





OIE LIST OF ANTIMICROBIAL AGENTS OF VETERINARY IMPORTANCE

The OIE¹ International Committee unanimously adopted the List of Antimicrobial Agents of Veterinary Importance at its 75th General Session in May 2007 (Resolution No. XXVIII).

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.

The FAO ²/OIE/WHO ³ 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 the OIE 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, the OIE 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 the OIE.

Preparation of the draft list

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

Sixty-six replies were received. This response rate highlights the importance given by OIE Member Countries from all regions to this issue. These replies were analysed first by the OIE Collaborating Centre for Veterinary Dugs, 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 the OIE International Committee during the General Session in May 2006.

¹ OIE: World Organisation for Animal Health

² FAO: Food and Agriculture Organization of the United Nations

³ WHO: World Health Organization

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 promotor 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.

Refinement of the list

The *ad hoc* Group was convened in September 2006 to review the comments made at the 74th General Session of the OIE International Committee, and Resolution No. XXXIII adopted at the 74th General Session. Based on the further analysis provided by the OIE 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.

Adoption of List of antimicrobial agents of Veterinary Importance

The refined list was submitted to the 75th International Committee during the General Session in May 2007 and adopted unanimously by Resolution No. XXVIII.



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 6.9. Responsible and prudent use of antimicrobial agents in veterinary medicine) is important. Therefore, based on OIE Member Country 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 criteria 1 OR 2

Revision of the list of antimicrobial agents of Veterinary Importance (July 2012)

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 the OIE further refine the categorisation of antimicrobial agents with respect to their importance in the treatment of specific animal diseases.

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

The Group made recommendations for the use of the updated OIE List.

Recommendations

Any use of antimicrobial agents in animals should be in accordance with the OIE Standards on the responsible and prudent use laid down in the Chapter 6.9. of the *Terrestrial Animal Health Code* and in the Chapter 6.3. of the *Aquatic Animal Health Code*.

According to the criteria detailed above, antimicrobial agents in the OIE 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 some specified disease in identified target species as it is indicated in the specific comments in the OIE List. In this context, particular attention should be paid to the use of VCIA and of specific VHIA.

Among the VCIA in the OIE List, some are considered to be critically important both for human and animal health; this is currently the case for Fluoroquinolones and for the third and fourth generation of Cephalosporins. Therefore these two classes should be used according to the following recommendations:

- Not to be used as preventive treatment applied by feed or water in the absence of clinical signs in the animal(s) to be treated.
- 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.
- Extra-label/off label use should be limited and reserved for instances where no alternatives are available. Such use should be in agreement with the national legislation in force.

The OIE 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 are not included in this OIE List. Recognising the need to preserve the effectiveness of the antimicrobial agents in human medicine, careful consideration should be given regarding their potential use (including extra-label/off-label use) / authorisation in animals.

Abbreviations:

Animal species in which these antimicrobial agents are used are abbreviated as follows:

AVI: avian EQU: Equine API: bee LEP: Rabbit BOV: bovine OVI: Ovine CAP: caprine PIS: Fish CAM: camel SUI: Swine

VCIA: Veterinary Critically Important Antimicrobial Agents VHIA: Veterinary Highly Important Antimicrobial Agents

