Veterinary Medicines Directorate

Highlights

UK-VARSS 2018

Published October 2019

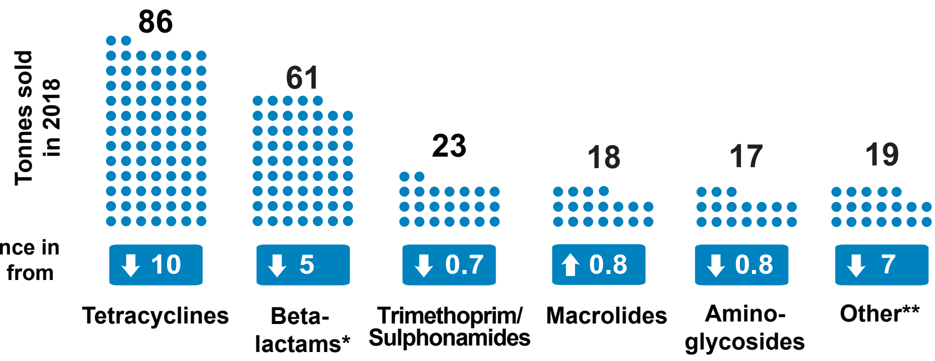
Antibiotic Sales

Total sales in tonnes (all animals)

In 2018 the total quantity of antibiotic active ingredient sold in the UK was 226 tonnes.

	2014	2015	2016	2017	2018	Compared with 2017	Compared with 2014
Total sales (all animals, tonnes)	448	408	296	248	226	↓ 9%	↓ 49%

Sales of highest priority critically important antibiotics (HP-CIAs) dropped by a further 0.4 tonnes (18%) from an already low level in 2017; a drop of 3.1 tonnes (66%) since 2014. Overall, tetracyclines remain the most sold antibiotic class (38%), followed by beta-lactams (27%) and trimethoprim/sulphonamides (10%). Sales of HP-CIAs in all animal species represent a small proportion (0.7%) of the overall antibiotic sales.

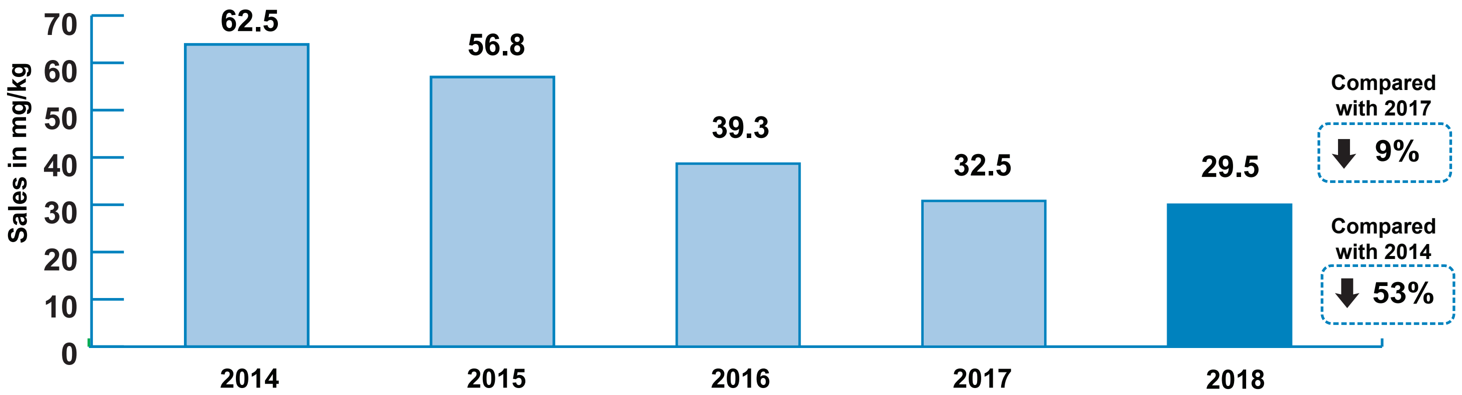


Highest Priority Critically Important Antibiotics

FQ	3rd/4th generation cephalosporins	Colistin
1.2 t	0.5 t	4.9 kg
↓ 0.05 t	↓ 0.3 t	↑ 0.7 kg

Overall trends in mg/kg (food-producing animals)

Sales of veterinary antibiotics for use in food-producing animals, adjusted for animal population, were 29.5 mg/kg; a 3 mg/kg (9%) and 33 mg/kg (53%) decrease since 2017 and 2014 respectively.



Sales of HP-CIAs in food-producing animals dropped from 0.26 mg/kg in 2017 to 0.21 mg/kg (19%) in 2018.

