Veterinary
Medicines
Directorate

Highlights

UK-VARSS 2024

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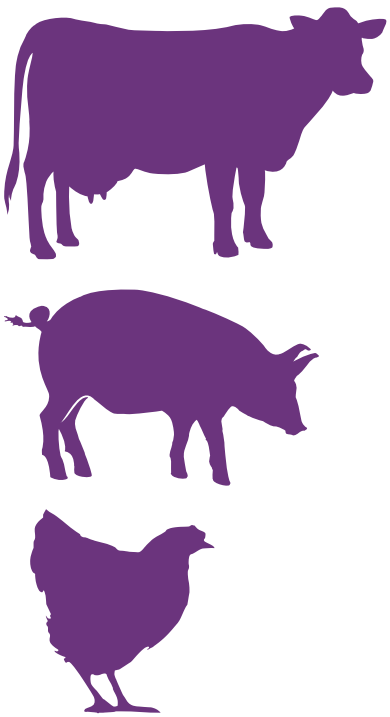


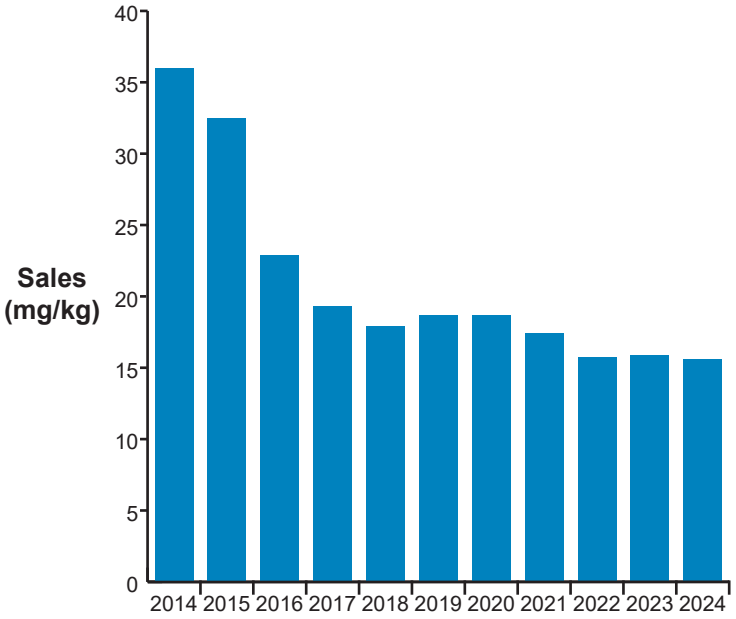
Antibiotic use and resistance 2014-2024

Key trends in antibiotic use and resistance since 2014

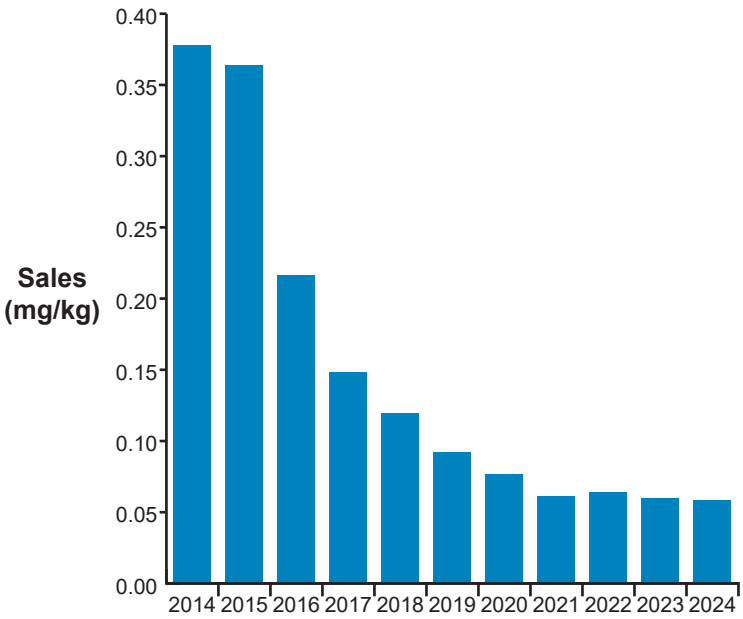
The UK-VARSS report brings together data on antibiotic sales, use and resistance. This allows us to show long term trends and acts as an early warning sign for emerging changes in antibiotic use and resistance.

