



MALAYSIAN VETERINARY

ANTIMICROBIALS GUIDELINES

(MVAG)

FIRST EDITION 2021

MALAYSIAN VETERINARY ANTIMICROBIALS GUIDELINES

First Edition 2021

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ABBREVIATIONS

ADI	Acceptable Daily Intake
AMAF	ASEAN Ministers on Agriculture and Forestry
AMR	Antimicrobial Resistance
API	Apian (Bee)
ASEAN	The Association of Southeast Asian Nations
ASWGL	ASEAN Sectoral Working Group on Livestock
AVI	Avian
BOV	Bovine
BRD	Bovine Respiratory Disease
CAM	Camelid (Camel)
CAN	Canine
CAP	Caprine
DVS	Department of Veterinary Services Malaysia
EQU	Equine
FAO	Food and Agriculture Organization of the United Nations
FEL	Feline
GAHP	Good Animal Husbandry Practice
IM	Intramuscular
IV	Intravenous
LEP	Leporidae (Rabbit)
mg	Milligram
mL	Milliliter
MRLs	Maximum Residue Limit
MVAG	Malaysian Veterinary Antimicrobial Guideline
OIE	Office International des Epizooties (World Organisation for Animal Health)
OVI	Ovine
PO	Per Os (to be taken Orally)
PIS	Pisces (Fish)
qh	<i>quaque hora</i> (Every Hour)
SC	Subcutaneous
SUI	Swine
VCIA	Veterinary Critically Important Antimicrobial Agents
VHIA	Veterinary Highly Important Antimicrobial Agents
VIA	Veterinary Important Antimicrobial Agents
VMP	Veterinary Medicinal Products
WHO	World Health Organization

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Foreword from **The Director General of Veterinary Services Malaysia**



The early usage of veterinary drugs particularly antimicrobial in the animal industry were for the purposes of treatment, prevention and as growth promoter. Since then, globally the occurrence of antimicrobial resistance (AMR) has been increasing alarmingly. To arrest this situation, the animal health sector has taken the necessary initiatives to ensure the prudent and responsible use of antimicrobials in animals.

DVS is committed to address the issue of AMR which has been emphasized internationally in both the human and animal health sectors. The AMR issue is contributed by the irresponsible use of drugs, which could be from either human health or animal health sector. Therefore, everybody who is involved in the use of these drugs are responsible for ensuring their prudent use.

The usage of antimicrobial for prevention and as growth promoter is being phased out gradually in order to curb or minimize the incidence of AMR. The department has taken a step further by restricting the usage of antimicrobial for the purpose of treatment and as a metaphylaxis in animals particularly in livestock. The use of antimicrobials as growth promoter and for the prevention (prophylaxis) at sub therapeutic doses and the prolong use will be phased out. Farms are encouraged to improve and enhance biosecurity, good husbandry practices and animal health management.

In addition, DVS is taking proactive measures to provide a guide on the use of antibiotics in animals and livestock production by developing this Malaysian Veterinary Antimicrobials Guidelines (MVAG) 2020. This MVAG is intended to be used as a reference for all veterinarians in the country, especially those involved in the animal industry and is part of our efforts to ensure prudent and responsible use of antimicrobials in the animal health sector.

All veterinary practitioners in the country are responsible to use veterinary drugs prudently as part of our ethics in veterinary practice. Finally, the development of this MVAG shows our support to the ASEAN's initiative in addressing AMR, as determined during the 38th ASEAN Ministers for Agriculture and Forestry Meeting (AMAF) and the proposition by the World Organization for Animal Health (OIE).

YBHG. DATO' DR. NORLIZAN BIN MOHD NOOR (D.I.M.P, A.M.N.)
Director General,
Department of Veterinary Services Malaysia.

GLOSSARY

Antibiotic

An antibiotic is a type of antimicrobial substance / medicine active against bacteria and is the most important type of antibacterial agent for fighting bacterial infections. They may either kill or inhibit the growth of bacteria.

Antimicrobial

An agent that acts against all types of microorganisms - bacteria (antibacterial), viruses (antiviral), fungi (antifungal) and protozoa (antiprotozoal) that kills microorganisms or stops their growth.

Antimicrobial resistance (AMR)

AMR refers to a situation when micro-organisms - bacteria, fungi, viruses, and parasites - evolve resistance to antimicrobial substances, like antibiotics. This phenomenon could happen when excessive or inappropriate use of antimicrobial can lead to the emergence of resistant bacteria which do not respond to antibiotic treatment. This is called antimicrobial resistance, which poses a threat to disease control throughout the world, is a primary concern for human and animal health.

Antimicrobial Growth Promoter (AGP)

Means the administration or use of antimicrobial agents to animals only to increase the rate of weight gain or the efficiency of feed utilization instead of using antimicrobial for treatment. This type of usage usually uses the amount at sub therapeutic level and can lead to the occurrence of AMR.

https://www.oie.int/index.php?id=169&L=0&htmfile=chapitre_antibio_monitoring.htm

Duration

The duration of action of a drug is the length of time that particular drug is effective. Duration of action is a function of several parameters including plasma half-life, the time to equilibrate between plasma and target compartments, and the off rate of the drug from its biological target.

Flushing

Usage of antibiotics generally on flock to prevent general disease at early stage of the animal life. This is a myth / common practice that is believed to have effect on the growth of the animals and to remove all diseases. No scientific evidence yet to prove this.

Metaphylaxis / Control

Means to administer an antimicrobial agent to a group of animals containing sick and healthy animals (population at risk in the same management), to minimise or resolve clinical signs and to prevent further spread of the disease.

Pharmacovigilance

Pharmacovigilance, also known as drug safety, is the pharmacological science relating to the collection, detection, assessment, monitoring, and prevention of adverse effects with pharmaceutical products.



Prescription

An instruction written by a medical practitioner (physician, veterinarian, dentist or other qualified health care practitioner) that authorizes a patient to be issued with a medicine or treatment.

Prophylaxis / Prevention

Means a preventive measure usage of antimicrobial to a group of animals that are not at risk from infected animals, but are given as a prevention to prevent the animals from getting infected. These animals are not of the same management or same premise with infected animals. The dose used is at sub therapeutic level.

Treatment / Therapeutic

Means to administer an antimicrobial agent to an individual or a group of animals showing clinical signs of an infectious disease

Subtherapeutic

A dose or concentration of a drug lower than that usually prescribed to treat a disease effectively. This refers to AGP, flushing and prophylaxis / prevention doses which are normally lower than therapeutic / treatment dose. The prolong subtherapeutic use of antimicrobials does increase the prevalence of resistance among bacteria especially those bacteria that linking human and animal health.

OIE List of Antimicrobial Agents Of Veterinary Importance

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). https://www.oie.int/fileadmin/Home/eng/Our_scientific_expertise/docs/pdf/AMR/A_OIE_List_antimicrobials_May2018.pdf

Unit Conversion and Abbreviations

UNIT CONVERSION	EXPLANATION
(imperial) gallon to Liter	1 gallon equals to 4.546 Liters
grams per ton	g/ton equals to parts per million (ppm)
mg/kg feed	mg/kg feed equals to parts per million (ppm)

SYMBOL / ABBREVIATION	EXPLANATION
mg	milligram
g	grams
kg	kilogram
t	ton (metric)
ml	millilitre
l	litre
ppm	parts per million

For more information on Unit Conversion, please refer to:

https://www.oie.int/fileadmin/Home/eng/Our_scientific_expertise/docs/pdf/AMR/ENG_AMUse_Annex_to_Guidance%20Final_2019.pdf

Note: Antibiotics with AMR Yellow colour coding indicates that bacteria are found to be resistant to that antibiotic base on surveillance study done under National antimicrobial resistance Committee (NARC)

INTRODUCTION



Veterinary Antimicrobials Guideline 2021, is a guideline provided to the veterinary practitioners involved in the animal health sector and the associated industry. This guideline provides some guidance on antimicrobials usage particularly the antibiotics used to treat infection from bacterial disease in animals. Antimicrobials are essential tool for veterinarians to ensure the maintenance of health and welfare of companion animals, livestock, wildlife and other animals. Veterinarians rely on antimicrobials to treat the animals and prevent suffering. Not only for the health and welfare of the animals but studies have shown that if the livestock suffered from diseases, it could lead to loss of production estimated around 20% of the total production. It is therefore critical that veterinarians should have access to these essential medicines and are prescribed responsibly.

The development of resistance to antibacterial drugs by bacterial populations is a growing global health issue, and this risk is increased by inappropriate use patterns, such as continuous use at sub therapeutic levels, or inappropriate choice of drug for the condition under treatment could have some impact on the drug resistant. Prudent use guidelines developed for veterinarians are therefore critical. The OIE has recognized that antimicrobial resistant (AMR) is a global public and animal health concern. Improper and irresponsible usage of antimicrobial drugs in human and animals will lead to the occurrence of AMR rapidly.

There is considerable pressure from the human health sector and the public to limit the usage of antimicrobial drugs in animals and the livestock industry. Nevertheless, for the purpose of maintaining animal health and welfare, the usage of antimicrobial drugs in veterinary medicine is essential. Hence, the prudent use of antimicrobials is of great importance to contain the development of AMR and ensure the implementation of preventive measures to reduce the need of antimicrobials in the farms is crucial.

In this regard, there is a need to produce a guideline on the usage of antimicrobials in animals for reference which is of national interest.



HOW TO USE THE GUIDELINE

This guideline is intended for animal health professionals and related personnel involved in the animal industry to use antimicrobials prudently and responsibly in maintaining animal health and welfare. This guideline should also be used in conjunction with existing national laws and regulations as well as professional technical and antimicrobial manufacturing guidelines.

This guideline is divided into two sections; Section A and B:

SECTION A

7

Principles of prudent use of antimicrobials in livestock which has been adopted from the ASEAN

SECTION B

Guides on the use and administration of antibiotics in livestock and companion animals which comprise:



01

Antibiotic Treatment & Metaphylaxis for livestock (oral),



02

Antibiotic Treatment in livestock (injection)



03

Antibiotic Treatment in companion animal

* This is not an exhaustive list, it will be reviewed and updated when necessary.

SECTION A

PRINCIPLES OF PRUDENT USE OF ANTIMICROBIALS IN LIVESTOCK



PRINCIPLE 1

The Use of Medically Important Antimicrobial in Human to Livestock Should Be Limited to Those Uses That Are Considered Necessary for Assuring Animal Health and Welfare

Antimicrobials are necessary for the health and welfare of animals. However, many antimicrobials specifically antimicrobials that are used in animals are also used in humans. Some of these are critical for preventing or treating life-threatening infections in humans. The OIE list of antimicrobial agents of veterinary importance includes some considered to be critically important both for human and animal health (shared class antimicrobials), such as fluoroquinolones and the 3rd and 4th generation of cephalosporins.

PRINCIPLE 2

The Use of Antimicrobials in Livestock Should Be Limited to Those Uses That Include Veterinary Oversight and Consultation

Medicated feeds are currently used in livestock for treatment, prevention of disease and production purposes. The department is looking at the purpose of using antimicrobial for disease prevention (prophylaxis and production) judiciously but will give consideration for metaphylaxis function. Veterinary oversight, including prescription and consultation, is an important mechanism for helping to assure appropriate use of antimicrobials. Veterinarians (or other suitably trained person authorised to prescribe antimicrobials in accordance with national legislation) play a critical role in the diagnosis of disease and in the decision-making process related to instituting measures to treat or prevent disease.

Responsible antimicrobial usage critically depends on the veterinary professional making a correct diagnosis such that appropriate treatment can be administered using the most suitable antimicrobial.

ASEAN GAHP guidelines for poultry specify that (i) the use of medicines must be under the supervision of veterinarian or competent authority, and (ii) the use of antimicrobials or medicated feeds for disease control must be in accordance with the instructions of a veterinarian following each country's regulations.

Section B in this guideline will provide guidelines for veterinarians (or authorised person) in prescribing antibiotics. It is recognised that the nature and extent of veterinary involvement can vary due to numerous factors such as geographic location, resources and animal production settings. The development of appropriate national strategies and roadmaps to phase-in or strengthen veterinary oversight on the use of antimicrobials in livestock, especially medically important antimicrobials, will be an important step towards prudent and responsible use of antimicrobials in animals.

PRINCIPLE 3

Only Antimicrobials Meeting the Criteria of Safety, Quality and Efficacy Is Used in Livestock, And Used According to The Intended Uses Approved by Authorities

The use of safe, quality and effective veterinary medicinal products (VMP) ensures that the intended treatment is effective in controlling disease, while minimizing adverse effects in animals, to the consumer or the environment.

This may be achieved through establishing effective regulatory and control systems for antimicrobials used in agriculture to ensure that:



Antimicrobials available for animals are safe, effective, and of consistent and high quality;



Accurate information is accessible by prescribers and user;



Veterinary medical products are disposed appropriately to prevent contamination of the environment.

Minimize the presence and use of fake, illegal or adulterated products that may be ineffective;



Access to these vital medicine is subject to effective, veterinary -guided oversight;



Veterinary medical products are stored and transported in a manner that maintains the effectiveness of the drug, such as ensuring cold chain where necessary;



Safety ensures that antimicrobials authorised are safe for the user, the consumer and the environment. Safety assessments include: (i) assessing the toxicology of the product understanding whether, and how the chemicals in the medicine could cause adverse reactions in the target species or in people, taking into account the way these chemicals cause changes to the normal biological functions of the body; (ii) setting a withdrawal period, if the antimicrobial is to be used in a livestock - this is the minimum length of time after treatment that must pass before an animal may go for slaughter or have its products, such as milk or eggs, considered to be safe for consumers.

Quality ensures that antimicrobials are manufactured to the high standard required. This will include ensuring that the applicant has demonstrated that: (i) the antimicrobial is manufactured appropriately; (ii) the manufacturing process delivers a reproducible product; (iii) the medicine will perform as it should, up to its expiry date.

Effectiveness ensures that antimicrobials will work against the microorganism causing illness in all the animals the medicine is authorised to treat. This will include ensuring that the applicant has demonstrated: (i) that antimicrobial resistance has been taken into account; (ii) that a correct dosage regimen has been set - how much, how often and for how long; (iii) that responsible use of antimicrobials warning is on the product literature and data sheet (Summary of Product Characteristics).



In general, an effective regulatory and control system to ensure safety, quality and effectiveness includes mechanisms for:



Registration and market authorisation of all antimicrobial products used for food animals and in agriculture;



Licensing of manufacturers, distributors, and personnel selling or prescribing any antimicrobial products used for food animals or in agriculture;



Ensuring that all antimicrobial products used for food animals and in agriculture are of adequate quality and are manufactured according to good manufacturing practices;



Combating the use of illegal, poor quality and prohibited drugs

The OIE Terrestrial Code and Codex Alimentarius provide guidance on the registration and quality assurance of VMPs. Evaluation for purpose of registration may include an assessment of quality control, therapeutic efficacy and potential to select for resistance, establishment of acceptable daily intake (ADI), maximum residue limit (MRL) and withdrawal periods in food producing animals, list of product characteristics and post-marketing antimicrobial surveillance, among other aspects, as determined by national registration requirements.

Pharmacovigilance is responsible for monitoring the safety of medicines in normal clinical use and during clinical trials. The marketing authorization holder (MAH) should be responsible for continuously monitoring the safety of its medicinal products for animal use, for informing the authorities of any changes that might have an impact on the marketing authorization, and for ensuring that the product information is kept up-to-date. Marketing authorization holders (MAH) record all suspected adverse reactions occurring in the countries, and which are brought to their attention spontaneously by the end users or occurring in the context of post-authorization study. For all medicinal products is mandatory to maintain a pharmacovigilance system master file (PSMF).

PRINCIPLE 4

Use “As Little as Possible, As Much as Necessary”

Antimicrobials are essential to protect the health and welfare of animals and should be used when needed. The overriding principle of antimicrobial prescribing is to “use as little as possible but as much as necessary” to address an infection.

Antimicrobials, when used responsibly: when they are needed, in the amount needed and under the supervision of a veterinarian, helps ensure greater animal health and welfare, and provide a safe and secure food supply. In this sense, it is crucial that antimicrobials are prescribed and administered at the correct dosage and following an accurate examination and clinical diagnosis, supported by sensitivity testing wherever possible. This can be summarized as the **5 R's: Right drug, Right time, Right dose, Right duration, and Right route.**

PRINCIPLE 5

Responsible and Prudent Use Activities Involve All Relevant Stakeholders

The successful implementation of prudent use in the livestock sector requires the cooperation of all stakeholders. These include the Competent Authority and stakeholders such as the veterinary pharmaceutical industry, veterinarians, animal feed manufacturers, distributors, and food animal producers, who are involved in the authorization, production, control, importation, exportation, distribution and use of VMP containing antimicrobial agents.

Activities associated with the prudent use of antimicrobials should involve all relevant stakeholders, who all have roles and responsibility in this area; the Competent Authority, as well as industry, pharmacists, retailers and wholesalers, feed business operators, food business operators, veterinary faculties and agricultural schools, veterinary professional associations, industry stakeholder associations and farmers' associations.

The control of AMR through prudent use of antimicrobials only if all stakeholders are well informed. Awareness campaigns, therefore, play a crucial role and need to be conducted regularly and updated as necessary. Prudent use campaigns in the livestock sector should be targeted at specific stakeholder groups in the agriculture sector, farmers, veterinarians, other professionals involved in animal production.

Awareness and education campaigns should include good animal husbandry practices and the appropriate use of antimicrobials. National guidelines and education programmes should promote best practices, including correct treatment, measures to prevent and reduce the transmission of pathogens, infection control, and hygiene measures.

The engagement and consultation of stakeholders prior to enforcement or introduction of prudent use policies or measures are critical for successful implementation. Parties who can see the benefits (e.g. to health, trade) or understand their contribution to the control of AMR are more likely to support prudent use activities. It is therefore important for regulators to maintain a high level of communication with all stakeholder groups, as well as to the general public, such as through regular dialogue, dissemination or publication of monitoring reports, guidelines, education material, and scientific publications.

PRINCIPLE 6

Prudent Use of Antimicrobials Is Part of Good Veterinary and Good Animal Husbandry Practice and Takes into Consideration Disease Prevention Practices Such as The Use of Vaccination and Improvements in Husbandry Conditions

Considering co-resistance and cross-resistance, any exposure to antimicrobials increases the occurrence of AMR. Therefore, to be effective in mitigating the risk of AMR, the main objective of prudent use is to bring about an overall reduction in the use of antimicrobials.

Preventing infections in the first instance is the best way to achieve this reduction and to minimise the need to use antimicrobials, as reducing the number of infections reduces the number of treatments needed.

Animal diseases and infections should primarily be prevented by ensuring biosecurity, following good production and good management practices, and implementing integrated disease control programmes to minimise the occurrence of diseases and eradicate endemic disease.



