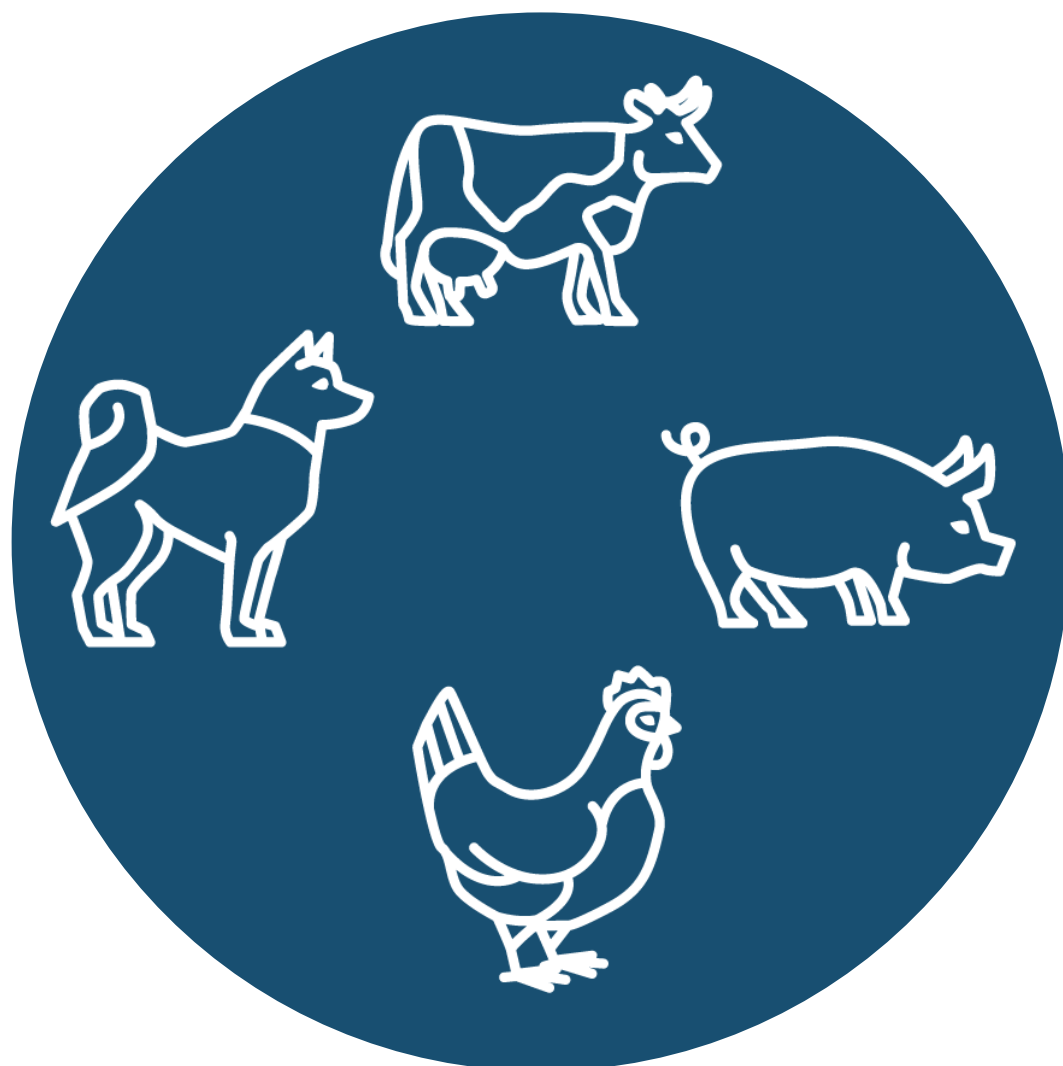# FINRES-Vet 2022

Finnish Veterinary Antimicrobial Resistance Monitoring and Consumption of Antimicrobial Agents

SUMMARY

The full report is available at www.ruokavirasto.fi
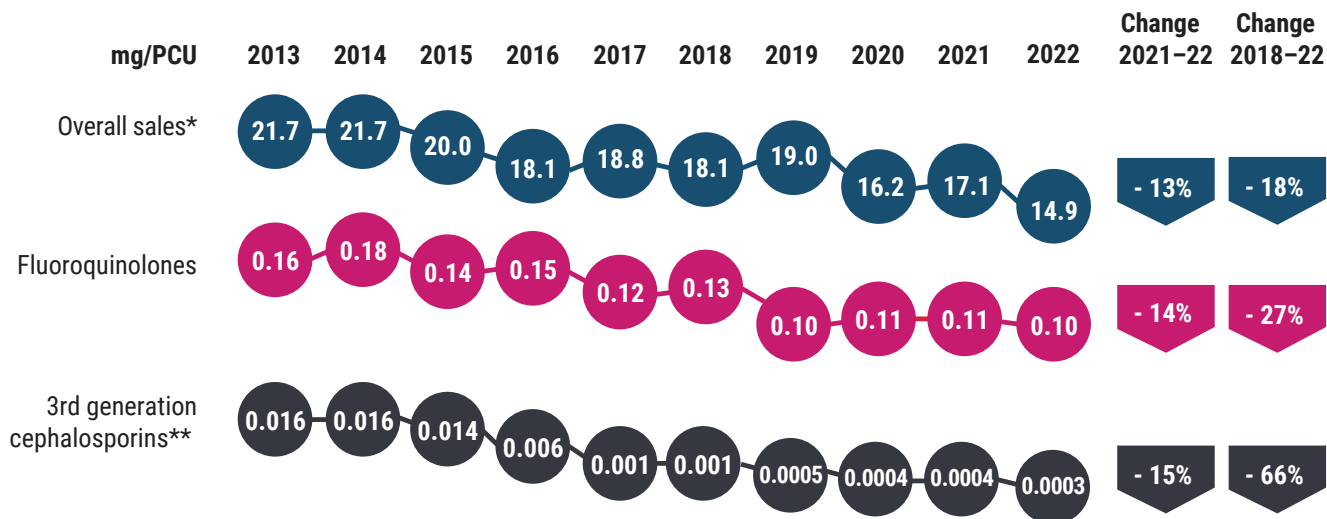
ANTIBIOTICS FOR FOOD-PRODUCING ANIMALS

