



Maryland Department of Agriculture

Office of the Secretary

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February 1, 2021

The Honorable Lawrence J. Hogan, Jr.
Governor
100 State Circle
Annapolis, MD 21401

The Honorable Adrienne A. Jones
Speaker
Maryland House of Delegates
State House, H-101
100 State Circle
Annapolis, MD 21401

The Honorable Bill Ferguson
President
Maryland Senate
State House, H-107
100 State Circle
Annapolis, MD 21401

RE: Report Required by AG § 3-1004(c) - MSAR # 12135

Dear Governor Hogan, Speaker Jones and President Ferguson:

AG § 3-1004(c) states, “(1) On or before February 1, 2020, and each February 1 thereafter, the Department shall report to the General Assembly, in accordance with § 2-1257 of the State Government Article, on the data collected under subsections (a) and (b) of this section.

(2) on or before February 1, 2021, the report shall include the following information for the previous calendar year:

- (i) the total number of animals raised on farm operations covered by this subtitle, categorized by species and production class;
- (ii) the specific antimicrobial active ingredients and classes of antimicrobial active ingredients used;
- (iii) the total weight of antimicrobial active ingredients used;
- (iv) indications for which veterinarians prescribed medically important antimicrobial drugs; and
- (v) patterns of use for medically important antimicrobial drugs, including duration and seasonal variation.

(3)(i) subject to subparagraph (ii) of this paragraph, the information required under paragraph (2) of this subsection shall be disaggregated by county.

(ii) if there are two or fewer reporting farm operations in a particular county for any of the categories described in paragraph (2) of this subsection, the Department may report the information for that category on a regional or statewide basis.

(d) the Department shall maintain all records and information relating to the administration of medically important antimicrobial drugs submitted to the Department under this section:

- (1) in a manner that protects the identity of the farm operation that submitted the information; and
- (2) for at least 5 years.

I have included 2020 report. I hope you find the information contained in this report useful. Should you have any questions, please do not hesitate to reach out to Cassie Shirk, Director of Legislation and Government Affairs, at cassie.shirk@maryland.gov or 410-841-5889.

Sincerely,

A handwritten signature in black ink that reads "Joseph Bartenfelder". The signature is written in a cursive, flowing style.

Joseph Bartenfelder
Secretary, Department of Agriculture

SUMMARY

Senate Bill 471 (SB471) requires that each year the Maryland Department of Agriculture (MDA) collect data from publicly available sources and report to the legislature on the use in Maryland of medically important antimicrobial drugs (MIADs) in cattle, swine and poultry.

In CY20, data from appropriate national and state agencies, organizations, trade associations and councils was collected to provide information on use in Maryland of MIADs in cattle, swine and poultry. Organizations contacted include the U.S. Food and Drug Administration (FDA), U.S. Centers for Disease Control and Prevention (CDC), U.S. Department of Agriculture (USDA), Delmarva Chicken Association, U.S. Poultry and Egg Association, National Chicken Council, National Cattlemen’s Beef Association, and the University of Minnesota Center for Disease Research and Policy (CIDRAP). In 2020, MIAD use data was also collected for the first time in Maryland, beginning January 1, 2020, through state-mandated submissions by Maryland veterinarians of Veterinary Feed Directives (VFDs) and prescriptions for water-soluble MIADs issued to large cattle, swine and poultry operations/farms.

Maryland-specific data was obtained subsequent to requirements under SB471. To obtain Maryland MIAD use data, the department compiled data submitted from Maryland veterinarians and farmers using a data management system developed in 2019. The report developed from this data provides the information required by SB471: (i) the total number of animals raised on farm operations covered by SB471 (beef cattle and swine farms with herds over 200 head, dairy farms with herds over 300 head, and poultry farms with over 60,000 birds), categorized by species and production class; (ii) the specific antimicrobial active ingredients and classes of antimicrobial active ingredients used; (iii) the total weight of antimicrobial active ingredients used; (iv) indications for which veterinarians prescribed MIADs; and (v) patterns of use for MIADs, including duration and seasonal variation. As this is the first year that data has been collected, there are limited evaluations made regarding any trends in use, and statistical analyses were not applied to the data received this year as comparative data was not available.

As a disclaimer, the data that is presented in this report was provided from third party sources submitted to MDA. It is not the product of a controlled research project, and data is not verified through audit. Also, as the final submission date by law is February 1, 2021, any data that is received after the due date may not be included in this report, but will be included in next year’s report.

NATIONAL DATA SUMMARY

At this point, nationally available reports summarize only national data. National antibiotic use data is available in the FDA “2019 Summary Report on Antimicrobials Sold or Distributed for Use in Food-Producing animals,” published December 2020, and provided as an attachment to this report. Each year, since 2010, and subsequent to federal legislation in 2008, every sponsor of an approved or conditionally approved animal drug application containing an antimicrobial active ingredient must report to the FDA the amount of each such ingredient in these drug products sold or distributed for use in food-producing animals. FDA summarizes this information and makes it available to the public in annual summary reports.

Key observations from the 2019 FDA report are provided on Page 3 of the report and shown below:

- Domestic sales and distribution of MIADs approved for use in food-producing animals (Table 2b):
 - increased by 3% from 2018 through 2019.
 - decreased by 36% from 2015 (the year of peak sales) through 2019.
 - decreased by 25% from 2010 through 2019.
 - Tetracyclines, which represent the largest volume of these domestic sales (4,117,031 kg in 2019), increased by 4% from 2018 through 2019.
- The domestic sales and distribution of MIADs approved for use in food-producing animals for 2019 included:
 - An estimated 41% was intended for use in cattle, an estimated 42% intended for use in swine, an estimated 10% intended for use in turkeys, an estimated 3% intended for use in chickens, and an estimated 4% intended for use in other species/unknown (Table 4a of FDA report).
 - Tetracyclines accounted for 67%, penicillins for 12%, macrolides for 8%, sulfas for 5%, aminoglycosides for 5%, lincosamides for 2%, cephalosporins for less than 1%, and fluoroquinolones for less than 1% (Table 2a of FDA report).
 - An estimated 81% of cephalosporins, 65% of sulfas, 45% of aminoglycosides, and 42% of tetracyclines were intended for use in cattle. An estimated 85% of lincosamides and 40% of macrolides were intended for use in swine. An estimated 66% of penicillins were intended for use in turkeys (Table 5a of FDA report).

BACKGROUND

In 2009, FDA began to collect and report the annual sales and distribution of MIADs approved for use in food-producing animals. Along with new judicious use guidelines, the FDA enhanced drug sales data beginning in 2016, when drug sponsors were required to begin providing species-specific estimates of the sales and distribution data, which may provide additional understanding about how antimicrobials are distributed to the major food-producing species. While providing important information, a limitation of these sales and distribution data is that they reflect the total quantity of antimicrobial drug products that enters the market, but not how much or for what purpose these drugs are ultimately used in treated animals.

In 2012, the FDA initiated a strategy designed to promote judicious use of MIADs in food-producing animals. As outlined in [Guidance for Industry #209 \(fda.gov/downloads/AnimalVeterinary/GuidanceComplianceEnforcement/GuidanceforIndustry/UCM216936.pdf\)](https://www.fda.gov/downloads/AnimalVeterinary/GuidanceComplianceEnforcement/GuidanceforIndustry/UCM216936.pdf), this strategy has two main principles: 1) limit MIADs to uses in food-producing animals that are necessary for assuring animal health; and 2) new requirements for veterinary oversight of antibiotic use. This strategy was implemented in January 2017. Since then, the use of MIADs for growth promotion and improved feed efficiency was no longer allowed, and veterinary oversight was required for their use in animal food and water.

The *National Action Plan for Combating Antibiotic Resistant Bacteria* was launched in FFY016 to address continuing concerns regarding antibiotic resistance. Detailed information on progress are provided in an integrated report produced jointly by the FDA, CDC and USDA through *National Antimicrobial Resistance Monitoring System* found at ([fda.gov/animal-veterinary/national-antimicrobial-resistance-monitoring-system/2018-narms-update-integrated-report-summary](https://www.fda.gov/animal-veterinary/national-antimicrobial-resistance-monitoring-system/2018-narms-update-integrated-report-summary)). These reports, however, lack information on national use data, but do note that pilot studies are underway to evaluate pre-harvest MIAD use data. Some of these studies were recently published in “Special Issue: Antimicrobial Use Date and Reporting”, *Zoonoses and Public Health*, Volume 67, Supplement 1, November 2020, 1-123 (onlinelibrary.wiley.com/toc/18632378/2020/67/S1). Highlights from these studies pertinent to Maryland industry are provided below.

In “Estimates of On Farm Antimicrobial Usage in broiler chicken production in the United States 2013-2017” by Singer et al, significant decreases in antibiotic use of all types are documented. Data was voluntarily submitted representing 81% (2013) to 87% (2017). In summarizing the data, the authors state “the use of antimicrobials in the hatchery decreased substantially between 2013 and 2017; the approximate percentage of broiler chicks placed that received hatchery MIADs decreased from 93% in 2013 to 17% in 2017. Medically important in-feed MIAD use decreased substantially. For example, in-feed tetracycline use decreased approximately 95% between 2013 and 2017. Medically-important water-soluble antimicrobial use decreased substantially for most antimicrobials. Between 2013 and 2017, water-soluble penicillin use decreased approximately 21%, water-soluble tetracycline use decreased approximately 47%, and water-soluble lincomycin use decreased approximately 28%.” This study supports a positive trend in controlling overuse of antibiotics that might lead to antibiotic resistance; however, the authors note, “While a reduction in antimicrobial amounts used may be an important indicator of improved stewardship, reducing the need for antimicrobials through improved disease prevention should be considered a more important objective and a better indicator of overall flock health and optimal antimicrobial use.”

Regarding antibiotic usage in cattle, information is much more limited and difficult to interpret, but some generalizations could be made using a particular, established protocol to measure antibiotic use in “standardized regimens per cow year” and “grams per cow year.” In a study of 29 dairies in the United States, the authors concluded that “mastitis is the disease syndrome with the greatest contribution to overall antimicrobial use,” and the “metritis, lameness and unknown disease syndromes are also significant contributors.” They also found that their studies

“... indicate the greatest magnitude of use is the cephalosporin class. However, when measures are stratified by drug” (within a class), “use within the penicillin class contributes more than any other single class. These differences highlight the need for a more complete understanding of the relationship between antimicrobial use measures and their relationship to antimicrobial resistance selection pressure.”

STATE DATA SUMMARY

Nine hundred and forty four Maryland accredited veterinarians were notified of the requirement to report MIAD data a minimum of five times each by direct email through the Maryland State

Board of Veterinary Examiners and the MDA Animal Health Program, and by phone as needed, to ensure knowledge of and cooperation with the new rule. A total of 10 veterinarians that prescribe for large cattle, swine and poultry farms responded with data (1%), 2 veterinarians responded that the poultry companies they service did not use MIADs in Maryland in 2020, 190 veterinarians (20.1%) reported that they do not prescribe or issue VFDs for any farms that meet the criteria of the rule, and the remainder were not required to respond if they did not issue prescriptions or VFDs for MIADS (most of these being small animal/companion animal veterinarians). Data was extracted from the submitted information into Excel for reporting.

Protecting Confidential Information

This report is designed to provide information to the public while protecting confidential business information of animal owners and veterinarians. If there were two or fewer operations reporting in a county, summary data is provided on a regional or statewide basis, in a manner consistent with SB 471 requirements.

Key observations from the State data are provided are below:

- Use in Maryland of MIADs approved for use in food-producing animals by large operations in 2020 included:
 - An estimated 50.6% was intended for use in poultry, an estimated 47.7% intended for use in cattle, an estimated 1.7% intended for use in swine. (Table 1 of this report).
 - Tetracyclines accounted for 89.3%, penicillins for 8.3%, sulfonamides for 2.3%, , lincosamides for 0.3%, and macrolides for 0.03%. No cephalosporins, fluoroquinolones or aminoglycosides were reported (Table 2 of this report).
 - An estimated 89.3% of tetracyclines, 8.3% of penicillins, 2.3% of sulfonamides, and 0.03% of macrolides were intended for use in poultry. An estimated 9.1% of tetracycline and no other antibiotics were reported for use in cattle. An estimated 1.2% of penicillins, 1.5% of tetracycline and 0.3% lincosamides were intended for use in swine (Table 3 of report).

Table 1. Antibiotic Use By Species Reported

Species	Approx. # of Animals Reported	Total Weight Antibiotics Reported (KG)	% of Antibiotics by Species Reported (KG)
Cattle	4549	9062.568	47.66%
Poultry	10029695	9625.447	50.62%
Swine	46420	328.86	1.73%
Grand Total	10080664	19016.875	100.00%

Table 2. Antibiotic By Total Amount and Percent Reported

Drug Class	Total Antibiotics Weight Reported (KG)	% of Total Abx Reported
Tetracycline	16988.0	89.33%
Aureo S 700	1.1	0.01%
Aureomycin	328.9	1.73%
Aureomycin 4 G Crumbles	9051.8	47.60%
Aureomycin 50 Granular --- Chlortetracycline	4.4	0.02%
Aureomycin 50 Granular A --- Chlortetracycline	0.3	0.00%
Aureomycin 90 Granular --- Chlortetracycline	71.7	0.38%
Chloronex (CTC)	83.5	0.44%
Oxytetracycline	7446.4	39.16%
Sulfonamides	442.9	2.33%
Sulfadimethoxine	442.9	2.33%
Penicillin	1581.0	8.31%
Amoxicillin	0.0	0.00%
Penicillin	1352.8	7.11%
R-Pen - Penicillin G Potassium	228.2	1.20%
Macrolides	5.0	0.03%
Tylavet	5.0	0.03%
Lincosamides	0.0	0.00%
Lincomycin/Hydrochloride	0.0	0.00%
Grand Total	19016.9	100.00%

Summary data of antibiotic use by production operation, active ingredient, number of animals treated and for what disease indicator is provided below in Table 3, and total numbers of animals on farms meeting the SB471 criteria are shown in Table 4.

Unsurprisingly, the broiler industry used the largest amount of antibiotics, a total of 8,888 kgs of antibiotics for the industry to treat an estimated 8,899,268 birds. However, with a total industry of an estimated 309,209,000 total birds, this equates to less than 3% (2.88%) of all broiler chickens being treated with MIADs. Without previous year's data to compare, we cannot determine an increase or decrease in antibiotic usage. Antibiotic usage was higher in winter months, consistent with normal periods of higher viral respiratory diseases and secondary bacterial infections.

