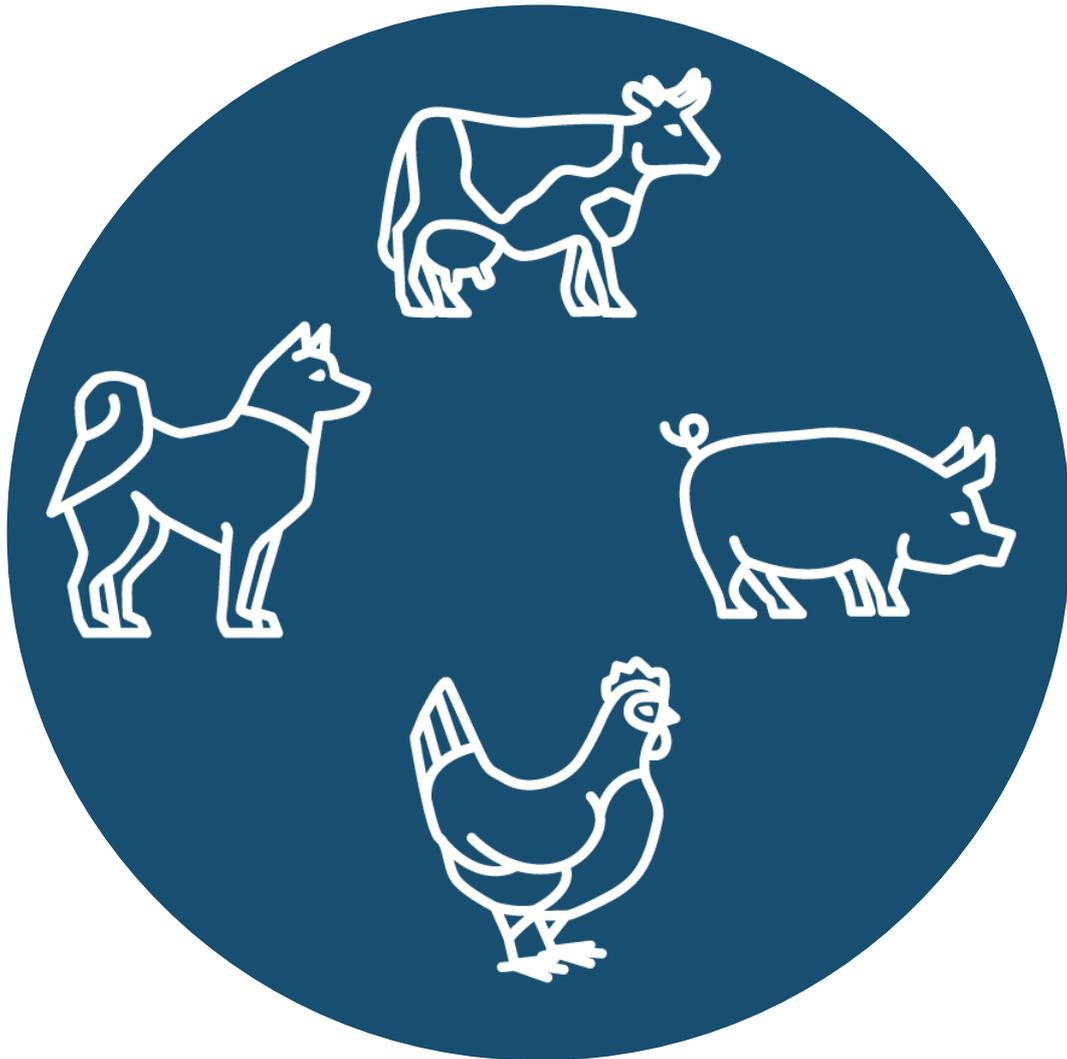# FINRES-Vet 2020

Finnish Veterinary Antimicrobial Resistance Monitoring and Consumption of Antimicrobial Agents
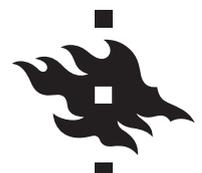
SUMMARY
The full report is available at www.ruokavirasto.fi

RUOKAVIRASTO
Livsmedelsverket • Finnish Food Authority

fimea
Lääkealan turvallisuus- ja kehittämiskeskus
Säkerhets- och utvecklingscentret
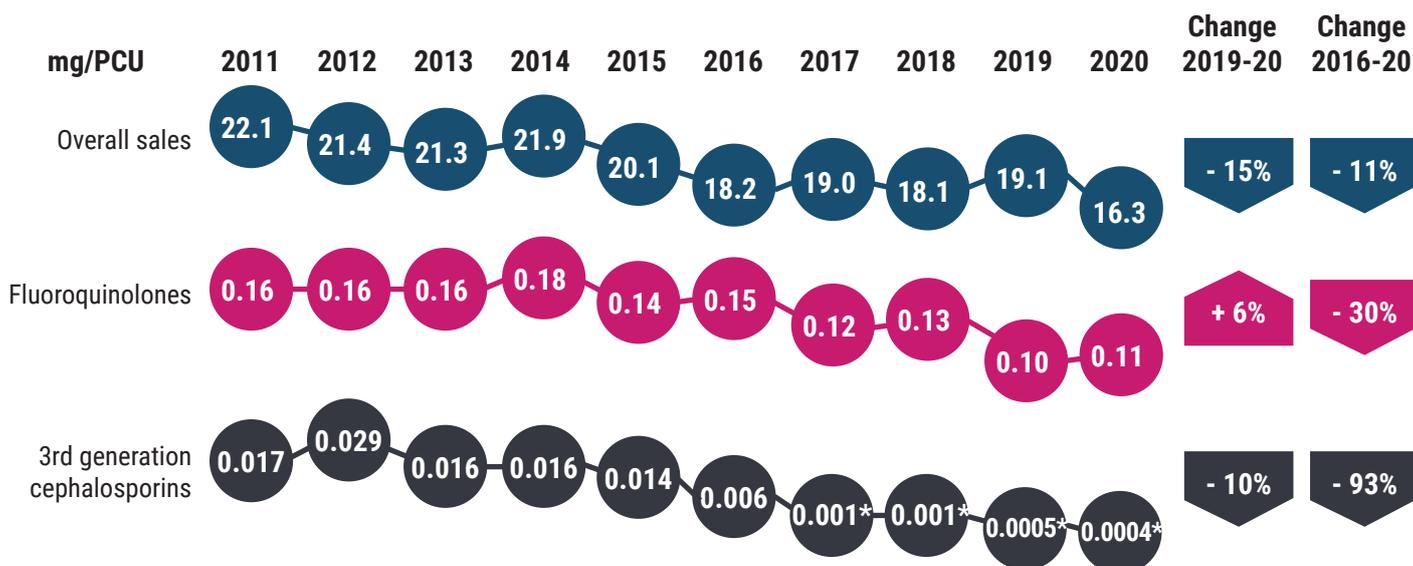för läkemedelsområdet
Finnish Medicines Agency

HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

ANTIBIOTICS FOR FOOD-PRODUCING ANIMALS

EU-indicators for the use of antibiotics in food-producing animals (mg/PCU)

Sales of population adjusted veterinary antibiotics continues to be very low in Finland. In 2020, sales was 16.3 mg/PCU i.e. lower than ever before. Sales decreased by 15% compared to 2019, mainly due to reduced antibiotic use in medicated feed for fur animals.