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

Population adjusted sales of veterinary antibiotics decreased by 13% in 2022. In 2022, sales 14.9 mg/PCU was the lowest ever reported during ESVAC surveillance which began in 2010. Sales of critically important antibiotics for human medicine continued to decrease.
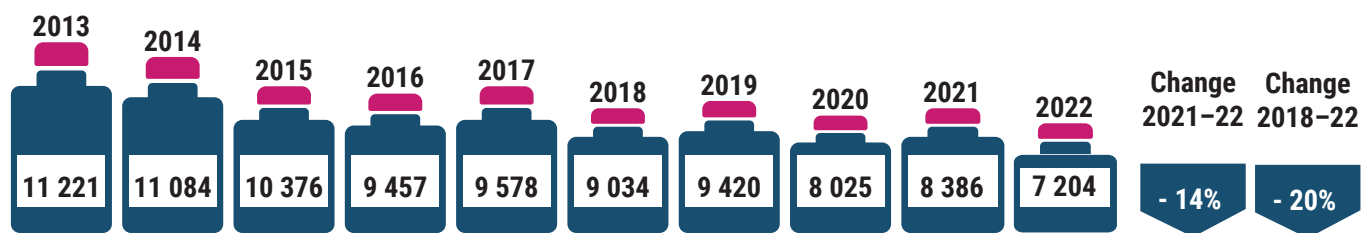
mg/PCU	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Change 2021–22	Change 2018–22
Overall sales*	21.7	21.7	20.0	18.1	18.8	18.1	19.0	16.2	17.1	14.9	- 13%	- 18%
Fluoroquinolones	0.16	0.18	0.14	0.15	0.12	0.13	0.10	0.11	0.11	0.10	- 14%	- 27%
3rd generation cephalosporins**	0.016	0.016	0.014	0.006	0.001	0.001	0.0005	0.0004	0.0004	0.0003	- 15%	- 66%

* Corrected, effect <1% per year.

** Since 2017, 3rd generation cephalosporins have been sold only for the treatment of foals and companion animals.

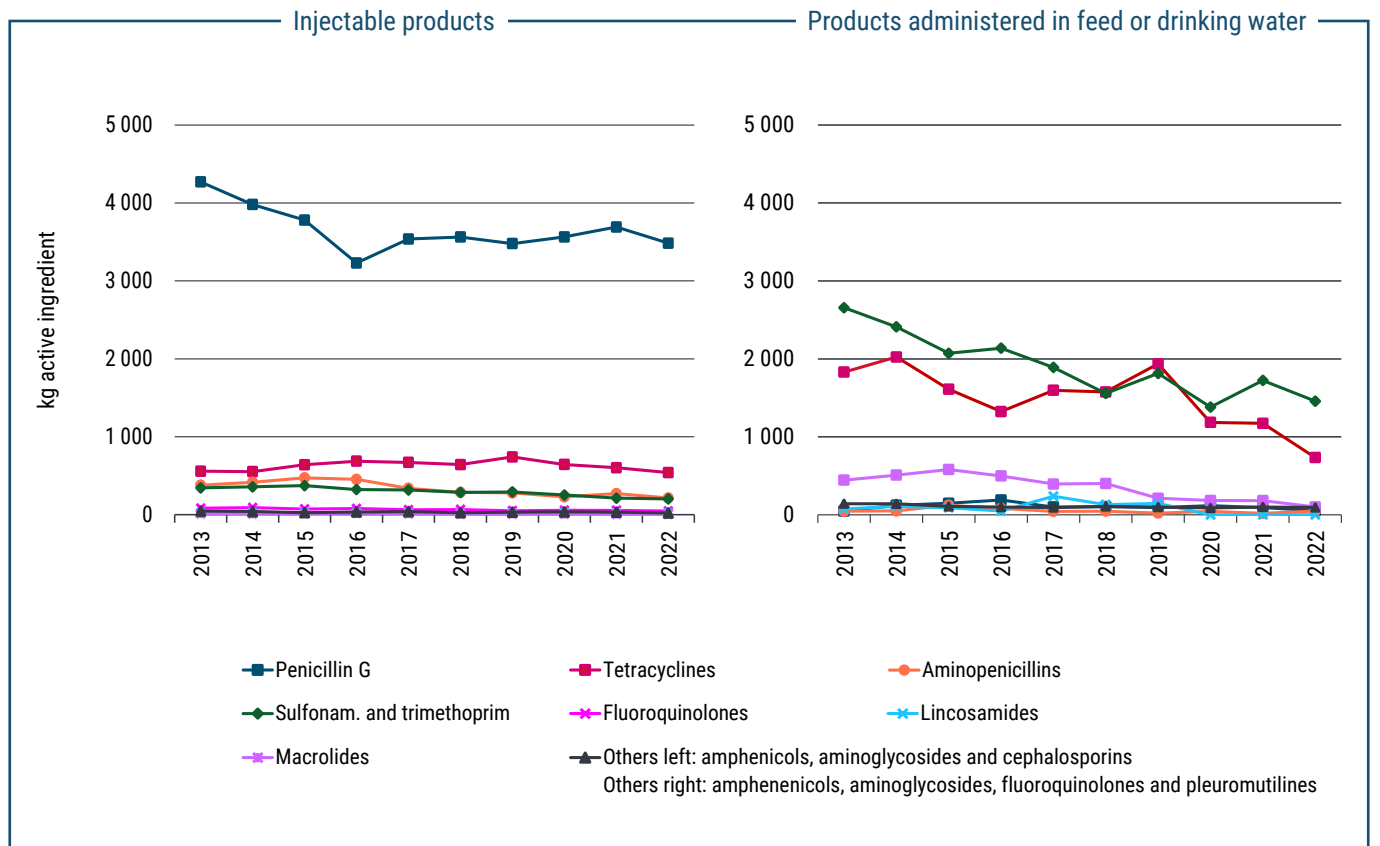## Total sales (kg active ingredient)*

Total sales for use in food-producing animals decreased by 14% and was lower than ever before. On international comparison use of antibiotics in Finland continues to be modest and prudent both considering EU-indicators and total sales.