Table 3. Antibiotic Use By Operation

Species Operation / Indication	Drug	Total Indications Per Drug	Approx. # of Animals	Amount of Drug (KG)	Average Duration of Use (Days)
Breeders - Broilers		36	1636395	671.1	5
Penicillin		29	1384800	228.2	5
Penicillin		29	1384800	228.2	5
Respiratory Disease		1	39600	0.0	5
gangrenous dermatitis		28	1345200	228.2	5
Sulfadimethoxine		7	251595	442.9	4
Sulfonamides		7	251595	442.9	4
Other		7	251595	442.9	4
Cattle - Beef		3	130	1.9	20
Chlortetracycline		3	130	1.9	20
Tetracycline		3	130	1.9	20
Respiratory Disease		2	110	1.7	17
Other		1	20	0.2	28
Cattle - Dairy		2	550	6600.0	5
Chlortetracycline		2	550	6600.0	5
Tetracycline		2	550	6600.0	5
Respiratory Disease		2	550	6600.0	5
Cattle - Feeder		7	759	30.9	5
Chlortetracycline		7	759	30.9	5
Tetracycline		7	759	30.9	5
Respiratory Disease		6	669	30.5	5
Other		1	90	0.4	
Chicken - Broiler		252	8199300	8887.7	4
Chlortetracycline		4	130700	83.5	5
Tetracycline		4	130700	83.5	5
Other		4	130700	83.5	5
Oxytetracycline		23	708300	7446.4	5
Tetracycline		23	708300	7446.4	5
Other		23	708300	7446.4	5
Penicillin		223	7319500	1352.8	4
Penicillin		223	7319500	1352.8	4
Other		223	7319500	1352.8	4
Tylosin		2	40800	5.0	3
Macrolides		2	40800	5.0	3
Other		2	40800	5.0	3
Chicken - Layers		2	194000	66.7	5
Chlortetracycline		2	194000	66.7	5
Tetracycline		2	194000	66.7	5
Other		2	194000	66.7	5
Swine		15	46420	328.9	12
Amoxicillin		4	10200	0.0	10
Penicillin		4	10200	0.0	10
Respiratory Disease		4	10200	0.0	10
Chlortetracycline		10	35020	328.9	14
Tetracycline		10	35020	328.9	14
Respiratory Disease		8	19020	295.3	14
bacterial enteritis		2	16000	33.6	14
Lincomycin		1	1200	0.0	5
Lincosamides		1	1200	0.0	5
Respiratory Disease		1	1200	0.0	5
Cattle - Unspecified		18	3110	2429.7	7
Chlortetracycline		18	3110	2429.7	7
Tetracycline		18	3110	2429.7	7
Respiratory Disease		9	1170	2420.4	7
Other		9	1940	9.3	
Grand Total		335	10080664	19016.9	5

Table 4. Animals Raised On Farms 2020

County	Broilers 1000/Flock	Layers 1000/Flock	Pullets 1000/Flock	Swine Total	Beef Cattle	Dairy Cattle
Anne Arundel					215	
Baltimore		75			575	700
Caroline	58997		175		2600	1260
Carroll		396			1028	4695
Cecil	1024	1528	1352		270	1810
Dorchester	27175		515			
Frederick		115			3175	6995
Garrett		350			1762	2090
Harford		120			1628	2635
Howard						320
Kent	4743	712	676			3045
Montgomery					543	
Queen Anne's	27985				319	1470
Saint Mary's						
Somerset	51536	1506	252		205	
STATEWIDE				55254		
Talbot	5343					706
Washington		72				6570
Wicomico	61995	528	233			
Worcester	70412	765	1120			
Grand Total	309209	6167	4323	55254	12320	32296

Trends

As previously stated, the broiler chicken production group had the largest amount of antibiotic usage in 2020 due to the large size of the industry. Dairy cattle as a production group had the next highest antibiotic usage in 2020, a reported total of 6,600 kg. Though there are relatively few dairy cattle in Maryland over 300 head (est. 32,296 cattle), and much less cattle treated with MIADs than chickens (est. total of 550 animals in 2020), the size of the animals of course requires large amounts of antibiotic per animal. Percentage of total dairy cattle in large (over 300 head) herds treated with MIADs is estimated to be 8.3% in 2020 based on reports. Without previous year's data, we cannot determine if this is an increase or decrease in antibiotic use. Most dairy receiving antibiotics were in the Western part of Maryland, which is where the majority of the dairy cattle are located in Maryland.

Maryland does not have a large swine industry. Total estimated number of swine on farms with over 200 head is 55,254 animals. The reported MIAD usage in a reported 46,240 swine in 2020 was 329 kg. Swine population is reported statewide because there are 2 or less farms per county raising swine to maintain confidentiality in accordance with SB471. It was noted by treating veterinarians that antibiotics were prescribed in 2020 for respiratory disease associated with a strain of *Streptococcus suis* and *Glaesserella parasuis* prevalent in swine herds during the winter months, and subsiding in the summer months.

DISCUSSION

Data reported on MIAD use in Maryland did not show any unusual information or unexpected trends. Use of antibiotics has significantly decreased in the poultry industry over years due to public and industry efforts toward judicious use of antibiotics, and the market pressure to sell and serve poultry that has not been treated with antibiotics. No significant comments can be made regarding antibiotic usage data in cattle and swine at this time. Data going forward will enable comparisons and trend analysis. Considerations should be taken regarding 2020 statistics, given the first year of the law and possible oversight by some veterinarians of the reporting requirement, as well as the impact on animal sales and movement due to COVID-19 market disruptions. Reduced animal sales, production or interaction can be related to reduced disease spread and reduced need for antibiotic use; conversely, reduced farmer incomes can lead to reduced ability to pay for veterinary care and treatment. Future reports will attempt to take into account confounders that influence antibiotic usage separate from indications of progress or regress in promotion of the judicious use of antibiotics in food animal production.

- Attachment (1) U.S. Food and Drug Administration, Center for Veterinary Medicine, 2019 Summary Report on Antimicrobials Sold or Distributed for Use in Food-Producing Animals, December 2020



FDA

**U.S. FOOD & DRUG
ADMINISTRATION**

CENTER FOR VETERINARY MEDICINE

2019

Summary Report

On

***Antimicrobials Sold or Distributed for
Use in Food-Producing Animals***

December 2020

Table of Contents

Executive Summary	3
I. Background	4
a. Scope of Reporting	4
b. Protecting Confidential Information.....	5
c. Use of the Summary Information	6
d. Description of Tables and Figures.....	7
II. Data on all marketed antimicrobial drugs.....	1
a. Drug classes and active ingredients.....	1
b. Number of applications and sponsors.....	2
c. Total sales by drug class	4
d. Export data.....	7
III. Data on medically important antimicrobial drugs	10
a. Estimate of sales by animal species	11
b. Sales by route of administration.....	17
c. Sales by indication of use	20
d. Sales by dispensing status.....	23
e. Sales by route of administration and drug class.....	27
IV. Data on antimicrobial drugs that are not medically important	30
a. Estimate of sales by animal species	31
b. Sales by route of administration.....	34
c. Sales by indication of use	36
d. Sales by dispensing status.....	39
References.....	41

Executive Summary

Each year, every sponsor of an approved or conditionally approved animal drug application containing an antimicrobial active ingredient must report to the Food and Drug Administration (FDA) the amount of each such ingredient in these drug products sold or distributed for use in food-producing animals. FDA summarizes this information and makes it available to the public in annual summary reports. This reporting requirement was enacted by Congress in 2008 to assist FDA in its continuing analysis of the interactions (including antimicrobial resistance), efficacy, and safety of antimicrobials approved for use in both humans and food-producing animals.

This summary report presents the sales and distribution data for actively marketed antimicrobial drugs approved for use in food-producing animals by drug class, medical importance,¹ route of administration, indication, and dispensing status, as well as species-specific estimates, of sales and distribution from 2010 through 2019.

Key observations from the report include:

- Domestic sales and distribution of medically important antimicrobials approved for use in food-producing animals (Table 2b):
 - increased by 3% from 2018 through 2019.
 - decreased by 36% from 2015 (the year of peak sales) through 2019.
 - decreased by 25% from 2010 through 2019.
 - Tetracyclines, which represent the largest volume of these domestic sales (4,117,031 kg in 2019), increased by 4% from 2018 through 2019.
- The domestic sales and distribution of medically important antimicrobials approved for use in food-producing animals for 2019 included:
 - An estimated 41% was intended for use in cattle, an estimated 42% intended for use in swine, an estimated 10% intended for use in turkeys, an estimated 3% intended for use in chickens, and an estimated 4% intended for use in other species/unknown (Table 4a).
 - Tetracyclines accounted for 67%, penicillins for 12%, macrolides for 8%, sulfas for 5%, aminoglycosides for 5%, lincosamides for 2%, cephalosporins for less than 1%, and fluoroquinolones for less than 1% (Table 2a).
 - An estimated 81% of cephalosporins, 65% of sulfas, 45% of aminoglycosides, and 42% of tetracyclines were intended for use in cattle. An estimated 85% of lincosamides and 40% of macrolides were intended for use in swine. An estimated 66% of penicillins were intended for use in turkeys (Table 5a).

¹ “Medically important antimicrobials” are those antimicrobials that have been determined to be medically important to human medicine.

I. Background

Section 105 of the Animal Drug User Fee Amendments of 2008 (ADUFA) (P.L. 110-316; 122 Stat. 3509) amended section 512 of the Federal Food, Drug, and Cosmetic Act (“the Act”) [21 U.S.C. 360b] to require that sponsors of approved and conditionally approved applications for new animal drugs containing an antimicrobial active ingredient submit an annual report to the Food and Drug Administration (FDA) on the amount of each such ingredient in the drug that is sold or distributed for use in food-producing animals, including information on any distributor-labeled product. This legislation was enacted to assist FDA in its continuing analysis of the interactions (including antimicrobial resistance), efficacy, and safety of antimicrobials approved for use in both humans and food-producing animals (see H. Rpt. 110-804).

On May 11, 2016, FDA issued a final rule codifying annual reporting requirements under section 105 of ADUFA and adding a new reporting provision to obtain estimates of sales by major food-producing species (the 2016 final rule). The 2016 final rule is available at <https://www.gpo.gov/fdsys/pkg/FR-2016-05-11/pdf/2016-11082.pdf>. Sponsors must comply with the reporting requirements in the final rule when submitting their reports covering the period of calendar year 2016 and thereafter. Under 21 CFR 514.87, each report submitted to the FDA must include the following information: (1) A listing of each antimicrobial active ingredient contained in the product; (2) A description of each product sold or distributed by unit, including the container size, strength, and dosage form of such product units; (3) For each such product, a listing of the target animal species, indications, and production classes that are specified on the approved label; (4) For each such product, the number of units sold or distributed in the United States (i.e., domestic sales) for each month of the reporting year; and (5) For each such product, the number of units sold or distributed outside the United States (i.e., quantities exported) for each month of the reporting year. Each report must also provide a species-specific estimate of the percentage of each product that was sold or distributed domestically in the reporting year for use in any of the following animal species categories, but only for such species that appear on the approved label: Cattle, swine, chickens, turkeys. The total of the species-specific percentages reported for each product must account for 100 percent of its sales and distribution; therefore, a fifth category of “other species/unknown” must also be reported. Each year’s report must be submitted to FDA no later than March 31 using Form FDA 3744, “Antimicrobial Animal Drug Distribution Report,” the use of which is now mandatory as per the final rule. The form is available at <https://www.fda.gov/about-fda/reports-manuals-forms/forms>. These reports are separate from periodic drug experience reports that are required under 21 CFR 514.80(b)(4).

Under section 512(l)(3)(E) of the Act [21 U.S.C. 360b(l)(3)(E)], as codified at 21 CFR 514.87(f), FDA is directed to make annual summaries of the information reported by animal drug sponsors for each calendar year publicly available by December 31 of the following year. These annual reports must include a summary of sales and distribution data and information by antimicrobial drug class and may include additional summary data and information as determined by FDA.

Scope of Reporting

This summary report includes sales and distribution data of all antimicrobial drugs that are specifically approved for antibacterial uses or are known to have antibacterial properties, consistent with the requirements of Section 105 of ADUFA. However, as described elsewhere in this report, FDA has identified certain antimicrobial active ingredients as “medically important” based on their utility for treating disease in humans. Certain other antimicrobial drugs are not considered medically important. Ionophores, for example, lack utility in human medicine and their use in animals, primarily as coccidiostats, does not pose cross-resistance concerns; thus, they do not have the same human health risks as medically important antimicrobials.

Antifungal and antiviral drugs are not included in this report because, with the exception of formalin and hydrogen peroxide water immersion products, there are currently no approved drug applications actively marketed for these purposes in food-producing animals. Antiprotozoal drugs without antibacterial properties (e.g., amprolium) are also not included.

Many antimicrobial animal drugs are approved and labeled for use in multiple species. Under section 512(1)(3)(B)(iii) of the Act [21 U.S.C. 360b(1)(3)(B)(iii)], each report submitted to the FDA must specify “a listing of the target animals... that are specified on the approved label of the product.” As stated above, the 2016 final rule includes an additional reporting requirement for species-specific sales estimates as a percentage of total domestic sales and distribution for each product, starting with calendar year 2016; therefore, this summary report includes summaries of sales and distribution estimates by certain major food-producing animal species – cattle, swine, chickens, and turkeys – but only if the species appears on the approved label for the product reported.

The total of the estimated species-specific percentages reported for each product must account for 100 percent of its sales and distribution; therefore, a fifth category of “Other Species/Unknown” must also be reported. The fifth category includes a single combined estimate of product sales and distribution for (1) other species listed on the approved label, including nonfood-producing animal species (e.g., dogs and horses) and minor food-producing species (e.g., fish and quail); (2) other species not listed on the approved label; and (3) unknown uses. For hypothetical scenarios that illustrate reporting of species-specific estimates, see the proposed rule published in the Federal Register of May 20, 2015 ([80 FR 28863 at 28866](#)).

Protecting Confidential Information

This report is designed to provide useful information to the public while, at the same time, meeting the requirement of section 512(1)(3)(E) of the Act [21 U.S.C. 360b(1)(3)(E)] to report summary data in a manner consistent with protecting both national security and confidential business information. In accordance with statutory requirements designed to protect confidential business information, and under 21 CFR 514.87(f), annual sales and distribution data are summarized by antimicrobial drug class, and only those antimicrobial drug classes and other categories with three or more distinct sponsors of approved and actively marketed animal drug products are independently reported. Antimicrobial drug classes with fewer than three distinct sponsors are reported collectively as “Not Independently Reported” (NIR).

The number of distinct sponsors in a particular antimicrobial class or other category is determined by two criteria: (1) the sponsor must be named in 21 CFR 510.600 as the holder of an approved application for an animal drug product in that particular class or category on the last day of the annual reporting period; and (2) the sponsor must have actively sold or distributed such animal drug product at some point during that annual reporting period. This same principle is utilized with the representation of any category included in this report. For example, for presentation of species-specific sales and distribution estimates, species categories (e.g., cattle) with fewer than three distinct sponsors are combined with the “Other Species/Unknown” category and reported collectively as “Not Independently Reported” (NIR).

Occasionally instances arise in which two or more individual pieces of summary data, when viewed together, can be utilized to derive other data that would reveal confidential business information (sometimes referred to as “the mosaic effect”). FDA believes the broad requirement to protect confidential business information means that we cannot independently report summary data that can be used together with summary data presented elsewhere in the report or data already in the public domain to indirectly derive confidential business information. In these instances, to protect the confidential business information that could be revealed by including such summary data, these categories will be reported

collectively as “Other.”

Use of the Summary Information

The totals in this summary report represent sales and distribution data for antimicrobial drugs approved for use in food-producing animals. However, in reviewing this report it is important to keep in mind that there are certain inherent limitations on how the data provided in this report may appropriately be interpreted and used. For example, the sales and distribution data submitted by animal drug sponsors and summarized in this report are not indicative of how these antimicrobial drugs were actually used in animals (e.g., for what indications). With the exception of medicated feeds and certain drugs that are specifically prohibited from extralabel use (listed in FDA’s regulations at 21 CFR 530.41), veterinarians can legally use approved animal drugs for species and therapeutic indications for which the drugs were not approved. Further, because the majority of antimicrobial drugs used in animal feed are approved for multiple indications, simply knowing that the route of administration for a drug is, for example, by oral means through animal feed cannot, by itself, be used to determine the indication for which the drug was used.

As discussed in **Description of Tables and Figures**, some of the antimicrobials included in this summary report are approved for use in both food- and nonfood-producing animals. In addition many of the applications are approved and labeled for use in multiple species, for multiple indications, and with multiple dosage regimens. These points should be carefully considered when interpreting or comparing the data presented in this summary report.

It is also important to note that animal drug sales data represent a summary of the volume of product sold or distributed through various outlets by the manufacturer intended for sale to the end user, not the volume of product ultimately purchased by the end user for administration to animals. For example, veterinarians and animal producers may purchase drugs, but never actually administer them to animals, or they may administer the drugs in later years.

Regarding the collection and reporting of species-specific data, the percentages provided by the sponsors are estimates of product sales and distribution. The data are not intended to be a substitute for actual usage data and should be used in conjunction with on-farm species-specific data on antimicrobial use. Also, there is a variety of factors that confound direct comparison of species-specific sales estimates, including differences in population size, weight, lifespan, and drug metabolism. For these reasons, caution should be applied when making direct comparisons between species-specific sales estimates.

Additionally, it should be noted that the potency of specific antimicrobials can vary substantially, which may impact the volume of drug needed to complete a course of therapy. This factor should be considered when comparing sales data for different antimicrobials.