Measures such as discouraging health programmes in which animals are systematically treated with antimicrobials prophylactically; using scientifically proven, effective and safe alternatives to antimicrobials; using safe, high-quality feed and water; providing incentives to farmers to encourage them to adopt effective preventive measures, will aid towards minimising disease and decreasing use of antimicrobials; These approaches are in line with objective of the Global Action Plan to “reduce the incidence of infection through effective sanitation, hygiene, and infection prevention measures” and with AMAF 38th commitment to promote good husbandry practices as one of the ways to combat AMR.

The principle promoted by this strategy is that prevention is better than cure. A reduction in the incidence of animal disease and zoonotic infections will minimise the need for, and use of, antimicrobials. The objective of reducing the use of antimicrobials is also in line with animal welfare, which aims to reduce the density and production stress of the farm animal population.

High stocking density is a major risk factor in the emergence and spread of infections that require the use of antimicrobials to reduce the suffering of sick animals, while production stress increases an animal's susceptibility to disease. The ASEAN guidelines on ASEAN Good Animal Husbandry Practices for Layers and Broilers and ASEAN Good Animal Husbandry Practices (GAHP) Animal Welfare and Environmental Sustainability Module, Layers, Broilers and Ducks, also provide guidance for good husbandry practices in poultry farms.

PRINCIPLE 7

Surveillance, Monitoring and The Collection of Reliable Data Provide Evidence to Guide Policies and Inform on Effectiveness of Measures Associated with Prudent Use of Antimicrobials in Livestock

Surveillance and monitoring of antimicrobial resistance are necessary to provide information for carrying out risk assessment, for research purposes, evaluating antimicrobial prescribing practices, for prudent use recommendations, and the effectiveness of the measures taken to tackle antimicrobial resistance. Surveillance data to support prudent use measures include data on:

- | | |
|---|---|
| 01 Antimicrobial resistance in bacteria in animals; | 02 Antimicrobial use food animals for infections, prophylaxis and as growth promoters; |
| 03 National import and export of bulk chemicals with potential antimicrobial use | 04 Levels of antimicrobial agent residues in food from animal sources |

The data could be collected using one or more of the following sources:

- | | |
|--|---|
| 01 Antimicrobial production data from manufacturers; | 02 Volume of antimicrobials imported by importers and exporters; |
| 03 If possible, data on intended and actual usage from manufacturers, wholesale and retail distributors including feed mills and veterinary prescription records; | 04 Surveys of veterinarians, farmers and producers of livestock. |

SECTION B

GUIDELINES ON THE USE AND ADMINISTRATION OF ANTIBIOTICS IN LIVESTOCK AND COMPANION ANIMALS



USE AND ADMINISTRATION OF ANTIBIOTICS IN LIVESTOCK AND COMPANION ANIMALS

The usage of antibiotics in livestock is for treatment and metaphylaxis purposes whilst the usage in companion animal is for health and welfare of the animals. General guidelines should be followed when it is necessary to use antibiotics. Particular attention should focus on when antibiotic is used in feed or water for a large number of animals (livestock).

General Guidelines in Antibiotic Usage

The dispensation and administration of antibiotics should be prescribed by a registered veterinary surgeon.

For some of the Veterinary Clinically Important Antibiotic (VCIA) declared by OIE, such as Fluoroquinolones and for the third and fourth generation of Cephalosporins, are critically important both for human and animal health. Therefore, these two classes should be used according to the following recommendations:

Antibiotics in Feed and Drinking Water

Oral antibiotic treatment is often administered to groups of animals through a medicated feed, adding medication on top of the feed or by adding the antibiotic to drinking water. Most oral antibiotic treatments are used in poultry and swine farms for a group of animals rather than individually.

Table 1: Antibiotic Treatment & Metaphylaxis for Livestock (Oral)

No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
1	Aminoglycosides	Spectinomycin	AVI	Spectinomycin has activity against a wide variety of gram-positive and gram-negative bacteria, including E. coli, Klebsiella, Proteus, Enterobacter, Salmonella, Streptococci, Staphylococcus and Mycoplasma. It has minimal activity against anaerobes, most strains of Pseudomonas, Chlamydia, or Treponema.	a) Add sufficient amount to drinking water to attain a final concentration of 2 g/gallon. b) Add sufficient amount to drinking water to attain a final concentration of 1 g/gallon.		5 days	Muscle: 300 Liver: 2,000 Kidney: 5,000 Fat: 500 Eggs: 2,000
2	Aminoglycosides	Neomycin	AVI	To treat bacterial enteritis	a) Chickens, turkeys, ducks: Feed at levels of 70 – 140 g/ton of feed	3 – 5 days	7 days	Muscle: 500 Liver: 500 Kidney: 1,000 Fat: 500 Milk: 1,500

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No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
			BOV	Limited to topical formulations for skin, eyes, and ears, oral treatment of enteric infections.	<p>a) 4 – 7.5 g/day PO divided 2 – 4 times daily at regular intervals. Calves: 2 – 3 g/day, PO divided 2 – 4 times daily at regular intervals. Doses are not standardized; use for general guidance only.</p> <p>b) 10 – 20 mg/kg q12h (general guideline only). (Jenkins 1986)</p> <p>c) 7–12 mg/kg, PO q12h (Howard 1986)</p> <p>d) Feed at levels of 70 – 140 g/ton of feed</p>	3 – 5 days	7 days	Muscle: 300 Liver: 2000 Kidney: 5000 Fat: 500 Eggs: 2000
			CAP	To treat susceptible enteral infections	<p>a) Lambs: 0.75 – 1 g/day PO divided 2 – 4 times daily at regular intervals. Doses are not standardized; use for general guidance only.</p> <p>b) Feed at levels of 70 – 140 g/ton of feed or mix the appropriate dose in the drinking water which will be consumed by animals in 12 hours to provide 11 mg/kg or mix with reconstituted milk replacers to provide 200 – 400 mg/gallon</p>			Muscle: 500 Liver: 500 Kidney: 10,000 Fat: 500
			EQU	To treat susceptible enteral infections	<p>a) Adults: 4 – 7.5 g/day PO divided 2 – 4 times daily at regular intervals. Foals: 2 – 3 g/day PO divided 2 – 4 times daily at regular intervals. Doses are not standardized; use for general guidance only.</p> <p>b) 5 – 15 mg/kg PO once daily</p> <p>c) For intrauterine infusion: Neomycin alone: 3 – 4 grams. Most intrauterine treatments are commonly performed every day or every other day for 3 – 7 days.</p>			
			OVI	To treat susceptible enteral infections	<p>a) Lambs: 0.75 – 1 g/day PO divided 2 – 4 times daily at regular intervals. Doses are not standardized; use for general guidance only.</p> <p>b) Feed at levels of 70 – 140 g/ton of feed or mix the appropriate dose in the drinking water which will be consumed by animals in 12 hours to provide 11 mg/kg or mix with reconstituted milk replacers to provide 200 – 400 mg/gallon.</p>	3 – 5 days	7 days	Muscle: 500 Liver: 500 Kidney: 10,000 Fat: 500
			SUI	To treat susceptible enteral infections	<p>a) Young pigs: 0.75 – 1 g/day, PO divided 2 – 4 times daily at regular intervals. Doses are not standardized; use for general guidance only. (Brander, Pugh, and Bywater 1982)</p> <p>b) 7 – 12 mg/kg, PO q12h</p>	3 – 5 days	7 days	Muscle: 500 Liver: 500 Kidney: 10,000 Fat: 500



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
3	Aminoglycosides	Gentamicin <i>*Bacteria is found to be resistant to this antibiotic based on national surveillance</i>	SUI	For colibacillosis, Swine dysentery	1. Neonate: 6.6 mg gentamicin/L drinking water 2. Weaner and older: 1.1 mg/kg/day in drinking water (concentration of 25 mg/gallon) for 3 days, 3. Swine dysentery: 13.2 mg gentamicin/L drinking water or 2.2 mg gentamicin/kg bwt/day	3 days	10 days	Muscle: 100 Liver: 200 Kidney: 1,000 Fat: 100
4	Aminoglycosides	Apramycin	AVI	Treatment of bacterial enteritis, colibacillosis, salmonellosis. Not for use in laying hens where eggs are for human consumption.	250 – 500 mg of apramycin activity per liter for 5 days. This may be achieved by adding 50 g apramycin per 100 – 200 liters of water	5 days	7 days	
			SUI	Pigs (weaned piglets): Treatment of bacterial enteritis caused by Escherichia coli susceptible to apramycin.	20 – 40 mg/kg PO in drinking water	7 days	14 days	
			SUI	For the treatment of bacterial enteritis associated with organisms susceptible to apramycin in pigs, colibacillosis and salmonellosis in calves Escherichia coli septicaemia in young chickens. In vitro, the following organisms were susceptible to Apramycin at concentrations of 16 µg/ml or less: i) Gram-positive bacteria Staphylococcus aureus. ii) Gram-negative bacteria Bordetella bronchiseptica Escherichia coli, Campylobacter spp Klebsiella spp Salmonella spp Proteus spp Pseudomonas aeruginosa Shigella sonnei iii) Mycoplasma hyopneumoniae	To be administered via the drinking water. Treated pigs should consume sufficient medicated drinking water to obtain 7.5-12.5 mg apramycin per kg of bodyweight	7 days	14 days	Muscle: 500 Liver: 500 Kidney: 10,000 Fat: 500
			SUI	For the treatment of bacterial enteritis in young pigs caused by Escherichia coli and other organisms susceptible to apramycin.	100 ppm in feed	7 days	14 days	

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No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
			BOV	Treatment of susceptible bacteria enteritis	1. 20 – 40 mg/kg PO daily in drinking water 2. Calves: For the treatment of colibacillosis or salmonellosis: 1 – 2 sachets to be administered in the drinking water, milk, or milk replacer to provide 20 – 40 mg of apramycin activity per kg of bodyweight daily according to the severity of the disease. Continue treatment for 5 days.	5 days	28 days	
5	Amphenicols	Florphenicol	AVI	For treatment of respiratory disease caused by <i>Ornithobacterium rhinotracheale</i> (ORT) is a Gramnegative bacterium that affects the respiratory tract causing severe respiratory signs, depression, reduction in feed uptake and growth rate.	35 mg/kg bw/day for 3 days via drinking water	3 days	5 days	
			AVI	Treatment of bacterial infections associated with <i>Salmonella</i> spp. and <i>E. coli</i> susceptible to florfenicol.	20mg Florfenicol per kg body weight in drinking water	5 days	5 days	
			SUI	For the treatment of swine respiratory disease (SRD) associated with <i>Actinobacillus pleuropneumoniae</i> , <i>Pasteurella multocida</i> , <i>Streptococcus suis</i> , and <i>Bordetella bronchiseptica</i> in groups of swine in buildings experiencing an outbreak of SRD. Treatment of salmonellosis, colibacillosis, streptococcosis and respiratory diseases including pheuropneumonia, pneumonic pasteurellosis, pneumonic mycoplasmosis, etc	200 ppm	5 days	14 days	
			SUI	Treatment of bacterial infections associated with <i>Actinobacillus pleuropneumoniae</i> , <i>Pasteurella multocida</i> , <i>Mycoplasma pneumoniae</i> (Mycoplasma) and other respiratory diseases, <i>Salmonella typhimurium</i> , and <i>Streptococcus suis</i> susceptible to florfenicol	100mg Florfenicol per 10kg body weight in drinking water	5 days	16 days	



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
6	Cephalosporins	Cefalexin	BOV	Against gram positive and gram-negative bacteria	7 mg/kg bw 200mg/quarter for up to 4 consecutive milkings, IM treatment in veal calves at dose of 15mg/kg bw twice a day for up to 3 days	5 days	5-10 days	
			OVI	Against gram positive and gram-negative bacteria	10 mg/kg bw	5 days	5-10 days	
			SUI	Against gram positive and gram-negative bacteria	10 mg/kg bw	5 days	5-10 days	
7	Ionophores	Lasalocid	AVI	i) For coccidiosis caused by Eimeria necatrix, E. tenella, E. acervulina, E. brunetti, E. maxima and E. mivati in broiler or fryer chickens. ii) For coccidiosis caused by Eimeria meleagritidis, E. gallopavonis, and E. adenoeides in turkeys.	113 ppm	14 days	0 days	Muscle: 400 Liver: 1,200 Kidney: 600 Skin+ 600
			OVI	Treatment of coccidiosis caused by Eimeria ovinoidalis (syn ninakohlyakimovae) and Eimeria ovina in lambs being fed in confinement.	36 mg/kg (0.0036%) of lasalocid sodium activity per tonne of complete diet.	Nil	2 days	
8	Ionophores	Monensin	AVI	Broiler and layer replacement chickens: For coccidiosis caused by Eimeria acervulina, E. brunetti, E. maxima, E. necatrix and E. tenella.	100 to 125 ppm	14 days	0 days	Muscle: 10 Liver: 10 Kidney: 10 Fat: 100
9	Ionophores	Narasin	AVI	For coccidiosis caused by E. necatrix, E. tenella, E. acervulina, E. brunetti, E. mivati and E. maxima in broiler chickens.	70 g per tonne of feed	14 days	0 days	Muscle: 15 Liver: 50 Kidney: 15 Fat: 50
10	Ionophores	Salinomycin	AVI	For coccidiosis caused by Eimeria acervulina, E. brunetti, E. maxima, E. mivati, E. necatrix and E. tenella in broiler chickens and in replacement birds intended for use as caged layers.	60ppm	14 days	0 days	Egg: 20 Intestine: 100

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No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MPL (µg/kg)
			AVI	For coccidiosis in broiler chicken caused by Eimeria necatrix, E. tenella, E. acervulina, E. brunetti, E. maxima and E. mivati	500g per ton of feed	14 days	5 days	Muscle 0.1 Fat 0.4 Liver 0.5 Kidney 0.5 Edible offal 0.5 Eggs 0.2
			LEP	Treatment of coccidiosis in weaned and growing rabbits on farms with a confirmed history of coccidiosis caused by Eimeria spp.	20 grams per ton	5 days	5 days before slaughter	
11	Ionophores	Semduramicin	AVI	For coccidiosis caused by Eimeria acervulina, E. brunetti, E. maxima, E. mivati, E. necatrix and E. tenella in broiler chickens.	25ppm	14 days	Zero (0) days	Meat: 50 Liver: 500 Kidney: 200 Fat: 500
12	Lincosamides	Lincomycin	AVI	Treatment and metaphylaxis of necrotic enteritis caused by Clostridium perfringens.	3-6 mg/kg of body weight	7 days	5 days	Muscle: 200 Liver: 500 Kidney: 500 Fat: 100
			BOV	Treatment of Septic arthritis, mastitis, and abscesses, Refractory infections:	Septic arthritis, mastitis, and abscesses: 5 mg/kg q24h IM for 5-7 days. • Refractory infections: 10 mg/kg q12h IM.	5-7 days		Milk(µg/L): 150
			OVI	Septic arthritis	5 mg/kg q24h for 3-5 days IM.			
			SUI	For mycoplasmal (M. hyopneumoniae) pneumonia, swine dysentery caused by Brachyspira hyodysenteriae	i) 200 grams per ton of feed or 11 mg/kg IM once Daily Or 11 mg/kg IM once daily for 3 – 7 days; or added to drinking water at a rate of 250 mg/gallon (average of 8.36 mg/kg/day) ii) Swine dysentery: 250 mg per gallon of drinking water, which is approximately 8.4 mg/kg/day if given as the only source of drinking water for 5-10 days. iii) Mycoplasma infections: 11 mg/kg q24h or 11 mg/kg q12h IM injection.	3-7 days or 5-10 days depending on product and route of administration. depending on product and route of administration.	5 days	Muscle: 100 Liver: 500 Kidney: 1,500 Fat: 100



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
13	Macrolides	Erythromycin	General	With Mycoplasma hyopneumoniae and porcine proliferative enteropathy (ileitis) associated with Lawsonia intracellularis	Cattle, sheep, goat and horse: 2.2 - 4.4 mg/kg body weight; Pigs: 2.2 - 6 mg/kg body weight		Cattle: 14 days (meat), 72 hours (milk)	
			AVI	Chicken: CRD, ornithosis, infectious synovitis and infectious coryza in poultry.	92.5-185 grams per ton	Feed for 5 to 8 days	6 days	Muscle: 100 Liver: 100 Kidney: 100
				PTurkey: Treatment of chronic respiratory disease	92.5-185 grams per ton	Feed for 5 to 8 days	6 days	Fat:100 Eggs: 50
				1. Chickens and turkeys: Treatment of infectious coryza, synovitis, chronic respiratory disease (due to M. gallisepticum etc) 2. Turkeys: Treatment of infectious sinusitis (due to M. gallisepticum), and complex disease syndromes such as bluecomb	1. Respiratory diseases and complex disease syndromes (115.6 mg active/L drinking water):4 g of powder per 4 L or 200 g (2 pouches) per 200 L of drinking water and mix thoroughly. 2. FOR AUTOMATIC PROPORTIONER: Set the apparatus to distribute 30 mL per 4 L of drinking water (1 oz/gallon U.S.). 3. Prepare the stock solution by dissolving 500 g (5 pouches) in 3.8 L of water. 4. This will medicate 500 L of drinking water.	Use as the only source of drinking water for 5 days. If birds have not fully responded, continue the medication for 2 or 3 more days	6 days	
			AVI	Treatment of Chronic Respiratory Disease (CRD) in chickens caused by Mycoplasma organisms.	25.5 mg/kg erythromycin bodyweight per day).	1-5 days	6 days	
			AVI	Infectious fowl coryza	92.5 grams Erythromycin thiocynate per ton of feed for 7 to 14 days.	7-14days	6 days	