Sales for all animals (mg/kg)

Sales of antibiotics in food-producing animals 2014-2024

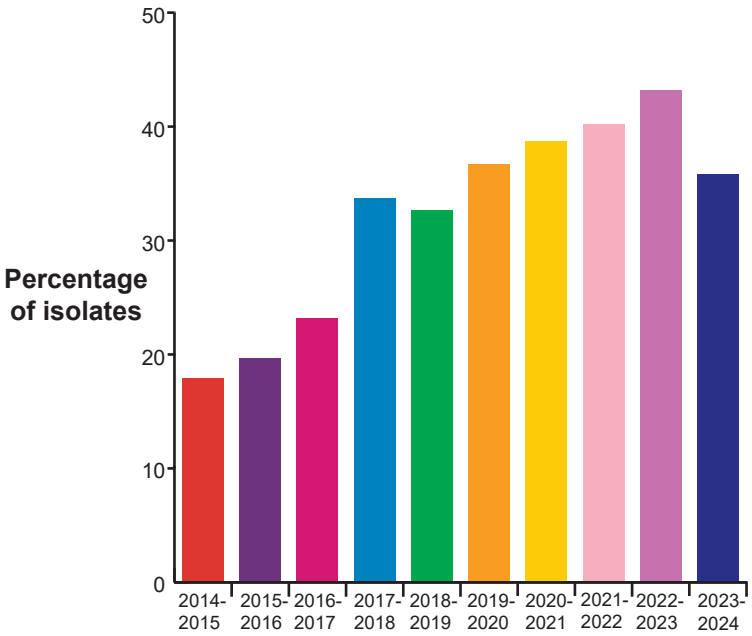


Sales of highest priority critically important antibiotics (HP-CIAs) in food-producing animals 2014-2024

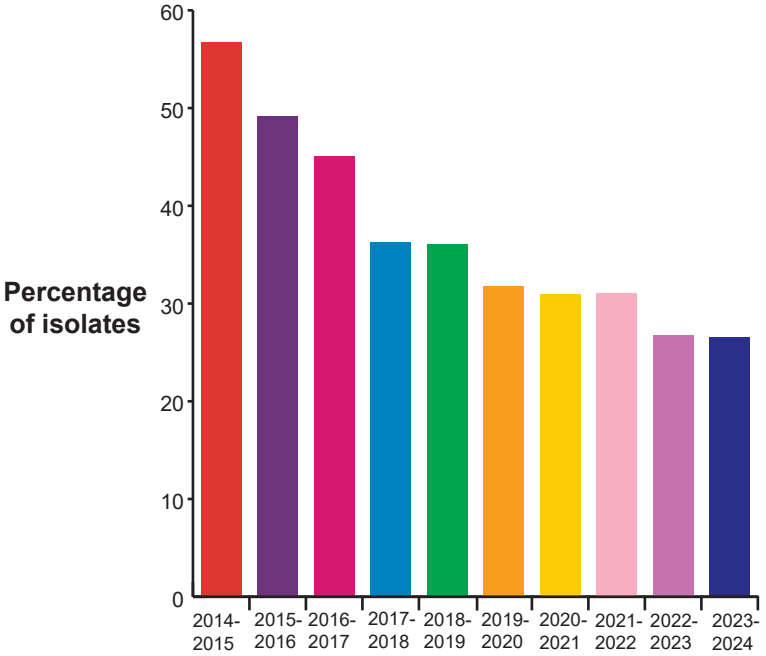


Resistance indicators for pigs and poultry

Percentage of fully susceptible *E. coli* isolates 2014-2024



Percentage of multi-drug resistant *E. coli* isolates 2014-2024



Indicators are an important tool for interpreting and comparing results of antibiotic use (AMU) and antimicrobial resistance (AMR) monitoring programmes.The indicators for sales are adjusted for population size. *E. coli* is the indicator organism for resistance. The outcome indicators for resistance are averaged over two years, due to the alternating schedule for AMR pig and poultry sampling, and are weighted by population size.

