



WOAH List of Antimicrobial Agents of Veterinary Importance (June 2024)

The WOAH¹ International Committee unanimously adopted the List of Antimicrobial Agents of Veterinary Importance at its 75th General Session in May 2007 ([Resolution No. XXVIII](#)).

1. Background

Antimicrobial agents are essential drugs for human and animal health and welfare. Antimicrobial resistance is a global public and animal health concern that is influenced by both human and non-human antimicrobial usage. The human, animal and plant sectors have a shared responsibility to prevent or minimise antimicrobial resistance selection pressures on both human and non-human pathogens and reduce to the extent possible the spillover of antimicrobial resistance into the environment.

The FAO² /OIE/WHO³ Expert Workshop on Non-Human Antimicrobial Usage and Antimicrobial Resistance held in Geneva, Switzerland, in December 2003 (Scientific Assessment) and in Oslo, Norway, in March 2004 (Management Options) recommended that WOAH should develop a list of critically important antimicrobial agents in veterinary medicine and that WHO should also develop such a list of critically important antimicrobial agents in human medicine.

Conclusion No. 5 of the Oslo Workshop is as follows:

5. The concept of “critically important” classes of antimicrobials for humans should be pursued by WHO. The Workshop concluded that antimicrobials that are critically important in veterinary medicine should be identified, to complement the identification of such antimicrobials used in human medicine. Criteria for identification of these antimicrobials of critical importance in animals should be established and listed by OIE. The overlap of critical lists for human and veterinary medicine can provide further information, allowing an appropriate balance to be struck between animal health needs and public health considerations.

Responding to this recommendation, WOAH decided to address this task through its existing *ad hoc* Group on antimicrobial resistance. The terms of reference, aim of the list and methodology were discussed by the *ad hoc* Group since November 2004 and were subsequently endorsed by the Biological Standards Commission in its January 2005 meeting and adopted by the International Committee in May 2005. Thus, the work was officially undertaken by WOAH.

¹ World Organisation for Animal Health (founded as OIE).

² FAO: Food and Agriculture Organization of the United Nations

³ WHO: World Health Organization

2. Scope

The WOAH List of Antimicrobial Agents of Veterinary Importance:

- Addresses antimicrobial agents authorised for use in food-producing animals
- Does not include antimicrobial classes/sub classes only used in human medicine
- Does not include antimicrobial agents only used as growth-promoters
- Focuses currently on antibacterials and other important antimicrobials agents used in veterinary medicine.

3. Preparation of the draft list

The Director General of WOAH sent a questionnaire prepared by the *ad hoc* Group accompanied by a letter explaining the importance of the task to WOAH Delegates of all Member Countries and international organisations having signed a Co-operation Agreement with WOAH in August 2005.

Sixty-six replies were received. This response rate highlights the importance given by WOAH Member Countries from all regions to this issue. These replies were analysed first by WOAH's Collaborating Centre for Veterinary Medicinal Products⁴, then discussed by the *ad hoc* Group at its meeting in February 2006. A list of proposed antimicrobial agents of veterinary importance was compiled together with an executive summary. This list was endorsed by the Biological Standards Commission and circulated among Member Countries aiming for adoption by WOAH International Committee during the General Session in May 2006.

4. Discussion at the 74th International Committee in May 2006

The list was submitted to the 74th International Committee where active discussion was made among Member Countries. Concerns raised by Member Countries include: 1) the list includes substances that are banned in some countries; 2) some of the substances on the list are not considered "critical"; 3) nature of the list – is this mandatory for Member Countries?; and 4) the use of antimicrobial agents as growth promoter is included. While many Member Countries appreciated the work, it was considered appropriate to continue refinement of the list. The list was adopted as a preliminary list by [Resolution No. XXXIII](#).

