

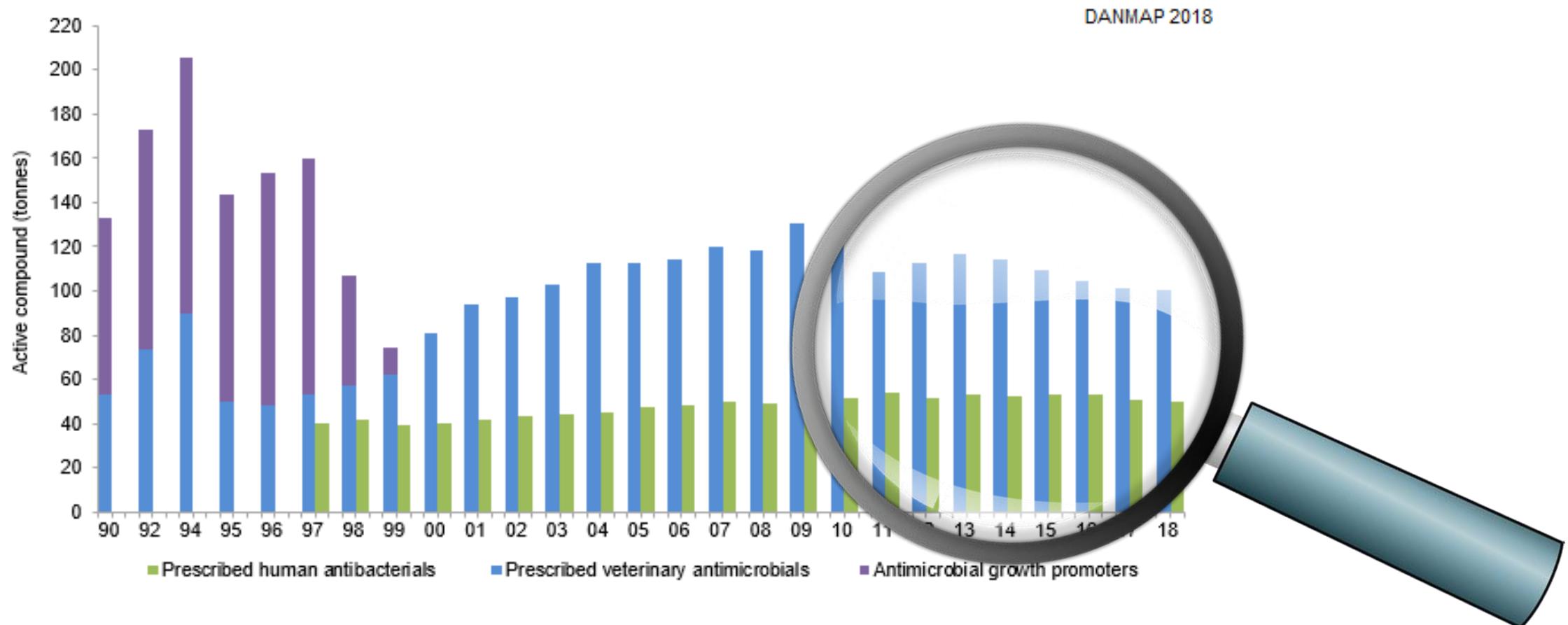


The image shows the front cover of the DANMAP 2018 report. It features the DTU logo at the top left and the Statens Serum Institut logo at the top right. The title "DANMAP 2018" is prominently displayed in large, bold, black letters. Below the title is a subtitle: "DANMAP 2018 - Use of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from food animals, food and humans in Denmark". A large blue silhouette map of Denmark is centered on the cover, with a small inset map showing the location of Denmark relative to surrounding countries. At the bottom, the text "Statens Serum Institut" and "National Food Institute, Technical University of Denmark" is printed.

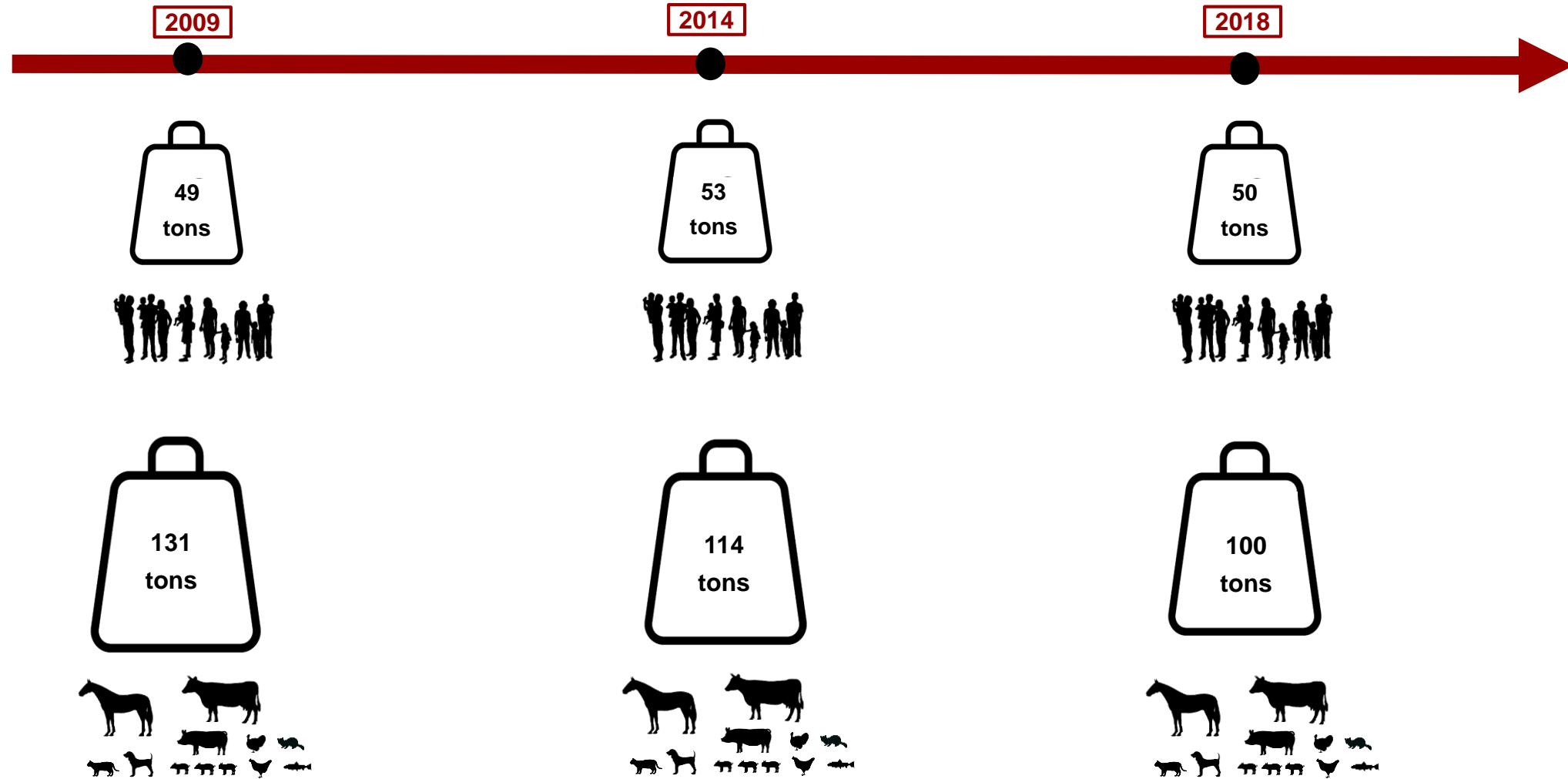
Highlights fra DANMAP 2018

Antibiotikaforbrug til dyr og mennesker – historisk overblik

Figure 4.1 Prescribed antimicrobial agents for humans and all animal species, tonnes active compound, Denmark

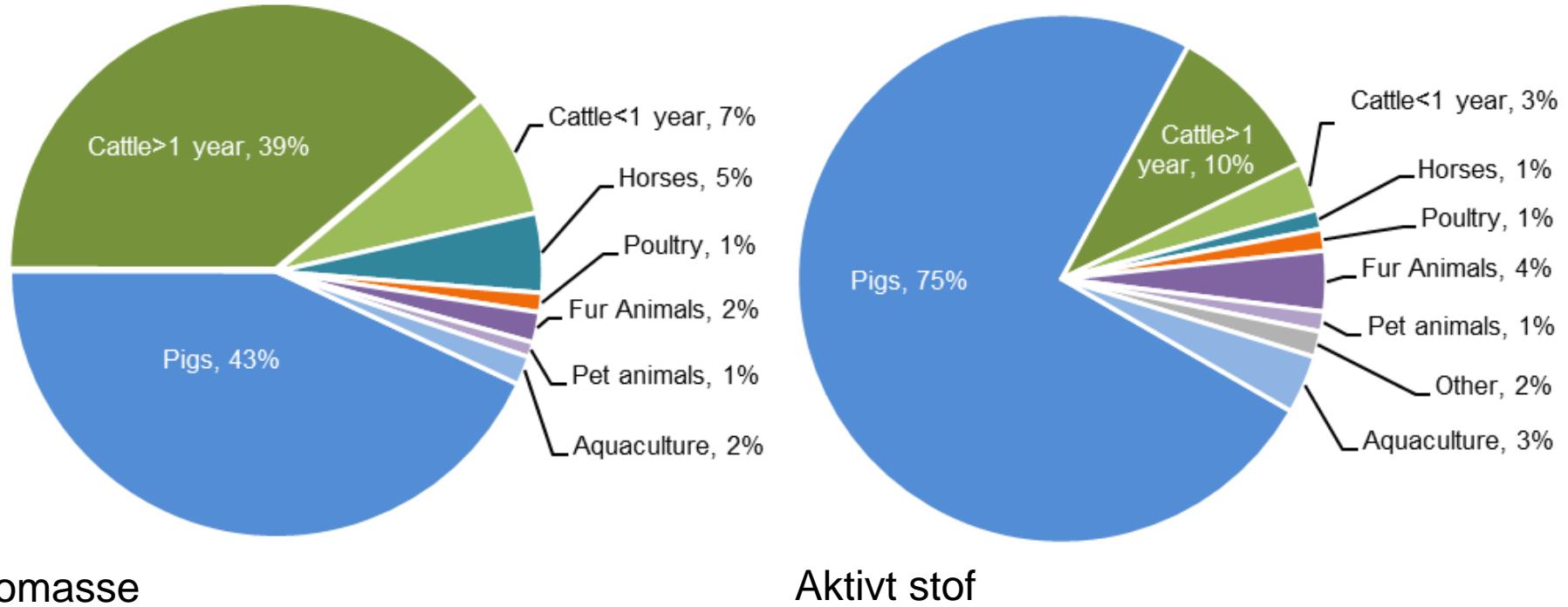


Udvikling i antibiotikaforbrug til dyr og mennesker (kg aktivt stof)



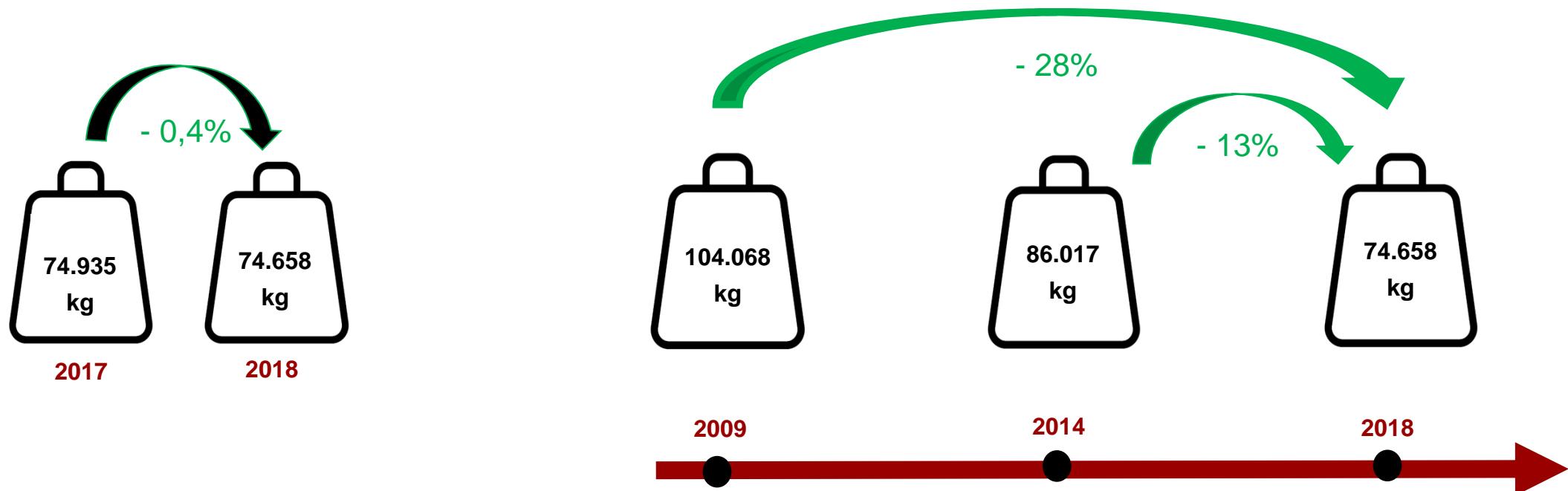
Relative fordelinger af biomasse og antibiotikaforbrug, dyr

DANMAP 2018

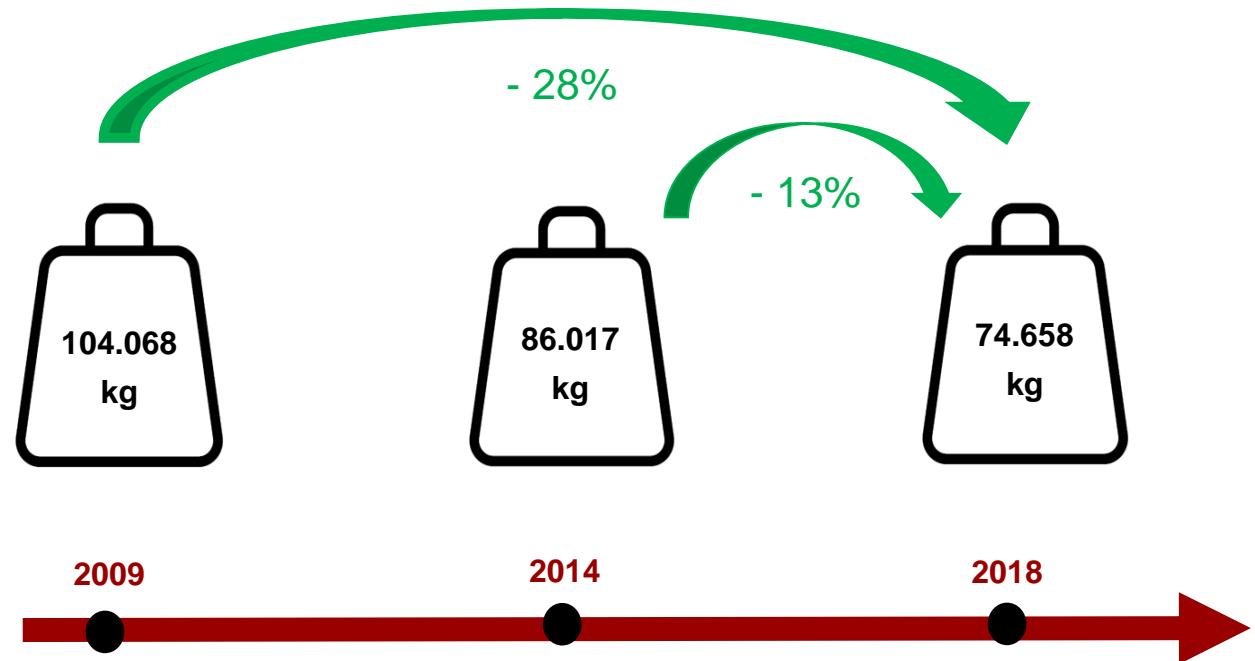


Note: The live biomass is estimated from census data (pigs, cattle and pet animals) and production data (poultry, fur animals, aquaculture). For poultry, the figures comprise only the biomass for the main production types (turkeys and broilers). The live biomass estimates for poultry, aquaculture, horses and pet animals are based on 2012 data and may well be underestimated.

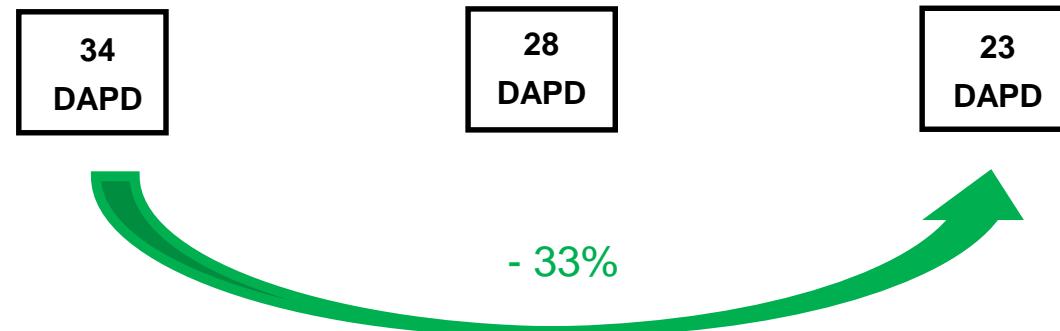
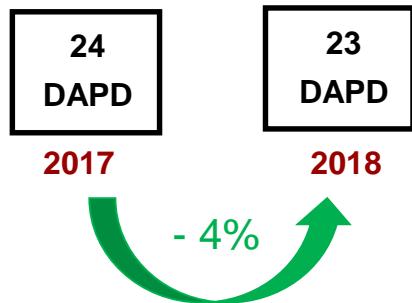
Antibiotika forbrug til svin (kg aktivt stof)



Antibiotika forbrug til svin (kg aktivt stof & behandlinger)