2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Change 2021–22	Change 2018–22
11 221	11 084	10 376	9 457	9 578	9 034	9 420	8 025	8 386	7 204	- 14%	- 20%

* Corrected, effect <1% per year.

Sales by administration route (kg active ingredient)

Three quarters of the antibiotics for food-producing animals were products intended for treatment of individual animals (injectables, oral paste, intramammaries). The remaining quarter was antibiotics administered via feed or drinking water to groups of animals. By far the most used antimicrobial was injectable penicillin followed by oral sulfonamide-trimethoprim combination and oral tetracyclines.

26%

74%

- Injectables, oral paste and intramammaries
- Products administered via feed or drinking water

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: amphenenicols, aminoglycosides, fluoroquinolones and pleuromutilines
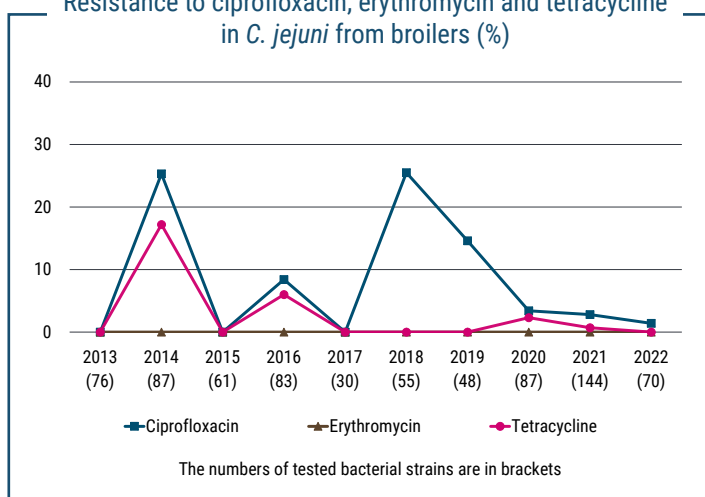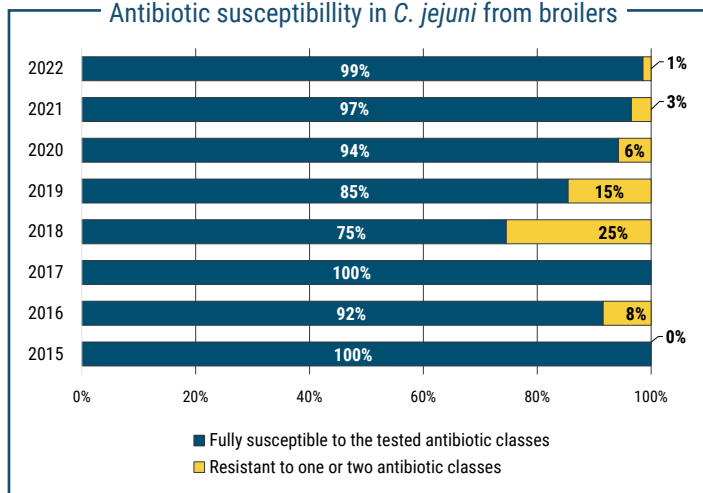
CAMPYLOBACTER IN FOOD-PRODUCING ANIMALS

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. Between 2020 and 2022 there has been very few resistant isolates.

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

Ciprofloxacin   Erythromycin   Tetracycline

The numbers of tested bacterial strains are in brackets

Antibiotic susceptibillity in *C. jejuni* from broilers

Year	Fully susceptible	Resistant
2022	99%	1%
2021	97%	3%
2020	94%	6%
2019	85%	15%
2018	75%	25%
2017	100%	
2016	92%	8%
2015	100%	0%

Fully susceptible to the tested antibiotic classes
Resistant to one or two antibiotic classes

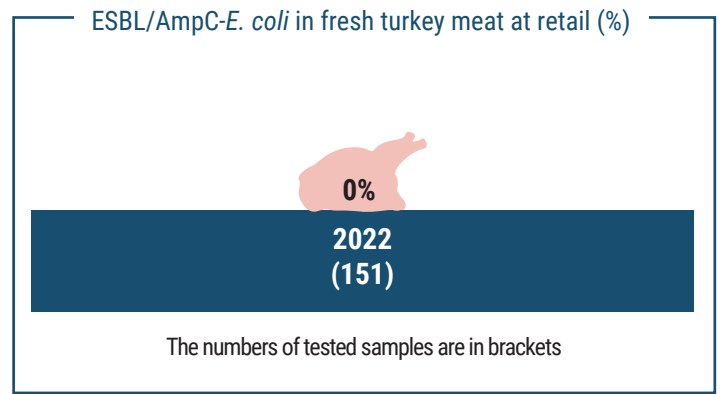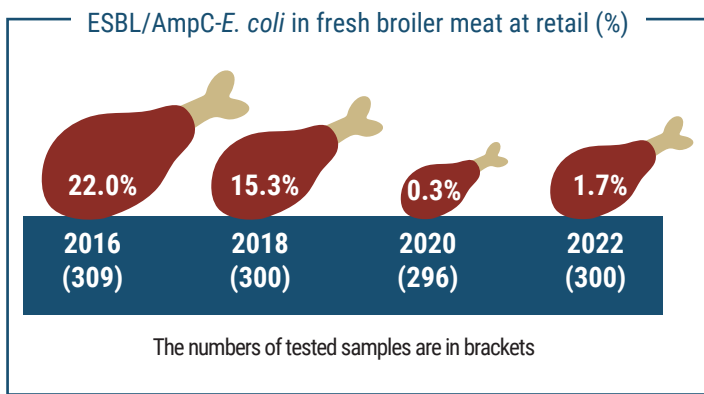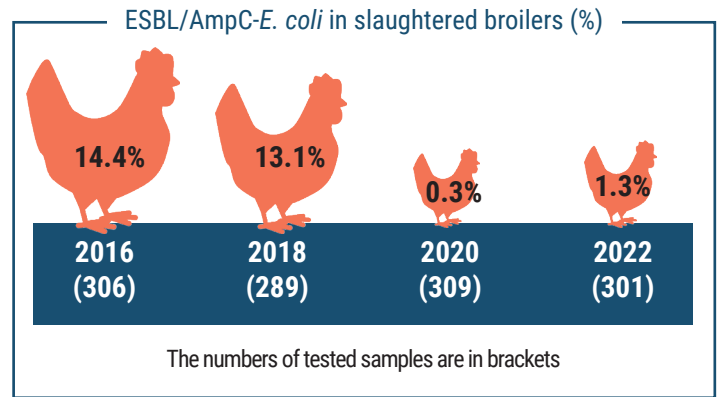# SALMONELLA IN FOOD-PRODUCING ANIMALS