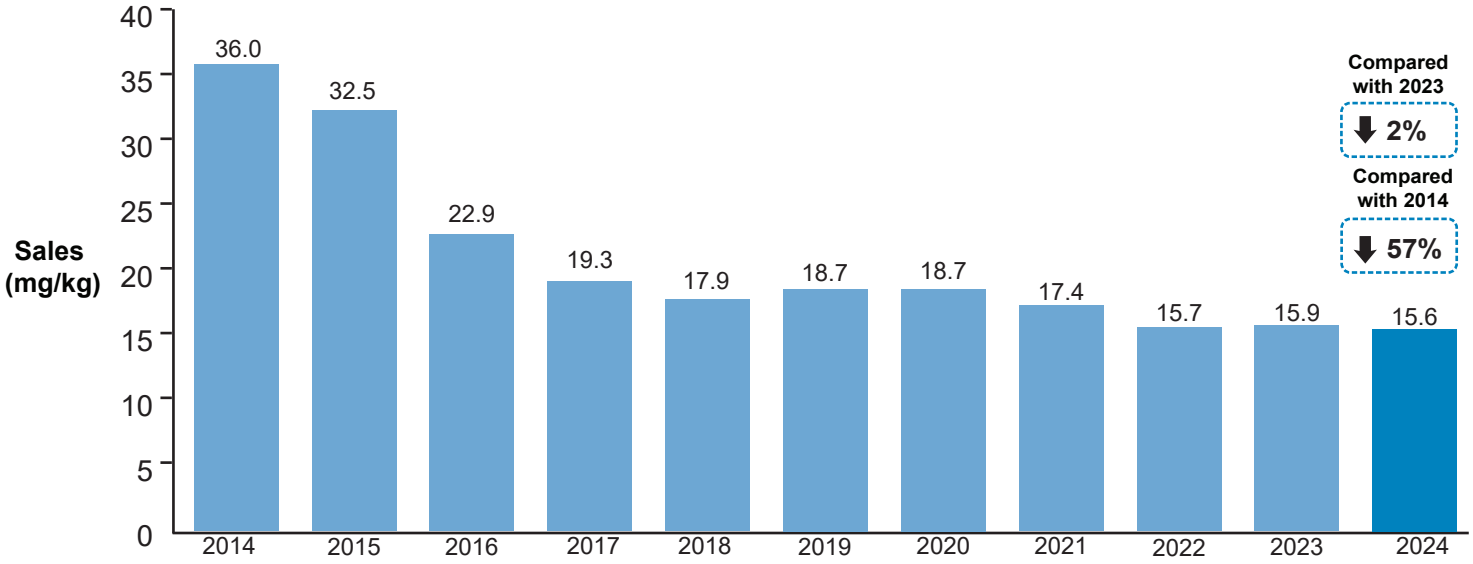
Antibiotic sales

New harmonised mg/kg metric for all animals

Antibiotic sales for food-producing animals are presented as weight of antibiotic active ingredient used in food animals (in mg) compared with the weight of the food population (in kg). This population weight is calculated by multiplying the number of animals in each category by a standardised weight. Previously, we used the Population Correction Unit (PCU) method to calculate the weight of the food animal population, but this year we will be adopting a new methodology which was developed and adopted by the EU in their ESUAvet report. It includes more animal categories (for cattle, laying hens, ducks) and therefore better represents the UK population weights. It also uses higher standard weights based on average living or slaughter weight, rather than the average weight at time of treatment, aligning better with the internationally recognised WOAH metric. As a result, the total animal weight is higher, making the mg/kg figure about 40% lower. All data reported as mg/kg now reflects this new metric. Comparisons between the new metric (mg/kg) and the old metric (mg/PCU) are included throughout the report.

Sales for food-producing animals (mg/kg)

Sales of veterinary antibiotics for use in food-producing animals, adjusted for animal population, were 15.6 mg/kg in 2024; this represents a 2% (0.3 mg/kg) decrease since 2023 and a 57% (20.5 mg/kg) decrease since 2014.



Over 50% of all antibiotics were sold were either tetracyclines (31%) or penicillins (26%). Sales of highest priority critically important antibiotics (HP-CIAs) in food-producing animals remain at very low levels at 0.06 mg/kg in 2024 and accounts for 0.4 % of total sales.

	2014 (mg/kg)	2023 (mg/kg)	2024 (mg/kg)	Compared with 2014
Total HP-CIAs	0.38	0.06	0.06	⬇ 84%
Fluoroquinolones	0.20	0.05	0.05	⬇ 74%
3rd/4th generation cephalasporins	0.11	0.01	0.01	⬇ 93%
Colistin	0.07	0.00	0.00	⬇100%

Sales of antibiotics for all animals (tonnes)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Compared with 2014
Tonnes	452	411	299	256	238	243	242	228	205	200	194	⬇ 57%