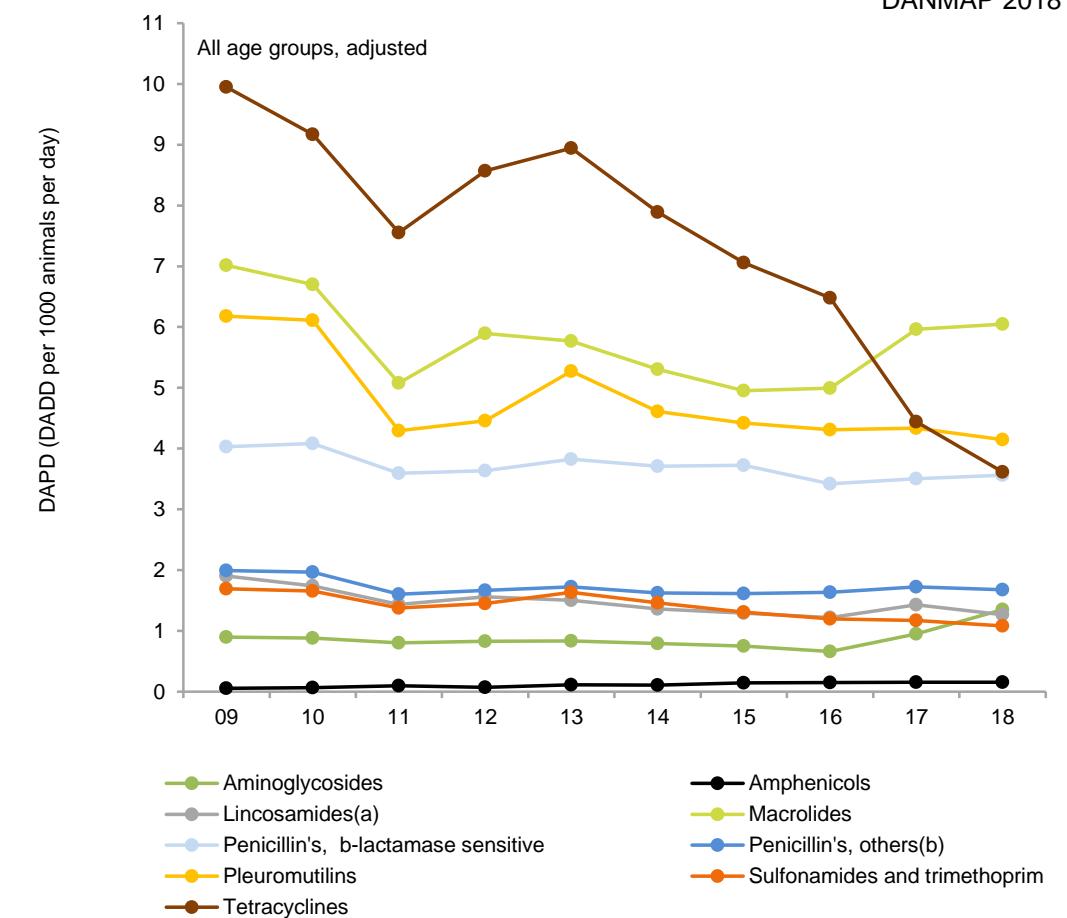
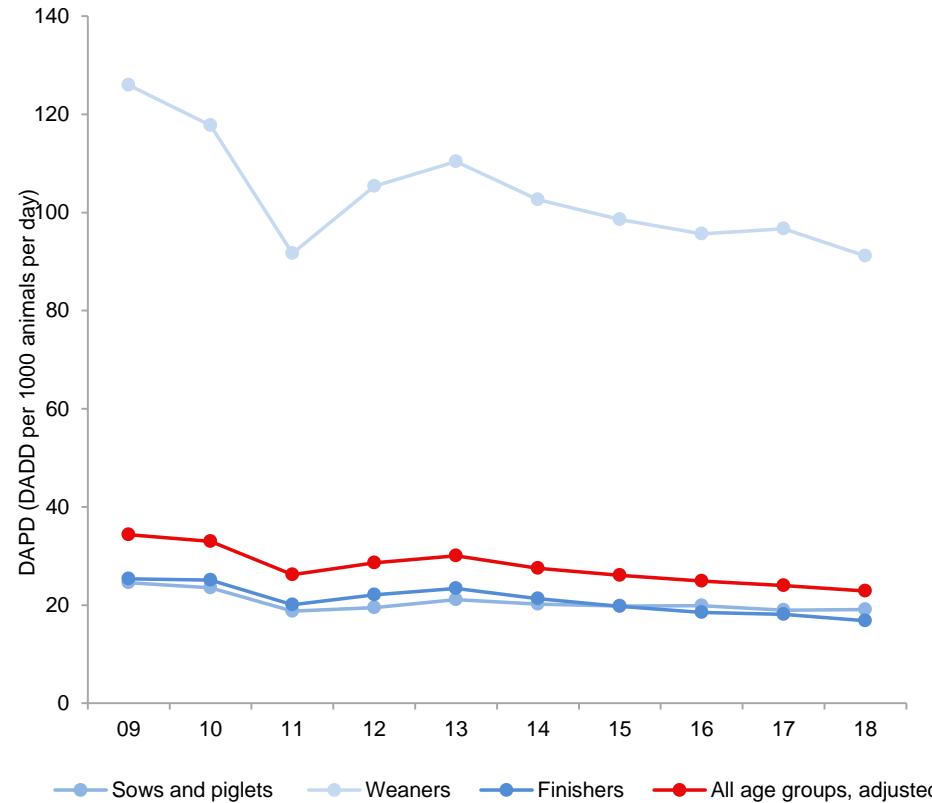


Eller målt i DAPD (DADD pr 1000 dyr pr dag)

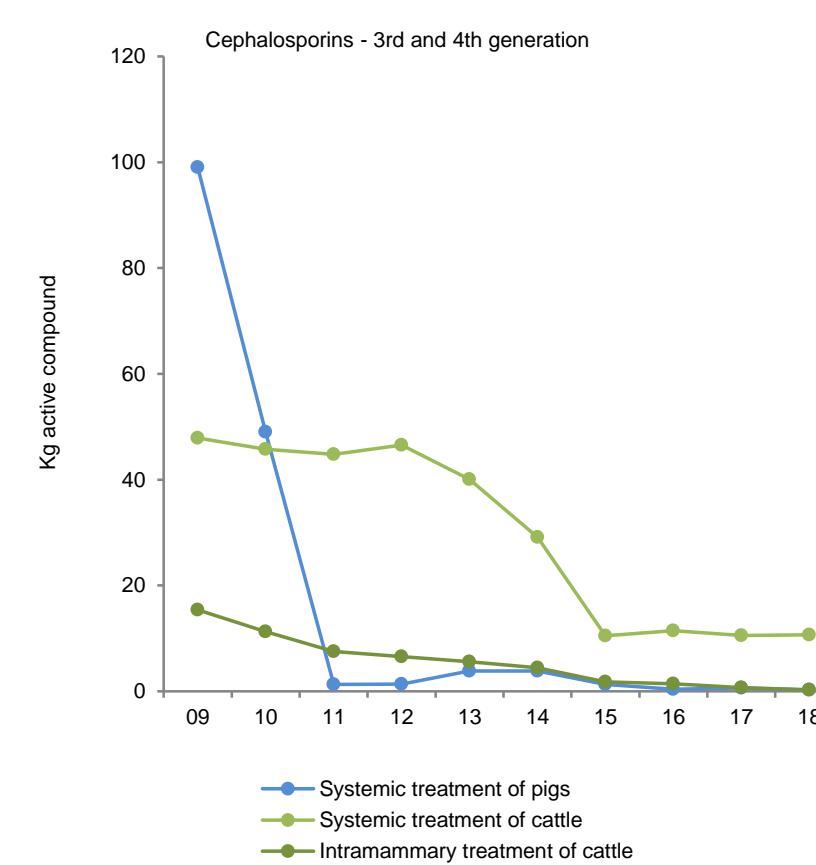
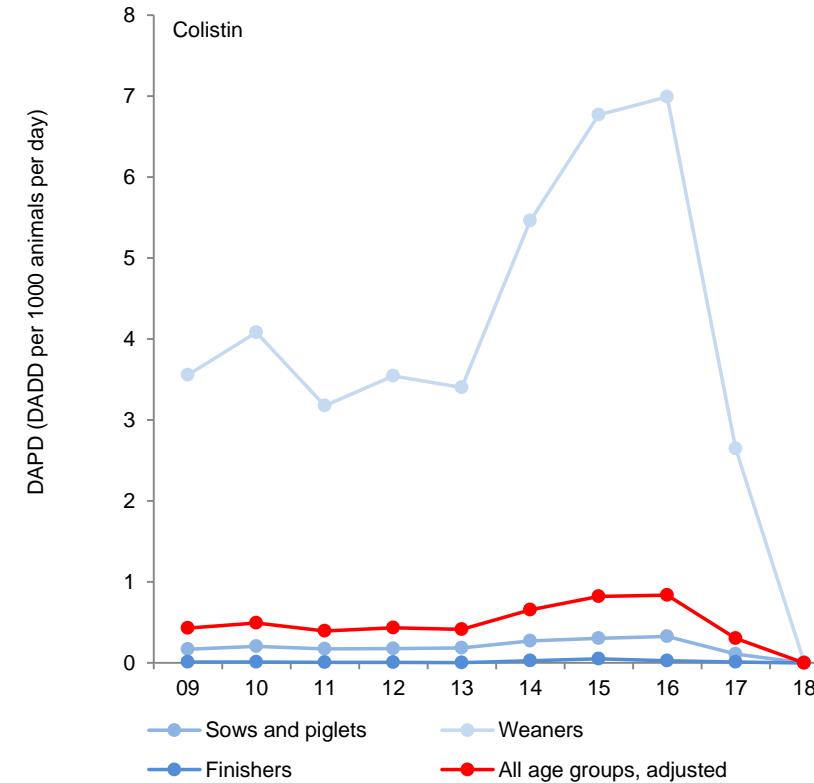


10 DAPD svarer til at 1% af den pågældende population er under behandling på en given dag

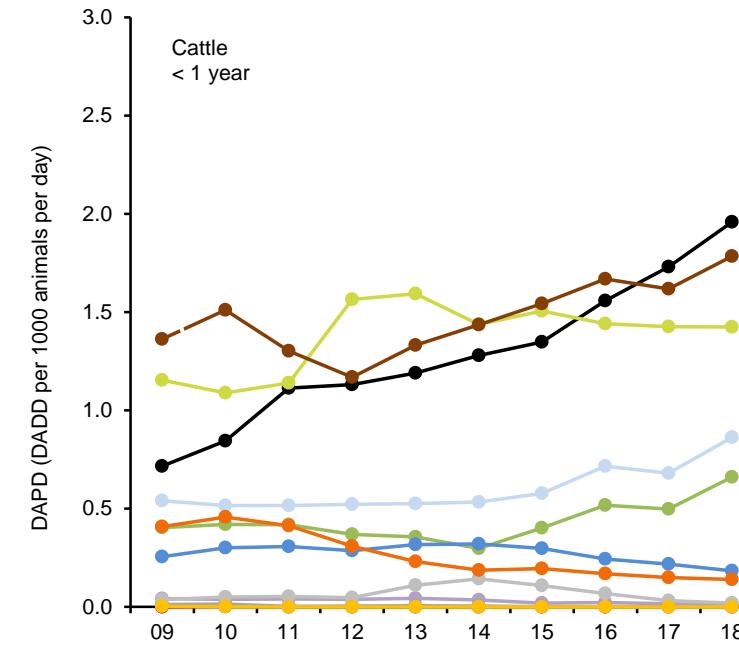
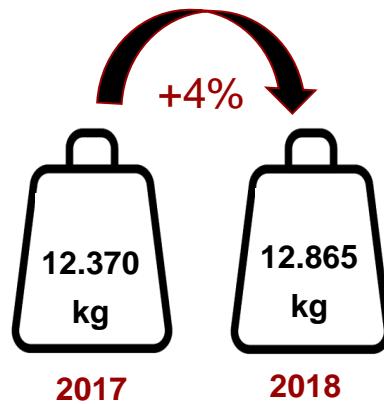
Antibiotika forbrug til svin – fald i behandlinger



Forbrug af colistin og 3. og 4. generations cephalosporiner

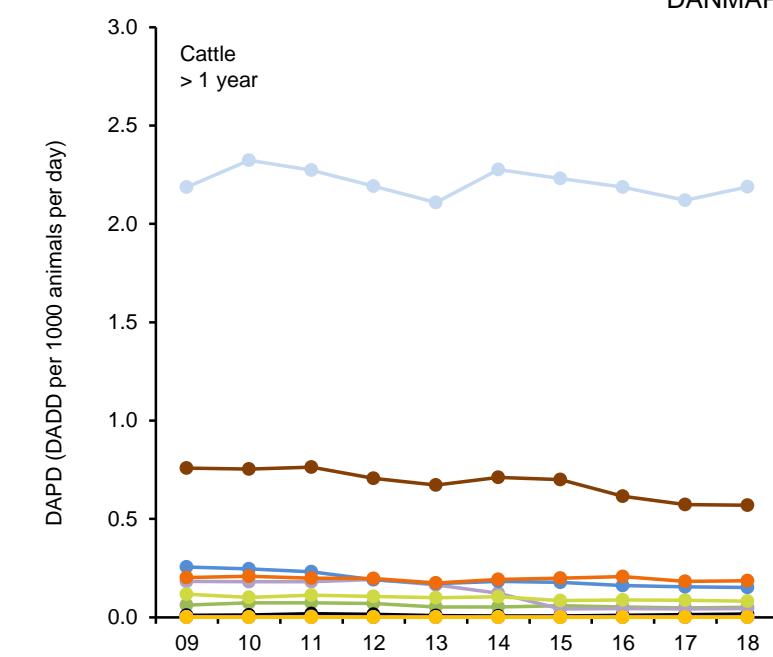


Antibiotikaforbrug til kvæg 2009-2018



- Aminoglycosides
- Lincosamides
- Penicillins, others(a)

- Amphenicols
- Macrolides
- Pleuromutilins

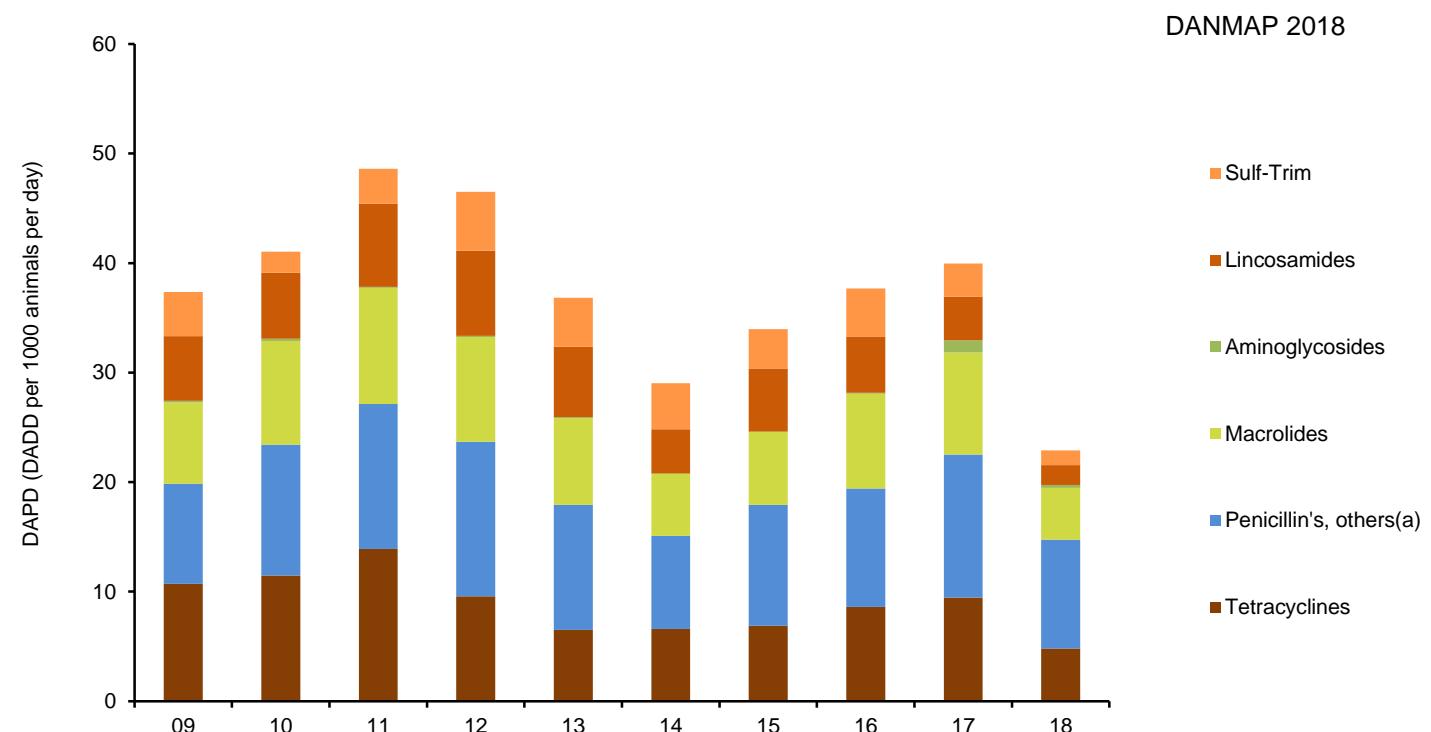


- Cephalosporins
- Other AB
- Fluoroquinolones
- Sulfonamides and trimethoprim
- Tetracyclines
- Penicillins, b-lactamase sensitive

Forbruget til mink næsten halveret



- ! Øget fokus
- ! Handlingsplan



Varm sommer presser forbruget til fisk i vejret

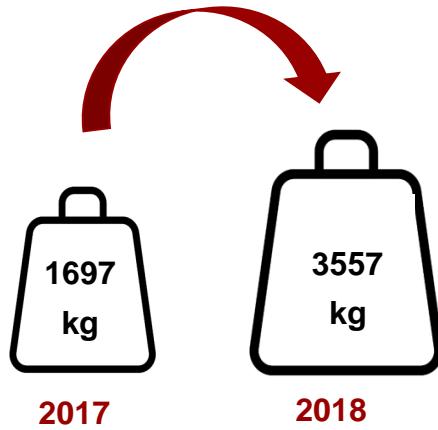


Table 4.5 Use of antimicrobial agents for aquaculture measured in kg active compound, Denmark
DANMAP 2018

	Amphenicols	Other quinolones	Sulfonamides and trimethoprim	Other AB	Total
2014	297	1678	3132	9	5116
2015	311	1005	1650	5	2970
2016	315	893	1086	12	2307
2017	350	637	679	31	1697
2018	323	896	2293	46	3557

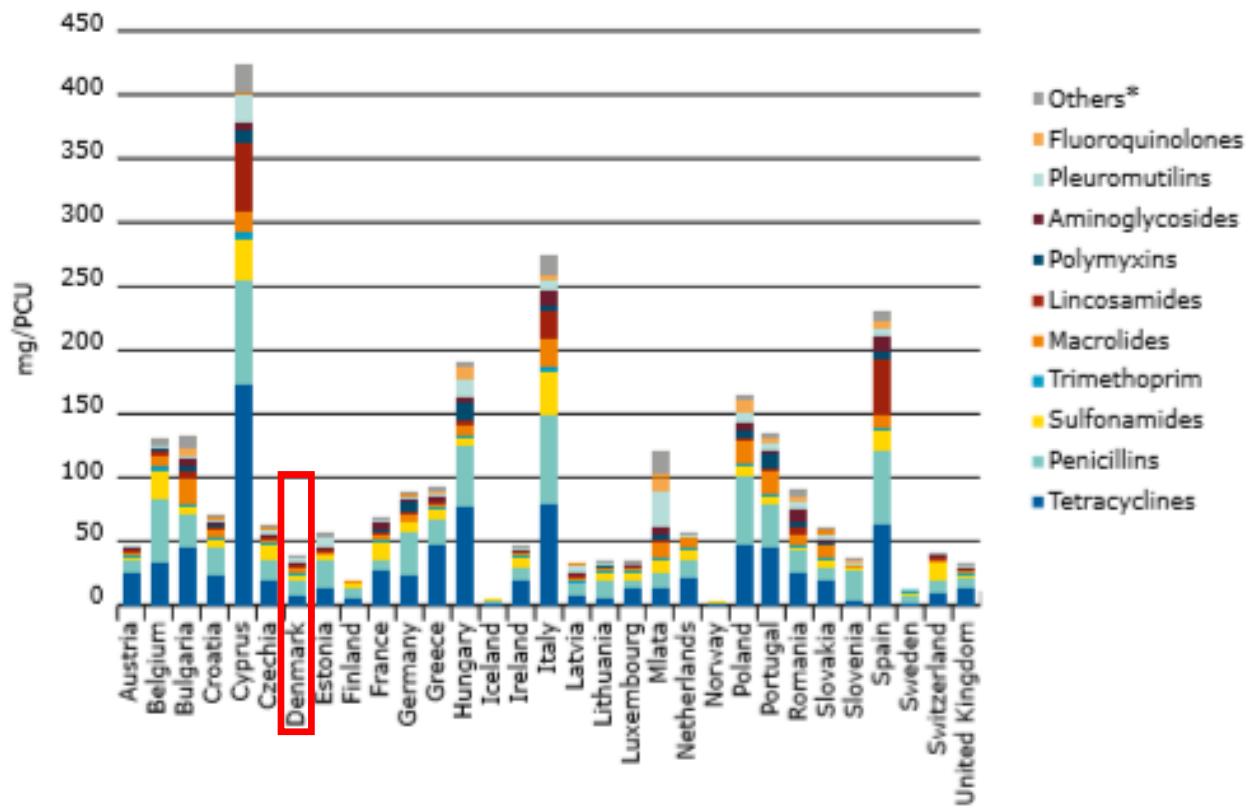
Note: Data were extracted from VetStat 3rd March 2019. Other AB include mainly penicillins with extended spectrum and combination penicillins, incl. β -lactamase inhibitors (98%) and tetracyclines (2%)