Comparison of the information in this summary report with information published elsewhere regarding sales and distribution of antimicrobial drugs for use in humans poses many challenges. A number of differences in the circumstances in which antimicrobial drugs are used in human and veterinary medicine must be carefully considered, including:

- The number of humans in the U.S. population (approx. 328 million²) compared to the much larger number of animals in each of the many animal species (e.g., approx. 9.3 billion chickens slaughtered annually³).
- The differences in physical characteristics of humans compared to various animal species (e.g., physiology and weight: average adult human weight, 184 lb.⁴ versus adult cattle live weight, 1,347 lb.⁵).
- Duration and dosage of antibacterial drug administration may also vary by indication and, in general, between the various animal species and humans due to differences in physiology.
- As noted above, the available animal sales and distribution data are not reported to the FDA by each use indication and, thus, do not allow the FDA to distinguish between or among the different types of uses. The data, therefore, do not allow a direct comparison of the amounts of antimicrobials sold for certain animal uses with those sold for certain human uses.
- Veterinarians commonly utilize human antimicrobial drugs in their companion animal patients; therefore, amounts presented for certain human antimicrobial drugs may represent some unknown portion sold for use in companion animals.

It is, therefore, difficult to draw conclusions from any direct comparisons between the quantity of antimicrobial drugs sold for use in humans and the animal drug sales and distribution data (and species-specific estimates) for use in animals.

Description of Tables and Figures

The information presented in the following tables is based on 2019 annual sales and distribution data. Please note that the number of marketed products and associated sponsors may vary from year to year; thus, the categories presented in the tables may also vary from year to year to meet the requirements for protecting confidential business information. Any yearly variations in categories presented may make it difficult to directly compare certain tabular data between reported years. Furthermore, FDA occasionally receives updates or corrections to previously submitted 512(l)(3) data from animal drug sponsors at various times after the March 31 deadline. Therefore, minor variations in tabular data may occur over time depending on when these summary data are generated. The data included in the 2019 annual summary report differ in some cases from previously published reports. These differences may be attributed to updated sales and distribution information provided by sponsors for previous reporting years. Percent total, percent grand total, and percent change columns in the tables may sum to more than one hundred percent due to the rounding of kilogram totals. In general, the tables are formatted so that Table Xa corresponds to current-year data and Table Xb corresponds to multi-year trends, and that Figure Xa or Xb is associated with the corresponding Table Xa or Xb. Please note that the data for the multi-year trends is limited to ten years (2010 through 2019) for reasons of data representation, and which is adequate for time trend evaluation. For data before 2010, please refer to previously published reports.

² U.S. Census Bureau, “Quick Facts: United States,” available at <https://www.census.gov/quickfacts/fact/table/US/PST045216>.

³ U.S. Department of Agriculture, National Agricultural Statistics Service, “Poultry Slaughter: 2019 Summary,” February 2020, available at https://www.nass.usda.gov/Publications/Todays_Reports/reports/pslaan20.pdf.

⁴ U.S. Centers for Disease Control and Prevention, National Center for Health Statistics, “Body Measurements,” available at <https://www.cdc.gov/nchs/fastats/body-measurements.htm>.

⁵ U.S. Department of Agriculture, National Agricultural Statistics Service, “Livestock Slaughter: 2019 Summary,” April 2019, available at <https://downloads.usda.library.cornell.edu/usda-esmis/files/r207tp32d/34850245n/5712mr72x/lsan0420.pdf>.

II. Data on all marketed antimicrobial drug

Table 1

Antimicrobial drug classes and active ingredients approved for use in food-producing animals¹
Actively marketed in 2019

Aminocoumarins (NMI)²

Novobiocin

Aminoglycosides (MI)³

Dihydrostreptomycin
Gentamicin
Neomycin
Spectinomycin

Amphenicols (MI)³

Florfenicol

Cephalosporins (MI)³

Ceftiofur
Cephapirin

Diaminopyrimidines (MI)³

Ormetoprim

Fluoroquinolones (MI)³

Danofloxacin
Enrofloxacin

Glycolipids (NMI)²

Bambermycins

Ionophores (NMI)²

Laidlomycin
Lasalocid
Monensin
Narasin
Salinomycin

Lincosamides (MI)³

Lincomycin¹
Pirlimycin

Macrolides (MI)³

Gamithromycin
Tildipirosin
Tilmicosin
Tulathromycin
Tylosin
Tylvalosin

Orthosomycins (NMI)²

Avilamycin

Penicillins (MI)³

Amoxicillin
Ampicillin¹
Cloxacillin
Penicillin¹

Pleuromutilins (NMI)²

Tiamulin

Polymyxins (MI)³

Polymyxin B¹

Polypeptides (NMI)²

Bacitracin

Quinoxalines (NMI)²

Carbadox

Streptogramins (MI)³

Virginiamycin

Sulfonamides (Sulfas) (MI)³

Sulfadimethoxine
Sulfamethazine
Sulfaquinoxaline

Tetracyclines (MI)³

Chlortetracycline¹
Oxytetracycline¹
Tetracycline

¹ Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

² NMI = Not Medically Important. Refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

³ MI = Medically Important. Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

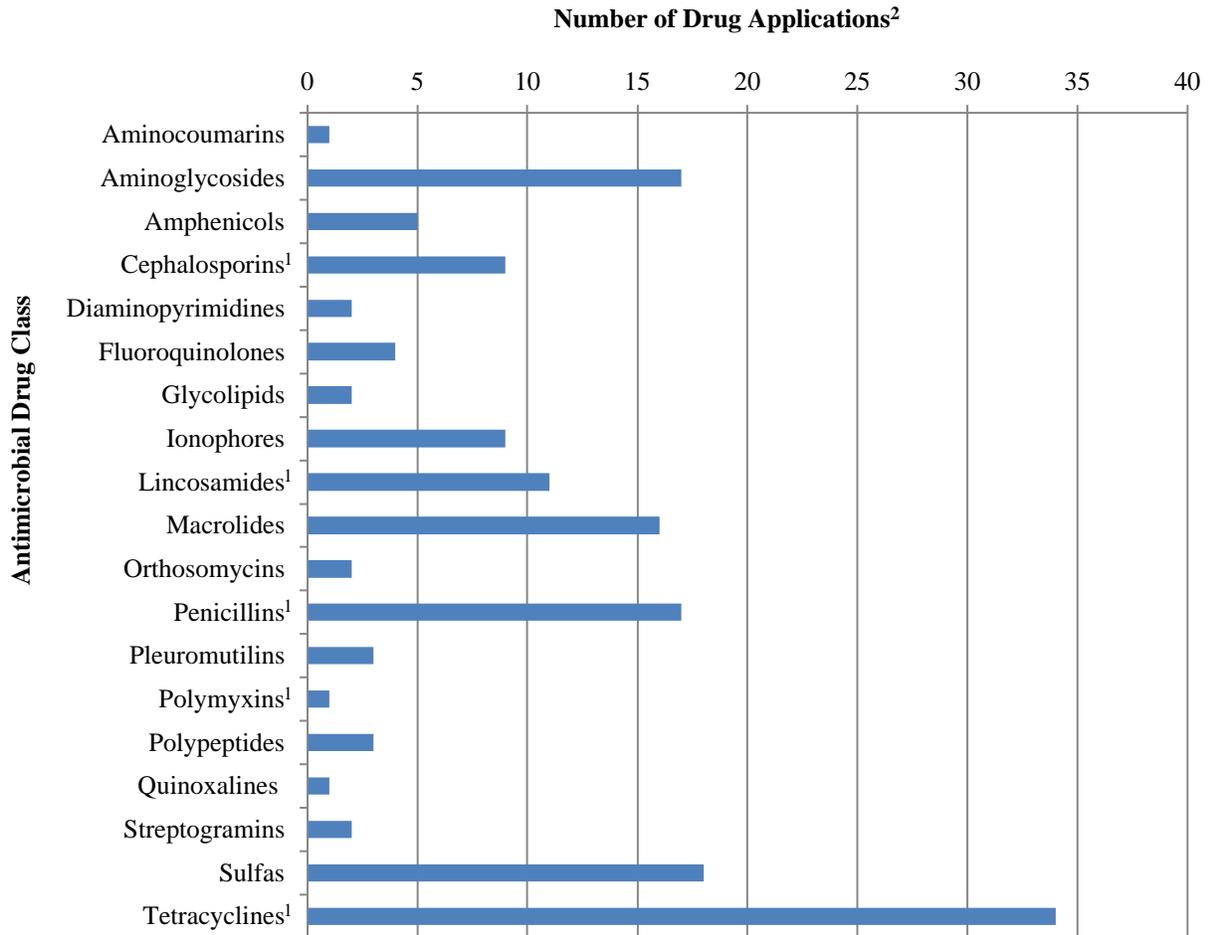
Figure 1a

Antimicrobial drug classes approved for use in food-producing animals¹

Actively marketed in 2019

Domestic sales and distribution data

Number of drug applications²



¹ Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

² Some drug applications contain multiple active ingredients; therefore, drug applications containing more than one antimicrobial active ingredient may be represented more than once.

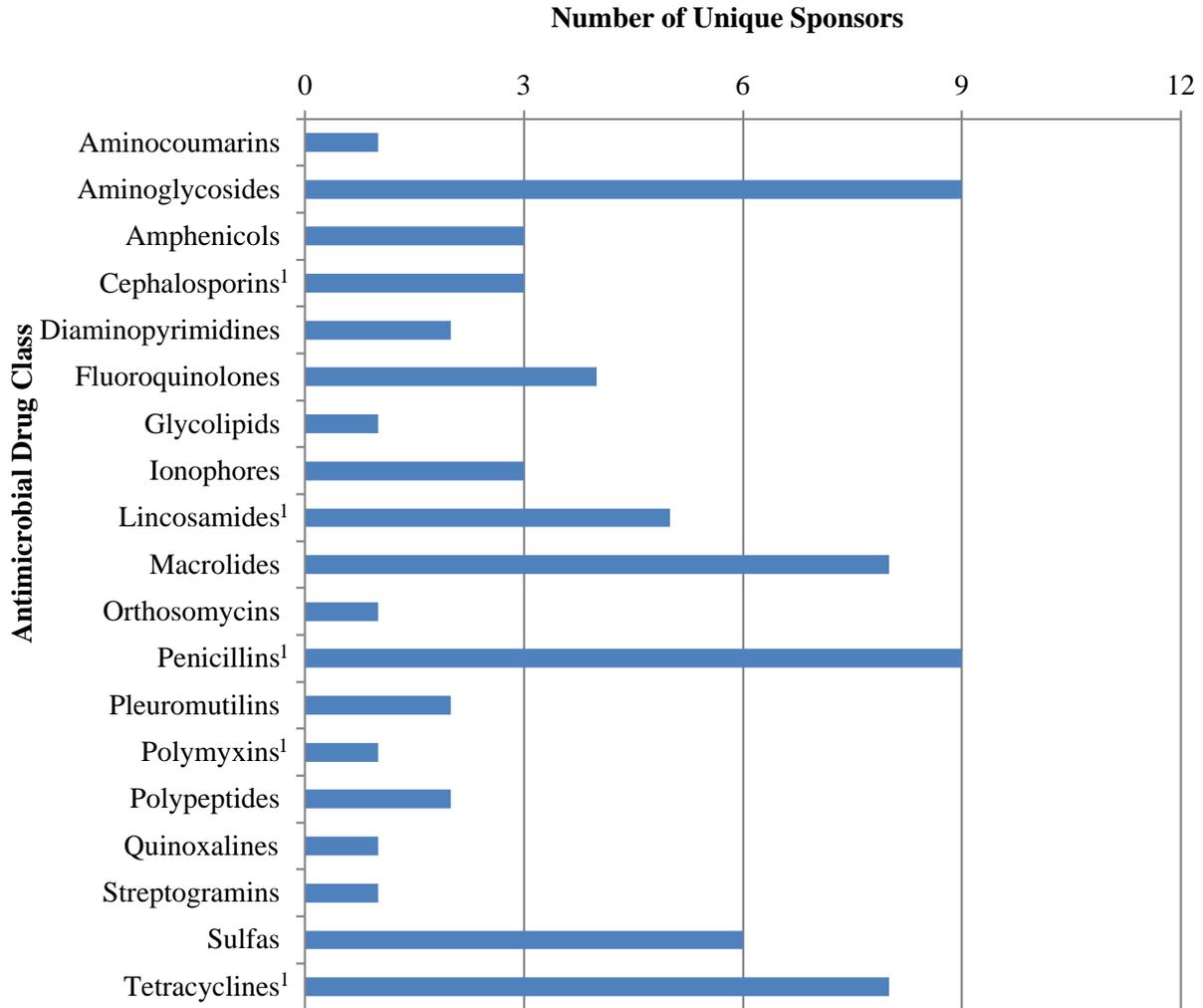
Figure 1b

Antimicrobial drug classes approved for use in food-producing animals¹

Actively marketed in 2019

Domestic sales and distribution data

Number of unique sponsors



¹ Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

Table 2a

Antimicrobial drugs approved for use in food-producing animals¹
 Actively marketed in 2019
 Domestic sales and distribution data
 Reported by medical importance and drug class

	Drug Class	Annual Totals (kg)²	% Subtotal	% Grand Total
Medically Important³	<i>Aminoglycosides</i>	307,988	5%	3%
	<i>Amphenicols</i>	53,212	1%	<1%
	<i>Cephalosporins¹</i>	29,830	<1%	<1%
	<i>Fluoroquinolones</i>	24,556	<1%	<1%
	<i>Lincosamides¹</i>	134,962	2%	1%
	<i>Macrolides</i>	488,082	8%	4%
	<i>Penicillins¹</i>	716,525	12%	6%
	<i>Sulfas</i>	304,327	5%	3%
	<i>Tetracyclines¹</i>	4,117,031	67%	36%
	<i>NIR^{1,4}</i>	12,746	<1%	<1%
	<i>Subtotal</i>	<i>6,189,260</i>	<i>100%</i>	<i>54%</i>
Not Medically Important⁵	<i>Ionophores</i>	4,270,122	81%	37%
	<i>NIR⁶</i>	1,008,976	19%	9%
	<i>Subtotal</i>	<i>5,279,098</i>	<i>100%</i>	<i>46%</i>
	<i>Grand Total</i>	<i>11,468,357</i>		<i>100%</i>

¹ Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

³ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

⁴ NIR = Not Independently Reported. Antimicrobial classes for which there were fewer than three distinct sponsors actively marketing products domestically are not independently reported. These classes include the following: Diaminopyrimidines, Polymyxins, and Streptogramins.

⁵ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

⁶ NIR = Not Independently Reported. Antimicrobial classes for which there were fewer than three distinct sponsors are not independently reported. These classes include the following: Aminocoumarins, Glycolipids, Orthosomycins, Pleuromutilins, Polypeptides, and Quinoxalines.

