UK-VARSS 2016

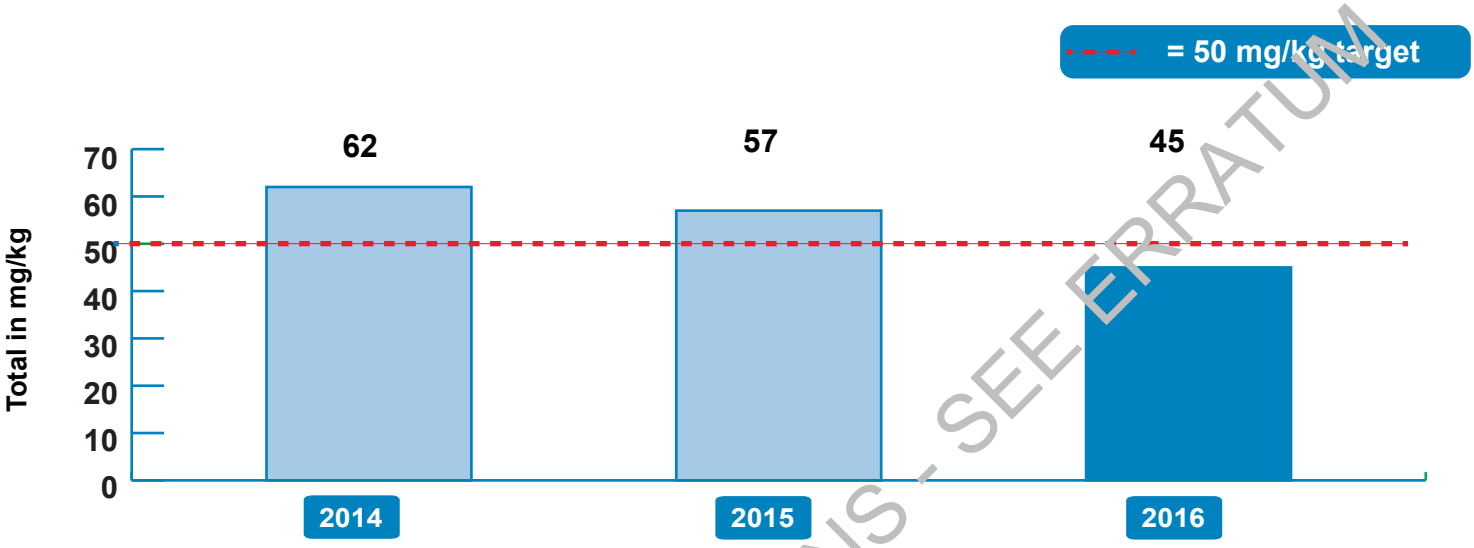
Veterinary Medicines Directorate

Highlights Report

Antibiotic Sales and Usage

Overall trends in mg/kg

The Government committed to reduce antibiotic use in livestock and fish farmed for food to a multi-species average of 50 mg/kg by 2018, from 62 mg/kg in 2014. This has been achieved two years early, with antibiotic use in food-producing animal species decreasing by 27% to 45 mg/kg.