- ! Varm sommer
- ! Valg af antibiotika



ESVAC 2017 – Antibiotikaforbrug i EU

Figure 2. Sales for food-producing species, in mg/PCU, of the various veterinary antimicrobial classes, for 31 European countries, in 2017¹

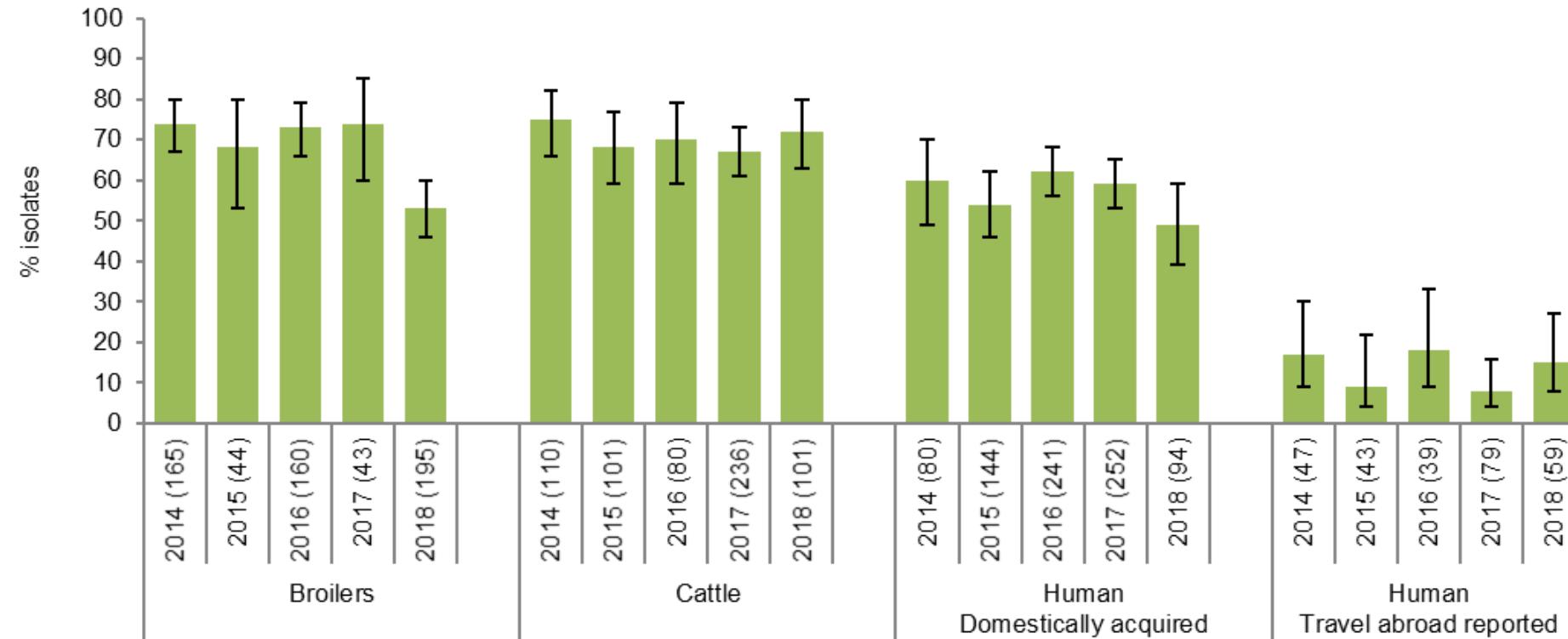


* Amphenicols, cephalosporins, other quinolones and other antibacterials (classified as such in the ATCvet system).

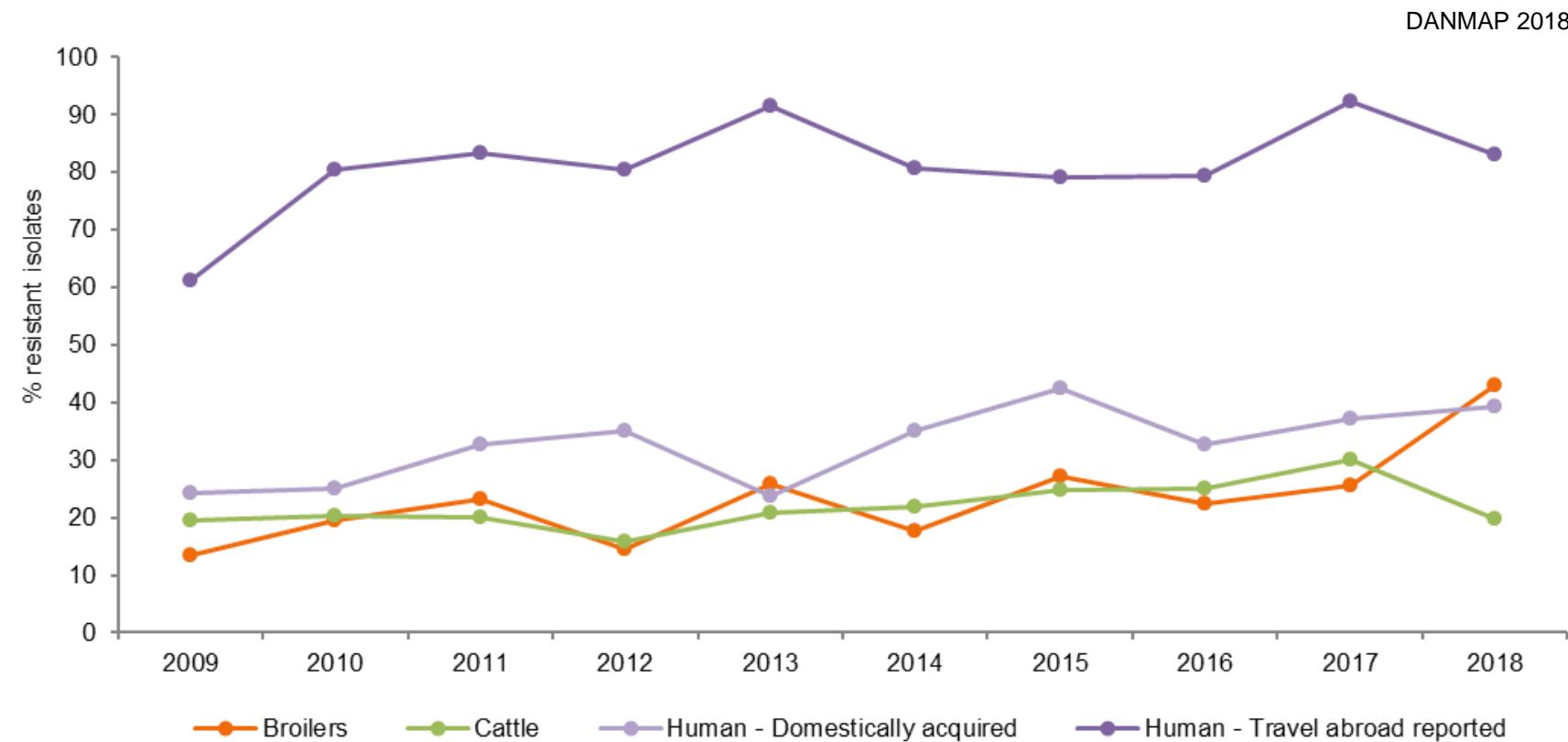
¹ Differences between countries can be partly explained by differences in animal demographics, in the selection of antimicrobial agents, in dosage regimes, in the type of data sources, and veterinarians' prescribing habits.

Fuldt følsomme *Campylobacter jejuni* (%) fra isolater fra kyllinger, kvæg og humane infektioner

DANMAP 2018

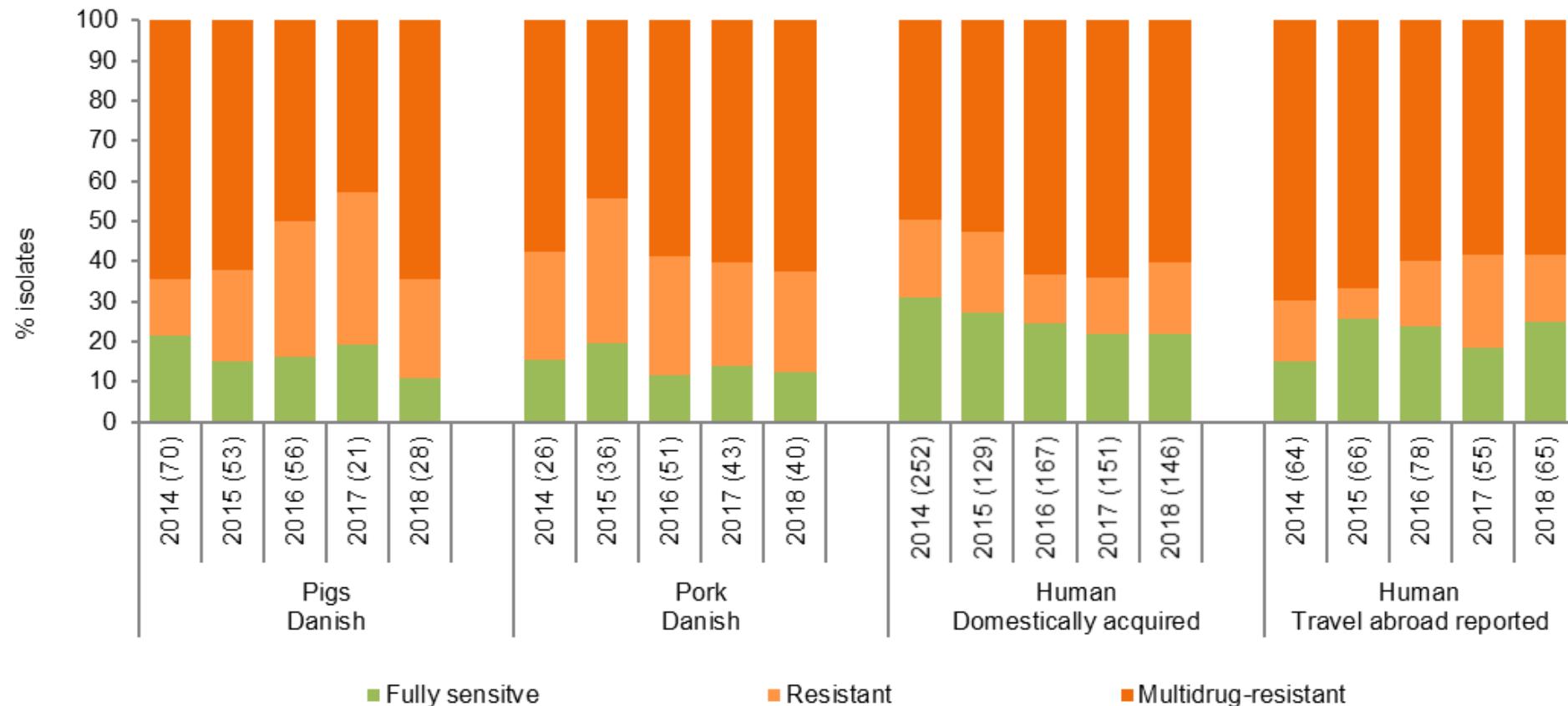


Forekomst af ciprofloxacin resistens i *Campylobacter jejuni* isolater fra kyllinger, kvæg og humane infektioner



Relative fordelinger af (%) fuldt følsomme, resistente og multi-resistente *Salmonella* Typhimurium fra svin, svinekød og humane infektioner

DANMAP 2018



Tendenser – *E. coli*

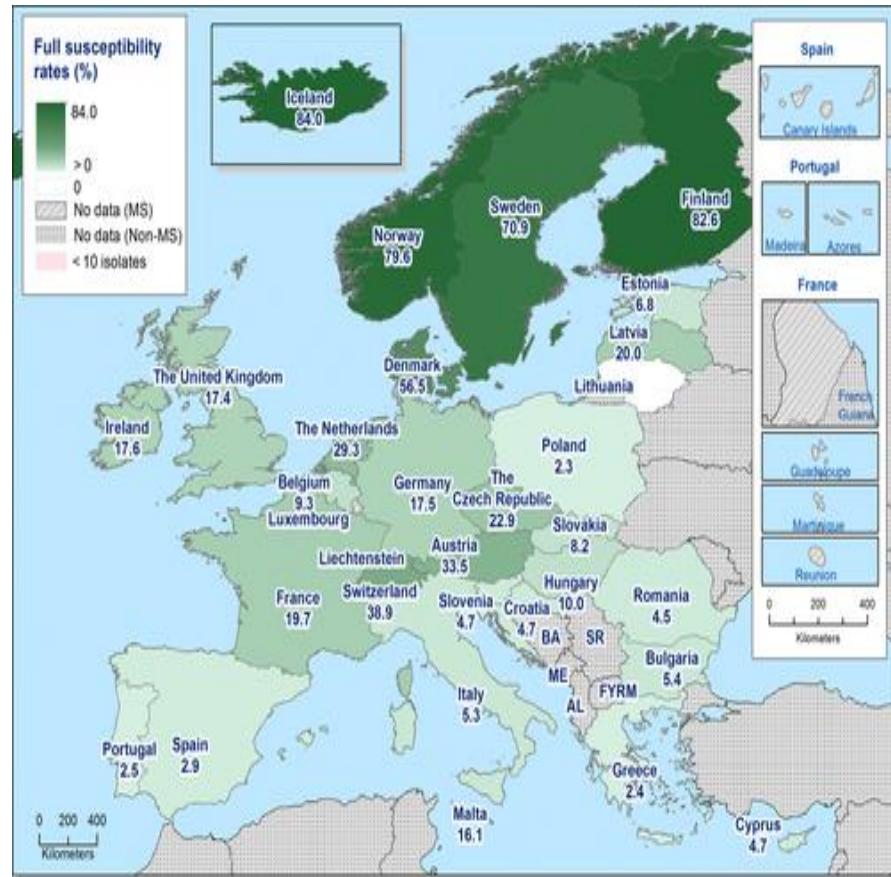
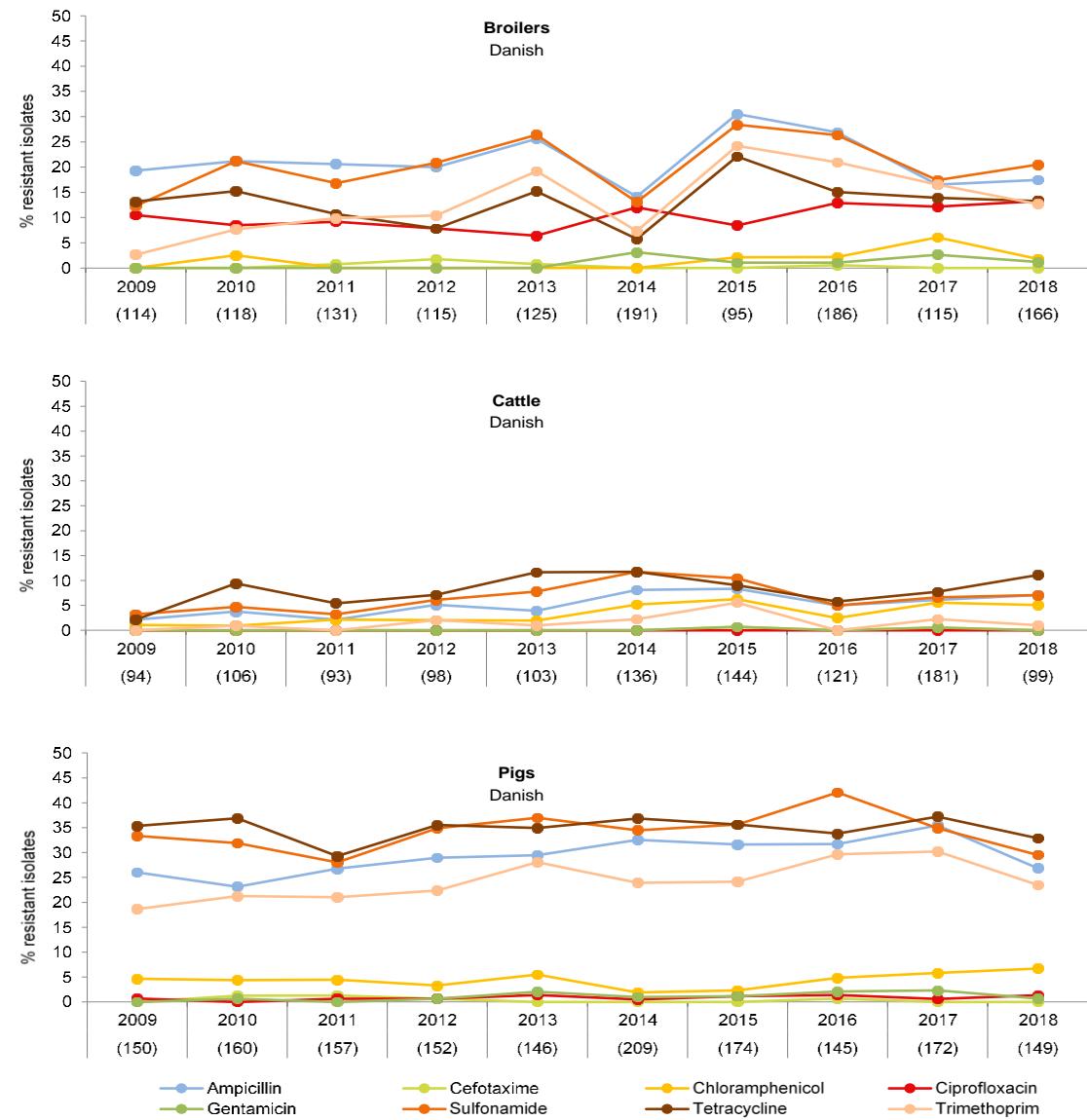
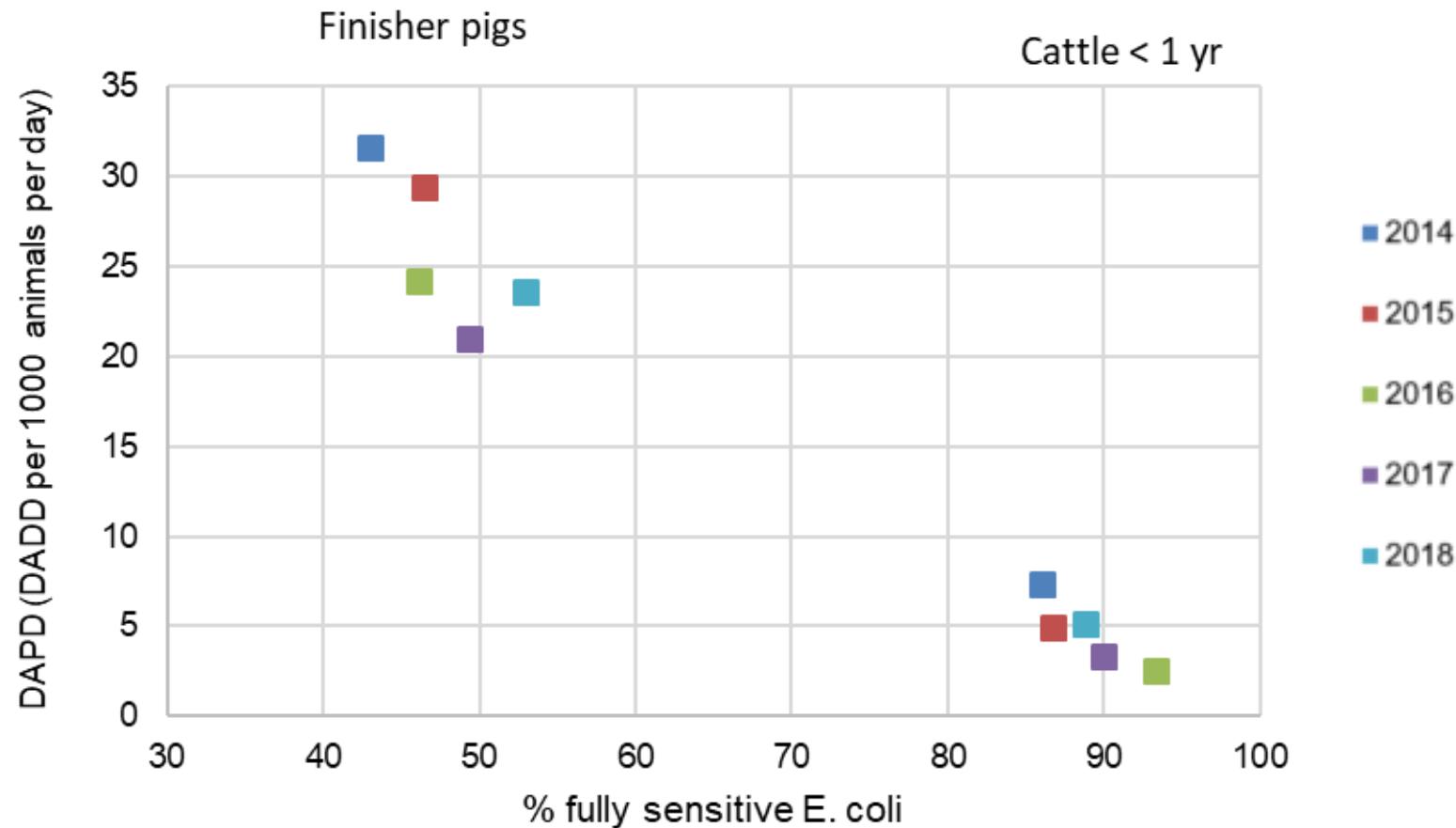


