an ECOFF >8 was applied for *E. faecium* (EUCAST, 30 December 2018). *E. faecalis* are assumed inherent resistant to streptogramins, and ECOFF only applies to *E. faecium*. For *E. faecium*, the EUCAST ECOFF (>1) was not applied for quinopristin/dalfopristin (tradename synercid) according to investigations presented in DANMAP 2006

Confidence intervals are calculated as 95% binomial proportions presenting Wilson intervals

White fields represent the range of dilutions tested. MIC values equal to or lower than the lowest concentration tested are presented as the lowest concentration. MIC values greater than the highest concentration in the range are presented as one dilution step above the range

Table A7.8 Distribution (n, %) of AMR profiles in *Enterococcus feacalis* (n=91) and *Enterococcus faecium* (n=100) from pigs, Denmark

DANMAP 2019

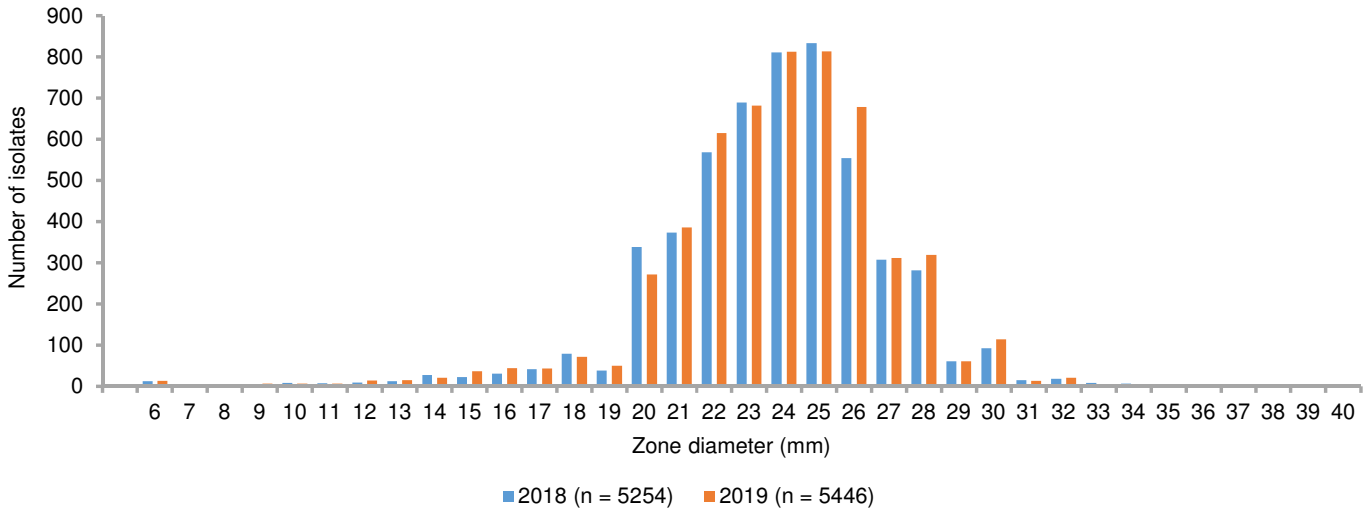
2019 AMR profiles	*E. faecalis*	*E. faecium*
FS	7 (8%)	40 (40%)
AMP		2 (2%)
AMP ERY GEN Q/D TET		1 (1%)
AMP ERY Q/D TET		1 (1%)
AMP ERY TET		3 (3%)
AMP TET		5 (5%)
CHL CIP ERY TET	2 (2%)	
CHL DAP ERY TET	2 (2%)	
CHL ERY GEN TET	3 (3%)	
CHL ERY Q/D TET		2 (2%)
CHL ERY TET	23 (25%)	
CIP		4 (4%)
CIP TET		1 (1%)
DAP TET	1 (1%)	
ERY	1 (1%)	
ERY GEN TET	7 (8%)	
ERY Q/D TET		2 (2%)
ERY TET	19 (21%)	11 (11%)
TET	26 (29%)	28 (28%)
Total number of isolates	91	100

Note:FS=fully suscpetable; AMP=ampicillin; AZI=azithromycin; CHL=chloramphenicol; CIP=ciprofloxacin; DAP=daptomycin: GEN=gentamicin; NAL=nalidixan; Q/D=quinopristin/dalfopristin; SMX=sulphamide; TET=tetracycline; TMP=trimethoprim