Sales of critically important antibiotics for human medicine remained very low.

mg/PCU	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Change 2019-20	Change 2016-20
Overall sales	22.1	21.4	21.3	21.9	20.1	18.2	19.0	18.1	19.1	16.3	- 15%	- 11%
Fluoroquinolones	0.16	0.16	0.16	0.18	0.14	0.15	0.12	0.13	0.10	0.11	+ 6%	- 30%
3rd generation cephalosporins	0.017	0.029	0.016	0.016	0.014	0.006	0.001*	0.001*	0.0005*	0.0004*	- 10%	- 93%

*Since 2017, third-generation cephalosporins have been sold only for the treatment of foals and companion animals.
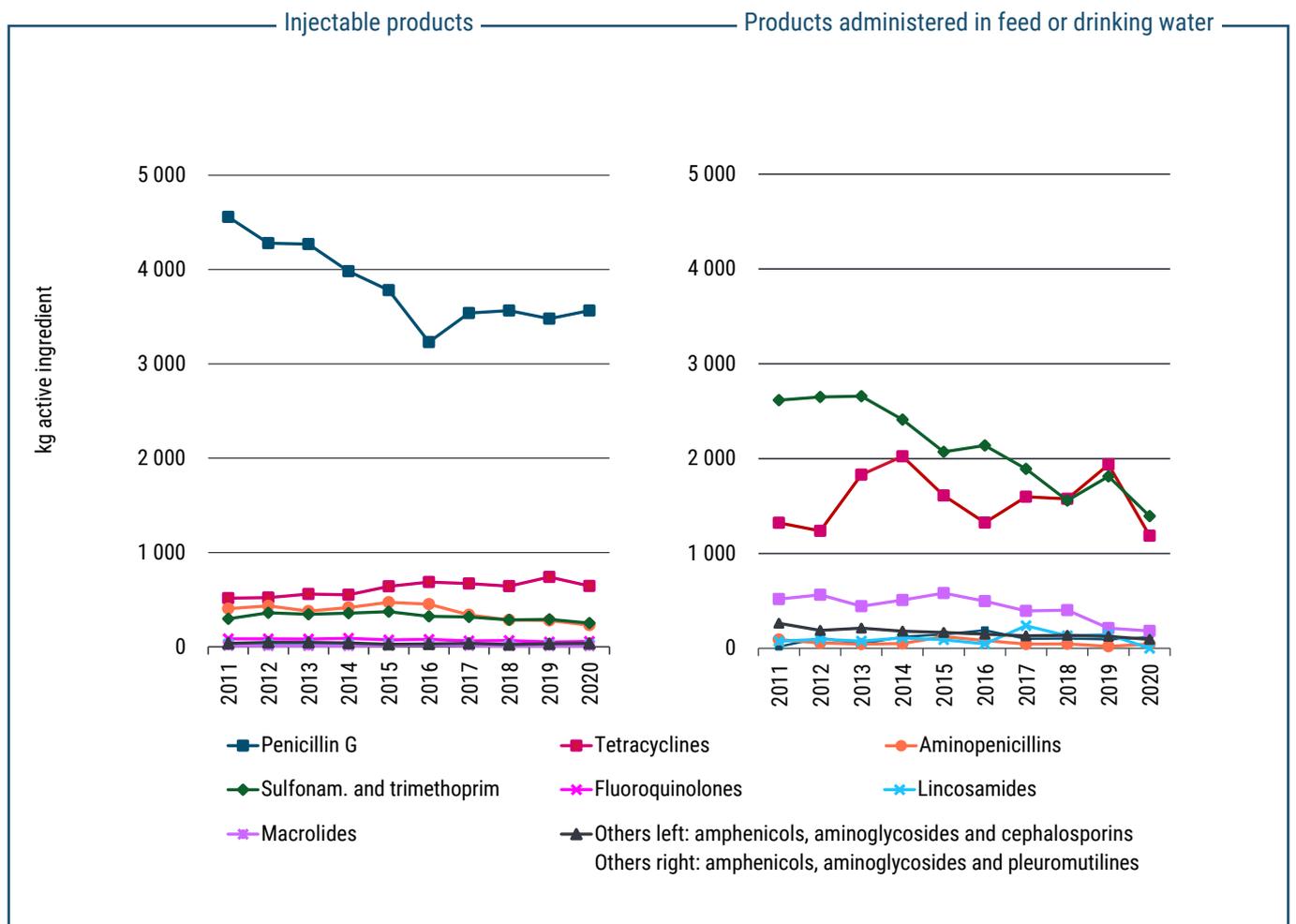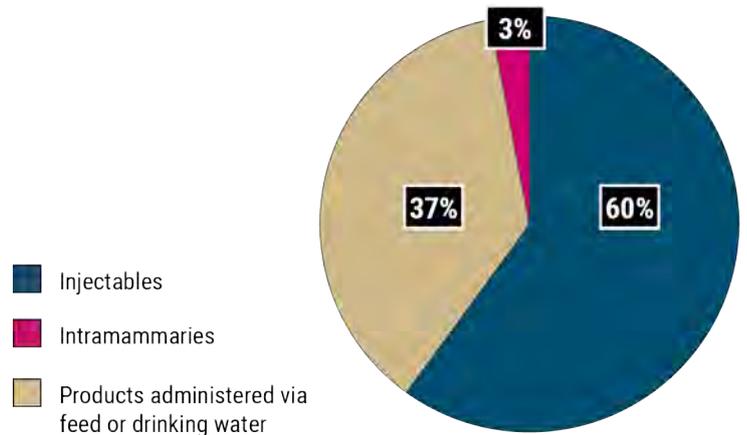
Total sales (kg active ingredient)

Total sales of antibiotics for food-producing animals decreased notably (15%) and was lower in 2020 than ever since the start of the monitoring.

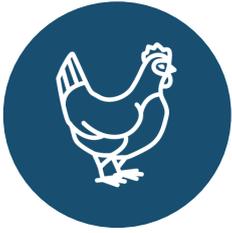| 2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Change 2019-20	Change 2016-20
11 177	10 943	11 297	11 180	10 439	9 511	9 627	9 066	9 449	8 033	- 15%	- 16%

Sales by administration route (kg active ingredient)

Majority of the antibiotics for food-producing animals are given as individual treatment in Finland. Injectable penicillin continues to be the most used antibiotic. Next most sold were orally administered sulfonamide-trimethoprim combination and tetracyclines, whose sales decreased notably in 2020.