Figure 7.2 Resistance (%) among *Escherichia coli* isolates from broilers, cattle and pigs, Denmark

DANMAP 2018



Sammenhæng mellem antibiotika forbrug og fuldt følsomme *E. coli* isolater fra slagtesvin og kvæg



DANMAP 2018

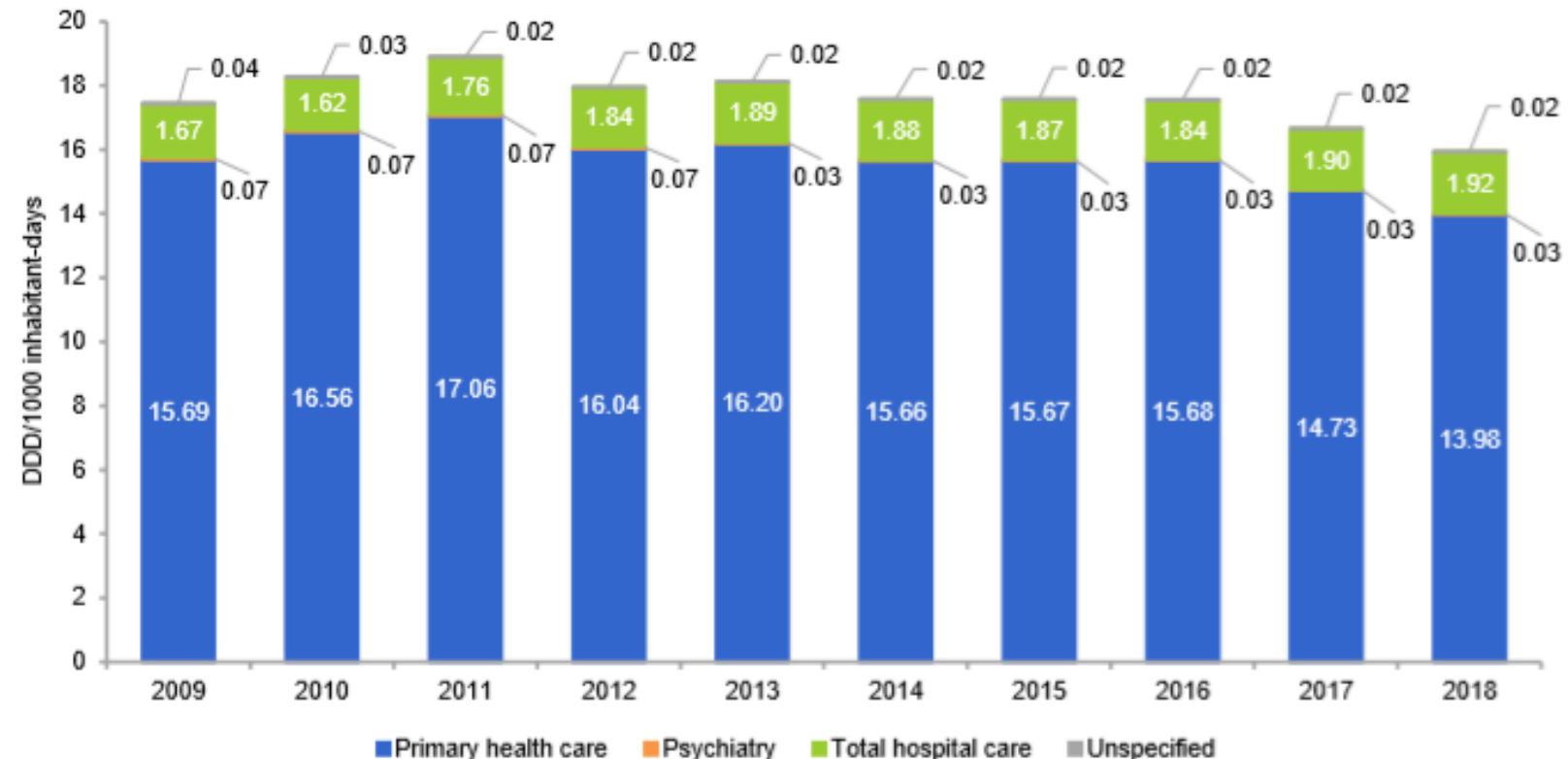


- Det totale forbrug
- primærsektoren
- hospitalssektoren

TOTALFORBRUGET AF ANTIBIOTIKA TIL MENNESKER

Figure 5.1a Total consumption of systematic antimicrobial agents in humans, Denmark

DANMAP 2018



Data for this figure is based on the total sales in Denmark

ATC numbers stem from the 2019 edition of the Anatomical Therapeutic Chemical (ATC) classification system

FORBRUGET I PRIMÆRSEKTOREN

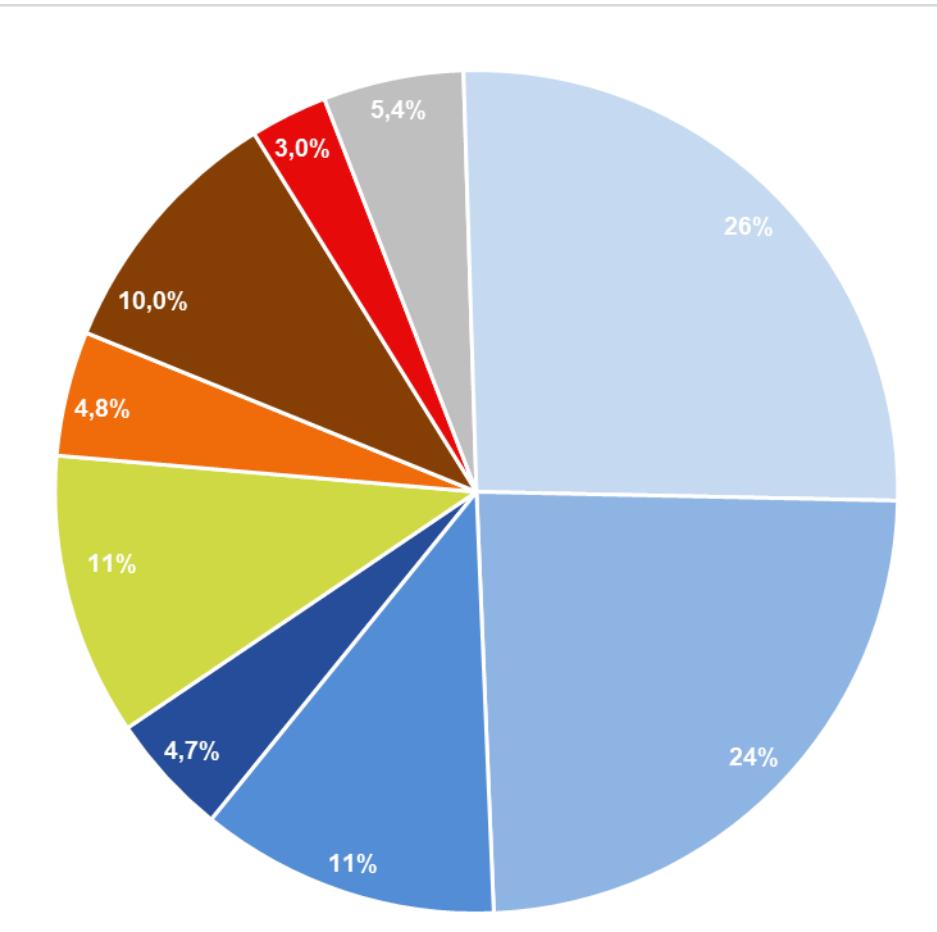
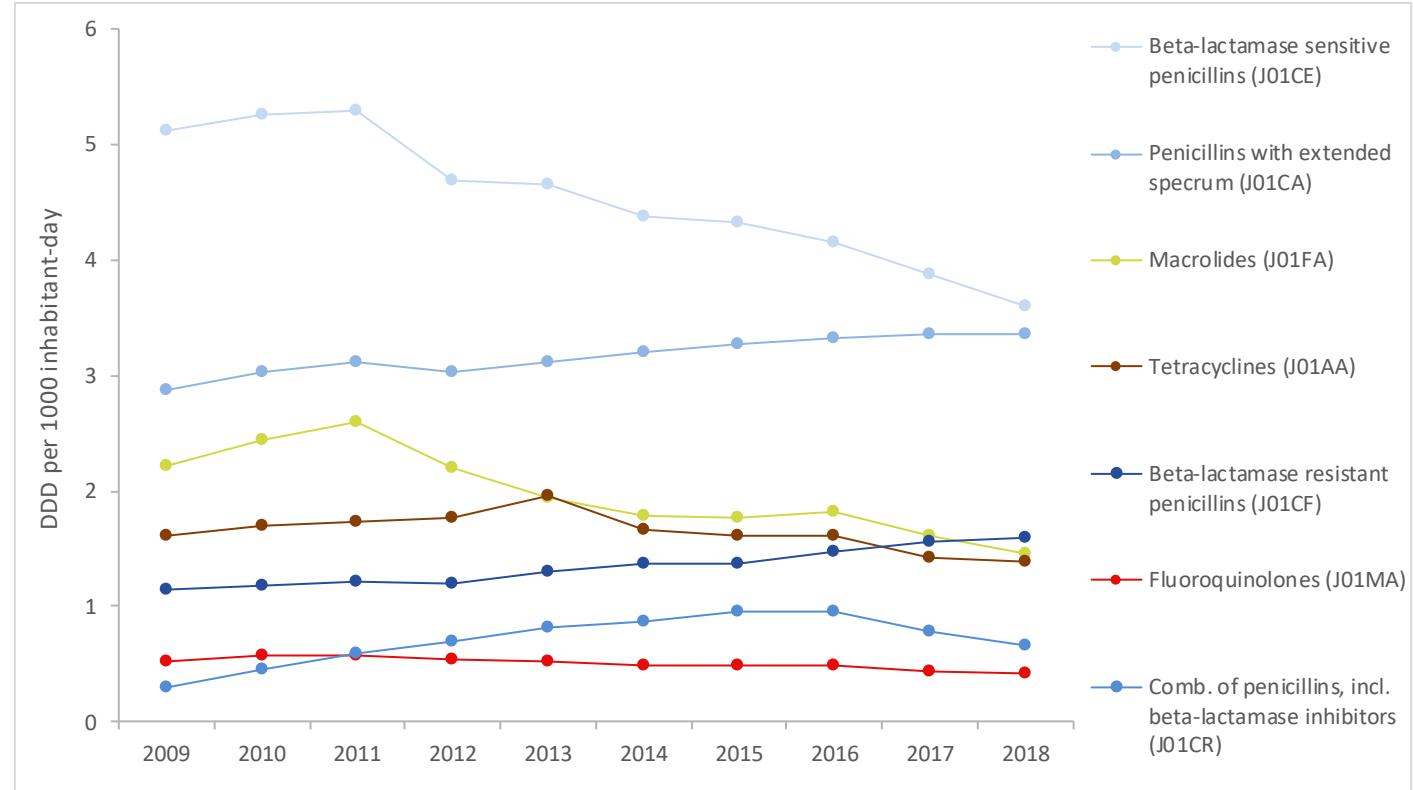


Figure 5.3 Consumption of leading antimicrobial groups for systemic use in primary health care, DID, Denmark
DANMAP 2018

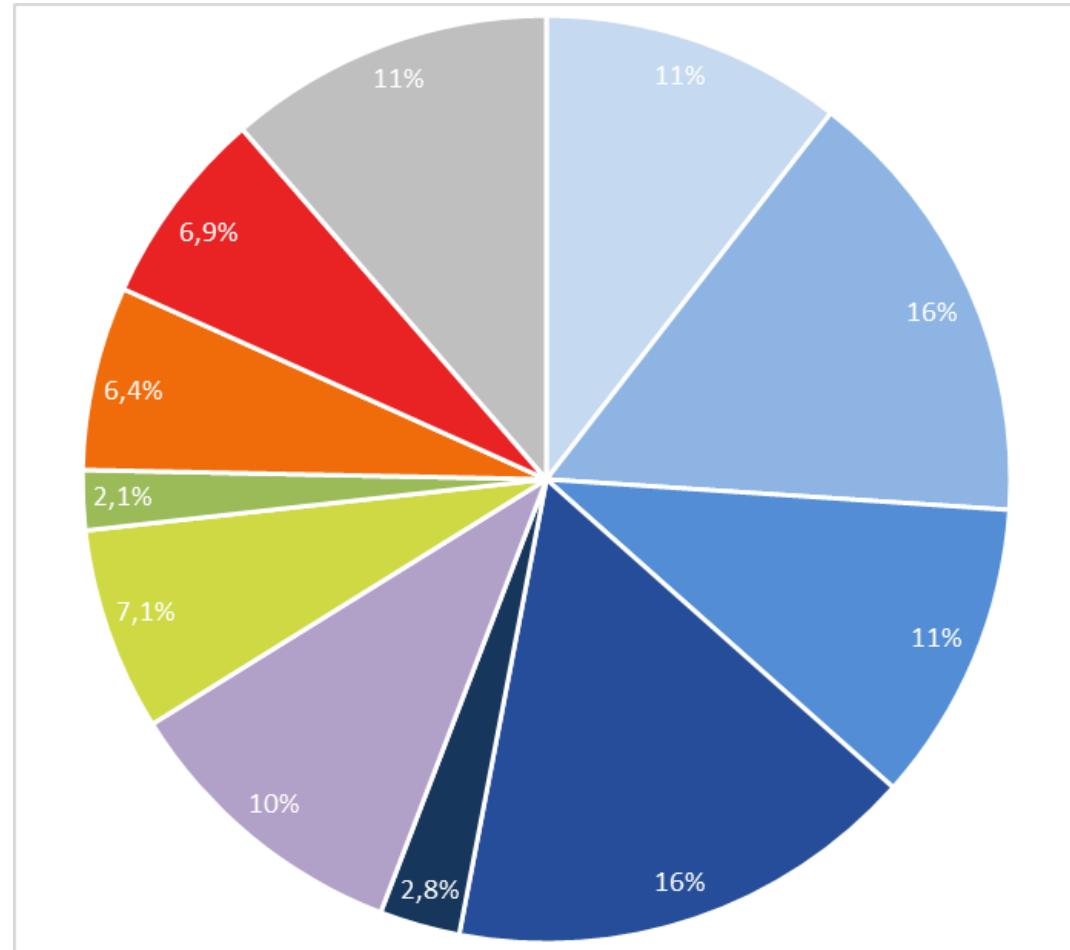


Data used for this figure is based on total sales in Denmark (individuals and clinics)