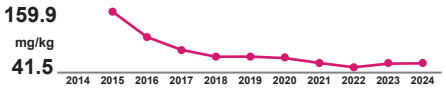
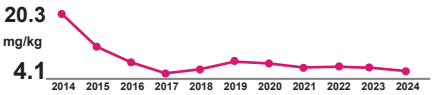
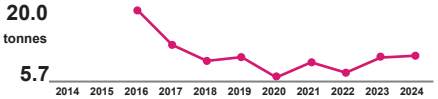
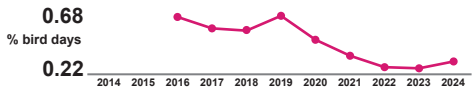
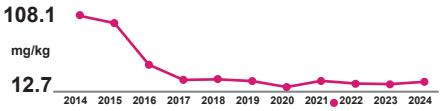
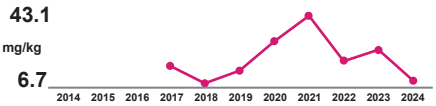
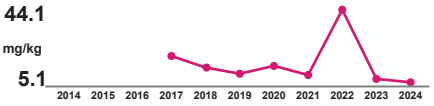
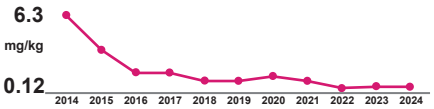
Total amount of HP-CIAs sold in 2024 was 0.79 tonnes representing a decrease of 3% (0.03 tonnes) since 2023 and an 83% decrease (4 tonnes) since 2014. Sales of HP-CIAs continue to represent a very small proportion (0.4%) of total veterinary antibiotic sales in tonnes.

Please note there has been some amendments to historic tonnes and mg/kg figures following a data correction relating to a product authorised for use in horses. For further details, please see the VARSS sales chapter.

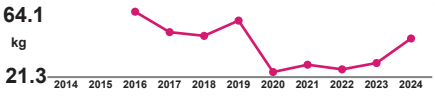
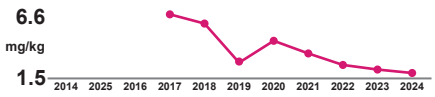
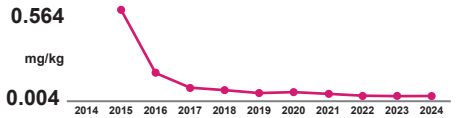
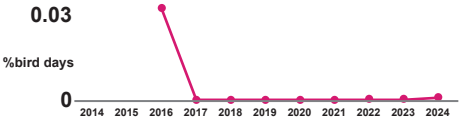
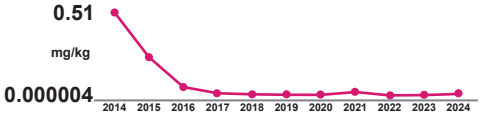
Antibiotic usage

Antibiotic usage refers to the amount of antibiotics prescribed and/or administered per sector. The data have been collected and provided to the VMD by the animal industry on a voluntary basis. Coverage is at least 85% for all sectors shown and calculated to represent the entire population.

Antibiotic usage by food-producing animal species

	2024 tonnage (● = 1 tonne)	2024 use	Change since 2023	Annual trends (scales differ beween graph starting with lowest figure reported)	% change from date first published
Pigs		50.0 mg/kg	↑ 0.84 mg/kg		↓69%
Broilers		4.7 mg/kg	↓ 0.92 mg/kg		↓77%
Gamebirds		10.3 tonnes	↑ 0.47 tonnes		↓48%
Laying hens		0.28 % bird days	↑ 0.06 % bird days		↓58%
Turkeys		19.7 mg/kg	↑ 3.2 mg/kg		↓82%
Salmon		8.1 mg/kg	↓ 16.7 mg/kg		↓49%
Trout		5.1 mg/kg	↓ 1.8 mg/kg		↓73%
Ducks		0.24 mg/kg	↑ 0.08 mg/kg		↓96%

Highest priority critically important antibiotics by food-producing animal species

	2024 kg (○ = 1 kg)	2024 use	Change since 2023	Annual trends (scales differ beween graph starting with lowest figure reported)	% change from date first published
Gamebirds		45.1 kg	↑ 17.5 kg		↓30%
Trout		1.5 mg/kg	↓ 0.29 mg/kg		↓78%
Pigs		0.005 mg/kg	↑ 0.001 mg/kg		↓99%
Laying hens		0.0007 % bird days[1]	↑ 0.0007 % bird days		↓98%
Meat Poultry		0.0009 mg/kg	↓ 0.001 mg/kg		↓99.8%

