Annual Summary Report

Veterinary Feed Directives

2019

Acronyms

Acronym	Name
AUS	Antimicrobial Use & Stewardship
CA	California
CDFA	California Department of Food and Agriculture
CDPH	California Department of Public Health
CFR	Code of Federal Regulations
CFRP	Commercial Feed Regulatory Program
CPRA	California Public Records Act
FDA	Federal Food and Drug Administration
FAC	Food and Agricultural Code
GFI	Guidance for Industry
MIAD	Medically Important Antimicrobial Drugs
NASS	National Agricultural Statistics Service
NIR	Not Independently Reported
SAFE	Safe Animal Feed Education
USDA	United States Department of Agriculture
VFD	Veterinary Feed Directive
VMB	Veterinary Medical Board
VCPR	Veterinary-Client-Patient Relationship

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Executive Summary

California Senate Bill 27 (Hill, 2015), chaptered as Food and Agricultural Code (FAC) Sections 14400-14408, placed additional restrictions on medically important antimicrobial drugs (MIADs) used in livestock production and mandated the California Department of Food and Agriculture (CDFA) to gather information on sales within the state. To implement the provisions of this law CDFA established the Antimicrobial Use and Stewardship (AUS) program, which is a collaborative effort between the Animal Health and Food Safety Services Division and Inspection Services Division, to assist in collecting information to fulfill this mandate.

Since 2017, CDFA's AUS program has been working closely with the California feed industry in collecting data from animal feed facilities that have filed a letter of intent with the U.S. Food and Drug Administration (FDA) to manufacture or distribute (sell) medicated animal feed containing MIADs, also known as veterinary feed directive (VFD) drugs (animal drugs intended for use in or on animal feed that require the supervision of a licensed veterinarian). The overarching purpose of the data collection is to support FDA's VFD final rule requirements pertaining to the use of VFD drugs in animal feed, further monitor the use of VFD drugs in California, and to maintain a high standard in promoting public health.

This report is broken out into five main sections:

- Background
- VFD Compliance
- Data Summaries, Tables and Figures
- Data on 2019 Manufacturing and Distribution Reports
- Looking Forward

This year's report has many new features. Most notably are the detailed infographics that offer a visual representation of the cycle and differences between a VFD order, VFD drug, and VFD feed as well as the process, as outlined by FDA, for a manufacturer or distributor to legally sell VFD feed. The background section now includes links to the National Agricultural Statistic Services (NASS) annual animal inventory numbers for California and links to all VFD drug approvals in the Code of Federal Regulations (CFR). The compliance section includes informative visuals as well as discusses how AUS addresses ongoing discrepancies in VFD orders received by manufacturers, and collaboration with the Veterinary Medical Board. The compliance section then concludes with a summary of audits and inspections and the work that CDFA is doing cooperatively with FDA to address tissue residue in food-producing animals.

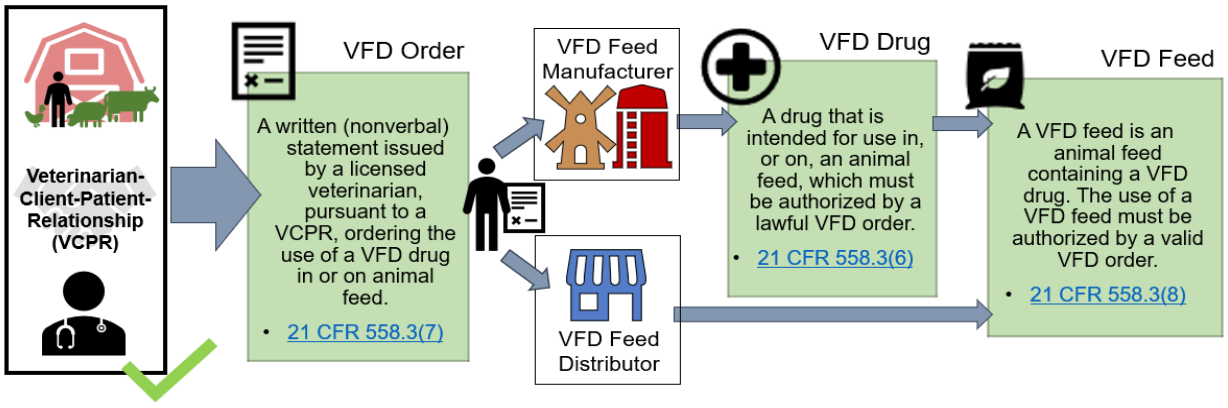
The tables and figures have been updated with the VFD numbers for 2019, including manufacturing and distribution reporting, and then concludes with a brief address of what can be expected of CDFA's AUS program for the following year. Each of the dedicated sections contained in this report are carefully constructed to provide easy to understand, visually comprehensive information with the goal of providing complete transparency into VFDs and how they play a part in maintaining and promoting a high standard of public health.

Background

In 2015, the FDA enacted stricter requirements for administering MIADs to animals through feed and water. California supported this effort at the state level through the enaction of FAC Sections 14400-14408 and creation of the AUS program. CDFA has worked to develop AUS into a resource to help veterinarians, producers, manufacturers, distributors, and the public gain a better understanding of the VFD final rule, as well as additional state requirements regarding the sale and use of MIADs. More information can be found in last year's Summary Report here: https://www.cdfa.ca.gov/is/ffldrs/pdfs/AUS_VFD_Summary_Report_2017-19.pdf.