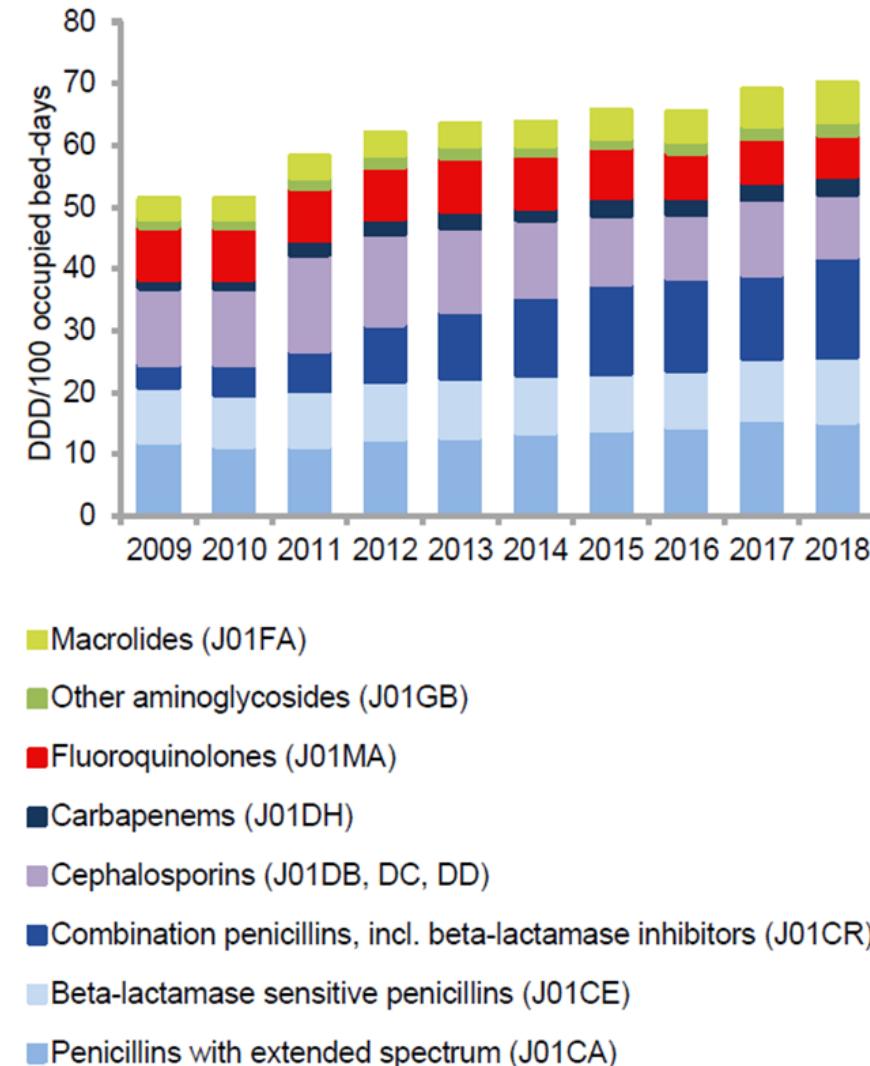
ATC numbers stem from the 2019 edition of the Anatomical Therapeutic Chemical (ATC) classification system

Penicilliner udgør fortsat 2/3 af det samlede forbrug i primærsektoren – men forholdet mellem penicillinerne har ændret sig væsentligt

HOSPITALSFORBRUGET



På hospitalerne udgjorde penicillinerne 54 %



TENDENSER OVER TID

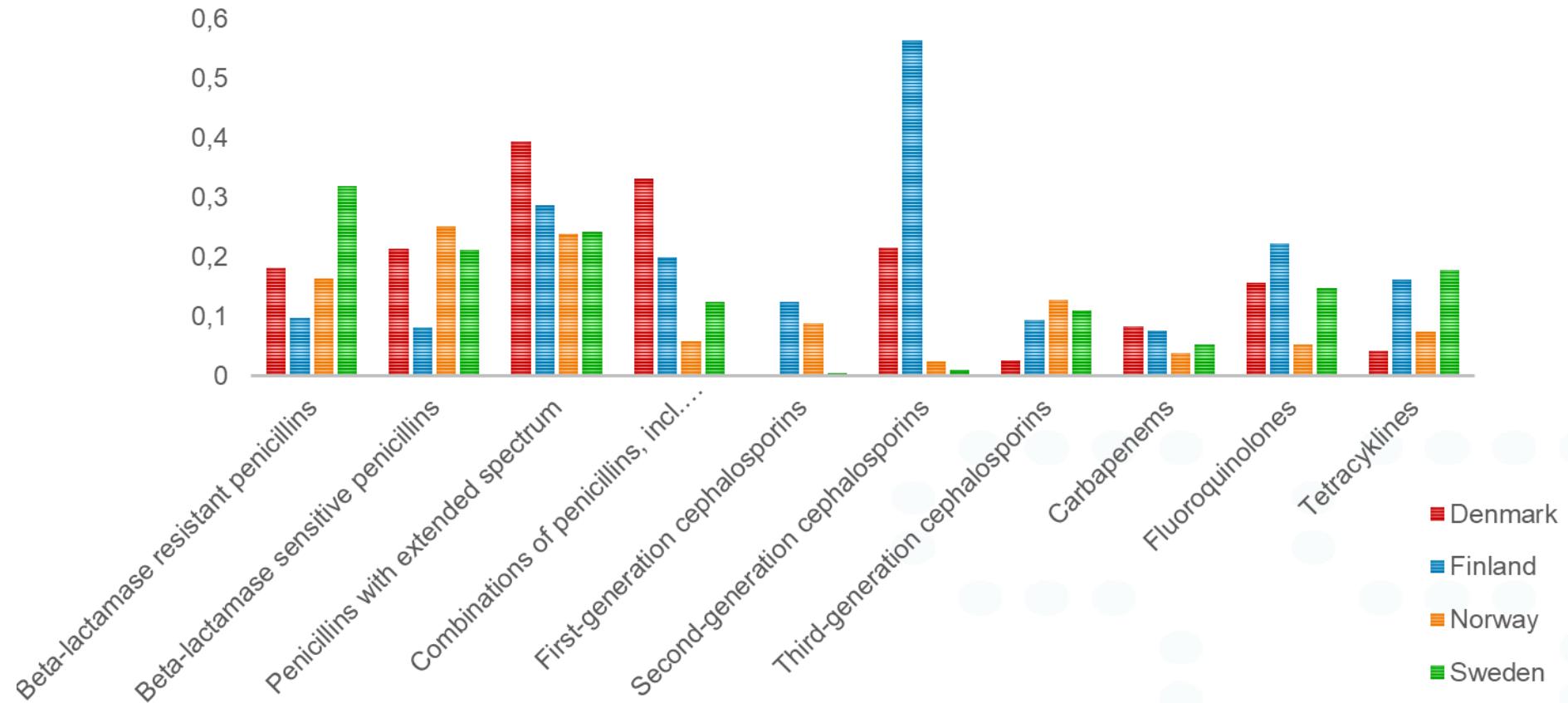
Table 5.8 Consumption of antimicrobial agents for systemic use in somatic hospitals (DDD/100 bed-days), Denmark

ATC group(a)	Therapeutic group	Year										Udv. 2009- 2018 i %
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
J01AA	Tetracyclines	0,95	0,99	1,07	1,54	1,45	1,63	1,80	2,08	2,04	2,37	149,8
J01CA	Penicillins w ith extended spectrum	12,02	11,45	11,35	12,47	12,88	13,56	14,11	14,46	15,66	15,37	27,8
J01CE	Beta-lactamase sensitive penicillins	8,75	8,24	9,02	9,31	9,40	9,31	9,08	9,18	10,03	10,38	18,6
J01CF	Beta-lactamase resistant penicillins	6,69	6,88	7,69	7,96	8,69	8,96	9,22	8,75	8,81	10,39	55,3
J01CR	Comb. of penicillins. incl. beta-lactamase inhibitors	3,83	4,83	6,48	9,30	10,92	12,76	14,40	15,00	13,48	16,26	324,6
J01DC	Second-generation cephalosporins	11,08	11,15	14,34	13,35	12,26	11,36	10,12	9,23	10,78	8,97	-19,1
J01DD	Third-generation cephalosporins	1,17	1,01	1,07	1,03	1,08	1,00	1,04	1,03	1,33	1,20	2,4
J01DH	Carbapenems	1,42	1,61	2,33	2,51	2,76	1,92	2,79	2,68	2,83	2,77	94,3
J01EE	Comb. of sulfonamides and trimethoprim. incl. derivatives	2,22	1,86	2,91	3,26	4,28	4,68	5,06	5,20	5,40	5,80	161,5
J01FA	Macrolides	3,08	3,17	3,26	3,38	3,27	3,64	4,34	4,69	5,68	6,25	102,6
J01FF	Lincosamides	0,46	0,43	0,48	0,60	0,64	0,65	0,57	0,62	0,64	0,76	64,4
J01GB	Aminoglycosides	1,42	1,55	1,84	2,05	2,10	1,55	1,61	1,90	2,18	2,06	44,9
J01MA	Fluoroquinolones	8,40	8,24	8,39	8,37	8,60	8,51	8,09	7,26	6,98	6,81	-19,0
J01XB	Polymyxins	0,06	0,09	0,08	0,09	0,12	0,19	0,17	0,19	0,19	0,23	258,9
J01XX08	Linezolid	0,20	0,20	0,29	0,31	0,36	0,34	0,44	0,36	0,37	0,52	156,8
J01XX09	Daptomycin	0,02	0,02	0,01	0,02	0,02	0,03	0,04	0,05	0,08	0,14	726,7
A07AA09	Intestinal antiinfectives (vancomycin)	0,17	0,25	0,40	0,47	0,49	0,52	0,47	0,49	0,52	0,50	184,0
J01, P01AB01, A07AA09	Antibacterial agents for systemic use, including metronidazole and vancomycin (total)	70,35	70,28	79,70	84,92	88,39	89,49	91,77	91,92	95,96	99,31	41,2

Udvikling, hvis målt i DDD/100 indlæggelser (DAD): 264 DAD i 2009 til 292 DAD i 2018 = 10 %

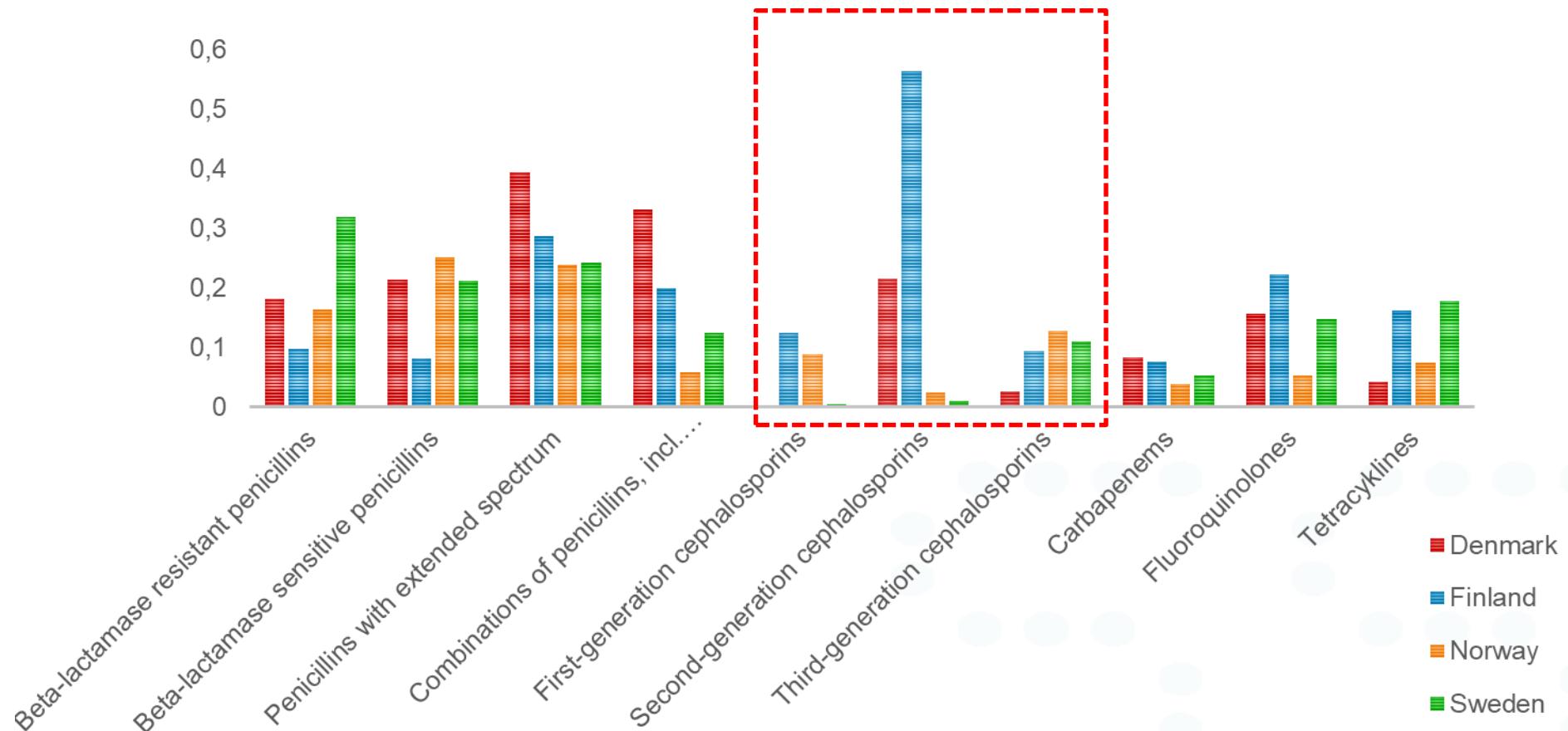
HOSPITALSFORBRUGET I DE NORDISKE LANDE, 2017

HOSPITALSFORBRUGET PR 1000 INDB. PR ÅR, 2017



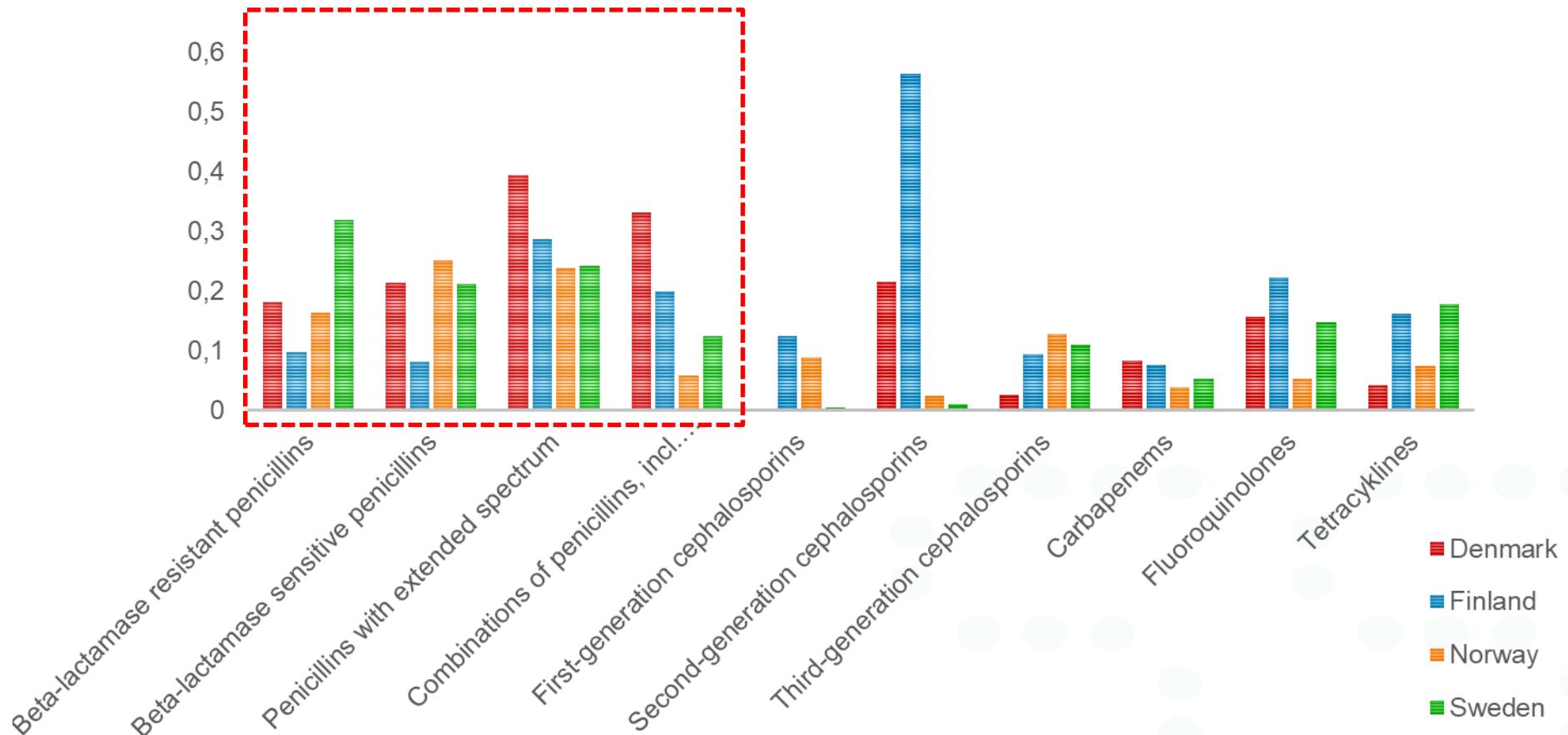
HOSPITALSFORBRUGET I DE NORDISKE LANDE, 2017

HOSPITALSFORBRUGET PR 1000 INDB. PR ÅR, 2017



HOSPITALSFORBRUGET I DE NORDISKE LANDE, 2017

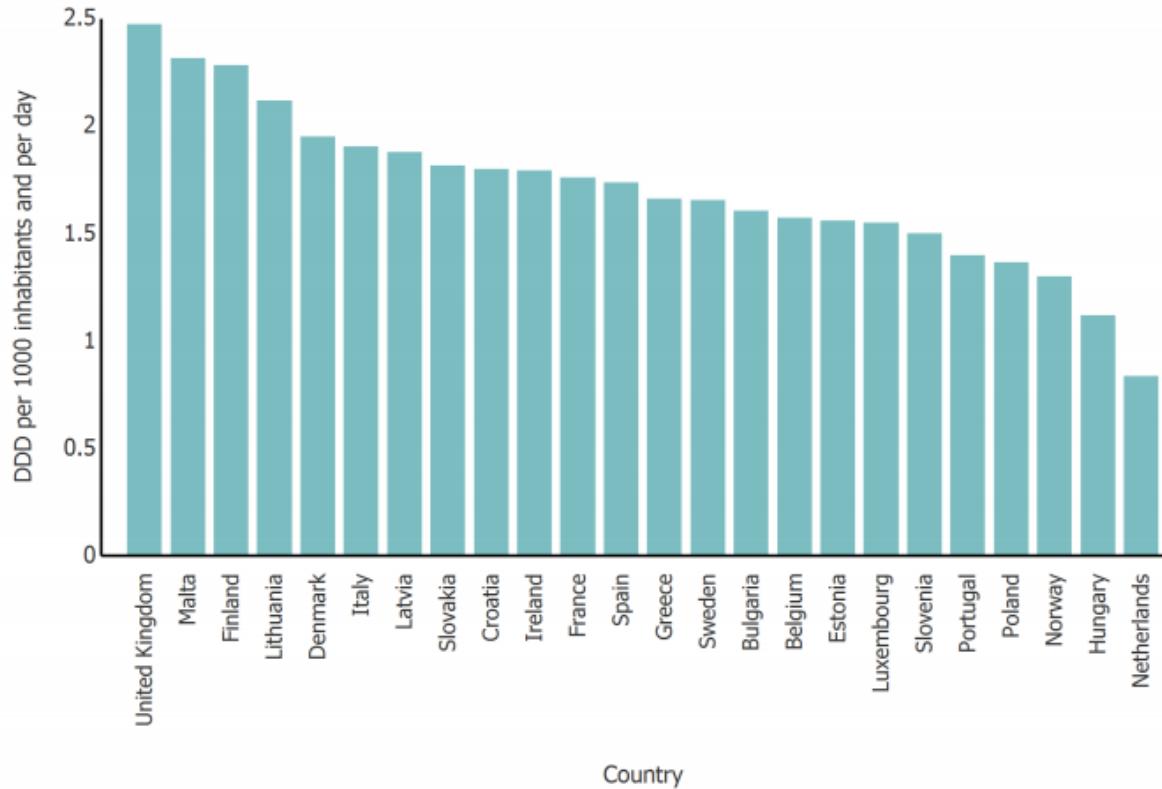
HOSPITALSFORBRUGET PR 1000 INDB. PR ÅR, 2017