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			General	1. It is indicated in bacterial pharyngitis, bronchitis, pneumonia, amoebic dysentery, sinusitis, abortion, brucellosis. 2. Pink eye and Galsser's disease in horses, swine erysipelas and enzootic pneumonia in pigs and CRD, ornithosis, infectious synovitis and infectious coryza in poultry.	Cattle, sheep, goat and horse: 2.2 - 4.4 mg/kg body weight; Pigs: 2.2 - 6 mg/kg body weight Poultry: 20 mg / kg / day for 5 days or 5 g of erythromycin in 100 liter of drinking water	3-5 days	6 days	Muscle: 100 Liver: 100 Kidney: 100 Fat: 100 Eggs: 50 Milk (µg/L):40 Intestine: 300
14	Macrolides	Spiramycin	AVI	Respiratory, gastrointestinal and locomotory apparatus bacteria diseases caused by gram + bacteria	500-1000mg/kg feed or 70mg/kg bw	3-5 days	15 days	Muscle: 200 Liver: 600 Kidney: 800 Fat: 300
			SUI	Bacterial enteritis caused by Gram + bacteria, Enzootic pneumonia	25mg/kg bw	3-5 days	20 days	Muscle: 200 Liver: 600 Kidney: 300 Fat: 300
15	Macrolides	Tilmicosin	AVI	For treatment of respiratory disease associated with Mycoplasma	15-20 mg/kg bodyweight in chickens and 10-27 mg/kg bodyweight in turkeys for 3 days, which may be achieved by the inclusion of 75 mg tilmicosin per litre.	3 days	12 days	Muscle:150 Liver: 2,400 Kidney: 600 Skin/Fat: 250
			BOV	Treatment of respiratory infections include of BRD (M. haemolytica, P. multocida)	568-757 grams per ton of feed to provide 12.5 mg/kg bodyweight for 14 days.	14 days	28 days (meat) Milk (82 days)	Muscle:100 Liver: 1,000 Kidney: 300 Fat: 100
			SUI	Pneumoniae in Swine caused by Actinobacillus (Haemophilus) Pleuropneumoniae, Mycoplasma Hyopneumonia, Pasteurella multocidal, and other organisms susceptible to tilmicosin.	568-757 grams per ton of feed to provide 12.5 mg/kg body weight for 14 days or 568-757 grams per ton of feed to provide 12.5 mg/kg body weight for 14 days.	14 days	7 days	Muscle:100 Liver: 1,500 Kidney: 1,000 Fat: 100



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
			SUI	(Water Soluble) For the treatment of respiratory disease in pig herds, associated with Mycoplasma hyopneumoniae, Pasteurella multocida, Actinobacillus pleuropneumoniae and other organisms susceptible to tilmicosin.	To be included in the drinking water to provide a daily dose of 15-20 mg/kg bodyweight for 5 days, which may be achieved by the inclusion of 200 mg tilmicosin per litre.	5 days	14 days	Muscle:100 Liver: 1,500 Kidney: 1,000 Fat: 100
			SUI	For the treatment of Pneumoniae in Swine caused by Actinobacillus (Haemophilus) Pleuropneumoniae, Mycoplasma Hyopneumonia, Pasteurella multocidal, and other organisms susceptible to tilmicosin.	200 to 400 ppm	14 days	7 days	Muscle:100 Liver: 1,500 Kidney: 1,000 Fat: 10
			SUI	For the treatment of pneumonia in weaned fattening pigs, caused by Actinobacillus pleuropneumoniae, Mycoplasma hyopneumoniae, Pasteurella multocida sensitive to tilmicosin	200-400g tilmicosin activity per ton of feed for 14 days. This provides a dose rate of 8-16 mg/kg bodyweight/DAY and is achieved by the incorporation of 2-4 kg per ton of feed.	14 days	14 days	Muscle: 50 Liver: 1000 Kidney: 1000 Fat: 50
16	Macrolides	Tylosin	AVI	1. Chickens: Treatment of chronic respiratory diseases (CRD) caused by Mycoplasma gallisepticum and Mycoplasma synoviae when the disease has been established in the flock. Treatment of necrotic enteritis caused by Clostridium perfringens when the disease has been established in the flock. 2. Turkeys: Treatment of infectious sinusitis caused by Mycoplasma gallisepticum. when the disease has been established in the flock.	1. Chickens: For the treatment of chronic respiratory disease: 75 to 100mg tylosin per kg body weight per day for 3 to 5 days. For the treatment of necrotic enteritis: 20mg tylosin per kg body weight per day for 3 days. 2. Turkeys: 75 to 100mg tylosin per kg body weight per day for 3 to 5 days.	3-5 days	Turkeys: 2 days Chickens: 1 day Egg: Turkeys: Zero days Chickens: Zero days	Muscle: 100 Liver: 100 Kidney: 100 Fat: 100 Egg: 200

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No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
			AVI	Treatment of necrotic enteritis caused by <i>Clostridium perfringens</i>	20 mg tylosin/kg bw	3 days	1 day Eggs: 0 day	
			SUI	Treatment of porcine proliferative enteropathies (ileitis) associated with <i>Lawsonia intracellularis</i> .	100 grams per Ton of Feed.	14 days	0 days	Muscle:100 Liver: 100 Kidney: 100 Fat: 100
			SUI	Treatment of Porcine Intestinal Adenomatosis (Ileitis) associated with <i>Lawsonia intracellularis</i> .	10 mg/kg bw	7 days	1 days	
			SUI	Treatment of swine dysentery associated with <i>Brachyspira hyodysenteriae</i> .	100 grams per Ton of Feed.	14 days	0 days	
			SUI	For treatment of swine dysentery associated with <i>Brachyspira hyodysenteriae</i>	40-100 grams Administer in feed as tylosin phosphate after treatment with tylosin tartrate in a liter drinking water; 0.25 gram per gallon in drinking water for 3-10 days, 40-100 grams per ton in feed	14 days	0 days	
			SUI	Treatment of enzootic pneumonia caused by <i>Mycoplasma hyopneumoniae</i> and <i>Mycoplasma hyorhinis</i> when the disease has been established in the herd. Treatment of Porcine Intestinal Adenomatosis (Ileitis) associated with <i>Lawsonia intracellularis</i> when the disease has been established in the herd.	For the treatment of enzootic pneumonia: 20mg tylosin per kg body weight per day for 10 days. For the treatment of ileitis or PIA: 5 to 10mg tylosin per kg body weight per day for 7 days. By oral administration.	10 days 7 days	1 day	
			BOV	Treatment of BRD caused by <i>Mannheimia</i> , <i>Pasteurella multocida</i> , and <i>Histophilus somni</i> (formerly <i>Haemophilus somnus</i>). It is used for interdigital necrobacillosis (foot rot) in cattle caused by <i>Fusobacterium necrophorum</i> or <i>Bacteroides melaninogenicus</i> .	40mg/kg bw orally in milk replacer for calves, 4-10mg/kg bw IM in adult cattle	3-5 days	21 days	Muscle: 100 Liver: 100 Kidney: 100 Fat: 100 Milk (µg/L): 50



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
			BOV	Calves: For the treatment of Pneumonia due to Mycoplasma spp, when the disease has been diagnosed in the herd	Calves: Pneumonia: 20mg to 40mg of Tylosin per kg of body weight) 2 times daily for 7 to 14 days.	7-14 days	Meat and offal: 12 days.	Muscle:100 Liver: 100 Kidney: 100 Fat: 100 Milk (µg/L): 50
			BOV	Treatment of pneumonia caused by Mycoplasma spp.	40 mg tylosin/kg bw	14 days	12 days	Muscle: 100 Liver: 100 Kidney: 100 Fat: 100 Milk (µg/L): 50
17	Macrolides	Tylosin, Sulfamethazine	SUI	For treatment of Bordetella bronchiseptica rhinitis; swine dysentery associated with Brachyspira hyodysenteriae; swine pneumonias caused by bacterial pathogens (Pasteurella multocida and/or Arcanobacterium pyogenes).	100g of tylosin and 100g of sulfamethazine per ton of feed	14 days	15 days	Muscle:100 Liver: 100 Kidney: 100 Fat: 100
18	Orthosomycins	Avilamycin	AVI	Broiler chickens: For the treatment of necrotic enteritis associated with Clostridium perfringens	100 grams per ton	14 days	Nil	Muscle:200 Liver: 300 Kidney: 200 Skin/ Fat: 200
			AVI	For of necrotic enteritis due to Clostridium perfringens in growing broiler chickens.	15-30 ppm	14 days	0 days	Muscle:200 Liver: 300 Kidney: 200 Skin/ Fat: 200
			LEP	Used for treating enteric disease rabbits.	80 grams per ton	14 days	Nil	Muscle:200 Liver: 300 Kidney: 200 Skin/ Fat: 200
			SUI	Used for treating enteric disease in pig, and post-weaning diarrhea associated with Escherichia coli in pigs.	80-100 grams per ton	14 days	Nil	Muscle:200 Liver: 300 Kidney: 200 Skin/ Fat: 200

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No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
19	Penicillins	Amoxicillin	AVI	Chicken: For the treatment of Pasteurellosis and Colibacillosis. Turkeys: For the treatment of Pasteurellosis Ducks: For the treatment of infections caused by <i>Streptococcus bovis</i> , <i>Pasteurella antipestifer</i> and <i>E. Coli</i>	1. Chickens: 15mg Amoxicillin Trihydrate per kg body weight on alternate days. Total treatment period should be 3 days or in severe cases for 5 days. 2. Ducks: 20mg Amoxicillin Trihydrate per kg body weight on alternate days for 3 days. 3. Turkeys: 15mg to 20mg Amoxicillin Trihydrate per kg body weight on alternate days for 5 days.	3- 5d 5d	Chickens: 1 day Ducks: 9 days Turkeys: 5 days	Muscle: 50 Liver: 50 Kidney: 50 Fat: 50
			BOV	Amoxicillin is used for a variety of infections in all species, including urinary tract infection, soft tissue infections, and pneumonia. It is generally more effective for infections caused by gram-positive bacteria.	6.6-22 mg/kg q8-12h PO (suspension).		Withdrawal time: (Cattle only) 25 days meat, 96 hours milk.	Muscle: 50 Liver: 50 Kidney: 50 Skin/ Fat: 50 Milk (µg/L): 4
			SUI	Salmonellosis and Pasteurellosis, respiratory infections caused by <i>E. coli</i> susceptible to Amoxicillin.	Pigs: 20 mg per kg body weight per day, The dose should be divided and administered at 12 hour intervals	5 days	6 days	Muscle: 50 Liver: 50 Kidney: 50 Skin/Fat: 50
			SUI	For the treatment of diseases caused by <i>Streptococcus suis</i> in weaned piglets.	Via Feed : 15 mg amoxicillin / kg body weight daily or 400 g of amoxicillin / ton for feed	14 days	4 days	
20	Penicillins	Penicillin procaine	AVI	Aid in the treatment of necrotic enteritis	55 mg/kg (0.0055%) of penicillin	5 days	2 days (meat)	Muscle: 0 Liver: 50 Kidney: 50 Eggs: 0
21	Penicillins	Ampicillin <i>*Bacteria is found to be resistant to this drug based on national surveillance</i>	AVI	Ampicillin is indicated in patients with infections caused by susceptible bacteria, such as skin and soft tissue infections, UTIs, and pneumonia.	1.65 g/L drinking water		Nil	Muscle: 50 Liver: 50 Kidney: 50 Fat: 50



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
22	Phosphonic acid	Fosfomycin	AVI	To treat E. coli and Salmonella spp. infections	150 pg/mL drinking water for 5 consecutive days		3 days	
			SUI	To treat E. coli and Salmonella spp. Infections, (Haemophilus parasuis, Streptococcus suis, Pasteurella multocida, Bordetella bronchiseptica, Staphylococcus hyicus, Escherichia coli)	PO administration of 30 mg/kg b.w.	3 to 5 days	3 days	
23	Pleuromutilins	Tiamulin	AVI	Chicken, turkey: Treatment of Mycoplasma pneumonia, infectious sinusitis and infectious synovitis	25 mg Tiamulin fumarate / kg bodyweight / day via drinking water	3 to 5 days	Edible tissue: 3 days Eggs: 0 day	
			AVI	For the treatment of chronic respiratory disease (CRD) and air sacculitis caused by Mycoplasma gallisepticum and Mycoplasma synoviae	250 - 500 ppm	3 to 5 days	Meat and offal: 1 day Eggs: 0 day	
			AVI	Treatment of infectious sinusitis and airsacculitis caused by Mycoplasma gallisepticum, Mycoplasma meleagridis and Mycoplasma synoviae in turkeys	Turkey: 32.4 mg tiamulin/kg bw/ day or 32.4 ml/ 100 kg in drinking water.	5 days	1 day	Muscle, skin+ fat: 100 Liver: 300
			SUI	Treatment for Infection of the digestive system: Porcine Proliferative Enteropathy (syn. Ileitis) caused by Lawsonia intracellularis, Dysentery, caused by Brachyspira hyodysenteriae, Porcine Colon Spirochaetosis (PCS), caused by Brachyspira pilosicoli	10 mg Tiamulin fumarate / kg bodyweight / day	3 to 5 days	7 days	Muscle: 3,600 Liver: 10,800 Kidney: 14,400 Fat: 14,400

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			SUI	Treatment for Infection of the respiratory tract: Pleuropneumonia, caused by <i>Actinobacillus pleuropneumoniae</i> (APP) Porcine Respiratory Disease Complex (PRDC), complicated by the above mentioned pathogens as well as <i>Pasteurella multocida</i> and <i>Mycoplasma hyorhinis</i> Enzootic pneumonia (EP), caused by <i>Mycoplasma hyopneumoniae</i>	15 - 25 mg Tiamulin fumarate / kg bodyweight / day	3 to 5 days	7 days	
			SUI	For the treatment of swine dysentery or colitis caused by <i>Brachyspira pilosicoli</i> .	100 - 200 ppm	7 to 10 days	6 days	
			SUI	For the treatment of ileitis caused by <i>Lawsonia intracellularis</i> .	150 ppm	10 to 14 days	6 days	
			SUI	For the treatment of enzootic pneumonia caused by <i>Mycoplasma hyopneumoniae</i> .	100 -200 ppm	7 to 10 days	6 days	
24	Polypeptides	Bacitracin methylenedisalicylate	AVI	Broiler chicken: For treatment of necrotic enteritis caused or complicated by <i>Clostridium</i> spp. or other organisms susceptible to bacitracin.	50 grams per ton	7 days	0 days	
			SUI	Treatment of bacterial enteritis	55 mg/kg	7 days	Nil	
25	Polypeptides	Enramycin	AVI	Treatment of necrotic enteritis due to <i>Clostridium perfringens</i> in broiler chicken.	20 ppm	10 days	Broiler chicken meat and offal: zero day	



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
26	Quinolones	Enrofloxacin	AVI	1. For susceptible gram-negative infections 2. Chickens: Mycoplasma gallisepticum, Mycoplasma synoviae, Avibacterium paragallinarum, Pasteurella multocida, Escherichia coli. 3. Turkey: Mycoplasma gallisepticum, Mycoplasma synoviae, Pasteurella multocida, Escherichia coli.	10 mg/kg body weight per day	3-5 consecutive days.	Chicken: 7 days; Turkey: 13 days	Muscle: 30 Liver: 30 Kidney: 30
			LEP	Treatment of infectious diseases caused by Pasteurella multocida and for the treatment of bacterial enteritis caused by E.coli.	10 mg/kg body weight per day	5 consecutive days.	15 days	
			SUI	Respiratory and alimentary tracts of bacterial or mycoplasmal origin (e.g. pasteurellosis, mycoplasmosis, coli-bacillosis, coli-septicaemia and salmonellosis), and multifactorial diseases such as atrophic rhinitis and enzootic pneumonia	1.5 – 5 mg/kg bodyweight.	Daily for 3-5 consecutive days.	10 days	Muscle: 30 Liver: 30 Kidney: 30
27	Sulfonamides	Sulfamethazine	AVI	Treated may include pneumonia, intestinal infections (especially coccidia), soft tissue infections, and UTIs, Infectious Coryza (Avibacterium paragallinarum), Acute Fowl Cholera (Pasteurella multocida), Pullorum Disease (Salmonella Pullorum)	134 to 196 mg/kg/day body weight in chickens		10days	

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			BOV	Treatment of pneumonia Bovine Respiratory Disease Complex (Shipping Fever Complex) (<i>Pasteurella</i> spp.), Colibacillosis (Bacterial Scours) (<i>Escherichia coli</i>), Necrotic Pododermatitis (Foot Rot) (<i>Fusobacterium necrophorum</i>) Calf Diphtheria (<i>Fusobacterium necrophorum</i>), Acute Metritis (<i>Streptococcus</i> spp.)	220 mg/kg as initial dose, followed by 110 mg/kg q24h PO. Or in drinking water: 237 mg/kg as initial dose, followed by 119 mg/kg q24h PO or 350-400 mg/kg PO as a single bolus dose		10 days 18days bolus dose	
			SUI	Treated may include pneumonia, intestinal infections (especially coccidia), soft tissue infections, and UTIs	In drinking water: 237 mg/kg as initial dose, followed by 119 mg/kg q24h PO.		15 days	
28	Sulfonamides	Trimethoprim+ Sulfonamide <i>* Bacteria is found to be resistant to this drug based on national surveillance</i>	AVI	For use in the treatment of diseases caused by bacteria sensitive to potentiated sulphonamides including infections due to <i>Salmonella</i> infection and pasteurellosis. For the treatment of respiratory infections caused by <i>E. coli</i> susceptible to trimethoprim and sulfamethoxazole	50 – 100 mg/kg PO q12h	5 days	7 days	Muscle: 50 Intestine: 50 Eggs: 50
			SUI	For the treatment of respiratory infections caused by <i>Actinobacillus pleuropneumoniae</i>	25 mg /kg bwt/day	3 – 4 days	5 days	Muscle: 50 Intestine: 50
29	Streptogramins	Virginiamycin	AVI	Treatment of necrotic enteritis caused by <i>Clostridium perfringens</i> susceptible to virginiamycin	22g/ton (metric) feed	14 days	Zero (0) days	Muscle: 10 Liver: 10 Kidney: 60 Fat: 30
			SUI	Treatment of necrotic enteritis (<i>Clostridium perfringens</i>), and treatment for swine dysentery (<i>Brachyspira hyodysenteriae</i>). Not for use in breeding swine over 54kg.	110 g/ton (metric) feed for 2 weeks followed by 55 g/ton (metric) feed	2 weeks	Nil	Muscle: 200 Liver: 400 Kidney: 500 Fat: 500
30	Tetracycline	Chlortetracycline	AVI	1. Treatment of infectious synovitis caused by <i>M. synoviae</i> susceptible to chlortetracycline 2. This antimicrobial can use for treatment of chlamydiosis and coccidiosis	100 to 200 grams per ton Treatment for coccidiosis: 20-25mg/kg feed (layer) 60mg/kg in drinking water	7to14 days Do not feed to chickens over 16 weeks of age.		Muscle: 200 Liver: 600 Kidney: 1,200 Eggs: 400
			BOV	Treatment of chlamydial diseases, heartwater (<i>Ehrlichia ruminantium</i>) and anaplasmosis (<i>Anaplasma marginale</i>)	10-20 mg/kg		10 days before slaughter	Muscle: 200 Liver: 600 Kidney: 1,200 Milk (µg/L): 100