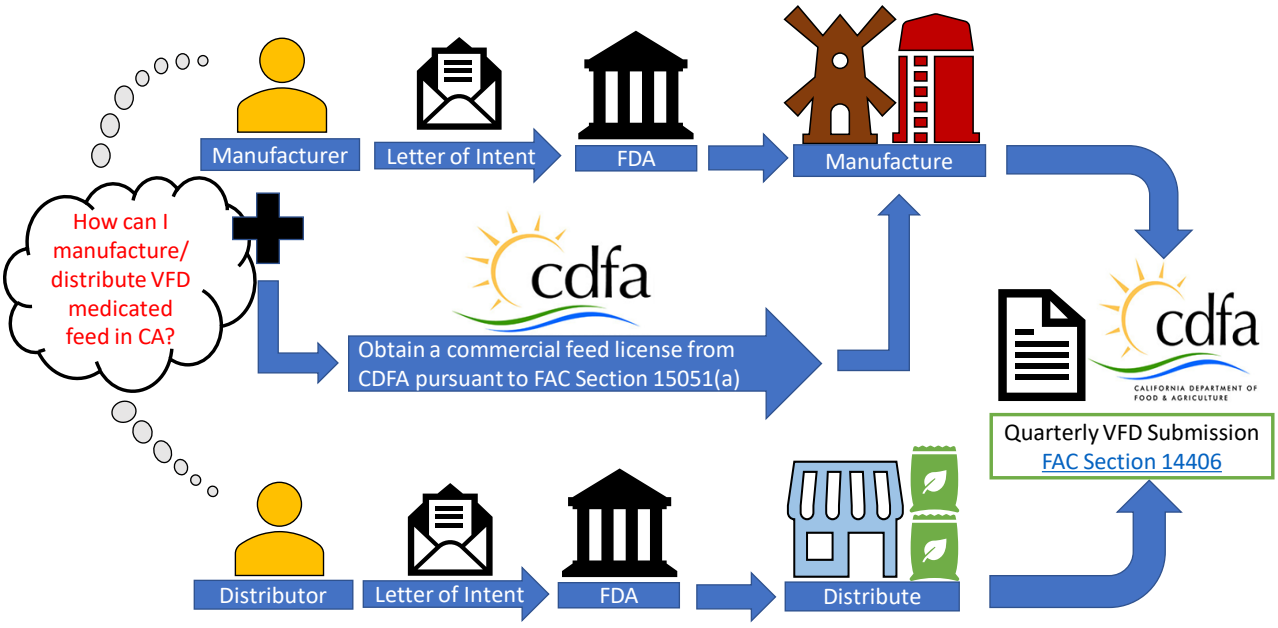
Veterinary Feed Directives

The infographic below shows the distinctions between the terms VFD drug, VFD order, VFD feed, and the order in which they occur.



All clients must have a valid VFD order to obtain VFD feed containing a VFD drug for all food-producing animals whether or not the individual animals fed is intended for food production. For the complete legal definitions of VFD drug, VFD order, and the types of VFD feed, please refer to the "Definitions" section of the Appendices. More information on VFD orders and VFD drugs in California can be found here: https://www.fda.gov/animal-veterinary/development-approval-process/veterinary-feed-directive-vfd.

Manufacturing and Distributing VFD Medicated Feed



VFD feed manufacturers licensed within California may produce VFD feed for producers within or out of state with a valid VFD order. All of the VFD feed produced within California is reported to CDFA, whether it was meant for Californian producers or out of state producers. CDFA does not have information on how much VFD feed is shipped out of state.

Scope of Reporting

This report summarizes manufacturing and distribution data for California medicated feed containing a VFD drug or combination VFD drugs, by VFD order written by a licensed veterinarian. The data reported is categorized by the MIADs used to manufacture VFD medicated feed, the species the feed is intended for, and the indication for use as it falls into the category of "respiratory disease," "gastrointestinal disease," "both," or "other" as classified by AUS staff with the indication given on collected VFD orders.

Data will be categorized into Not Independently Reported (NIR) when VFD orders issued to a single species or a single type of VFD drug represents less than 5% of the total VFD orders collected in a year. Also, if a reported species on a VFD order, or the VFD drug(s), make up less than 5% of total manufactured or distributed medicated feed, it will be captured within the NIR category. The NIR category is designed to protect the confidentiality of producer information that may be easily reidentified based on rare or unique characteristics, such as when a VFD drug is used for only one species.

For reference to number of livestock animals in California by year refer to United States Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS) database at https://www.nass.usda.gov/Statistics_by_State/California/index.php.

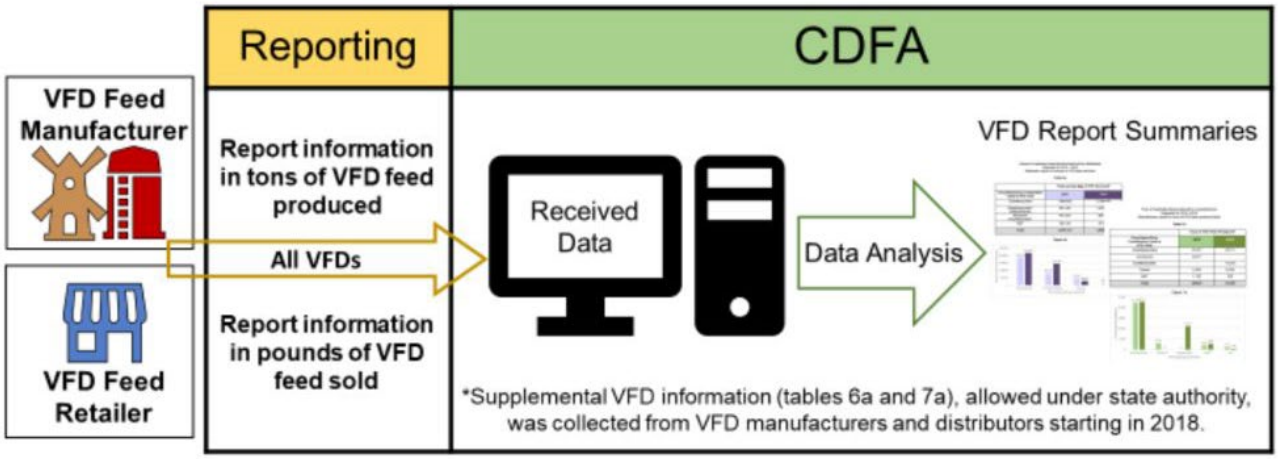
Protecting Confidential Information

Designed to provide the public a summary of information collected under FAC Division 7 Chapter 4.5, this information is being reported in a manner consistent with maintaining confidentiality of a business' or individual's information in accordance with FAC Section 14407.

All data collected is subject to extensive internal review prior to publication. If it is determined that summary information would identify, or have the potential to identify, an individual or business, the data is reported as "Other" or "Not Independently Reported." The report includes a list of information that is included in the "Other" or "Not Independently Reported" categories.

