Veterinary Medicines Directorate

Highlights

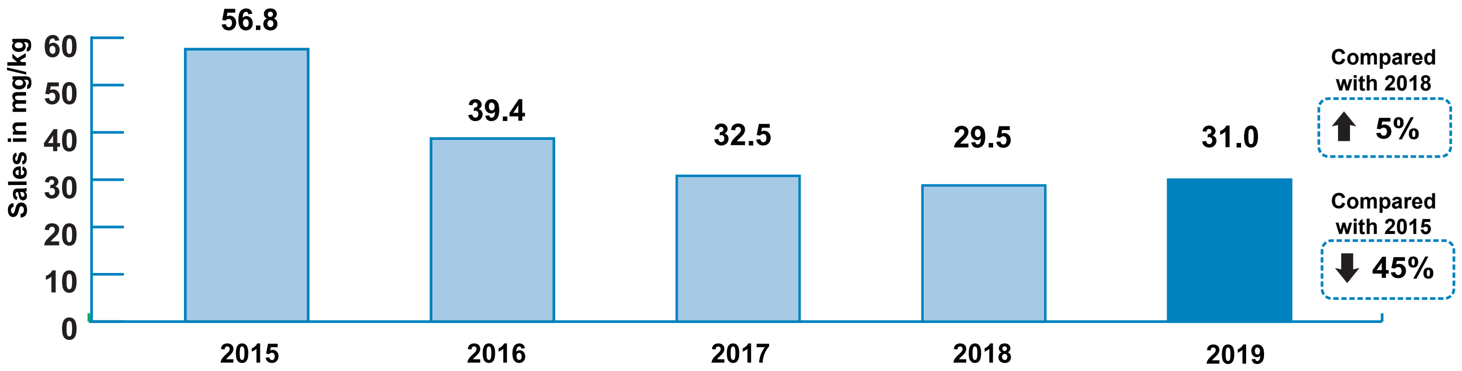
UK-VARSS 2019

Published November 2020

Antibiotic Sales

Sales for food-producing animals (mg/kg)

Sales of veterinary antibiotics for use in food-producing animals, adjusted for animal population, were 31.0 mg/kg; a 1.5 mg/kg (5%) increase since 2018, however there was an overall 25.8 mg/kg (45%) decrease since 2015.



Sales of Highest Priority Critically Important Antibiotics (HP-CIAs) in food-producing animals dropped from 0.21 mg/kg in 2018 to 0.17 mg/kg (21%) in 2019.

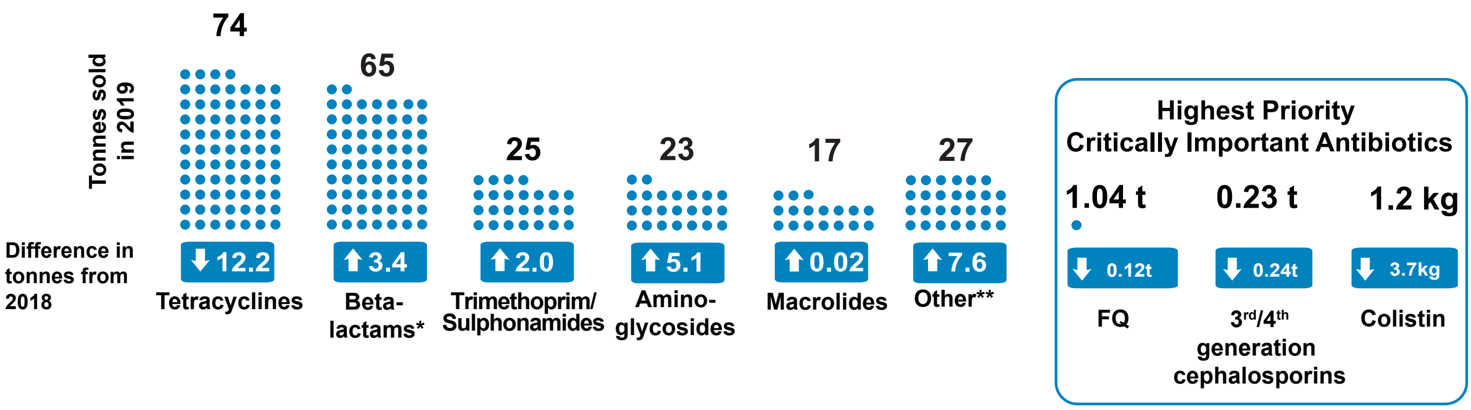
	2015	2016	2017	2018	2019	Compared with 2015
Fluoroquinolones (mg/kg)	0.35	0.23	0.16	0.15	0.13	↓ 61%
3rd/4th generation cephalosporins (mg/kg)	0.17	0.14	0.11	0.06	0.03	↓ 82%
Colistin (mg/kg)	0.12	0.02	0.0006	0.0007	0.0002	↓ 99.9%
Total HP-CIAs (mg/kg)	0.64	0.38	0.26	0.21	0.17	↓ 74%