Salmonella isolated from Finnish food-producing animals have mostly been susceptible to the tested antibiotic classes. Multiresistant salmonella strains have been detected yearly since 2018, and they have originated from chicken, pig and cattle farms. In 2022, one isolate from pigs and one isolate from cattle was found resistant to several antibiotics.

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

Nr of strains

Resistant to three or more antibiotic classes
Resistant to one or two antibiotic classes
Fully susceptible to the tested antibiotic classes

The numbers of tested bacterial strains are in brackets

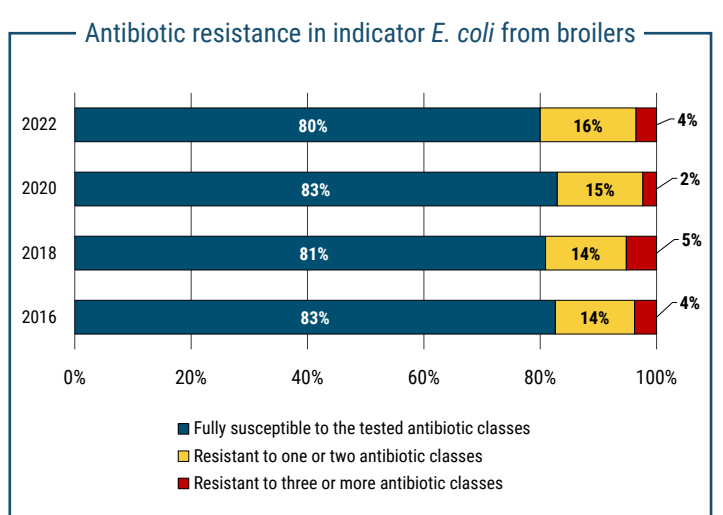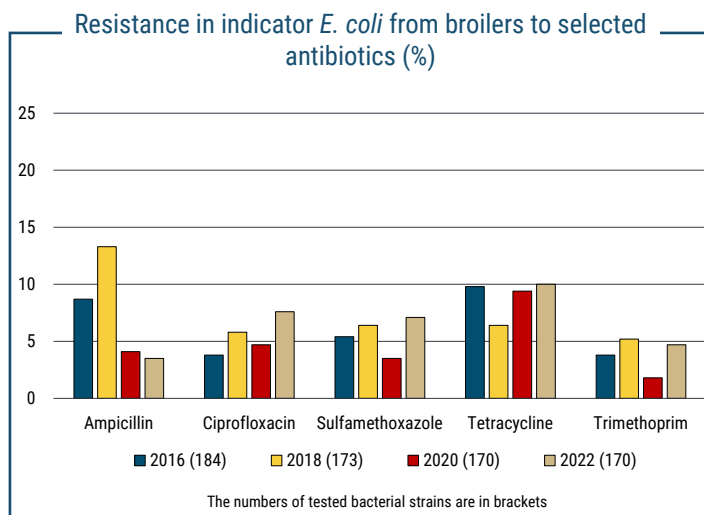# ESBL BACTERIA IN FOOD-PRODUCING ANIMALS AND MEAT

The prevalence of ESBL- and AmpC-producing *E. coli* in broilers and broiler meat has decreased significantly between the years 2016 and 2020. In 2022, the prevalence was 1.3% in broilers and 1.7% in broiler meat. In 2022, each sample from broilers consisted of a pooled sample of ten birds instead of a sample from one bird as in the previous years. In turkey meat, which was included in the monitoring for the first time, neither ESBL- nor AmpC-producing *E. coli* were deteted. Carbapenemase-producing *E. coli* have not been found.