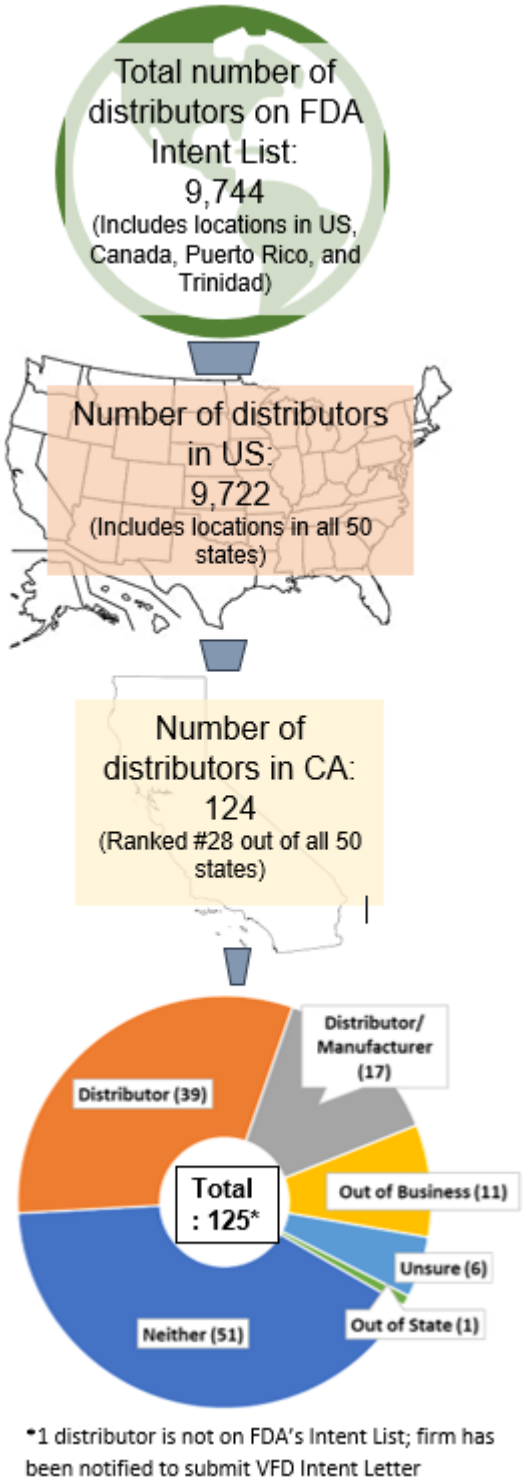
Data collected under FAC Chapter 4.5 and Section 14902.5 is confidential and exempt under Section 14407 from release under the California Public Records Act (CPRA) (Government Code Chapter 3.5 commencing with Section 6250). As such, it will not be disclosed to any person or government agency except to the Veterinary Medical Board (VMB), as appropriate.

Data Collection Methods



Description of Tables and Figure

The information presented in the tables and figures is based on quarterly collections of VFD orders and other manufacturer or distributor VFD information. Whether data is reported independently or not independently will vary each year depending on numerous factors that could lead to revealing personally identifying information (PII) of a business or producer. Some factors may include but are not limited to disease outbreaks, environmental factors, different drugs being approved or used, firm location changes, etc. These extenuating factors between years may make it difficult to directly compare certain data in either table or figure form. Additionally, AUS will periodically receive updates or corrections to the information previously given in VFD orders after their original submission date. Should this occur, it may cause slight variations in the data provided for years already reported on. Some figures may have the abbreviations for VFD drugs Chlortetracycline (CTC), Neomycin (Neo), and Oxytetracycline (Oxy). For a list of FDA approved VFD drugs, or more information click on: eCFR 558 Subpart B – Specific New Animal Drugs For Use In Animal Feed.



*1 distributor is not on FDA's Intent List; firm has been notified to submit VFD Intent Letter

Veterinary Feed Directive Compliance

Trends in Compliance and Plan of Action:

CDFA's Inspection Services Division's primary focus is compliance. Therefore, CDFA is developing several outreach and education documents simplifying the minimum qualifications for manufacturers and distributors to identify VFDs that can be filled, and which should be returned to the veterinarians for further information.

Pursuant to 21 CFR 558.6(b)(3), each VFD order is required to clearly identify information such as veterinarian name, client name, animal premises address, species and production class, drug name, product name, dosage, duration of treatment, indication for treatment, number of animals to be treated, withdrawal period to prevent antimicrobial residues, combination drug use, and manufacturing or distributing firm of VFD medicated feed. VFD orders can only be written for the approved labelled use for that drug. VFD drugs cannot be used for extra-label use for major species. It is the responsibility of the licensed veterinarian to be well versed in the law for issuing a legal and complete VFD order to a client with whom they have a Veterinary Client Patient Relationship (VCPR). It has been observed in the quarterly collections that VFD orders are being submitted to manufacturers and distributors with incomplete information. CDFA has published articles in veterinary publications regarding common errors found on VFD orders and created outreach documents to address common errors. CDFA continues to work with the Veterinary Medical Board on any issues involving the licensed veterinarian in accordance with FAC Sections 14407 and 14408.

CDFA Audits and Inspections:

CDFA conducts audits of all facilities on the FDA VFD intent list to validate accuracy of VFD information and ensure manufacturer/distributor compliance. CDFA Commercial Feed Regulatory Program staff perform regular inspections at firms that manufacture VFD medicated feed and monitor the feed manufacturing process, check medication logs and inventories, obtain samples, and review production records. CDFA AUS staff also conduct compliance visits, similarly to those conducted by FDA at all firms distributing VFD medicated feed. Compliance inspections include a thorough review of all recordkeeping requirements and a review of multiple VFDs on file for completeness and accuracy. Although CDFA collects and reviews all VFD orders, this in-depth review at each location allows CDFA

to verify that all collected VFD orders from that location are submitted, accurate, and proper retention of the VFD orders has occurred.

Tissue Residues and the FDA Drug Residue Cooperative Agreement:

All food-producing animals meant for human consumption are tested prior to harvest to provide surveillance for any drug residues in the meat. If a drug residue is found, that animal will not be processed for consumption and an investigation by CDFA's Livestock Drug program or federal investigators will take place to identify the source of the drug residue and take enforcement action as appropriate.

CDFA holds a cooperative agreement with FDA to follow up on drug residue violations in California. This agreement is meant to help provide violators with outreach and education to prevent future drug residue violations. CDFA follows up with the violator by in-person visits to educate the producer about drug residues and to do an assessment to try to determine the cause of the residue. Additionally, during these visits, CDFA will determine if the violator possesses a VFD order; then CDFA performs an additional on-farm assessment of the producer's VFD order use. This outreach helps prevent antibiotic resistance by following up on any drug residue violations found in California.

Veterinary feed directive order summary

Reported for 2017 - 2019
Veterinary feed directive order data

Table 1a

	2017	2018	2019
Total Number of VFD Orders[1]	639	634	664
Number of VFD Collection Locations[2]	41	36	35
Total Number of Locations VFD Orders Were Issued[3]	298	287	313
Total Number of Veterinarians Who Issued VFD Orders[4]	113	112	110

1. Total number of VFD orders received from manufacturers and distributors located in California (CA), that are listed on FDA's VFD intent list. The total number of VFD orders includes only CA locations where the VFD feed is intended to be fed.
2. Number of VFD collection locations is inclusive of all manufacturers and distributors in CA that received VFD orders.
3. Total number of locations VFD orders were issued represents the locations where the animals are housed.
4. Total number of veterinarians who issued VFD orders are licensed veterinarians who deemed that VFD feed should be used for treatment.