Sales for all animals (tonnes)

In 2019 the total quantity of antibiotic active ingredient sold in the UK was 232.2 tonnes.

	2015	2016	2017	2018	2019	Compared with 2015	Compared with 2018
Total sales (all animals, tonnes)	408	296	248	226	232	↓ 43%	↑ 3%

Sales of HP-CIAs dropped by a further 0.36 tonnes (22%) from an already low level in 2018; a drop of 3.3 tonnes (72%) since 2015. Overall, tetracyclines remain the most sold antibiotic class (32%), followed by beta-lactams (28%). Sales of HP-CIAs in all animal species represent a small proportion (0.5%) of the overall antibiotic sales.



● = 1 tonne
t = tonnes
FQ = fluoroquinolones
* Includes 3rd and 4th generation cephalosporins.
** Includes amphenicols, lincomycins, pleuromutilins, steroidal antibiotics and polymyxins (including colistin).

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 %*	2019 Total tonnage**	2019 Total per unit***	Longer term change****	1 year change
Pigs	95	84.0	110 mg/kg	↓ 168 mg/kg	0 mg/kg
Turkeys	90	19.7	42 mg/kg	↓ 177 mg/kg	↓ 4.7 mg/kg
Broilers			17 mg/kg	↓ 31.3 mg/kg	↑ 5.0 mg/kg
Ducks			1.6 mg/kg	↓ 13.5 mg/kg	↓ 0.10 mg/kg
Laying hens	90	4.8	0.68 % bird days	↑ 0.02 % bird days	↑ 0.13 % bird days
Gamebirds	90	10.4	—	↓ 9.8 tonnes	↑ 0.64 tonnes
Salmon	100	2.8	13.5 mg/kg	↓ 2.6 mg/kg	↑ 6.8 mg/kg
Trout	90	0.13	9.8 mg/kg	↓ 10.0 mg/kg	↓ 3.0 mg/kg

Highest Priority Critically Important Antibiotics by food-producing animal species

	Total coverage %*	2019 Total kg**	2019 Total per unit***	Longer term change****	1 year change
Pigs	95	32	0.04 mg/kg	↓ 0.94 mg/kg	↓ 0.02 mg/kg
Meat Poultry	90	14	0.01 mg/kg	↓ 1.2 mg/kg	↓ 0.01 mg/kg
Gamebirds	90	58	—	↓ 6.6 kg	↑ 11.0 kg

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

** Relates to the weight of antibiotic active ingredient, using ESVAC methodology

*** 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'

**** This represents the change from when antibiotic usage was first published, which was 2015 for pigs, 2014 for meat poultry, 2016 for laying hens, 2016 for gamebirds and 2017 for salmon and trout

Antibiotic Resistance in Zoonotic and Commensal Bacteria from Healthy Animals at Slaughter

Resistance in *Salmonella* spp. from pigs

None of the *Salmonella* isolates tested were resistant to the HP-CIAs cefotaxime, ceftazidime or ciprofloxacin. Two *Salmonella* isolates from pigs were resistant to colistin, however, neither isolate had known transferable colistin resistance genes identified.