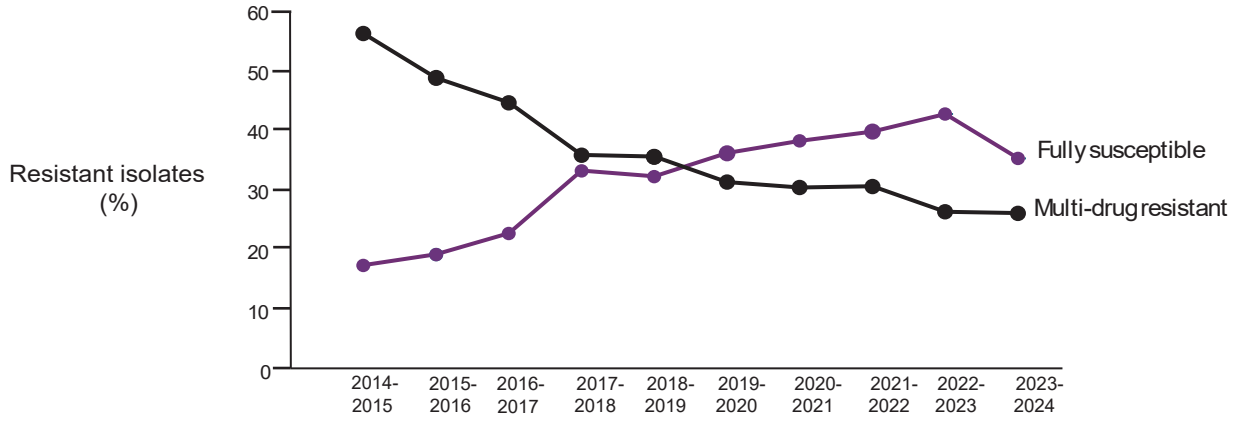
indicates different metric for usage

[1] BEIC have indicated that this relates to a single course of treatment adminstered to a breeder flock and not for birds producing eggs for the food chain

Antibiotic resistance - harmonised monitoring

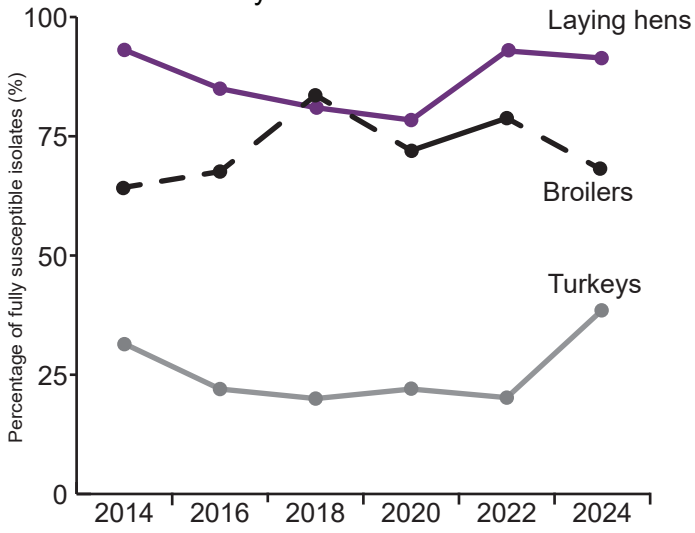
Key resistance outcome indicators: *E. coli*

The harmonised monitoring outcome indicators combine results from healthy pigs and poultry at slaughter to give an overall picture of antimicrobial resistance (AMR), and are internationally comparable. Results show a decrease in fully susceptible *E. coli* from 43% in 2022/2023 to 36% in 2023/2024. This is the first substantial decrease since harmonised monitoring began in 2014 and is attributable to increased resistance in broilers. The percentage of multi-drug resistant isolates (resistant to three or more antibiotic classes) continues to decrease and remains at the lowest recorded level of 27%.



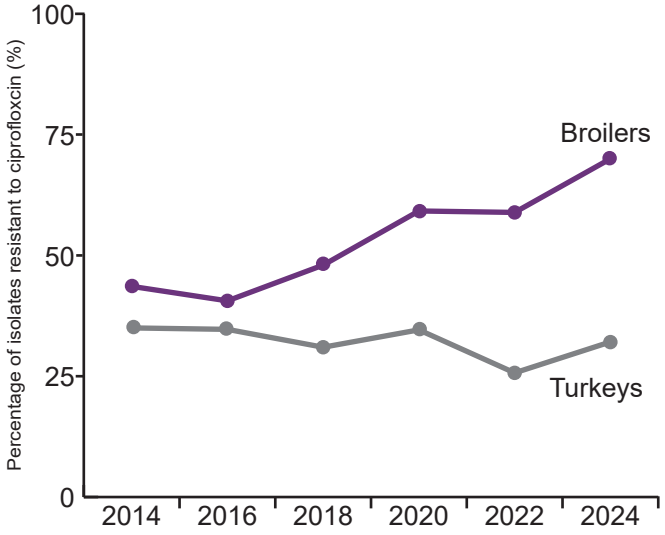
Full susceptibility in *Salmonella*

In 2024, fully susceptible *Salmonella* isolated from broilers and laying hens decreased, but increased in turkeys.