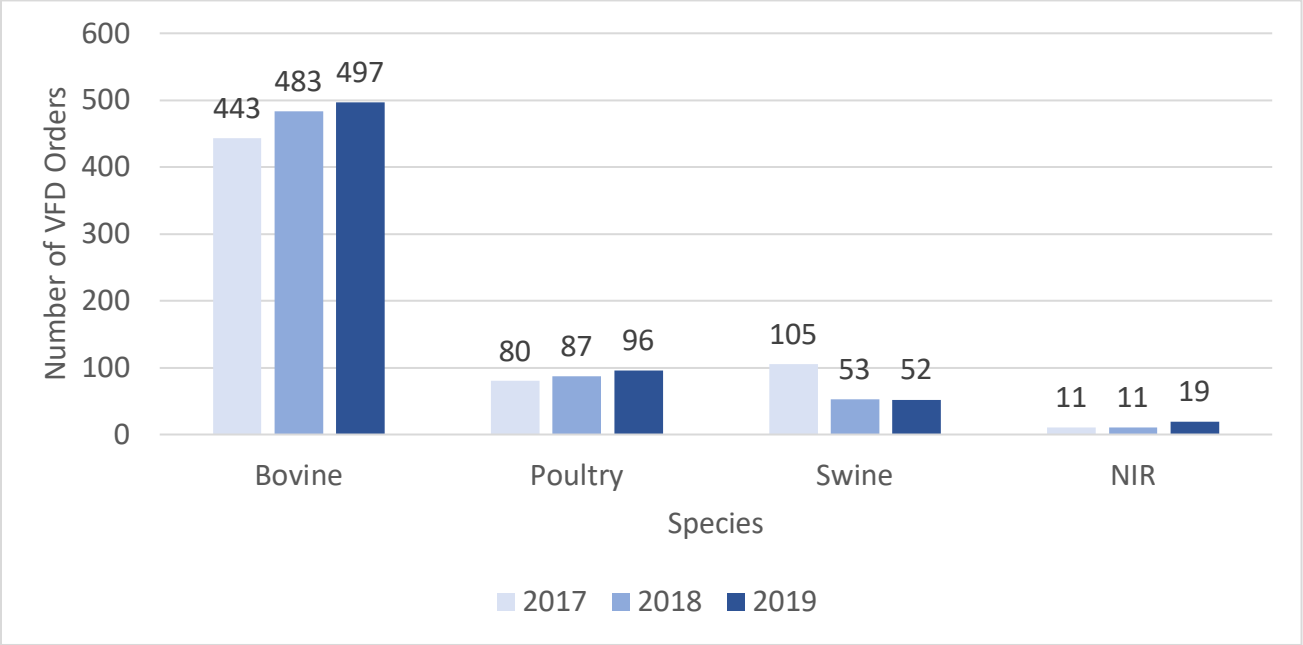
Number of VFD orders represented by intended species

Reported for 2017 - 2019
Veterinary feed directive order data

Table 2a

Species	2017	2018	2019
Bovine	443	483	497
Poultry	80	87	96
Swine	105	53	52
NIR[1]	11	11	19
Total	**639**	**634**	**664**

Figure 2a



1. NIR = Not Independently Reported. This category includes Aquaculture, Caprine and Ovine. These species independently represent less than 5% of the total VFD orders.

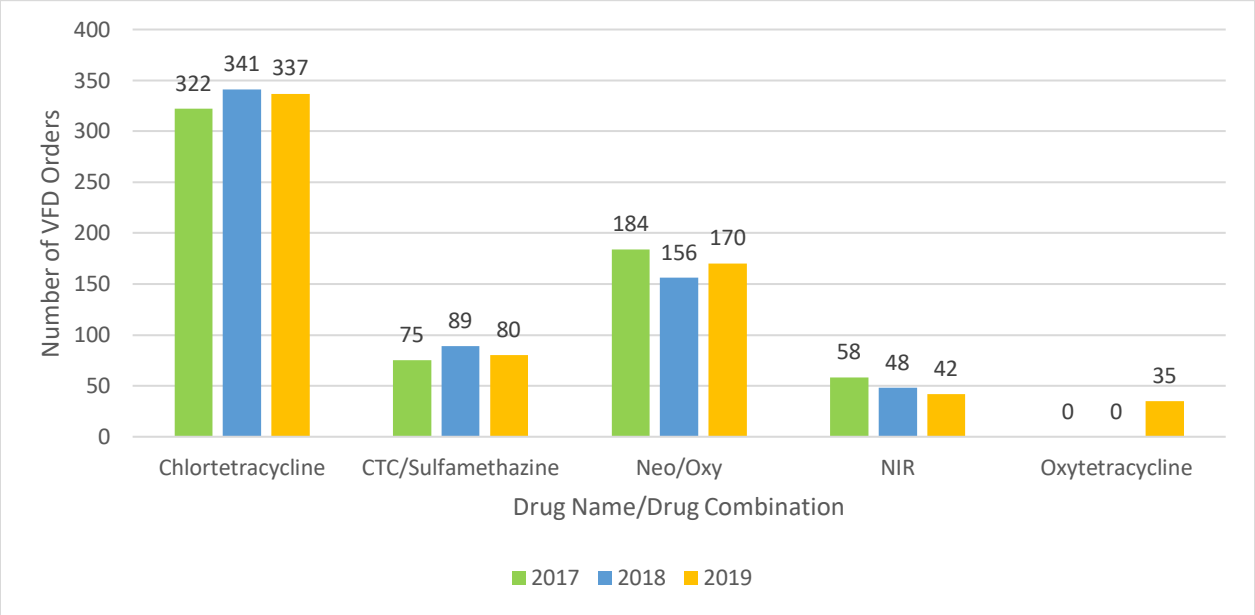
Number of VFD orders represented by drug name

Reported for 2017 - 2019
Veterinary feed directive order data

Table 3a

Drug Name/Drug Combination Indicated on VFD Order	2017	2018	2019
Chlortetracycline	322	341	337
Chlortetracycline/Sulfamethazine	75	89	80
Neomycin/Oxytetracycline	184	156	170
NIR[1]	58	48	42
Oxytetracycline[2]	-	-	35
Total	**639**	**634**	**664**

Figure 3a



1. NIR = Not Independently Reported. This category includes Chlortetracycline/Tiamulin, Florfenicol, Lincomycin, Oxytetracycline, Neomycin, Tiamulin, Tilmicosin, Tylosin and Virginiamycin (only represented in 2017). These drugs/combinations independently represent less than 5% of the total VFD orders collected.
2. Oxytetracycline is represented in 2019 due to higher number of VFD orders for specific non-combination drug and not in NIR.