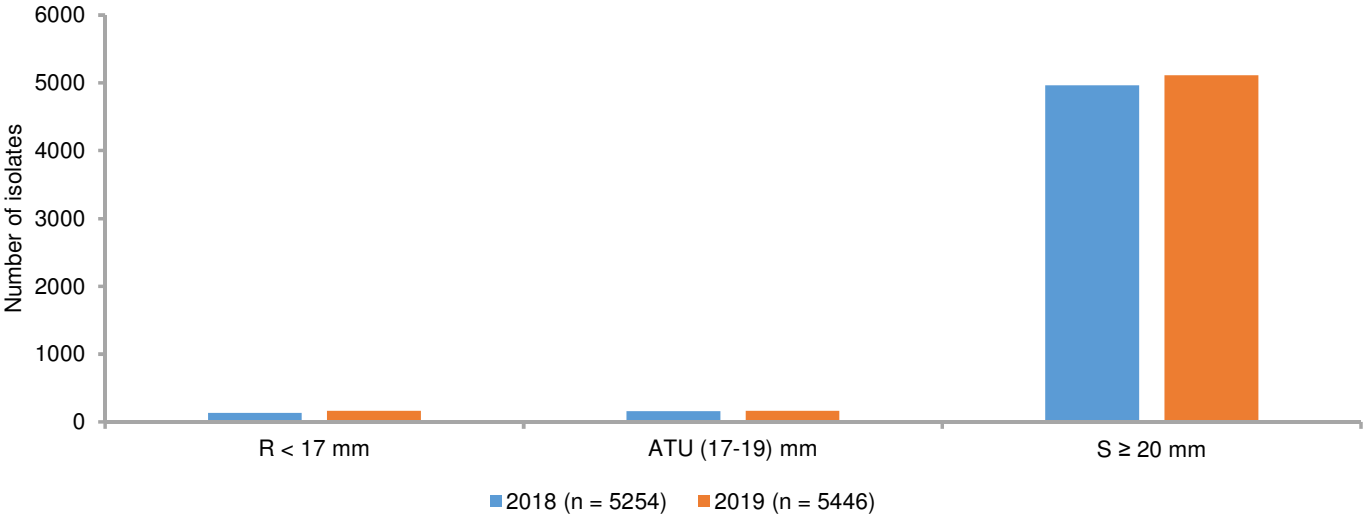
Figure A8.1 *Escherichia coli/piperacillin-tazobactam*. Zone diameter distributions in invasive isolates from humans, 2018 and 2019

DANMAP 2019

a) Distribution of isolates in relation to zone diameters



b) Distribution of isolates in relation to zone diameter breakpoints



c) Distribution of isolates in relation to zone diameter breakpoints

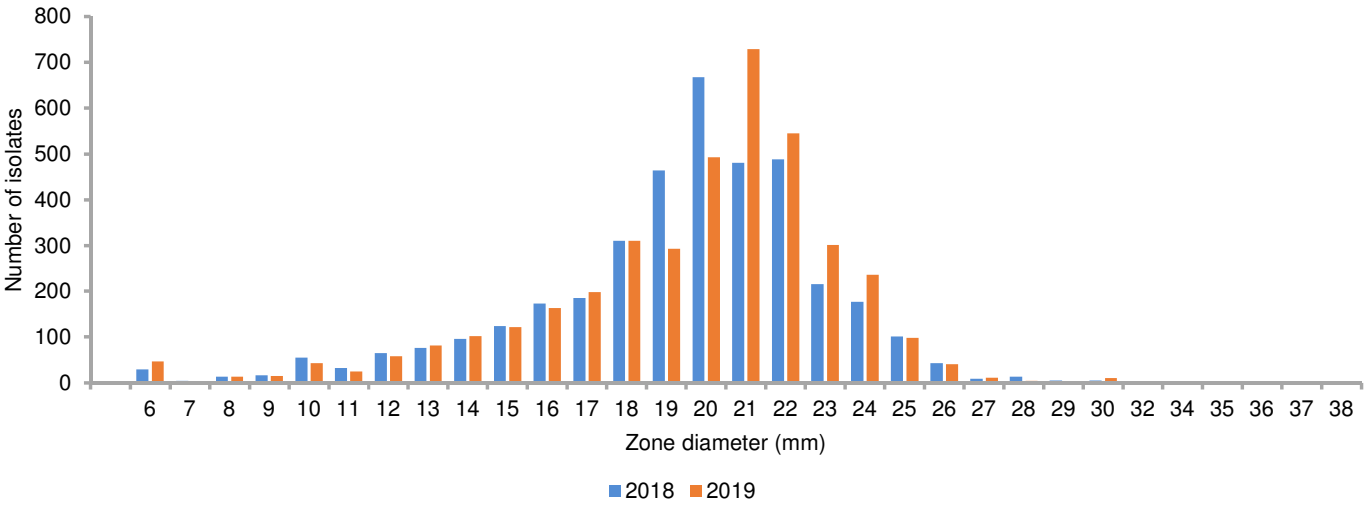
	R < 17 mm	ATU (17-19) mm	S ≥ 20 mm	Total	%R	%S	%ATU
2018	132	159	4963	5254	2.5%	94.5%	3.0%
2019	166	165	5115	5446	3.0%	93.9%	3.0%