- Injectables
- Intramammaries
- Products administered via feed or drinking water

60%   37%   3%

Injectable products —— Products administered in feed or drinking water ——

kg active ingredient

- Penicillin G
- Tetracyclines
- Aminopenicillins
- Sulfonam. and trimethoprim
- Fluoroquinolones
- Lincosamides
- Macrolides
- Others left: amphenicols, aminoglycosides and cephalosporins
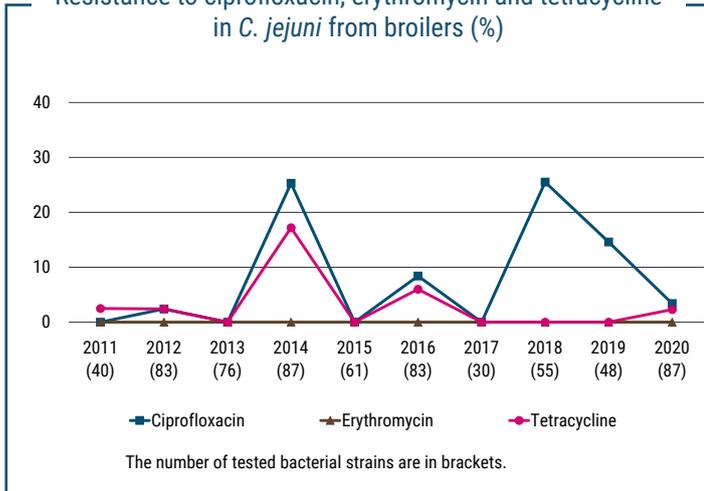 Others right: amphenicols, aminoglycosides and pleuromutilines
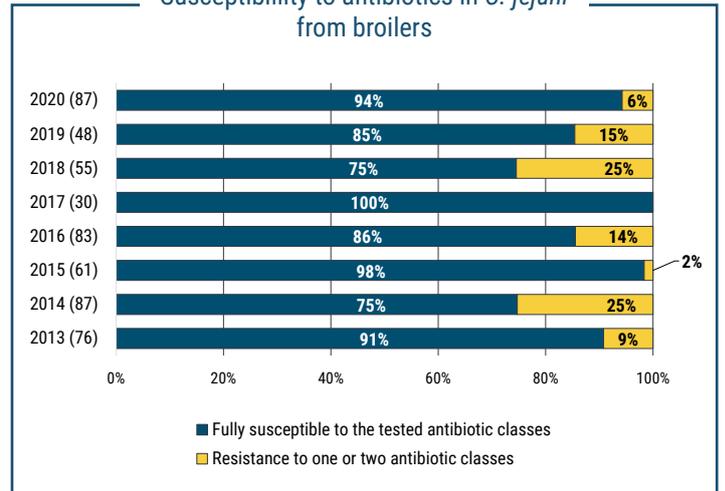
CAMPYLOBACTER IN FOOD-PRODUCING ANIMALS

The majority of campylobacter isolates from the national control programme have been fully susceptible to all of the tested antibiotics. Resistance to quinolones and tetracycline has varied from 2014. Strains concurrently resistant to three or more antibiotic classes (multidrug resistance) have not been detected.

Resistance to ciprofloxacin, erythromycin and tetracycline in *C. jejuni* from broilers (%)
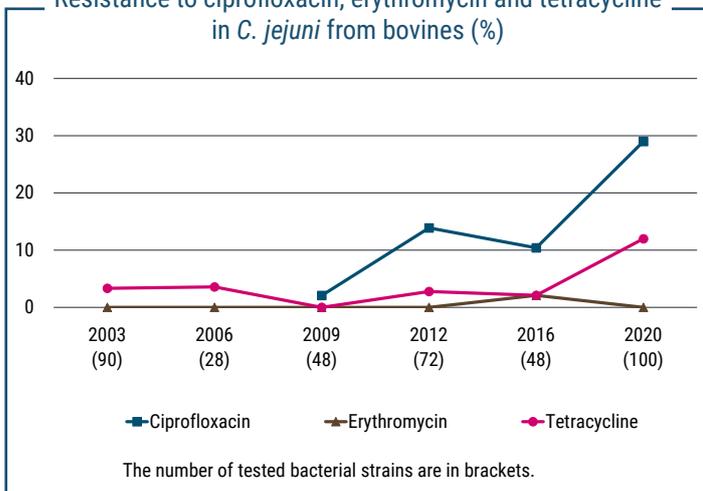

Ciprofloxacin ■ Erythromycin ▲ Tetracycline ●

The number of tested bacterial strains are in brackets.

Susceptibillity to antibiotics in *C. jejuni* from broilers

Year (n)	Fully susceptible	Resistance to one or two antibiotic classes
2020 (87)	94%	6%
2019 (48)	85%	15%
2018 (55)	75%	25%
2017 (30)	100%	
2016 (83)	86%	14%
2015 (61)	98%	2%
2014 (87)	75%	25%
2013 (76)	91%	9%

■ Fully susceptible to the tested antibiotic classes
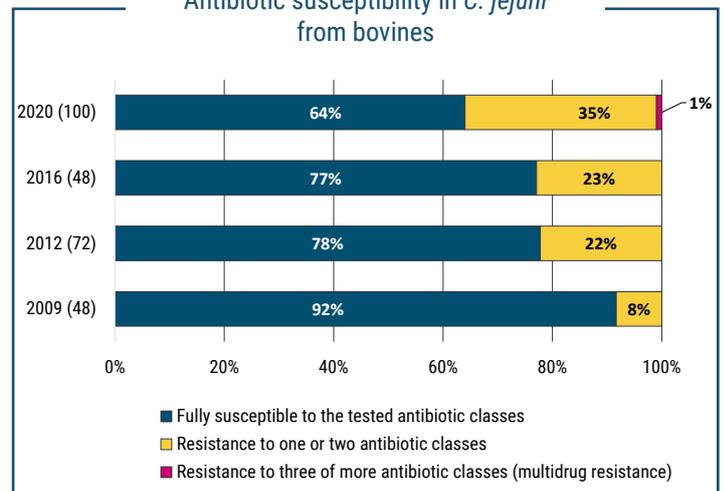▢ Resistance to one or two antibiotic classes

In campylobacter isolated from cattle, resistance against the studied antibiotics has been low until the year 2009. In the second decade of the 21st century, resistance especially against fluorokinolones has increased. In 2020, the first multi-resistant bacterial strain was identified.