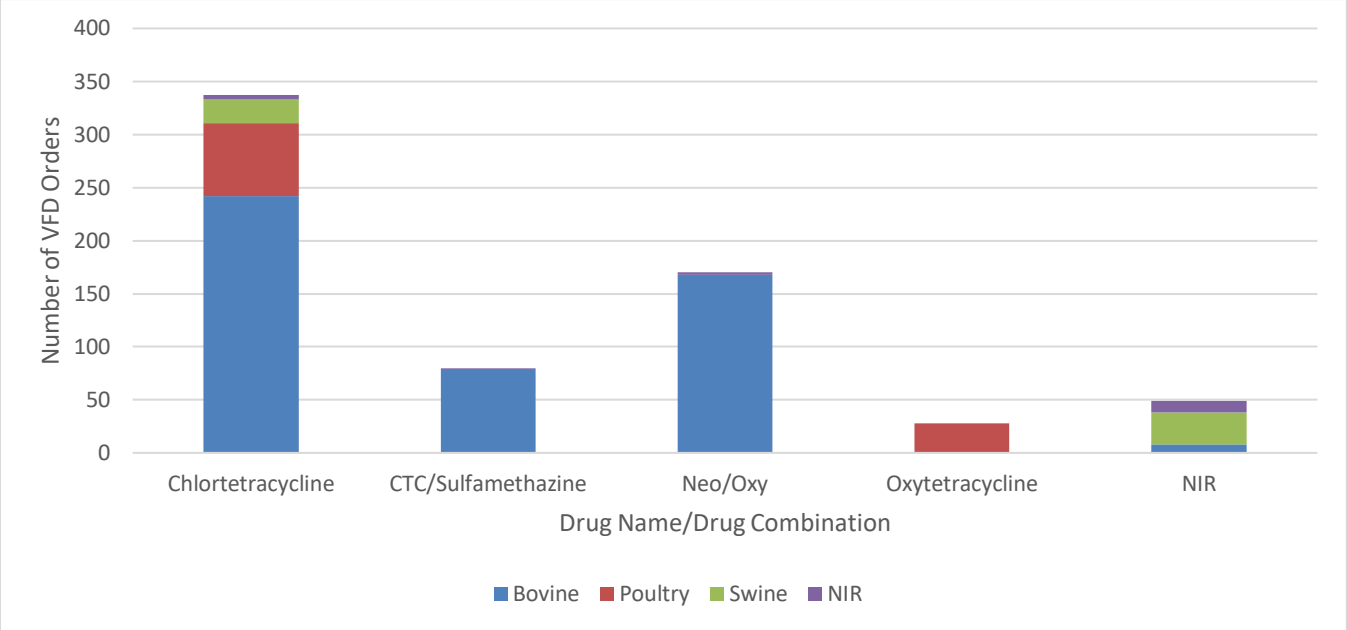
Number of VFD orders by drug and intended species

Reported for 2019
Veterinary feed directive order data

Table 4a

2019					
Drug Name/Drug Combination Indicated on VFD Order	**Bovine**	**Poultry**	**Swine**	**NIR[1]**	**Total**
Chlortetracycline	242	69	22	4	**337**
Chlortetracycline/Sulfamethazine	79	-	-	1	**80**
Neomycin/Oxytetracycline	168	-	-	2	**170**
Oxytetracycline	-	27	-	1	**28**
NIR[2]	8	-	30	11	**49**
Total	**497**	**96**	**52**	**19**	**664**

Figure 4a



1. NIR = Not Independently Reported. This category for species includes Aquaculture, Caprine, and Ovine. These species independently represent less than 5% of the total VFD orders.
2. NIR = Not Independently Reported. This category for drug name/drug combination independently represents Chlortetracycline/Tiamulin, Florfenicol, Lincomycin, Neomycin, Oxytetracycline, Tiamulin, Tilmicosin, Tylosin.

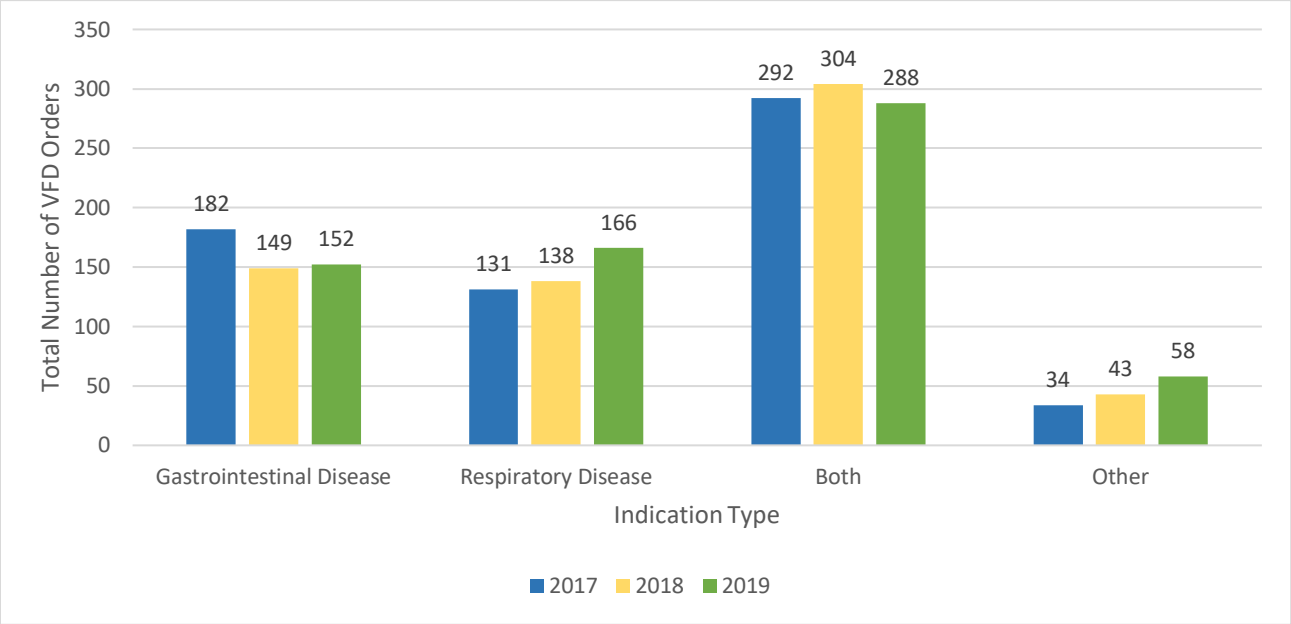
Number of VFD orders by indication type

Reported for 2017 – 2019
Veterinary feed directive order data

Table 5a

Indication Type	2017	2018	2019
Gastrointestinal Disease[1]	182	149	152
Respiratory Disease[2]	131	138	166
Both[3]	292	304	288
Other[4]	34	43	58
Total	**639**	**634**	**664**

Figure 5a



1. Gastrointestinal (GI) Diseases include bacterial enteritis, bluecomb disease, coccidiosis, hexamitiasis, necrotic enteritis, porcine proliferative enteropathy, swine dysentery, swine ileitis, and transmissible enteritis.
2. Respiratory diseases included bacterial pneumonia, chronic respiratory disease, and respiratory disease.
3. "Both" is representative of two indications per VFD order, GI and Respiratory diseases.
4. "Other" diseases include abortions, anaplasmosis, bacterial hemorrhagic septicemia, columnaris disease, fowl cholera, infectious synovitis, jowl abscesses, leptospirosis, liver abscesses, and vibrionic abortions.