5. Refinement and adoption of the List of Antimicrobial Agents of Veterinary Importance

The *ad hoc* Group was convened in September 2006 to review the comments made at the 74th General Session of WOAH International Committee, and [Resolution No. XXXIII](#) adopted at the 74th General Session. Based on the further analysis provided by WOAH Collaborating Centre for Veterinary Medicinal Products, the *ad hoc* Group prepared its final recommendations of the List of Antimicrobial Agents of Veterinary Importance together with an executive summary. Once again, this was examined and endorsed by the Biological Standards Commission in its January 2007 meeting and circulated among Member Countries.

⁴ French Agency for Food, Environmental and Occupational Health & Safety (ANSES) and French Agency for Veterinary Medicinal Products (ANMV), Fougères, France

The refined List was submitted to the 75th International Committee during the General Session in May 2007 and adopted unanimously by [Resolution No. XXVIII](#).

This list was further updated and adopted in May 2013, May 2015 and May 2018 by the World Assembly of WOAAH Delegates.

In July 2018, the *ad hoc* Group conducted a technical review of the List to improve coherence between the WHO and WOAAH List with respect to terminology used for antimicrobial classification, and this revision was endorsed by the Scientific Commission in February 2019. The report of the Scientific Commission to the WOAAH World Assembly of Delegates is detailed in the 86th General Session Final Report.

CRITERIA USED FOR CATEGORISATION OF VETERINARY IMPORTANT ANTIMICROBIAL AGENTS

In developing the list, the *ad hoc* Group agreed that any antimicrobial agent authorised for use in veterinary medicine according to the criteria of quality, safety and efficacy as defined in the *Terrestrial Animal Health Code* (Chapter 6.10. Responsible and prudent use of antimicrobial agents in veterinary medicine) is important. Therefore, based on WOAH Member contributions, the Group decided to address all antimicrobial agents used in food-producing animals to provide a comprehensive list, divided into critically important, highly important and important antimicrobial agents.

In selecting the criteria to define veterinary important antimicrobial agents, one significant difference between the use of antimicrobial agents in humans and animals has to be accounted for: the many different species that have to be treated in veterinary medicine.

The following criteria were selected to determine the degree of importance for classes of veterinary antimicrobial agents.

Criterion 1. Response rate to the questionnaire regarding Veterinary Important Antimicrobial Agents

This criterion was met when a majority of the respondents (more than 50%) identified the importance of the antimicrobial class in their response to the questionnaire.

Criterion 2. Treatment of serious animal disease and availability of alternative antimicrobial agents

This criterion was met when compounds within the class were identified as essential against specific infections and there was a lack of sufficient therapeutic alternatives.

On the basis of these criteria, the following categories were established:

- Veterinary **Critically Important Antimicrobial Agents (VCIA)**: are those that meet **BOTH** criteria 1 **AND** 2
- Veterinary **Highly Important Antimicrobial Agents (VHIA)**: are those that meet criteria 1 **OR** 2
- Veterinary **Important Antimicrobial Agents (VIA)**: are those that meet **NEITHER** criterion 1 **NOR** 2

Revision of the list of antimicrobial agents of Veterinary Importance

2007

The Joint FAO/WHO/OIE Expert Meeting on Critically Important Antimicrobials held in Rome, Italy, in November 2007, recommended that the list of antimicrobial agents of Veterinary Importance should be revised on a regular basis and that WOAH further refine the categorisation of antimicrobial agents, with respect to their importance in the treatment of specific animal diseases.

2012

The WOAH *ad hoc* Group on Antimicrobial Resistance met in July 2012 to review and update the WOAH List of antimicrobial agents of veterinary importance taking into account changes in the categorisation of critically important antimicrobial agents of the WHO list of Critically Important Antimicrobials for Human Medicine.