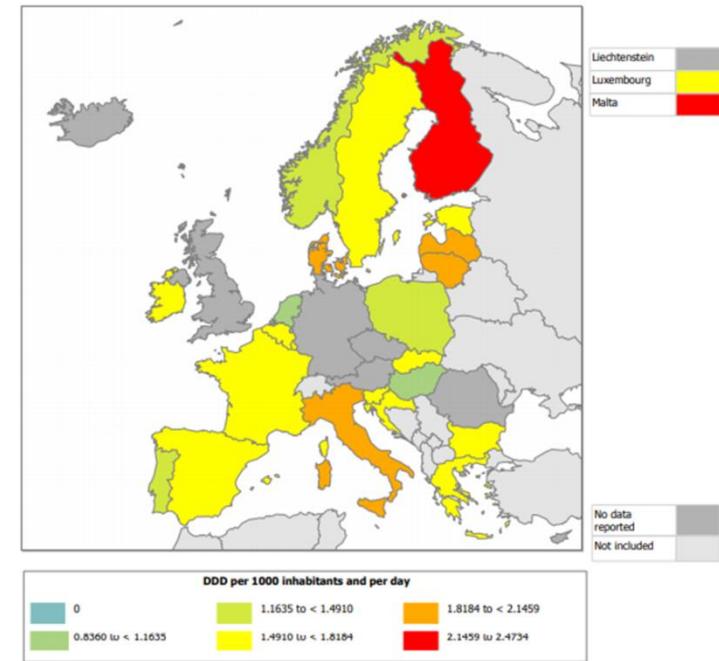


Consumption of Antibacterials for systemic use (ATC group J01) in the hospital sector in Europe, reporting year 2018

Consumption of Antibacterials for systemic use (ATC group J01) in the hospital sector in Europe,
reporting year 2018

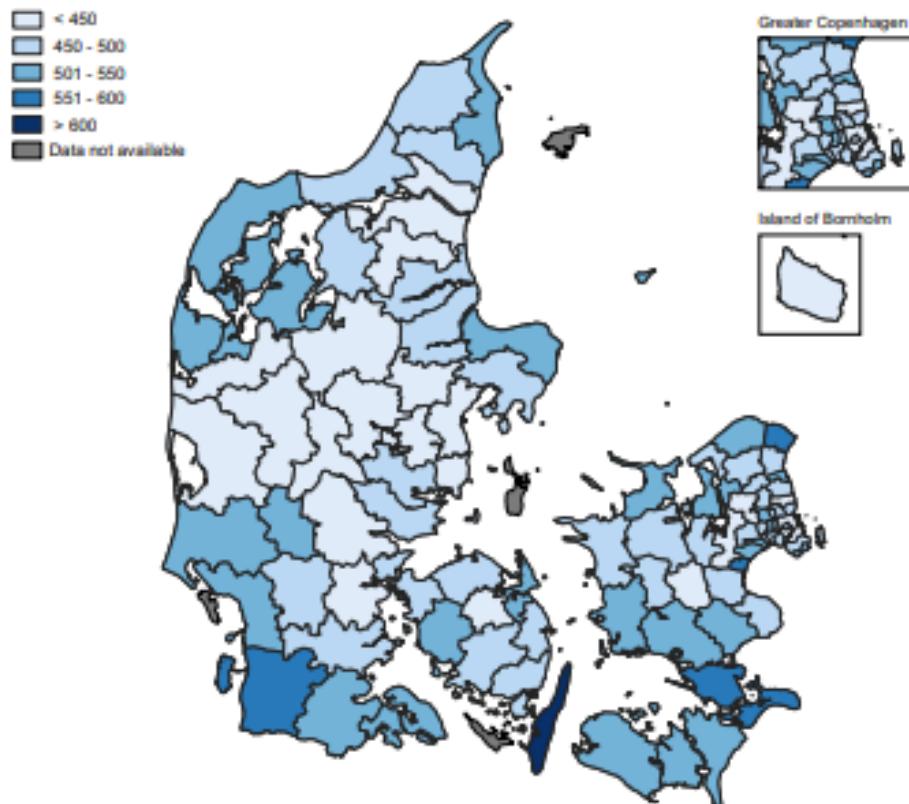


Consumption of Antibacterials for systemic use (ATC group J01) in the hospital sector in Europe, reporting year 2018



MÅL 1, REDUKTION I ANTAL RECEPTER

Figure 5.10 Number of prescriptions from primary healthcare /1000 inhabitants in Danish municipalities DANMAP 2018



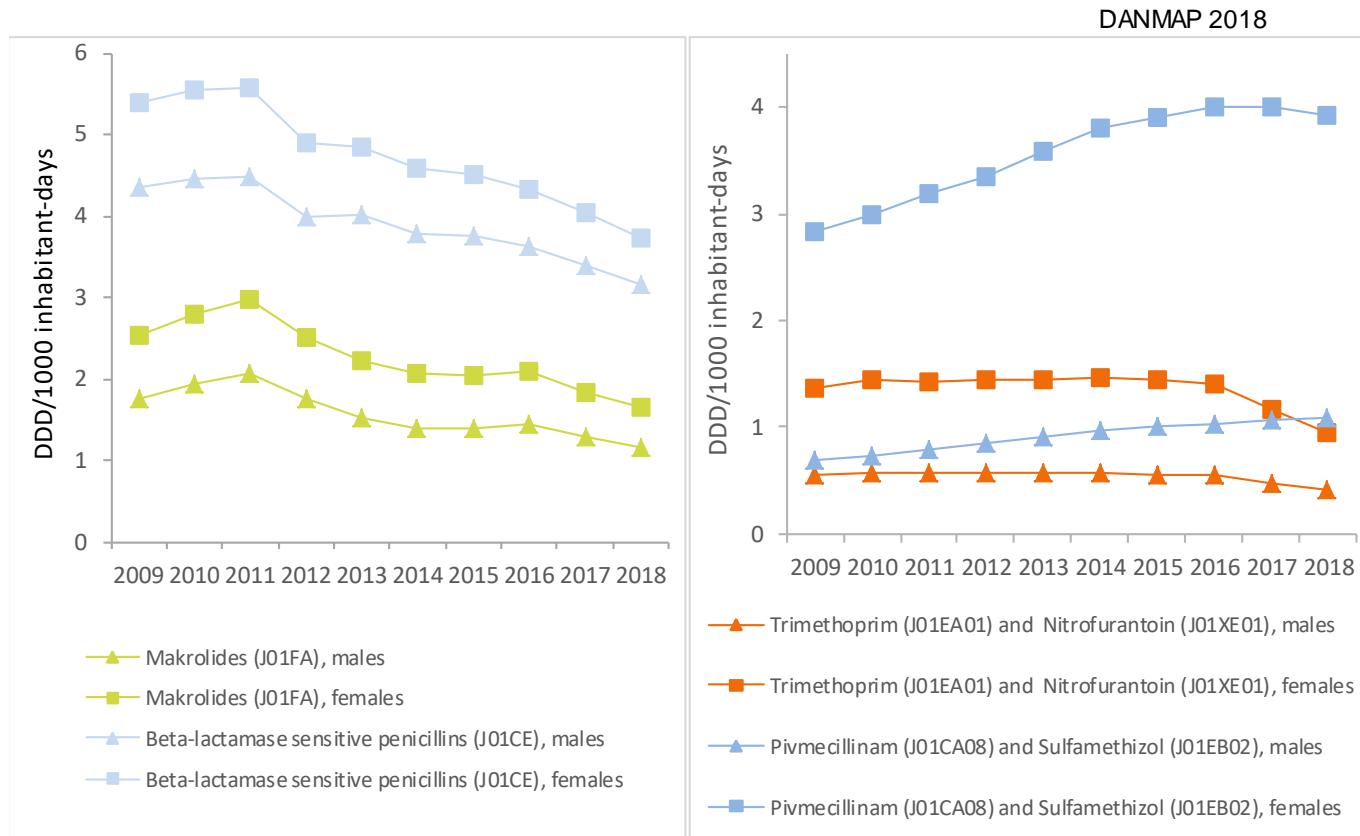
Data used for this figure is based on registered sales to individuals

Table 5.6 Number of prescriptions per 1000 inhabitants per prescribing specialty DANMAP 2018

Doctor type	Year		
	2016	2017	2018
General practitioners	390.7	368.6	341.5
Ear nose throat specialists	8.8	8.9	8.4
Specialists in dermatovenerology	6.4	5.9	5.2
Doctors with other specialties	4.5	4.3	4.2
Doctors with unknown specialties	15.0	10.9	9.7
Hospital doctors	60.7	62.6	62.8
Dentists	36.5	29.1	27.8

Data used for this table is based on registered sales to individuals

Figure 5.7b consumption of most used antimicrobials against respiratory infections and urinary tract infections, Denmark

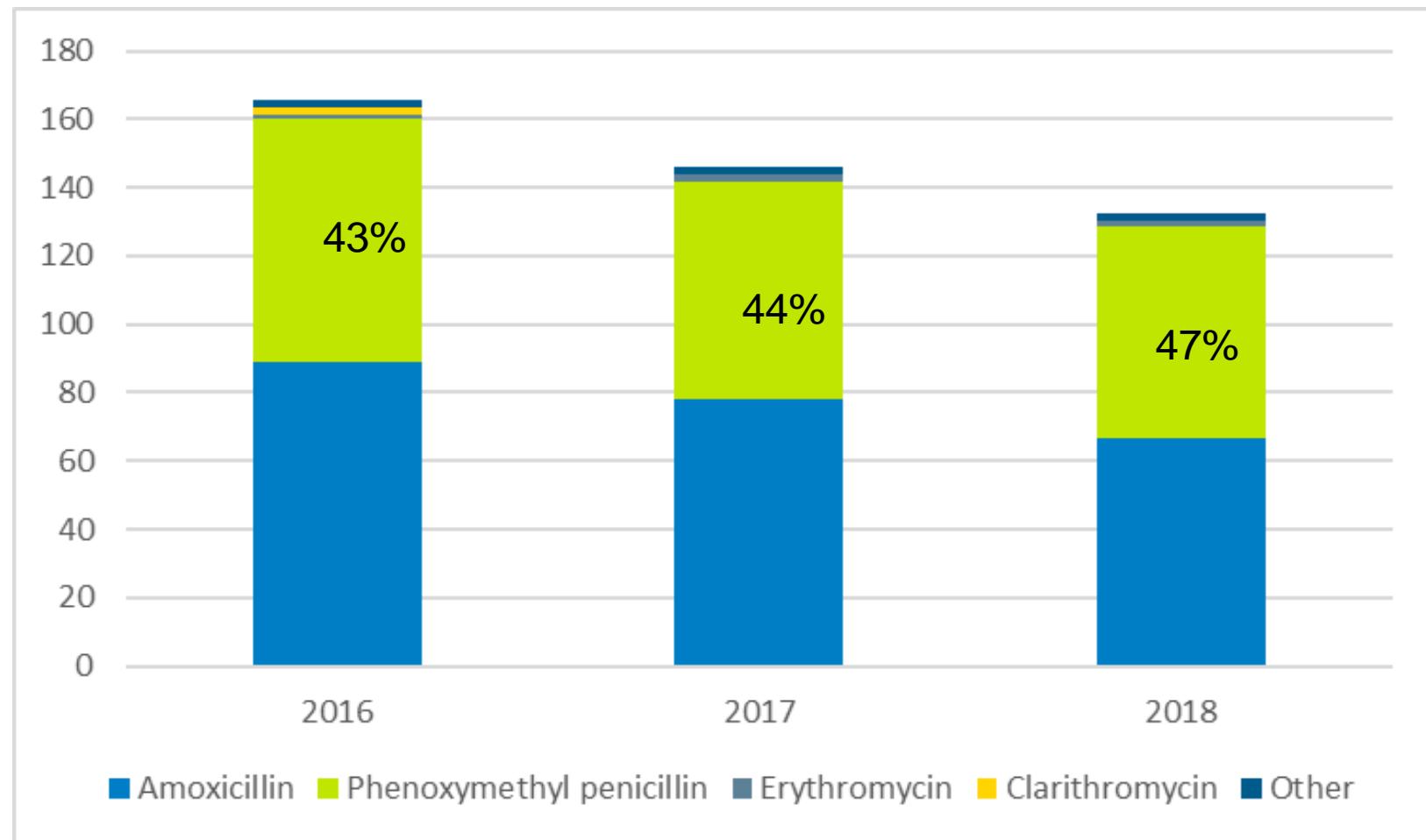


Data used in this figure is based on registered sales to individuals

ATC numbers stem from the 2019 edition of the Anatomical Therapeutic Chemical (ATC) classification system

Penicillin V og makrolider har været faldende siden 2012,
Nu følger antibiotika brugt til behandling af urinvejsinfektion?

MÅL 2, ØG ANDELEN AF PENICILLIN V



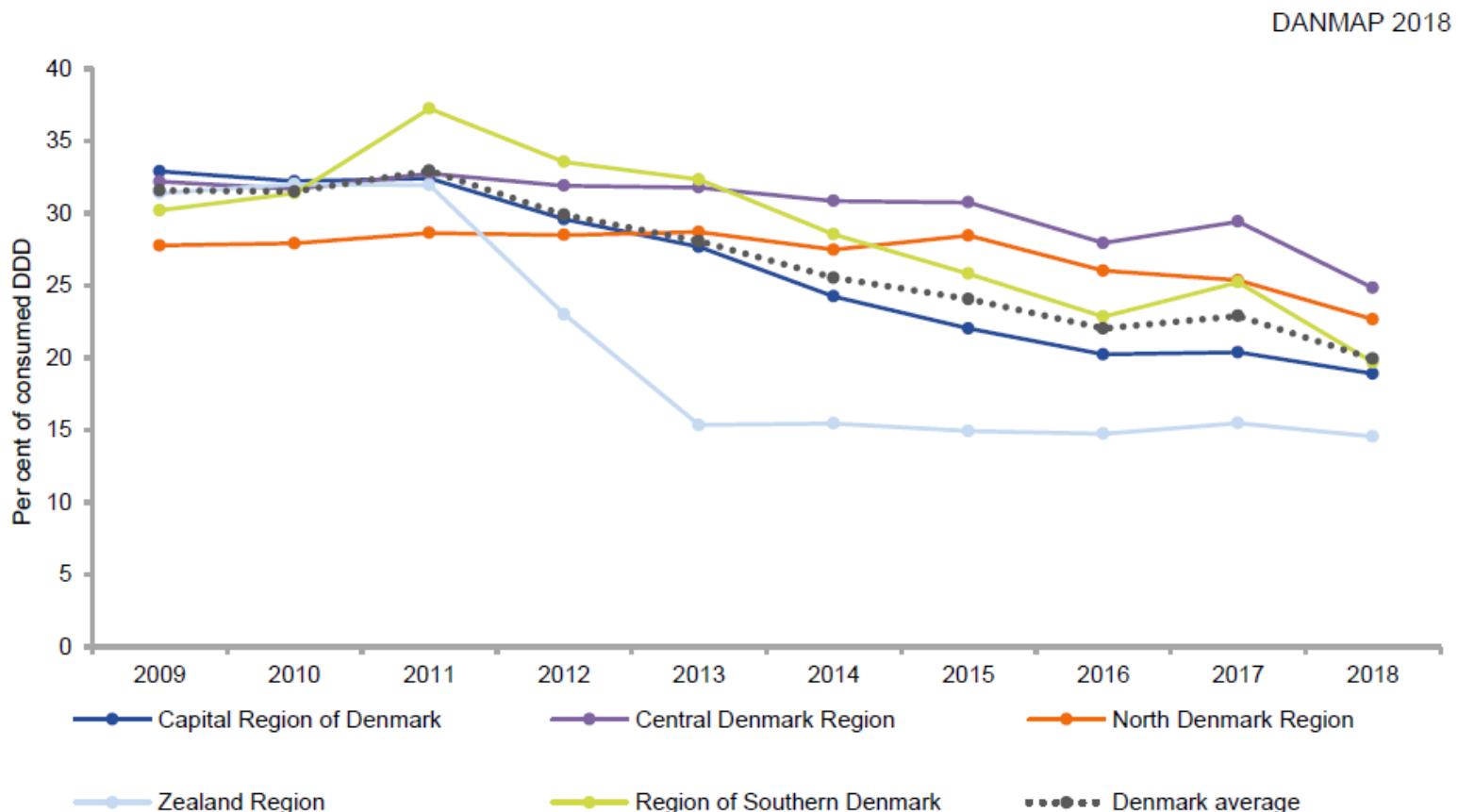
Antibiotika brugt i
behandling af
mellemøre-
betændelse
til små børn
(0 – 4 år)

Indenfor visse sygdomsgrupper stiger andelen af penicillin samtidig med at forbruget falder –
eksempel med indikationen mellemørebetændelse til små børn

MÅL 3, REDUCER ANDELEN AF KRITISK VIGTIGE PÅ HOSP.



