

Intensity of Antibiotic Consumption In U.S. Livestock: 2019 Update

On December 10, 2019, the U.S. Food and Drug Administration (FDA) released the latest data on sales of medically important antibiotics in 2018 for use livestock production.¹

Using those data, NRDC completed a 2019 update to an analysis we had completed the previous year looking at the intensity of antibiotic consumption in the U.S. livestock industry in comparison to industries in Canada and top livestock producing countries in Europe.² For the original analysis and this update, we used the same methodology and measure devised and used since 2011 by Europe's version of the FDA, the European Medicines Agency (EMA), and more recently by Public Health Canada.³

The 2018 analysis included four figures. With this effort, NRDC updates Figures 2, 3, and 4 and we also include a summary of our calculations, with more detailed notes on the data points used and the sources of those data.

UPDATED FIGURE 2. INTENSITY OF ANTIBIOTIC CONSUMPTION AMONG U.S. (2018), CANADIAN AND TOP EU LIVESTOCK PRODUCERS (2017)

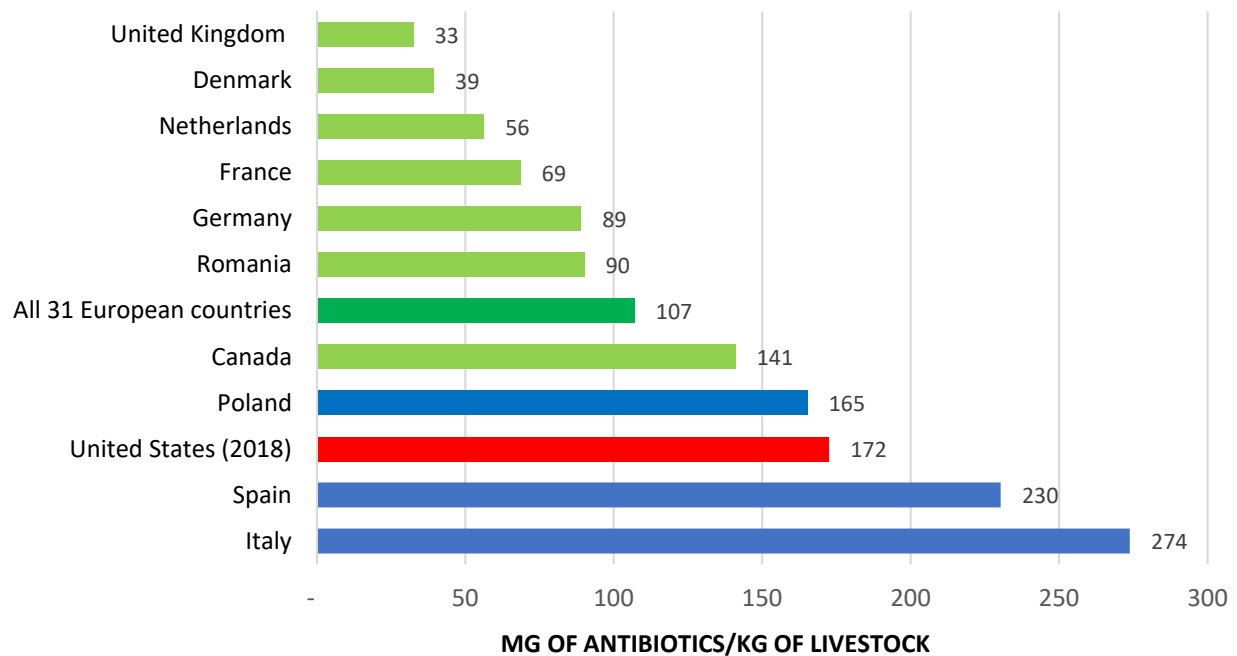


Figure 2 compares the intensity or rate at which medically important antibiotics are consumed or used by livestock production in the U.S., Canada and the top nine individual European livestock-producing countries. Consumption intensity also is tracked for all 31 of the European countries collectively for which the underlying data are collected.