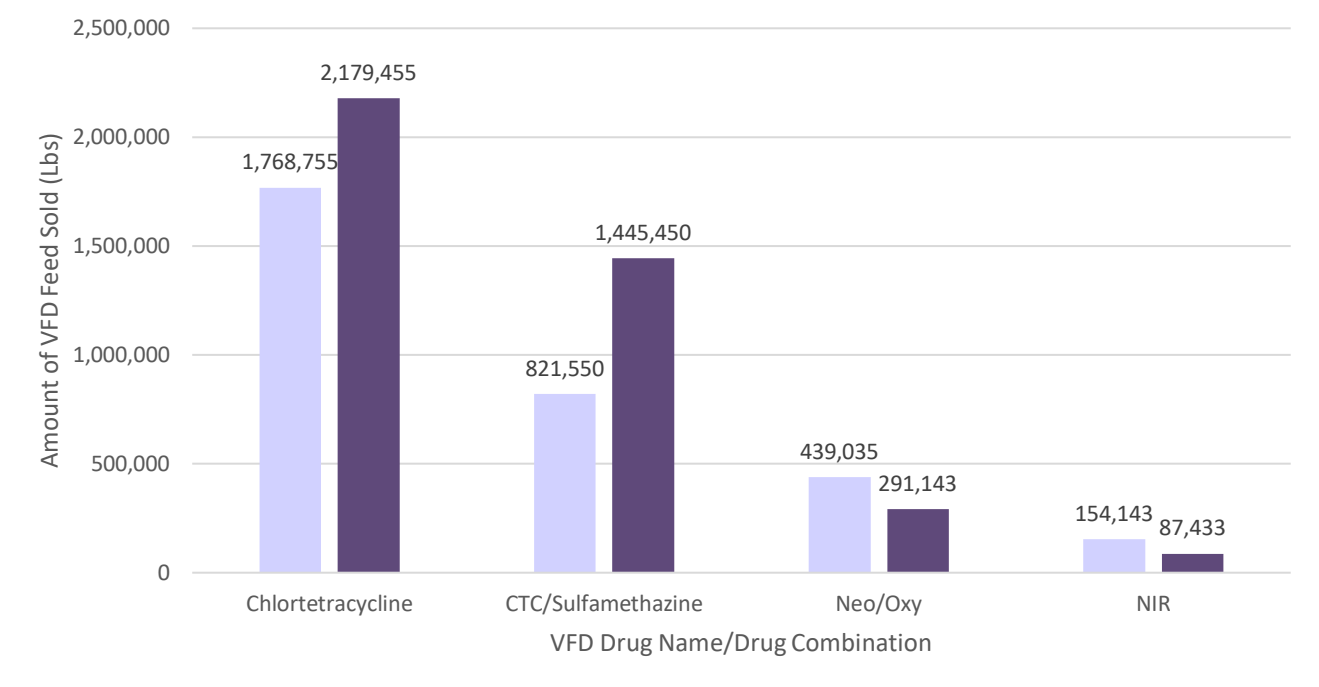
Data on 2019 Manufacturing and Distribution

Amount of veterinary feed directive feed sold by distributors
Reported for 2018 - 2019
Distributor report for amount of VFD feed sold data

Table 6a

	Total pounds (lbs.) of VFD feed sold	
Drug Name/Drug Combination Used in VFD Feed	**2018**	**2019**
Chlortetracycline	1,768,755	2,179,455
Chlortetracycline/ Sulfamethazine	821,550	1,445,450
Neomycin/ Oxytetracycline	439,035	291,143
NIR[1]	154,143	87,433
Total	**3,183,483**	**4,003,481**

Figure 6a



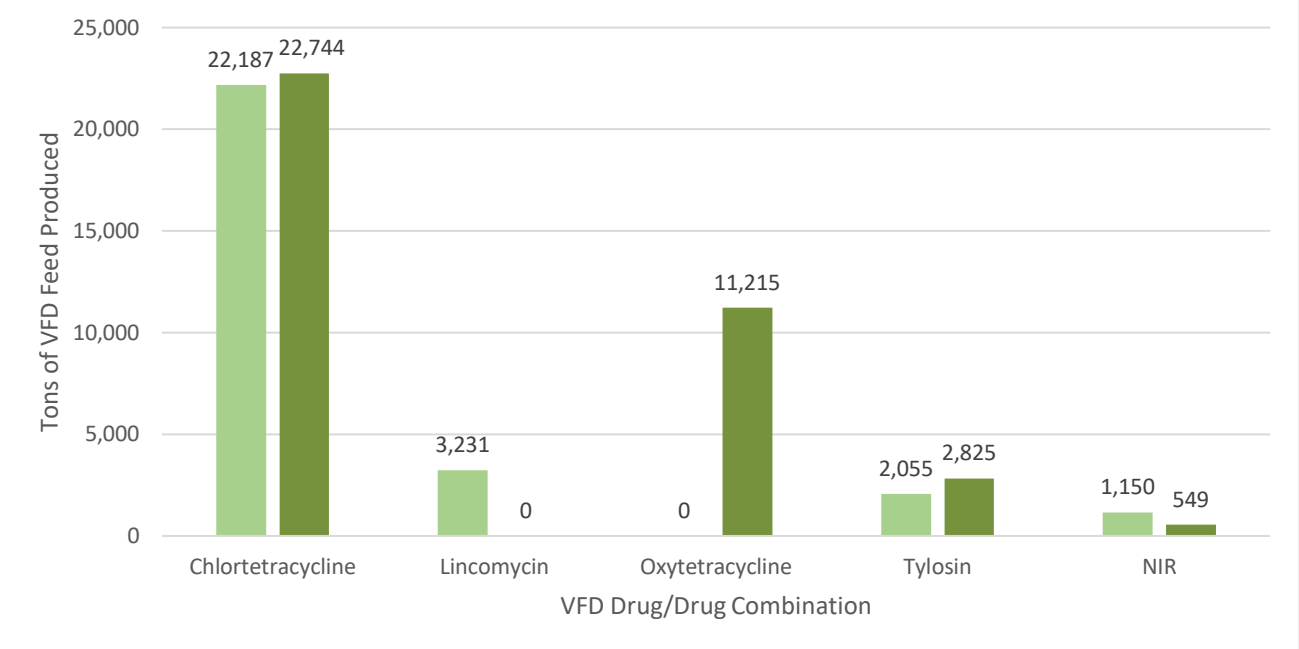
1. NIR = Not Independently Reported. This category includes CTC/ Tiamulin, Florfenicol, Lincomycin, Neomycin, Oxytetracycline, Spectinomycin, Sulfadimethoxine, and Tiamulin. These drugs/combinations independently represent less than 5% of the total amount of drug sold by distributors.