Figure 5.17 Percentage of the consumption of antimicrobials of special critical interest, shown as the percentage of each regions total consumption of antimicrobials, DDD, Denmark

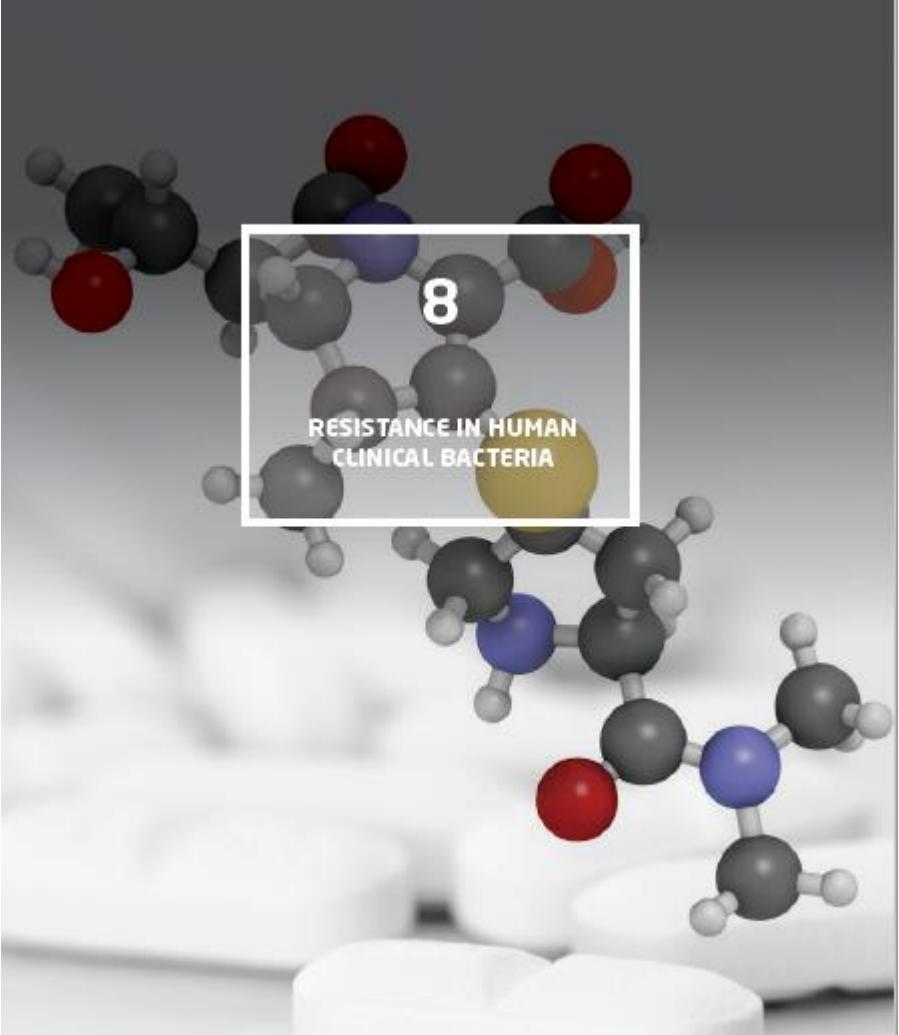


Data used in this figure is based consumption at acute care public somatic hospitals

ATC numbers stem from the 2019 edition of the Anatomical Therapeutic Chemical (ATC) classification system

I Danmark er 3 antibiotikaklasser i særligt fokus:
Cefalosporiner
Fluorkinoloner
Carbapenemer

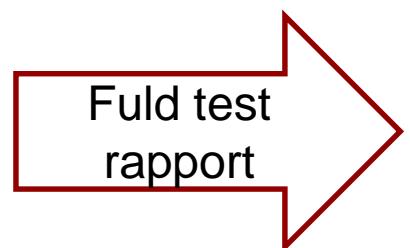
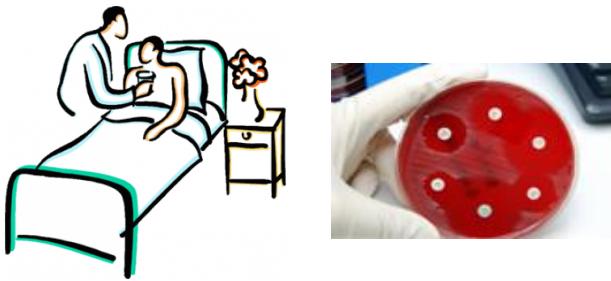
Dette skyldes deres vigtige betydning i behandlingen af akut syge patienter med fx blodforgiftning og deres samtidige evne til at skabe resistens, hvilket gør at de skal bruges med særlig omtanke



- National overvågning
- Databaseret
- Isolatbaseret



1. Databaseret Rutinediagnostikken fra alle 10 KMA'er i Danmark

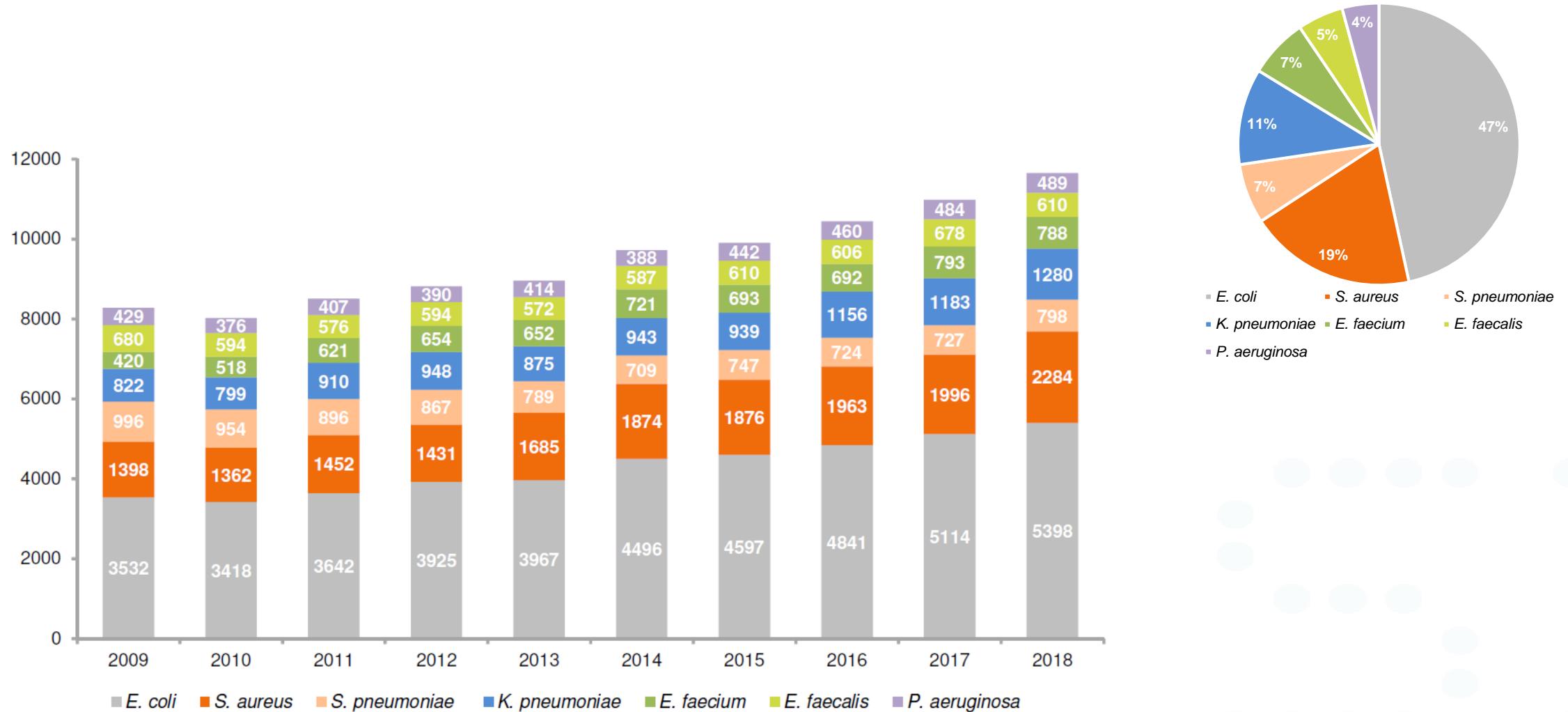


Blod og spinalvæske:
E. coli, K. pneumoniae
Enterokokker,
P. aeruginosa,
Acinetobacter

Hospitalsurin og praksisurin:
E. coli, K. pneumoniae

1. isolat pr patient pr år
Resistensdata KMA

Total antal overvågede bakteriæmier



Bakteriæmier per 100.000 indbyggere

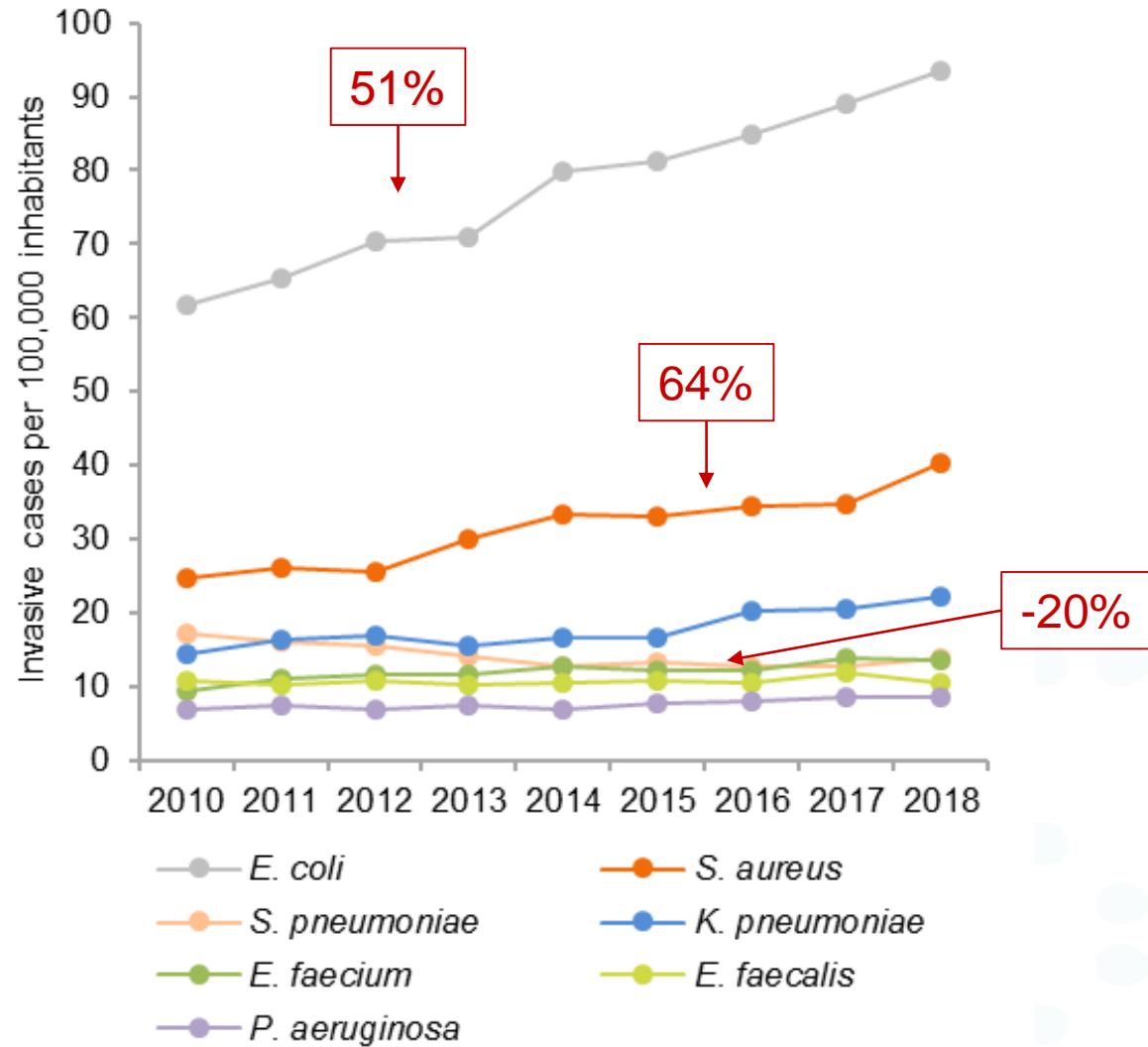
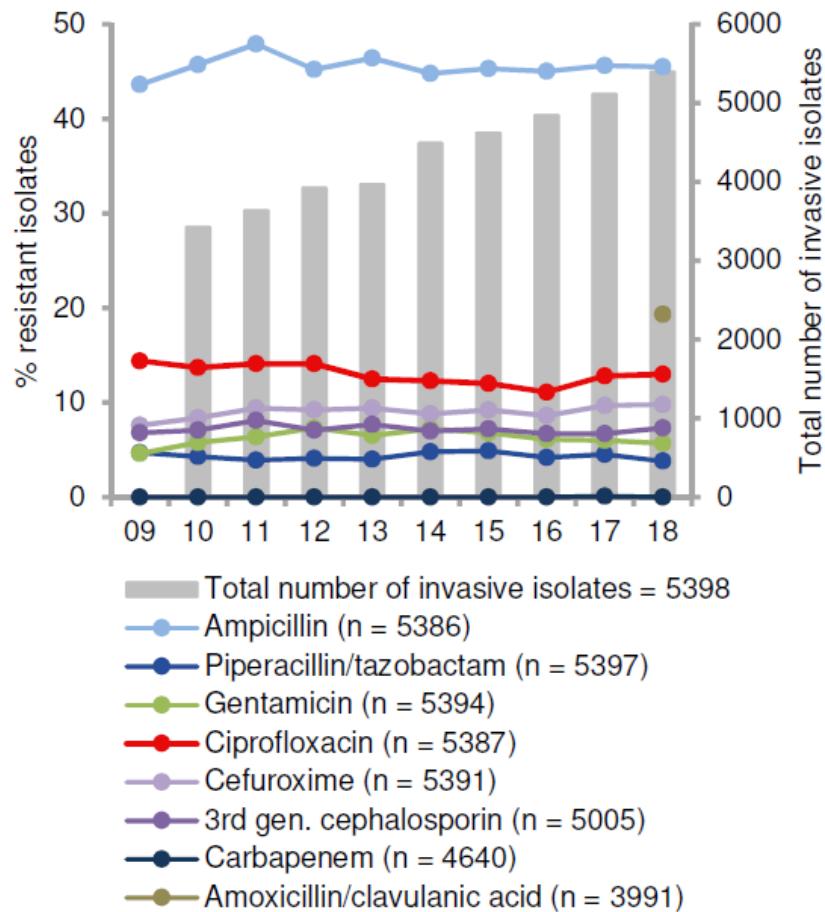
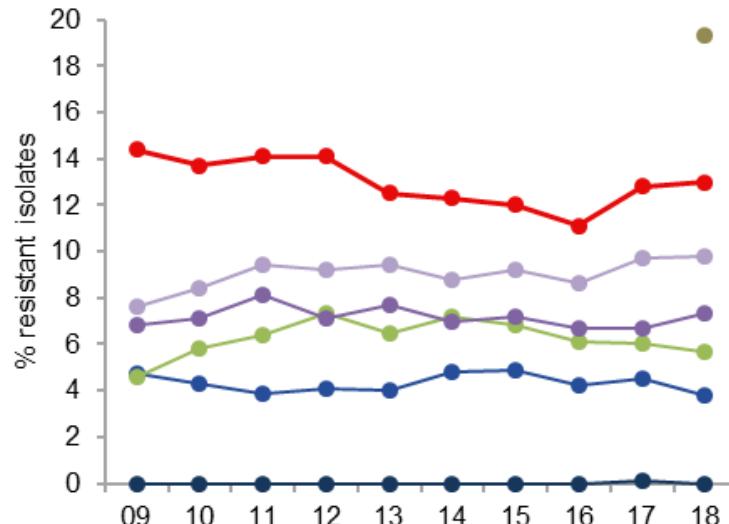


Figure 8.3 *E. coli*. Resistance (%) in invasive isolates from humans, Denmark





Substance	Time trends (Cochran-Armitage test)	
	10 years (2009 - 2018)	5 years (2014 - 2018)
Ampicillin	↑ p = 0.46	↓ p = 0.23
Piperacillin/tazobactam	↓ p = 0.1	↓ p = 0.4
Gentamicin	↑ p = 0.17	↓ p = 0.0002
Ciprofloxacin	NA	NA
Cefuroxime	↑ p = 0.001	↑ p = 0.03
3 rd generation cephalosporins	↓ p = 0.08	↑ p = 0.42
Carbapenem	↑ p = 0.1	↑ p = 0.21

EARS-Net 2017, multiresistente *E. coli*: 6,3% (1,5% - 24,9%)

EARS-Net 2017, 3. gen cephalosporin R *E. coli*: 14,9% (5,9% - 41,3%)

EARS-Net 2017, fluoroquinolon R *E. coli*: 25,7% (11,6% - 44,9%)

- Piperacillin/tazobactam (n = 5397)
- Gentamicin (n = 5394)
- Ciprofloxacin (n = 5387)
- Cefuroxime (n = 5391)
- 3rd gen. cephalosporin (n = 5005)
- Carbapenem (n = 4640)
- Amoxicillin/clavulanic acid (n = 3991)

Table 8.3 *Escherichia coli*. Combined resistance to 3rd generation cephalosporins, ciprofloxacin, and gentamicin (multiresistance) in invasive isolates from humans, Denmark
DANMAP 2018

	2014 % (N)	2015 % (N)	2016 % (N)	2017 % (N)	2018 % (N)
Resistance	1.8 (72)	2.3 (93)	1.8 (87)	1.8 (88)	2.0 (100)
Percentage (no.) of isolates tested for combined resistance (multiresistance)	90 (4039)	88 (4071)	98 (4763)	95 (4883)	93 (4997)
Total number of invasive isolates	4495	4614	4841	5114	5398

K. pneumoniae, invasive

Figure 8.6 *K. pneumoniae*. Resistance (%) in invasive isolates from humans, Denmark

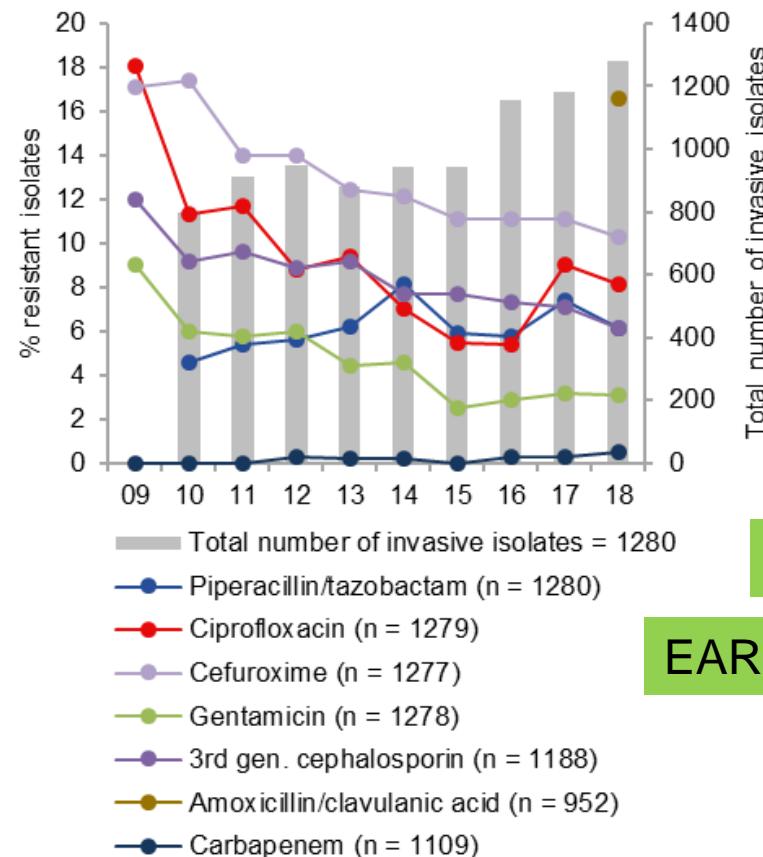


Table 8.5 *K. pneumoniae*. Combined resistance to 3rd generation cephalosporins, ciprofloxacin, and gentamicin (multiresistance) in invasive isolates from humans, Denmark

DANMAP 2018

	2014 % (N)	2015 % (N)	2016 % (N)	2017 % (N)	2018 % (N)
Resistance	3.0 (26)	1.1 (9)	1.6 (18)	2.4 (27)	1.7 (20)
Percentage (no.) of isolates tested for combined resistance (multiresistance)	91 (859)	89 (840)	98 (1131)	95 (1122)	93 (1188)
Total number of invasive isolates	943	943	1156	1183	1280

EARS-Net 2017, multiresistente *K. pneumoniae*: 20,5% (0% - 57,1%)

EARS-Net 2017, 3. gen cephalosporin R *K. pneumoniae*: 31,2% (4,6% - 76,3%)

2018: 2.276 tilfælde med S. aureus bakteriæmier (2009: 1.466 tilfælde)