'Consumption intensity' is determined as follows:

$$\text{Consumption intensity (mg/kg)} = \frac{\text{antibiotic (active ingredient) sold for use in that sector, in milligrams}}{\text{Calculated livestock weight (PCU), in kilograms}}$$

COWS	Number	X	Average (kg)	Calculated weight (kg), or PCU
Number of slaughtered cows	6,177,100	a	425	2,625,267,500
Number of slaughtered heifers	9,166,800	a	200	1,833,360,000
Number of slaughtered bulls	537,600	a	425	228,480,000
Number of slaughtered steers	16,636,700	a	425	7,070,597,500
Number of slaughtered calves	479,900	a	140	67,186,000
Number of dairy cows	9,399,000	b	425	3,994,575,000
Imported slaughter cows	416,996	c	-425	(177,223,300)
Exported slaughter cows			425	0
Imported fattening cows	827,233	d	-140	(115,812,620)
Exported fattening cows	243,795	e	140	34,131,300
			<i>Semitotal</i>	<i>15,560,561,380</i>
PIGS				
Number of slaughtered pigs	123,696,200	a	65	8,040,253,000
Imported fattening pigs	4,498,583	f	-25	(112,464,575)
Exported fattening pigs	33,231	g	25	830,775
Imported slaughter pigs	695,080	h	-65	(45,180,200)
Exported slaughter pigs	8,551	i	65	555,815
Livestock sows (sows farrowed)	3,158,000	j	240	757,920,000
			<i>Semitotal</i>	<i>8,641,914,815</i>
CHICKENS				
Slaughtered chickens	9,158,885,000	k	1	,158,885,000
Imported chickens	3,954,204	l	-1	(3,954,204)
Exported chickens	8,829,085	m	1	58,829,085
			<i>Semitotal</i>	<i>9,213,759,881</i>
TURKEYS				
Slaughtered turkeys	243,255,000	k	6.5	,581,157,500
			<i>Semitotal</i>	<i>1,581,157,500</i>
TOTAL PCUs (all species)				34,997,393,576

The values of the milligrams of antibiotics per kilogram of livestock (also referred to as mg/PCU) calculation for the European countries represented in Figure 2 were obtained from the latest EMA report, *Sales of veterinary antimicrobial agents in 31 European countries in 2017*.⁴ Equivalent calculations and figures for Canada were found in the latest antibiotic surveillance report from Public Health Canada.⁵

For the U.S., the milligrams of antibiotic sold for use in livestock production for 2018 are from the just-released FDA report. The table on page 2 summarizes the USDA data used to calculate the 'kilograms of livestock' for the United States in 2018. The footnotes to that table, below, summarize the USDA and other sources for that data.

Table footnotes

a. From page 13, Table entitled Federally Inspected Slaughter – Regions and United States: January to December 2018. Released February 27, 2019. Retrieved at

<https://downloads.usda.library.cornell.edu/usdaesmis/files/rx913p88g/vq27zv38d/cn69m9731/lstk0219.pdf>.

b. NASS Quick Stats, <https://quickstats.nass.usda.gov/results/E0CFD1BD-790D-341C-853F-A5727C3EC03D>

c. Economic Research Service (hereinafter ERS) webpage, Cattle: Annual and cumulative year-to-date U.S. trade - All years and countries, "Cattle Imports, over 700 lbs for slaughter", retrieved from <https://www.ers.usda.gov/data-products/livestock-and-meat-international-trade-data/>.

d. ERS webpage, Cattle: Annual and cumulative year-to-date U.S. trade - All years and countries, "Cattle Imports, 400-700 lbs", retrieved from <https://www.ers.usda.gov/data-products/livestock-and-meat-international-trade-data/>.

e. ERS webpage, Cattle: Annual and cumulative year-to-date U.S. trade - All years and countries, "Cattle Exports", retrieved from <https://www.ers.usda.gov/data-products/livestock-and-meat-international-trade-data/>.

f. ERS webpage, Hogs: Annual and cumulative year-to-date U.S. trade - All years and countries, "Hog imports, less than 7kg" + "Hog imports, 7 - less than 23 kg", + "Hog imports, 23 to less than 50 kg", retrieved from <https://www.ers.usda.gov/data-products/livestock-and-meat-international-trade-data/>.

