



OIE LIST OF ANTIMICROBIAL AGENTS OF VETERINARY IMPORTANCE (July 2019)

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 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 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.

Scope

The OIE 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

¹ OIE: World Organisation for Animal Health

² FAO: Food and Agriculture Organization of the United Nations

³ WHO: World Health Organization

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 Drugs, 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.

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 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 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. 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 OIE Delegates.

In July 2018, the *ad hoc* Group conducted a technical review of the List to improve coherence between the WHO and OIE 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 OIE 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 6.9. 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

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 OIE *ad hoc* Group on Antimicrobial Resistance met in January 2018 to review and update the OIE 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 OIE 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 OIE 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 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*.

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 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. Colistin has been moved in 2016 to the WHO category of Highest Priority Critically Important Antimicrobials. Therefore these two classes and Colistin 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; and
- 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; and
- Urgently prohibit their use as growth promoters.

The classes in the WHO category of Highest Priority Critically Important Antimicrobials should be the highest priorities for countries in phasing out use of antimicrobial agents as growth promoters.

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	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	

Introduction Criteria used for categorisationCATEGORISATION OF VETERINARY IMPORTANT ANTIMICROBIAL AGENTS
FOR FOOD-PRODUCING ANIMALS

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	Specific comments	VCIA	VHIA	VIA
AMINOCOUMARIN Novobiocin	BOV, CAP, OVI, PIS	Novobiocin is used in the local treatment of mastitis and in septicaemias 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 Streptomycin	AVI, BOV, CAP, EQU, LEP, OVI, SUI 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 veterinary medicine.			
AMINOGLYCOSIDES + 2 DEOXYSTREPTAMINE Amikacin Apramycin Fortimycin Framycetin Gentamicin Kanamycin Neomycin Paromomycin Tobramycin	EQU AVI, BOV, LEP, OVI, SUI AVI, BOV, LEP, OVI, SUI BOV, CAP, OVI AVI, BOV, CAM, CAP, EQU, LEP, OVI, SUI AVI, BOV, EQU, PIS, SUI API, AVI, BOV, CAP, EQU, LEP, OVI, SUI AVI, BOV, CAP, OVI, LEP, SUI EQU	Aminoglycosides are of importance in septicaemias; 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		
AMPHENICOLS Florphenicol Thiamphenicol	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI AVI, BOV, CAP, OVI, PIS, SUI	The wide range of applications and the nature of the diseases treated make phenicols extremely important for veterinary medicine. 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.	X		
ANSAMYCIN – RIFAMYCINS Rifampicin Rifaximin	EQU BOV, CAP, EQU, LEP, OVI, SUI	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	
ARSENICAL Nitarsona Roxarsone	AVI, SUI AVI, SUI	Arsenicals are used to control intestinal parasitic coccidiosis. (<i>Eimeria</i> spp.).			X

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	Specific comments	VCIA	VHIA	VIA
BICYCLOMYCIN Bicozamycin	AVI, BOV, PIS, SUI	Bicyclomycin is listed for digestive and respiratory diseases in cattle and septicæmias in fish.			X
CEPHALOSPORINS					
CEPHALOSPORINS FIRST GENERATION Cefacetrile Cefalexin Cefalonium Cefalotin Cefapyrin Cefazolin	BOV BOV, CAP, EQU, OVI, SUI BOV, CAP, OVI EQU BOV BOV, CAP, OVI	Cephalosporins are used in the treatment of septicemias, respiratory infections, and mastitis.		X	
CEPHALOSPORINS SECOND GENERATION Cefuroxime	BOV				
CEPHALOSPORINS THIRD GENERATION Cefoperazone Ceftiofur Ceftriaxone	BOV, CAP, OVI AVI, BOV, CAP, EQU, LEP, OVI, SUI AVI, BOV, OVI, SUI	The wide range of applications and the nature of the diseases treated make cephalosporin third and fourth generation extremely important for veterinary medicine.	X		
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.			
FUSIDANE Fusidic acid	BOV, EQU	Fusidic acid is used in the treatment of ophthalmic diseases in cattle and horses.			X
IONOPHORES Lasalocid Maduramycin Monensin Narasin Salinomycin Semduramicin	AVI, BOV, LEP, OVI AVI API, AVI, BOV, CAP AVI, BOV AVI, LEP, BOV, SUI AVI	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. <u>This class is currently only used in animals.</u>		X	
LINCOSAMIDES Lincomycin Pirlimycin	API, AVI, BOV, CAP, OVI, PIS, SUI BOV, SUI, AVI	Lincosamides are essential in the treatment of Mycoplasmal pneumonia, infectious arthritis and hemorrhagic enteritis of pigs.		X	
MACROLIDES					
MACROLIDES 14-MEMBERED RING Erythromycin Oleandomycin	API, AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI BOV	The wide range of applications and the nature of the diseases treated make macrolides extremely important for veterinary medicine.			
MACROLIDES 15-MEMBERED RING Gamithromycin Tulathromycin	BOV BOV, SUI	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.	X		
MACROLIDES 16-MEMBERED RING Carbomycin Josamycin Kitasamycin Mirosamycin	AVI AVI, PIS, SUI AVI, SUI, PIS API, AVI, SUI, PIS	This class is also used for respiratory infections in cattle			