VIA: Veterinary Important Antimicrobial Agents





CATEGORISATION OF VETERINARY IMPORTANT ANTIMICROBIAL AGENTS FOR FOOD-PRODUCING ANIMALS

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	Specific comments	VCIA	VHIA	VIA
AMINOCOUMARIN		Novobiocin is used in the local treatment			V
Novobiocin	BOV, CAP, OVI, PIS	of mastitis and in septicaemias in fish			X
AMINOGLYCOSIDES					
AMINOCYCLITOL					
Spectinomycin	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI	The wide was as of annihilations and the			
Streptomycin	API, AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI	The wide range of applications and the nature of the diseases treated make aminoglycosides extremely important for			
Dihydrostreptomycin	AVI, BOV, CAP, EQU, LEP, OVI, SUI	veterinary medicine.			
AMINOGLYCOSIDES + 2 DEOXYSTREPTAMINE		Aminoglycosides are of importance in septicaemias; digestive, respiratory and			
Kanamycin	AVI, BOV, EQU, PIS, SUI	urinary diseases.			
Neomycin	API, AVI, BOV, CAP, EQU, LEP, OVI, SUI	Gentamicin is indicated for Pseudomonas aeruginosa infections	Х		
Framycetin	BOV, CAP, OVI	with few alternatives.			
Paromomycin	AVI, BOV, CAP, OVI, LEP, SUI	Spectinomycin, Apramycin and			
Apramycin	AVI, BOV, LEP, OVI, SUI	Fortimycin are currently only used in			
Fortimycin	AVI, BOV, LEP, OVI, SUI	animals. Few economic alternatives are available.			
Gentamicin	AVI, BOV, CAM, CAP, EQU, LEP,OVI, SUI	avallable.			
Tobramycin	EQU				
Amikacin	EQU				
ANSAMYCIN - RIFAMYCINS		This antimicrobial class is authorised			
Rifampicin	EQU	only in a few countries and with a very			
Rifaximin	BOV, CAP, EQU, LEP, OVI, SUI	limited number of indications (mastitis) and few alternatives.			
		Rifampicin is essential in the treatment of <i>Rhodococcus</i> equi infections in foals. However it is only available in a few countries, resulting in an overall classification of VHIA.		X	
ARSENICAL					
Roxarsone	AVI, SUI	Arsenicals are used to control intestinal parasitic coccidiosis. (<i>Eimeria</i> spp.).			Χ
Nitarsone	AVI, SUI	parasitic coccidiosis. (Emena spp.).			
BICYCLOMYCIN Bicozamycin	AVI, BOV, PIS, SUI	Bicyclomycin is listed for digestive and respiratory diseases in cattle and			X
Dicozamycin	7.1., 201, 1.0, 00.	septicaemias in fish.			
CEPHALOSPORINS					
CEPHALOSPORINS FIRST GENERATION					
Cefacetrile	BOV				
Cefalexin	BOV, CAP, EQU, OVI, SUI	Cephalosporins are used in the treatment of septicemias, respiratory infections, and mastitis.			
Cefalotin	EQU			V	
Cefapyrin	BOV			Х	
Cefazolin	BOV, CAP, OVI				
Cefalonium	BOV, CAP, OVI				
CEPHALOSPORINS SECOND GENERATION					
	BOV				

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	Specific comments	VCIA	VHIA	VIA
CEPHALOSPORINS THIRD GENERATION Cefoperazone	BOV, CAP, OVI	The wide range of applications and the nature of the diseases treated make cephalosporin third and fourth generation extremely important for			
Ceftiofur	AVI, BOV, CAP, EQU, LEP, OVI, SUI	veterinary medicine.			
Ceftriaxone	AVI, BOV, OVI, SUI		Х		
CEPHALOSPORINS FOURTH GENERATION Cefquinome	BOV, CAP, EQU, LEP, OVI, SUI	Cephalosporins are used in the treatment of septicemias, respiratory infections, and mastitis. Alternatives are limited in efficacy through either inadequate spectrum or	^		
		presence of antimicrobial resistance.			
Fusidic acid	BOV, EQU	Fusidic acid is used in the treatment of ophthalmic diseases in cattle and horses.			Χ
IONOPHORES Lasalocid Maduramycin Monensin Narasin Salinomycin	AVI, BOV, LEP, OVI AVI API, AVI, BOV, CAP AVI, BOV AVI, LEP, BOV, SUI	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. Ionophores are critically important in poultry.		Х	
Semduramicin	AVI	This class is currently only used in animals.			
LINCOSAMIDES		Lincosamides are essential in the			
Pirlimycin Lincomycin	BOV, SUI, AVI API, AVI, BOV, CAP, OVI, PIS, SUI	treatment of Mycoplasmal pneumonia, infectious arthritis and hemorrhagic enteritis of pigs.		Х	
MACROLIDES (C refers to the chemical structure)					
MACROLIDES C14	ADLANT BOY CAR FOLL LED ON				
Erythromycin	API, AVI, BOV,CAP, EQU, LEP, OVI, PIS, SUI				
Oleandomycin	BOV	The wide range of applications and the			
MACROLIDES C15		nature of the diseases treated make			
Gamithromycin	BOV	macrolides extremely important for veterinary medicine.			
Tulathromycin	BOV, SUI				
MACROLIDES C16		Macrolides are used to treat			
Carbomycin	AVI	Mycoplasma infections in pigs and poultry, haemorrhagic digestive			
Josamycin	AVI, PIS, SUI	disease in pigs (Lawsonia intracellularis) and liver abscesses (Fusobacterium necrophorum) in cattle, where they have very few alternatives.	X		
Kitasamycin	AVI, SUI, PIS				
Spiramycin	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI				
Tilmicosin	AVI, BOV, CAP, LEP, OVI, SUI				
Tylosin	API, AVI, BOV, CAP, LEP, OVI, SUI	This class is also used for respiratory infections in cattle			
Mirosamycin	API, AVI, SUI, PIS				
Terdecamycin	AVI, SUI				
Tildipirosin	BOV, SUI				
Tylvalosin	AVI, SUI				
MACROLIDES C17	 				
Sedecamycin	SUI				
ORTHOSOMYCINS		Avilamycin is used for enteric diseases			
Avilamycin	AVI, LEP	of poultry and rabbit. This class is currently only used in animals.			X