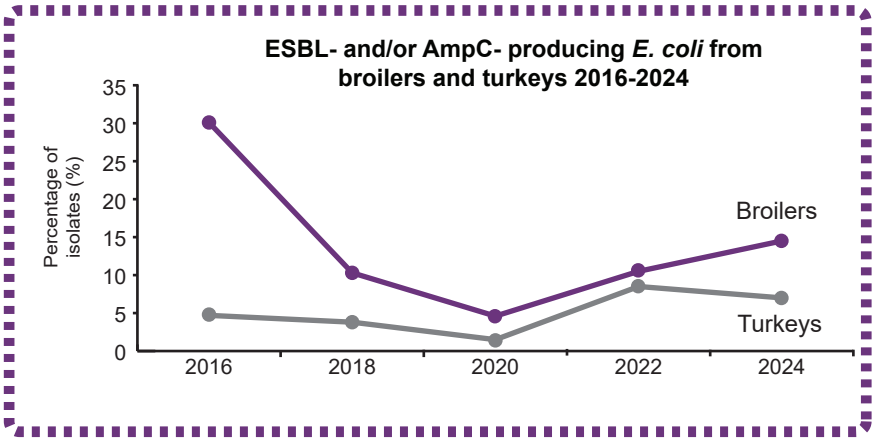
Resistance in *Campylobacter*

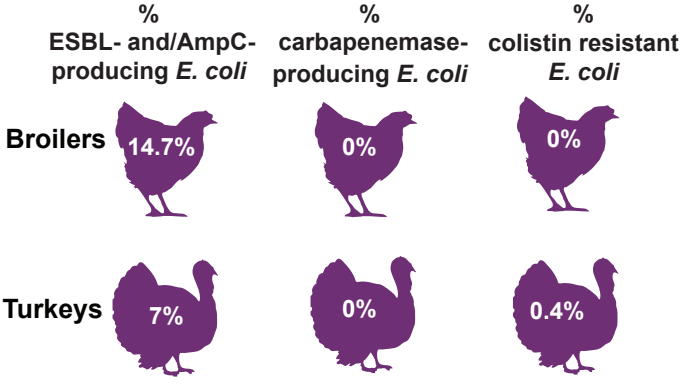
Resistance to ciprofloxacin in *Campylobacter jejuni* from broilers and turkeys has increased since 2022 despite minimal use by these sectors.



Using selective media to *detect E. coli*

We also perform a more sensitive type of testing using selective media which inhibits the growth of susceptible bacteria but allows bacteria with specific resistances to multiply, making them easier to detect. This tells us the percentage of individual samples containing resistance to the HP-CIAs, even when present in very low numbers. In 2024, carriage of ESBL-/AmpC- producing *E. coli,* which are resistant to third and fourth generation cephalosporins and penicillins, increased in broilers and decreased in turkeys.





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Antibiotic resistance - clinical surveillance

Clinical surveillance is a programme of passive surveillance which evaluates AMR in bacteria isolated from diagnostic samples some of which also have zoonotic potential. As this kind of scanning surveillance is subject to biases and differences in the number of samples, the results are not representative of the UK's wider animal populations.