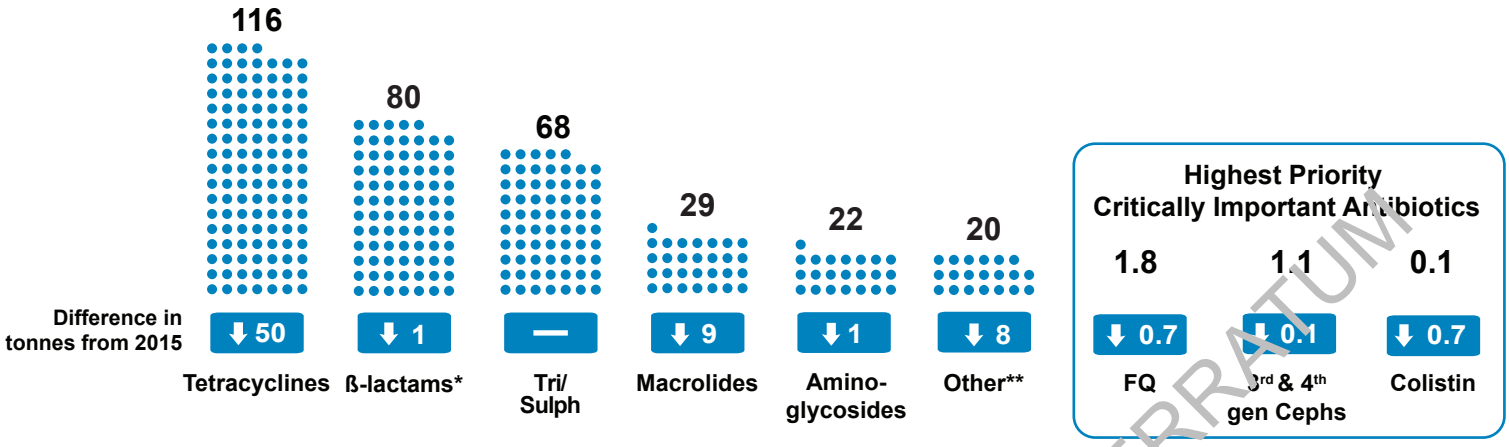
Sales of highest priority critically important antibiotics (HP-CIAs) have also reduced in 2016 from an already low level. Sales of 3rd/4th generation cephalosporins reduced by 12% to 0.15 mg/kg, fluoroquinolones reduced by 29% to 0.24 mg/kg, and colistin reduced by 83% to 0.02 mg/kg, which is considerably below the 1 mg/kg maximum target for colistin recommended by the European Medicines Agency.

	2012	2013	2014	2015	2016	Compared with 2015
Total (mg/kg)	66	62	62	57	45	⬇ 21%
Fluoroquinolones (FQ) (mg/kg)	0.33	0.36	0.35	0.34	0.24	⬇ 29%
3rd/4th gen Cephalosporins (mg/kg)	0.20	0.18	0.19	0.17	0.15	⬇ 12%
Colistin (mg/kg)	0.09	0.11	0.12	0.12	0.02	⬇ 83%
Total sales (tonnes)	464	436	445	408	337	⬇ 17%

Total sales in tonnes of active ingredient by class for 2016

○ = 1 tonne

Tetracyclines, β-lactams and trimethoprim/sulphonamides accounted for the majority (78%) of active antibiotic ingredient sold. As with previous years, HP-CIAs (fluoroquinolones, colistin and 3rd/4th generation cephalosporins) accounted for a small proportion of the sales (<1%).



*includes 3rd & 4th gen Cephs
**other includes: amphenicols, lincomycins, pleuromutilins, steroidal antibiotics and polymixins (including colistin)
FQ = fluoroquinolones

Antibiotic usage and data collection activities by livestock species

Antibiotic usage refers to the amount of antibiotics purchased, prescribed and/or administered. For the first time, this report includes antibiotic usage data from the pig, meat poultry, egg, gamebird and dairy industries, collected and provided on a voluntary basis.

	Total Coverage %*	2016 Total tonnage	2016 Total Usage**	Compared with 2015 %	HP-CIA usage	Compared with 2015 %
Pigs	62	89.3	183 mg/kg	↓ 34	0.3 mg/kg	↓ 73
Turkeys	90	23.7	86 mg/kg	↓ 57	0.12 mg/kg	↓ 78
Broilers			17 mg/kg	↓ 37		
Ducks			3 mg/kg	↓ 60		
Dairy	33	7.2	26 mg/kg (2.3 DCDVet)	↑ 9 (↓ 5†)	0.96 mg/kg	↓ 50
Layers	90	2.6	0.7 DD/100 days	—	15.2 kg	—
Gamebirds	90	20.2	—	—	64.1 kg	—

*represents the % of animals covered by the data, except for gamebirds where it represents an estimate of the % of total antibiotic sales
**mg/kg relates to the amount of active ingredient whereas Defined Course Doses (DCDVet) relates to the number of antibiotic courses administered, in both cases normalised by kg biomass and calculated using ESVAC methodology. ESVAC methodology is not available for eggs, gamebirds or ducks. The British Poultry Council (BPC) use a weight of 1.75kg per slaughter duck to estimate biomass whereas the British Egg Industry Council calculate the average number of antibiotic daily doses (DD) per chicken given over a 100 day period, using actual usage data.
†the reason for the increase in mg/kg but reduction in DCDVet is due to a switch away from HP-CIAs to non HP-CIAs, which have a higher amount of active ingredient per course than HP-CIAs