2018

The WOAH *ad hoc* Group on Antimicrobial Resistance met in January 2018 to review and update the WOAH List taking into account:

- the Global Action Plan on Antimicrobial Resistance supporting the phasing out of use of antibiotics for animal growth promotion in the absence of risk analysis;
- the [Resolution N° 38](#) adopted by the WOAH World Assembly of Delegates in May 2017;
- the fifth revision of the WHO list of Critically Important Antimicrobials for Human Medicine (2016) moving Colistin among the Highest Priority Critically Important Antimicrobials; and
- the WOAH report on antimicrobial agents intended for use in animals (Second Report), in particular the antimicrobial agents used as growth promoters (English version, page 30, figure 5)

The *ad hoc* Group made recommendations for the use of the updated WOAH list.

2019

The Director General established the Working Group on Antimicrobial Resistance following the adoption of [Resolution No. 14](#) at the 87th WOAH General Session. The Working Group replaced the *ad hoc* group on Antimicrobial Resistance to:

- ensure the sustainability of WOAH's [Strategy on Antimicrobial Resistance and Prudent Use](#)
- implement the [recommendations](#) made during WOAH's 2nd Global Conference on Antimicrobial Resistance.

2021

Editorial changes in the list were made public at the 2021 General Session. These changes addressed the incorrect spelling of some antimicrobial agents and an out-of-date reference to Chapter 6.9, which was updated to Chapter 6.10.

2024

The Working Group on Antimicrobial Resistance revised the recommendations section of the WOAH List and endorsed it during its biannual meeting in February 2024. The Working Group took into account during the revision the new categorisation criteria of the [WHO List of](#)

Medically Important Antimicrobials that now include the AWaRe classification and the WHO Essential Medicines List, which resulted in the move of phosphonic acid derivatives (e.g., Fosfomycin) among Highest Priority Critically Important Antimicrobials (HPCIA).

The Working Group on Antimicrobial Resistance made recommendations for the use of the updated WOAHL List

Recommendations

Any use of antimicrobial agents in animals should be in accordance with the WOAHL Standards on the responsible and prudent use laid down in Chapter 6.10 of the *Terrestrial Animal Health Code* and in the Chapter 6.3. of the *Aquatic Animal Health Code*.

The responsible and prudent use of antimicrobial agents does not include the use of antimicrobial agents for growth promotion in the absence of risk analysis.

According to the criteria detailed above, antimicrobial agents in the WOAHL List are classified according to three categories, Veterinary Critically Important Antimicrobial Agents (VCIA), Veterinary Highly Important Antimicrobial Agents (VHIA) and Veterinary Important Antimicrobial Agents (VIA).

However, a specific antimicrobial/class or subclass may be considered as critically important for the treatment of a specific disease in a specific species (See specific comments in the following table of categorisation of veterinary important antimicrobial agents for food-producing animals).

For a number of antimicrobial agents, there are no or few alternatives for the treatment of specific disease(s) in identified target species as it is indicated in the related comments in the WOAHL List. In this context, particular attention should be paid to the use of VCIA and of specific VHIA.

In the WOAHL List, some antimicrobial classes, subclasses and specific antimicrobial agents are considered to be Highest Priority Critically Important (HPCIA) by WHO; this is currently the case for Fluoroquinolones, third and fourth generation Cephalosporins, Colistin (Polymyxin E) and Phosphonic acid derivatives (e.g., Fosfomycin). Therefore, HPCIA should be used according to the following recommendations:

- Not to be used for prevention in an individual or group of animals at risk of acquiring a specific infection or in a specific situation where infectious disease is likely to occur if the drug is not administered.
- Not to be used as a first line treatment unless justified, when used as a second line treatment, it should ideally be based on the results of bacteriological tests; and
- Extra-label/off label use should be limited and reserved for instances where no alternatives are available and in agreement with the national legislation in force; and
- Urgently prohibit their use as growth promoters.

The classes in the WHO category of HPCIA should be the highest priorities for countries in phasing out use of antimicrobial agents as growth promoters.

The WOAH List of antimicrobial agents of veterinary importance is based on expert scientific opinion and will be regularly updated when new information becomes available.