R = resistant, ATU = area of technical uncertainty, S = susceptible. The number (n) in parentheses represents the total number of tested isolates in the given year

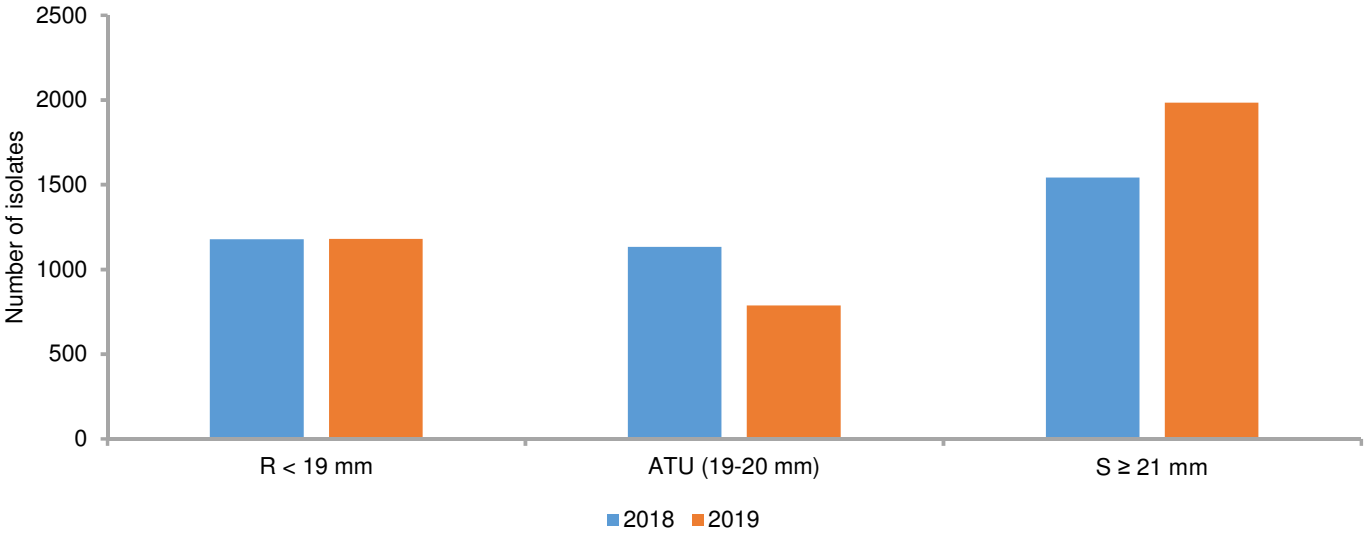
Figure A8.2 *Escherichia coli*amoxicillin-clavulanic acid. Zone diameter distributions in invasive isolates from humans, 2018 and 2019

DANMAP 2019

a) Distribution of isolates in relation to zone diameters



b) Distribution of isolates in relation to zone diameter breakpoints



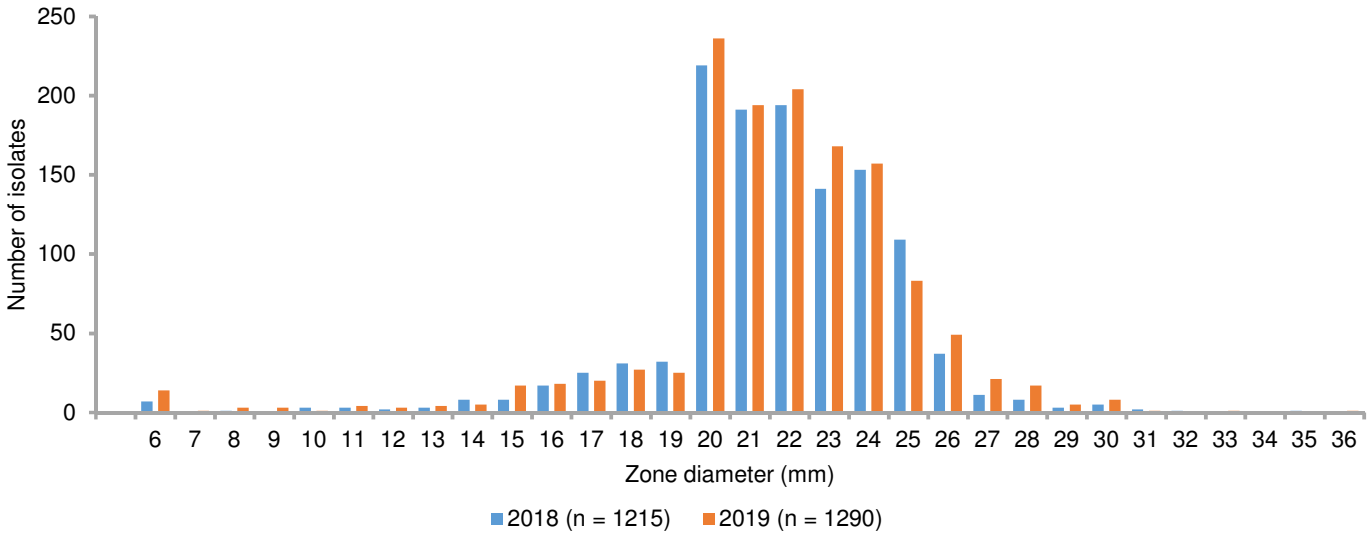
c) Distribution of isolates in relation to zone diameter breakpoints