It is important to note that none of these datasets have 100% coverage and so the results presented here may not be fully representative of the industry, especially for pigs and dairy cattle where the UK coverage is 62% and 33% respectively. In pigs, the number of contributors to the electronic medicines book (eMB) is set to increase; Quality Meat Scotland required the use of eMB pigs to record antibiotic usage from August 2016 and, as of 11th November 2017, this will now be a requirement under the Red Tractor assurance scheme. The Cattle Health and Welfare Group will also continue to work towards increasing the amount of antibiotic usage data available for the dairy industry, as well as obtaining usage data for the beef and sheep industries.

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

Resistance in *Escherichia coli* from broilers and turkeys

Of the highest priority critically important antibiotics for human medicine (HP-CIAs), no resistance was detected in indicator *E. coli* from broilers and turkeys at slaughter with the exception of a single isolate from turkeys resistant to cefotaxime and ceftazidime (3rd/4th generation cephalosporins) and the moderate resistance to fluoroquinolones reduced further from 2014 to 21.6% in broilers and 15.6% in turkeys.

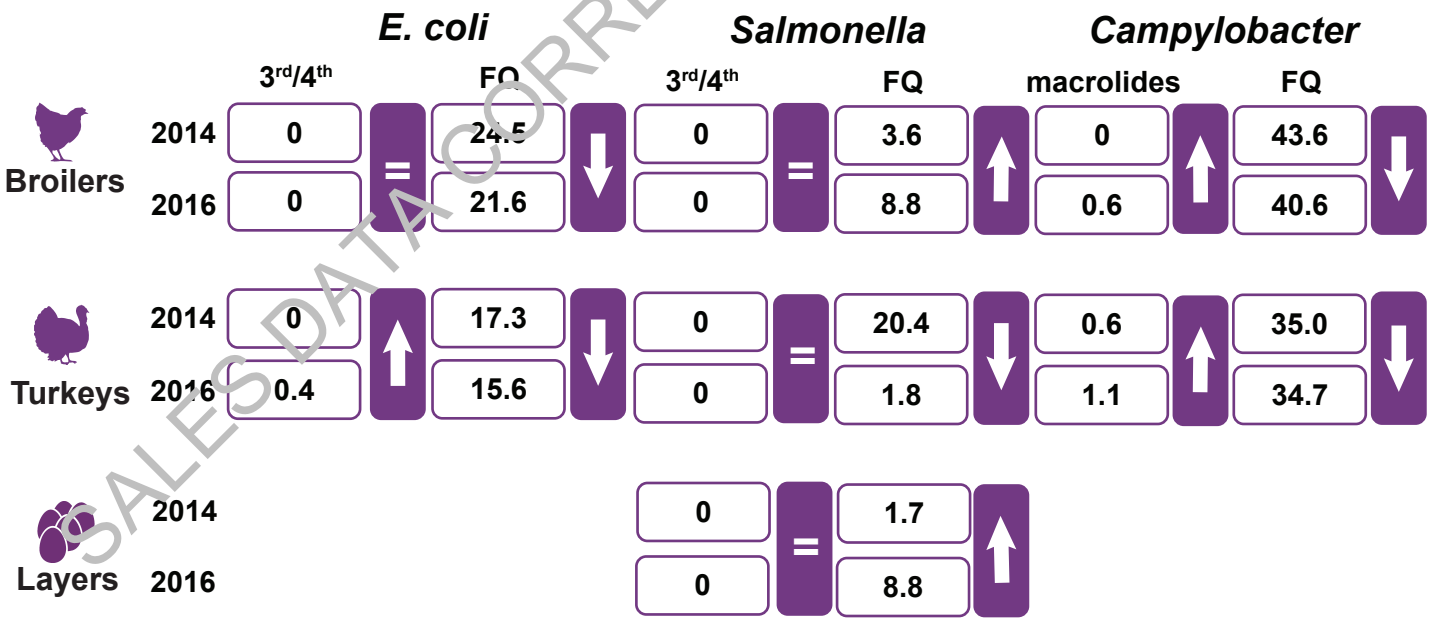
Resistance in *Salmonella* from laying hens, broilers and turkeys

No resistance to HP-CIAs was detected in *Salmonella* isolates from laying hens, broilers or turkeys, other than a relatively low level to fluoroquinolones (1.7%-8.8%). Compared to 2014 there was a big reduction in resistance to fluoroquinolones in isolates from turkeys and a small increase in those from broilers and layers.

