Veterinary Medicines Directorate

Highlights

UK-VARSS 2021

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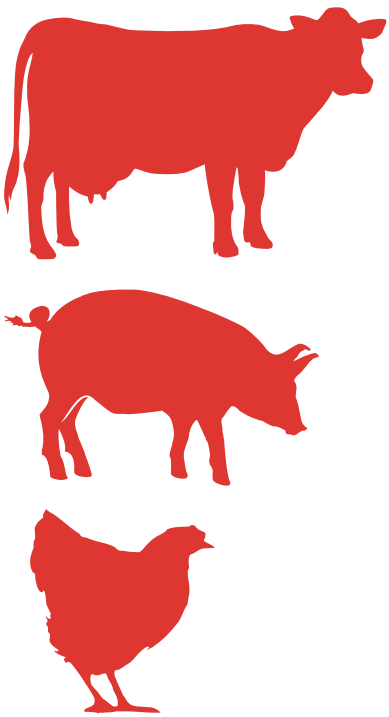
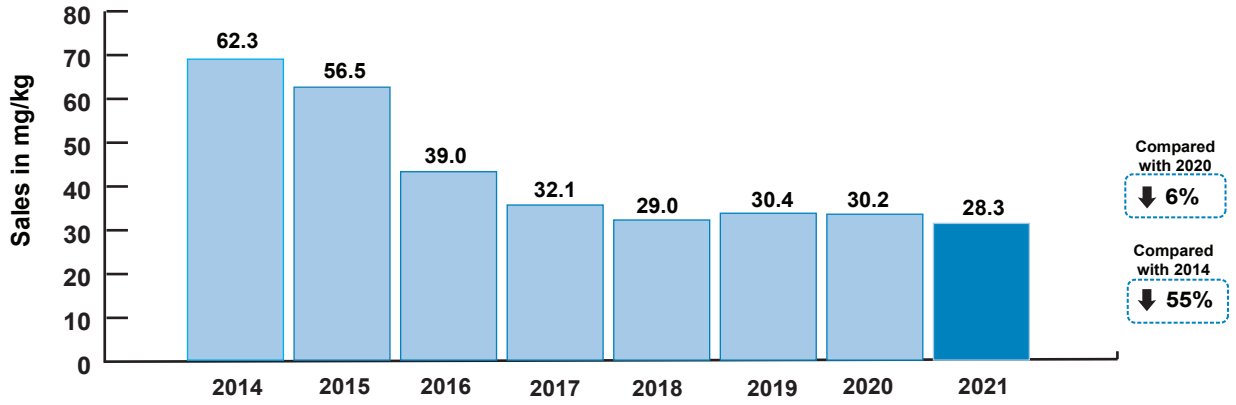