Resistance in *Escherichia coli* from pigs

There was no resistance to colistin in *E. coli* from pigs in 2015, 2017 and 2019. Resistance to cefotaxime and ceftazidime was detected in 1.4% and 1.0%, respectively, of *E. coli* from pigs in 2019, which was not detected in 2017 or 2015. Very low resistance to ciprofloxacin was detected in isolates from pigs in 2015, 2017 and 2019.

Resistance to the other antibiotics tested in the panel was either not detected or has overall declined since 2015.

In 2019, 18.8% of pig caecal samples yielded *E. coli* with an ESBL- and/or AmpC- phenotype, down from 21.6% in 2017 and 24.7% in 2015. No presumptive carbapenemase-producing *E. coli* were detected.

ESBL-, AmpC- or carbapenemase- producing *Escherichia coli* from pigs

Testing carried out on *E. coli* collected as part of the harmonised monitoring scheme

Year	Resistant to 3rd generation cephalosporins	Resistant to fluoroquinolones	Positive for carbapenemase-producing *E. coli*	Positive for ESBL-producing *E. coli*
2015	150 random isolates		327 caecal samples grown on selective medium*	
	0%	0.7%	0%	24.7%
2017	186 random isolates		347 caecal samples grown on selective medium*	
	0%	1.6%	0%	21.6%
2019	208 random isolates		308 caecal samples grown on selective medium*	
	1.9%	0.5%	0%	18.8%

*** To note this testing does not identify the type or number of ESBLs present.**

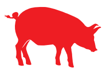
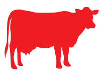
Antibiotic Resistance - Clinical Surveillance

Resistance in *Salmonella* spp.

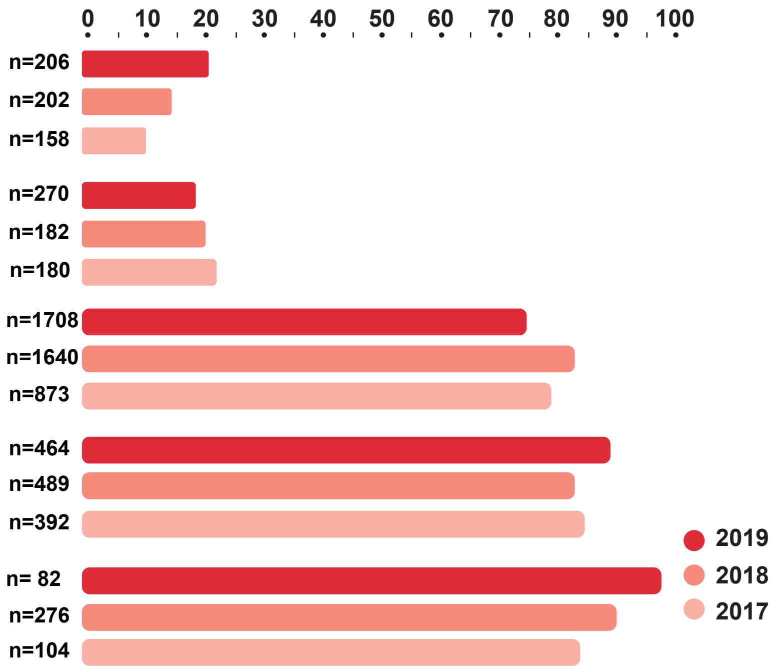
A high percentage of all *Salmonella* isolates tested (72% of 4533 isolates) was susceptible to all the antibiotics tested, a similar situation to previous years.

Resistance to 3rd generation cephalosporins was detected in two isolates from environmental samples related to monitoring of animal-by-products, but not in livestock isolates. Nine isolates from turkeys were resistant to ciproflaxcin (a fluroquinolone).