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
			SUI	Treatment against mycoplasma, spirochetes (including the Lyme disease organism), Chlamydia, and Rickettsia. Against gram-positive bacteria, the tetracyclines have activity against some strains of staphylococcus and streptococci, but resistance of these organisms is increasing. Gram-positive bacteria include: Actinomyces spp., Bacillus anthracis, Clostridium perfringens and tetani, Listeria monocytogenes, and Nocardia. Among gram-negative bacteria include Bordetella spp., Brucella, Bartonella, Haemophilus spp., Pasteurella multocida, Shigella, and Yersinia pestis.	10 – 20 mg/kg PO 6 – 10 mg/kg IV or IM;			Muscle: 200 Liver: 600 Kidney: 1,200
31	Tetracycline	Doxycycline	AVI	Colibacillosis, CRD and Mycoplasmosis produced by microorganisms sensitive to doxycycline.	Oral, in the drinking water. 50-100 mg doxycycline/litre water	3-5 days	5 days	Muscle: 100 Liver: 300 Kidney: 600
			AVI	Chickens (broilers): For the treatment of Chronic Respiratory Disease (CRD) caused by Mycoplasma gallisepticum.	Product which Each gram contains 500mg of Doxycycline (as hydrochloride): 20 mg of doxycycline) / kg body weight / day for 3 - 5 days		6 days	Muscle: 100 Liver: 300 Kidney: 600
			AVI	Infections of the respiratory tract caused by Mycoplasma spp., Escherichia coli, Haemophilus paragallinarum and Bordetella avium; Enteritis caused by Clostridium perfringens and Clostridium colinum	Product which Each gram contains 500mg of Doxycycline Hyclate: 25mg doxycycline hyclate per kg body weight per day, for 3 to 5 consecutive days	3-5 days	5 days	Muscle: 100 Liver: 300 Kidney: 600
			BOV	Treating pneumonia caused by Mycoplasma and Past. Haemolytica, anaplasmosis	5 mg doxycycline hyclate/kg body weight/ twice daily for twice the recommended duration (10 days)	5 days	7 days	Muscle: 100 Liver: 300 Kidney: 600

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			BOV	Cattle (Pre-ruminant calves): -Bronchopneumonia and pleuropneumonia caused by Pasteurella spp., Streptococcus spp., Trueperella pyogenes, Histophilus somni and Mycoplasma spp.	5 Cattle (Pre-ruminant calves): for use in milk replacer 10mg doxycycline hyclate per kg body weight per day, divided over 2 administrations, for 3 to 5 consecutive days.	3-5 days	7 days	
			SUI	Respiratory infections produced by Actinobacillus pleuropneumoniae, Pasteurella multocida and Mycoplasma hyopneumoniae.	Oral, in the drinking water. 5-10 mg doxycycline/kg b.w./day	5 days	4 days	Muscle: 100 Liver: 300 Kidney: 600
			SUI	For the treatment of clinical respiratory infection caused by sensitive strains of Pasteurella multocida. In case of any infective process, a bacteriological confirmation of the diagnosis is recommended, as well as a sensitivity test of the bacteria causing the process.	Product which Each gram contains 500mg of Doxycycline (as hydrochloride): 10 mg of doxycycline) / kg body weight / day for 5 days	3-5 days	8 days	Muscle: 100 Liver: 300 Kidney: 600
32	Tetracycline	Doxycycline	SUI	- Atrophic rhinitis caused by Pasteurella multocida and Bordetella bronchiseptica; - Bronchopneumonia caused by Pasteurella multocida, Streptococcus suis and Mycoplasma hyorhinis; - Pleuropneumonia caused by Actinobacillus pleuropneumoniae.	Pigs: for use in drinking water 10mg doxycycline hyclate (corresponding to 20mg of product) per kg body weight per day, for 3 to 5 consecutive days	3-5 days	8 days	Muscle: 100 Liver: 300 Kidney: 600
33	Tetracycline	Oxytetracycline	BOV	Treatment of bovine respiratory disease (BRD) caused by Pasteurella multocida, Mannheimia haemolytica, and Histophilus somni (formerly Haemophilus somnus)	11 mg/kg/day PO q12hr	5 days	7days-28days depending on product	Muscle: 100 Liver: 300 Kidney: 600 Fat: 10 Milk (µg/L): 100



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
			AVI	Reduction of mortality rate due to air sacculitis caused by Escherichia coli susceptible to oxytetracycline	500g oxytetracycline/ton feed	5 days	7 days	Muscle: 100 Liver: 300 Kidney: 600 Fat: 10 Eggs: 200
			SUI	Treat atrophic rhinitis, pneumonic pasteurellosis, and Mycoplasma infections	22.05mg/ kg BW	5 days	28 days and up to 42 days, depending on product	
34	Tetracycline	Tetracycline <i>*Bacteria is found to be resistant to this drug based on national surveillance</i>	BOV	Treat a variety of infections, including soft tissue infections, pneumonia, and urinary tract infections (UTIs), enteritis	11 mg/kg q12h, or 22 mg/kg once daily administered in the water or as a bolus		Oral: 5 days for meat; Intrauterine: 18 days for meat and 72 hours for milk; and 12, 14, and 24 days when oral tablets are used for intrauterine treatment	Muscle: 200 Liver: 600 Kidney: 1,200 Milk (µg/L): 100
			SUI	Treat a variety of infections, including soft tissue infections, pneumonia, and urinary tract infections (UTIs).	11 mg/kg q12h, or 22 mg/kg once daily administered in the water or as a bolus			Muscle: 200 Liver: 600 Kidney: 1,200
35	Hydroxy-quinoline compound	Halquinol		Treatment of scours in weaner and fattening pigs at least four weeks old and above caused or complicated by Balantidium coli, E. coli and Salmonella spp. and to help control outbreaks at non-specific scouring in pig at this age.	120 to 360 ppm	7 to 10 days	7 days	Muscle: 40 Liver: 500 Kidney: 9,000 Fat: 350

Table 2: Antibiotic Treatment in Livestock (Injection)

No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Route of administration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
1	Aminocoumarin	Novobiocin	BOV	1. For treatment of bovine mastitis in lactating and dry dairy cows alone or in combination with penicillin G. 2. For use in dry dairy cattle as a mastitis tube.	A dose of 200 mg/quarter is recommended.	5 days	Intramammary Infusion	Do not use 30 days prior to calving. Milk must not be used for 72 hours after calving. Slaughter withdrawal (at labeled doses) = 30 days.	
2	Penicillin	Benzyl penicillin/Sodium or Potassium Penicillin G	BOV	1. Indicated for treatment of gram-positive cocci that cause respiratory infections, abscesses, and urinary tract infections. 2. For susceptible organisms include gram-positive bacilli and anaerobic bacteria.	Sodium or potassium penicillin G: 20,000 units/kg IM or IV, q6h.		Intramuscular/ Intravenous	10 days meat, 96 hours milk.	Muscle: 50 Liver: 50 Kidney: 50 Milk (µg/L): 4
			CAP, OVI	3. Most gram-negative bacilli, especially those of enteric origin, are resistant. Some gram-negative respiratory pathogens such as <i>Pasteurella multocida</i> and <i>Mannheimia haemolytica</i> are susceptible.	Sodium or potassium penicillin G: 20,000 units/kg IM or IV, q6h.		Intramuscular/ Intravenous	10 days meat, 96 hours milk.	
3	Penicillin	Penicillin procaine	BOV	Bacterial pneumonia (shipping fever) caused by <i>Pasteurella multocida</i> .	Procaine penicillin G: 24,000-66,000 units/kg q24h IM.		Intramuscular	Procaine penicillin G at a dose of 60,000 units/kg: 21 days cattle	Muscle: 50 Liver: 50 Kidney: 50 Milk (µg/L): 4
			CAP, OVI	Bacterial pneumonia (shipping fever) caused by <i>Pasteurella multocida</i> .	Procaine penicillin G: 24,000-66,000 units/kg q24h IM.		Intramuscular	Nil	
			LEP	An effective bactericide in the treatment of infections caused primarily by penicillin-sensitive organisms	Penicillin G Procaine 20,000-84,000 IU/kg SC, IM q24h for 5-7 days	5-7 days	Intramuscular/ Subcutaneous	Nil	
			SUI	Erysipelas caused by <i>Erysipelothrix rhusiopathiae</i> .	Procaine penicillin G: 15,000-25,000 units/kg q24h IM. Procaine penicillin G at a dose of 60,000 units/kg: 15 days pigs.	15 days	Intramuscular	Nil	Muscle: 50 Liver: 50 Kidney: 50



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Route of administration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
4	Penicillin	Amoxicillin	AVI	1. Used for urinary tract infection, soft tissue infections, and pneumonia. 2. It is generally more effective for infections caused by gram-positive bacteria.	150 – 175 mg/kg PO once to twice daily (using 50 mg/mL suspension). 100 mg/kg q8h, IM, SC	5 days	Oral/ Intramuscular/ SC	Nil	Muscle: 50 Liver: 50 Kidney: 50 Skin/ Fat: 50
			BOV	In vitro amoxicillin is effective against a wide range of Gram-positive and Gram-negative bacteria which include: <i>Escherichia coli</i> <i>Klebsiella pneumoniae</i> <i>Proteus</i> species <i>Salmonella</i> species <i>Staphylococci</i> and <i>Streptococci</i> Not effective against beta-lactamase producing organisms. Indications include infections of: (a) Alimentary tract (b) Respiratory tract (c) Skin and soft tissue (d) Urogenital tract and, (e) post-operative infection	15mg/kg, repeatable if necessary after 48 hours.	2-3 days	IM	Cattle: Meat and offal: 28 days. Milk: 84 hours Sheep: Meat and offal: 19 days	Muscle: 50 Liver: 50 Kidney: 50 Skin/ Fat: 50 Milk (µg/L): 4
			SUI	Treatment of Gram-positive and Gram-negative bacteria which include: <i>Escherichia coli</i> , <i>Klebsiella pneumoniae</i> , <i>Proteus</i> spp, <i>Salmonella</i> spp., <i>Staphylococci</i> and <i>Streptococci</i> .	15mg/kg	2-3 day	IM	16 days	Muscle: 50 Liver: 50 Kidney: 50 Skin/ Fat: 50
5	Penicillin	Ampicillin <small>*Bacteria is found to be resistant to this drug based on national surveillance</small>	BOV	Ampicillin is indicated in animals with infections caused by susceptible bacteria, such as skin and soft tissue infections, UTIs, and pneumonia.	4.4 to 11 mg/kg q24h IM.	3-5 days	Intramuscular	Cattle withdrawal time: 6 days meat; 48 hours milk (at 6 mg/kg).	Muscle: 50 Liver: 50 Kidney: 50 Skin/ Fat: 50 Milk (µg/L): 4
			SUI		6 – 8 mg/kg SC or IM q8h	3-5 days	Intramuscular/ SC	6 days	Muscle: 50 Liver: 50 Kidney: 50 Skin/ Fat: 50
6	Penicillin	Hetacillin	BOV	For the treatment of acute, chronic or subclinical bovine mastitis	(10 mL) into each infected quarter.	3-5 days	Intramammary Infusion	10 days	

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7	Penicillin	Cloxacillin	BOV	The spectrum of cloxacillin includes gram-positive bacilli, including beta lactamase -producing strains of Staphylococcus. Used to treat staphylococcal infections in animals, including pyoderma.	200mg/10mL q12hr for 3 doses	3-5 days	Intramammary Infusion	withdrawal time for milk: 30 days for dry-cow treatment. Cattle withdrawal time for meat: 10 days for meat and 48 hours for milk for the lactating cow treatment.	Muscle: 300 Liver: 300 Kidney: 300 Fat: 300 Milk (µg/L): 30
8	Amphenicol	Flor-fenicol	BOV	For gram-negative and gram-positive organisms, Enteric Septicemia, Keratoconjunctivitis, Pododermatitis, Pneumonia, bacterial, (Cattle), bacterial pneumonia	For Pododermatitis in Cattle; intramuscular, 20 mg per kg of body weight, to be repeated in forty-eight hour. For Subcutaneous, 40 mg per kg of body weight as a single dose		Intramuscular/ Oral, Intramammary Infusion/ Intravenous,	withdrawal time (meat): 28 days if administered IM; 38 days if administered SQ Nuflo Gold withdrawal time (40 mg/kg SQ) is 44 days	
			BOV	Therapeutic treatment of respiratory tract infections in cattle due to Mannheimia haemolytica, Pasteurella multocida, and Histophilus somni. Swine: Treatment of acute outbreaks of respiratory disease caused by strains of Actinobacillus pleuropneumoniae and Pasteurella multocida.	20 mg/kg bodyweight	48 hours apart. To be administered twice	IM	Meat and offal: 30 days	Muscle: 200 Liver: 3000 Kidney: 300
			SUI	For respiratory infections caused by susceptible Actinobacillus pleuropneumoniae, P. multocida, Salmonella choleraesuis, and Streptococcus suis	15 mg/kg IM in the neck q48h.	2 days	Intramuscular	18 days	



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Route of administration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
9	Aminoglycosides	Spectino-mycin	AVI	1. Spectinomycin has activity against a wide variety of gram-positive and gram-negative bacteria, including <i>E. coli</i> , <i>Klebsiella</i> , <i>Proteus</i> , <i>Enterobacter</i> , <i>Salmonella</i> , <i>Streptococci</i> , <i>Staphylococcus</i> and <i>Mycoplasma</i> . 2. It has minimal activity against anaerobes, most strains of <i>Pseudomonas</i> , <i>Chlamydia</i> , or <i>Treponema</i> . 3. For control and to lessen mortality due to infections from <i>M. synoviae</i> , <i>S. typhimurium</i> , <i>S. infantis</i> , and <i>E. coli</i> in newly hatched chicks	a) Newly hatched chicks: 2.5 – 5 mg/0.2 mL and inject SC. b) For chronic respiratory disease associated with <i>Mycoplasma gallisepticum</i> in broilers: Add sufficient amount to drinking water to attain a final concentration of 2 g/gallon. c) For infectious synovitis associated with <i>Mycoplasma synoviae</i> in broilers: Add sufficient amount to drinking water to attain a final concentration of 1 g/gallon.		SC, PO		Muscle: 300 Liver: 2,000 Kidney: 5,000 Fat: 500
			BOV	For a wide variety of gram-positive and gram-negative bacteria, including <i>E. coli</i> , <i>Klebsiella</i> , <i>Proteus</i> , <i>Enterobacter</i> , <i>Salmonella</i> , <i>Streptococci</i> , <i>Staphylococcus</i> and <i>Mycoplasma</i>	a) For Bronchopneumonia and Fibrinous Pneumonia: 33 mg/kg SC q8h. b) 22 - 39.6 mg/kg/day IM divided three times daily c) For Bovine Respiratory Disease: 10 - 15 mg/kg SC (in the neck; not more than 50 mL per site) once daily (q24h) for 3 - 5 consecutive days	3-5 days	SC/ Intramuscular		Muscle: 300 Liver: 2,000 Kidney: 5,000 Fat: 500 Milk (µg/L): 200
			SUI	For a wide variety of gram-positive and gram-negative bacteria, including <i>E. coli</i> , <i>Klebsiella</i> , <i>Proteus</i> , <i>Enterobacter</i> , <i>Salmonella</i> , <i>Streptococci</i> , <i>Staphylococcus</i> and <i>Mycoplasma</i>	20 mg/kg, IM		Intramuscular	Nil	Muscle: 300 Liver: 2,000 Kidney: 5,000 Fat: 500
10	Aminoglycosides	Genta-micin	BOV	Indicated for acute serious infections, such as those caused by gram-negative bacilli, the only approved use in food animals is oral treatment in pigs for swine dysentery	a) 4.4 - 6.6 mg/kg/day IM divided three times daily b) Intramammary: 100 - 150 mg q12h		IM, Intramammary Infusion	Nil	Muscle: 100 Liver: 200 Kidney: 1,000 Fat: 100 Milk: 100
			LEP	1. Indicated for acute serious infections, such as those caused by gram-negative bacilli. 2. The only approved use in food animals is oral treatment in pigs for swine dysentery	1. Rabbits: 5 - 8 mg/kg daily dose (may divide into q8h - q24h) SC, IM or IV. 2. Increased efficacy and decreased toxicity if given once daily. 3. If given IV, dilute into 4 mL/kg of saline and give over 20 minutes		SC, IM, IV	Nil	

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10	Aminoglycosides	Genta-micin	SUI	<p>1. Indicated for acute serious infections, such as those caused by gram-negative bacilli.</p> <p>2. The only approved use in food animals is oral treatment in pigs for swine dysentery</p>	<p>a) For colibacillosis in neonates: 5 mg PO or IM once</p> <p>b) For weanlings and other swine: Colibacillosis: 1.1 mg/kg/day in drinking water (concentration of 25 mg/gallon) for 3 days.</p> <p>c) Swine Dysentery (Treponema hyodysenteriae): 2.2 mg/kg/day in drinking water (concentration of 50 mg/gallon) for 3 days</p>		PO, IM	Nil	<p>Muscle:100 Liver: 200 Kidney: 1,000 Fat: 100</p>
11	Lincosamides	Pirli-mycin	BOV	<p>1. Pirlimycin is a lincosamide antibiotic with activity primarily against gram-positive organisms, including Staphylococcus and Streptococcus species.</p> <p>2. It is considered more active than clindamycin against Staphylococcus aureus.</p> <p>3. Pirlimycin is not active against gram-negative bacteria, such as Escherichia coli.</p>	50 mg administered into each affected quarter, followed by a second dose administered twenty-four hours later.		Intramammary Infusion	<p>Meat: 9 -28 day</p> <p>Milk: 36 – 48 hours</p>	<p>Muscle:100 Liver:1,000 Kidney: 400 Fat:100 Milk (µg/L): 100</p>
12	Macrolides	Tulathro-mycin	BOV	<p>1. Bovine Respiratory Disease (BRD) in cattle caused by Mannheimia haemolytica, Pasteurella multocida,</p> <p>2. Histophilus somni and Mycoplasma bovis;</p> <p>3. Infectious Bovine Keratoconjunctivitis (IBK) in cattle, and eye disease caused by Moraxella bovis;</p>	<p>1. Draxxin is given as a single injection of 2.5 mg per kilogram bodyweight.</p> <p>2. In cattle, it is injected under the skin, and the dose is divided in cattle weighing over 300 kg so that no more than 7.5 ml are injected at one site.</p>		Subcutaneous in calves	For cattle, the meat withdrawal period is 22 days	
13	Macrolides	Erythromycin	SUI	Swine Respiratory Disease (SRD) in pigs caused by Actinobacillus pleuropneumoniae, Pasteurella multocida, Mycoplasma hyopneumoniae, Haemophilus parasuis and Bordetella bronchiseptica.	In pigs it is injected into a muscle, and the dose is divided in pigs weighing over 80 kg so that no more than 2 ml are injected at one site		Intramuscular in pigs	Pigs it is 13 days	<p>Muscle: 300 Intestine: 300</p>