Antimicrobial classes / sub classes used only in human medicine (e.g., carbapenems) are not included in the WOAH List. Recognising the need to preserve the effectiveness of these antimicrobial agents in human medicine, careful consideration based on risk assessment and existing evidence should be given regarding their potential use (including extra-label/off-label use) or authorisation for use in animals or both.

Abbreviations

Animal species in which antimicrobial agents are used and categories of antimicrobials of veterinary importance are abbreviated as follows:

AVI:	Avian	EQU:	Equine	VCIA:	Veterinary Critically Important Antimicrobial Agents
API:	Bee	LEP:	Rabbit	VHIA:	Veterinary Highly Important Antimicrobial Agents
BOV:	Bovine	OVI:	Ovine	VIA:	Veterinary Important Antimicrobial Agents
CAP:	Caprine	PIS:	Fish		
CAM:	Camel	SUI:	Swine		

CATEGORISATION OF VETERINARY IMPORTANT ANTIMICROBIAL AGENTS FOR FOOD-PRODUCING ANIMALS

Antimicrobial Agents (Class, Sub-class, Substance)	Species	Specific comments	VCIA	VHIA	VIA
AMINOCOUMARIN					
Novobiocin	AVI, BOV, CAP, OVI, PIS	Novobiocin is used in the local treatment of mastitis and in septicæmias in fish. This class is currently only used in animals.			X
AMINOCYCLITOL					
Spectinomycin	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI	Used for respiratory infections in cattle and enteric infections in multiple species.	X		
AMINOGLYCOSIDES					
Dihydrostreptomycin	AVI, BOV, CAP, EQU, LEP, OVI, SUI	The wide range of applications and the nature of the diseases treated make aminoglycosides extremely important for veterinary medicine.			
Streptomycin	API, AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI				
AMINOGLYCOSIDES + 2 DEOXYSTREPTAMINE					
Amikacin	EQU	Aminoglycosides are of importance in septicæmias; digestive, respiratory and urinary diseases. Gentamicin is indicated for <i>Pseudomonas aeruginosa</i> infections with few alternatives. Apramycin and Fortimycin are currently only used in animals. Few economic alternatives are available.	X		
Apramycin	AVI, BOV, LEP, OVI, SUI				
Fortimycin	BOV, LEP, OVI, SUI				
Framycetin	BOV, CAP, OVI				
Gentamicin	AVI, BOV, CAM, CAP, EQU, LEP, OVI, SUI				
Kanamycin	AVI, BOV, EQU, PIS, SUI				
Neomycin	API, AVI, BOV, CAP, EQU, LEP, OVI, SUI				
Paromomycin	AVI, BOV, CAP, OVI, LEP, SUI				
Tobramycin	EQU				
AMPHENICOLS					
Florfenicol	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI	The wide range of applications and the nature of the diseases treated make phenicols extremely important for veterinary medicine.	X		
Thiamphenicol	AVI, BOV, CAP, OVI, PIS, SUI	This class is of particular importance in treating some fish diseases, in which there are currently no or very few treatment alternatives. This class also represents a useful alternative in respiratory infections of cattle, swine and poultry. This class, in particular florfenicol, is used to treat pasteurellosis in cattle and pigs.			