Resistance in 2019 to:

	3rd/4th generation cephalosporins	fluoroquinolones
	0%	0%
	0%	3.3%
	0%	0%
	0%	0%
	0%	0%

Percentage fully susceptible to all tested antibiotics

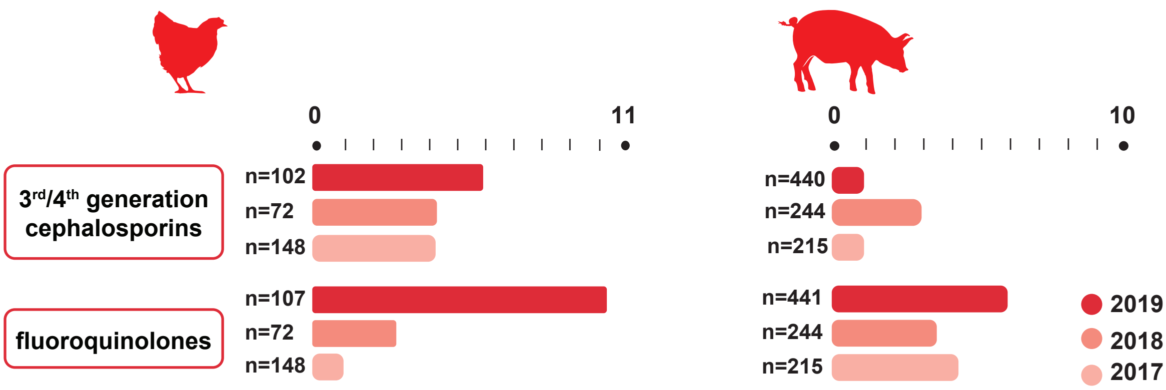


n = number of samples tested

Resistance in *Escherichia coli*

Resistance to fluoroquinolones and 3rd generation cephalosporins was low (<5%), except in cattle (7% of isolates resistant to fluoroquinolones, 5% resistant to ceftazidime and 12% resistant to cefotaxime; the majority of these isolates were obtained from calves) and in chickens (11% of isolates resistant to fluoroquinolones). No colistin resistance was detected in any species.

% resistant isolates from poultry and pigs



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. From the amounts and the product characteristics, the quantity of active ingredient is calculated which is reported here. These sales data do not take into account wastage of veterinary antibiotics. However, they do serve as the best currently available approximation of the quantity of antibiotics administered to animals in the UK. 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. Usage data are now being reported.

How are usage data collected?
Data have been voluntarily provided by producers (pig, poultry and egg sectors), feed companies (gamebirds) and veterinary practices (gamebirds, cattle 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), FarmVet Systems (cattle), British Trout Association (trout) and Scottish Salmon Producers' Association (salmon).

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 December 2014, the European Medicines Agency published scientific advice on the risk to humans from antibiotic resistance caused by the use of HP-CIAs in animals. This advice classed macrolides as category 1, where the risk of use in animals to public health is low or limited, whereas fluoroquinolones and 3rd and 4th generation cephalosporins were classified as category 2, where the risk to public health is considered higher. Following discovery of a novel gene conferring resistance to colistin and capable of horizontal transmission (*mcr-1*) in November 2015, this advice was updated, and it was recommended that colistin was moved to category 2, alongside fluoroquinolones and 3rd and 4th generation cephalosporins.

How is antibiotic resistance interpreted?
Antibiotic resistance in bacteria isolated from animals is monitored through two distinct antibiotic resistance surveillance programmes: the compulsory harmonised monitoring scheme (from healthy animals) and the voluntary Clinical Surveillance programme (from sick animals).

For the harmonised monitoring scheme, both EUCAST human clinical break points (CBPs) and EUCAST epidemiological cut-off values (ECOFFs) were used to determine the susceptibility of the different bacterial populations. Susceptibility results included in the highlights section as well as in the main body of the report were interpreted using CBPs. Results interpreted using both human CBPs and ECOFFs are provided in full in Chapter S3 of the supplementary material.

For the clinical surveillance programme, resistance in bacteria was interpreted using BSAC human CBPs. Where BSAC CBPs were not available, a historical APHA veterinary breakpoint (13 mm zone size diameter) has been used to indicate resistance (see Table S4.1.1 of the supplementary material for further details).