Resistance to ciprofloxacin, erythromycin and tetracycline in *C. jejuni* from bovines (%)
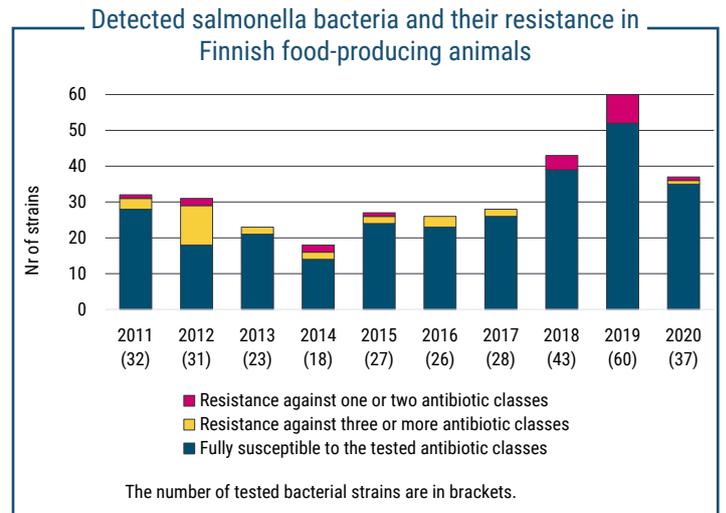

Ciprofloxacin ■ Erythromycin ▲ Tetracycline ●

The number of tested bacterial strains are in brackets.

Antibiotic susceptibility in *C. jejuni* from bovines

Year (n)	Fully susceptible	Resistance to one or two	Multidrug
2020 (100)	64%	35%	1%
2016 (48)	77%	23%	
2012 (72)	78%	22%	
2009 (48)	92%	8%	

■ Fully susceptible to the tested antibiotic classes
▢ Resistance to one or two antibiotic classes
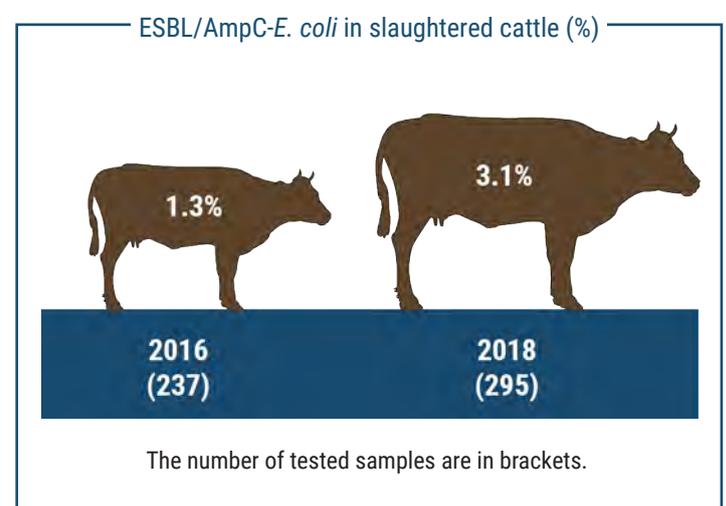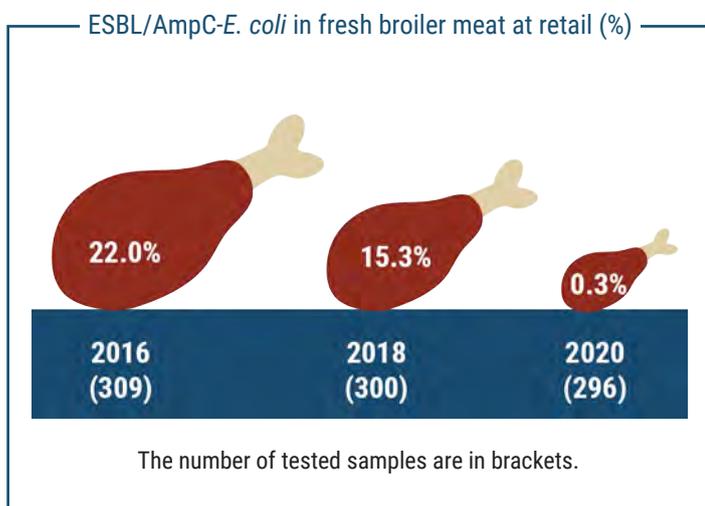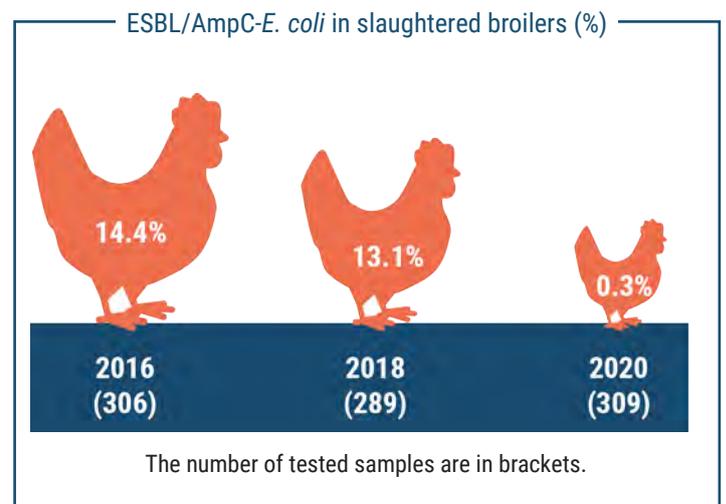■ Resistance to three of more antibiotic classes (multidrug resistance)

SALMONELLA IN FOOD-PRODUCING ANIMALS

Salmonella bacteria isolated from Finnish food-producing animals have mostly been susceptible to the tested antibiotic classes. In 2018 and 2019, multiresistant salmonella strains were more often detected. In 2020, resistance was found only in a few strains.

Detected salmonella bacteria and their resistance in Finnish food-producing animals

Nr of strains

| 2011 (32) | 2012 (31) | 2013 (23) | 2014 (18) | 2015 (27) | 2016 (26) | 2017 (28) | 2018 (43) | 2019 (60) | 2020 (37) |

■ Resistance against one or two antibiotic classes
■ Resistance against three or more antibiotic classes
■ Fully susceptible to the tested antibiotic classes

The number of tested bacterial strains are in brackets.

ESBL BACTERIA IN FOOD-PRODUCING ANIMALS AND MEAT

The prevalence of ESBL- and AmpC-producing *E. coli* in broilers and broiler meat has decreased significantly between the years 2016 and 2020. In 2020, the prevalence in both was only 0.3%. In cattle, these bacteria were detected in 3% of the samples. Carbapenemase-producing *E. coli* have not been found.

ESBL/AmpC-*E. coli* in slaughtered broilers (%)

14.4% — 2016 (306)
13.1% — 2018 (289)
0.3% — 2020 (309)

The number of tested samples are in brackets.

