

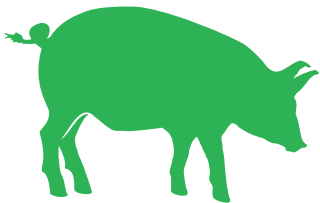
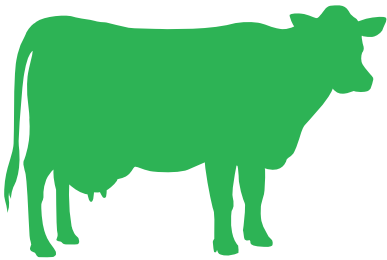


Veterinary  
Medicines  
Directorate

# Highlights

## UK-VARSS 2022

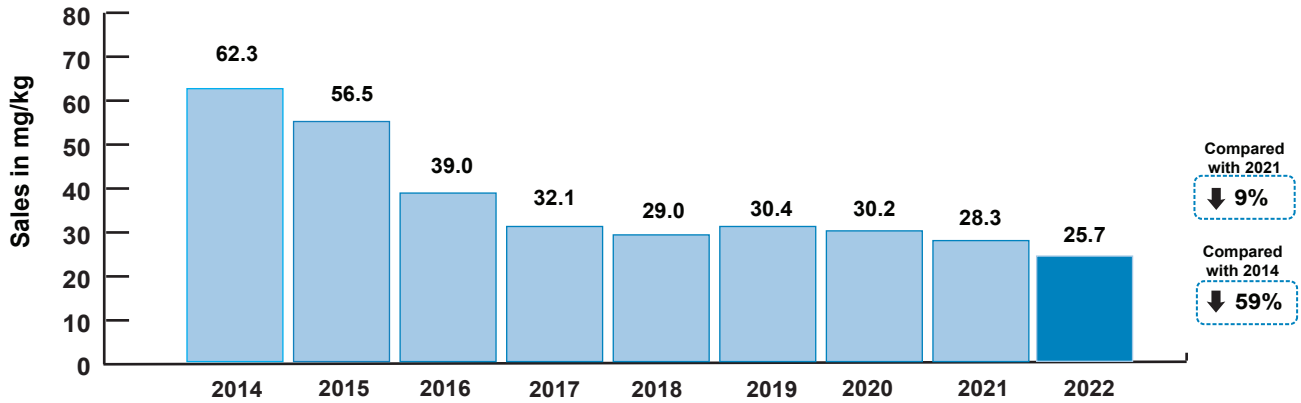
Published November 2023



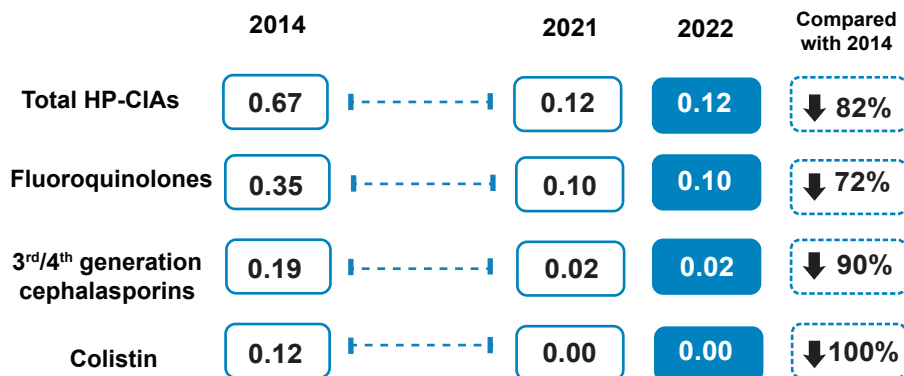
# Antibiotic sales

## Sales for food-producing animals (mg/kg)

Sales of veterinary antibiotics for use in food-producing animals, adjusted for animal population, were 25.7 mg/kg in 2022; this is a 9% (2.6mg/kg) decrease since 2021 and an overall 59% (36.6mg/kg) decrease since 2014. This represents the lowest sales ever recorded.

