Farm antibiotic use in the United States

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Levels of farm antibiotic use in the United States

Data from the United States Food and Drug Administration (FDA) on the annual sales of antibiotics for food-producing animals are available for 2009 to 2015. During this period, total sales of medically important antibiotics increased every year, and by 26% in total, see Table 1.

Table 1 Weight of active ingredient (tonnes) of medically important antibiotics sold for use in food-producing animals in the United States 2009-2015 [1].

2009	2010	2011	2012	2013	2014	2015
7,687	8,229	8,256	8,897	9,193	9,479	9,702

The FDA does not publish information on the use of the critically important modern cephalosporins (3rd and 4th generation cephalosporins), but the total sales of all cephalosporins increased by 61% between 2009 and 2015.

The US sales of the critically important fluoroquinolones antibiotics was 20 tonnes in 2015, a 16% increase over 2014 and a 33% increase over 2013. However, since 2005 the use of fluoroquinolones has been banned in the US in poultry due to scientific evidence that this use was leading to fluoroquinolone resistance in human Campylobacter infections. In contrast, most European countries continue to permit the use of fluoroquinolones in poultry.

The FDA data shows that in 2015, 74% of farm-animal antibiotics were administered in feed and 21% in drinking water. This means that approximately 95% of farm antibiotics are being used for mass medication.

Total antibiotic use in human medicine in the US in 2011 was 3,290 tonnes of active ingredient [3], so the use of medically important antibiotics in food animals in the US is approximately three times higher than human use. These data do not include the further 5,785 tonnes of non-medically important antimicrobials (including 4,741 tonnes of the ionophore antibiotics) which are used in US farm animals.

Comparison with EU countries

Comparing total US farm antibiotic sales with EU countries is not straightforward due to the need to compare the sizes of the livestock populations in different countries. The EU unit used to measure the size of livestock populations is the “Population Correction Unit” (PCU), but no published data on the PCU of US livestock species are available.

A further difficulty with international comparisons is that levels of antibiotic use vary significantly by species. Usually, intensively farmed species like pigs, poultry and veal calves (when they are intensively farmed) have very high antibiotic use, whereas extensively farmed sheep, and cattle raised on pasture, tend to have much lower antibiotic use. So countries with different proportions of different species can be expected to have different antibiotic-use levels.

Nevertheless, a rough comparison can be made between antibiotic use in US and UK livestock. In 2015, total sales of medically important antibiotics in the US in 2015 was 9,702 tonnes whereas in the UK it was 404 tonnes [4]. So total US use was 24 times higher than UK use in absolute terms.

In terms of livestock populations [4][5], in 2015:

- the US had 9.3 times more cattle
- the US had 14.4 times more pigs
- the US slaughtered 11.2 times more chickens (figures for the UK are for 2014)
- the US had 6.2 times fewer sheep.

Since antibiotic use is known to be extremely low in sheep in comparison to other species, these figures suggest that US farm antibiotic use is roughly twice as high per animal as it is in the UK.

Using US farm-animal census data [5], it is also possible to produce a rough estimate of the total PCU. Using this estimate (42,000 tonnes of PCU), we estimate that US farm antibiotic use is between 200 and 250 mg/kg of PCU, whereas in 2014 the average levels of use for 29 European countries (EU/EEA) was 152 mg/PCU [6].

Use in the United States is much higher than in the Nordic countries (Norway 3.1 mg/PCU, Iceland 5.2 mg/PCU, Sweden 11.5 mg/PCU, Finland 22.3 mg/PCU, Denmark 44.2 mg/PCU) [6]. With the exception of Denmark, in all of these Nordic countries most farm antibiotics are used for individual treatments.

Regulatory situation in the United States

Between 1 January 2014 and 31 December 2016, the FDA implemented a voluntary plan with the pharmaceutical industry to phase out the use of antibiotic growth promoters [7]. The FDA asked industry to voluntarily remove, by the end of 2016, all indications for growth promotion from veterinary products which have medically important antibiotics as an active ingredient.

The pharmaceutical industry agreed to these changes, however, during the first two years of the phase-out, overall farm use of medically important antibiotics increased by 5.5% (see Table 1).

Data on antibiotic use in 2017, the first year without any growth promoters, will not be available until late 2018. However, the evidence so far is that farmers may switch to using more antibiotics for routine disease prevention and control, as occurred in the European Union when growth promoters were phased out between 1997 and 2006.

In fact, the FDA has indicated that it supports the continued use of antibiotics for preventative mass medication and has provided advice to the pharmaceutical industry on how to add “new indications” to an existing growth-promoting product, so that the product can be re-licensed for “for treating, controlling, or preventing a particular disease” [8].

In contrast, routine preventative mass medication is no longer practiced in the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) and the Netherlands, demonstrating that such practices are not necessary. The Nordic countries and the Netherlands generally have much lower levels of antibiotic use than the United States and most of Europe.

National action plan

The United States Department of Agriculture published an Antimicrobial Resistance Action Plan in 2014 [9]. However, the action plan lacks serious ambition and does not include any proposals to ban routine preventative use, nor to introduce targets for reducing antibiotic use nor even to collect nationwide statistics on actual farm antibiotic use (rather than sales data).

The action plan does include proposals to improve surveillance of antibiotic resistance and antibiotic use (but the latter would just be surveys rather than data collected from all farms), and to improve education of farmers, veterinarians and the general public regarding the "judicious use" of antibiotics.

What still needs to be done

The United States 2005 ban on the use of fluoroquinolones in poultry has proven effective in helping limit the rise of fluoroquinolone-resistant Campylobacter infections in humans which is now much higher in the European Union [10]. However, other than this action, little has been done by regulatory authorities to reduce inappropriate and unnecessary use of farm antibiotics.

The US should move to phase out all routine preventative antibiotic use, including all preventative group treatments. Moves in this direction are currently happening in Europe, but the US has not put forward any plans to significantly limit inappropriate group treatments.

The US should set targets for reducing total antibiotic use and the use of critically important antibiotics in human medicine, as current data shows that usage levels are far higher than in most European countries. In order to enable targets to be set by species, data on antibiotic use by species should be collected.

The overuse of farm antibiotics in the US is not just due to poor regulation of antibiotic use, but to highly intensive farming systems which promote poor animal health. Less intensive farming systems, which promote animal health and welfare need to be encouraged.

For example, in pig farming there is evidence that the early weaning of piglets leads to much higher levels of antibiotic use, as diarrhoea is more likely. A study comparing weaning practices and antibiotic use in Sweden, Belgium, France and Germany found that median antibiotic use in weaner piglets was over 100 times lower in Sweden than in the other three countries [11][12]. In Sweden, the media weaning age was 35 days, whereas in the other three countries it was between 22 and 25 days.

Pig farmers in most EU countries, can wean as early as 21 days. Council directive 2008/120/EC mentions an official minimum weaning age of 28 days, but allows weaning at 21 days when certain minimal requirements are met. In contrast, in Sweden weaning is not legally permitted before 28 days.

In the United States, however, the average weaning age is about 20 days, and weaning can even occur before two weeks [13]. The US should introduce legislation requiring a later weaning age, which would improve the gut health of weaners and reduce the need for antibiotic treatments.

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