Tons of medicated feed produced by manufacturers
Reported for 2018 -2019
Manufacturer report for tons of VFD feed produced data

Table 7a

	Tons of VFD Feed Produced	
Drug Name/Drug Combination Used in VFD Feed	**2018**	**2019**
Chlortetracycline	22,187	22,744
Lincomycin	3,231	-
Oxytetracycline	-	11,215
Tylosin	2,055	2,825
NIR[1]	1,150	549
Total	**28,623**	**37,333**

Figure 7a

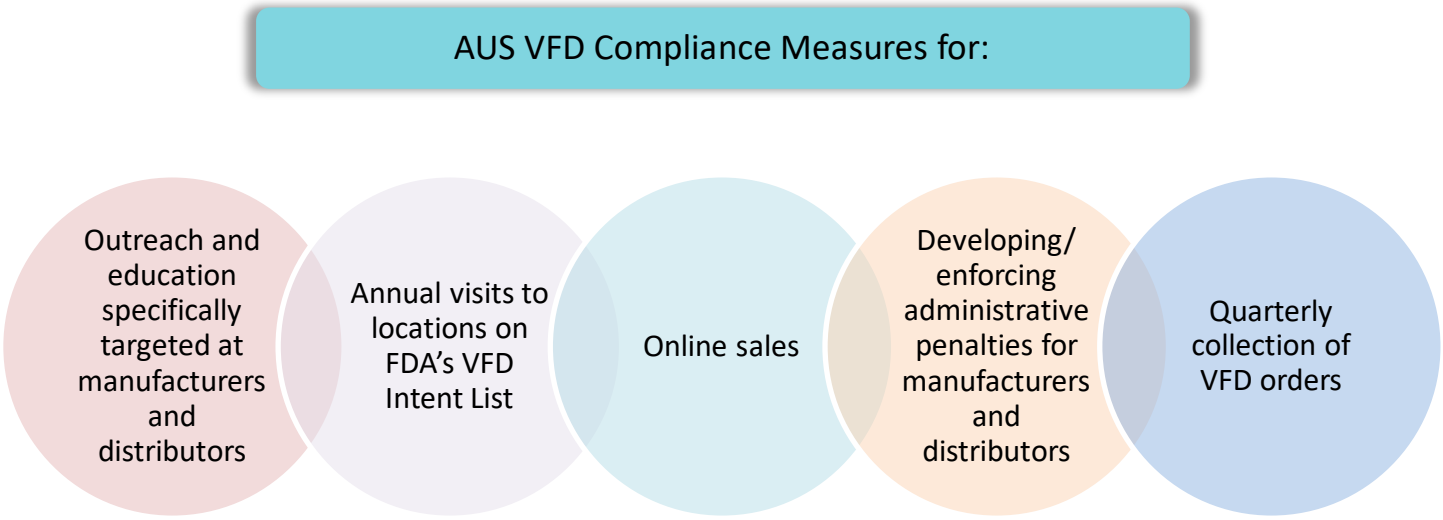


1. NIR = Not Independently Reported. This category includes CTC/Sulfamethazine, Lincomycin, Neo/Oxy, Oxytetracycline, Tiamulin, and Tilmicosin. These drugs/combinations independently represent less than 5% of the total tons of VFD feed produced.

Looking Forward

California is mandated to identify and work toward reducing antimicrobial resistance in animal agriculture. It is the intent of AUS to present VFD data and establish accurate, honest, and transparent communication with the public while maintaining data confidentiality in accordance with FAC Section 14407. CDFA's AUS program has taken that initiative very seriously and continues to develop outreach and education materials to help veterinarians, producers, manufacturers, distributors, and the public to know and understand the laws surrounding VFD orders, drugs, and feed. By collecting, documenting, and analyzing VFD orders, AUS has been able to create more knowledgeable programs and resources to assist industry participants to function successfully within the boundaries of the law, while also mitigating the risk of antimicrobial resistance and promoting public welfare.

Future AUS program efforts will utilize the VFD report information to assist in the development of the following projects:



This report is the result of efforts outlining the AUS program's commitment to utilizing collected information to make analytical, science-based decisions; maintain transparency in reporting; and focus on human and animal health. The overarching program goal is that the information contained in this report will provide publicly available and unbiased information and to promote a better understanding when issuing, manufacturing, and distributing medicated feed containing VFD drugs.

Appendix

Definitions

"Antimicrobial" - referred broadly to drugs with activity against a variety of microorganisms including bacteria, viruses, fungi, and parasites. Antimicrobial drugs that have specific activity against bacteria are referred to as antibacterial or antibiotic drugs. However, the broader term "antimicrobial," commonly used in reference to drugs with activity against bacteria. (Guidance for Industry (GFI) #209)

"Antimicrobial Resistance" - the ability of bacteria or other microbes to resist the effects of a drug. Antimicrobial resistance, as it relates to bacterial organisms, occurs when bacteria change in some way that reduces or eliminates the effectiveness of drugs, chemicals, or other agents designed to treat bacterial infections. (GFI #209)

"Antimicrobial Stewardship" - aim to optimize patient health and improve antimicrobial drug use in order to preserve the efficacy and ensure the availability of antimicrobials for years to come. (AUS Principles of Antimicrobial Stewardship)

"Commercial Feed" - includes all materials which are intended for use as feed or for mixing in feed except preparations which are manufactured or distributed for feeding to domestic pets, such as dogs, cats, and birds. (FAC, Division 7, Chapter 6, Article 2, Section 14925)

"Distribute" - to offer for sale, sell, exchange, or barter. (FAC, Division 7, Chapter 4, Article 1.5, Section 14209)

"Distributor" - means any person who distributes a medicated feed containing a VFD drug to another person. Such other person may be another distributor or the client-recipient of a VFD (21 CFR 558.3(b)(9)). As defined in the Federal Food, Drug, and Cosmetic Act (the FD&C Act), , the term "person" includes an individual, partnership, corporation, or association (section 201(e) of the FD&C Act (21 USC 321(e). (FDA)

"Drug" - any of the following substances: (a) Any substance which is intended for use in the diagnosis, cure, mitigation, prevention, or treatment of disease. (b) Any substance, except food and water, which is intended to affect the structure or function of the body of any livestock. (FAC, Division 7, Chapter 4, Article 1.5, Section 14202)

"Finished Feed" - complete feed ready to be fed or further mixed on farm.

"Integrated Feed Mill" - facility that manufactures feed with the intent to feed only their own animals.