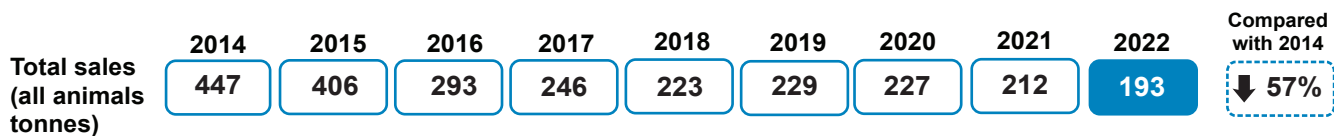


Sales of Highest Priority Important Antibiotics (HP-CIAs) in food-producing animals remain at very low levels at 0.12mg/kg in 2022 and account for less than 0.5% of total sales.



## Sales of antibiotics for all animals (tonnes)

In 2022 the total quantity of antibiotic active ingredient sold in the UK was 193 tonnes, the lowest sales to date.



Tetracyclines remain the most sold antibiotic class (32%), followed by penicillins (28%).

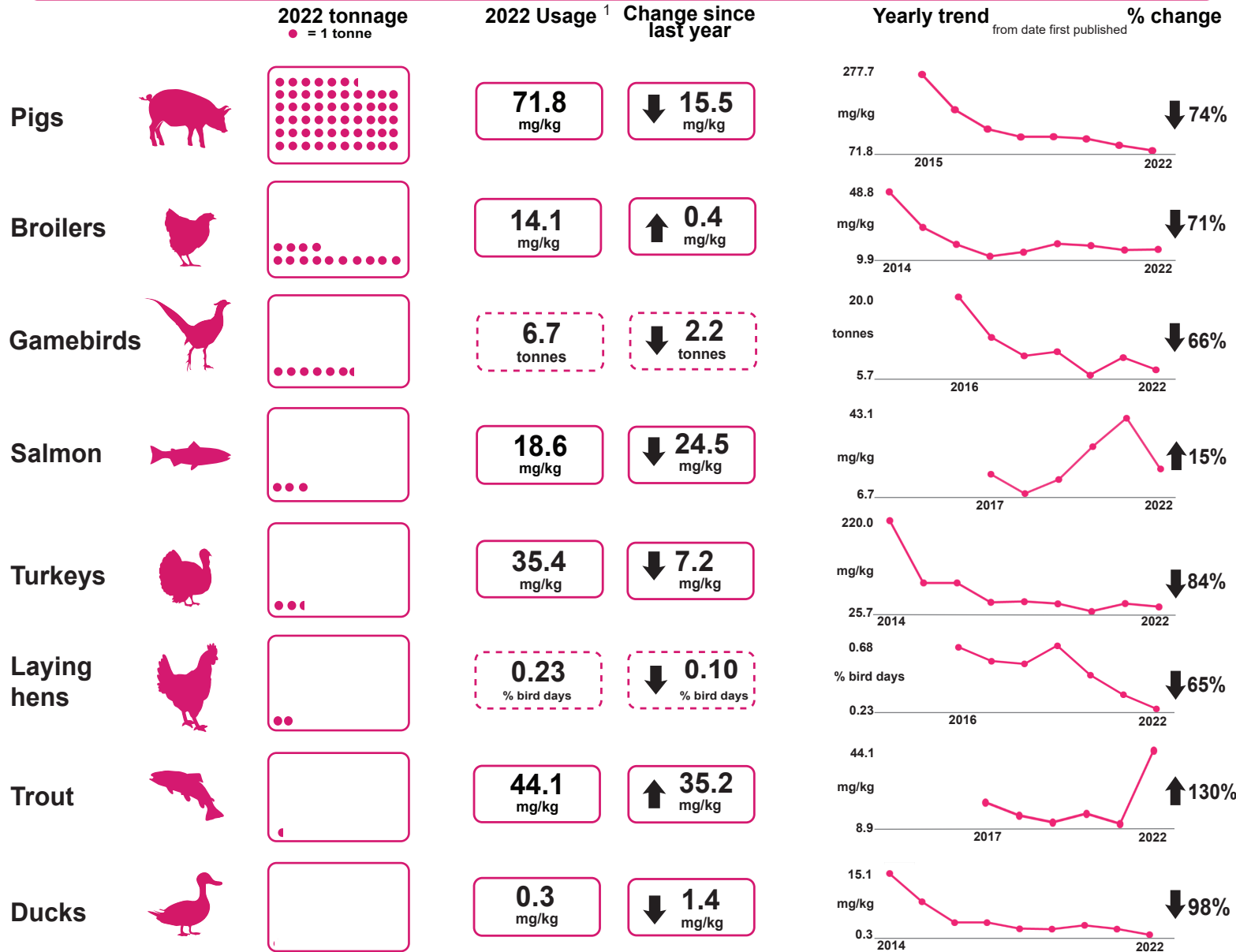
## Sales of HP-CIAs for all animals (tonnes)

