

Report of the *ad hoc* group of the Technical Reference Document for Antimicrobial Agents of Veterinary Importance for Bovine Animals

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1. Introduction

The WOAHA List of Antimicrobial Agents of Veterinary Importance (hereafter, “the WOAHA List”) was adopted by the WOAHA International Committee at its 75th General Session in May 2007 (Resolution No. XXVIII). The WOAHA List was updated and adopted in May 2013, May 2015, May 2018 and May 2024 by the WOAHA World Assembly of Delegates. The subdivision of the WOAHA List by animal species follows recommendations by the participants of the 2nd WOAHA Global Conference on Antimicrobial Resistance and Prudent Use of Antimicrobials in 2018 in Marrakesh, and of the previous work conducted by the WOAHA *ad hoc* Group on Antimicrobial Resistance. This task was delegated to the WOAHA Working Group on Antimicrobial Resistance (hereafter, the “AMRWG”) created by the General Director in 2019. *Ad hoc* groups and subgroups composed by members of the Working Group and/or external experts prepared the Technical Reference Documents for Antimicrobial Agents of Veterinary Importance (hereafter, the “technical reference document”) for Poultry (October 2020), Aquatic and Swine animals (October 2022).

Veterinarians working in bovine animal health management have the dual responsibility of ensuring the well-being and health of bovine animals (cattle and water buffalos) and of protecting human health by minimising the risk of resistant bacteria entering the food chain through animal-derived food products and the environment.

The objective of the technical reference document is to support responsible and prudent use of antimicrobials in bovine animals, without serving as a treatment guideline. It is envisaged that WOAHA Members will use the information in the technical reference document to update existing guideline documents for the responsible and prudent use of antimicrobials in bovine animals. This document will contribute to development of national and/or regional treatment guidelines, advice on prevention and best animal health management, risk management, and risk prioritisation to minimise and contain antimicrobial resistance.

The work on the technical reference document was conducted by an *ad hoc* group ([Annex 1](#)) and it started in April 2023 and was completed in late September 2024. The *ad hoc* group met face-to-face on the 27-28 April 2023 at WOAHA headquarters and subsequently held subsequently three meetings via teleconference. Regular updates were provided to the AMRWG during their biannual meetings. Feedback was sought from the AMRWG in June 2024 and from external experts on bovine animal health management, Collaborating Centres and stakeholder organisations between mid-July and September 2024 ([Annex 2](#)). The technical reference document was submitted for consideration and endorsement to the AMRWG in early October 2024.

2. Rationale

The *ad hoc* group agreed that a paragraph on off-label use of antimicrobial agents for treatment of specific bacterial infections in bovine animals would be included in the explanatory text of the technical reference document.

The *ad hoc* group agreed that the following antimicrobial agents are **still “authorised for use” in bovine animals** in one or more countries on the technical reference document; therefore **the reference to bovine animals (BOV) should be kept on the WOAHA List**:

Aminocyclitol

- Spectinomycin

Aminoglycosides

- Dihydrostreptomycin
- Streptomycin

Aminoglycosides + 2 Deoxystreptamine

- Apramycin
- Gentamicin
- Kanamycin
- Neomycin
- Paromomycin

Amphenicols

- Florfenicol (vet only)
- Thiamphenicol

Ansamycins-Rifamycins

- Rifaximin (topical use only)

Cephalosporins- 1st Generation

- Cefacetrile (topical use only)
- Cefalexin (topical use only)
- Cefalonium (vet only; topical use only)
- Cefapirin (topical use only)
- Cefazolin (topical use only)

Cephalosporins- 2nd Generation

- Cefuroxime

Cephalosporins- 3rd Generation

- Cefoperazone (topical use only)
- Ceftiofur (vet only)
- Ceftriaxone

Cephalosporins- 4th Generation

- Cefquinome (vet only)

Ionophores

- Lasalocid (vet only)
- Monensin (vet only)

Lincosamides

- Lincomycin
- Pirlimycin (vet only)

Macrolides- 14 membered ring

- Erythromycin

Macrolides- 15 membered ring

- Gamithromycin (vet only)
- Tulathromycin (vet only)