	2014	2015	2016	2017	2018	Compared with 2014
Fluoroquinolones (mg/kg)	0.35	0.35	0.23	0.15	0.15	↓ 58%
3rd/4th generation cephalosporins (mg/kg)	0.19	0.17	0.14	0.11	0.06	↓ 66%
Colistin (mg/kg)	0.12	0.12	0.02	0.0006	0.0007	↓ 99%
Total HP-CIAs (mg/kg)	0.67	0.64	0.38	0.26	0.21	↓ 68%

● = 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 purchased, 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 %*	2018 Total tonnage**	2018 Total per unit***	Compared with 2015 %	Compared with 2016 %	Compared with 2017 %
Pigs	89	76	110 mg/kg	↓ 60	↓ 40	↓ 16
Turkeys	90	16	47 mg/kg	↓ 77	↓ 46	↑ 3
Broilers			12 mg/kg	↓ 55	↓ 27	↑ 26
Ducks			1.6 mg/kg	↓ 79	↓ 46	↓ 47
Laying hens	90	3.2	0.63 bird days	—	↓ 13	↑ 11
Gamebirds	90	9.7	—	—	↓ 52	↓ 25
Salmon	100	1.0	6.5 mg/kg	—	—	↓ 60
Trout	90	0.2	13 mg/kg	—	—	↓ 32
Dairy†	30	4.9	17 mg/kg	↓ 30	↓ 36	↑ 9
Beef † (¥)	5.5 (4.0)	1.1 (1.0)	21 mg/kg (25 mg/kg)	— 0	— ↓ (2)	— ↓ (6)

Highest Priority Critically Important antibiotics by food-producing animal species

	Total coverage %*	2018 Total kg**	2018 Total per unit***	Compared with 2015 %	Compared with 2016 %	Compared with 2017 %
Pigs	89	41	0.06 mg/kg	↓ 94	↓ 78	↓ 39
Meat Poultry	90	17	0.02 mg/kg	↓ 97	↓ 87	↓ 49
Gamebirds	90	47	—	—	↓ 27	↓ 5
Dairy	31	107	0.38 mg/kg	↓ 80	↓ 61	↓ 37
Beef † (¥)	5.5 (4.0)	14 (10)	0.26 mg/kg (0.27 mg/kg)	— ↓ (73)	— ↓ (66)	— ↓ (49)

* 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, bird days refers to 'actual daily bird days treated/100 bird days at risk'
† Due to the low proportion of UK cattle in this sample, these figures may not accurately reflect the situation for the whole UK cattle population
¥ Data from a subset of beef farms where usage data was available for 2015, 2016, 2017 and 2018

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

Resistance in *Salmonella* spp. from laying hens, broilers and turkeys

Of the highest priority critically important antibiotics, no resistance to 3rd generation cephalosporins was detected in *Salmonella* isolates from broilers, laying hens or turkeys in 2014, 2016 and 2018. Resistance to ciprofloxacin fluctuated at a low level across monitoring years in isolates from broilers, laying hens and turkeys (2%-9% resistance), with the exception in turkey isolates from 2014 (20% resistance).

Resistance in *Escherichia coli* from broilers and turkeys

There was no resistance to colistin in *E. coli* isolates from turkeys or broilers in 2014, 2016 and 2018. Ciprofloxacin-resistance showed a downward trend in turkey isolates between 2014 and 2018 (from 8% to 3%) and fluctuated at a low level over the same period in broiler isolates (between 2% and 4%). No or low resistance to 3rd generation cephalosporins was detected in isolates from turkeys and broilers from 2014, 2016 and 2018.

In 2018, 10.3% broiler caecal samples yielded *E. coli* with an ESBL and/or AmpC phenotype, for turkey caecal samples this was 3.5%. This was a decrease compared to 2016, when this was 30.1% for broliers and 4.7% for turkeys. No presumptive carbapenemase-producing *E. coli* were detected.

Resistance in *Campylobacter jejuni* from broilers and turkeys

Resistance to erythromycin, a first-line treatment for *Campylobacter* infection in people, remained very low in isolates from broilers and turkeys (≤1%). A high level of resistance to fluroquinolones was detected in isolates from broilers (between 41%-48%), whereas in turkeys a decreasing trend was seen (from 35% in 2014 to 31% in 2018).

		E. coli **(%)**		***Salmonella*** **spp. (%)**		***C. jejuni*** **(%)**	
		3rd/4th GC	**FQ**	**3rd/4th GC**	**FQ**	**Ery**	**FQ**
Broilers	**2014**	0	4.4	0	3.6	0	43.6
	2016	0	2.1	0	8.8	0.6	40.6
	2018	0.5/1.6*	4.4	0	6.4	0.6	48.0
	Trend	↔ ↑	↓ ↑	↔	↑ ↓	↑ ↔	↓ ↑
Turkeys	**2014**	0	8.3	0	20.4	0.6	35.0
	2016	0.4/0.4*	5.8	0	1.8	1.1	34.7
	2018	0	2.8	0	5.3	0.6	31.0
	Trend	↑ ↓	↓	↔	↓ ↑	↑ ↓	↓
Layers	**2014**			0	1.7		
	2016			0	8.8		
	2018			0	3.8		
	Trend			↔	↑ ↓		

3rd/4th GC = 3rd and 4th generation cephalosporins; FQ = fluoroquinolones; Ery= erythromycin
*Resistance to ceftazidime and cefotaxime respectively