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

14.4%	13.1%	0.3%	1.3%
2016 (306)	2018 (289)	2020 (309)	2022 (301)

The numbers of tested samples are in brackets

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

22.0%	15.3%	0.3%	1.7%
2016 (309)	2018 (300)	2020 (296)	2022 (300)

The numbers of tested samples are in brackets

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

0%
2022 (151)

The numbers of tested samples are in brackets

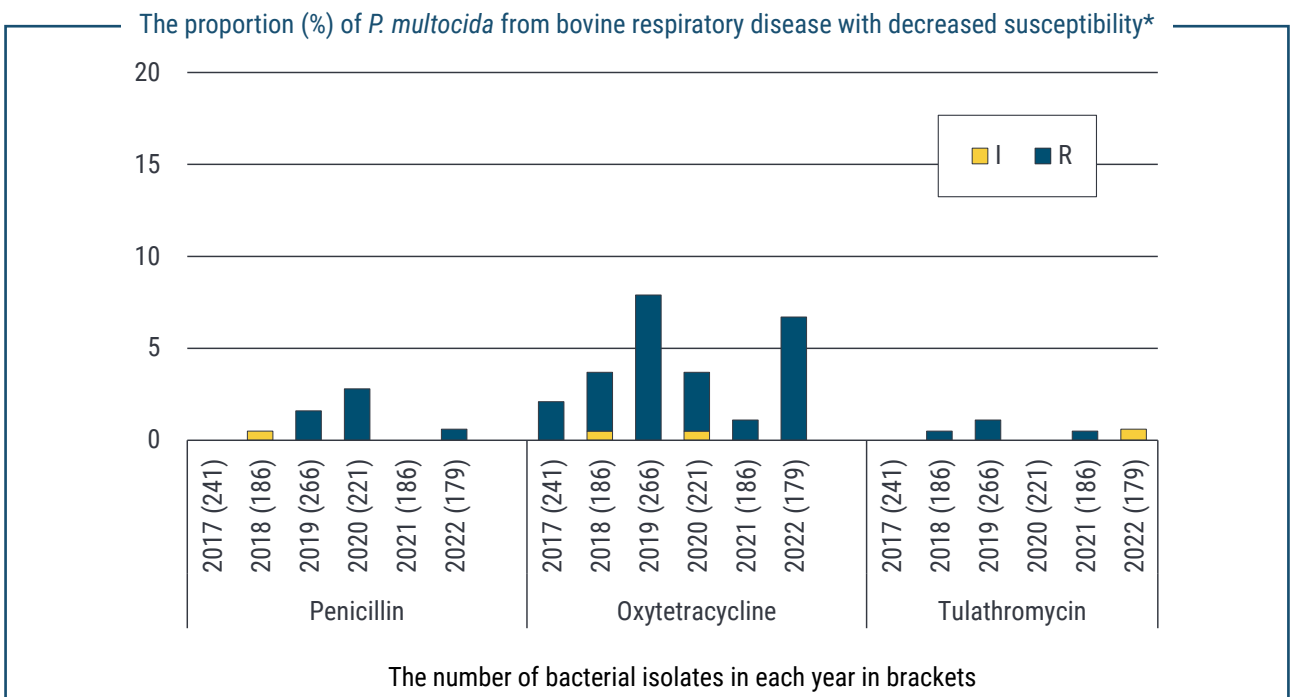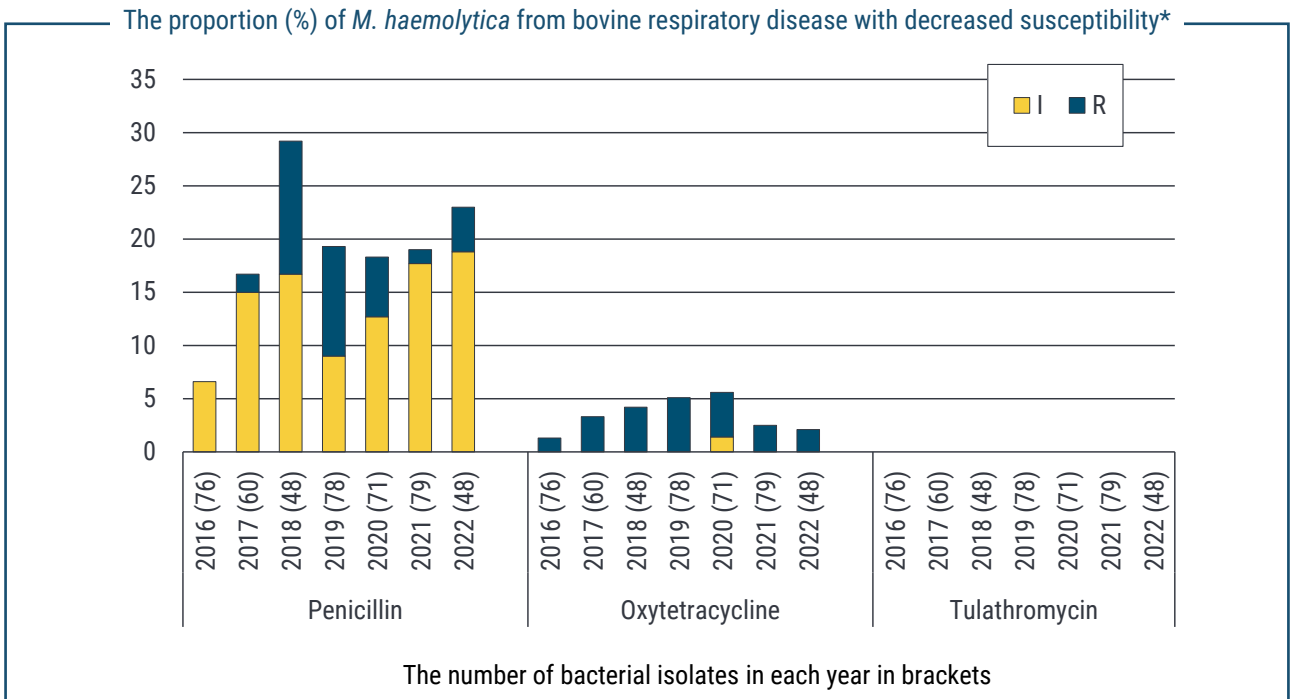# INDICATOR BACTERIA IN FOOD-PRODUCING ANIMALS

The majority of indicator *E. coli* isolates from broilers have been fully susceptible to the tested antibiotic classes. Resistance have been mostly detected against tetracycline, ciprofloxacin, sulfamethoxazole, trimethoprim and ampicillin. The proportion of multidrug-resistance was 3.5% in 2022.