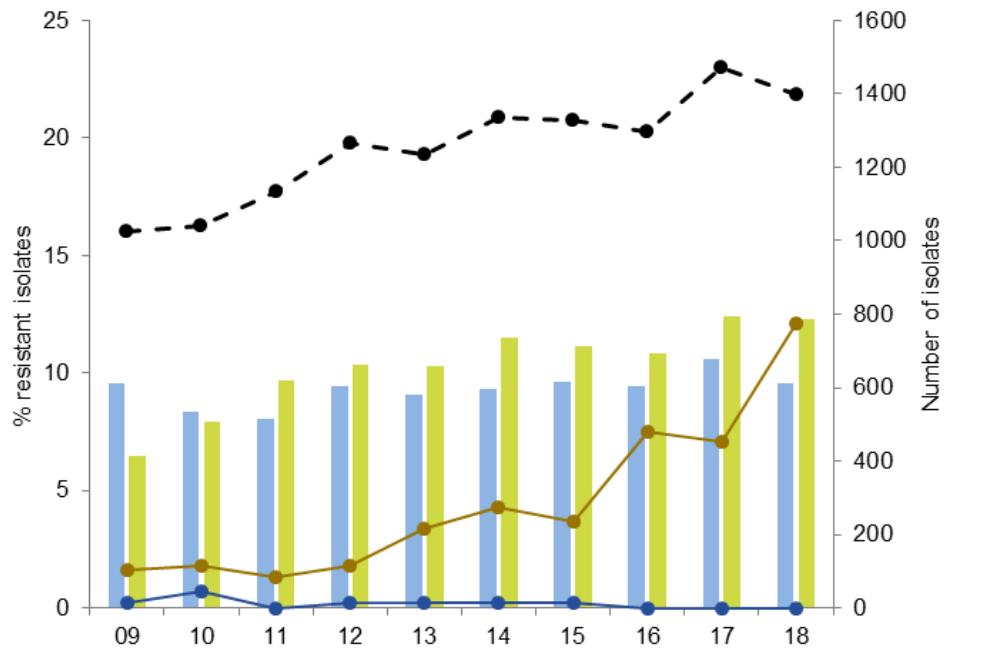
MRSA 1,6%

Table 8.16 Resistance (%) in isolates from *Staphylococcus aureus* bacteraemia cases, Denmark DANMAP 2018

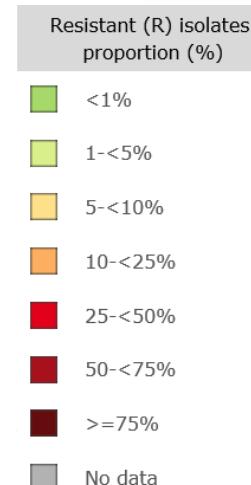
Antimicrobial agent	2009 %	2010 %	2011 %	2012 %	2013 %	2014 %	2015 %	2016 %	2017 %	2018 %
Methicillin	1.6	1.4	1.4	1.2	1.7	2.9	1.5	2.1	2.2	1.6
Penicillin	77	75	77	74	76	77	71	71	72	72
Erythromycin	7	5	7	6	7	8	7	7	6	5
Clindamycin	6	4	6	6	6	8	7	6	5	4
Tetracycline	2	3	2	2	3	5	4	3	3	3
Fusidic acid	9	13	13	14	15	15	16	12	14	17
Rifampicin	<1	<1	<1	<1	0	<1	<1	<1	<1	<1
Norfloxacin	2	3	4	4	5	6	6	4	4	4
Kanamycin	1	1	<1	1	2	2	3	1	1	2
Linezolid	0	0	0	0	0	0	0	0	0	0
Mupirocin	<1	<1	<1	<1	<1	<1	<1	0	<1	0
Trimethoprim-sulfamethoxazole	nt	nt	<1	1	1	1	<1	<1	<1	0
Numbers tested	1479	1416	1515	1523	962	381	502	560	551	504

EARS-Net 2017, MRSA: 16,9% (0% - 57,1%)

Enterokokker, invasive



- Number of *E. faecalis* invasive isolates = 610
- Number of *E. faecium* invasive isolates = 788
- E. faecalis*, vancomycin (n = 576)
- E. faecium*, vancomycin (n = 785)
- ● - Total number of invasive isolates, both species = 1398



EARS-Net 2017, VRE: 14,9% (0% - 43,9%)



Figure 8.14 Numbers of *Enterococcus faecium* and *Enterococcus faecalis* isolates carrying *vanA* and *vanB* genes from clinical samples submitted to SSI 2009-2018 supplemented with data obtained from MiBa from 2016-2018, Denmark

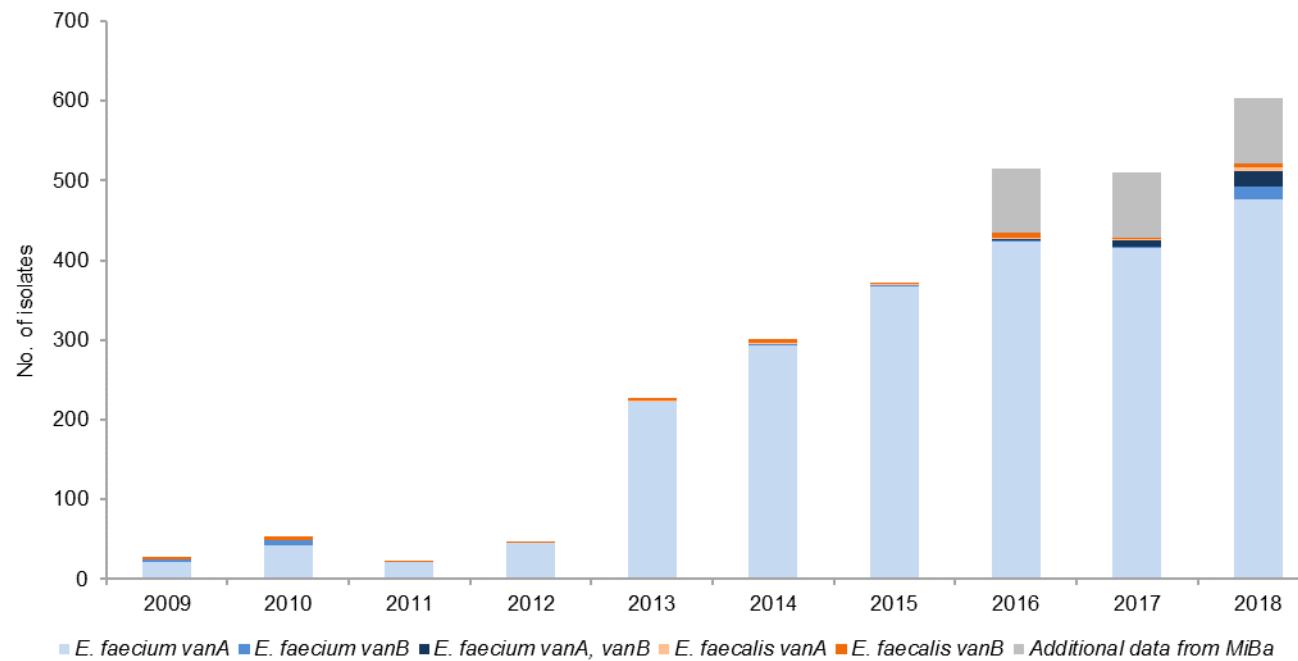
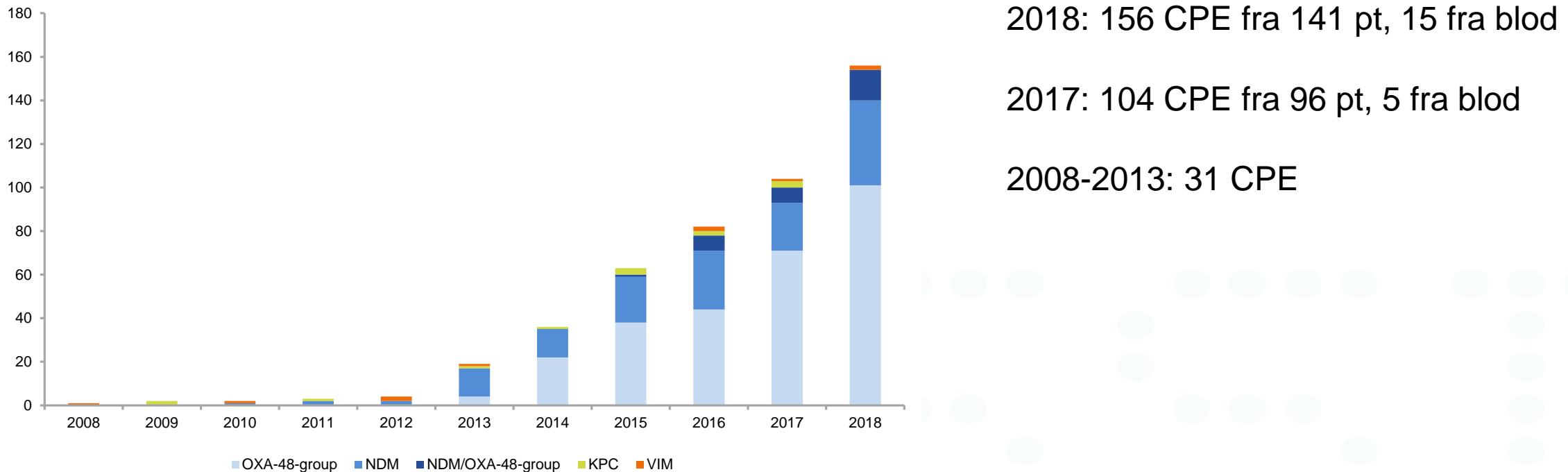




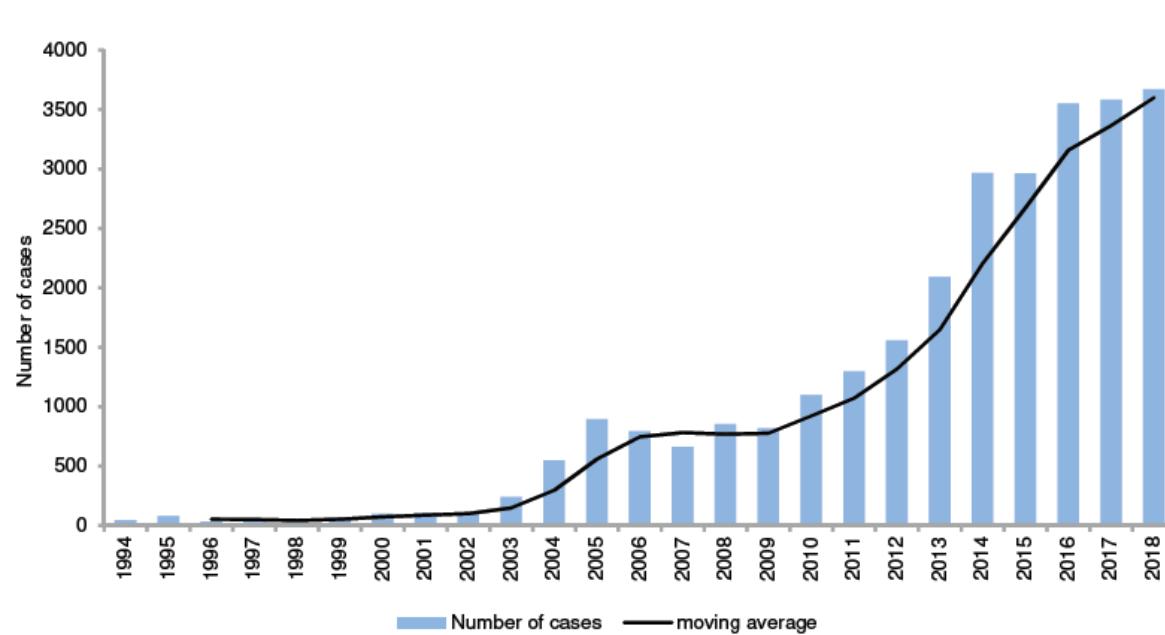
Figure 8.13 Numbers of carbapenemase-producing Enterobacterales (CPE), 2008-2018, Denmark



More than one isolate was included from the same patient, if the isolates belonged to different bacterial species and/or harboured different carbapenemases

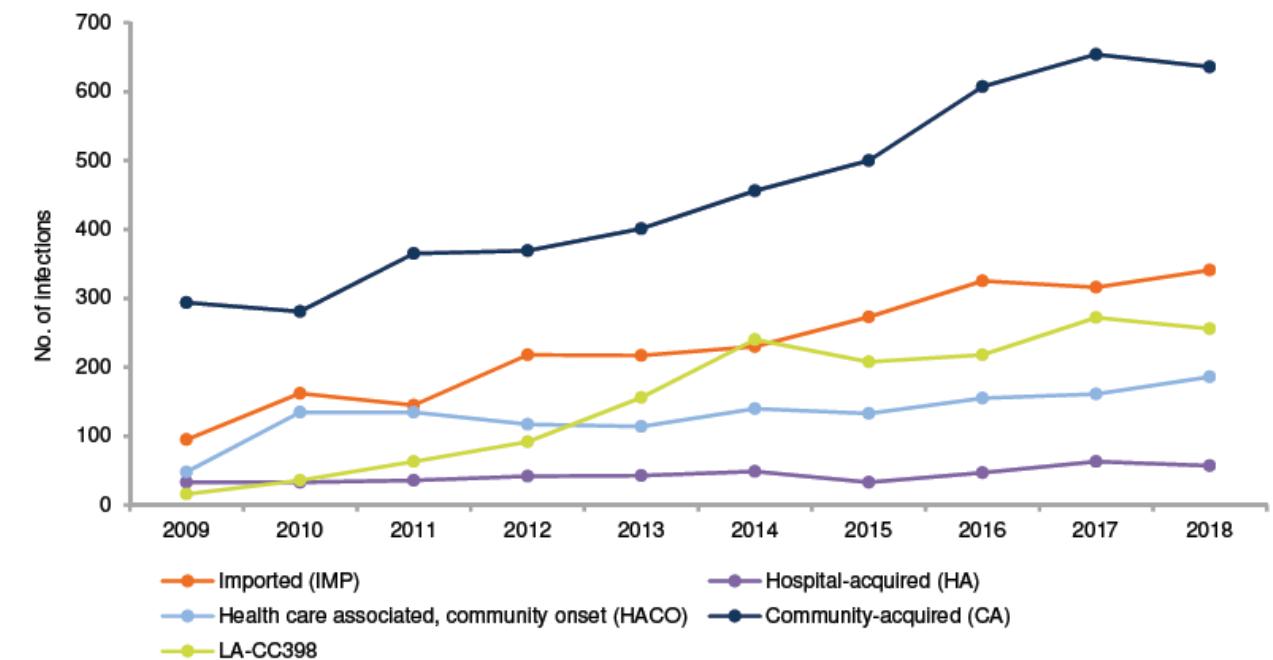
MRSA, nye tilfælde og epidemiologisk udvikling

Figure 8.19 Number of new MRSA cases with a three years moving average, Denmark



2018: 3.669 nye MRSA anmeldelser

Figure 8.20 Number of MRSA infections according to epidemiological classification, Denmark



***Tusind tak til alle vores fantastiske
kolleger:***

På SSI,

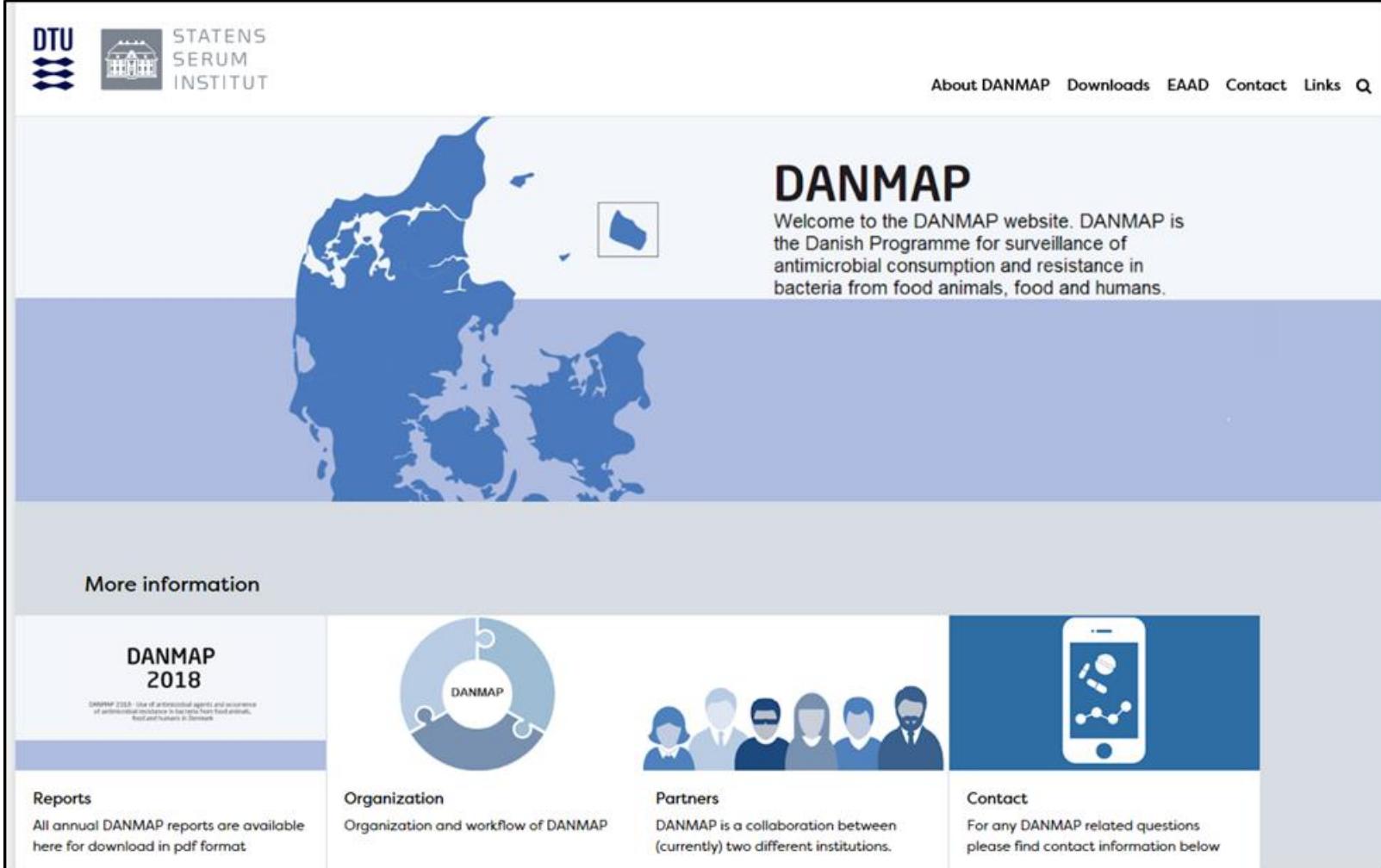
På DTU

I Fødevarestyrelsen

Og til alle vores samarbejdspartnere,
- på institutionerne
- i myndighederne

Og ikke mindst til de læger, tandlæger og
veterinærer,
Der tager prøverne og løfter opgaven
Om en fælles antibiotika-indsats





The screenshot shows the DANMAP website homepage. At the top left is the DTU logo and the Statens Serum Institut logo. At the top right are links for "About DANMAP", "Downloads", "EAAD", "Contact", "Links", and a search icon. Below the header is a large blue map of Denmark and surrounding areas. To the right of the map, the word "DANMAP" is written in large, bold, black capital letters. Below it is a brief description: "Welcome to the DANMAP website. DANMAP is the Danish Programme for surveillance of antimicrobial consumption and resistance in bacteria from food animals, food and humans." In the bottom left corner of the main content area, there is a section titled "More information" with a link to the "DANMAP 2018" report. The report cover is shown, featuring the year "2018" and some small text at the bottom. To the right of the report are four smaller boxes: "Reports" (link to annual reports), "Organization" (link to workflow diagram), "Partners" (link to information about institutions), and "Contact" (link to contact information). Each box contains a small icon related to its content.

Husk også at bruge hjemmesiden: www.DANMAP.org ☺