Sales of HP-CIAs for 2022 was 0.91 tonnes representing a small increase of 0.01 tonnes since 2021 but a reduction of 81% (3.9 tonnes) since 2014. Sales of HP-CIAs continue to represent a small proportion (less than 0.5%) of total veterinary antibiotic sales.

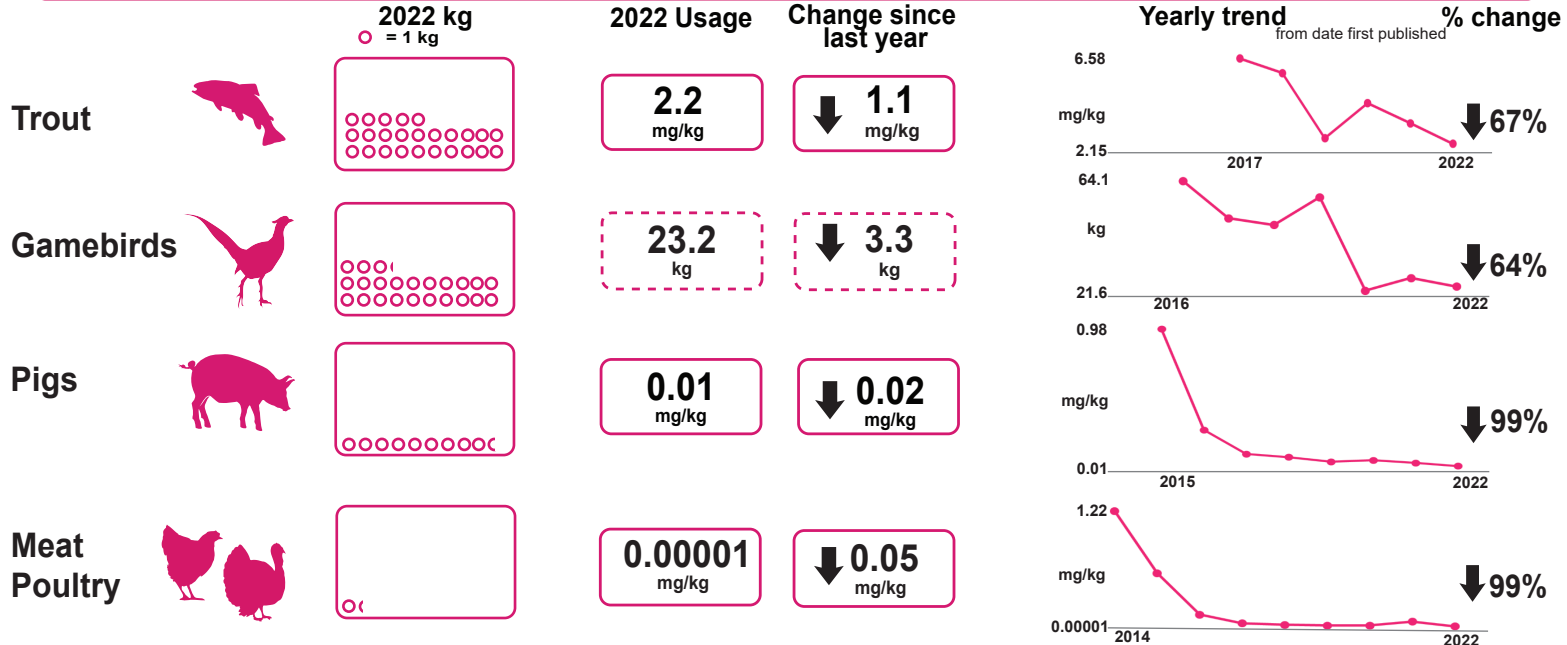
# Antibiotic usage

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. Total coverage of all sectors is at least 90%.

## Antibiotic usage by food-producing animal species



## Highest Priority Critically Important Antibiotics by food-producing animal species



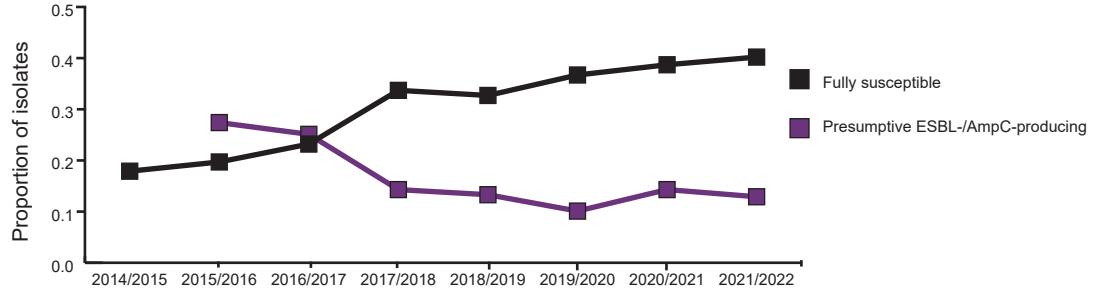
<sup>1</sup> mg/kg relates to the amount of active ingredient standardised by kg biomass and calculated using ESVAC methodology, % bird days refers to 'actual daily bird-doses/100 bird-days at risk'