Resistance in indicator *E. coli* from broilers to selected antibiotics (%)

2016 (184)   2018 (173)   2020 (170)   2022 (170)

The numbers of tested bacterial strains are in brackets

Antibiotic resistance in indicator *E. coli* from broilers

Year	Fully susceptible	Resistant to one or two	Resistant to three or more
2022	80%	16%	4%
2020	83%	15%	2%
2018	81%	14%	5%
2016	83%	14%	4%

■ Fully susceptible to the tested antibiotic classes
■ Resistant to one or two antibiotic classes
■ Resistant 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 resistant bacteria has remained at low level.

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

The number of bacterial isolates in each year in brackets

The proportion (%) of *P. multocida* from bovine respiratory disease with decreased susceptibility*

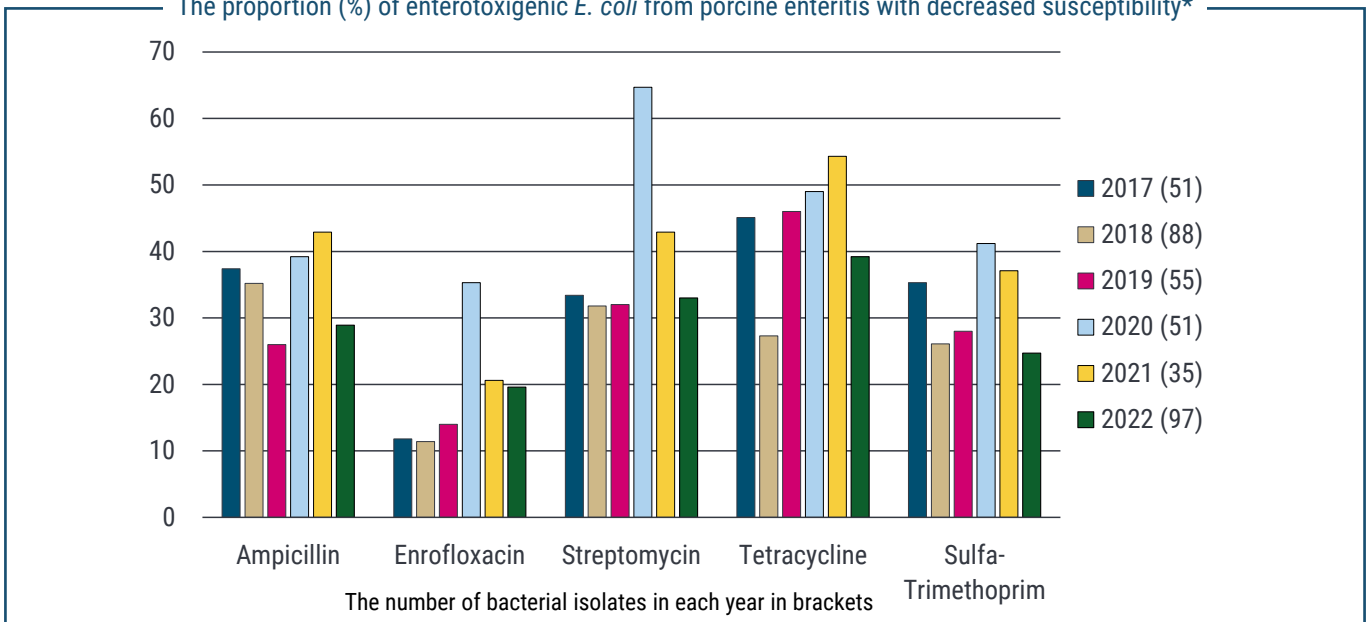The number of bacterial isolates in each year in brackets

*Decreased susceptibility means that bacterial strains are phenotypically either resistant (R) or intermediately susceptible (I) to the antibiotic in question according to clinical breakpoints.
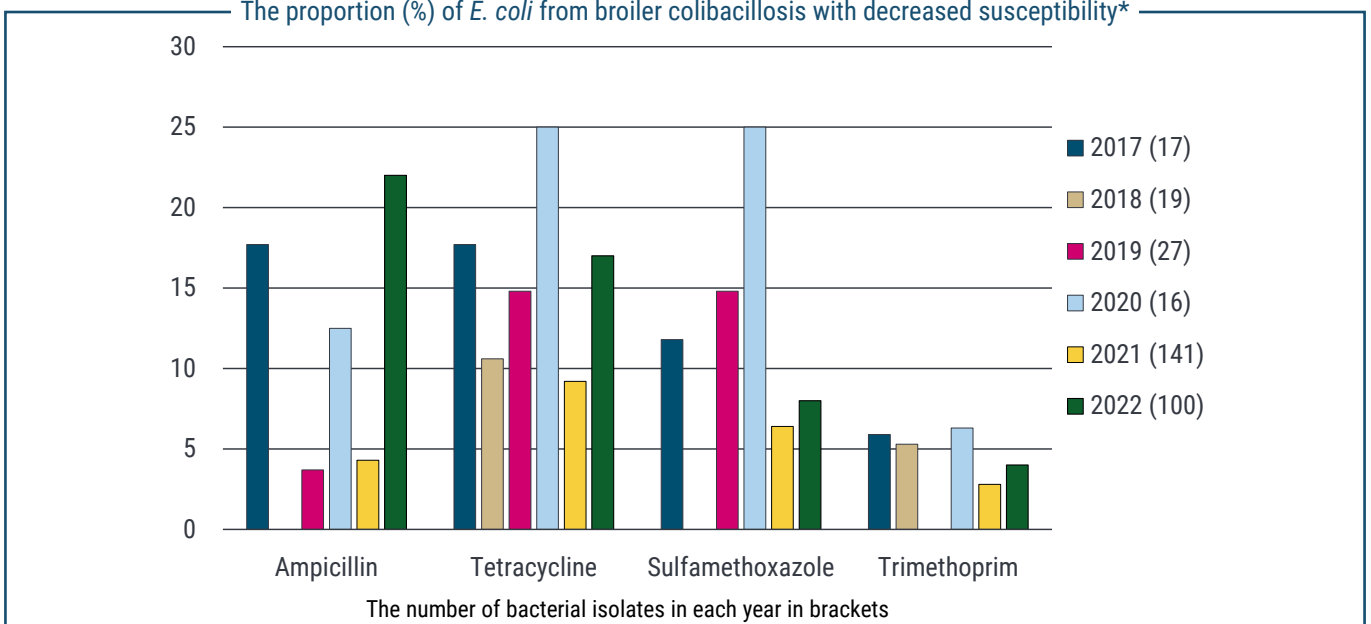
Among swine pathogens, the antibiotic susceptibilities of enterotoxigenic *E. coli*, *Brachyspira pilosicoli* and *Actinobacillus pleuropneumoniae* isolates from diseased animals are reported. In *B. pilosicoli* and *A. pleuropneumoniae*, no significant changes were detected in 2022 compared to the previous years. In enterotoxigenic *E. coli*, resistance to several antibiotics was common as in previous years and multidrug resistance was still found in a large proportion of the strains. AmpC producing strains were detected in ten farms but no ESBL-*E.coli* was detected. More samples were obtained than in previous years.