Macrolides- 16 membered ring

- Spiramycin
- Tildipirosin (vet only)
- Tilmicosin (vet only)
- Tylosin (vet only)

Natural penicillins (including esters and salts)

- Benzylpenicillin
- Procaine Benzylpenicillin/ Benzathine Benzylpenicillin
- Penethamate hydriodide (vet only)

Aminopenicillin

- Amoxicillin
- Ampicillin
- Hetacillin

Aminopenicillin plus betalactamase inhibitor

- Amoxicillin + Clavulanic acid
- Ampicillin + sulbactam

Antistaphylococcal penicillins

- Cloxacillin (topical use only)
- Oxacillin

Polypeptides

- Bacitracin

Polymyxins

- Colistin

Quinolones 1st generation

- Flumequine
- Oxolinic acid

Quinolones 2nd generation (Fluoroquinolones)

- Ciprofloxacin
- Danofloxacin
- Enrofloxacin (vet only)
- Marbofloxacin (vet only)
- Norfloxacin

Sulfonamides

- Sulfacetamide
- Sulfachlorpyridazine
- Sulfadiazine
- Sulfamethoxazole
- Sulfadimethoxine
- Sulfadimidine
- Sulfadoxine
- Sulfaguanidine
- Sulfamerazine
- Sulfanilamide
- Sulfapyridine
- Sulfaquinoxaline
- Sulfamethoxypyridazine (previous classified under "Sulfonamides + diaminopyrimidines. The change in the WOH List will be conducted after the main species-specific Technical Reference Documents are finalised)

Sulfonamides + diaminopyrimidines

- Trimethoprim + Sulfonamide

Diaminopyrimidines

- Trimethoprim

Streptogramins

- Virginiamycin (vet only)

Tetracyclines

- Chlortetracycline
- Doxycycline
- Oxytetracycline
- Tetracycline

The *ad hoc* group agreed that the following molecules should be **included as "authorised for used"** on the technical reference document, and to **add a reference to bovine (BOV) in the WOH List**:

Aminoglycosides + 2 Deoxystreptamine

- Amikacin

Cephalosporins 1st generation

- Cefalotin (topical use only)

Thiopeptides

- Nosiheptide

The *ad hoc* group agreed that the following molecules should **not be included** on the technical reference document (**no change required on the WOH List**):

Aminoglycosides + 2 Deoxystreptamine

- Tobramycin

Ansamycins- Rifamycins

- Rifampicin

Arsenicals

- Nitarsone (vet only)

- Roxarsone (vet only)

Ionophores

- Maduramicin (vet only)
- Semduramicin (vet only)

Macrolides (16-membered ring)

- Carbomycin
- Josamycin
- Kitasamycin (vet only)
- Mirosamicin
- Terdecamycin
- Tylvalosin (vet only)

Macrolides 17-membered ring

- Sedecamycin

Orthosomycin

- Avilamycin (vet only)

Carboxypenicillins

- Ticarcillin
- Tobicillin

Phenoxyphenicillins

- Pheneticillin
- Phenoxyethylpenicillin

Pleuromutilins

- Tiamulin (vet only)
- Valnemulin (vet only)

Polypeptides

- Enramycin
- Gramicidin

Quinolones 1st generation

- Miloxacin

Quinolones 2nd generation

- Ofloxacin
- Sarafloxacin

Quinoxalines

- Carbadox (vet only)
- Olaquinox (vet only)

Sulfonamides

- Phthalylsulfathiazole
- Sulfamethoxydiazine
- Sulfamonomethoxine

Sulfonamides + Diaminopyridines

- Ormetoprim + Sulfonamide

Diaminopyridines

- Ormetoprim

Halogenated hydroxyquinolines

- Halquinol

The *ad hoc* group agreed that the following molecules should **not be included** on the technical reference document, and to **remove the reference to bovine (BOV) in the WOA List**:

Aminocoumarins

- Novobiocin

Aminoglycosides + 2 Deoxystreptamine

- Astromycin
- Framycetin

Bicyclomycin

- Bicozamycin

Fusidane

Fusidic acid

Ionophores

- Narasin (vet only)
- Salinomycin (vet only)