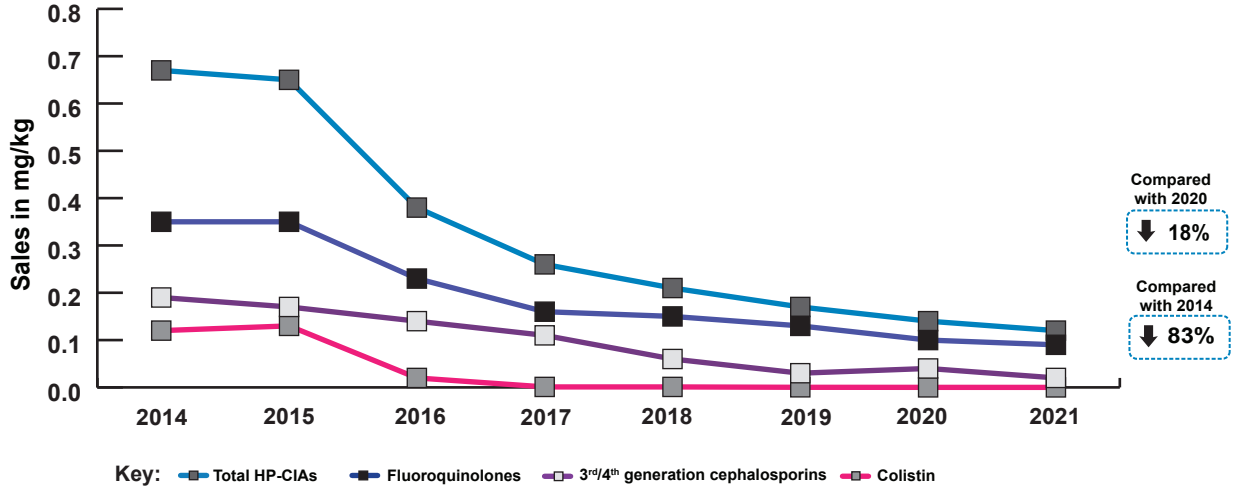
Antibiotic sales

Sales for food-producing animals (mg/kg)

Sales of veterinary antibiotics for use in food-producing animals, adjusted for animal population, were 28.3 mg/kg; a 2.0 mg/kg (6%) decrease since 2020 and an overall 34 mg/kg (55%) decrease since 2014. This represents the lowest sales to date.



Sales of Highest Priority Critically Important Antibiotics (HP-CIAs) in food-producing animals account for 0.4% of total sales and have dropped from 0.14 mg/kg in 2020 to 0.12 mg/kg in 2021; an 18% decrease since 2020.

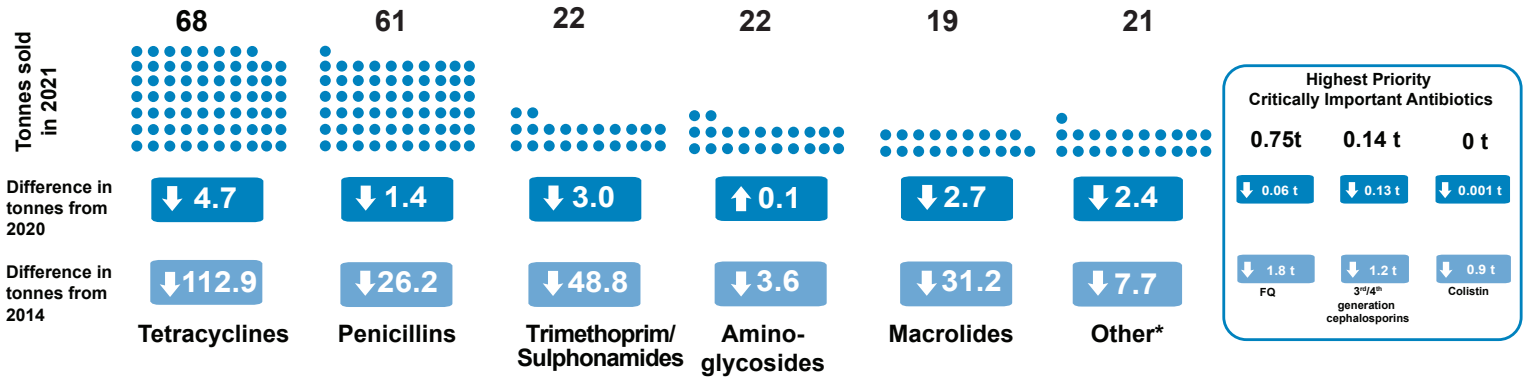


Sales of antibiotics for all animals (tonnes)

In 2021 the total quantity of antibiotic active ingredient sold in the UK was 212 tonnes, the lowest sales to date.

	2014	2015	2016	2017	2018	2019	2020	2021	Compared with 2014	Compared with 2020
Total sales (all animals tonnes)	447	406	293	246	223	229	227	212	⬇ 52%	⬇ 6%

Sales of HP-CIAs reduced by a further 0.19 tonnes (18%) from an already low level; a drop of 3.9 tonnes (81%) since 2014. Tetracyclines remain the most sold antibiotic class (32%), followed by penicillins (29%). Sales of HP-CIAs in all animal species represent a small proportion (0.4%) of total veterinary antibiotic sales.