Table 2b

Antimicrobial drugs approved for use in food-producing animals¹
 Actively marketed 2010-2019
 Domestic sales and distribution data
 Reported by medical importance and drug class

	Drug Class	2010 Annual Totals (kg) ²	2011 Annual Totals (kg) ²	2012 Annual Totals (kg) ²	2013 Annual Totals (kg) ²	2014 Annual Totals (kg) ²	2015 Annual Totals (kg) ²	2016 Annual Totals (kg) ²	2017 Annual Totals (kg) ²	2018 Annual Totals (kg) ²	2019 Annual Totals (kg) ²	% Change 2010 - 2019	% Change 2018 - 2019
Medically Important³	<i>Aminoglycosides⁴</i>	211,790	214,895	277,854	267,734	304,160	344,120	319,009	259,184	289,455	307,988	45%	6%
	<i>Cephalosporins⁴</i>	24,588	26,611	27,654	28,337	31,722	32,254	31,010	29,369	31,448	29,830	21%	-5%
	<i>Fluoroquinolones</i>	*	*	*	15,099	17,220	20,063	18,502	22,904	23,350	24,556	**	5%
	<i>Lincosamides⁴</i>	154,653	190,101	218,140	236,450	233,681	182,543	142,458	152,497	125,514	134,962	-13%	8%
	<i>Macrolides⁴</i>	553,229	582,836	616,274	563,251	621,769	627,757	554,714	468,794	473,038	488,082	-12%	3%
	<i>Penicillins⁴</i>	884,419	885,304	965,196	828,721	885,975	936,669	842,863	690,889	731,863	716,525	-19%	-2%
	<i>Sulfas⁴</i>	517,128	383,105	493,514	383,469	452,224	380,186	369,826	274,112	278,562	304,327	-41%	9%
	<i>Tetracyclines⁴</i>	5,602,281	5,652,855	5,954,361	6,514,779	6,604,199	6,881,530	5,861,188	3,535,701	3,974,179	4,117,031	-27%	4%
	<i>NIR^{4,5}</i>	281,221	319,991	344,428	355,452	328,389	297,822	216,771	125,761	104,888	65,958	-77%	-37%
	Subtotal	8,239,309	8,255,697	8,897,420	9,193,293	9,479,339	9,702,943	8,356,340	5,559,212	6,032,298	6,189,260	-25%	3%
Not Medically Important⁵	<i>Ionophores</i>	3,820,004	4,122,397	4,573,795	4,434,657	4,718,650	4,740,615	4,651,491	4,394,850	4,562,260	4,270,122	12%	-6%
	<i>NIR⁶</i>	1,237,784	1,190,943	1,151,532	1,157,095	1,163,571	1,134,382	1,018,305	979,306	968,524	1,008,976	-18%	4%
		Subtotal	5,057,788	5,313,340	5,725,327	5,591,752	5,882,221	5,874,997	5,669,796	5,374,156	5,530,784	5,279,098	4%
	Grand Total	13,287,097	13,569,037	14,622,747	14,785,045	15,361,560	15,577,940	14,026,136	10,933,367	11,563,081	11,468,357	-14%	-1%

¹ Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

* Not reported because there were fewer than three distinct sponsors actively marketing products domestically in 2009 through 2012.

** There were fewer than three distinct sponsors actively marketing products domestically in 2009 through 2012. Therefore, percentage change cannot be calculated.

³ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

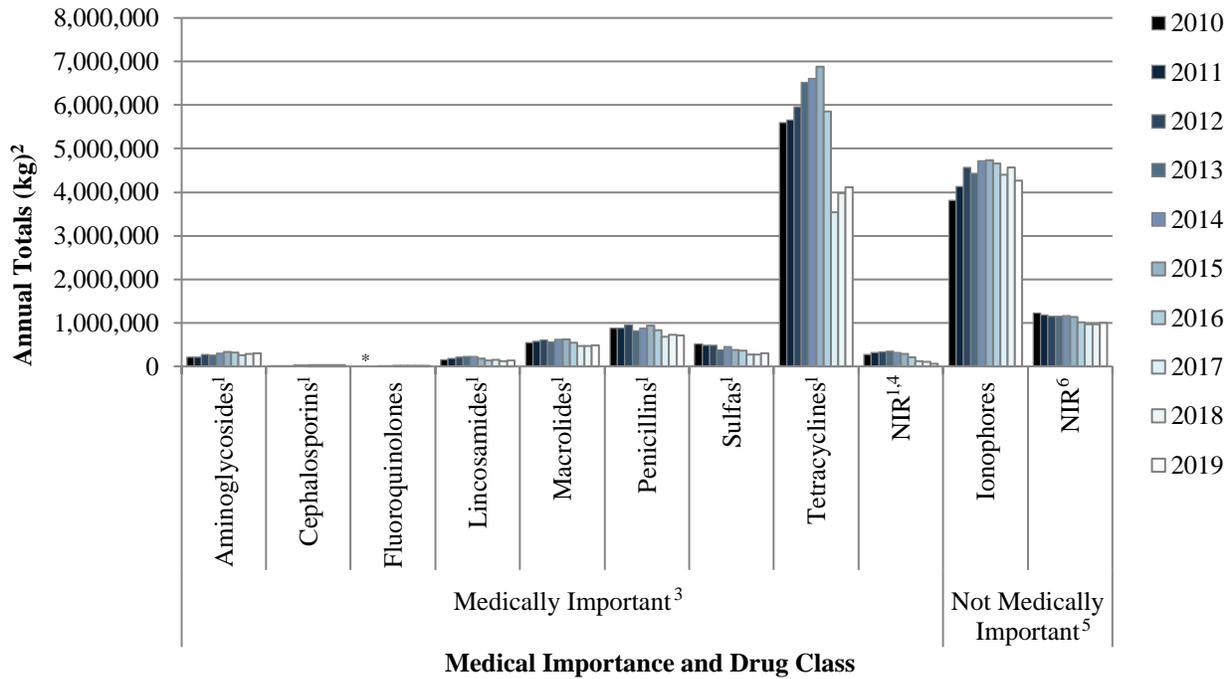
⁴ NIR = Not Independently Reported. Antimicrobial classes for which there were fewer than three distinct sponsors actively marketing products domestically are not independently reported. These classes include the following: Amphenicols, Diaminopyrimidines, Fluoroquinolones (excluding 2013 through 2019), Polymyxins (excluding 2012 and 2013), and Streptogramins.

⁵ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

⁶ NIR = Not Independently Reported. Antimicrobial classes for which there were fewer than three distinct sponsors are not independently reported. These classes include the following: Aminocoumarins, Glycolipids, Orthosomycins (excluding 2010 through 2015), Pleuromutilins, Polypeptides, and Quinoxalines.

Figure 2b

Antimicrobial drugs approved for use in food-producing animals¹
 Actively marketed 2010-2019
 Domestic sales and distribution data
 Reported by medical importance and drug class



¹ Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

* Not reported because there were fewer than three distinct sponsors actively marketing products domestically in 2009 through 2012.

³ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

⁴ NIR = Not Independently Reported. Antimicrobial classes for which there were fewer than three distinct sponsors actively marketing products domestically are not independently reported. These classes include the following: Amphenicols, Diaminopyrimidines, Fluoroquinolones (excluding 2013 through 2019), Polymyxins (excluding 2012 and 2013), and Streptogramins.

⁵ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

⁶ NIR = Not Independently Reported. Antimicrobial classes for which there were fewer than three distinct sponsors are not independently reported. These classes include the following: Aminocoumarins, Glycolipids, Orthosomycins (excluding 2010 through 2015), Pleuromutilins, Polypeptides, and Quinoxalines.

Table 3a

Antimicrobial drugs approved for use in food-producing animals¹
Actively marketed in 2019
Domestic/export sales and distribution data

Domestic/Export	Annual Totals (kg)²	% Total
<i>Domestic¹</i>	11,468,357	100%
<i>Export^{1,3}</i>	5,355	<1%
<i>Total</i>	<i>11,473,712</i>	<i>100%</i>

¹ Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

³ Only includes exports of FDA-approved, US-labeled antimicrobial drugs approved for use in food-producing animals.

Table 3b

Antimicrobial drugs approved for use in food-producing animals¹
 Actively marketed in 2010-2019
 Domestic/export sales and distribution data

Domestic/Export	2010 Estimated Annual Totals (kg) ²	2011 Estimated Annual Totals (kg) ²	2012 Estimated Annual Totals (kg) ²	2013 Estimated Annual Totals (kg) ²	2014 Estimated Annual Totals (kg) ²	2015 Estimated Annual Totals (kg) ²	2016 Estimated Annual Totals (kg) ²	2017 Estimated Annual Totals (kg) ²	2018 Estimated Annual Totals (kg) ²	2019 Estimated Annual Totals (kg) ²	% Change 2010 - 2019	% Change 2018 - 2019
<i>Domestic</i> ¹	13,287,097	13,569,037	14,622,747	14,785,045	15,361,560	15,577,940	14,026,136	10,933,367	11,563,081	11,468,357	-14%	-1%
<i>Export</i> ^{1,3}	219,072	202,335	139,173	74,374	30,682	20,861	6,818	10,038	8,134	5,355	-98%	-34%
Total	13,506,168	13,771,373	14,761,919	14,859,419	15,392,242	15,598,801	14,032,953	10,943,406	11,571,216	11,473,712	-15%	-1%

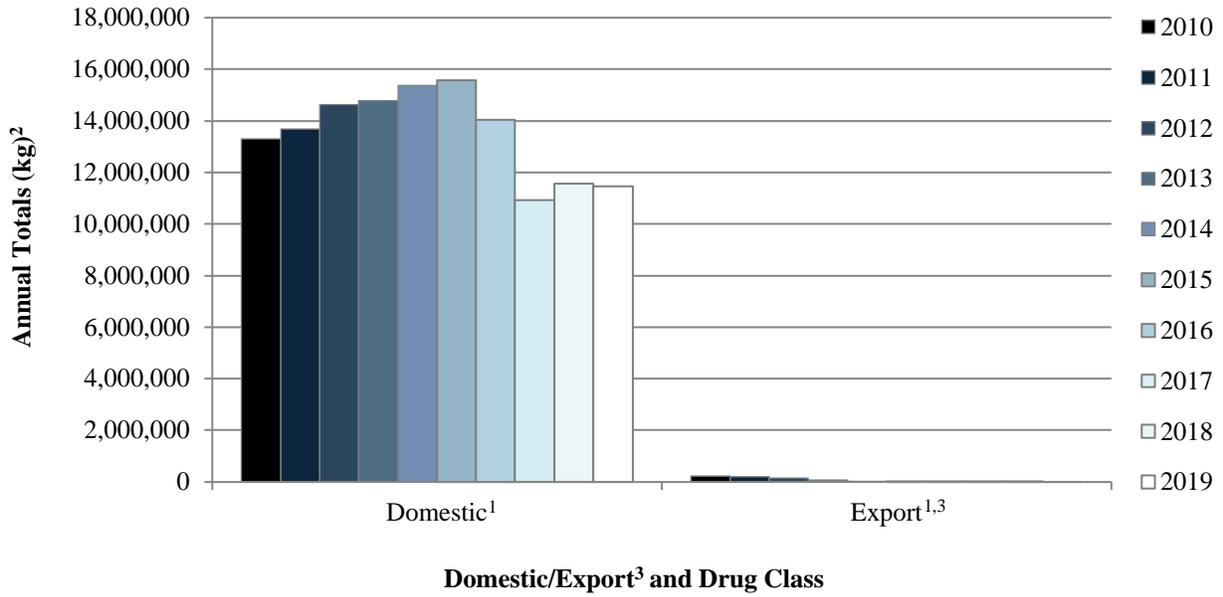
¹ Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

³ Only includes exports of FDA-approved, US-labeled antimicrobial drugs approved for use in food-producing animals.

Figure 3b

Antimicrobial drugs approved for use in food-producing animals¹
Actively marketed 2010-2019
Domestic/export sales and distribution data



- ¹ Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).
- ² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.
- ³ Only includes exports of FDA-approved, US-labeled antimicrobial drugs approved for use in food-producing animals.

III. Data on medically important antimicrobial drugs

Table 4a

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed in 2019
Domestic sales and distribution data
Reported by species-specific estimated sales

Species	Estimated Annual Totals (kg) ³	% Total
Cattle	2,529,281	41%
Swine	2,582,399	42%
Chicken	192,964	3%
Turkey	644,921	10%
Other ⁴	239,694	4%
Total	6,189,260	100%

¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ The Other category includes estimates of product sales intended for use in (1) species listed on the approved label other than cattle, swine, chickens, and turkeys, including nonfood-producing animal species (e.g., dogs and horses) and minor food-producing species (e.g., fish); (2) other species not listed on the approved label; and (3) unknown uses.

Table 4b

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed in 2016-2019
Domestic sales and distribution data
Reported by species-specific estimated sales

Species	2016 Estimated Annual Totals (kg) ³	2017 Estimated Annual Totals (kg) ³	2018 Estimated Annual Totals (kg) ³	2019 Estimated Annual Totals (kg) ³	% Change 2016 - 2019	% Change 2018 - 2019
<i>Cattle</i>	3,605,543	2,333,839	2,517,386	2,529,281	-30%	<1%
<i>Swine</i>	3,133,262	2,022,932	2,374,277	2,582,399	-18%	9%
<i>Chicken</i>	508,800	268,047	221,774	192,964	-62%	-13%
<i>Turkey</i>	756,620	670,831	671,108	644,921	-15%	-4%
<i>Other⁴</i>	352,114	263,564	247,753	239,694	-32%	-3%
Total	8,356,340	5,559,212	6,032,298	6,189,260	-26%	3%

¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

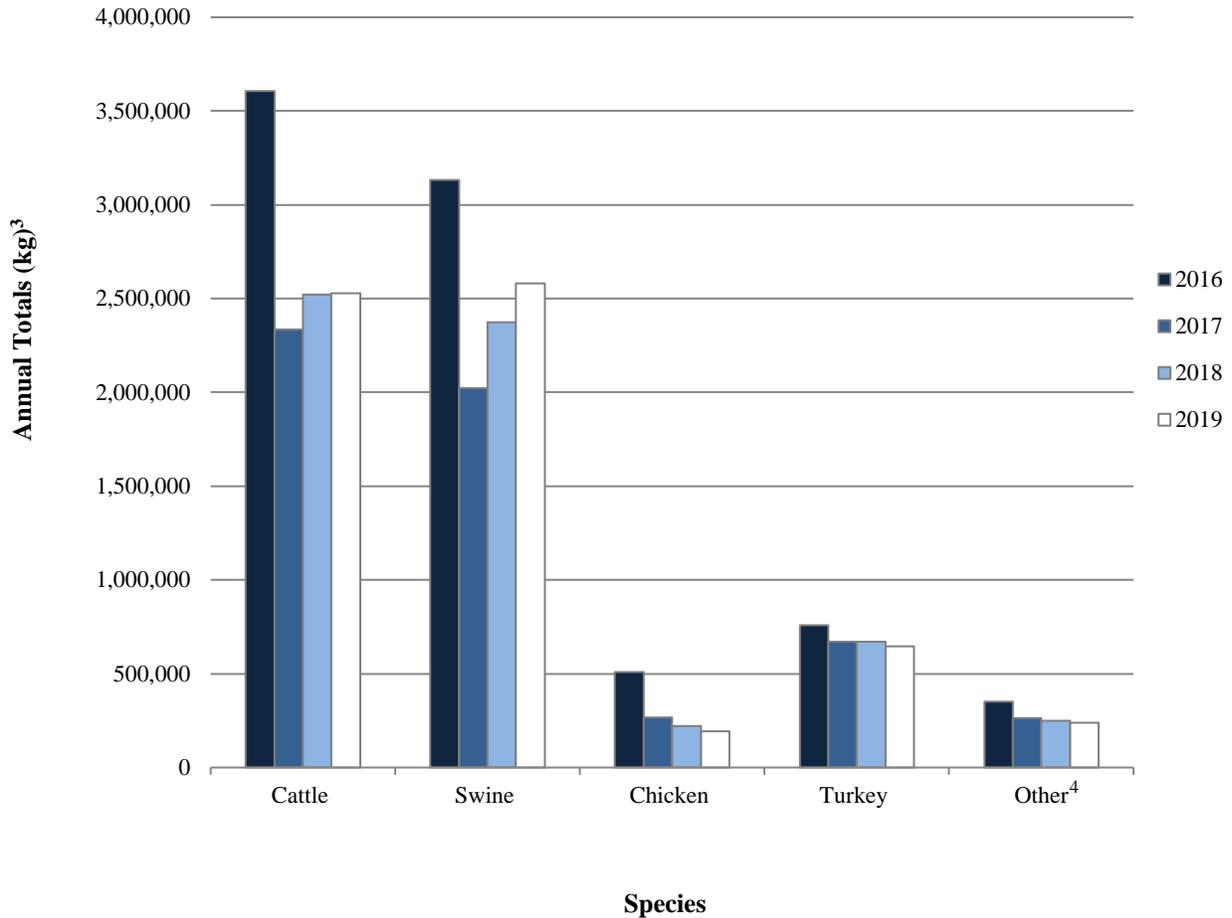
² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ The Other category includes estimates of product sales intended for use in (1) species listed on the approved label other than cattle, swine, chickens, and turkeys, including nonfood-producing animal species (e.g., dogs and horses) and minor food-producing species (e.g., fish); (2) other species not listed on the approved label; and (3) unknown uses.