--- indicates a different metric for usage

# Antibiotic resistance in zoonotic and commensal bacteria from healthy animals at slaughter

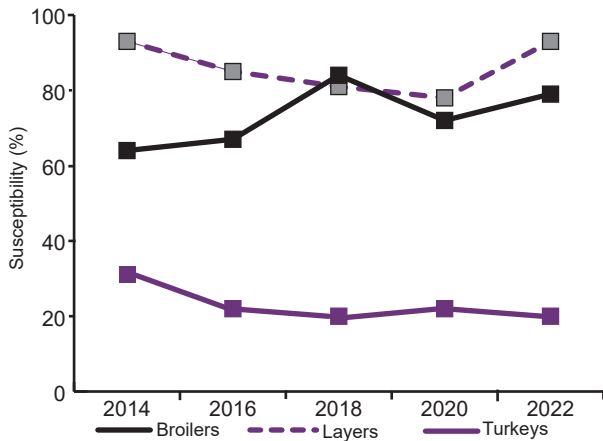
## Key resistance outcome indicators: *E. coli*

The harmonised monitoring indicators combine results from healthy pigs and poultry at slaughter to give an idea of the major trends in UK AMR surveillance, and are internationally comparable. The overall picture for 2022 is positive. The proportion of isolates showing full sensitivity to the panel of antibiotics tested has continued to increase, and the proportion of presumptive ESBL-/AmpC-producing *E. coli* has remained stable.