ESBL/AmpC-*E. coli* in fresh broiler meat at retail (%)

22.0% — 2016 (309)
15.3% — 2018 (300)
0.3% — 2020 (296)

The number of tested samples are in brackets.

ESBL/AmpC-*E. coli* in slaughtered cattle (%)

1.3% — 2016 (237)
3.1% — 2018 (295)

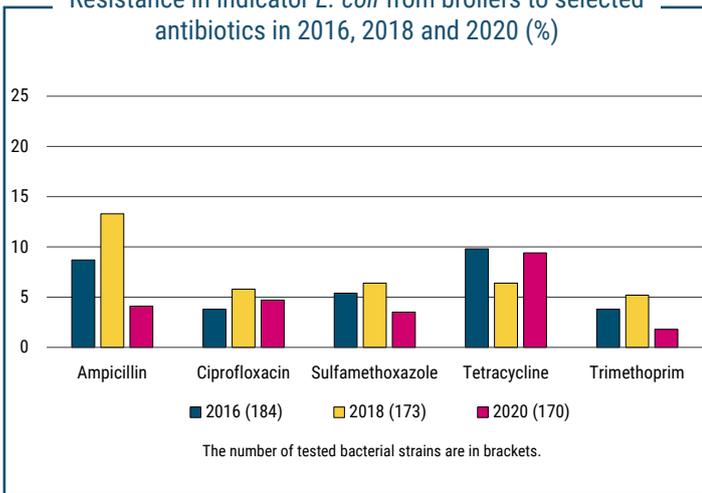The number of tested samples are in brackets.

INDICATOR BACTERIA IN FOOD-PRODUCING ANIMALS

The majority of indicator *E. coli* isolates from broilers is fully susceptible to the tested antibiotic classes. Resistance is mostly detected against ampicillin, tetracycline, sulfamethoxazole, trimethoprim and ciprofloxacin. The proportion of multidrug-resistance was 2% in 2020.

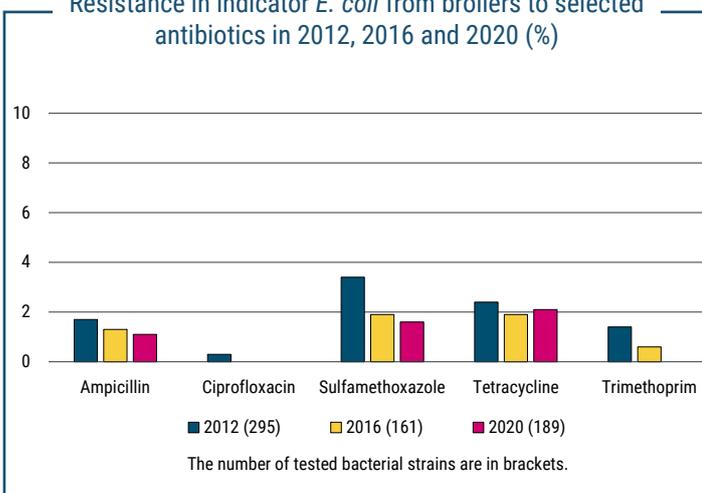### Resistance in indicator *E. coli* from broilers to selected antibiotics in 2016, 2018 and 2020 (%)

Legend:
- 2016 (184)
- 2018 (173)
- 2020 (170)

The number of tested bacterial strains are in brackets.

Antibiotic susceptibility in indicator *E. coli* from broilers

Year	Fully susceptible	Resistance to one or two	Resistance to three or more
2020	83%	15%	2%
2018	81%	14%	5%
2016	83%	14%	4%

Legend:
- Fully susceptible to the tested antibiotic classes
- Resistance to one or two antibiotic classes
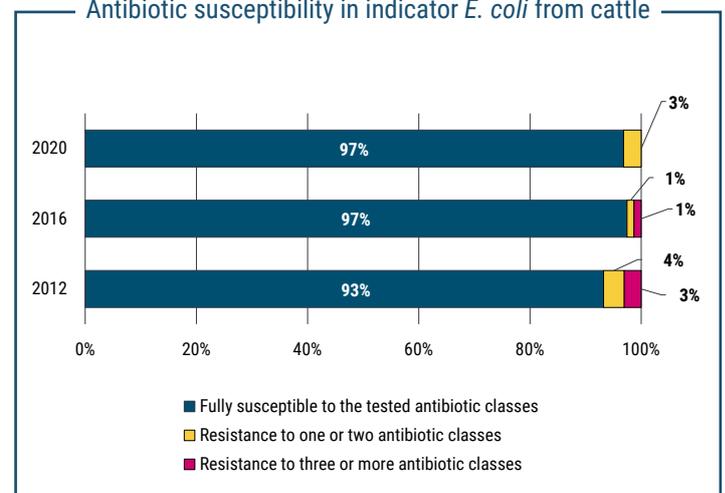- Resistance to three or more antibiotic classes
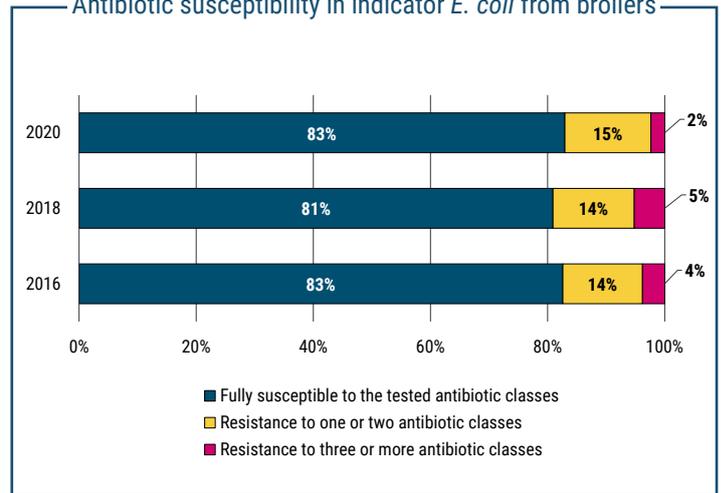
Antibiotic resistance is very low in *E. coli* from cattle. Resistance in bacteria isolated from cattle is followed every fourth year. Tetracycline resistance was most common in 2020 (2%).

Resistance in indicator *E. coli* from broilers to selected antibiotics in 2012, 2016 and 2020 (%)

Legend:
- 2012 (295)
- 2016 (161)
- 2020 (189)

The number of tested bacterial strains are in brackets.