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	Specific comments	VCIA	VHIA	VIA
Spiramycin	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI				
Terdecamycin	AVI, 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		Avilamycin is used for enteric diseases of poultry, swine and rabbit.			
Avilamycin	AVI, LEP, SUI	This class is currently only used in animals.			X
PENICILLINS					
NATURAL PENICILLINS (including esters and salts)					
Benethamine penicillin	BOV				
Benzylpenicillin	AVI, BOV, CAM, CAP, EQU, LEP, OVI, SUI				
Benzylpenicillin procaine / Benzathine penicillin	BOV, CAM, CAP, EQU, OVI, SUI				
Penethamate (hydroiodide)	BOV	Penethamate (hydroiodide) is currently only used in animals			
AMIDINOPENICILLINS					
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		The wide range of applications and the nature of the diseases treated make penicillins extremely important for veterinary medicine.			
Amoxicillin + Clavulanic Acid	AVI, BOV, CAP, EQU, OVI, SUI				
Ampicillin + Sulbactam	AVI, BOV, SUI	This class is used in the treatment of septicaemias, respiratory and urinary tract infections.			
CARBOXYPENICILLINS					
Ticarcillin	EQU				
Tobicillin	PIS	This class is very important in the treatment of many diseases in a broad range of animal species.			
UREIDOPENICILLIN					
Aspoxicillin	BOV, SUI				
PHENOXYPENICILLINS		Few economical alternatives are available.			
Phenethicillin	EQU				
Phenoxyethylpenicillin	AVI, SUI				
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				

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	Specific comments	VCIA	VHIA	VIA
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 Valnemulin	AVI, CAP, LEP, OVI, SUI AVI, SUI	The class of pleuromutilins is essential against respiratory infections in pigs and poultry. 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 Enramycin Gramicidin	AVI, BOV, LEP, SUI, OVI AVI, SUI EQU	Bacitracin is used in the treatment of necrotic enteritis in poultry. This class is used in the treatment of septicaemias, colibacillosis, salmonellosis, and urinary infections.		X	
POLYMYXINS Polymixin B Polymixin E (colistin)	BOV, CAP, EQU, LEP, OVI, AVI AVI, BOV, CAP, EQU, LEP, OVI, SUI	Polymixin E (colistin) is used against Gram negative enteric infections.			
QUINOLONES					
QUINOLONES FIRST GENERATION Flumequin Miloxacin Nalidixic acid Oxolinic acid	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI PIS BOV AVI, BOV, LEP, PIS, SUI, OVI	Quinolones of the 1st generations are used in the treatment of septicaemias and infections such as colibacillosis.		X	
QUINOLONES SECOND GENERATION (FLUOROQUINOLONES) Ciprofloxacin Danofloxacin Difloxacin Enrofloxacin Marbofloxacin Norfloxacin Ofloxacin Orbifloxacin Sarafloxacin	AVI, BOV, SUI AVI, BOV, CAP, LEP, OVI, SUI AVI, BOV, LEP, SUI AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI AVI, BOV, EQU, LEP, SUI AVI, BOV, CAP, LEP, OVI, SUI AVI, SUI BOV, SUI PIS	The wide range of applications and the nature of the diseases treated make fluoroquinolones extremely important for veterinary medicine. Fluoroquinolones are critically important in the treatment of septicaemias, respiratory and enteric diseases.	X		
QUINOXALINES Carbadox Olaquinox	SUI SUI	Quinoxalines (carbadox) is used for digestive disease of pigs (e.g. swine dysentery). This class is currently only used in animals.			X

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	Specific comments	VCIA	VHIA	VIA
SULFONAMIDES Phthalylsulfathiazole Sulfacetamide Sulfachlorpyridazine Sulfadiazine Sulfadimethoxazole Sulfadimethoxine Sulfadimidine (Sulfamethazine, Sulfadimerazin) Sulfadoxine Sulfafurazole Sulfaguanidine Sulfamerazine Sulfamethoxine Sulfamonomethoxine Sulfanilamide Sulfapyridine Sulfaquinoxaline	SUI AVI, BOV, OVI AVI, BOV, SUI AVI, BOV, CAP, OVI, SUI AVI, BOV, SUI AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI AVI, BOV, CAP, EQU, LEP, OVI, SUI BOV, EQU, OVI, SUI BOV, PIS AVI, CAP, OVI AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI AVI, PIS, SUI AVI, PIS, SUI AVI, BOV, CAP, OVI BOV, SUI AVI, BOV, CAP, LEP, OVI	<p>The wide range of applications and the nature of the diseases treated make sulfonamides extremely important for veterinary medicine.</p> <p>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.</p>	X		
SULFONAMIDES+ DIAMINOPYRIMIDINES Ormetoprim+ Sulfadimethoxine Sulfamethoxyppyridazine Trimethoprim+ Sulfonamide	PIS AVI, BOV, EQU, SUI AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI				
DIAMINOPYRIMIDINES Baquiloprim Ormetoprim Trimethoprim	BOV, SUI AVI AVI, BOV, CAP, EQU, LEP, OVI, SUI				
STREPTOGRAMINS Virginiamycin	AVI, BOV, OVI, SUI	Virginiamycin is an important antimicrobial in the prevention of necrotic enteritis (<i>Clostridium perfringens</i>)			X
TETRACYCLINES Chlortetracycline Doxycycline Oxytetracycline Tetracycline	AVI, BOV, CAP, EQU, LEP, OVI, SUI AVI, BOV, CAM, CAP, EQU, LEP, OVI, PIS, SUI API, AVI, BOV, CAM, CAP, EQU, LEP, OVI, PIS, SUI API, AVI, BOV, CAM, CAP, EQU, LEP, OVI, PIS, SUI	<p>The wide range of applications and the nature of the diseases treated make tetracyclines extremely important for veterinary medicine</p> <p>This class is critically important in the treatment of many bacterial and chlamydial diseases in a wide range of animal species.</p> <p>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.</p>	X		
THIOSTREPTON Nosiheptide	AVI, SUI	This class is currently used in the treatment of some dermatological conditions.			X