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	Specific comments	VCIA	VHIA	VIA
PENICILLINS					
NATURAL PENICILLINS (including esters and salts)					
Benzylpenicillin	AVI, BOV, CAM, CAP, EQU, LEP, OVI, SUI				
Penethamate (hydriodide)	BOV, SUI, AVI, OVI				
Benzylpenicillin procaine / Benzathine penicillin	BOV, CAM, CAP, EQU, OVI, SUI				
AMDINOPENICILLINS					
Mecillinam	BOV, SUI				
AMINOPENICILLINS		1			
Amoxicillin	AVI, BOV, CAP, EQU, OVI, PIS, SUI	The wide range of applications and the nature of the diseases treated make			
Ampicillin	AVI, BOV, CAP, EQU, OVI, PIS, SUI	penicillins extremely important for			
Hetacillin	BOV	veterinary medicine.			
AMINOPENICILLIN + BETALACTAMASE INHIBITOR		This class is used in the treatment of septicaemias, respiratory and urinary			
Amoxicillin + Clavulanic Acid	AVI, BOV, CAP, EQU, OVI, SUI	tract infections.	Х		
Ampicillin + Sulbactam	AVI, BOV, SUI	This class is very important in the treatment of many diseases in a broad			
CARBOXYPENICILLINS		range of animal species.			
Ticarcillin	EQU				
Tobicillin	PIS	Few economical alternatives are			
UREIDOPENICILLIN		available.			
Aspoxicillin	BOV, SUI				
PHENOXYPENICILLINS	<u> </u>				
Phenoxymethylpenicillin	AVI, SUI				
Phenethicillin	EQU				
ANTISTAPHYLOCOCCAL PENICILLINS					
Cloxacillin	BOV, CAP, EQU, OVI, SUI				
Dicloxacillin	BOV, CAP, OVI, AVI, SUI				
Nafcillin	BOV, CAP, OVI				
Oxacillin	BOV, CAP, EQU, OVI, AVI, SUI				
PHENICOLS		The wide range of applications and the			
Florphenicol	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI	nature of the diseases treated make phenicols extremely important for			
Thiamphenicol	AVI, BOV, CAP, OVI, PIS, SUI	veterinary medicine. This class is of particular importance in treating some fish diseases, in which there are currently no or very few treatment alternatives.	X		
		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.			
PHOSPHONIC ACID		Fosfomycin is essential for the			
Fosfomycin	AVI, BOV, PIS, SUI	treatment of some fish infections with few alternatives however it is only available in a few countries, resulting in an overall classification of VHIA.		Х	