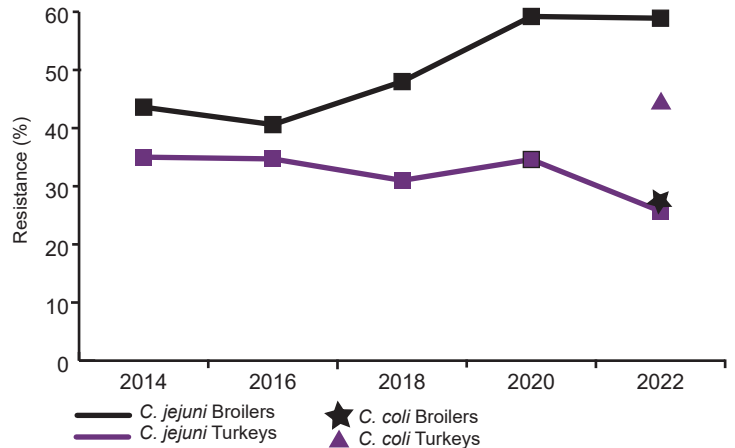
## Resistance in *Salmonella* spp.

In 2022, full susceptibility in *Salmonella* increased in broilers and layers and remained stable in turkeys.



## Resistance in *Campylobacter* spp.

In 2022, there were very high levels<sup>2</sup> of resistance to ciprofloxacin in *Campylobacter* from broilers and turkeys. This was the first year resistance in *C. coli* was tested.

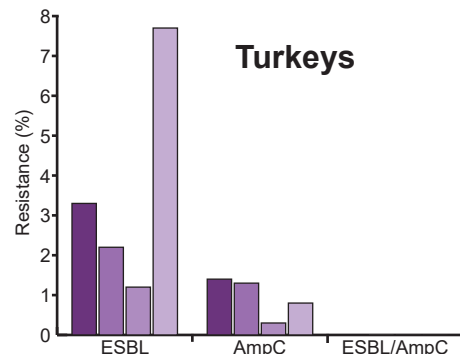
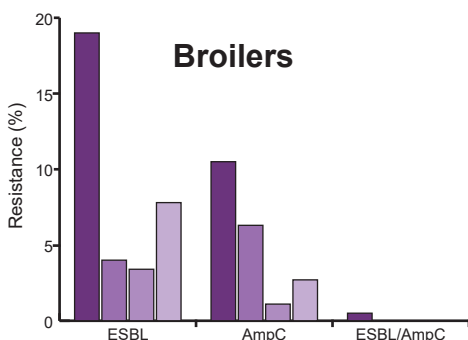


## New surveillance for 2022

This year's harmonised monitoring includes three new species of bacteria: *Campylobacter coli*, *Enterococcus faecalis*, *Enterococcus faecium*. The addition of *Enterococcus* allows for detection of vancomycin resistance enterococci (VRE), which is of clinical importance. No VRE were detected.

## Amplified detection of ESBL-/AmpC-producing *E. coli*

We also perform a more sensitive type of testing using selective media. This test inhibits the growth of susceptible bacteria but allows ESBL-/AmpC-producing *E. coli* to multiply, making them easier to detect. This tells us the proportion of individual birds carrying resistance to 3<sup>rd</sup> and 4<sup>th</sup> generation cephalosporins even at very low levels.



There was an increase in the prevalence of broilers and turkeys carrying ESBL- and AmpC-producing *E. coli* compared to 2020. Of these organisms from broilers, 77% were co-resistant to ciprofloxacin, an increase from 37% in 2020.

<sup>2</sup> Description of % resistance referenced: very high levels (50-70%)  
ESBL= Extended Spectrum Beta-Lactamase

# Antibiotic resistance in clinical surveillance

Clinical surveillance aims to provide veterinarians with relevant treatment information using results from bacteria isolated from diagnostic samples. As 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.