g. ERS webpage, Hogs: Annual and cumulative year-to-date U.S. trade - All years and countries, "Hog exports, less than 50 kg", retrieved from <https://www.ers.usda.gov/data-products/livestock-and-meat-international-trade-data/>.

h. ERS webpage, Hogs: Annual and cumulative year-to-date U.S. trade - All years and countries, "Hog imports, 50 kg or more for immediate slaughter", retrieved from <https://www.ers.usda.gov/data-products/livestock-and-meat-international-trade-data/>.

i. ERS webpage, Hogs: Annual and cumulative year-to-date U.S. trade - All years and countries, "Hog exports, 50 kg or more", retrieved from <https://www.ers.usda.gov/data-products/livestock-and-meat-international-trade-data/>.

j. From NASS, United States and Canadian Hogs, released March 23, 2019, retrieved from

<https://downloads.usda.library.cornell.edu/usda-esmis/files/7h149p85x/t148fq60f/j3860f267/usch0319.pdf>.

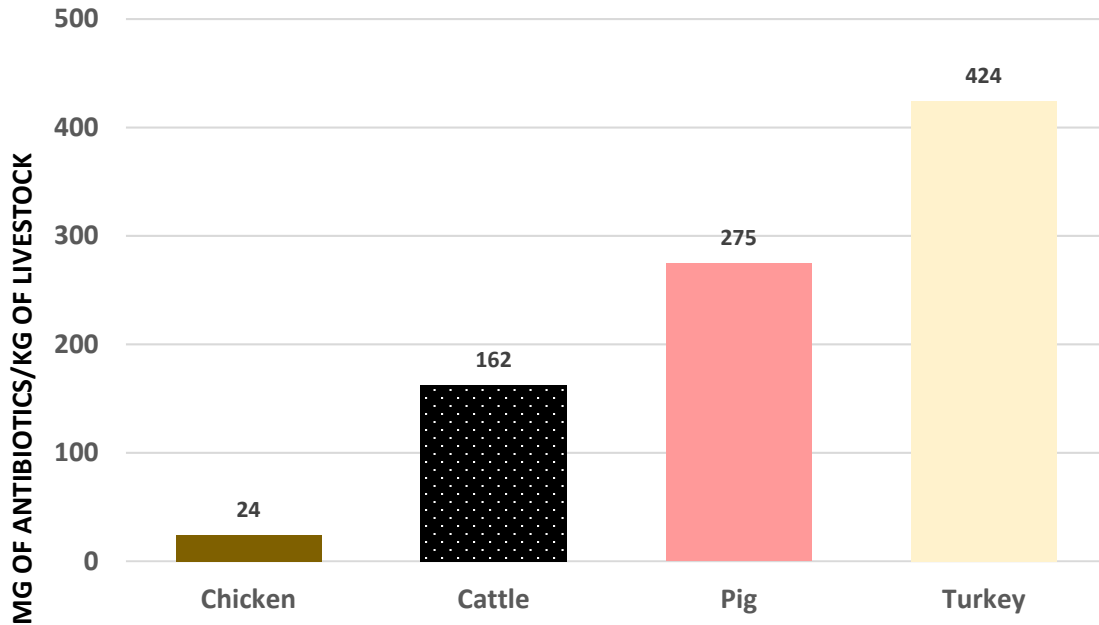
k. From page 2, Table entitled Poultry Slaughtered, Total Live Weight, and Average Live Weight by Type – United States [Federally inspected only]: January to December 2018. Released February 15, 2019.

<https://downloads.usda.library.cornell.edu/usda-esmis/files/3197xm04j/rj430b12j/4x51hr101/psla0219.pdf>.

l. See ITC Trade Map, at <https://www.trademap.org/Index.aspx>. Search for United States imports from the world of Product Code #010511, "Live fowls of the species Gallus domesticus, weighing > 185, imported by the US", which is chicken.

m. See ITC Trade Map, at <https://www.trademap.org/Index.aspx>. Search for United States exports to the world of Product Code #010511, "Live fowls of the species Gallus domesticus, weighing > 185, imported by the US", which is chicken.