Antibiotic susceptibility in indicator *E. coli* from cattle

Year	Fully susceptible	Resistance to one or two	Resistance to three or more
2020	97%	3%	1%
2016	97%	1%	1%
2012	93%	4%	3%

Legend:
- Fully susceptible to the tested antibiotic classes
- Resistance to one or two antibiotic classes
- Resistance to three or more antibiotic classes

# PATHOGENS IN FOOD-PRODUCING ANIMALS

Among bovine respiratory pathogens, antibiotic susceptibilities of *Mannheimia haemolytica*, *Pasteurella multocida* and *Histophilus somni* bacteria isolated from diseased animals are reported. The proportion of intermediate and resistant bacteria has decreased during year 2020. No tulathromycin resistance was detected.

The proportion (%) of *M. haemolytica* from bovine respiratory disease with decreased susceptibility*

The number of bacteria in each year in brackets.
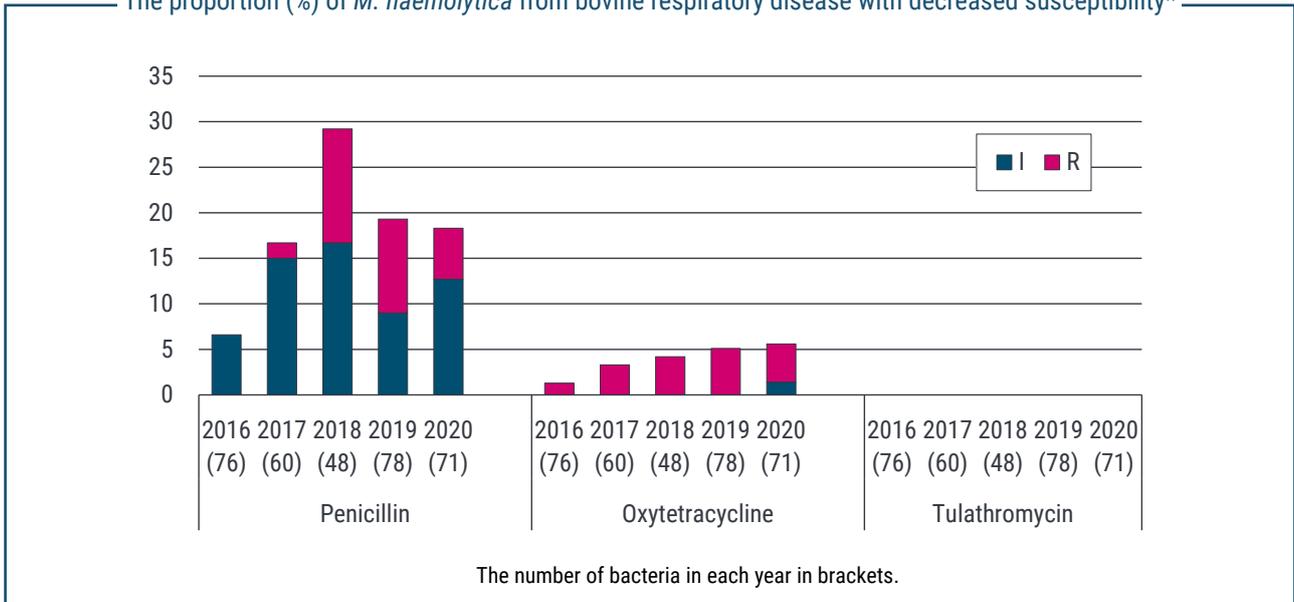
The proportion (%) of *P. multocida* from bovine respiratory disease with decreased susceptibility*
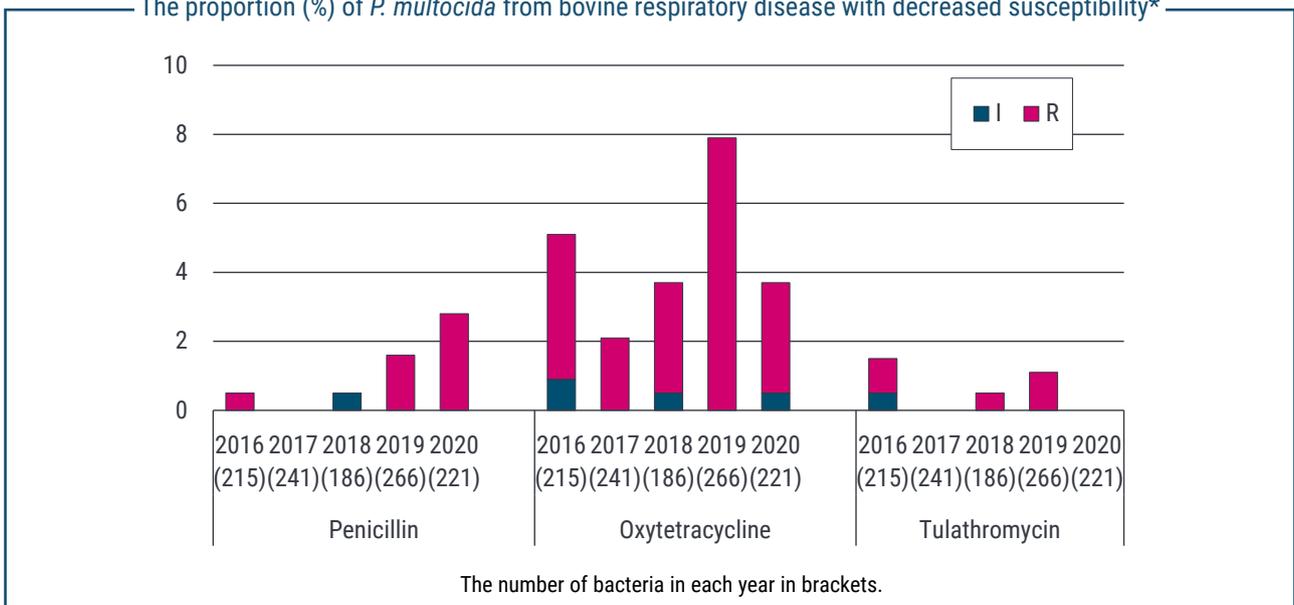
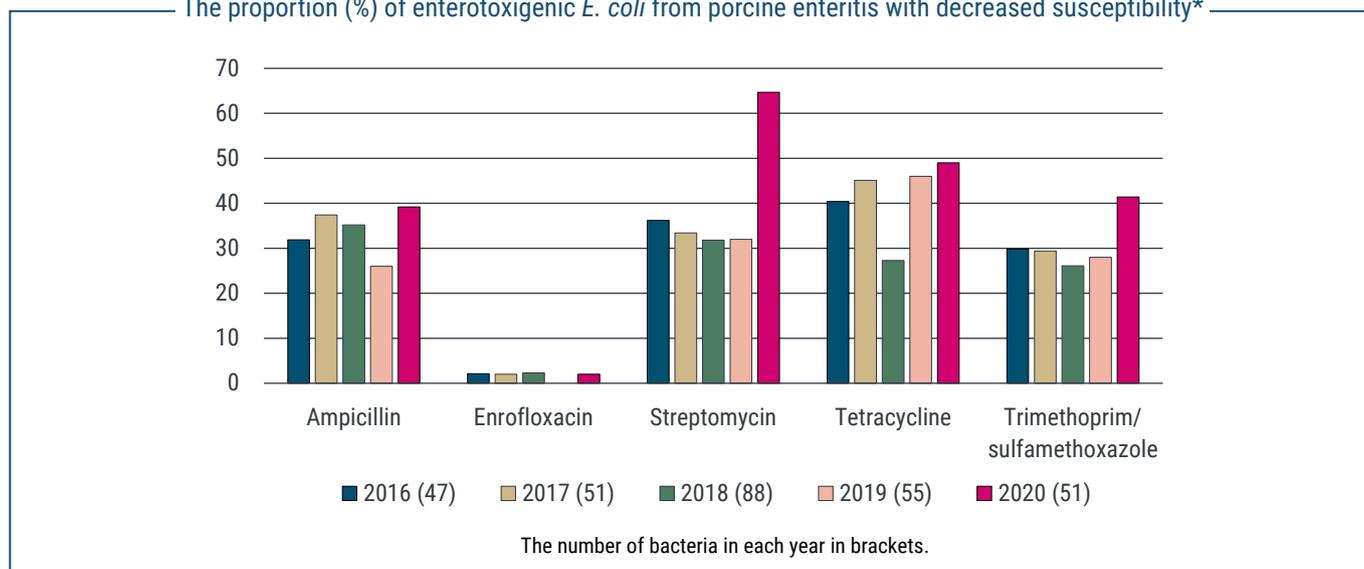The number of bacteria in each year in brackets.