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Route of administration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
13	Macrolides	Erythromycin	SUI	To treat infections caused by susceptible organisms in swine	a) For respiratory infections: 2.2 – 6.6 mg/kg IM once daily b) For scours in young pigs: 22 mg/kg IM in one or more daily doses		Intramuscular	Slaughter withdrawal (when used as labeled) =7 days	Muscle: 300 Intestine: 300
			BOV	1. Erythromycin is indicated in the treatment of mastitis caused by susceptible <i>Staphylococcus aureus</i> [R-4], <i>Streptococcus agalactiae</i> , <i>Streptococcus dysgalactiae</i> , and <i>Streptococcus uberis</i> [R-3; 14]. 2. It may be most effective against <i>Streptococcus agalactiae</i> [R-5; 17] and <i>Streptococcus dysgalactiae</i> [R-4]. 3. Intramammary therapy alone is indicated only in the treatment of subacute or subclinical mastitis manifested by mild changes in the milk or udder. 4. Cows with acute or peracute mastitis, which has been defined as the presence of gross changes in the milk or udder or systemic signs, should be administered other medications also, which may include systemic antibiotics and/or supportive therapy	1. Cows, lactating: Intramammary, 300 mg administered into each affected quarter every twelve hours for three treatments. 2. Cows, nonlactating: Intramammary, 600 mg administered into each quarter at the time of drying-off.		Intramammary Infusion	Meat: 14 days Milk: 36 Jam	Muscle: 100 Liver: 100 Kidney: 100 Fat: 100 Milk (µg/L): 40 Intestine: 300
			OVI	To treat infections caused by susceptible organisms in sheep	a) For respiratory infections in older animals: 2.2 mg/kg IM once daily as indicated. b) For "dysentery" in newborn lambs when the likely causative agent is susceptible to erythromycin: 123 mg/kg IM once soon after birth		Intramuscular	Slaughter withdrawal (when used as labeled) 3 days	Muscle: 300 Intestine: 300
			EQU	Treatment of <i>C. (Rhodococcus) equi</i> infections, proliferative enteropathy caused by <i>L. intracellularis</i> infections in foals	1. For susceptible infections: Foals: Erythromycin estolate: 25 mg/kg PO q6h; Erythromycin gluceptate: 5 mg/kg IV q4 2. As a prokinetic agent: 0.1 - 1 mg/kg, IV or erythromycin lactobionate 2.2 mg/kg IV over a 30 - 60 minute period every 6 hours. 3. Dose in a 450 kg horse is 1 gram.		IV	Nil	

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14	Macrolides	Tilmicosin	BOV	Tilmicosin is indicated for the treatment of bovine or Ovine Respiratory Diseases (BRD) caused by Mannheimia (Pasteurella) haemolytica	1. For susceptible infections (subcutaneous injection under the skin in the neck, or if not accessible, behind the shoulders and over the ribs is suggested). 2. For treatment of Pneumonic Pasteurellosis: 10 mg/kg SC every 72 hours		SC	Slaughter withdrawal (at labeled doses) = 28 days	Muscle: 100 Liver: 1,000 Kidney: 300 Fat: 100
			OVI	Tilmicosin is indicated for the treatment of bovine or ovine respiratory diseases (BRD) caused by Mannheimia (Pasteurella) haemolytica	For susceptible infections: a) 10 mg/kg SC (not more than 15 mL per injection site). b) Subcutaneous injection under the skin in the neck, or if not accessible, behind the shoulders and over the ribs is suggested. c) Do not use in lambs less than 15 kg of body weight		SC	Nil	
			LEP	Treatment of respiratory disease	Rabbits: Two regimens: a) 25 mg/kg SC once; repeat in 3 days if necessary. b) 5 mg/kg SC on day 0, if no reaction, give 10 mg/kg SC on days 7 and 14.		SC	Nil	
15	Macrolides	Tylosin	AVI	Used for the treatment of chronic respiratory disease (CRD) associated with Mycoplasma gallisepticum.	15-30 mg/kg IM q6-12h		IM;	0-day egg withdrawal period	Muscle: 100 Liver: 100 Kidney: 100 Skin/ Fat: 100 Eggs: 200
			SUI	Treatment of arthritis, caused by Mycoplasma hyosynoviae, swine pneumonia caused by Pasteurella spp, swine erysipelas caused by Erysipelothrix rhusiopathiae, swine dysentery associated with Serpulina (Treponema) hyodysenteriae, and proliferative enteropathy caused by L. intracellularis.	8.8 mg/kg q12h IM	3 days	IM;	withdrawal time for meat: 14 days	Muscle: 100 Liver: 100 Kidney: 100 Fat: 100



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Route of administration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
15	Macrolides	Tylosin	SUI	Indicated in all conditions associated with bacteria sensitive to tylosin which includes organisms in the following genera: Streptococcus, Campylobacter, Chlamydia, Bacillus, Spirochaetes, Staphylococcus, Mycoplasma, Corynebacterium, Fusiformis, Clostridium, Pasteurella, Erysipelothrix. Treatment for respiratory and genito-urinary tract infections, otitis, cellulitis and secondary bacterial conditions associated with virus disease or post operative infections. Treatment for specific disease entities: Swine Dysentery, Erysipelas and Enzootic Pneumonia.	2 to 10 mg per kg bodyweight daily.	3 days	IM	9 days	Muscle: 100 Liver: 100 Kidney: 100 Fat: 100
			BOV	Treatment of liver abscesses	Sedation/restraint: 0.05 mg per kg body weight, IV; 0.03 - 0.11 mg per kg body weight, IM.		IV	withdrawal time for slaughter 0-day	Muscle: 100 Liver: 100 Kidney: 100 Fat: 100 Milk (µg/L): 50
			BOV	1. For treatment of BRD caused by Mannheimia, Pasteurella multocida, and Histophilus somni (formerly Haemophilus somnus). 2. It is used for interdigital necrobacillosis (foot rot) in cattle caused by Fusobacterium necrophorum or Bacteroides melaninogenicus	Pododermatitis and pneumonia: 17.6 mg/kg q24h IM		IM	withdrawal time for meat: 21 days	Muscle: 100 Liver: 100 Kidney: 100 Fat: 100 Milk (µg/L): 50
16	Phosphonic acid	Fosfomycin	BOV	To treat E. coli and Salmonella spp. infections	20 mg/kg b.w IM		IM	3 days	
			SUI	To treat E. coli and Salmonella spp. Infections, (Haemophilus parasuis, Streptococcus suis, Pasteurella multocida, Bordetella bronchiseptica, Staphylococcus hyicus, Escherichia coli)	PO administration of 30 mg/kg b.w. or IV and IM administration of 15 mg/kg b.w.		IM, IV	3 days	

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No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Route of administration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
17	Quinolones	Enrofloxacin	BOV	For the treatment of respiratory tract(RT) infections caused by enrofloxacin-sensitive <i>Histophilus somni</i> , <i>Mannheimia haemolytica</i> , <i>Pasteurella multocida</i> , <i>Mycoplasma</i> spp. For the treatment of Mastitis (MT) caused by <i>E.coli</i> .	(RT): 7.5mg/kg body weight (MT): 5mg/kg body weight	RT:1Shot (MT):2-3 consecutive days	(RT): subcutaneous injection (MT): intravenous injection	Meat and offal: 14 days (s.c); 7 days (i.v) Milk: 120 hrs (s.c.); 72 hrs (i.v)	Muscle: 30 Liver: 30 Kidney: 30
				Treatment of infections of the respiratory tract caused by enrofloxacin susceptible strains of <i>Pasteurella multocida</i> , <i>Mannheimia haemolytica</i> and <i>Mycoplasma</i> spp. Treatment of infections of the alimentary tract caused by enrofloxacin susceptible strains of <i>Escherichia coli</i> . Treatment of septicaemia caused by enrofloxacin susceptible strains of <i>Escherichia coli</i> . Treatment of acute mycoplasma-associated arthritis due to enrofloxacin susceptible strains of <i>Mycoplasma bovis</i>	5 mg /kg body weight	once daily for 3-5 days	intravenous or subcutaneous	intravenous injection: Meat and offal: 5 days. subcutaneous injection: Meat and offal: 12 days.	
			SUI	For the treatment of bacterial bronchopneumonia caused by enrofloxacin-sensitive <i>Actinobacillus pleuropneumoniae</i> , <i>Pasteurella multocida</i> and complicated by <i>Haemophilus parasuis</i> as secondary pathogen in pigs.	7.5mg/kg body weight	1 shot	intramuscular injection	Meat and offal: i.m.: 12 days	Muscle: 30 Liver: 30 Kidney: 30
				Treatment of infections of the respiratory tract caused by enrofloxacin susceptible strains of <i>Pasteurella multocida</i> , <i>Mycoplasma</i> spp. and <i>Actinobacillus pleuropneumoniae</i> . Treatment of infections of the alimentary tract caused by enrofloxacin susceptible strains of <i>Escherichia coli</i> . Treatment of septicaemia caused by enrofloxacin susceptible strains of <i>Escherichia coli</i> .	Respiratory tract infection: 2.5 mg/kg bw, once daily. Alimentary tract infection or septicaemia caused by <i>Escherichia coli</i> : 5 mg of enrofloxacin/kg bw	3 days		Meat and offal: 13 days	
18	Sulfonamides	Trimethoprim+ Sulfonamide <small>*Bacteria is found to be resistant to this drug based on national surveillance</small>	BOV	Respiratory infections, soft tissue and skin infections, wounds, abscesses, and urogenital infections.	16 mg/kg combined drug every 24 hours IV or IM		IM,IV		Muscle: 50 Milk (µg/L): 50 Intestine: 50
				Respiratory infections, soft tissue and skin infections, wounds, abscesses, and urogenital infections.	48 mg/kg, IM q24h		IM		Muscle: 50 Intestine: 50



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage	Duration	Route of administration	Withdrawal Period	Maximum Residue Limit, MRL (µg/kg)
19	Cephalosporins	Ceftiofur	BOV	<p>1. For the treatment of bacterial respiratory disease associated with Mannheimia haemolytica (former Pasteurella haemolytica), Pasteurella multocida and Haemophilus somnus.</p> <p>2. For the treatment of acute interdigital necrobacillosis (panaritium, foot rot) associated with Fusobacterium necrophorum and Bacteroides melfianus (Phorphyromonas asaccharolytica).</p> <p>3. For the treatment of the bacterial component of acute post-partum (puerperal) metritis within 10 days after calving associated with Escherichia coli, Arcanobacterium pyogenes and Fusobacterium necrophorum.</p>	<p>Respiratory disease: 1 mg ceftiofur/kg b.w./ day for 3 to 5 days by subcutaneous injection,</p> <p>Acute interdigital necrobacillosis: 1 mg ceftiofur/kg b.w./ day for 3 days by subcutaneous injection,</p> <p>Acute post-partum metritis within 10 days after calving: 1 mg ceftiofur/kg b.w./ day for 5 consecutive days by subcutaneous injection, Subsequent injections must be given at different sites.</p>	3-5 days	IM Subcutaneous injection	Meat: 8 days after last treatment. Milk: Zero days.	Muscle: 200 Liver: 2,000 Kidney: 4,000 Fat: 600 Milk (µg/L): 100
			SUI	Treatment of bacterial respiratory disease associated with Pasteurella multocida, Actinobacillus pleuropneumoniae and Streptococcus suis.	3 mg ceftiofur/kg b.w./ day	3 days	IM	Meat: 5 days after last treatment	Muscle: 200 Liver: 2,000 Kidney: 4,000 Fat: 600 Milk (µg/L): 100
20	Tetracycline	Oxytetracycline	SUI	Treatment of Atrophic rhinitis caused by Bordetella bronchiseptica, Mannheimia haemolytica and Pasteurella Multocida, Septicaemia caused by Salmonella dublin and Streptococcus pyogenes; Erysipelas caused by Erysipelothrix rhusiopathiae	20mg/kg	Single administration	IM	18 days	Muscle: 100 Liver: 300 Kidney: 600 Fat: 10
			BOV	Infection by Arcanobacterium (Actinomyces) pyogenes and Haemophilus somnus.	20mg/kg	72 hours	IM	Cattle: meat and offal: 35 days Milk: 8 days	Muscle: 100 Liver: 300 Kidney: 600 Milk: 100

Table 3: Antibiotic Treatment in Companion Animal

No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
1	Aminocoumarin	Novobiocin	CAN	Primarily effective against some gram-positive TT cocci	22 mg/kg PO, q12hr
2	Aminoglycosides	Spectinomycin	CAN	Against a wide variety of gram-positive and gram-negative bacteria, including <i>E. coli</i> , <i>Klebsiella</i> , <i>Proteus</i> , <i>Enterobacter</i> , <i>Salmonella</i> , <i>Streptococci</i> , <i>Staphylococcus</i> , and <i>Mycoplasma</i> .	For susceptible infections: a) 5.5 – 11 mg/kg q12h IM or 22 mg/kg PO q12h (for enteric infections; not absorbed) b) 5 – 10 mg/kg IM q12h c) For acute infectious gastroenteritis: 5 – 12 mg/kg IM q12h
			FEL		For susceptible infections: a) For acute infectious gastroenteritis: 5 – 12 mg/kg IM q12h
			EQU		For susceptible infections: a) 20 mg/kg, IM three times daily b) For pneumonia: 20 mg/kg IM q8h; may cause local myositis.
3	Aminoglycosides	Streptomycin	CAN	Active against a range of Gram-negative and some Gram-positive pathogens. Specifically indicated in treatment of infections caused by <i>Leptospira</i> and <i>Mycobacterium tuberculosis</i>	25 mg/kg IM q24h
			LEP		25-50mg/kg IM SC, q24h
			FEL	Do not use	Do not use
4	Aminoglycosides	Neomycin	CAN	Active primarily against Gram-negative bacteria, although some <i>Staphylococcus</i> and <i>Enterococcus</i> species are sensitive. It is also used orally to reduce intestinal bacterial population in the management of hepatic encephalopathy. Often combined with antimuscarinic agents in treatment of non-specific bacterial enteritis.	1) Oral: 20 mg/kg PO 16h or per rectum as retention enema for hepatic encephalopathy. 2) Ophthalmic: 1 drop/eye q6-8h 3) Otic: 2-12 drops/ear or apply liberally to skin a4-12h
			FEL	Active primarily against Gram-negative bacteria, although some <i>Staphylococcus</i> and <i>Enterococcus</i> species are sensitive. It is also used orally to reduce intestinal bacterial population in the management of hepatic encephalopathy. Often combined with antimuscarinic agents in treatment of non-specific bacterial enteritis.	1) Oral: 5.5-10mg/kg PO q12h 2) Ophthalmic: 1drop/eye q6-8h 3) Otic: 2-12 drops/ ear or apply liberally to skin q4-12h
			LEP		30 mg/kg PO q12h
			OTHER SMALL MAMMALS		1) Ferrets: 10-20 mg/kg PO q6h 2) Chinchillas, Guinea pigs: 15mg/kg PO q12h 3) Rats/ mice: 25 mg/kg PO q12h, 2.6mg/ml drinking water 4) Hamster: 0.5mg/ml drinking water 5) Gerbils: 2.6 mg/ml drinking water Ophthalmic: 1drop/eye q6-8h Otic: 2-12 drops/ ear or apply liberally to skin q4-12h



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
4	Aminoglycosides	Neomycin	EQU	To treat susceptible enteral infections	<p>a) Adults: 4 – 7.5 g/day PO divided 2 – 4 times daily at regular intervals. Foals: 2 – 3 g/day PO divided 2 – 4 times daily at regular intervals. Doses are not standardized; use for general guidance only.</p> <p>b) 5 – 15 mg/kg PO once daily</p> <p>c) For intrauterine infusion: Neomycin alone: 3 – 4 grams. Most intrauterine treatments are commonly performed every day or every other day for 3 – 7 days.</p>
5	Aminoglycosides	Framycetin	CAN FEL	Treatment of ocular infections causing conjunctivitis or blepharitis, and aural infections. Effective against Gram negative bacteria	Ophthalmic: 1-2 drops in affected eye q8h Otic: 5-10 drops per ear q12h
6	Aminoglycosides	Gentamicin	CAN	Against Gram-negative bacteria, but some Staphylococcal and Streptococcal (<i>Streptococcus faecalis</i>) species are also sensitive.	<p>1) Ophthalmic: 1 drop per eye a6-8h. Severe ocular infections may require dosing q1-2h. A fortified topical solution (100 mg gentamicin in 5 ml of 0.3% solution, making 14.3 mg/ml) can be used.</p> <p>2) Otic: 2-4 drops in affected ear or apply ointment to affected area q6-8h</p> <p>3) Systemic: 2-5 mg/kg IV (Slowly over 30 min), IM SC q12h for 2 doses then q24h</p> <p>4) For susceptible infections:</p> <p>a) For sepsis: 6 mg/kg IV once daily</p> <p>b) 6 – 8 mg/kg (route not specified) q24h. Neutropenic or immunocompromised</p> <p>d) For localized, urinary infections: First dose of 4.4 mg/kg IM, SC and then 2.2 mg/kg IM, SC q24h for 7 – 10 days;</p> <p>e) For orthopedic and soft tissue infections: 4.4 – 6.6 mg/kg IV, IM, SC q24h for <7 days.</p> <p>f) For bacteremia, sepsis: 6.6 mg/kg IV, IM, SC q24h for <7 days. Monitor renal function by urine sediment examination and serum urea nitrogen levels.</p> <p>e) For Brucellosis: Gentamicin 5 mg/kg SC q24h for 7 days; 2-courses of treatment, treating on weeks one and four; plus Minocycline at 25 mg/kg PO q24h for 4 weeks. Eventually, doxycycline can be substituted for minocycline at the same dosage to lower cost. Infected animals may need to be treated for two or more 4-week courses. Sequential antibody tests at 3 to 6 monthly intervals are recommended to monitor treatment. Monitor renal function secondary to gentamicin therapy</p>
			CAN	Treatment of acute external otitis. Also for treatment of short term exacerbation of the acute signs of chronic external otitis of bacterial origin due to bacteria susceptible to gentamicin, such as <i>Staphylococcus intermedius</i>	<p>Gentamicin base (as sulfate) 3 mg Apply to the ear twice a day in ear.</p> <p>1. Dogs weighing less than 15 kg: 4 drops from the 7.5 g and 15 g and 30 g bottles</p> <p>2. Dogs weighing more than 15 kg: 8 drops from the 7.5 g and 15 g and 30 g bottles</p>