## Key findings

- 7,284 isolates were tested for AMR in England and Wales.
- *E. coli* and *Salmonella* were the most frequently isolated bacteria from all species.
- Resistance was usually highest to the most commonly used antibiotics: aminopenicillins and tetracyclines.
- Resistance tended to be higher in *E. coli* isolated from young animals, likely reflecting more frequent treatment.

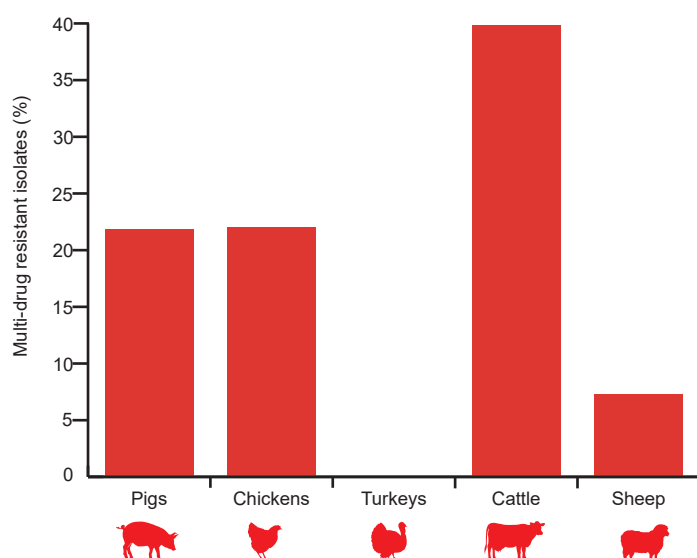
## Resistance in *Escherichia coli*

- Of the 984 *E. coli* isolates tested from all species, 24% were multi-drug resistant (resistant to three or more separate antibiotic classes). This was highest in cattle (40%).
- The highest levels of resistance were detected to the most commonly used antibiotics: the aminoglycoside streptomycin (54%), the aminopenicillin ampicillin (49%) and tetracycline (46%).
- In isolates from neonatal sheep, resistance to spectinomycin declined from 45% in 2021 to 23% in 2022. This is possibly due to withdrawal of this antibiotic from the market.

### Highest priority critically important antibiotics (HP-CIAs):

Resistance was low across all species: cefotaxime (3.7%), cefpodoxime (0.9%), ceftazidime (0.7%) and enrofloxacin (2.5%).

Percentage of isolates with multi-drug resistance

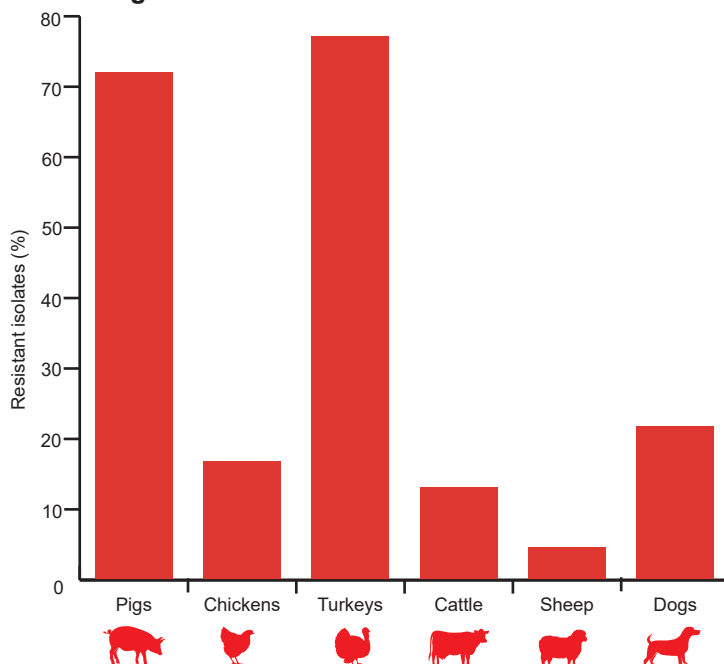


## Resistance in *Salmonella* spp. from animals and their environment

- Of the 5,562 *Salmonella* isolates tested, 24% of isolates from all species showed resistance to at least one antibiotic. This was highest in turkeys (77%) and pigs (72%).
- A change to legislation in 2021 meant that *Salmonella* isolates from dogs became reportable under the Zoonoses Order in Great Britain. The number of isolates retrieved from dogs has increased from 105 in 2020 to 924 in 2022.