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	Specific comments	VCIA	VHIA	VIA
PLEUROMUTILINS		The class of pleuromutilins is			
Tiamulin	AVI, CAP, LEP, OVI, SUI	essential against respiratory infections in pigs and poultry.			
Valnemulin	AVI, 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 is used in the treatment of			
Enramycin	AVI, SUI	necrotic enteritis in poultry.			
Gramicidin	EQU	This class is used in the treatment of			
Bacitracin	AVI, BOV, LEP, SUI, OVI	septicaemias, colibacillosis,		Χ	
POLYPEPTIDES CYCLIC	T	salmonellosis, and urinary infections.			
Colistin	AVI, BOV, CAP, EQU, LEP, OVI, SUI	Cyclic polypeptides are widely used			
Polymixin	BOV, CAP, EQU, LEP, OVI, AVI	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		X	
Miloxacin	PIS	and infections such as colibacillosis.			
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			
Danofloxacin	AVI, BOV, CAP, LEP, OVI, SUI	nature of the diseases treated make			
Difloxacin	AVI, BOV, LEP, SUI	fluoroquinolones extremely important for veterinary medicine.			
Enrofloxacin	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI		X		
Marbofloxacin	AVI, BOV, EQU, LEP, SUI	Fluoroquinolones are critically important in the treatment of septicaemias,			
Norfloxacin	AVI, BOV, CAP, LEP, OVI, SUI	respiratory and enteric diseases.			
Ofloxacin	AVI, SUI				
Orbifloxacin	BOV, SUI				
Sarafloxacin	PIS				
QUINOXALINES		Quinoxalines (carbadox) is used for			
Carbadox	SUI	digestive disease of pigs (e.g. swine dysentery).			Х
Olaquindox	SUI	This class is currently only used in animals.			

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	Specific comments	VCIA	VHIA	VIA
SULFONAMIDES					
Sulfachlorpyridazine	AVI, BOV, SUI				
Sulfadiazine	AVI, BOV, CAP, OVI, SUI				
Sulfadimethoxine	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI				
Sulfadimidine (Sulfamethazine, Sulfadimerazin)	AVI, BOV, CAP, EQU, LEP, OVI, SUI				
Sulfadoxine	BOV, EQU, OVI, SUI				
Sulfafurazole	BOV, PIS				
Sulfaguanidine	AVI, CAP, OVI	The wide range of applications and the nature of the diseases treated make			
Sulfamerazine	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI				
Sulfadimethoxazole	AVI, BOV, SUI	sulfonamides extremely important for			
Sulfamethoxine	AVI, PIS, SUI	veterinary medicine.			
Sulfamonomethoxine	AVI, PIS, SUI	These classes alone or in	Χ		
Sulfanilamide	AVI, BOV, CAP, OVI	combination are critically important in			
Sulfapyridine	BOV, SUI	the treatment of a wide range of diseases (bacterial, coccidial and			
Phthalylsulfathiazole	SUI	protozoal infections) in a wide range			
Sulfaquinoxaline	AVI, BOV, CAP, LEP, OVI	of animal species.			
SULFONAMIDES+ DIAMINOPYRIMIDINES					
Sulfamethoxypyridazine	AVI, BOV, EQU, SUI				
Ormetoprim+ Sulfadimethoxine	PIS				
Trimethoprim+ Sulfonamide	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI				
DIAMINOPYRIMIDINES					
Baquiloprim	BOV, SUI				
Trimethoprim	AVI, BOV, CAP, EQU, LEP, OVI, SUI				
Ormetoprim	AVI				
STREPTOGRAMINS		Virginiamycin is an important			
Virginiamycin	AVI, BOV, OVI, SUI	antimicrobial in the prevention of necrotic enteritis (<i>Clostridium</i> perfringens)			X
TETRACYCLINES		The wide range of applications and the			
Chlortetracycline	AVI, BOV, CAP, EQU, LEP, OVI, SUI	nature of the diseases treated make tetracyclines extremely important for			
Doxycycline	AVI, BOV, CAM, CAP, EQU, LEP, OVI, PIS, SUI	veterinary medicine This class is critically important in the treatment of many bacterial and chlamydial diseases in a wide range of animal species.			
Oxytetracycline	API, AVI, BOV, CAM, CAP, EQU, LEP, OVI, PIS, SUI				
Tetracycline	API, AVI, BOV, CAM, CAP, EQU, LEP, OVI, PIS, SUI		Х		
	This class is also critically important in the treatment of animals against heartwater (Ehrlichia ruminantium) and anaplasmosis (Anaplasma marginale) due to the lack of antimicrobial alternatives.	heartwater (Ehrlichia ruminantium) and anaplasmosis (Anaplasma marginale) due to the lack of			
THIOSTREPTON Nosiheptide	AVI, SUI	This class is currently used in the treatment of some dermatological conditions.			Х