	R < 19 mm	ATU (19-20) mm	S ≥ 21 mm	Total	%R	%S	%ATU
2018	1178	1132	1542	3852	30.6%	40.0%	29.4%
2019	1180	786	1984	3950	29.9%	50.2%	19.9%

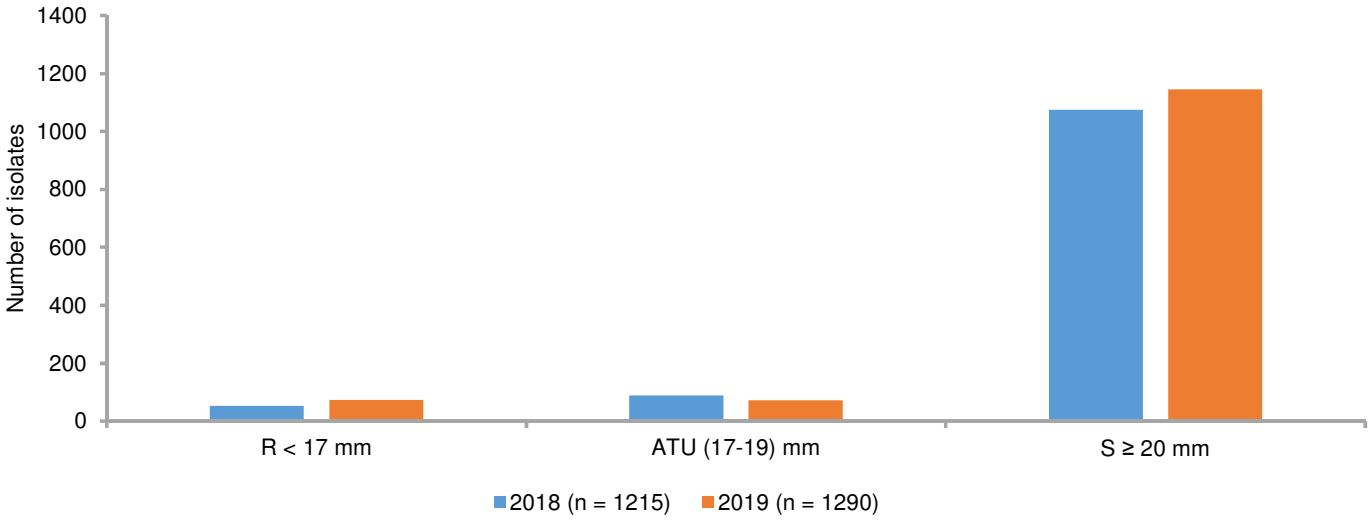
R = resistant, ATU = area of technical uncertainty, S = susceptible. The number (n) in parentheses represents the total number of tested isolates in the given year

Figure A8.3 *Klebsiella pneumoniae/piperacillin-tazobactam*. Zone diameter distributions in invasive isolates from humans, 2018 and 2019

a) Distribution of isolates in relation to zone diameters



b) Distribution of isolates in relation to zone diameter breakpoints



c) Distribution of isolates in relation to zone diameter breakpoints

	R < 17 mm	ATU (17-19) mm	S ≥ 20 mm	Total	%R	%S	%ATU
2018	52	88	1075	1215	4.3%	88.5%	7.2%
2019	73	72	1145	1290	5.7%	88.8%	5.6%

R = resistant, ATU = area of technical uncertainty, S = susceptible. The number (n) in parentheses represents the total number of tested isolates in the given year