Figure 4b

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed in 2016-2019
Domestic sales and distribution data
Reported by species-specific estimated sales



¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA’s Guidance for Industry #152 are considered “medically important” in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ The Other category includes estimates of product sales intended for use in (1) species listed on the approved label other than cattle, swine, chickens, and turkeys, including nonfood-producing animal species (e.g., dogs and horses) and minor food-producing species (e.g., fish); (2) other species not listed on the approved label; and (3) unknown uses.

Table 5a

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
 Actively marketed in 2019
 Domestic sales and distribution data
 Reported by drug class and species-specific estimated sales

Ingredient Class	Species	Estimated Annual Totals (kg)³	% Subtotal
Aminoglycosides	<i>Cattle</i>	139,445	45%
	<i>Swine</i>	101,270	33%
	<i>Chicken</i>	16,200	5%
	<i>Turkey</i>	25,125	8%
	<i>Other⁴</i>	25,949	8%
	Subtotal	307,988	100%
Amphenicols	<i>All Species⁵</i>	53,212	100%
	Subtotal	53,212	100%
Cephalosporins²	<i>Cattle</i>	24,158	81%
	<i>NIR⁶</i>	5,672	19%
	Subtotal	29,830	100%
Fluoroquinolones	<i>Cattle</i>	12,560	51%
	<i>Swine</i>	11,790	48%
	<i>Other⁴</i>	205	1%
	Subtotal	24,556	100%
Lincosamides²	<i>Swine</i>	114,398	85%
	<i>Chicken</i>	6,409	5%
	<i>NIR⁷</i>	14,156	10%
	Subtotal	134,962	100%
Macrolides	<i>Cattle</i>	286,438	59%
	<i>Swine</i>	195,441	40%
	<i>Chicken</i>	2,760	1%
	<i>Turkey</i>	1,944	<1%
	<i>Other⁴</i>	1,498	<1%
Subtotal	488,082	100%	
Penicillins²	<i>Cattle</i>	78,887	11%
	<i>Turkey</i>	471,660	66%
	<i>NIR⁸</i>	165,978	23%
	Subtotal	716,525	100%
Sulfas	<i>Cattle</i>	197,486	65%
	<i>Swine</i>	72,126	24%
	<i>Chicken</i>	5,903	2%
	<i>Turkey</i>	14,908	5%
	<i>Other⁴</i>	13,905	5%
	Subtotal	304,327	100%
Tetracyclines²	<i>Cattle</i>	1,741,883	42%
	<i>Swine</i>	2,062,275	50%
	<i>Chicken</i>	149,295	4%
	<i>Turkey</i>	131,034	3%
	<i>Other⁴</i>	32,545	1%
	Subtotal	4,117,031	100%
NIR^{2,9}	<i>All Species¹⁰</i>	12,746	100%
	Subtotal	12,746	100%

¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA’s Guidance for Industry #152 are considered “medically important” in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ The Other category includes estimates of product sales intended for use in (1) species listed on the approved label other than cattle, swine, chickens, and turkeys, including nonfood-producing animal species (e.g., dogs and horses) and minor food-producing species (e.g., fish); (2) other species not listed on the approved label; and (3) unknown uses.

⁵ This category includes the following: Cattle, Swine, and Other.

⁶ NIR = Not Independently Reported. Species-specific sales estimates for which there were fewer than three distinct sponsors are not independently reported. This category includes the following: Swine, Chicken, and Other.

⁷ NIR = Not Independently Reported. Species-specific sales estimates for which there were fewer than three distinct sponsors are not independently reported. This category includes the following: Cattle, Turkey, and Other.

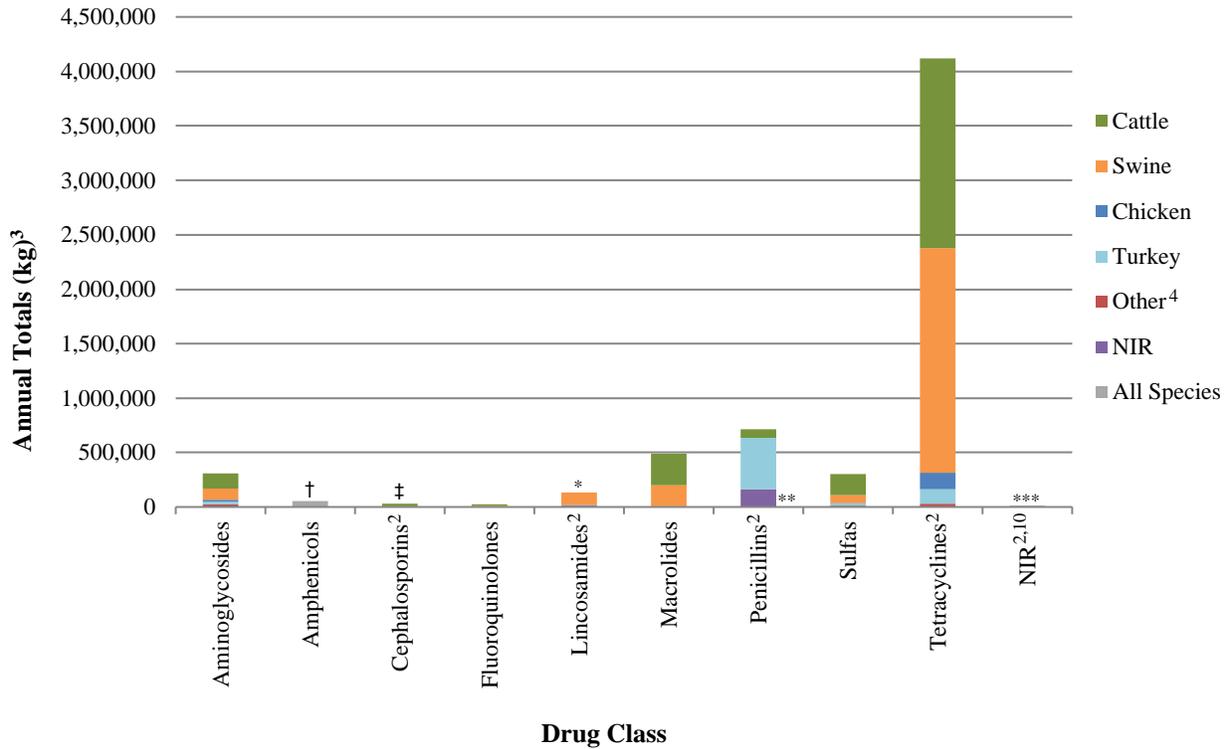
⁸ This category includes the following: Swine and Other.

⁹ NIR = Not Independently Reported. Antimicrobial classes for which there were fewer than three distinct sponsors actively marketing products domestically are not independently reported. These classes include the following: Diaminopyrimidines, Polymyxins, and Streptogramins.

¹⁰ This category includes the following: Cattle, Swine, Chicken, and Other.

Figure 5a

**Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed in 2019
Domestic sales and distribution data
Reported by drug class and species-specific estimated sales**



¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA’s Guidance for Industry #152 are considered “medically important” in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ The Other category includes estimates of product sales intended for use in (1) species listed on the approved label other than cattle, swine, chickens, and turkeys, including nonfood-producing animal species (e.g., dogs and horses) and minor food-producing species (e.g., fish); (2) other species not listed on the approved label; and (3) unknown uses.

⁺ This category includes the following: Cattle, Swine, and Other.

[‡] NIR = Not Independently Reported. Species-specific sales estimates for which there were fewer than three distinct sponsors are not independently reported. This category includes the following: Swine, Chicken, and Other.

^{*} NIR = Not Independently Reported. Species-specific sales estimates for which there were fewer than three distinct sponsors are not independently reported. This category includes the following: Cattle, Turkey, and Other.

^{**} This category includes the following: Swine and Other.

¹⁰ NIR = Not Independently Reported. Antimicrobial classes for which there were fewer than three distinct sponsors actively marketing products domestically are not independently reported. These classes include the following: Diaminopyrimidines, Polymyxins, and Streptogramins.

^{***} This category includes the following: Cattle, Swine, Chicken, and Other.

Table 5b
Medically important¹ antimicrobial drugs approved for use in food-producing animals²
 Actively marketed 2016-2019
 Domestic sales and distribution data
 Reported by drug class and species-specific estimated sales

Ingredient Class	Species	2016 Estimated Annual Totals (kg) ³	2017 Estimated Annual Totals (kg) ³	2018 Estimated Annual Totals (kg) ³	2019 Estimated Annual Totals (kg) ³	% Change 2016 - 2019	% Change 2018 - 2019
Aminoglycosides	Cattle	161,646	124,675	133,842	139,445	-14%	4%
	Swine	65,850	63,602	90,708	101,270	54%	12%
	Chicken	24,111	20,185	13,430	16,200	-33%	21%
	Turkey	22,198	24,042	24,321	25,125	13%	3%
	Other ⁴	45,204	26,680	27,154	25,949	-43%	-4%
	Subtotal	319,009	259,184	289,455	307,988	-3%	6%
Amphenicols	All Species ⁵	*	49,321	56,056	53,212	**	-5%
	Subtotal	*	49,321	56,056	53,212	**	-5%
Cephalosporins ²	Cattle	24,677	23,512	25,337	24,158	3%	-5%
	NIR ⁶	6,333	5,857	6,111	5,672	-4%	-7%
	Subtotal	31,010	29,369	31,448	29,830	1%	-5%
Fluoroquinolones	Cattle	*	*	*	12,560	**	**
	Swine	*	*	*	11,790	**	**
	Other ⁴	*	*	*	205	**	**
	All Species ⁷	18,502	22,904	23,350	*	**	**
	Subtotal	18,502	22,904	23,350	24,556	33%	5%
Lincosamides ²	Swine	118,916	128,642	104,527	114,398	-4%	9%
	Chicken	8,874	8,213	8,780	6,409	-28%	-27%
	NIR ⁸	14,667	15,642	12,208	14,156	-3%	16%
	Subtotal	142,458	152,497	125,514	134,962	-5%	8%
Macrolides	Cattle	194,811	274,479	274,837	286,438	47%	4%
	Swine	337,295	189,503	192,175	195,441	-42%	2%
	Chicken	20,718	2,614	2,971	2,760	-87%	-7%
	Turkey	1,176	1,307	1,653	1,944	65%	18%
	Other ⁴	714	891	1,403	1,498	110%	7%
	Subtotal	554,714	468,794	473,038	488,082	-12%	3%
Penicillins ²	Cattle	99,935	96,936	96,591	78,887	-21%	-18%
	Swine	17,958	*	*	*	**	**
	Turkey	529,083	423,689	463,939	471,660	-11%	2%
	Other ⁴	195,888	*	*	*	**	**
	NIR ⁹	*	170,263	171,333	165,978	**	-3%
	Subtotal	842,863	690,889	731,863	716,525	-15%	-2%
Sulfas ²	Cattle	234,955	196,902	187,603	197,486	-16%	5%
	Swine	40,215	31,024	45,581	72,126	79%	58%
	Chicken	21,115	7,319	*	5,903	-72%	**
	Turkey	41,127	28,817	30,446	14,908	-64%	-51%
	Other ⁴	32,414	10,050	*	13,905	-57%	**
	NIR ¹⁰	*	*	14,933	*	**	**
	Subtotal	369,826	274,112	278,562	304,327	-18%	9%
Tetracyclines ²	Cattle	2,840,519	1,560,542	1,732,416	1,741,883	-39%	1%
	Swine	2,520,680	1,579,145	1,902,950	2,062,275	-18%	8%
	Chicken	285,513	153,621	140,561	149,295	-48%	6%
	Turkey	156,617	192,976	150,749	131,034	-16%	-13%
	Other ⁴	57,859	49,416	47,502	32,545	-44%	-31%
	Subtotal	5,861,188	3,535,701	3,974,179	4,117,031	-30%	4%
NIR ^{2,11}	All Species ¹²	216,771	76,440	48,832	12,746	-94%	-74%
	Subtotal	216,771	76,440	48,832	12,746	-94%	-74%

¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ The Other category includes estimates of product sales intended for use in (1) species listed on the approved label other than cattle, swine, chickens, and turkeys, including nonfood-producing animal species (e.g., dogs and horses) and minor food-producing species (e.g., fish); (2) other species not listed on the approved label; and (3) unknown uses.

⁵ This category includes the following: Cattle, Swine (excluding 2016), and Other.

* Species-specific sales estimates for which there were fewer than three distinct sponsors are not independently reported.

** Species-specific sales estimates for which there were fewer than three distinct sponsors are not independently reported. Therefore, percentage change cannot be calculated.

⁶ NIR = Not Independently Reported. Species-specific sales estimates for which there were fewer than three distinct sponsors are not independently reported. This category includes the following: Swine, Chicken, and Other.

⁷ This category includes the following: Cattle, Swine, and Other (excluding 2019).

⁸ NIR = Not Independently Reported. Species-specific sales estimates for which there were fewer than three distinct sponsors are not independently reported. This category includes the following: Cattle, Turkey (excluding 2016 through 2018), and Other.

⁹ This category includes the following: Swine and Other (excluding 2016).

¹⁰ This category includes Chicken and Other for 2018.

¹¹ NIR = Not Independently Reported. Antimicrobial classes for which there were fewer than three distinct sponsors actively marketing products domestically are not independently reported. These classes include the following: Amphenicols, Diaminopyrimidines, Polymyxins, and Streptogramins.

¹² This category includes the following: Cattle, Swine, Chicken, Turkey (excluding 2017 through 2019), and Other.

Table 6a

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed in 2019
Domestic sales and distribution data
Reported by route of administration

Route	Annual Totals (kg)³	% Total
<i>Feed²</i>	4,013,580	65%
<i>Injection²</i>	311,562	5%
<i>Intramammary</i>	16,155	<1%
<i>Oral^{2,4} or Topical^{2,5}</i>	72,486	1%
<i>Water⁶</i>	1,775,475	29%
<i>Total</i>	<i>6,189,260</i>	<i>100%</i>

¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ Orally administered, excluding administration by means of feed and water.

⁵ The Oral or Topical category includes Topical products marketed by less than three distinct sponsors; therefore, Topical products cannot be independently reported (excluding 2012 and 2013).

⁶ Water includes when the drug is administered either through drinking water, as a drench, through the immersion of fish, or as a syrup or dusting for honey bees.

