

**TABLE 2: COMPARING MEDICALLY IMPORTANT ANTIBIOTICS DISTRIBUTED FOR PIG PRODUCTION (mg/kg), U.S. AND CANADA AND SELECT E.U. COUNTRIES**

| Country        | Antibiotics in pig production, adjusted by total pig weight (mg/kg) | Antibiotics sold for pig production (mg of active ingredient) | Estimated total pig weight at the time antibiotics are administered (kg) <sup>a</sup> | Factor by which mg/kg antibiotics in U.S. pig production exceeds that in this country |
|----------------|---|---|---|---|
| United States  | 338   | 3,093,844,000,000 <sup>b</sup>                                | 9,151,391,000 <sup>b</sup>  |   |
| Denmark        | 44  | 78,200,000,000 <sup>c</sup>                                   | 1,784,000,000   | 7.7   |
| Netherlands    | 44  | 73,453,000,000 <sup>d</sup>                                   | 1,661,000,000   | 7.7   |
| Canada         | 91 <sup>(e)*</sup>  | NA  | NA  | 3.7   |
| France         | 104   | 189,400,000,000 <sup>f</sup>                                  | 1,817,000,000   | 3.3   |
| United Kingdom | 183 <sup>g</sup>  | NA  | NA  | 1.8   |

Notes: Where available, calculations of mg/kg by the country's relevant authority in the country are used. Where not available, we use antibiotic sales data and animal population and average animal weights to calculate milligrams of antibiotics used per kilogram of animal produced. Because of the limitations of available data, the mg/kg calculations are based on the following: antibiotic sales figures are from 2016, and animal population figures or the total estimated weights of pigs, are based on 2015 data. Based on our experience with U.S. data, we assume that the amount of antibiotics sold for pig production and the inventory of mature pigs and sows is unlikely to vary significantly from one year to the next, unless a significant regulatory change occurs as it did in the Netherlands in 2008. Finally, the overall scale of difference in the country comparisons is unlikely to be significantly affected by these potential variations.

For Denmark, the Netherlands and France, our mg/kg calculations are based on the antibiotic sales figures presented in the third column, and the estimated total weight of pigs presented in the fourth column. This follows the approach described in annual European Surveillance of Veterinary Antimicrobial Consumption (ESVAC) reports since 2010. See the latest report, for example, at European Medicines Agency, European Surveillance of Veterinary Antimicrobial Consumption, 2017. (ESVAC 2017) 'Sales of veterinary antimicrobial agents in 30 European countries in 2015'. [http://www.ema.europa.eu/docs/en\\_GB/document\\_library/Report/2017/10/WC500236750.pdf](http://www.ema.europa.eu/docs/en_GB/document_library/Report/2017/10/WC500236750.pdf). For the U.S., Canada, and U.K., additional footnotes provide more detail on the derivation of the mg/kg numbers. For the sake of comparison, we assume that there are no net exports or imports of pigs.

a) Estimated total weight of the pig population is not an actual measurement, but rather a calculated estimate of the biomass of the pig population at risk. In the European Union, this calculated estimate is referred to as the PCU, or population correct unit. For any one country, it is the product of the total number of slaughtered pigs that year multiplied by the EU-average weight for an adult hog (65 kg), added to the product of the number of breeding sows that years multiplied by the EU average sow weight (240 kg). Since 2010, the ESVAC project of the European Medicines Agency has collected data to derive PCUs for member countries. This fourth column contains the 2015 PCUs calculated for Denmark, the Netherlands, France and the United Kingdom, as reported on page 50, Table 6 in European Medicines Agency, European Surveillance of Veterinary Antimicrobial Consumption, 2017. 'Sales of veterinary antimicrobial agents in 30 European countries in 2015'. (EMA/184855/2017). [http://www.ema.europa.eu/docs/en\\_GB/document\\_library/Report/2017/10/WC500236750.pdf](http://www.ema.europa.eu/docs/en_GB/document_library/Report/2017/10/WC500236750.pdf). The 2016 PCUs will be released in October 2018.

b) The U.S. figures are taken from Table 1. Both antibiotic sales and estimated total weight of pigs are for 2016.

c) 2016 data on antibiotic sales for distribution in pig production in Denmark, found on page 21 in DANMAP 2016. Use of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from food animals, food and humans in Denmark. October 2017. <https://www.danmap.org/Downloads/Reports.aspx>.

d) 2016 data on antibiotic sales for distribution in pig production in the Netherlands, found in Table 6, page 25, in Netherlands Veterinary Medicines Institute (SDa). Usage of Antibiotics in Agricultural Livestock in the Netherlands in 2016. September 2017. <http://www.autoriteitdiergeneesmiddelen.nl/Userfiles/Eng%20rapport%20AB%202016/engels-def-rapportage-2016-deel-1-en-2-22-09-2017.pdf>.

e) This figure is found in Figure 53, on page 82 in Public Health Agency of Canada. Canada Antimicrobial Resistance Surveillance Systems - Report 2017. 10 November 2017. <https://www.canada.ca/en/public-health/services/publications/drugs-health-products/canadian-antimicrobial-resistance-surveillance-system-2017-report-executive-summary.html>. It pertains only to antibiotics used in raising pigs for slaughter -- i.e. it doesn't reflect antibiotic use on sows, in nurseries.

\* This 91 mg/kg estimation is derived from data on antibiotic sales for distribution in pig production, supplied voluntarily by the Canada Animal Health Institute. Canadian authorities use the same basic methodology in deriving it as does ESVAC, to facilitate comparison. They acknowledge it likely is an underestimate, since a loophole in Canadian law allows livestock producers to legally import antibiotics for "self use", and these imports are not tracked and therefore impossible to quantify or estimate. If included in the calculation, these self-use antibiotics would increase the overall mg/kg calculation.

f) 2016 data on antibiotic sales for distribution in pig production in France, found in Table 2, page 19, in Agence Nationale de Sécurité Sanitaire de l'Alimentation, de l'Environnement et du Travail" (Anses). Suivi des ventes de médicaments vétérinaires contenant des antibiotiques en France en 2016. October 2017. <https://www.anses.fr/fr/system/files/ANMV-Ra-Antibiotiques2016.pdf>.

g) 2016 calculation for mg/kg of antibiotics used in UK pig production based on the same ESVAC methodology, and found in the untitled graphic on page 12 in the following report: UK Veterinary Medicines Directorate. Veterinary Antibiotic Resistance and Sales Surveillance Report. 27 October 2017. <https://www.gov.uk/government/collections/veterinary-antimicrobial-resistance-and-sales-surveillance>. This figure, it should be noted, does not encompass the whole industry. UK authorities do not use 2016 sales data, but rather rely on actual antibiotic usage data collected from individual farms -- representing 62 percent of UK pig farms, but 70 percent of all slaughtered pigs. Participation in this data collection initiative has been voluntary. The pig PCU listed in column four comes from the ESVAC 2017 report, and presumably reflects the entire UK pig industry, but it wasn't used in the mg/kg calculation because data on antibiotics used on 100% of pig farms are lacking.