Antimicrobial Agents (Class, Sub-class, Substance)	Species	Specific comments	VCIA	VHIA	VIA
ANSAMYCIN – RIFAMYCINS		This antimicrobial class is authorised only in a few countries and with a very limited number of indications (mastitis) and few alternatives. Rifampicin is essential in the treatment of <i>Rhodococcus equi</i> infections in foals. However, it is only available in a few countries, resulting in an overall classification of VHIA.		X	
Rifampicin	EQU				
Rifaximin	BOV, CAP, EQU, LEP, OVI, SUI				
ARSENICAL		Arsenicals are used to control intestinal parasitic coccidiosis. (<i>Eimeria</i> spp.).			X
Nitarsone	AVI, SUI				
Roxarsone	AVI, SUI				
BICYCLOMYCIN		Bicyclomycin is listed for digestive and respiratory diseases in cattle and septicaemias in fish.			X
Bicozamycin	BOV, PIS, SUI				
CEPHALOSPORINS		Cephalosporins are used in the treatment of septicaemias, respiratory infections, and mastitis.		X	
CEPHALOSPORINS FIRST GENERATION					
Cefacetile	BOV				
Cefalexin	AVI, BOV, CAP, EQU, OVI, SUI				
Cefalonium	BOV, CAP, OVI				
Cefalotin	EQU				
Cefapyrin	BOV				
Cefazolin	BOV, CAP, OVI				
CEPHALOSPORINS SECOND GENERATION					
Cefuroxime	BOV				
CEPHALOSPORINS THIRD GENERATION		The wide range of applications and the nature of the diseases treated make cephalosporin third and fourth generation extremely important for veterinary medicine. Cephalosporins are used in the treatment of septicaemias, respiratory infections, and mastitis.	X		
Cefoperazone	BOV, CAP, OVI				
Ceftiofur	AVI, BOV, CAP, EQU, LEP, OVI, SUI				
Ceftriaxone	BOV, OVI, SUI				
CEPHALOSPORINS FOURTH GENERATION		Alternatives are limited in efficacy through either inadequate spectrum or presence of antimicrobial resistance.			
Cefquinome	BOV, CAP, EQU, LEP, OVI, SUI				
FUSIDANE		Fusidic acid is used in the treatment of ophthalmic diseases in cattle and horses.			X
Fusidic acid	BOV, EQU				

Antimicrobial Agents (Class, Sub-class, Substance)	Species	Specific comments	VCIA	VHIA	VIA				
IONOPHORES		<p>Ionophores are essential for animal health because they are used to control intestinal parasitic coccidiosis (<i>Eimeria</i> spp.) where there are few or no alternatives available.</p> <p>Ionophores are critically important in poultry.</p> <p>This class is currently only used in animals.</p>		X					
Lasalocid	AVI, BOV, LEP, OVI								
Maduramycin	AVI								
Monensin	API, AVI, BOV, CAP								
Narasin	AVI, BOV								
Salinomycin	AVI, LEP, BOV, SUI								
Semduramicin	AVI								
LINCOSAMIDES		<p>Lincosamides are essential in the treatment of Mycoplasma pneumonia, infectious arthritis and haemorrhagic enteritis of pigs.</p>		X					
Lincomycin	API, AVI, BOV, CAP, OVI, PIS, SUI								
Pirlimycin	BOV, SUI								
MACROLIDES		<p>The wide range of applications and the nature of the diseases treated make macrolides extremely important for veterinary medicine.</p> <p>Macrolides are used to treat Mycoplasma infections in pigs and poultry, haemorrhagic digestive disease in pigs (<i>Lawsonia intracellularis</i>) and liver abscesses (<i>Fusobacterium necrophorum</i>) in cattle, where they have very few alternatives.</p> <p>This class is also used for respiratory infections in cattle.</p>	X						
MACROLIDES 14-MEMBERED RING									
Erythromycin	API, AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI								
Oleandomycin	BOV								
MACROLIDES 15-MEMBERED RING									
Gamithromycin	BOV								
Tulathromycin	BOV, SUI								
MACROLIDES 16-MEMBERED RING									
Carbomycin	AVI								
Josamycin	PIS, SUI								
Kitasamycin	AVI, SUI, PIS								
Mirosamycin	API, AVI, SUI, PIS								
Spiramycin	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI								
Terdecamycin	SUI								
Tildipirosin	BOV, SUI								
Tilmicosin	AVI, BOV, CAP, LEP, OVI, SUI								
Tylosin	API, AVI, BOV, CAP, LEP, OVI, SUI								
Tylvalosin	AVI, SUI								
MACROLIDES C17									
Sedecamycin	SUI								
ORTHOSOMYCINS									X