● = 1 tonne
t = tonnes
FQ = fluoroquinolones
* Includes amphenicols, lincomycins, pleuromutilins, 1st and 2nd cephalosporins, imidazole derivatives and aminocoumarins

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.

Antibiotic usage by food-producing animal species

	Total coverage %*	2021 Usage**	Change since last year	Trends since data first published
Pigs	>95	87.3 mg/kg	↓ 17.7 mg/kg	↓ 69% since 2015
Turkeys	90	42.6 mg/kg	↑ 16.8 mg/kg	↓ 81% since 2014
Broilers		13.7 mg/kg	↓ 2.6 mg/kg	↓ 72% since 2014
Ducks		1.7 mg/kg	↓ 0.9 mg/kg	↓ 89% since 2014
Laying hens	90	0.33 % bird days	↓ 0.14 % bird days	↓ 50% since 2016
Gamebirds	91	8.9 tonnes	↑ 3.2 † tonnes	↓ 55% since 2016
Salmon	100	43.1 mg/kg	↑ 13.8 mg/kg	↑ 168% since 2017
Trout	90	5.9 mg/kg	↓ 7.9 mg/kg	↓ 69% since 2017

Highest Priority Critically Important Antibiotics by food-producing animal species

	Total coverage %*	2021 Usage**	Change since last year	Trends since data first published
Pigs	>95	0.03 mg/kg	↓ 0.02 mg/kg	↓ 97% since 2015
Meat Poultry	90	0.05 mg/kg	↑ 0.04 mg/kg	↓ 96% since 2014
Gamebirds	90	26.5 kg	↑ 5.0 † kg	↓ 59% since 2016
Trout	90	2.1 mg/kg	↓ 2.1 mg/kg	↓ 68% since 2017

* Represents the % animals covered by the data, except gamebirds which represents an estimate of the total % antibiotics sales

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

† Note that industry estimates suggest that, due to Covid restrictions, gamebird rearing reduced by 30% during 2020

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

Resistance in *Escherichia coli* from pigs

The UK can report mostly decreasing trends of AMR in indicator *E. coli* from healthy pigs at slaughter since 2015. Of the HP-CIAs, resistance to third generation cephalosporins is low* and has declined since 2019; resistance to the fluoroquinolone ciprofloxacin has increased since 2015 but remains at low levels; and resistance to the quinolone nalidixic acid has remained low since 2015. No resistance has been detected to colistin over the monitoring period.

In 2021, the percentage of pig caecal sample positive for ESBL- or AmpC- producing *E. coli* on selective media reached the highest level seen so far during this monitoring programme, at 18.1% and 12.0% of samples respectively (30.1% combined). This result is unexpected and is being investigated further. No isolates were positive for both phenotypes and no carbapenemase- producing *E. coli* were detected during monitoring period.

Resistance in *Salmonella* spp. from pigs

This year is the baseline year for testing the resistance of *Salmonella* isolates from caecal samples (rather than carcase swab samples). Of the HP-CIAs, no resistance was detected to third generation cephalosporins or colistin. Resistance to quinolones, including fluoroquinolones, was detected at low levels.

*** Description of percentage resistance referenced: rare (<0.1%), very low (0.1% to 1%), low (>1% to 10%), moderate (>10% to 20%), high (>20% to 50%), very high (>50% to 70%), extremely high (>70%)**

Antibiotic resistance - clinical surveillance

Resistance in *Escherichia coli*

Of the HP-CIAs, resistance to fluoroquinolones and third generation cephalosporins was low* or not detected in 2021 for all animal species. Resistance to HP-CIAs has generally not increased for any of the animal species tested.

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

Of the 4,507 *Salmonella* isolates tested, 67.5% were susceptible to all of the antibiotics tested. The number of *Salmonella* isolates from cattle, pigs, chickens and turkeys fully susceptible to the panel of antibiotics tested increased in 2021. No resistance to third generation cephalosporins or fluoroquinolones was detected in cattle, pigs, sheep and turkeys. In chickens, resistance to third generation cephalosporins and fluoroquinolones was very low* (0.1% for both). Resistance to ciprofloxacin was detected in 11 isolates: one from chickens, one from a dog, and nine isolates from feed. A change to legislation in 2021 meant that *Salmonella* isolates from dogs became reportable under the Zoonoses Order in Great Britain. Of the 821 isolates tested, 34.6% were resistant to at least one antibiotic in the panel.