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No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
6	Aminoglycosides	Gentamicin	FEL	Against Gram-negative bacteria, but some Staphylococcal and Streptococcal (<i>Streptococcus faecalis</i>) species are also sensitive.	a) For sepsis: 6 mg/kg IV once daily b) 6 – 8 mg/kg (route not specified) q24h. Neutropenic or immunocompromised patients may still need to be dosed q8h (dose divided). c) 8 mg/kg once daily or 2 – 4 mg/kg q8h IV, IM or SC d) For localized, urinary infections: 2.2 mg/kg IV, IM, SC q24h for <7 days; For bacteremia, sepsis: 4.4 mg/kg IV, IM, SC q24h for <7 days. Monitor renal function by urine sediment examination and serum urea nitrogen levels.
			LEP	Against Gram-negative bacteria, but some Staphylococcal and Streptococcal (<i>Streptococcus faecalis</i>) species are also sensitive.	1.5-2.5 mg/kg SC, IM, IV q8h
			SMALL MAMMALS	Against Gram-negative bacteria, but some Staphylococcal and Streptococcal (<i>Streptococcus faecalis</i>) species are also sensitive.	1) Ferrets: 2-4 mg/kg IV (over 30min), IM, SC q6-12h 2) Guinea pigs: 6 mg/kg SC q24h 3) Rats and mice: 4-20 mg/kg IM q12h 4) Other rodents: 2-5 mg/kg SC IM q8-24h
			AVI		a) For Pheasants and Cranes: 5 mg/kg IM three times daily for 5 – 10 days. For Quail, African Grey Parrots: 10 mg/kg IM three times daily. Blue and Gold Macaws: 10 mg/kg IM q12h. Once or twice daily dosing may be effective in less serious infections. b) For gut sterilization/gut infections: 40 mg/kg PO 1 – 3 times a day for 2 – 3 days. c) For pneumonia (with carbenicillin or tylosin given IM): 5 – 10 mg/kg intratracheally once daily d) Ratites: 5 mg/kg IM q24h; note: use only as a last resort as it causes visceral gout e) Topically q6-8h f) Nebulize 50mg in 10 ml saline for 15 min q8-12h
			REPTILES		1) Chelonians and lizards: 2-4 mg/kg IM q72h; Nebulized at dilution of 10-20mg gentamicin/ 15 ml saline for 15-20 min q8-12h for respiratory tract infections 2) Snakes: 2.5 mg/kg IM q72h
			EQU		For susceptible infections: a) Foals: 8 – 10 mg/kg q18 – 24 hours. Monitor levels to adjust dosage or dosing interval. b) Adults: 6.6 mg/kg IV or IM q24h c) For intrauterine infusion: 0.5 – 2 grams performed every day or every other day for 3 – 7 days. d) Foals: 7 mg/kg IV or IM q24h
7	Aminoglycosides	Amikacin	CAN	Active against many Gram-negative bacteria including some that may be resistant to gentamicin. Its use is generally indicated when sensitivity testing has been performed	a) 5-10 mg/kg IV, SC, IM q8h or 10-15 mg/kg IV, IM, SC q24h b) For septic shock: 30 mg/kg IV, IM, SC q24h (higher dose increase risk of adverse effects)
			FEL		For susceptible infections: a) Sepsis: 20 mg/kg once daily IV b) 15 mg/kg (route not specified) q24h. Neutropenic or immunocompromised patients may still need to be dosed q8h (dose divided). c) 10 – 15 mg/kg IV, IM or SC q24h
			LEP		2-10 mg/kg IV, IM, SC q8-12h
			SMALL MAMMALS		1) Ferrets: 8-16 mg/kg IV, IM, SC q8-24h 2) Rodents: 5-15 mg/kg IV, IM, SC q8-12h Concurrent fluid therapy is advised, especially if hydration status poor or uncertain 3) Guinea pigs: 10 – 15 mg/kg SC, IM, IV divided q8 – 24h 4) Chinchillas: 10 – 15 mg/kg SC, IM, IV divided q8 – 24h 5) Hamster, rats, mice: 10 mg/kg SC, IM q12h 6) Prairie Dogs: 5 mg/kg SC, IM q12h 7) Chinchillas: 2 – 5 mg/kg SC, IM q8 – 12h



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
7	Aminoglycosides	Amikacin	AVI	Active against many Gram-negative bacteria including some that may be resistant to gentamicin. Its use is generally indicated when sensitivity testing has been performed	For susceptible infections: a) For sunken eyes/sinusitis in macaws caused by susceptible bacteria: 40 mg/kg IM once or twice daily. Must also flush sinuses with saline mixed with appropriate antibiotic (10 – 30 mL per nostril). May require 2 weeks of treatment. b) 15 mg/kg IM or SC q12h c) For gram-negative infections resistant to gentamicin: Dilute commercial solution and administer 15 – 20 mg/kg (0.015 mg/g) IM once a day or twice a day d) Ratites: 7.6 – 11 mg/kg IM twice daily; air cell: 10 – 25 mg/egg; egg dip: 2000 mg/gallon of distilled water pH of 6
			REPTILES		1) Snake: 5 mg/kg IM once, then 2.5 mg/kg IM q72h @ 25 °C for 7-9 treatments. House snakes at high end of their preferred optimum ambient temperature 2) Turtles with bacterial shell diseases: 10 mg/kg daily in water turtles, every other day in land turtles and tortoises for 7 – 10 days. Used commonly with a beta-lactam antibiotic. Recommended to begin therapy with 20 mL/kg fluid injection. Maintain hydration and monitor uric acid levels when possible. 3) Crocodilians: 2.25 mg/kg IM q 72 – 96h e) For gram-negative respiratory disease: 3.5 mg/kg IM, SC or via lung catheter every 3 – 10 days for 30 days.
			EQU		For susceptible infections: a) 21 mg/kg IV or IM q24h b) In neonatal foals: 21 mg/kg IV once daily c) In neonatal foals: Initial dose of 25 mg/kg IV once daily; strongly recommend to individualize dosage based upon therapeutic drug monitoring. d) Adults: 10 mg/kg IM or IV q24h Foals (<30 days old): 20 – 25 mg/kg IV or IM q24h. For uterine infusion: a) 2 grams mixed with 200 mL sterile normal saline (0.9% sodium chloride for injection) and aseptically infused into uterus daily for 3 consecutive days b) 1 – 2 grams IU For intra-articular injection as adjunctive treatment of septic arthritis in foals: a) If a single joint is involved, inject 250 mg daily or 500 mg every other day; frequency is dependent upon how often joint lavage is performed. Use cautiously in multiple joints as toxicity may result (particularly if systemic therapy is also given). For regional intravenous limb perfusion (RILP) administration in standing horses: a) Usual dosages range from 500 mg – 2 grams; dosage must be greater than 250 mg when a cephalic vein is used for perfusion and careful placement of tourniquets must be performed

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No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
8	Aminoglycosides	Kanamycin	EQU	Kanamycin is a broad-spectrum antibiotic used to treat gram-negative infections. It is less active than gentamicin, amikacin, or tobramycin. Therefore, there is little advantage for using kanamycin over the other drugs in this class. The use of kanamycin has greatly diminished and gentamicin and amikacin are much more frequently used in animals	10 mg/kg q24h
9	Aminoglycosides	Tobramycin	EQU	1. Tobramycin can be used against a variety of bacteria, predominantly gram-negative aerobic bacilli also in ophthalmic preps. 2. Tobramycin's spectrum of activity includes coverage against many Aerobic gram-negative and some aerobic gram-positive bacteria, including most species of <i>E. coli</i> , <i>Klebsiella</i> , <i>Proteus</i> , <i>Pseudomonas</i> , <i>Salmonella</i> , <i>Enterobacter</i> , <i>Serratia</i> , <i>Shigella</i> , <i>Mycoplasma</i> and <i>Staphylococcus</i> .	1 - 1.7 mg/kg q8h IV (slowly) or IM (note: This is a human dose and should be used as a general guideline only)
10	Ansamycin	Rifampicin	CAN	Wide spectrum of activity including bacteria (Particularly Gram-positive), Chlamydia, Rickettsia, some protozoans and poxviruses. Very active against <i>Staphylococcus aureus</i> and <i>Mycobacterium tuberculosis</i> . Obligate anaerobes (Gram positive or negative) are usually susceptible.	10-15 mg/kg PO q24h a) For combination therapy of atypical Mycobacteria infections; treatment of resistant Staph endocarditis (in combination with amoxicillin/clavulanate or trimethoprim/sulfa): 10 – 20 mg/kg PO q8 – 12h b) For CNS fungal infections (aspergillosis/histoplasmosis): Rifampin 10 – 20 mg/kg PO three times daily with amphotericin B and flucytosine c) For actinomycosis: 10 – 20 mg/kg PO q12h PO
			FEL		For CNS fungal infections (aspergillosis/histoplasmosis): Rifampin 10 – 20 mg/kg PO three times daily with amphotericin B and flucytosine
			EQU	Treatment of <i>Rhodococcus equi</i> (<i>Corynebacterium equi</i>) infections and proliferative enteropathy caused by <i>Lawsonia intracellularis</i> in foals	For treatment of <i>Rhodococcus equi</i> (<i>C. equi</i>) infections in foals: a) Rifampin 5 mg/kg PO two times daily with erythromycin 15 – 25 mg/kg, PO q12 – 24h. Conventional treatment, but erythromycin has numerous side effects including enterocolitis in foals and mares, hyperthermia, and acute respiratory distress. Clarithromycin may be superior. b) Rifampin 5 mg/kg PO two times daily or 10 mg/kg PO once daily with erythromycin 25 mg/kg, PO q6 – 8h. Duration of therapy usually takes 4 – 9 weeks. For susceptible infections in foals: a) For treatment of proliferative enteropathy caused by <i>Lawsonia intracellularis</i> in foals: Erythromycin estolate (25 mg/kg PO q6 – 8h) alone or in combination with rifampin: 10 mg/kg PO once daily for a minimum of 21 days
			AVI	Treatment of mycobacteriosis	a) Rifampin (45 mg/kg PO once daily) in combination with ethambutol (30 mg/kg PO once daily) and one of the following: clofazimine (6 mg/kg PO once daily) or isoniazid (30 mg/kg PO once daily)



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
11	Cephalosporins	Cefalexin	CAN	Active against several Gram positive and Gram negative organism (e.g. <i>Staphylococcus</i> , <i>Pasteurella</i> , and <i>Escherichia coli</i>).	10-25 mg/kg PO q8-12h; IM, SC q24h
			FEL		15-20 mg/kg SC q12-24h
			LEP		1) Ferrets: 15-30 mg/kg PO q8-12h 2) Guinea pig: 25 mg/kg PO, IM q12-24h
			SMALL MAMMALS		1) Ferrets: 15-30 mg/kg PO q8-12h 2) Guinea pig: 25 mg/kg PO, IM q12-24h
			AVI		35-100 mg/kg PO IM q6-8h
			REPTILES		20-40 mg/kg PO q24h at 30 °C
12	Cephalosporins	Cefuroxime	CAN	Higher activity against many Gram-negative organisms but lower activity against many Gram-positive organisms when compared to 1st generations cephalosporins. Good activity against Enterobacteriaceae (not <i>Pseudomonas</i>). Many obligate anaerobes also susceptible. Many uses but may be particularly indicated for surgical prophylaxis in prolonged and difficult orthopaedic procedures.	10-15 mg/kg IV q8-12h
			FEL		100 mg/kg IM q24h for 10 days at 30°C
			REPTILES		
13	Cephalosporins	Ceftiofur	CAN	Against Gram-negative organisms especially Enterobacteriaceae (not <i>Pseudomonas</i>) but lower activity against many Gram-positive than 1st and 2nd generation cephalosporins. Should be reserved for treatment of acute sepsis or urinary tract infections	2.2 mg/kg SC q24h
			REPTILES	For bacterial respiratory tract infections in tortoises (<i>Pasteurella</i> and gram-negative bacteria)	1) Chelonians: 4mg/kg IM q24h 2) Snake: 2.2 mg/kg IM q24h
			EQU	For treatment of respiratory tract infections caused by susceptible <i>Streptococcus equi</i> (<i>S. zooepidemicus</i>)	6.6 mg/kg IM in neck muscle (15 mL per 1000 pounds)
14	Fusidic acid	Fusidic acid	CAN	Active against Gram positive bacteria, particularly <i>Staphylococcus intermedius</i> . Used topically in management of staphylococcal infections of conjunctiva, skin or ear.	1) Ophthalmic: 1 drop per eye q12-24h 2) Otic: 5-10 drops per affected ear q12h 3) Skin: Apply to affected area q12h for 5 days
			FEL		1) Ophthalmic: 1 drop per eye q12-24h 2) Otic: 5-10 drops per affected ear q12h
			LEP		1 drop per eye q12-24h
			AVI		1) Skin: Apply thin layer q24h 2) Ophthalmic: 1 drop per affected eye q12-24h

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No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
15	Lincosamides	Lincomycin	CAN	Active against Gram positive cocci (including penicillin-resistant staphylococci) and many obligate anaerobes. Indicated for staphylococcal bone and joint infections	1) Parenteral: 22 mg/kg IM q24h or 11mg/kg IM q12h or 11-22 mg/kg slow IV q12-24h 2) Oral: 22mg/kg PO q12h or 15 mg/kg PO q8h For susceptible infections: a) For skin and soft tissue infections: 15.4 mg/kg PO q8h or 22 mg/kg PO q12h. Treatment for superficial pyoderma 21 – 42 days; for deep, resistant pyoderma 56 days; For systemic infections: 22 mg/kg IM, SC, or IV (must be diluted and given as a slow drip infusion) q24h or 11 mg/kg IM or SC q12h for 12 days or less. For bacteremia, sepsis: 11 – 22 mg/kg IV q8h for 12 days or less. b) For pyoderma: 20 mg/kg twice daily c) For superficial pyodermas: 20 mg/kg PO q12h d) For pyoderma: 22 mg/kg PO twice daily; good for first time pyodermas.
			FEL	Active against Gram positive cocci (including penicillin-resistant staphylococci) and many obligate anaerobes. Indicated for staphylococcal bone and joint infections	For susceptible infections: a) For skin and soft tissue infections: 11 mg/kg IM q12h or 22 mg/kg IM q24h. Treatment for 12 days or less; For systemic infections: 15 mg/kg PO q8h or 22 mg/kg PO q12h. Treatment for 12 days or less.
			LEP		DO NOT USE
			SMALL MAMMALS		1) Ferrets: 10 – 15 mg/kg PO three times daily; 10 mg/kg IM twice daily 2) Chinchillas, Guinea pigs, Hamsters: DO NOT USE
			AVI		50-75 mg/kg PO, IM q12h
			REPTILES		5 mg/kg IM q12-24h
16	Macrolides	Erythromycin	CAN	Has similar antibacterial spectrum to penicillins. Active against Gram positive cocci (some Staphylococci are resistant), Gram positive bacilli and some Gram negative bacilli (Pasteurella spp). Some strains of Actinomyces, Norcardia, Chlamydia and Rickettsia are also inhibited by erythromycin.	For susceptible infections: a) 10 – 20 mg/kg PO three times daily b) For localized, soft tissue infections: 10 – 15 mg/kg PO q8h or 15 – 25 mg/kg PO q12h for 7 – 10 days; For systemic, bacteremia infections: 22 mg/kg PO or IV q8h for as long as necessary
			FEL		For susceptible infections: a) 10 – 20 mg/kg PO three times daily b) For localized, soft tissue infections: 10 – 15 mg/kg PO q8h or 15 – 25 mg/kg PO q12h for 7 – 10 days; For systemic, bacteremia infections: 22 mg/kg PO or IV q8h for as long as necessary
			AVI		20 mg/kg IM SC q8h; 60 mg/kg PO q12h; 125 mg/ml in drinking water; 200 mg/kg soft feed
			EQU	Treatment of C. (Rhodococcus) equi infections in foals	a) Erythromycin: 15 – 25 mg/kg PO q12 – 24h daily, with Rifampin (5 mg/kg, PO q12h). Treatment may be necessary for 1 – 3 months. For treatment of proliferative enteropathy caused by L. intracellularis infections in foals: a) Erythromycin estolate: 25 mg/kg PO q6 – 8h, with rifampin: 10 mg/kg PO q12h for a minimum of 21 days For susceptible infections: a) Foals: Erythromycin estolate: 25 mg/kg PO q6h;



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
16	Macrolides	Erythromycin	SMALL MAMMALS	Treat hamster with proliferative ileitis caused by <i>Lawsonia intracellularis</i> , in ferrets to treat <i>Campylobacter</i> infection	1) Hamsters: 20 mg/kg PO q12h or 0.13 mg/ml drinking water 2) Ferrets: 10 mg/kg PO q6h
17	Macrolides	Tylosin	CAN	Good activity against Mycoplasmas and has the same antibacterial spectrum of activity as erythromycin but is generally less active against bacteria. Rarely indicated for small animal medicine	2-10 mg/kg IM q24h. 7-11 mg/kg PO q6-8h.
		FEL			1) Ferrets, Mice, Rats, Chinchillas: 10 mg/kg PO, IM, SC q12h 2) NOT RECOMMENDED FOR Hamsters, Guinea pigs, or rabbits
		SMALL MAMMALS			
		AVI			1) 20-40 mg/kg IM q8-12h or by 2) Nebulization of 100 mg diluted in 5 mL DMSO and 10 mL saline; 3) Passerines: 1g/L drinking water for 7-10 days; 4) Pigeons: 50 mg/kg PO q24h; 25 mg/kg IM q6-8h or 800 mg/L drinking water
			REPTILES		5mg/kg IM q24h q10-60d
18	Penicillin	Ampicillin	CAN	Active against many Gram positives and Gram negatives aerobic organisms and obligate anaerobes, but not against those that produces Beta-lactamases (e.g. <i>Escherichia coli</i> , <i>Staphylococcus aureus</i>)	1) 10-20 mg/kg IV, IM, SC, PO q6-8h 2) CNS or serious bacterial infections: up to 40 mg/kg IV q6h
		FEL			10-20 mg/kg IV, IM, SC, PO q6-8h
		LEP			DO NOT USE
		SMALL MAMMALS			1) Ferrets: 5-30 mg/kg IM, SC q12h 2) Chinchillas, Guinea pigs, Hamster: DO NOT USE 3) Gerbils: 20-100 mg/kg SC q8h, 6-30 mg/kg PO q8h 4) Rats, Mice: 25 mg/kg IM, SC q12h; 50-200 mg/kg PO 12h
			AVI		50-100 mg/kg IV, IM q8-12h; 150-200 mg/kg PO q8-12h; 1-2 g/L Drinking water; 2-3 g/kg soft feed
			REPTILES		20 mg/kg SC, IM q24h @ 26 °C
			EQU	Ampicillin is indicated in animals with infections caused by susceptible bacteria, such as skin and soft tissue infections, UTIs, and pneumonia.	6.6 mg/kg up to 10-20 mg/kg q6-8h IM or IV
19	Penicillin	Amoxicillin/Clavunate	CAN	Active against Gram positive and gram negative aerobic organism and many obligate anaerobes. Beta-lactamase producing <i>Escherichia coli</i> and <i>Staphylococcus spp</i> are susceptible, but difficult Gram negative organism such as <i>Pseudomonas aeruginosa</i> and <i>Klebsiella spp</i> are often resistant.	1) Parenteral: 8.75 mg/kg (combined) IV q8h, IM, SC q24h 2) Oral: 12.5-25 mg/kg (combined) PO q8-12h
		FEL			1) Ferrets: 12.5-20 mg/kg IM, SC q12h 2) Rats, Mice: 100 mg/kg q12h
		SMALL MAMMALS			
		AVI			125-150 mg/kg PO, IV q12h; 125-150 mg/kg IM q24h
			EQU	1. Amoxicillin is used for a variety of infections in all species, including urinary tract infection, soft tissue infections, and pneumonia. 2. It is generally more effective for infections caused by gram-positive bacteria.	6.6-22 mg/kg q8-12h PO (suspension).
			CAN, FEL	Treatment of digestive, respiratory, urogenital, cutaneous and soft tissue infections caused by bacteria sensitive to amoxicillin	The recommended dosage is 15mg per kg body weight, to be repeated once after 48 hours