Antimicrobial Agents (Class, Sub-class, Substance)	Species	Specific comments	VCIA	VHIA	VIA
Avilamycin	AVI, LEP, SUI	Avilamycin is used for enteric diseases of poultry, swine and rabbit. This class is currently only used in animals.			
PENICILLINS					
NATURAL PENICILLINS (including esters and salts)					
Benethamine penicillin	BOV				
Benzylpenicillin	AVI, BOV, CAM, CAP, EQU, LEP, OVI, SUI				
Benzylpenicillin procaine / Benzathine penicillin	AVI, BOV, CAM, CAP, EQU, OVI, SUI				
Penethamate (hydroiodide)	BOV	Penethamate (hydroiodide) is currently only used in animals.			
AMDINOPENICILLINS					
Mecillinam	BOV, SUI				
AMINOPENICILLINS					
Amoxicillin	AVI, BOV, CAP, EQU, OVI, PIS, SUI				
Ampicillin	AVI, BOV, CAP, EQU, OVI, PIS, SUI				
Hetacillin	BOV				
AMINOPENICILLIN + BETALACTAMASE INHIBITOR					
Amoxicillin + Clavulanic Acid	AVI, BOV, CAP, EQU, OVI, SUI				
Ampicillin + Sulbactam	BOV, SUI				
CARBOXYPENICILLINS					
Ticarcillin	EQU				
Tobicillin	PIS				
UREIDOPENICILLIN					
Aspoxicillin	BOV, SUI				
PHENOXYPENICILLINS					
Phenethicillin	EQU				
Phenoxyethylpenicillin	AVI, SUI				
ANTISTAPHYLOCOCCAL PENICILLINS					
Cloxacillin	BOV, CAP, EQU, OVI, SUI				
Dicloxacillin	BOV, CAP, OVI, AVI, SUI				
Nafcillin	BOV, CAP, OVI				

Antimicrobial Agents (Class, Sub-class, Substance)	Species	Specific comments	VCIA	VHIA	VIA
Oxacillin	BOV, CAP, EQU, OVI, SUI				
PHOSPHONIC ACID DERIVATIVES					
Fosfomycin	AVI, BOV, PIS, SUI	Fosfomycin is essential for the treatment of some fish infections with few alternatives however it is only available in a few countries, resulting in an overall classification of VHIA.		X	
PLEUROMUTILINS					
Tiamulin	AVI, CAP, LEP, OVI, SUI	The class of pleuromutilins is essential against respiratory infections in pigs and poultry.			
Valnemulin	SUI	This class is also essential against swine dysentery (<i>Brachyspira hyodysenteriae</i>) however it is only available in a few countries, resulting in an overall classification of VHIA.		X	
POLYPEPTIDES					
Bacitracin	AVI, BOV, LEP, SUI, OVI	Bacitracin is used in the treatment of necrotic enteritis in poultry.			
Enramycin	AVI, SUI				
Gramicidin	EQU				
POLYMYXINS					
Polymixin B	BOV, CAP, EQU, LEP, OVI	This class is used in the treatment of septicaemias, colibacillosis, salmonellosis, and urinary infections.		X	
Polymixin E (colistin)	AVI, BOV, CAP, EQU, LEP, OVI, SUI	Polymixin E (colistin) is used against Gram negative enteric infections.			
QUINOLONES					
QUINOLONES FIRST GENERATION					
Flumequin	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI	Quinolones of the 1st generations are used in the treatment of septicaemias and infections such as colibacillosis.		X	
Miloxacin	PIS				
Nalidixic acid	BOV				
Oxolinic acid	AVI, BOV, LEP, PIS, SUI, OVI				
QUINOLONES SECOND GENERATION (FLUOROQUINOLONES)					
Ciprofloxacin	AVI, BOV, SUI	The wide range of applications and the nature of the diseases treated make fluoroquinolones extremely important for veterinary medicine.			
Danofloxacin	BOV, CAP, LEP, OVI, SUI		X		
Difloxacin	AVI, BOV, LEP, SUI				
Enrofloxacin	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI	Fluoroquinolones are critically important in the treatment of septicaemias, respiratory and enteric diseases.			
Marbofloxacin	BOV, EQU, LEP, SUI				
Norfloxacin	AVI, BOV, CAP, LEP, OVI, SUI				