Resistance in *Campylobacter jejuni* from broilers and turkeys

Resistance to fluoroquinolones was detected in a relatively high proportion of *C. jejuni* isolates from broilers (40.6%) and turkeys (34.7%), a small decrease in levels compared to 2014.

Resistance to erythromycin, which is the first-line treatment for *Campylobacter* infection in people, was very low in isolates from broilers (0.6%) and turkeys (1.1%).



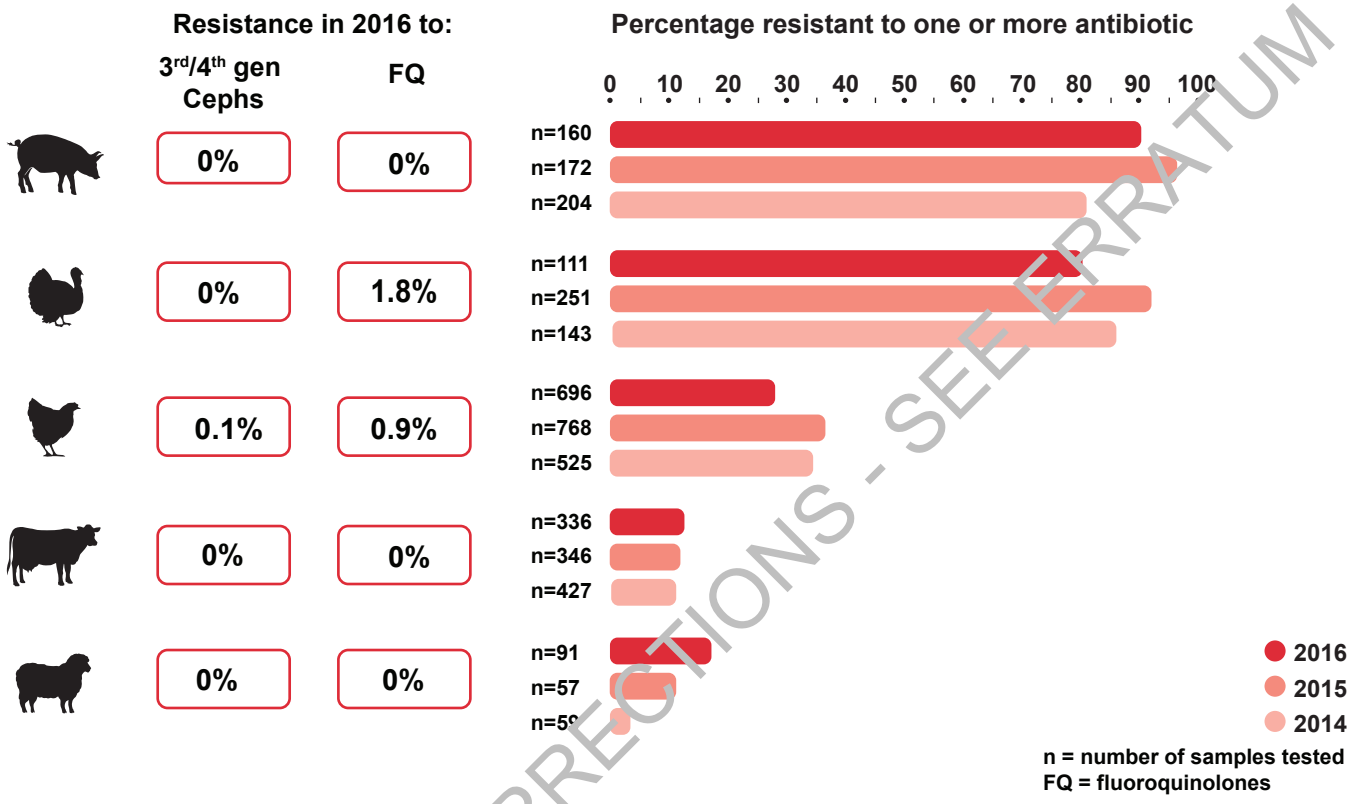
FQ = fluoroquinolones
3rd/4th = 3rd/4th generation cephalosporins

Antibiotic Resistance - Clinical Surveillance

Resistance in *Salmonella*

Overall, a high percentage of *Salmonella* isolates (69.0%) were susceptible to all the 16 antibiotics tested.