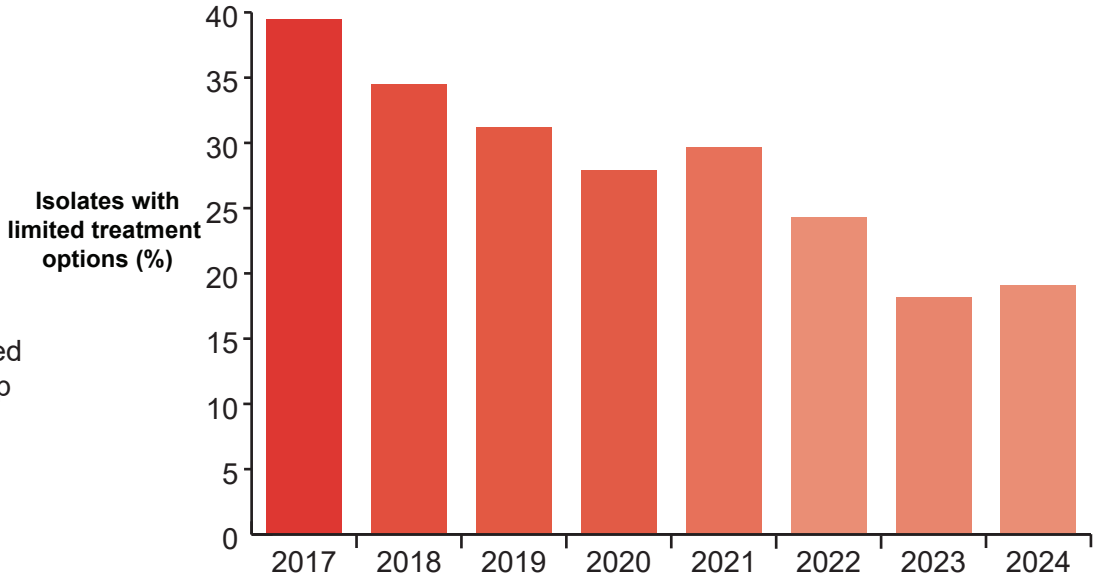
Overview of sampling

6,921 isolates were tested for AMR in England and Wales in 2024.The percentages of isolates tested by main animal species were: poultry (30% of isolates), pigs (17%), cattle (15%), sheep (9%), and dogs (7.4%).

Percentage of *E. coli* with limited treatment options

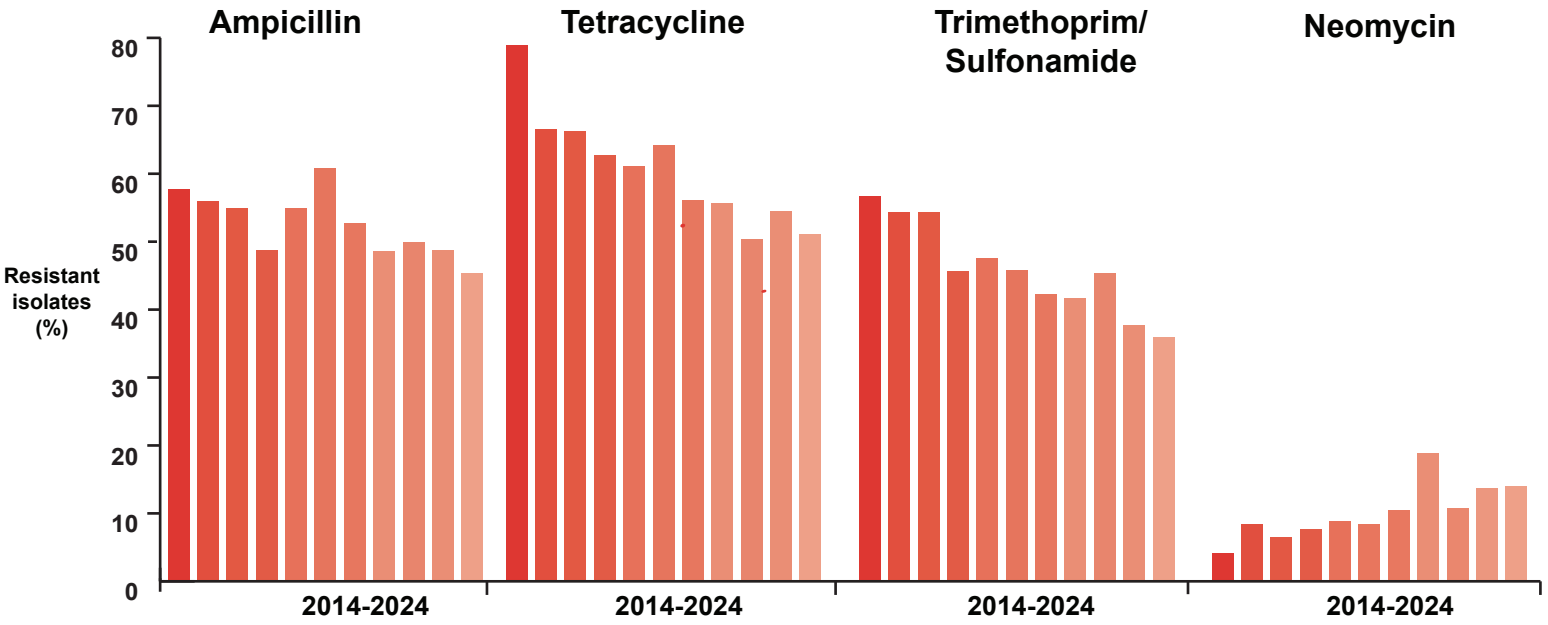
In 2024, 19% of all clinical *E. coli* isolated from animals had limited treatment options, meaning they were resistant to four or more individual antibiotics. This has reduced significantly from 40% since 2017.