Antimicrobial Agents (Class, Sub-class, Substance)	Species	Specific comments	VCIA	VHIA	VIA
Ofloxacin	AVI, SUI				
Orbifloxacin	BOV, SUI				
Sarafloxacin	PIS				
QUINOXALINES		Quinoxalines (carbadox) is used for digestive disease of pigs (e.g. swine dysentery). This class is currently only used in animals.			X
Carbadox	SUI				
Olaquinox	SUI				
SULFONAMIDES					
Phthalylsulfathiazole	SUI				
Sulfacetamide	AVI, BOV, OVI				
Sulfachlorpyridazine	AVI, BOV, SUI				
Sulfadiazine	AVI, BOV, CAP, OVI, SUI				
Sulfadimethoxazole	AVI, BOV, SUI				
Sulfadimethoxine	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI				
Sulfadimidine (Sulfamethazine, Sulfadimerazine)	AVI, BOV, CAP, EQU, LEP, OVI, SUI				
Sulfadoxine	AVI, BOV, EQU, OVI, SUI				
Sulfafurazole	BOV, PIS	The wide range of applications and the nature of the diseases treated make sulfonamides extremely important for veterinary medicine.			
Sulfaguanidine	AVI, CAP, OVI				
Sulfamerazine	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI				
Sulfamethoxine	AVI, PIS, SUI		X		
Sulfamonomethoxine	AVI, PIS, SUI	These classes alone or in combination are critically important in the treatment of a wide range of diseases (bacterial, coccidial and protozoal infections) in a wide range of animal species.			
Sulfanilamide	BOV, CAP, OVI				
Sulfapyridine	BOV, SUI				
Sulfaquinoxaline	AVI, BOV, CAP, LEP, OVI				
SULFONAMIDES+ DIAMINOPYRIMIDINES					
Ormetoprim+ Sulfadimethoxine	AVI, PIS				
Sulfamethoxypridazine	AVI, BOV, EQU, SUI				
Trimethoprim+ Sulfonamide	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI				
DIAMINOPYRIMIDINES					
Baquiloprim	BOV, SUI				
Ormetoprim	AVI				
Trimethoprim	AVI, BOV, CAP, EQU, LEP, OVI, SUI				
STREPTOGRAMINS					X

Antimicrobial Agents (Class, Sub-class, Substance)	Species	Specific comments	VCIA	VHIA	VIA
Virginiamycin	AVI, BOV, OVI, SUI	Virginiamycin is an important antimicrobial in the prevention of necrotic enteritis (<i>Clostridium perfringens</i>).			
TETRACYCLINES					
Chlortetracycline	AVI, BOV, CAP, EQU, LEP, OVI, SUI	The wide range of applications and the nature of the diseases treated make tetracyclines extremely important for veterinary medicine.	X		
Doxycycline	AVI, BOV, CAM, CAP, EQU, LEP, OVI, PIS, SUI				
Oxytetracycline	API, AVI, BOV, CAM, CAP, EQU, LEP, OVI, PIS, SUI	This class is critically important in the treatment of many bacterial and chlamydial diseases in a wide range of animal species.			
Tetracycline	API, AVI, BOV, CAM, CAP, EQU, LEP, OVI, PIS, SUI	This class is also critically important in the treatment of animals against heartwater (<i>Ehrlichia ruminantium</i>) and anaplasmosis (<i>Anaplasma marginale</i>) due to the lack of antimicrobial alternatives.			
THIOSTREPTON					
Nosiheptide	SUI	This class is currently used in the treatment of some dermatological conditions.			X