A very low level of resistance to fluoroquinolones (0.6%) and to 3rd/4th cephalosporins (0.4%) was observed, however none of the *Salmonella* Typhimurium isolates were resistant to these HP-CIAs.

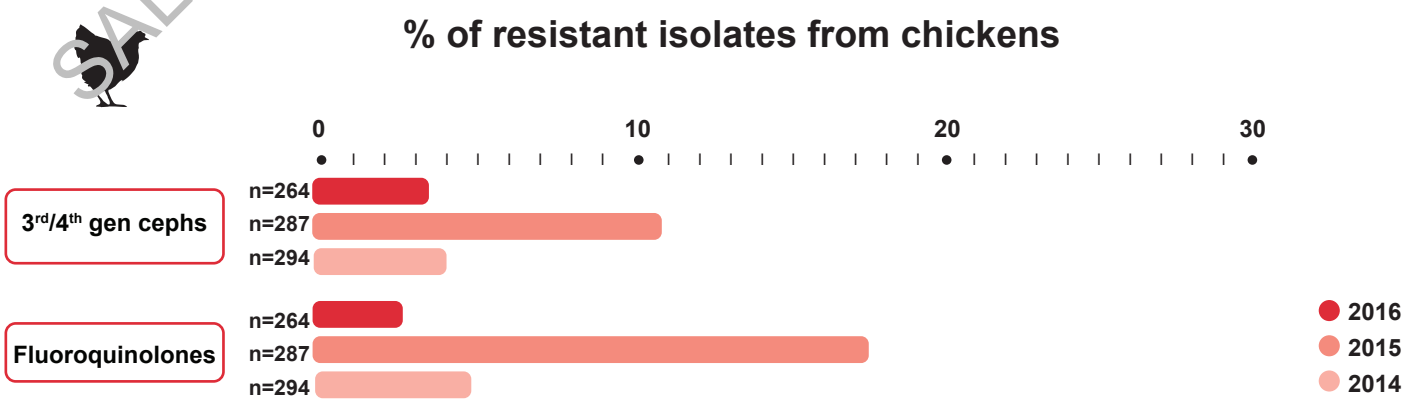


Resistance in *Escherichia coli*

Resistance in *E. coli* isolates from chickens, which has shown an upward trend since 2013, showed a marked decline in 2016 for several antibiotics, coinciding with a reduction in antibiotic use in broilers.

Resistance levels to 3rd/4th generation cephalosporins were relatively low in *E. coli* isolates from most livestock species (less than 3%), with the exception of isolates from calves which showed a higher resistance level (16%).

Colistin resistance was not detected.



Background

How are sales data collected and analysed?
In the UK, from 2005 it has been a statutory requirement for pharmaceutical companies to report the quantity of antibiotics sold for use in animals to the VMD. These data do not take into account wastage, imports or exports of veterinary antibiotics. However, they do serve as the best currently available approximation of the quantity of antibiotics administered to animals in the UK. Consumption data, i.e. the amount of antibiotics purchased, prescribed and/or administered, have the potential to provide much more precise estimates of usage. The VMD has been working with the poultry, pig and cattle sectors to develop sector-led collection systems to monitor their antibiotic consumption. Consumption 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 practice delivery records (game birds and dairy cattle). Usage data systems have been put in place to collect data from the British Poultry Council (meat poultry), the British Egg Industry Council (egg sector), the Game Farmers Association (gamebirds), the electronic Medicines Book (pigs) and FarmVet Systems (cattle).

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 have been treated. 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 produce.

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 Organisation (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 for 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 the expert group 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 (ECVs) 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 ECVs. Results interpreted using both human CBPs and ECVs are provided in full in Table S3.3.1, S3.4.1 and S3.5.1 of the supplementary material.

For the clinical surveillance programme, resistance in bacteria was interpreted using BSAC human CBPs. Where BSAC CBP were not available, a historical APHA veterinary breakpoint (13 mm zone size diameter) has been used to indicate resistance (Refer to Table S4.1 of the supplementary material for further details).