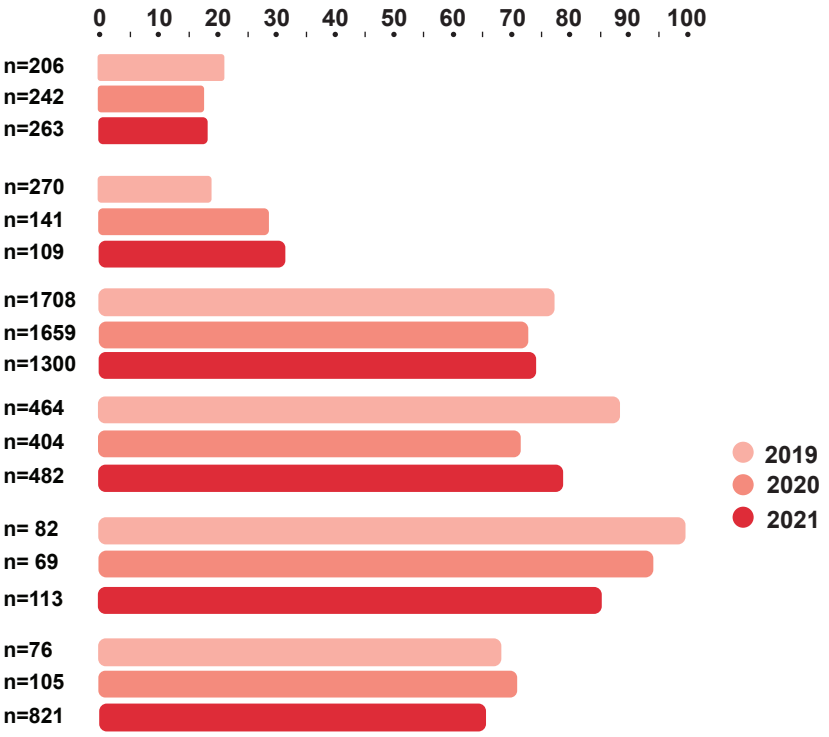
Resistance in 2021 (%) to:

	Third generation cephalosporins**	Quinolones***
	0/0	0/1.1
	0/0	0/16.5
	0.1/0	0.1/3.9
	0/0	0/1.2
	0/0	0/1.8
	0.5/0.4	0.1/7.2

**Cefotaxime/Ceftazidime

***Ciprofloxacin/Nalidixic acid

Percentage fully susceptible to all tested antibiotics



n = number of samples tested

MIC testing of veterinary pathogens

Following the introduction of MIC testing for key veterinary bacterial pathogens against commonly used clinical antibiotics in 2020, as an enhancement of the clinical surveillance programme, additional pathogens have been added to the core range in 2021. This testing improves the usefulness of our AMR surveillance and also helps vets make better prescribing choices. Many isolates were fully susceptible to the panel of antimicrobials tested. Resistance was uncommon or not detected amongst antimicrobials which are often used as second or third line treatment options.

*** Description of percentage resistance referenced: rare (<0.1%), very low (0.1% to 1%), low (>1% to 10%), moderate (>10% to 20%), high (>20% to 50%), very high (>50% to 70%), extremely high (>70%)**

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

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, 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 3.

In the 2021 clinical surveillance programme, MIC testing was performed for important respiratory pathogens of cattle, sheep, and pigs, *S. uberis* isolates from bovine mastitis, *S. suis* isolates from pigs and *E. coli* isolates from chickens. The results were interpreted using veterinary clinical breakpoints (CBPs) when possible. Otherwise, resistance was assessed by disc diffusion techniques, and interpreted using BSAC (British Society for Antimicrobial Chemotherapy) human CBPs, where available. Full details of the methods used are available in supplementary material 1.