*Decreased susceptibility means that bacterial strains are phenotypically either resistant (R) or intermediately susceptible (I) to the antibiotic in question according to clinical breakpoints.
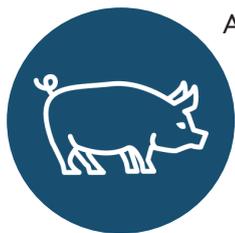
Among swine pathogens, the antibiotic susceptibilities of enterotoxigenic *E. coli*, B*rachyspira pilosicoli* and *Actinobacillus pleuropneumoniae* isolates from diseased animals are reported. In *B. pilosicoli* and *A. pleuropneumoniae*, no significant changes were detected in 2020 compared to the previous years. In enterotoxigenic *E. coli*, resistance to several antibiotics was common as in previous years and the proportion of resistance to several antibiotics increased compared to previous years.

Also multidrug resistance was detected in higher proportion of isolates than before. AmpC-producing *E. coli* was detected in 5 farms but no ESBL-producers were detected.

The proportion (%) of enterotoxigenic *E. coli* from porcine enteritis with decreased susceptibility*

2016 (47)   2017 (51)   2018 (88)   2019 (55)   2020 (51)

The number of bacteria in each year in brackets.

Among poultry pathogens, the antibiotic susceptibilities of *E. coli* from colibacillosis cases and *Staphylococcus aureus* from arthritis and tenosynovitis are reported. In 2020, no resistance to the tested antibiotics was detected in *S. aureus* strains when clinical breakpoints were applied. In *E. coli*, no resistance to fluoroquinolones or 3rd generation cephalosporins was detected.

The proportion (%) of E. coli from broiler colibacillosis with decreased susceptibility*
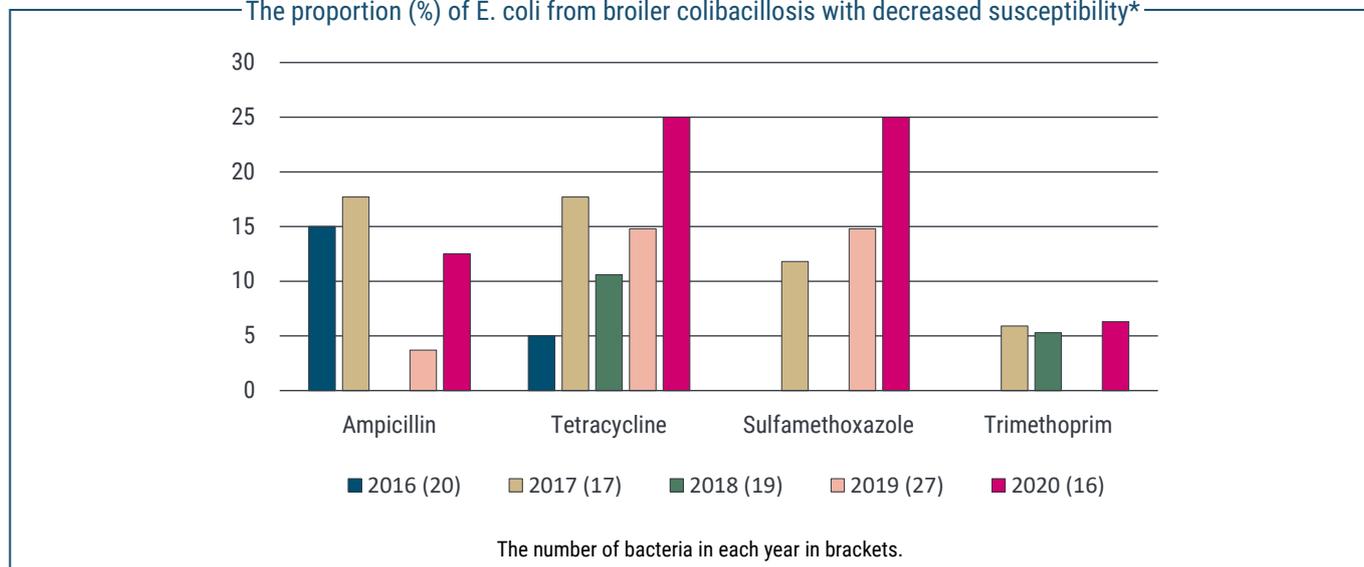
2016 (20)   2017 (17)   2018 (19)   2019 (27)   2020 (16)

The number of bacteria in each year in brackets.

*Decreased susceptibility means that bacterial strains are phenotypically either resistant (R) or intermediately susceptible (I) to the antibiotic in question according to clinical breakpoints.