UPDATED FIGURE 3. INTENSITY OF ANTIBIOTIC CONSUMPTION BY U.S. FOOD ANIMAL SECTOR, 2018



In updating Figure 3, the just-released FDA data provide the total amount of antibiotic active ingredient sold for use in animals in 2018 (6.04 million kilograms, or 13.3 million pounds), as well as estimates of the portion of those sales intended for use in the cattle, pig, chicken and turkey sectors. Those data are summarized below.

	Cattle	Pigs	Chickens	Turkeys
Total Animal Antibiotic Sales (kg), 2018	2,521,157	2,374,348	221,774	671,108
% of total	42%	39%	4%	11%

Again, we used USDA data from 2018 and represented in the table on page 2 to calculate the 'kilograms of livestock' for various species.

UPDATED FIGURE 4. INTENSITY OF ANTIBIOTIC CONSUMPTION IN PIG AND CATTLE PRODUCTION IN THE U.S. (2018), FRANCE, UNITED KINGDOM, NETHERLANDS, AND DENMARK (ALL 2017)

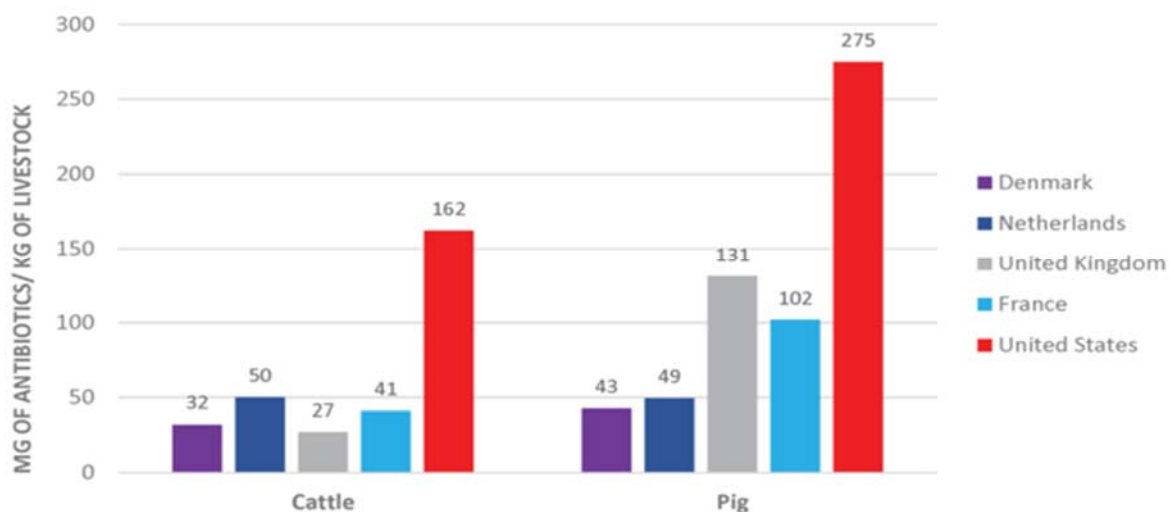


Figure 4 focuses on the intensity or rate at which cattle and pig production in the U.S. uses antibiotics compared to the counterpart sectors in several leading livestock-producing countries in Europe. The table below summarizes the data used in creating it.

Sources for the data used to derive mg/kg of livestock for 2018 in the United States have been previously described. The milligrams of antibiotic (active ingredient) sold in 2017 for use in the hog and cattle sectors of each of the four European countries, Denmark, the Netherlands, France and the United Kingdom, was information found in the 2017 reports of their respective FDA-equivalent agencies.⁶

Country	Antibiotics consumed in pig production, (mg/ kg of pig)	Factor by which mg/kg antibiotics in U.S. pig production exceeds that in this country	Antibiotics consumed in cattle production, (mg/ kg of cattle)	Factor by which mg/kg antibiotics in U.S. cattle production exceeds that in this country
United States	275		162	
Denmark	43	6.4	32	5.1
Netherlands	49	5.6	50	3.2
France	102 ^a	2.7	41 ^a	4.0
United Kingdom	131	2.1	27 ^b	6.0

^aNote that ANSES, the French Agency for Food, Environmental and Occupational Health & Safety, starting in 2018 began to use a measure for the weight of pig and cattle populations that differs quite a lot from the PCUs calculated by the EMA. To be consistent, we use the EMA value for Figure 4.