"Livestock" - all animals and poultry, including aquatic and amphibian species that are raised, kept, or used for profit. Livestock does not include bees or those species that are usually kept as pets, such as dogs, cats, and pet birds. (FAC, Division 7, Chapter 4.5, Section 14400)

"Manufacture" - to grind, mix or further process a [commercial] feed. (FAC, Division 7, Chapter 6, Article 2, Section 14933)

"Major Species" - means cattle, horses, swine, chickens, turkeys. (FDA)

"Medically Important Antimicrobial Drug (MIAD)" - an antimicrobial drug listed in Appendix A of the federal Food and Drug Administration's GFI #152, including critically important, highly important, and important antimicrobial drugs, as that appendix may be amended. (FAC, Division 7, Chapter 4.5, Section 14400)

"Medicated Feed" - [commercial] feeds that contain drugs. (FAC, Division 7, Chapter 6, Article 2, Section 14934)

"Minor Species" - means livestock and avian species, that are not major species.

"Type A Medicated Article" - intended solely for use in the manufacture of another Type A medicated article or a Type B or Type C medicated feed. It consists of a new animal drug(s), with or without carrier (e.g., calcium carbonate, rice hull, corn, gluten) with or without inactive ingredients. (FDA)

"Type B Medicated Feed "- intended solely for the manufacture of other medicated feeds (Type B or Type C). It contains a substantial quantity of nutrients including vitamins and/or minerals and/or other nutritional ingredients in an amount not less than 25% of the weight. It is manufactured by diluting a Type A medicated article or another Type B medicated feed. (FDA)

"Type C Medicated Feed" - intended as the complete feed for the animal or may be fed "top dressed" (added on top of usual ration) on or offered "free-choice" (e.g., supplement) in conjunction with other animal feed. It contains a substantial quantity of nutrients including vitamins, minerals, and/or other nutritional ingredients. It is manufactured by diluting a Type A medicated article or a Type B medicated feed. A Type C medicated feed may be further diluted to produce another Type C medicated feed. (FDA)

"Ton" - a net weight of 2,000 pounds avoirdupois. (FAC, Division 7, Chapter 6, Article 2, 14939)

"Veterinary-Client-Patient Relationship" - key elements include that the veterinarian engages with the client (i.e., the animal producer) to assume responsibility for making clinical judgments about patient (i.e., animal) health, have sufficient knowledge of the patient by virtue of patient examination and/or visits to the facility where the patient is managed, and provide for any necessary follow-up evaluation or care. (FDA)

"Veterinary Feed Directive" - a written (nonverbal) statement issued by a licensed veterinarian in the course of the veterinarian's professional practice that orders the use of a VFD drug or combination VFD drug in or on an animal feed. This written statement authorizes the client (the owner of the animal or animals or other caretaker) to obtain and use animal feed bearing or containing a VFD drug or combination VFD drug to treat the client's animals only in accordance with the conditions for use approved, conditionally approved, or indexed by the FDA (21 CFR 558.3(b)(7)). A VFD may also be referred to as a VFD order. (FDA)

"Veterinary Feed Directive Order" - refer to Veterinary Feed Directive definition.

"Veterinary Feed Directive Drug" - a drug intended for use in or on animal feed which is limited by an approved new animal drug application filed pursuant to section 512(b) of the FD&C Act), a conditionally approved application filed pursuant to section 571 of the FD&C Act, or an index listing pursuant to section 572 of the FD&C Act to use under the professional supervision of a licensed veterinarian (21 CFR 558.3(b)(6)). Use of animal feed bearing or

containing a VFD drug (VFD feed) must be authorized by a lawful VFD (21 CFR 558.6(a)(1)). (FDA)

"Veterinary Feed Directive Feed" - refer to Type B and C Medicated Feeds definition.

References

Links

AUS Guidelines for Judicious Use – https://www.cdfa.ca.gov/ahfss/AUS/docs/Guidelines_Judicious_Use_of_Antimicrobials_Livestock.pdf

AUS Legislature Report - https://www.cdfa.ca.gov/ahfss/AUS/docs/CDFA_AUS_Report_2019.pdf

AUS Principles of Antimicrobial Stewardship - https://www.cdfa.ca.gov/ahfss/AUS/docs/Antimicrobial_Stewardship_Principles.pdf

AUS Veterinarians Judicious Use of Antimicrobials - https://www.cdfa.ca.gov/ahfss/AUS/docs/Guidelines_Veterinarians_Judicious_Use_of_Antimicrobials_Livestock.pdf

AUS Website - https://www.cdfa.ca.gov/ahfss/AUS/Stewardship.html

CDFA Commercial Feed Regulatory Program - https://www.cdfa.ca.gov/is/ffldrs/CommercialFeedReg.html

CDFA Inspection Services - https://www.cdfa.ca.gov/is/

CDFA Livestock Drug Program - https://www.cdfa.ca.gov/is/ffldrs/LivestockDrug.html

CDFA – Safe Animal Feed Education Program - https://www.cdfa.ca.gov/is/ffldrs/safe.html

CDFA VFD Page - https://www.cdfa.ca.gov/is/ffldrs/VeterinaryFeedDirective.html

CDFA Website - https://www.cdfa.ca.gov/

CPG Sec 615.115 Extralabel Use of Medicated Feeds for Minor Species - https://www.fda.gov/regulatory-information/search-fda-guidance-documents/cpg-sec-615115-extralabel-use-medicated-feeds-minor-species

eCFR Part 558 New Animal Drugs for Use in Animal Feeds - https://www.ecfr.gov/cgi-bin/text-idx?SID=b8e74620d2b65cd5c35fb00efa6dbcd9&mc=true&node=pt21.6.558&rgn=div5#se21.6.558_14

FDA 2017 Summary Report on Antimicrobials Sold or Distributed for Use in Food-Producing Animals - https://www.fda.gov/media/119332/download

FDA CVM GFI #120 Veterinary Feed Directive Regulation Questions and Answers - https://www.fda.gov/regulatory-information/search-fda-guidance- documents/cvm-gfi-120-veterinary-feed-directive-regulation-questions-and-answers

FDA CVM GFI #209 The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals - https://www.fda.gov/regulatory-information/search-fda-guidance- documents/cvm-gfi-209-judicious-use-medically-important-antimicrobial-drugs-food- producing-animals

FDA CVM GFI #233 Veterinary Feed Directive Common Format Questions and Answers - https://www.fda.gov/regulatory-information/search-fda-guidance-documents/cvm-gfi-233-veterinary-feed-directive-common-format-questions-and-answers

FDA VFD Final Rule - https://www.govinfo.gov/content/pkg/FR-2015-06-03/pdf/2015-13393.pdf

FDA VFD Final Rule homepage: https://www.fda.gov/animal-veterinary/development-approval-process/veterinary-feed-directive-vfd