Table 6b

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by route of administration

Route	2010 Annual Totals (kg)³	2011 Annual Totals (kg)³	2012 Annual Totals (kg)³	2013 Annual Totals (kg)³	2014 Annual Totals (kg)³	2015 Annual Totals (kg)³	2016 Annual Totals (kg)³	2017 Annual Totals (kg)³	2018 Annual Totals (kg)³	2019 Annual Totals (kg)³	% Change 2010 - 2019	% Change 2018 - 2019
<i>Feed²</i>	5,957,748	5,933,440	6,250,770	6,833,526	6,981,097	7,139,853	5,982,351	3,432,373	3,862,586	4,013,580	-33%	4%
<i>Injection²</i>	421,272	416,775	393,422	352,693	341,790	353,197	348,239	358,534	355,994	311,562	-26%	-12%
<i>Intramammary</i>	24,692	21,023	25,979	9,875	11,450	16,049	16,172	17,583	14,056	16,155	-35%	15%
<i>Oral^{2,4} or Topical^{2,5}</i>	109,839	126,775	113,409	97,952	104,082	121,288	90,464	95,311	88,609	72,486	-34%	-18%
<i>Water⁶</i>	1,715,757	1,757,686	2,113,840	1,899,248	2,040,920	2,072,557	1,919,115	1,655,410	1,711,053	1,775,475	3%	4%
Total	8,229,309	8,255,697	8,897,420	9,193,293	9,479,339	9,702,943	8,356,340	5,559,212	6,032,298	6,189,260	-25%	3%

¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

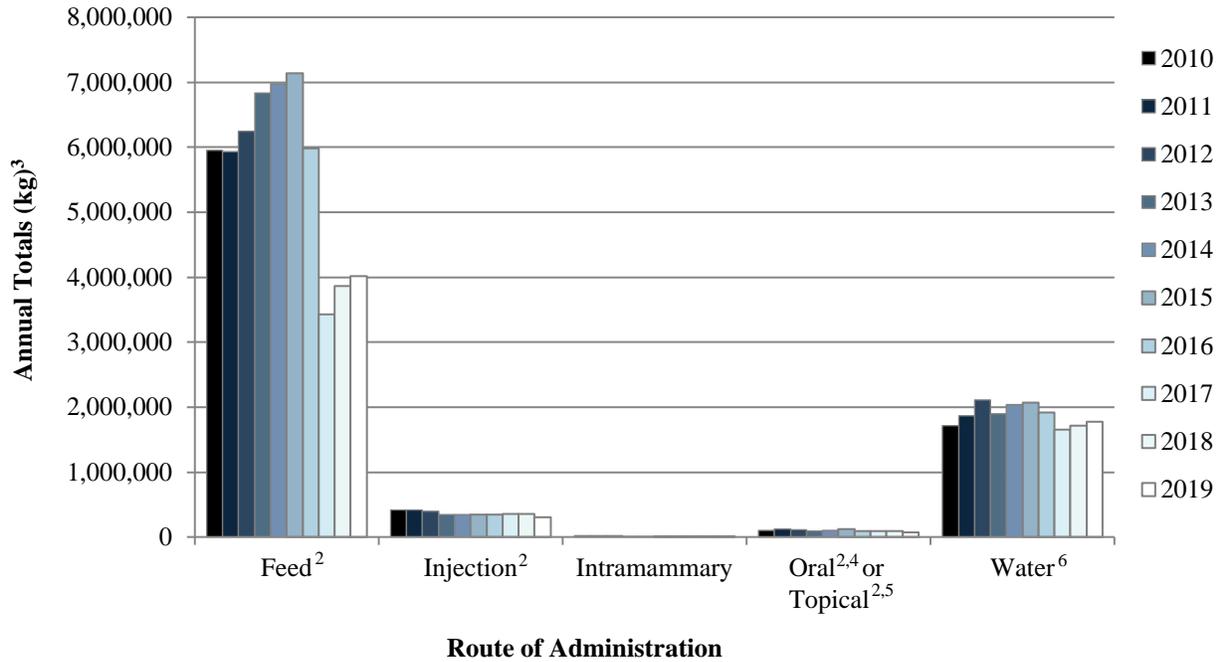
⁴ Orally administered, excludes administration by means of feed and water.

⁵ The Oral or Topical category includes Topical products marketed by less than three distinct sponsors; therefore, Topical products cannot be independently reported (excluding 2012 and 2013).

⁶ Water includes when the drug is administered either through drinking water, as a drench, through the immersion of fish, or as a syrup or dusting for honey bees.

Figure 6b

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by route of administration



¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA’s Guidance for Industry #152 are considered “medically important” in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ Orally administered, excluding administration by means of feed and water.

⁵ The Oral or Topical category includes Topical products marketed by less than three distinct sponsors; therefore, Topical products cannot be independently reported (excluding 2012 and 2013).

⁶ Water includes when the drug is administered either through drinking water, as a drench, through the immersion of fish, or as a syrup or dusting for honey bees.

Table 7a

**Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by indications**

Indications	2010 Annual Totals (kg) ³	2011 Annual Totals (kg) ³	2012 Annual Totals (kg) ³	2013 Annual Totals (kg) ³	2014 Annual Totals (kg) ³	2015 Annual Totals (kg) ³	2016 Annual Totals (kg) ³	2017 Annual Totals (kg) ³	2018 Annual Totals (kg) ³	2019 Annual Totals (kg) ³	% Change 2010 - 2019	% Change 2018 - 2019
<i>Production⁴ or Production/Therapeutic⁵ Indications^{2,6}</i>	5,828,079	5,770,871	6,073,485	6,664,835	6,790,996	6,917,639	5,770,655	0*	0*	0*	**	**
<i>Therapeutic Indications Only^{2,5}</i>	2,401,230	2,484,827	2,823,935	2,528,458	2,688,343	2,785,304	2,585,685	5,559,212*	6,032,298	6,189,260	158%	3%
Total	8,229,309	8,255,697	8,897,420	9,193,293	9,479,339	9,702,943	8,356,340	5,559,212	6,032,298	6,189,260	-25%	3%

¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA’s Guidance for Industry #152 are considered “medically important” in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ The implementation of GFI #213 was completed in January 2017; all affected medically important products had production indications removed from their labeling at that time.

⁵ Therapeutic Indications (e.g., treatment, control, or prevention of disease).

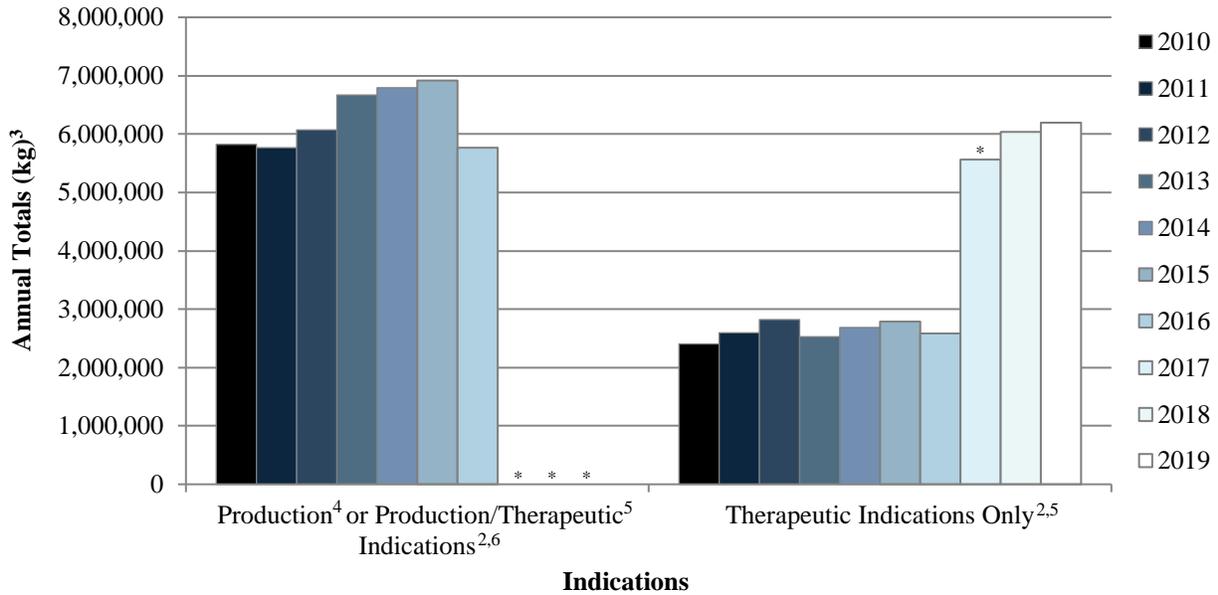
⁶ There were fewer than three distinct sponsors marketing antimicrobial animal drugs with only production indications (i.e., with no therapeutic indications). To protect confidential business information these data cannot be independently reported and are, therefore, combined with the data for drugs with both production and therapeutic (production/therapeutic) indications.

* The quantities reported in 2017 through 2019 under the production indications category dropped to zero as a result of the implementation of GFI #213. Applications that were formerly in the Production category were voluntarily withdrawn. Applications that were formerly in the Production/Therapeutic Indications category had production claims eliminated and were moved to the Therapeutic Only Indications category.

** Cannot divide by zero.

Figure 7a

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by indications



¹ Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ The implementation of GFI #213 was completed in January 2017; all affected medically important products had production indications removed from their labeling at that time.

⁵ Therapeutic Indications (e.g., treatment, control, or prevention of disease).

⁶ There were fewer than three distinct sponsors (excluding 2013 through 2016 for the Not Medically Important category) marketing antimicrobial animal drugs with only production indications (i.e., with no therapeutic indications). To protect confidential business information these data cannot be independently reported and are, therefore, combined with the data for drugs with both production and therapeutic (production/therapeutic) indications.

* The quantity reported in 2017 under the production indications category dropped to zero as a result of the implementation of GFI #213.

Applications that were formerly in the Production category were voluntarily withdrawn. Applications that were formerly in the Production/Therapeutic Indications category had production claims eliminated and were moved to the Therapeutic Only Indications category.

Figure 7b

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by indications (combined annual totals)



¹ Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ The implementation of GFI #213 was completed in January 2017; all affected medically important products had production indications removed from their labeling at that time.

⁵ Therapeutic Indications (e.g., treatment, control, or prevention of disease).

⁶ There were fewer than three distinct sponsors (excluding 2013 through 2016 for the Not Medically Important category) marketing antimicrobial animal drugs with only production indications (i.e., with no therapeutic indications). To protect confidential business information these data cannot be independently reported and are, therefore, combined with the data for drugs with both production and therapeutic (production/therapeutic) indications.

* The quantity reported in 2017 under the production indications category dropped to zero as a result of the implementation of GFI 213.

Applications that were formerly in the Production category were voluntarily withdrawn. Applications that were formerly in the Production/Therapeutic Indications category had production claims eliminated and were moved to the Therapeutic Only Indications category.

Table 8a

**Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed in 2019
Domestic sales and distribution data
Reported by dispensing status**

Dispensing Status	Annual Totals (kg)³	% Total
<i>OTC^{2,4,5}</i>	223,753	4%
<i>Rx^{2,6}</i>	1,918,965	31%
<i>Rx⁶/OTC^{2,4,7}</i>	32,961	1%
<i>VFD⁸</i>	4,013,580	65%
<i>Total</i>	<i>6,189,260</i>	<i>100%</i>

¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ OTC = Over-the-Counter. Approved animal drugs that are available without a prescription or veterinary feed directive.

⁵ The implementation of GFI #213 was completed in January 2017; all affected medically important products transitioned from OTC to either Rx or VFD dispensing status at that time.

⁶ Rx = Prescription. Approved animal drugs that require a prescription from a licensed veterinarian.

⁷ Animal drugs that were approved with both a prescription and OTC dispensing status (Rx/OTC), with the approved drug being marketed with either a prescription label or an OTC label, depending upon the species and indication on the label.

⁸ VFD = Veterinary Feed Directive. Approved animal drugs that are intended for use in or on animal feed and must be used under the professional supervision of a licensed veterinarian.

Table 8b

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by dispensing status

Dispensing Status	2010 Annual Totals (kg) ³	2011 Annual Totals (kg) ³	2012 Annual Totals (kg) ³	2013 Annual Totals (kg) ³	2014 Annual Totals (kg) ³	2015 Annual Totals (kg) ³	2016 Annual Totals (kg) ³	2017 Annual Totals (kg) ³	2018 Annual Totals (kg) ³	2019 Annual Totals (kg) ³	% Change 2010 - 2019	% Change 2018 - 2019
<i>OTC</i> ^{2,4,5}	8,050,340	8,029,437	8,642,153	8,964,750	9,219,892	9,422,402	8,000,326	271,280*	262,678	223,753	-97%	-15%
<i>Rx</i> ⁶ / <i>OTC</i> ^{2,4,7}	47,901	50,205	54,968	54,942	48,489	56,363	60,705	57,269	47,245	32,961	-31%	-30%
<i>Rx</i> ⁶ or <i>VFD</i> ^{2,8,9}	131,068	176,055	200,298	173,600	210,958	224,179	295,309	5,230,663*	5,722,375	5,932,545	4426%	4%
Total	8,229,309	8,255,697	8,897,420	9,193,293	9,479,339	9,702,943	8,356,340	5,559,212	6,032,298	6,189,260	-25%	3%

¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ OTC = Over-the-Counter. Approved animal drugs that are available without a prescription or veterinary feed directive.

⁵ The implementation of GFI #213 was completed in January 2017; all affected medically important products transitioned from OTC to either Rx or VFD dispensing status at that time.

* The quantity reported in 2017 under the OTC category dropped sharply as a result of the implementation of GFI #213. Applications that were formerly in the OTC category moved to the Rx or VFD category.

⁶ Rx = Prescription. Approved animal drugs that require a prescription from a licensed veterinarian.

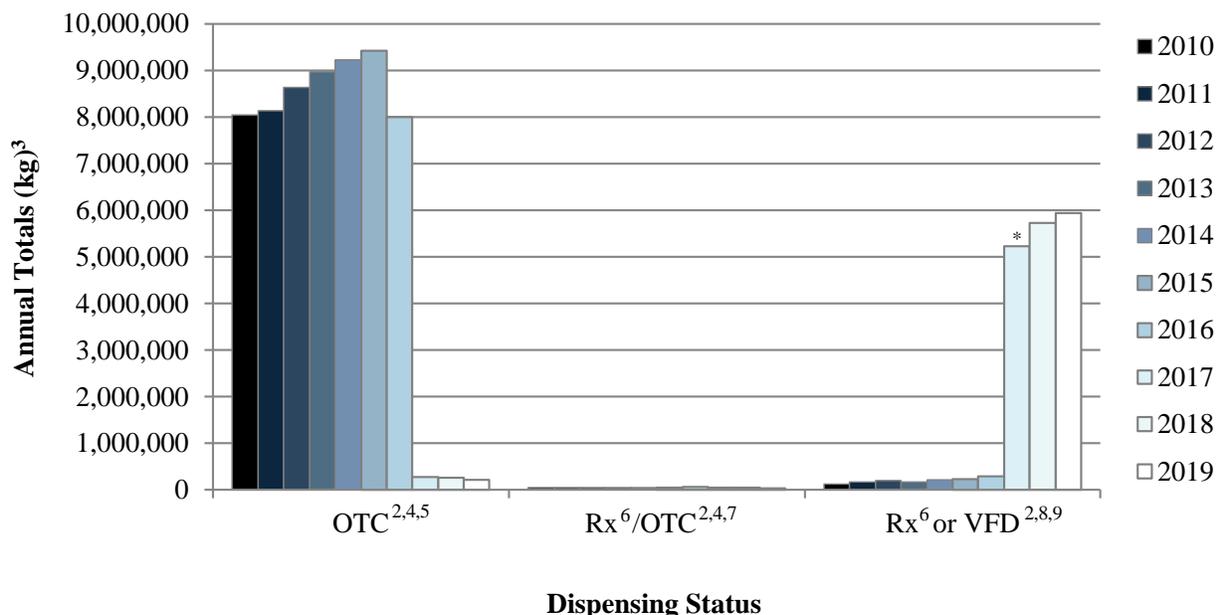
⁷ Animal drugs that were approved with both a prescription and OTC dispensing status (Rx/OTC), with the approved drug being marketed with either a prescription label or an OTC label, depending upon the species and indication on the label.

⁸ VFD = Veterinary Feed Directive. Approved animal drugs that are intended for use in or on animal feed and must be used under the professional supervision of a licensed veterinarian.

⁹ The Rx or VFD category includes VFD products marketed by less than three distinct sponsors; therefore, VFD products cannot be independently reported (excluding 2013 through 2019).

Figure 8b

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
 Actively marketed 2010-2019
 Domestic sales and distribution data
 Reported by dispensing status



¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA’s Guidance for Industry #152 are considered “medically important” in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ OTC = Over-the-Counter. Approved animal drugs that are available without a prescription or veterinary feed directive.

⁵ The implementation of GFI #213 was completed in January 2017; all affected medically important products transitioned from OTC to either Rx or VFD dispensing status at that time.

* The quantity reported in 2017 under the OTC category dropped sharply as a result of the implementation of GFI #213. Applications that were formerly in the OTC category moved to the Rx or VFD category.

⁶ Rx = Prescription. Approved animal drugs that require a prescription from a licensed veterinarian.