Antibiotic Resistance - Clinical Surveillance

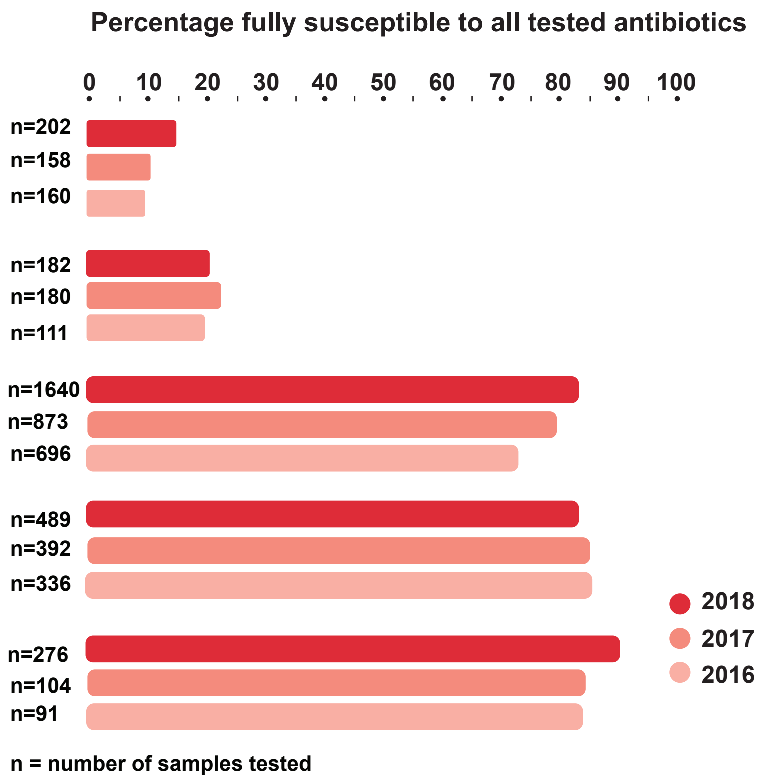
Resistance in *Salmonella* spp.

A high percentage of all *Salmonella* isolates tested (76% of 4,414 total isolates) was susceptible to all the antibiotics tested; the results indicate an increasing trend in this susceptible proportion.

Resistance to 3rd generation cephalosporins was detected in two isolates from chickens, but not in isolates from turkeys, pigs, cattle and sheep. One isolate from turkeys and two isolates from chickens showed resistance to ciprofloxacin (a fluoroquinolone).

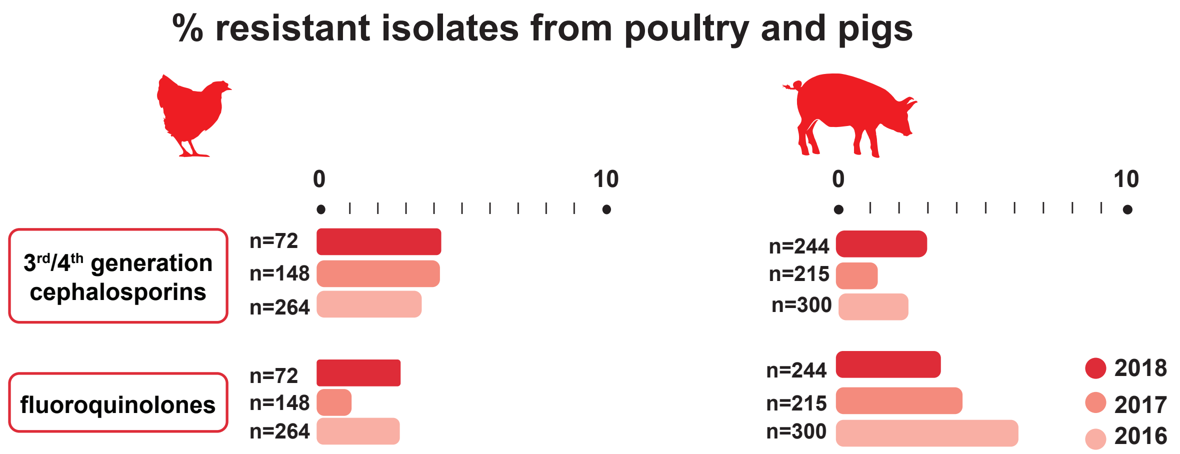
Resistance in 2018 to:

	3rd/4th generation cephalosporins	fluoroquinolones
	0%	0%
	0%	0.6%
	0.1%	0.1%
	0%	0%
	0%	0%



Resistance in *Escherichia coli*

Resistance to fluoroquinolones and 3rd generation cephalosporins was low (≤4%), except in cattle (7% of isolates resistant to fluoroquinolones, 6% resistant to ceftazidime and 12% resistant to cefotaxime; the majority of these isolates were obtained from calves). Resistance to colistin was detected in one isolate from pigs, but not in other major food-producing animal species.



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 EU Harmonised Monitoring Scheme (from healthy animals) and the voluntary Clinical Surveillance programme (from sick animals).

For the EU 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).