**HP-CIA resistance** was generally low (<2%), except to the quinolone nalidixic acid in turkeys (22%). This is difficult to interpret given the disruption to the poultry industry as a result of avian influenza during 2022 which impacted the number of samples submitted.

Percentage of isolates resistant to at least one antibiotic



## Private Laboratory Initiative (PLI)

The PLI is a collaborative project between the VMD and APHA, which aims to routinely collect and analyse data from private veterinary laboratories, to provide an additional source of data for AMR surveillance. The PLI is feeding into the new National Biosurveillance Network (NBN) and will run pilot projects from April 2024 to April 2025.

# 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 amount of antibiotic products sold for use in animals. The quantity of active ingredient is calculated from the amounts sold and the product characteristics. These sales data do not take into account wastage of veterinary antibiotics. However, this is the best currently available approximation of the quantity of antibiotics administered to animals in the UK.

## How are usage data collected?

Data have been voluntarily provided by producers (pig, poultry and laying hen sectors), feed companies (gamebirds) and veterinary practices (gamebirds and fish). Usage data collection systems have been put in place to collect data from the British Poultry Council (meat poultry), the British Egg Industry Council (laying hen sector), the Game Farmers Association (gamebirds), the electronic Medicines Book (pigs), British Trout Association (trout) and Scottish Salmon Producers' Association (salmon).

Usage data, i.e. the amount of antibiotics purchased, prescribed and/or administered, have the potential to provide much more precise estimates of use. The VMD has been working with the animal production sectors to develop sector-led data collection systems to monitor their antibiotic usage.

## What is the Population Correction Unit (PCU)?

Trends in sales of antibiotics between years and different countries cannot be determined without taking into consideration variations in the number and size of animals that may require treatment. Therefore, sales data are analysed using the population correction unit (PCU). This is a standard technical unit of measurement developed by the European Medicines Agency and adopted by EU countries. This allows data to be presented as mg of antibiotic per kg of livestock biomass. For more details see:

<https://www.gov.uk/government/publications/understanding-the-mgpcu-calculation-used-for-antibiotic-monitoring-in-food-producing-animals>

## What are Critically Important Antibiotics (CIAs)?

Certain antibiotic classes are categorised by the World Health Organization (WHO) as critically important antibiotics for human use, of which several are designated as 'highest priority critically important antibiotics' (HP-CIA). In January 2020, the European Medicines Agency published new scientific advice on the risk to humans from antibiotic resistance caused by the use of highest priority critically important antibiotics (HP-CIAs) in animals. The report was prepared by Antimicrobial Advice Ad Hoc Expert Group (AMEG). Quinolones, third and fourth generation cephalosporins and polymyxins were classified as category B, where the use of these antibiotics should be restricted, as a result of their critical importance in human medicine. For more details see:

[https://www.ema.europa.eu/en/documents/report/categorisation-antibiotics-european-union-answer-request-european-commission-updating-scientific\\_en.pdf](https://www.ema.europa.eu/en/documents/report/categorisation-antibiotics-european-union-answer-request-european-commission-updating-scientific_en.pdf)

## 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). Results interpreted using ECOFFs are reported in full in supplementary material 2.

In the 2022 clinical surveillance programme, resistance was assessed by disc diffusion techniques, and interpreted using BSAC (British Society for Antimicrobial Chemotherapy) human clinical breakpoints (CBPs), where available. Broth microdilution testing has continued to develop and apply to an increasing number of organisms over the last two years, with ten bacterial species included this year. Full details of the methods used are available in Supplementary Material 2.