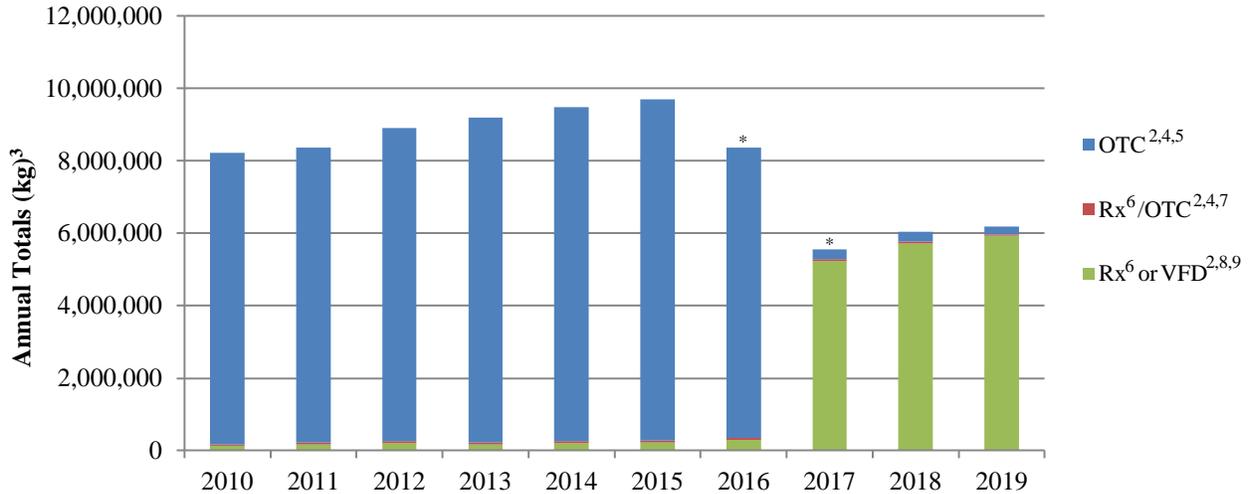
⁷ Animal drugs that were approved with both a prescription and OTC dispensing status (Rx/OTC), with the approved drug being marketed with either a prescription label or an OTC label, depending upon the species and indication on the label.

⁸ VFD = Veterinary Feed Directive. Approved animal drugs that are intended for use in or on animal feed and must be used under the professional supervision of a licensed veterinarian.

⁹ The Rx or VFD category includes VFD products marketed by less than three distinct sponsors; therefore, VFD products cannot be independently reported (excluding 2013 through 2019).

Figure 8c

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by dispensing status (combined annual totals)



¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ OTC = Over-the-Counter. Approved animal drugs that are available without a prescription or veterinary feed directive.

⁵ The implementation of GFI #213 was completed in January 2017; all affected medically important products transitioned from OTC to either Rx or VFD dispensing status at that time.

* The quantity reported in 2017 under the OTC category dropped sharply as a result of the implementation of GFI 213. Applications that were formerly in the OTC category moved to the Rx or VFD category.

⁶ Rx = Prescription. Approved animal drugs that require a prescription from a licensed veterinarian.

⁷ Animal drugs that were approved with both a prescription and OTC dispensing status (Rx/OTC), with the approved drug being marketed with either a prescription label or an OTC label, depending upon the species and indication on the label.

⁸ VFD = Veterinary Feed Directive. Approved animal drugs that are intended for use in or on animal feed and must be used under the professional supervision of a licensed veterinarian.

⁹ The Rx or VFD category includes VFD products marketed by less than three distinct sponsors; therefore, VFD products cannot be independently reported (excluding 2013 through 2019).

Table 9a

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
 Actively marketed in 2019
 Domestic sales and distribution data
 Reported by route of administration and drug class

Route	Drug Class	Annual Total (kg)³	% Total
Feed	<i>Sulfas</i>	34,510	1%
	<i>Tetracyclines²</i>	3,443,546	56%
	<i>Other Drugs⁴</i>	535,524	9%
Water	<i>Aminoglycosides</i>	215,980	3%
	<i>Lincosamides</i>	70,444	1%
	<i>Penicillins</i>	607,741	10%
	<i>Sulfas</i>	197,631	3%
	<i>Tetracyclines</i>	598,052	10%
	<i>Other Drug⁵</i>	85,627	1%
Other Routes⁶	<i>Cephalosporins²</i>	29,830	<1%
	<i>Sulfas</i>	72,186	1%
	<i>Tetracyclines²</i>	75,433	1%
	<i>Other Drugs^{2,7}</i>	222,755	4%
	Total	6,189,260	100%

¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA's Guidance for Industry #152 are considered "medically important" in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ This category includes the following: Aminoglycosides, Amphenicols, Diaminopyrimidines, Lincosamides, Macrolides, and Streptogramins.

⁵ This category includes the following: Amphenicols and Macrolides.

⁶ This category includes the following: Injection, Intramammary, Oral (excluding administration by means of feed or water), and Topical.

⁷ This category includes the following: Aminoglycosides, Amphenicols, Fluoroquinolones, Lincosamides, Macrolides, Penicillins, and Polymyxins.

Table 9b

**Medically important¹ antimicrobial drugs approved for use in food-producing animals²
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by route of administration and drug class**

Route	Drug Class	2010 Annual Total (kg) ³	2011 Annual Total (kg) ³	2012 Annual Total (kg) ³	2013 Annual Total (kg) ³	2014 Annual Total (kg) ³	2015 Annual Total (kg) ³	2016 Annual Total (kg) ³	2017 Annual Total (kg) ³	2018 Annual Total (kg) ³	2019 Annual Total (kg) ³	% Change 2010 - 2019	% Change 2018 - 2019
Feed	<i>Sulfas</i>	109,983	105,400	90,972	90,723	103,243	98,831	77,217	21,871	28,838	34,510	-69%	20%
	<i>Tetracyclines</i> ²	4,921,071	4,848,946	5,085,178	5,699,364	5,811,961	6,033,388	5,109,033	2,819,727	3,282,091	3,443,546	-30%	5%
	<i>Other Drugs</i> ⁴	926,695	979,093	1,074,620	1,043,439	1,065,893	1,007,634	796,102	590,775	551,656	535,524	-42%	-3%
Water	<i>Aminoglycosides</i>	153,907	162,672	195,043	198,247	198,505	223,139	233,668	188,684	204,826	215,980	40%	5%
	<i>Lincosamides</i>	41,186	66,510	72,187	88,709	100,057	90,086	57,085	63,959	63,249	70,444	71%	11%
	<i>Penicillins</i>	630,946	650,220	753,510	672,131	740,929	793,018	700,779	559,589	599,409	607,741	-4%	1%
	<i>Sulfas</i>	289,529	145,972	283,909	192,995	239,582	154,529	199,201	152,432	158,257	197,631	-32%	25%
	<i>Tetracyclines</i>	582,660	710,403	782,959	719,529	712,026	762,411	663,602	625,568	609,430	598,052	3%	-2%
	<i>Other Drugs</i> ⁵	17,529	21,909	26,233	27,637	49,822	49,374	64,780	65,179	75,881	85,627	388%	13%
Other Routes ⁶	<i>Cephalosporins</i> ²	24,588	26,611	27,654	28,337	31,722	32,254	31,010	29,369	31,448	29,830	21%	-5%
	<i>Fluoroquinolones</i>	*	*	*	15,099	17,220	20,063	18,502	22,904	23,350	24,556	**	5%
	<i>Tetracyclines</i> ²	98,551	93,506	86,224	95,887	80,211	85,732	88,553	90,406	82,657	75,433	-23%	-9%
	<i>Other Drugs</i> ^{2,7}	432,665	444,456	418,933	321,196	328,168	352,485	316,809	328,749	321,205	270,385	-38%	-16%
	Total	8,229,309	8,255,697	8,897,420	9,193,293	9,479,339	9,702,943	8,356,340	5,559,212	6,032,298	6,189,260	-25%	3%

¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA’s Guidance for Industry #152 are considered “medically important” in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ This category includes the following: Aminoglycosides, Amphenicols, Diaminopyrimidines, Lincosamides, Macrolides, Penicillins (excluding 2017 through 2019), and Streptogramins.

⁵ This category includes the following: Amphenicols (excluding 2013 and 2016) and Macrolides.

* Not reported because there were fewer than three distinct sponsors actively marketing products domestically 2010 through 2012.

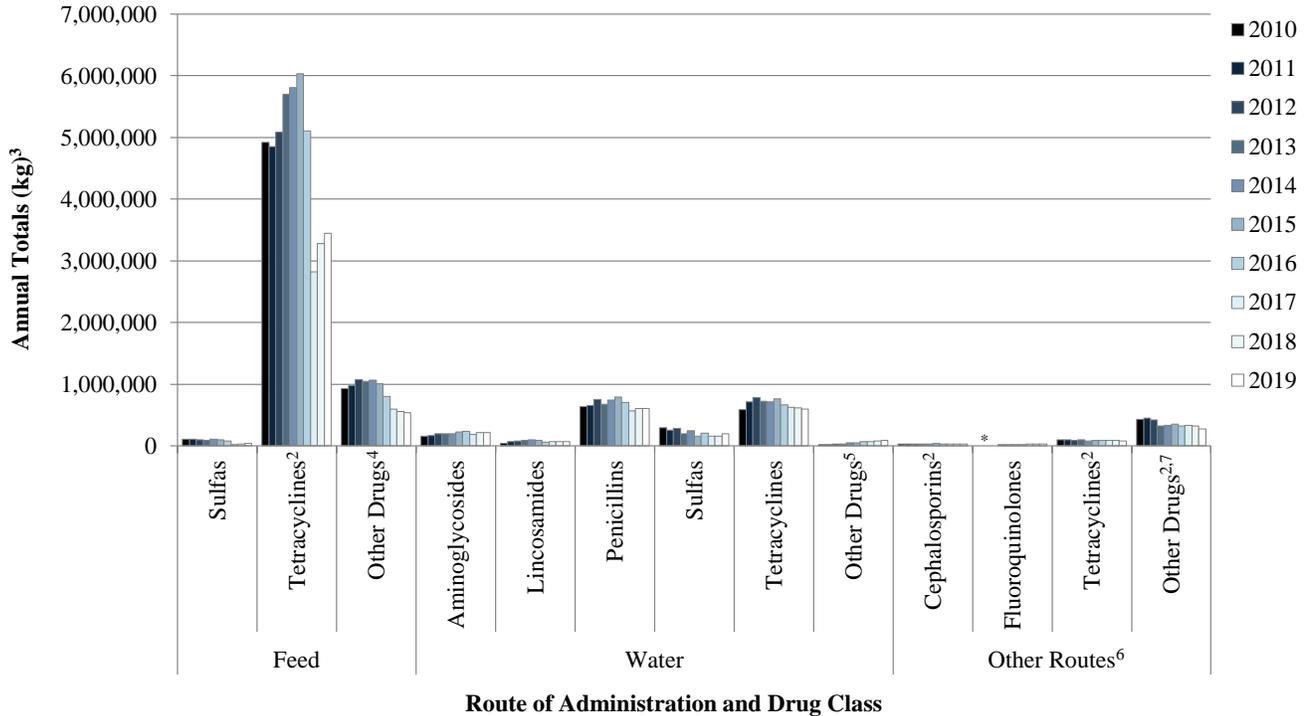
** Not reported because there were fewer than three distinct sponsors actively marketing products domestically 2010 through 2012. Therefore, percentage change cannot be calculated.

⁶ This category includes the following: Injection, Intramammary, Oral (excluding administration by means of feed or water), and Topical (excluding 2012 and 2013).

⁷ This category includes the following: Aminoglycosides, Amphenicols, Fluoroquinolones (excluding 2013 through 2019), Lincosamides, Macrolides, Penicillins, Polymyxins (excluding 2012 and 2013), and Sulfonamides.

Figure 9b

Medically important¹ antimicrobial drugs approved for use in food-producing animals²
 Actively marketed 2010-2019
 Domestic sales and distribution data
 Reported by route of administration and drug class



¹ Guidance for Industry #213 states that all antimicrobial drugs and their associated classes listed in Appendix A of FDA’s Guidance for Industry #152 are considered “medically important” in human medical therapy.

² Includes antimicrobial drug applications that are approved and labeled for use in both food-producing animals (e.g., cattle and swine) and nonfood-producing animals (e.g., dogs and horses).

³ kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

⁴ This category includes the following: Aminoglycosides, Amphenicols, Diaminopyrimidines, Lincosamides, Macrolides, Penicillins (excluding 2017 through 2019), and Streptogramins.

⁵ This category includes the following: Amphenicols (excluding 2013 and 2016) and Macrolides.

* Not reported because there were fewer than three distinct sponsors actively marketing products domestically.

⁶ This category includes the following: Injection, Intramammary, Oral (excluding administration by means of feed or water), and Topical (excluding 2012 and 2013).

⁷ This category includes the following: Aminoglycosides, Amphenicols, Fluoroquinolones (excluding 2013 through 2019), Lincosamides, Macrolides, Penicillins, Polymyxins (excluding 2012 and 2013), and Sulfonamides.

IV. Data on antimicrobial drugs that are not medically important

Table 10a

Not medically important¹ antimicrobial drugs approved for use in food-producing animals
Actively marketed in 2019
Domestic sales and distribution data
Reported by species-specific estimated sales

Species	Estimated Annual Totals (kg)²	% Total
<i>Cattle</i>	3,246,667	62%
<i>Swine</i>	404,343	8%
<i>Chicken</i>	1,315,354	25%
<i>Turkey</i>	310,426	6%
<i>Other³</i>	2,308	<1%
Total	5,279,098	100%

¹ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

³ The Other category includes estimates of product sales intended for use in (1) species listed on the approved label other than cattle, swine, chickens, and turkeys, including nonfood-producing animal species (e.g., dogs and horses) and minor food-producing species (e.g., fish); (2) other species not listed on the approved label; and (3) unknown uses.

Table 10b

Not medically important¹ antimicrobial drugs approved for use in food-producing animals
Actively marketed 2016-2019
Domestic sales and distribution data
Reported by species-specific estimated sales

Species	2016 Estimated Annual Totals (kg)²	2017 Estimated Annual Totals (kg)²	2018 Estimated Annual Totals (kg)²	2019 Estimated Annual Totals (kg)²	% Change 2016 - 2019	% Change 2018 - 2019
<i>Cattle</i>	3,164,626	3,139,331	3,376,063	3,246,667	3%	-4%
<i>Swine</i>	425,568	395,994	414,170	404,343	-5%	-2%
<i>Chicken</i>	1,700,124	1,477,197	1,401,759	1,315,354	-23%	-6%
<i>Turkey</i>	379,478	358,774	335,826	310,426	-18%	-8%
<i>Other³</i>	0	2,860	2,965	2,308	*	-22%
Total	5,669,796	5,374,156	5,530,784	5,279,098	-7%	-5%

¹ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

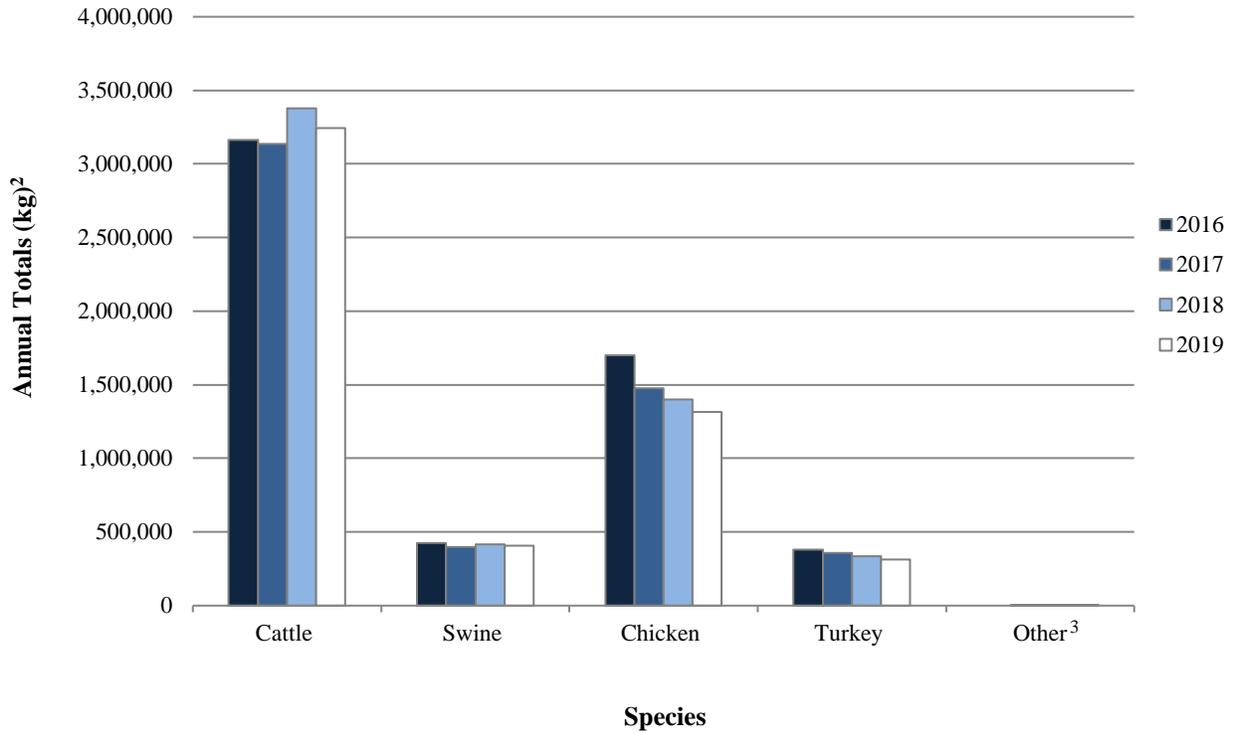
² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

³ The Other category includes estimates of product sales intended for use in (1) species listed on the approved label other than cattle, swine, chickens, and turkeys, including nonfood-producing animal species (e.g., dogs and horses) and minor food-producing species (e.g., fish); (2) other species not listed on the approved label; and (3) unknown uses.