^bIn its 2017 Veterinary Antibiotic Resistance and Sales Surveillance Report (VARSS) report, the UK’s Veterinary Medicines Directorate warns that the dairy and beef farms sampled to estimate antibiotic sales and usage for these sectors were limited and may not represent the industry as a whole. We therefore use a 2017 mg/kg measure of 27 for the beef production alone, which is derived from a subset of 2,350 UK beef farms for which antibiotic use data are available for 2015 to 2018. (See page 39 of the VARSS 2018 report, [here](#)).

The calculated weights in kilograms of the country-specific hog and cattle populations for 2017, also called the PCUs, can be found in the most recent EMA report described in Endnote #4.

Endnotes

¹ U.S. Food and Drug Administration (hereinafter FDA), Center for Veterinary Medicine, *2018 Summary Report on Antimicrobials Sold or Distributed for Use in Food-Producing Animals*, December 2019, <https://www.fda.gov/media/133411/download>.

² David Wallinga and Steve Roach, “Issue Brief: Antibiotic Consumption in U.S. Pork, Beef, and Turkey Industries Vastly Outstrips Comparable Industries in Europe, and the U.S. Chicken Industry,” NRDC and Food Animal Concerns Trust (FACT), November 2018, <https://www.nrdc.org/sites/default/files/antibiotic-consumption-us-pork-beef-and-turkey-industries-ib.pdf>.

³ The measure divides the total sales of antibiotics, in milligrams of active ingredient, by a calculated amount in kilograms representing the weight of all animals at the time(s) they are most likely to receive antibiotics. The European Medicines Agency (EMA) describes this as the “Population Correction Unit” or PCU and refers to the overall metric as milligrams of antibiotic per PCU. See: European Medicines Agency. *Trends in the Sales of Veterinary Antimicrobial Agents in Nine European Countries (2005–2009)*, Appendix 2. September 2011. http://www.ema.europa.eu/docs/en_GB/document_library/Report/2011/09/WC500112309.pdf.

⁴ European Medicines Agency, 2019, ‘Sales of veterinary antimicrobial agents in 31 European countries in 2017’. (EMA/294674/2019), https://www.ema.europa.eu/en/documents/report/sales-veterinary-antimicrobial-agents-31-european-countries-2017_en.pdf. The EMA report also reviews the methodology for making these mg/kg calculations, also known as mg/PCU (population correction unit).

⁵ Canadian figures are from Public Health Canada, Canadian Antimicrobial Resistance Surveillance System, 2018 Update. <https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/drugs-health-products/canadian-antimicrobial-resistance-surveillance-system-2018-report-executive-summary/pub1-eng.pdf>.

⁶ DANMAP, 2017, Use of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from food animals, food and humans in Denmark, October 2018, https://www.danmap.org/-/media/arkiv/projekt-sites/danmap/danmap-reports/danmap_2017_rapport_230519_low.pdf?la=en; The Netherlands Veterinary Medicines Institute (SDa), Usage of Antibiotics in Agricultural Livestock in the Netherlands in 2017, September 2018, <https://cdn.i-pulse.nl/autoriteitdiergeensmiddelen/userfiles/Publications/engels-def-rapportage-2017.pdf>; French Agency for Food, Environmental, Occupational Health and Safety (ANSES) - French Agency for Veterinary Medicinal Products (ANMV), Sales survey of veterinary medicinal products containing antimicrobials in France in 2017, November 2018, <https://www.anses.fr/en/system/files/ANMV-Ra-Antibiotiques2017EN.pdf>; Veterinary Medicines Directorate, UK Veterinary Antibiotic Resistance and Sales Surveillance Report (UK-VARSS, 2017), October 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/837176/PCDOCS-1692017-v1-VARSS_2017_Report_-_Watermarked.pdf.