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

The number of bacterial isolates in each year in brackets

Legend: 2017 (51), 2018 (88), 2019 (55), 2020 (51), 2021 (35), 2022 (97)

Among poultry pathogens, the antibiotic susceptibilities of *E. coli* from colibacillosis cases and *Staphylococcus aureus* from arthritis and tenosynovitis are reported. In 2022, no resistance to the tested antibiotics was detected in *S. aureus* strains when clinical breakpoints were applied. In *E. coli*, no resistance to 3rd generation cephalosporins was detected, but three strains (3%) were resistant to fluoroquinolones.

The proportion (%) of *E. coli* from broiler colibacillosis with decreased susceptibility*

The number of bacterial isolates in each year in brackets

Legend: 2017 (17), 2018 (19), 2019 (27), 2020 (16), 2021 (141), 2022 (100)

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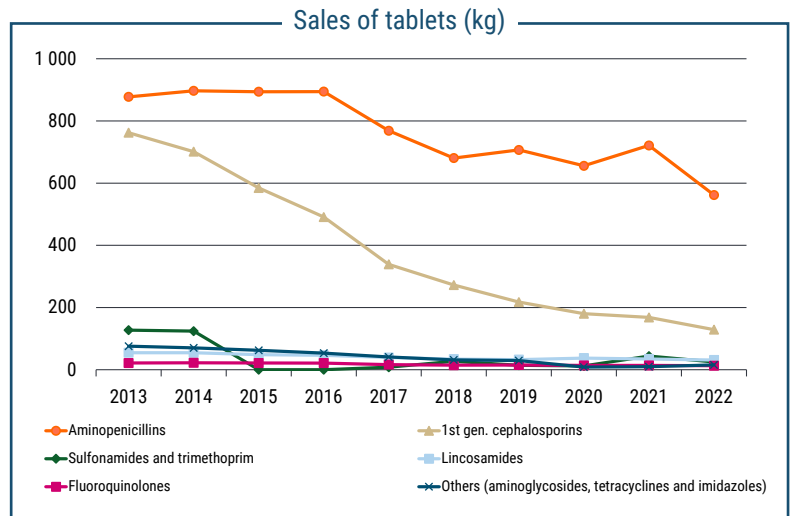
ANTIBIOTICS AND PATHOGENS IN COMPANION ANIMALS

Sales of tablets

Monitoring of sales of antibiotics intended for companion animals is currently possible only for products in the form of tablets. Their sales have decreased by 60% in ten years. By far the most sold antibiotic for companion animals is amoxycillin, sales of which decreased by a fifth from 2021 to 2022. Decrease in sales of 1st generation cephalosporins and fluoroquinolones continued (-23% and -7% respectively).

Sales of tablets (kg)

Legend:
- Aminopenicillins
- 1st gen. cephalosporins
- Sulfonamides and trimethoprim
- Lincosamides
- Fluoroquinolones
- Others (aminoglycosides, tetracyclines and imidazoles)
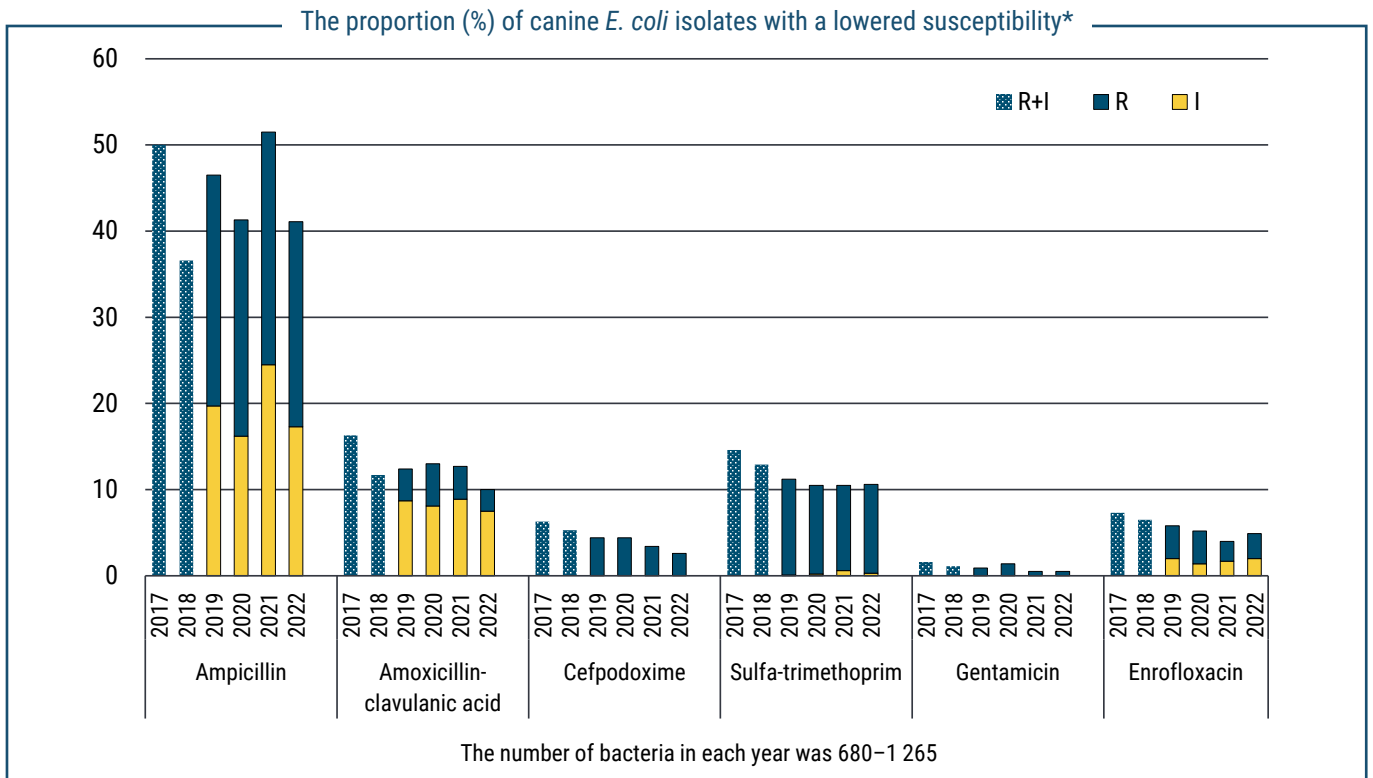
The number of dogs and cats