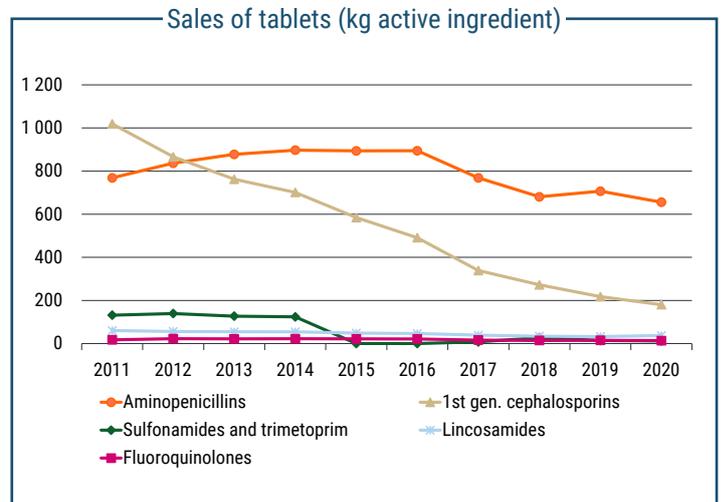# ANTIBIOTICS AND PATHOGENS IN COMPANION ANIMALS

Monitoring of sales of antibiotics intended for companion animals is currently possible only for tablet products.
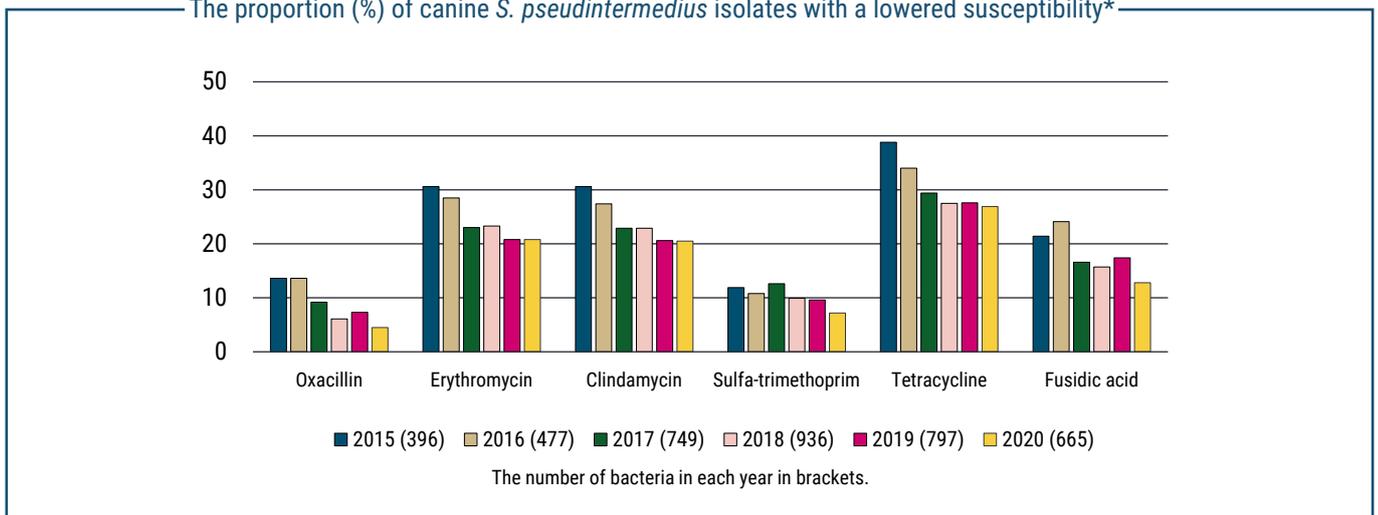
The number of dogs and cats

According to Statistics Finland, number of dogs and cats in Finland was about 700 000 and 600 000, respectively, in 2016.
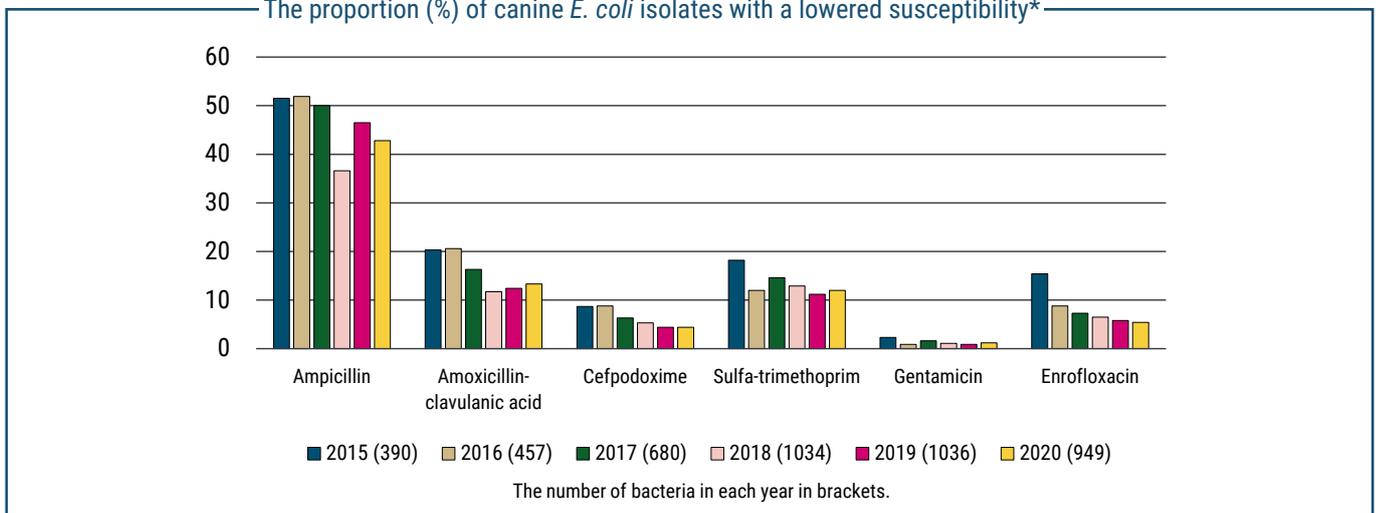
Sales of tablets

The decrease in sales of tablets for companion animals continued and has halved in ten years. Sales of first-generation cephalosporins has decreased the most. Aminopenicillins and fluoroquinolones were sold slightly less and sales of lincosamides increased.

Sales of tablets (kg active ingredient)

Legend: Aminopenicillins, 1st gen. cephalosporins, Sulfonamides and trimetoprim, Lincosamides, Fluoroquinolones

The proportion (%) of canine *S. pseudintermedius* isolates with a lowered susceptibility*

2015 (396) 2016 (477) 2017 (749) 2018 (936) 2019 (797) 2020 (665)

The number of bacteria in each year in brackets.

The proportion (%) of canine *E. coli* isolates with a lowered susceptibility*

2015 (390) 2016 (457) 2017 (680) 2018 (1034) 2019 (1036) 2020 (949)

The number of bacteria in each year in brackets.

The proportion of ESBL among canine *E. coli* has decreased steadily from 2015 being only 0.5% in 2020.

*Decreased susceptibility means that bacterial strains are phenotypically either resistant (R) or intermediately susceptible (I) to the antibiotic in question according to clinical breakpoints.