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20	Penicillin	Benzyl penicillin/ Sodium or Potassium Penicillin G	EQU	<ol style="list-style-type: none"> 1. Indicated for treatment of gram-positive cocci that cause respiratory infections, abscesses, and urinary tract infections. 2. For susceptible organisms include gram-positive bacilli and anaerobic bacteria. 3. Most gram-negative bacilli, especially those of enteric origin, are resistant. Some gram-negative respiratory pathogens such as <i>Pasteurella multocida</i> and <i>Mannheimia haemolytica</i> are susceptible. 	<ol style="list-style-type: none"> 1. Penicillin sodium or penicillin potassium: 20,000-24,000 units/kg q6-8h IV. 2. (Doses up to 44,000 units/kg q6h have been used for refractory cases.)
21	Penicillin	Penicillin procaine	EQU	Strangles caused by <i>Streptococcus equi</i>	Procaine penicillin G: 20,000-24,000 units/kg q24h IM.
22	Penicillin	Ticarcillin	CAN	For septicaemia caused by <i>Pseudomonas aeruginosa</i> , and other Gram negative bacillus including <i>Proteus spp</i> and <i>Bacteroides fragillis</i> .	40-100 mg/kg IV, IM q4-6h
			FEL		DO NOT USE
			LEP		DO NOT USE
			SMALL MAMMALS		DO NOT USE
			AVI		150-200 mg/kg IV, IM q8-12h
			EQU	Ticarcillin has been used in animals for treatment of various infections, including pneumonia, soft tissue infections, and bone infections.	44 mg/kg q6-8h.
23	Penicillin	Cloxacillin	CAN	The spectrum of cloxacillin includes gram-positive bacilli, including betalactamase-producing strains of <i>Staphylococcus</i> . Therefore, it has been used to treat staphylococcal infections in animals, including pyoderma. Because of the availability of other beta-lactam drugs for treating gram-positive infections such as those caused by <i>Staphylococcus</i> , cloxacillin is used infrequently in small animals.	20-40 mg/kg q8h PO
			FEL		
24	Penicillin	Dicloxacillin	CAN	Dicloxacillin has a relatively narrow spectrum of activity. Like cloxacillin and oxacillin, the spectrum of dicloxacillin includes gram-positive bacilli, including beta-lactamase-producing strains of <i>Staphylococcus</i> . Therefore, it has been used to treat staphylococcal infections in animals, including pyoderma. It is not active against methicillin-resistant <i>Staphylococcus</i> . The veterinary use of dicloxacillin has been primarily in the PO treatment of bone, skin, and other soft tissue infections in small animals when penicillinase-producing <i>Staphylococcus</i> species have been isolated. Because of its low oral bioavailability and short half-life, other drugs with good staph coverage are usually employed. Because of availability of other drugs for small animals to treat this spectrum of bacteria, dicloxacillin is not used commonly.	11-55 mg/kg q8h PO.
			FEL		



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
25	Penicillin	Oxacillin	CAN	Primarily in the treatment of bone, skin, and other soft tissue infections in small animals when penicillinase-producing <i>Staphylococcus</i> species have been isolated. Because of its rapid elimination and required frequent dosing, it is infrequently used. Cloxacillin, dicloxacillin and oxacillin have nearly identical spectrums of activity and can be considered therapeutically equivalent when comparing in vitro activity.	a) 22 – 40 mg/kg PO, SC, IM, or IV q8h b) For non-superficial pyoderma: 25 – 30 mg/kg PO three times daily for 3 – 6 weeks. Maximum dose is 1 gram three times daily. Increase dose if no response in one week. If no response by second week, discontinue. c) For <i>Staph. acute osteomyelitis</i> : 22 mg/kg IV, IM, SC or PO three to four times daily d) For penicillinase-producing <i>Staph. Endocarditis</i> : 50 – 60 mg/kg three times daily for 4 – 6 weeks (route not indicated) e) For systemic therapy for <i>Staph. blepharitis</i> : 22 mg/kg PO three times daily
			FEL		For susceptible infections: a) 22 – 40 mg/kg PO, SC, IM, or IV q8h
			EQU		For susceptible infections: a) Foals: 20 – 30 mg/kg IV q6 – 8h (Dose extrapolated from adult horse data; use lower dose or longer interval in premature foals or those less than 7 days old.) (Caprile and Short 1987); b) 25 – 50 mg/kg IM, IV twice daily
26	Polypeptides	Polymixin B	CAN	Effective against Gram negative organisms, particularly external <i>Pseudomonas</i> infections e.g. keratoconjunctivitis, otitis externa	1) Skin: Apply a few drops and rub in well 2) Otic: Clean ear and apply a few drops into affected ear q12h 3) Ophthalmic: Apply ointment q6-8h
			FEL		
27	Quinolones	Ceftfloxacin	CAN	Broad-spectrum activity against wide range of Gram negative and some Gram positive aerobes, some activity against <i>Mycoplasma</i> and <i>Chlamydia</i> . Active against many ocular pathogens, including <i>Staphylococcus</i> and <i>Pseudomonas aeruginosa</i> . Use should be reserved for serious corneal infections due to sensitive organisms, particularly aminoglycoside-resistant <i>Pseudomonas</i> , when other antibacterials are ineffective and should be ideally be dictated by sensitivity testing.	a) 5 – 15 mg/kg PO q12h; Avoid or reduce dosage of these drugs in animals with severe renal failure; avoid in young animals or in pregnant or breeding animals. b) For UTI: 10 mg/kg PO once daily (q24h) for 7 – 14 days For skin, soft tissue infections: 10 – 15 mg/kg PO once daily (q24h) for 7 – 14 days For bone systemic infections, bacteremia and more resistant pathogens (e.g., <i>Enterobacter</i>): 20 mg/kg PO once daily (q24h) for 7 – 14 days c) For pyoderma: 11 mg/kg PO q12h d) Ophthalmic: 1 drop to affected eye q6h, loading dose can be used 1 drop to affected eye q15min for 4 doses
			FEL		a) Ciprofloxacin: 5 – 15 mg/kg PO q12h Avoid or reduce dosage of these drugs in animals with severe renal failure; avoid in young animals or in pregnant or breeding animals.
			LEP		5 – 20 mg/kg PO q12h
			SMALL MAMMALS		1) Ferret: 5 – 15 mg/kg PO twice daily 2) Chinchillas, Gerbils, Guinea Pigs, Hamsters, Mice, Rats: 7 – 20 mg/kg PO q12h
			AVI		For susceptible gram-negative infections: a) Using ciprofloxacin 500 mg tablets: 20 – 40 mg/kg PO twice daily. Crushed tablet goes into suspension well, but must be shaken well before administering. b) Ciprofloxacin (using crushed tablets): 20 mg/kg PO q12h c) Ciprofloxacin (using crushed tablets or suspend) 10 – 15 mg/kg PO q12h d) Ratites: 3 – 6 mg/kg PO twice daily

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28	Quinolones	Difloxacin	CAN	Active against a wide range of Gram negative organisms (<i>Escherichia coli</i> , <i>Klebsiella</i> spp, <i>Pasteurella</i> spp, <i>Pseudomonas aeruginosa</i> , <i>Enterobacter</i> , <i>Campylobacter</i> , <i>Shigella</i>), and also good to intermediate activity against Gram positive organisms (<i>Staphylococcus intermedius</i>) and <i>Proteus</i> is intermediate. Main indications include infections associated with skin and soft tissues, and bacterial cystitis	a) For susceptible infections: 5 – 10 mg/kg once daily PO for 2 – 3 days beyond the cessation of clinical signs to a maximum of 30 days therapy
			EQU		a) For susceptible infections (MIC ≤ 0.25 mcg/mL): 7.5 mg/kg PO (non-fasted) once daily (q24h). Appears to be safe, adequately absorbed and well distributed. Further investigation is warranted to substantiate. Unknown whether administration of difloxacin to young, growing horses should be avoided.
29	Quinolones	Enrofloxacin	CAN	Treatment of bacterial infections of the alimentary, respiratory and urogenital tracts, skin, secondary wound infections and otitis externa. Active against <i>Mycoplasma</i> spp. And many Gram positive and Gram negative organisms including <i>Pasteurella</i> spp, <i>Staphylococcus</i> spp, <i>Pseudomonas aeruginosa</i> , <i>Klebsiella</i> spp, <i>Escherichia coli</i> , <i>Mycobacterium</i> spp, <i>Proteus</i> spp, and <i>Salmonella</i> spp.	5 mg/kg SC, IV, PO q24h; 2.5mg/kg PO q12h, If orally for 3-10 days; if IV up to 5 days
			FEL		5 mg/kg SC, IV, PO q24h; 2.5mg/kg PO q12h If SC up to 5 days
30	Quinolones	Enrofloxacin	LEP	Treatment of bacterial infections of the alimentary, respiratory and urogenital tracts, skin, secondary wound infections and otitis externa where clinical experience, supported where possible by sensitivity testing of the causal organism, indicates enrofloxacin as the drug of choice. Active against <i>Mycoplasma</i> spp. And many Gram positive and Gram negative organisms including <i>Pasteurella</i> spp, <i>Staphylococcus</i> spp, <i>Pseudomonas aeruginosa</i> , <i>Klebsiella</i> spp, <i>Escherichia coli</i> , <i>Mycobacterium</i> spp, <i>Proteus</i> spp, and <i>Salmonella</i> spp.	5-10 mg/kg SC, PO, IV q12h or 20 mg/kg SC, PO, IV q24h or 100-200 mg/L drinking water
			SMALL MAMMALS		1) Ferrets: 5-10 mg/kg PO, SC, IM q12h or 10-20 mg/kg PO, SC, IM q24h 2) Rodents: 5-10 mg/kg SC, PO q12h-24h
			AVI		10-15 mg/kg IM, (switch to oral route as soon as possible), PO q12h (sensitive infection can be treated q24h) or 100-200 mg/L drinking water
			REPTILES		5-10 mg/kg IM, PO q24-48h
			EQU	For susceptible respiratory infections	7.5 mg/kg PO or IV once daily



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
31	Quinolones	Marbofloxacin	CAN	Active against mycoplasma and many Gram positive and particularly Gram negative organisms, including Pasteurella spp, Staphylococcus spp, Pseudomonas aeruginosa, Klebsiella spp, Escherichia coli, Proteus spp, and Salmonella spp. And beta lactamase producing bacteria. Particularly effective in management of soft tissue infections, urogenital (including prostatitis) and skin infections	1) Oral and parenteral: 2mg/kg IV, SC, PO q24h 2) Topical: 10 drops per ear once daily
			FEL		1) 2 mg/kg IV, SC, PO q24h
			SMALL MAMMALS		2-5 mg/kg PO, SC, IM q24h
			BIRDS		10 mg/kg PO, IM, IV q24h
			REPTILES		10 mg/kg SC, IM, PO q48h
32	Quinolones	Orbifloxacin	CAN	Treatment of acute otitis externa and acute exacerbations of recurrent otitis externa, associated with bacteria susceptible to orbifloxacin	For auricular use. One drop contains 267 µg orbifloxacin Dogs weighing less than 2 kg, apply 2 drops to the ear once a day. Dogs weighing 2 to 15 kg, apply 4 drops to the ear once a day. Dogs weighing 15 kg or more, apply 8 drops to the ear once a day.
33	Sulfonamides	Sulfadiazine	CAN	Treatment for UTI, pyoderma, soft tissue infections, protozoal diseases, coccidiosis, and active against Gram negative organisms such as Pseudomonas aeruginosa causing Otitis	For susceptible infections: a) For pyoderma, soft tissue infections: 30 mg/kg PO q24h (not soft tissue infections) or 15 mg/kg PO q12h for 14 days. For chronic pyoderma, acanthamebiasis: 30 mg/kg PO q12h for 21 – 42 days. For systemic infections; bacteremia: 30 – 45 mg/kg PO q12h for 3 – 5 days. b) For bacterial UTI: 30 mg/kg q12h PO c) For protozoal diseases: For toxoplasmosis: 15 mg/kg, PO q12h for 28 days. For Neospora: 15 mg/kg, PO q12h for 4 weeks. Used concurrently with clindamycin (10 mg/kg q12h for 4 weeks) or pyrimethamine (1 mg/kg PO once daily for 4 weeks) For Hepatazoon canis: 15 mg/kg, PO q12h for 2 – 4 weeks. Used concurrently with clindamycin (10 mg/kg PO q8h for 2 – 4 weeks) and pyrimethamine (0.25 mg/kg PO once daily for 2 – 4 weeks) d) For coccidiosis: 30 mg/kg PO once daily for 10 days e) For pneumocystosis (Pneumocystis carinii): 15 mg/kg PO q8h or 30 mg/kg PO q12h, both for 3 weeks. May be given with cimetidine and levamisole as potential immune stimulants. f) For Hepatazoon americanum: TMP/sulfa (15 mg/kg PO q12h), pyrimethamine (0.25 mg/kg PO q24h), and clindamycin (10 mg/kg q8h). Once remission attained decoquinatate can maintain g) For Hepatazoon americanum: TMP/sulfa (15 mg/kg PO q12h for 14 days), pyrimethamine (0.25 mg/kg PO q24h for 14 days), and clindamycin (10 mg/kg q8h for 14 days). Once remission attained decoquinatate (see monograph) can maintain. For neosporosis: pyrimethamine (1 mg/kg PO daily) with TMP/sulfa (15 – 30 mg/kg PO twice daily).

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			FEL		<p>a) For UTI: 30 mg/kg PO q24h for 7 – 14 days. For UTI, soft tissue infections: 15 mg/kg PO q12h for 7 – 14 days.</p> <p>b) 30 mg/kg q12h (if treating Nocardia, double dose)</p> <p>c) For toxoplasmosis: 15 mg/kg PO q12h for 28 days</p> <p>d) For bacterial UTI: 30 mg/kg q12h PO</p>
			LEP		<p>15 – 30 mg/kg, PO q12 – 24h; 30 – 48 mg/kg SC q12h. Sulfadiazine has a very short half-life (approx. 1 hour) in rabbits.</p>
			SMALL MAMMALS		<p>1) Ferrets: 30 mg/kg PO twice daily. For coccidiosis: 30 mg/kg PO q24h for 14 days.</p> <p>2) Gerbils, Guinea Pigs, Hamsters, Mice, Rats: 15 – 30 mg/kg PO q12h; or 30 mg/kg IM q12h</p> <p>3) Chinchillas: 30 mg/kg PO, SC or IM q12h</p>
34	Sulfonamides	Sulfadiazine	EQU	Treatment for Respiratory tract infection, UTI, pyoderma, soft tissue infections, protozoal diseases, coccidiosis, and active against Gram negative organisms such as Pseudomonas aeruginosa causing Otitis	<p>a) For respiratory tract infections: 15 – 30 mg/kg PO q12h. Give 30 minutes prior to feeding hay (grain is OK)</p> <p>b) Foals: 15 mg/kg IV q12h; 30 mg/kg PO q12h</p> <p>c) 22 mg/kg IV q24h or 30 mg/kg, PO q24h</p> <p>d) 30 mg/kg PO once daily or 21.3 mg/kg IV once daily</p> <p>e) Foals: 15 mg/kg PO or IV twice daily</p> <p>f) For EPM: Sulfadiazine 20 mg/kg (either alone or as a potentiated sulfa) PO once or twice a day with Pyrimethamine (1 mg/kg PO once a day) for 90 – 120 days (or longer). Monitor: CBC's</p>
			AVI		<p>For susceptible infections:</p> <p>a) Using TMP/SMX oral suspension (240 mg/5 mL): 2 mL/kg PO twice daily. Good for many gram-positive and negative enteric and respiratory infections, particularly in hand-fed babies. May cause emesis in Macaws.</p> <p>b) For respiratory and enteric infections in psittacines using the 24% injectable suspension: 0.22 mL/kg IM once to twice daily. For coccidiosis in toucans and mynahs using TMP/SMX oral suspension (240 mg/5 mL): 2.2 mL/kg once daily for 5 days. May be added to feed. For respiratory and enteric infections in hand-fed baby psittacines using TMP/SMX oral suspension (240 mg/5 mL): 0.22 mL/30 grams twice daily to three times daily for 5 – 7 days.</p> <p>c) Using oral suspension: 50 – 100 mg/kg (of combined product) PO q12h</p> <p>d) Ratites: For Toxoplasma gondii: 30 – 50 mg/kg IM twice daily</p>
			REPTILES		<p>For susceptible infections:</p> <p>a) For most species: 30 mg/kg IM (upper part of body) once daily for 2 treatments, then every other day for 5 – 12 treatments. May be useful for enteric infections.</p> <p>b) For all species: 30 mg/kg IM, first two doses 24 hours apart and then every other day</p> <p>c) 15 – 25 mg/kg/day IM for 7 – 14 days</p>