The percentage of isolates with limited treatment options declined substantially in pigs, cattle and sheep between 2017-2024.



Resistance to selected antibiotics in *E. coli* isolates from pigs 2014-2024

In *E. coli* isolated from pigs in 2024, the highest levels of resistance were detected to the antibiotic classes that are most commonly used in the pig sector: penicillins, trimethoprim/sulfonamide, tetracyclines and aminoglycosides. Resistance of clinical *E. coli* to antibiotics in the first three classes has reduced since 2014, mirroring reductions in antibiotic use. Resistance to neomycin has increased significantly from 3.9% in 2014 to 14% in 2024. This aligns with antibiotic use data for aminoglycosides in pigs, which has increased from 2 mg/kg in 2015 to 6.8 mg/kg in 2024.



Private Laboratories Initiative (PLI)

Most AMR data from animals in the UK is generated and held by private veterinary laboratories (PVLs) and does not feed into government surveillance programmes. This gap limits our understanding of AMR in animals and our ability to respond to emerging threats to animals and humans. The VMD set up the PLI to address this gap by improving the sharing of AMR data held by PVLs with government. In 2025 it covers four major animal streams: farm animals, companion animals, horses, and fish

Background

How are sales data collected?
In the UK, from 2005 it has been a statutory requirement for pharmaceutical companies to report to the VMD the quantity of antibiotics sold for use in animals. This data does not take into account special imports of veterinary antibiotics not authorised for sale in the UK but authorised elsewhere, and some medicines may not be used in the same year (or at all if the product goes out of date before being used). However, they serve as the best currently available approximation of the quantity of antibiotics administered to animals within the UK.

How are usage data collected?
Antibiotic usage data, i.e. the amount of antibiotics purchased, prescribed and/or administered, has the potential to provide much more precise estimates of use as it allows antibiotic use to be split by species/sector and also include antibiotics imported under the special import scheme.

Antibiotic usage data collection systems have been put in place by the British Poultry Council (meat poultry), the British Egg Industry Council (laying hens),the Game Farmers Association and British Veterinary Poultry Association (gamebirds), the electronic Medicines Book (pigs), the British Trout Association (trout), Salmon Scotland (Salmon) and Medicine Hub (ruminants). This data has been voluntarily provided by producers (pigs, poultry and laying hens), feed companies (gamebirds) and veterinary practices (gamebirds and fish).

What are Critically Important Antibiotics (CIAs)?
HP-CIA refers antibiotics that are vitally important to human medicine and where there is the highest risk of transmission from non-human sources. These are defined by the World Health Organisation (WHO) List of Medically Important Antimicrobials, and include third- and fourth- generation cephalosporins, polymyxins (e.g. colistin) and quinolones/fluoroquinolones. This also aligns with “Category B” in the European Antimicrobial Expert Group report categorisation (AMEG).

How is antibiotic resistance interpreted?
Antibiotic resistance in bacteria isolated from animals is monitored through two distinct surveillance programmes: harmonised monitoring and clinical surveillance. The harmonised monitoring scheme is a UK-wide programme in which we test bacteria from the gut of healthy pigs and poultry at slaughter, and the National Control Programme for *Salmonella,* giving us a representative picture of resistance in key livestock species entering the food chain. Clinical surveillance involves the testing of bacteria that have been isolated from clinical samples submitted by farmers and private veterinarians to government laboratories in England and Wales.

Susceptibility testing for harmonised monitoring is performed using broth microdilution to determine minimum inhibitory concentrations (MICs). Resistance is assessed using EUCAST (European Committee on Antimicrobial Susceptibility Testing) epidemiological cut-off values (ECOFFs) where possible. Where no EUCAST values were available, European Food Safety Authority (EFSA) recommended cut-off values were used. Where neither defined values are available, tentative EUCAST ECOFF values were applied. Results interpreted using ECOFFs are reported in full in Supplementary Material 5.

In the 2024 clinical surveillance programme, the majority of the results presented were assessed by disc diffusion techniques, and interpreted using BSAC (British Society for Antimicrobial Chemotherapy) human clinical breakpoints (CBPs) where available. Broth microdilution testing was introduced in UK-VARSS 2020 and continues to be developed and applied to an increasing number of organisms over the last four years. MIC results have been interpreted using veteirnary clinincal breakpoints from Clinical and Laboratory Standards Institute (CLSI) in the first instance, or Comité de l’Antibiogramme de la Société Française de Microbiologie (CA-SFM) when these are not available; if veterinary clinical breakpoints were not available, human clinical breakpoints were used. Full details of the methods used are available in Supplementary Material 6.