According to Statistics Finland, the number of dogs and cats in Finland in 2016 was about 700 000 and 600 000, respectively. It has been estimated that the number of companion animals increased during the Covid-19 pandemic. According to a survey commissioned by the Finnish Kennel Club, there were approximately 800 000 dogs in Finland in 2023.

The proportion (%) of canine *S. pseudintermedius* isolates with a lowered susceptibility
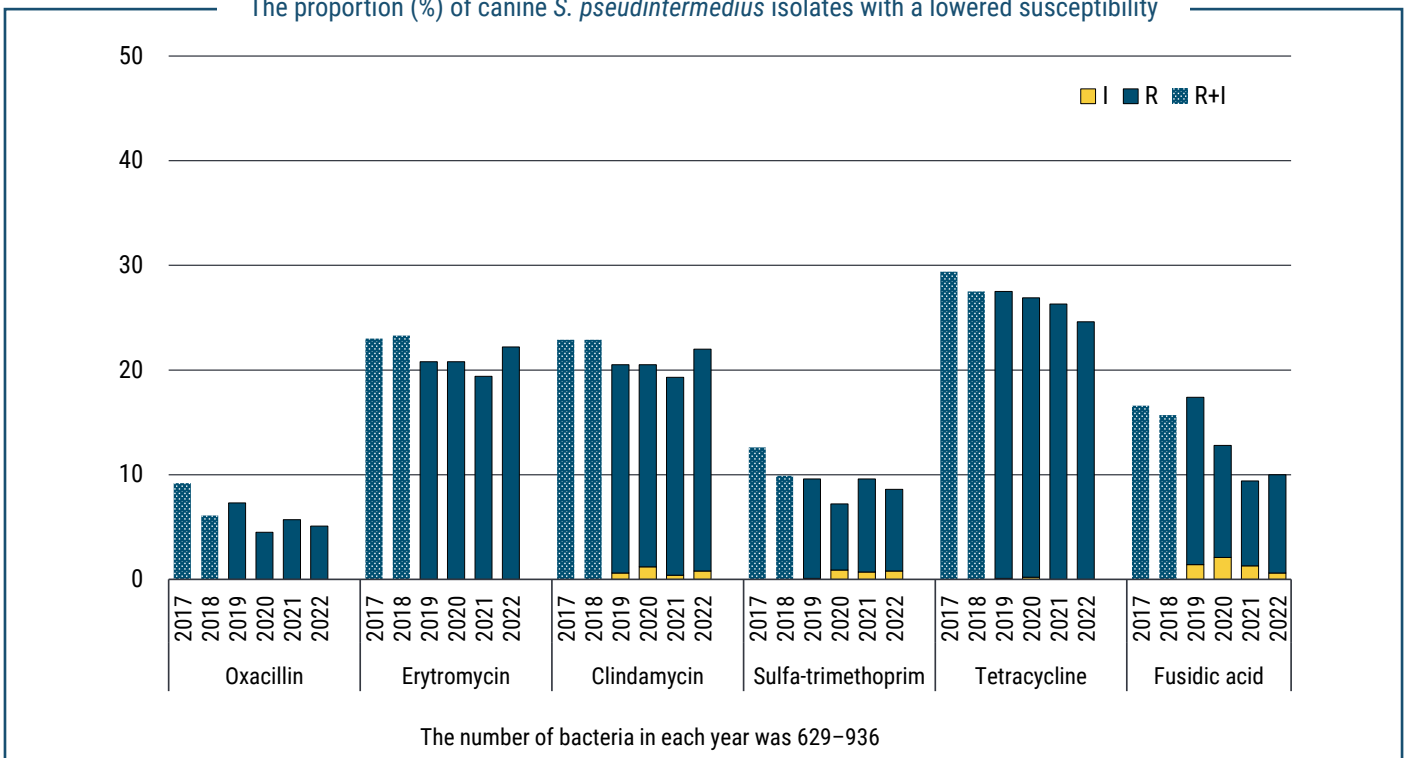
The number of bacteria in each year was 629–936

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

The proportion of ESBL among canine *E. coli* has decreased steadily from 2015 being 0.6% in 2022.

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

The number of bacteria in each year was 680–1 265

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