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
35	Sulfonamides	Sulfadimethoxine	CAN	Treatment for respiratory, genitourinary, enteric and soft tissue infections caused by susceptible organisms	a) 25 mg/kg PO, IV, or IM once daily b) 100 mg/kg PO, IV or IM once daily c) 55 mg/kg PO, or IV, or SC initially, then 27.5 mg/kg once daily thereafter For coccidiosis: a) 55 mg/kg PO initially on the first day of therapy, then 27.5 mg/kg PO once daily for 9 days b) 50 mg/kg once daily for 10 – 14 days will eliminate oocyst excretion in most dogs and cats c) During the infant period (2 – 6 weeks): 50 mg/kg PO on the first day followed by a daily dose of 25 mg/kg PO until symptoms regress
			FEL	Treatment for respiratory, genitourinary, enteric and soft tissue infections caused by susceptible organisms	For susceptible infections: a) 25 mg/kg PO, IV, or IM once daily b) 100 mg/kg PO, IV or IM once daily c) 55 mg/kg PO, or IV, or SC initially, then 27.5 mg/kg once daily thereafter For coccidiosis: a) 50 mg/kg once daily for the first day, then 25 mg/kg once daily for 14 – 20 days. Sulfas are coccidiostatic. It is important that supportive care, including fluids and good nutrition be maintained during therapy. b) 50 mg/kg once daily for 10 – 14 days will eliminate oocyst excretion in most dogs and cats
			EQU	Treatment of respiratory infections caused by <i>Streptococcus equi</i> .	For susceptible infections: a) 55 mg/kg, PO or IV q12h b) 55 mg/kg IV or PO initially, then 27.5 mg/kg q24h IV
			LEP	Treatment for respiratory, genitourinary, enteric and soft tissue infections caused by susceptible organisms	10 – 15 mg/kg PO q12h For coccidiosis: 25 mg/kg PO once daily
			SMALL MAMMALS	Treatment for respiratory, genitourinary, enteric and soft tissue infections caused by susceptible organisms	1) Ferrets: For susceptible infections: a) 25 mg/kg PO, SC or IM once daily b) For coccidiosis: 25 mg/kg PO once daily for 14 days. 2) Hedgehogs: 2 – 20 mg/kg/day IM, SC or PO 3) Mice, Rats, Gerbils, Hamsters, Guinea pigs, Chinchillas: As a coccidiostat: 50 mg/kg PO once, then 25 mg/kg PO once daily for 10 – 20 days or 75 mg/kg PO for 7 – 14 days
			REPTILES		For coccidia: 90 mg/kg PO on day one and then 45 mg/kg PO on 5 successive days; may also be given IM or IV. Maintain adequate hydration

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36	Sulfonamides	Trimethoprim	CAN	Treatment of Urinary Tract Infection, respiratory tract infections and prostatic infections, systemic salmonellosis,	4-5mg/kg PO q12h
			FEL		
			LEP		Trimethoprim –sulfadiazine 30 mg/kg PO, SC q24h
			SMALL MAMMALS		Trimethoprim- sulfamethoxazole 40 mg/kg PO q24h
					Dose (mg) of total product (Trimethoprim + sulphonamide) 1) Ferrets: 15-30 mg/kg PO, SC q12h 2) Chinchillas, hamsters, Guinea pigs: 15-30 mg/kg PO, IM, SC q12-24h 3) Gerbils, rats, mice: 50-100 mg/kg PO, SC q24h
			AVI	Treatment of Urinary Tract Infection, respiratory tract infections and prostatic infections, systemic salmonellosis,	Dose (mg) of total product (Trimethoprim + sulphonamide) 8-30 mg/kg IM q12h; 20-100 mg/kg PO q12h, pigeons: 475-970 mg/L drinking water
			REPTILES	Treatment of Coccidiosis	Coccidiosis: 25 mg/kg PO q24h for 21 days
37	Tetracycline	chlortetracycline	EQU	For respiratory infections caused by Streptococcus equi, joint infections, abdominal infections, prostate infections, soft tissue infections, and infections of the CNS, infections caused by protozoa (e.g., coccidia and Toxoplasma infections)	25-30 mg/kg (approximately 25 mg sulfonamide 1 5 mg trimethoprim) q12h PO
			CAN	Inhibits growth of many Gram positive and Gram negative bacteria, rickettsiae, mycoplasmas, spirochaetes. Treat chlamydophilosis ocular infections	For susceptible infections: a) 25 mg/kg PO q6
			FEL		
			SMALL MAMMALS		1) Chinchillas: 50 mg/kg PO q12h 2) Hamsters: 20 mg/kg IM or SC q12h; 3) Mice: 25 mg/kg SC or IM q12h; Rats: 6 – 10 mg/kg SC or IM q12h
			LEP		50 mg/kg PO q12 – 24h
			AVI		a) For the treatment of chlamydiosis: In small birds add chlortetracycline to food in a concentration of 0.05%; larger psittacines require 1% CTC. b) Ratites: 15 – 20 mg/kg PO three times daily c) Pigeons: 50 mg/kg PO q6 – 8h; or 1000 – 1500 mg/gallon drinking water; in warm weather mix fresh every 12 hours. Best used in combination with tylosin for ornithosis complex, calcium inhibits absorption therefore grit and layer pellets should be withheld during treatment



No.	Antimicrobial Class	Antimicrobial substance	Species	Indications	Dosage
38	Tetracycline	Doxycycline	CAN	Against spirochates such as Helicobacter spp, and Campylobacter spp), antirickettsial (e.g Mycoplasma haemofelis), antimycoplasmal and antichlamydial activity.	10 mg/kg PO q24h with food
			FEL		
			LEP		2.5-4 mg/kg PO q24h
			SMALL MAMMALS		1) Rat, Mice: 5mg/kg PO q12h
			AVI		1) Parrots: 15-50 mg/kg PO q24h, 1000 mg/kg in soft food/ dehulled seed, 75-100mg/kg IM q7d Chlamydophilosis = 45 days 2) Raptors: 50 mg/kg PO q12h, 100 mg/kg IM q7d 3) Passerines/ Pigeons: 40 mg/kg PO q12-24h, 200-500 mg/L in water (soft water only)
			REPTILES		50 mg/kg IM once then 25 mg/kg IM q72h
			EQU	For Lyme disease	10-20 mg/kg PO once to twice daily for up to 30 days
39	Tetracycline	Oxytetracycline	CAN	To treat mycoplasma, rickettsia, spirochetes, & Chlamydia	For susceptible infections: a) For systemic infections: 22 mg/kg PO q8h for 7 – 14 days or 20 mg/kg IM (using repositol form) every 7 days as needed. b) 20 mg/kg PO q8 – 12h; (may give with food if GI upset occurs; avoid or reduce dose in animals with renal or severe liver failure; avoid in young, pregnant or breeding animals)
			FEL		For susceptible infections: a) For hemotropic mycoplasmosis: 10 – 25 mg/kg PO, IV q8h for 5 – 7 days b) 20 mg/kg PO q8 – 12h; (may give with food if GI upset occurs; avoid or reduce dose in animals with renal or severe liver failure; avoid in young, pregnant or breeding animals) (
			LEP		15 mg/kg SC, IM q8h; 15 – 50 mg/kg PO once daily; 1 mg/mL in drinking water
			SMALL MAMMALS		1) Chinchillas: 50 mg/kg PO q12h 2) Gerbils: 10 mg/kg PO q8h or 20 mg/kg SC q24h; 3) Guinea Pigs: 50 mg/kg, PO q12h; 4) Hamsters: 16 mg/kg, SC q24h; 5) Mice: 10 – 20 mg/kg PO q8h; 6) Rats: 10 – 20 mg/kg PO q8h or 6 – 10 mg/kg IM q12h

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39	Tetracycline	Oxytetracycline	EQU	To treat mycoplasma, rickettsia, spirochetes, & Chlamydia	<p>For susceptible infections:</p> <p>a) Foals: 5 – 10 mg/kg IV q12h diluted and given slowly, or 10 – 20 mg/kg IV q24h diluted and given slowly. Monitor creatinine and UA.</p> <p>b) Drug of choice for equine monocytic or granulocytic ehrlichiosis: 6.6 mg/kg IV q24h; to safeguard against adverse effects (muscle tremors, agitation or acute collapse) dilute at least in a 1:1 ratio and give IV slowly, or deliver it as an infusion in 500 mL or 1 liter of fluids.</p> <p>c) For Lyme disease: 6.6 mg/kg IV once to twice daily</p> <p>d) For Potomac Horse Fever (Ehrlichia risticii) early in the clinical course of the disease: 6.6 mg/kg IV twice a day. Usually no more than 5 days treatment is necessary. For Equine Granulocytic Ehrlichiosis: 7 mg/kg once daily for 5 – 7 days</p> <p>e) For intrauterine infusion: 1 – 5 grams; use povidone based products only. Little science is available for recommending doses, volume infused, frequency, diluents, etc. Most intrauterine treatments are commonly performed every day or every other day for 3 – 7 days.</p>
40	Tetracycline	Oxytetracycline	AVI	To treat mycoplasma, rickettsia, spirochetes, & Chlamydia	<p>For chlamydiosis (Psittacosis):</p> <p>a) 50 mg/kg IM once every 3 – 5 days in birds suspected or confirmed of having disease. Used in conjunction with other forms of tetracyclines. IM injections may cause severe local tissue reactions.</p> <p>b) 200 mg/kg IM once daily for 3 – 5 days. Has worked well in treating breeding birds and while getting birds to eat oral forms doxycycline or chlortetracycline</p>
			REPTILES		<p>For susceptible infections:</p> <p>a) For turtles and tortoises: 10 mg/kg PO once daily for 7 days (useful in ulcerative stomatitis caused by Vibrio)</p>



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ANNEX 1

**OIE LIST OF ANTIMICROBIAL
AGENTS OF VETERINARY
IMPORTANCE**



OIE LIST OF ANTIMICROBIAL AGENTS OF VETERINARY IMPORTANCE

The OIE 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/OIE/WHO 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 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 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.


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

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

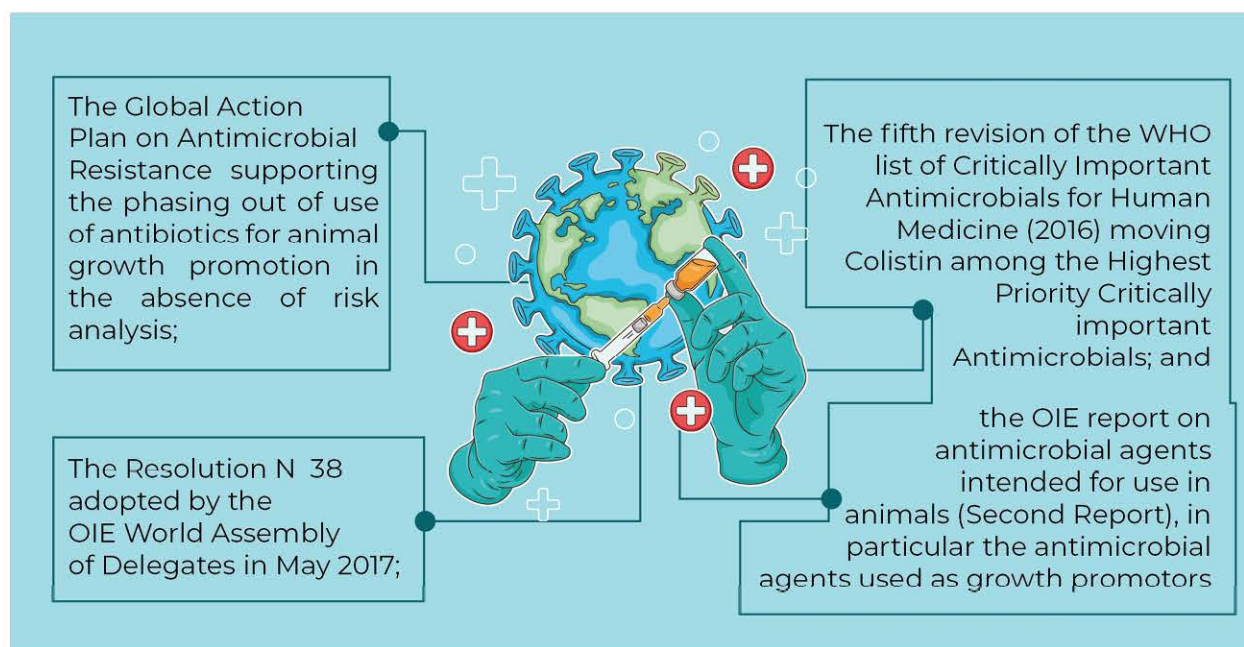


Revision of the list of antimicrobial agents of Veterinary Importance

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 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 absence of clinical signs in the animal(s) to be treated;
- Urgently prohibit their use as growth promoters.
- 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



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.



CATEGORISATION 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			X
AMINOGLYCOSIDES					
AMINOCYCLITOL Spectinomycin Streptomycin Dihydrostreptomycin	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI API, AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI 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. Aminoglycosides are of importance in septicaemias; digestive, respiratory and urinary diseases.			
AMINOGLYCOSIDES + 2 DEOXYSTREPTAMINE Kanamycin Neomycin Framycetin Paromomycin Apramycin Fortimycin Gentamicin Tobramycin Amikacin	AVI, BOV, EQU, PIS, SUI API, AVI, BOV, CAP, EQU, LEP, OVI, SUI BOV, CAP, OVI AVI, BOV, CAP, OVI, LEP, SUI AVI, BOV, LEP, OVI, SUI AVI, BOV, LEP, OVI, SUI AVI, BOV, CAM, CAP, EQU, LEP, OVI, SUI EQU EQU	Gentamicin is indicated for <i>Pseudomonas aeruginosa</i> infections with few alternatives. <u>Apramycin and Fortimycin are currently only used in animals.</u> 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		

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	SPECIFIC COMMENTS	VCIA	VHIA	VIA
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 Roxarsone Nitarsone	AVI, SUI AVI, SUI	Arsenicals are used to control intestinal parasitic coccidiosis. (<i>Eimeria spp.</i>).			X
BICYCLOMYCIN Bicozamycin	AVI, BOV, PIS, SUI	Bicyclomycin is listed for digestive and respiratory diseases in cattle and septicaemias in fish.			X
CEPHALOSPORINS				X	
CEPHALOSPORINS FIRST GENERATION Cefacetrile Cefalexin Cefalotin Cefapirin Cefazolin Cefalonium	BOV BOV, CAP, EQU, OVI, SUI EQU BOV BOV, CAP, OVI BOV, CAP, OVI	Cephalosporins are used in the treatment of septicemias, respiratory infections, and mastitis.			
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.			
FUSIDIC ACID Fusidic acid	BOV, EQU	Fusidic acid is used in the treatment of ophthalmic diseases in cattle and horses.			X



ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	SPECIFIC COMMENTS	VCIA	VHIA	VIA
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 Pirlimycin Lincomycin	BOV, SUI, AVI API, AVI, BOV, CAP, OVI, PIS, SUI	Lincosamides are essential in the treatment of Mycoplasmal pneumonia, infectious arthritis and hemorrhagic enteritis of pigs.		X	
MACROLIDES (C refers to the chemical structure)					
MACROLIDES C14 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 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. This class is also used for respiratory infections in cattle.	X		
MACROLIDES C15 Gamithromycin Tulathromycin	BOV BOV, SUI				
MACROLIDES C16 Carbomycin Josamycin Kitasamycin Spiramycin Tilmicosin Tylosin Mirosamycin Terdecamycin Tildipirosin Tylvalosin	AVI AVI, PIS, SUI AVI, SUI, PIS AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI AVI, BOV, CAP, LEP, OVI, SUI API, AVI, BOV, CAP, LEP, OVI, SUI API, AVI, SUI, PIS AVI, SUI BOV, SUI AVI, SUI				
MACROLIDES C17 Sedecamycin	SUI				
ORTHOSOMYCINS Avilamycin	AVI, LEP	Avilamycin is used for enteric diseases of poultry and rabbit. <u>This class is currently only used in animals.</u>			X

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	SPECIFIC COMMENTS	VCIA	VHIA	VIA
PENICILLINS		<p><u>Penethamate (hydroiodide) is currently only used in animals</u></p> <p>The wide range of applications and the nature of the diseases treated make penicillins extremely important for veterinary medicine.</p> <p>This class is used in the treatment of septicaemias, respiratory and urinary tract infections.</p> <p>This class is very important in the treatment of many diseases in a broad range of animal species.</p> <p>Few economical alternatives are available.</p>	X		
NATURAL PENICILLINS (including esters and salts) Benethamine penicillin Benzylpenicillin Penethamate (hydroiodide) Benzylpenicillin procaine / Benzathine penicillin	BOV AVI, BOV, CAM, CAP, EQU, LEP, OVI, SUI BOV BOV, CAM, CAP, EQU, OVI, SUI				
AMDINOPENICILLINS Mecillinam	BOV, SUI				
AMINOPENICILLINS Amoxicillin Ampicillin Hetacillin	AVI, BOV, CAP, EQU, OVI, PIS, SUI AVI, BOV, CAP, EQU, OVI, PIS, SUI BOV				
AMINOPENICILLIN + BETALACTAMASE INHIBITOR Amoxicillin + Clavulanic Acid Ampicillin + Sulbactam	AVI, BOV, CAP, EQU, OVI, SUI AVI, BOV, SUI				
CARBOXYPENICILLINS Ticarcillin Tobicillin	EQU PIS				
UREIDOPENICILLIN Aspoxicillin	BOV, SUI				
PHENOXYPENICILLINS Phenoxymethylpenicillin Phenethicillin	AVI, SUI EQU				
ANTISTAPHYLOCOCCAL PENICILLINS Cloxacillin Dicloxacillin Nafcillin Oxacillin	BOV, CAP, EQU, OVI, SUI BOV, CAP, OVI, AVI, SUI BOV, CAP, OVI BOV, CAP, EQU, OVI, AVI, SUI				
PHOSPHONIC ACID 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	



ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS, SUBSTANCE)	SPECIES	SPECIFIC COMMENTS	VCIA	VHIA	VIA
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 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	
POLYPEPTIDES CYCLIC Colistin Polymixin	AVI, SUI EQU AVI, BOV, LEP, SUI, OVI AVI, BOV, CAP, EQU, LEP, OVI, SUI BOV, CAP, EQU, LEP, OVI, AVI	Cyclic polypeptides are widely used against Gram negative enteric infections.		X	
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). <u>This class is currently only used in animals.</u>			X

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				
Sulfamerazine	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI				
Sulfadimethoxazole	AVI, BOV, SUI				
Sulfamethoxine	AVI, PIS, SUI				
Sulfamonomethoxine	AVI, PIS, SUI				
Sulfanilamide	AVI, BOV, CAP, OVI				
Sulfapyridine	BOV, SUI				
Phthalylsulfathiazole	SUI				
Sulfaquinoxaline	AVI, BOV, CAP, LEP, OVI				
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	AVI, BOV, OVI, SUI	Virginiamycin is an important antimicrobial in the prevention of necrotic enteritis (<i>Clostridium perfringens</i>)			X
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.			
Doxycycline	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.			
Oxytetracycline	API, AVI, BOV, CAM, CAP, EQU, LEP, OVI, PIS, SUI				
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	AVI, SUI	This class is currently used in the treatment of some dermatological conditions.			X



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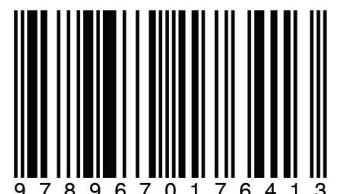
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