* Cannot divide by zero.

Figure 10b

Not medically important¹ antimicrobial drugs approved for use in food-producing animals
Actively marketed in 2019
Domestic sales and distribution data
Reported by species-specific estimated sales



¹ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

³ The Other category includes estimates of product sales intended for use in (1) species listed on the approved label other than cattle, swine, chickens, and turkeys, including nonfood-producing animal species (e.g., dogs and horses) and minor food-producing species (e.g., fish); (2) other species not listed on the approved label; and (3) unknown uses.

Table 11a

Not medically important¹ antimicrobial drugs approved for use in food-producing animals
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by route of administration

Route	2010 Annual Totals (kg) ²	2011 Annual Totals (kg) ²	2012 Annual Totals (kg) ²	2013 Annual Totals (kg) ²	2014 Annual Totals (kg) ²	2015 Annual Totals (kg) ²	2016 Annual Totals (kg) ²	2017 Annual Totals (kg) ²	2018 Annual Totals (kg) ²	2019 Annual Totals (kg) ²	% Change 2010 - 2019	% Change 2018 - 2019
<i>All Routes³</i>	5,057,788	5,313,340	5,725,327	5,591,752	5,882,221	5,874,997	5,669,796	5,374,156	5,530,784	5,279,098	4%	-5%

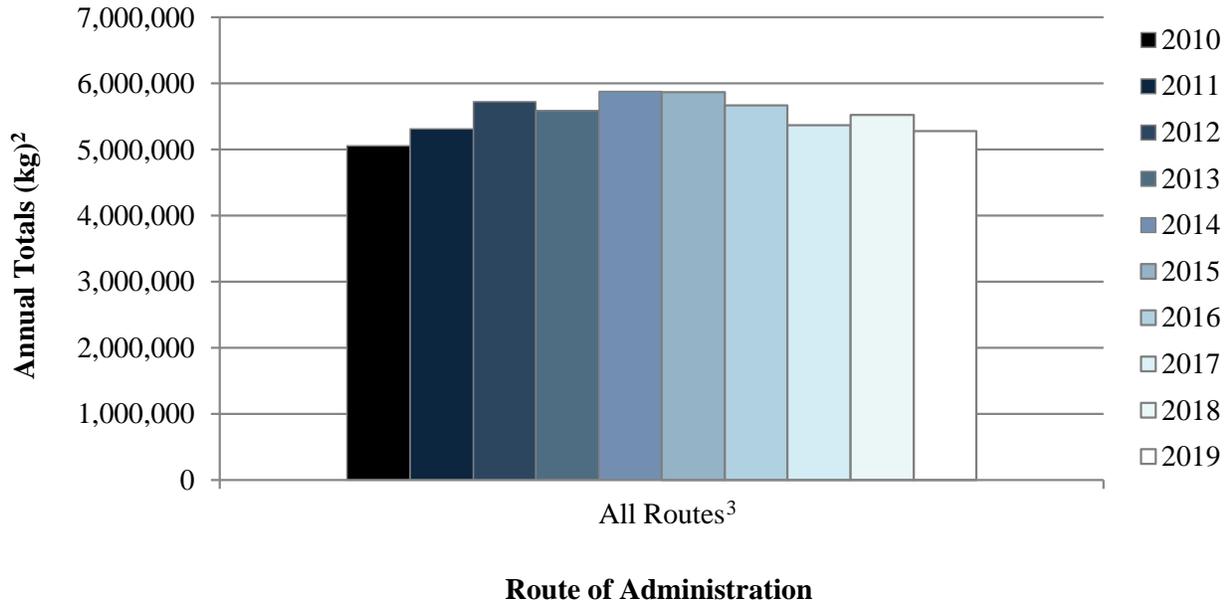
¹ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

³ This category includes the following: Feed, Intramammary, and Water. To protect confidential business information, the routes of administration for the Not Medically Important antimicrobial drugs are not separately presented.

Figure 11a

Not medically important¹ antimicrobial drugs approved for use in food-producing animals
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by route of administration



¹ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

² kg = kilogram of active ingredient. Antimicrobials that were reported in International Units (IU) (e.g., Penicillins) were converted to kg. Antimicrobial class includes drugs of different molecular weights, with some drugs reported in different salt forms.

³ This category includes the following: Feed, Intramammary, and Water. To protect confidential business information, the routes of administration for the Not Medically Important antimicrobial drugs are not separately presented.

Table 12a

Not medically important¹ antimicrobial drugs approved for use in food-producing animals
Actively marketed in 2019
Domestic sales and distribution data
Reported by indications

Indications	Annual Totals (kg)²	% Total
<i>Production Indications Only³</i>	95,226	2%
<i>Production/Therapeutic⁴ Indications</i>	4,167,540	79%
<i>Therapeutic Indications Only⁴</i>	1,016,332	19%
Total	5,279,098	100%

¹ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

³ Production Indications (e.g., increased rate of weight gain or improved feed efficiency).

⁴ Therapeutic Indications (e.g., treatment, control, or prevention of disease).

Table 12b

Not medically important¹ antimicrobial drugs approved for use in food-producing animals
 Actively marketed 2010-2019
 Domestic sales and distribution data
 Reported by indications

Indications	2010 Annual Totals (kg) ²	2011 Annual Totals (kg) ²	2012 Annual Totals (kg) ²	2013 Annual Totals (kg) ²	2014 Annual Totals (kg) ²	2015 Annual Totals (kg) ²	2016 Annual Totals (kg) ²	2017 Annual Totals (kg) ²	2018 Annual Totals (kg) ²	2019 Annual Totals (kg) ²	% Change 2010 - 2019	% Change 2018 - 2019
<i>Production³ or Production/Therapeutic⁴ Indications⁵</i>	3,622,315	3,790,628	3,972,057	3,900,298	4,259,148	4,329,598	4,350,075	4,229,651	4,453,964	4,262,766	18%	-4%
<i>Therapeutic Indications Only⁴</i>	1,435,473	1,522,712	1,753,270	1,691,454	1,623,073	1,545,399	1,319,721	1,144,504	1,076,819	1,016,332	-29%	-6%
Total	5,057,788	5,313,340	5,725,327	5,591,752	5,882,221	5,874,997	5,669,796	5,374,156	5,530,784	5,279,098	4%	-5%

¹ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

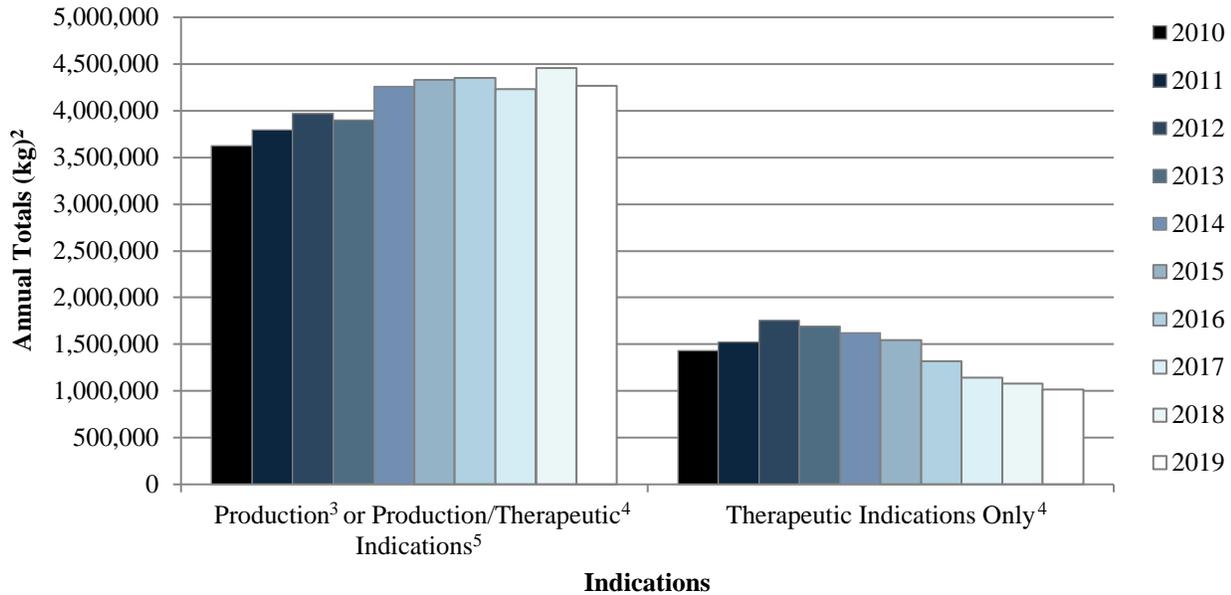
³ Production Indications (e.g., increased rate of weight gain or improved feed efficiency).

⁴ Therapeutic Indications (e.g., treatment, control, or prevention of disease).

⁵ There were fewer than three distinct sponsors (excluding 2012 through 2019 for the Not Medically Important category) marketing antimicrobial animal drugs with only production indications (i.e., with no therapeutic indications). To protect confidential business information these data cannot be independently reported and are, therefore, combined with the data for drugs with both production and therapeutic (production/therapeutic) indications.

Figure 12b

Not medically important¹ antimicrobial drugs approved for use in food-producing animals
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by indications



¹ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

³ Production Indications (e.g., increased rate of weight gain or improved feed efficiency).

⁴ Therapeutic Indications (e.g., treatment, control, or prevention of disease).

⁵ There were fewer than three distinct sponsors (excluding 2012 through 2018 for the Not Medically Important category) marketing antimicrobial animal drugs with only production indications (i.e., with no therapeutic indications). To protect confidential business information these data cannot be independently reported and are, therefore, combined with the data for drugs with both production and therapeutic (production/therapeutic) indications.

Table 13a

Not medically important¹ antimicrobial drugs approved for use in food-producing animals
 Actively marketed 2010-2019
 Domestic sales and distribution data
 Reported by dispensing status

Dispensing Status	2010 Annual Totals (kg) ²	2011 Annual Totals (kg) ²	2012 Annual Totals (kg) ²	2013 Annual Totals (kg) ²	2014 Annual Totals (kg) ²	2015 Annual Totals (kg) ²	2016 Annual Totals (kg) ²	2017 Annual Totals (kg) ²	2018 Annual Totals (kg) ²	2019 Annual Totals (kg) ²	% Change 2010 - 2019	% Change 2018 - 2019
<i>All Dispensing Statuses³</i>	5,057,788	5,313,340	5,725,327	5,591,752	5,882,221	5,874,997	5,669,796	5,374,156	5,530,784	5,279,098	4%	-5%

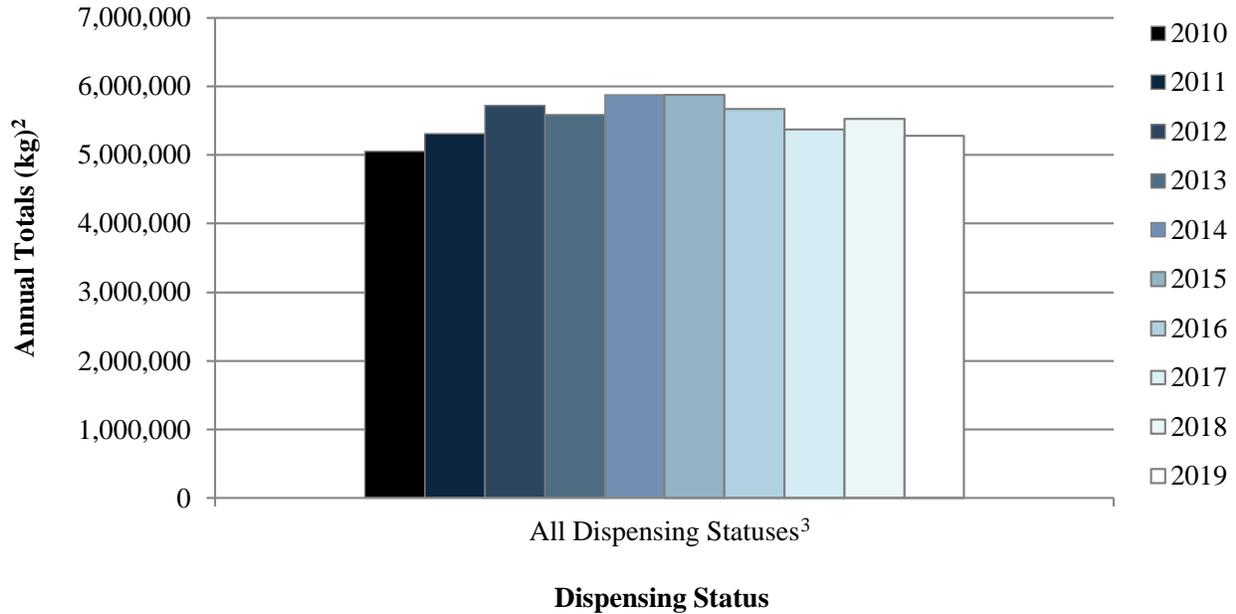
¹ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

² kg = kilogram of active ingredient. Antimicrobial class includes drugs of different molecular weights, with some drugs labeled in different salt forms. Antimicrobials that are labeled in International Units (IU) (e.g., Penicillins) were converted to kg.

³ The All Dispensing Statuses category includes the following: OTC, Rx/OTC (excluding 2010 through 2015 and 2019), and VFD (excluding 2010 through 2015). There were fewer than three distinct sponsors marketing antimicrobial animal drugs in these categories. To protect confidential business information these data cannot be independently reported and are, therefore, combined into the All Dispensing Statuses category.

Figure 13a

Not medically important¹ antimicrobial drugs approved for use in food-producing animals
Actively marketed 2010-2019
Domestic sales and distribution data
Reported by dispensing status



¹ Not Medically Important refers to any antimicrobial class not listed in Appendix A of FDA's Guidance for Industry #152.

² kg = kilogram of active ingredient. Antimicrobials that were reported in International Units (IU) (e.g., Penicillins) were converted to kg. Antimicrobial class includes drugs of different molecular weights, with some drugs reported in different salt forms.

³ The All Dispensing Statuses category includes the following: OTC, Rx/OTC (excluding 2010 through 2015 and 2019), and VFD (excluding 2010 through 2015). There were fewer than three distinct sponsors marketing antimicrobial animal drugs in these categories. To protect confidential business information these data cannot be independently reported and are, therefore, combined into the All Dispensing Statuses category.

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