Macrolides 14-membered ring

- Oleandomycin

Natural penicillins

- Benethamine penicillin

Amidinopenicillins

- Mecillinam

Ureidopenicillins

- Aspoxicillin

Antistaphylococcal penicillins

- Dicloxacillin
- Nafcillin

Phosphonic acid derivatives

- Fosfomicin

Polypeptides (Polymyxins)

- Polymyxin B

Quinolones 1st generation

- Nalidixic acid

Quinolones 2nd generation (Fluoroquinolones)

- Difloxacin
- Orbifloxacin (vet only)

Sulfonamides

- Sulfafurazole

Diaminopyrimidines

- Baqiloprim

The *ad hoc* group agreed to **add** a new antimicrobial agent to the Reference Technical Document that was not previously and to include **the reference to bovine (BOV) in the WOAHL List:**

Quinolones 2nd Generation (Fluoroquinolones)

- Pradofloxacin

The *ad hoc* group agreed to **update the nomenclature** of the antimicrobial agents in the Technical Reference Document with their **Non-Proprietary Names (INNs)** in line with international standards. The old names of the antimicrobial agents were kept as synonyms in the list. The names of antimicrobial agents will also be updated in the WOAHL List; the latter will be updated after all the main species-specific technical reference documents are finalised:

Aminoglycosides + 2 Deoxystreptamine

- Astromycin (previously listed as Fortimycin)

Cephalosporins 1st Generation

- Cefapirin (Cefapirin)

Macrolides (16-membered ring)

- Miroamicin (Miroamicin)

Natural penicillins (including esters and salts)

- Procaine benzylpenicillin (Benzylpenicillin procaine)
- Benzathine benzylpenicillin (Benzathine penicillin)

Polymyxins

- Polymyxin B (Polymyxin B)
- Colistin (Polymyxin E)

Quinolones 1st Generation

- Flumequine (Flumequin)

Sulfonamides (note: the two sulfonamides named below had been previously misnamed and have been renamed accordingly taking into account existing INNs. These will be updated in the WOAHL List):

- Sulfamethoxazole (Sulfadimethoxazole)
- Sulfametoxydiazine (Sulfamethoxine)

The previous antimicrobial class **Thiostrepton** has been reclassified as **Thiopeptides** as this the most accurate classification for Nosiheptide according to current scientific evidence.

Annex 1. List of Participants

**MEETING OF THE WOAHS SUBGROUP OF THE WORKING GROUP ON ANTIMICROBIAL RESISTANCE ON
THE REFERENCE TECHNICAL DOCUMENT OF ANTIMICROBIALS OF VETERINARY IMPORTANCE FOR
BOVINE ANIMALS**

April 2023 – September 2024

MEMBERS OF THE SUBGROUP

Dr Damien Bouchard
FRANCE

Prof Moritz van Vuuren (Chair)
SOUTH AFRICA

Dr Grace Murilla
KENYA

Dr Claire Burbick
UNITED STATES of AMERICA

Dr Yang Wang
CHINA

Dr Guilherme de Souza
BRAZIL

Annex 2. List of WOA External Experts on Bovine Animal Health

MEETING OF THE WOA SUBGROUP OF THE WORKING GROUP ON ANTIMICROBIAL RESISTANCE ON THE REFERENCE TECHNICAL DOCUMENT OF ANTIMICROBIALS OF VETERINARY IMPORTANCE FOR BOVINE ANIMALS

April 2023 – September 2024

Dr Jing Ling
CHINA

LIST OF NON-GOVERNMENTAL ANIMAL HEALTH ORGANISATIONS

Brooke
UNITED KINGDOM
<https://www.thebrooke.org/>

HealthforAnimals
BELGIUM
<https://www.healthforanimals.org/>

International Dairy Federation (IDF)
BELGIUM
<https://fil-idf.org/>

World Veterinary Association (WVA)
BELGIUM
<https://worldvet.org/>

LIST OF COLLABORATING CENTRES

French Agency for Food, Environmental and Occupational Health & Safety (ANSES)
Fougères, FRANCE

National Institute of Animal Health (NIAH)
JAPAN

National Veterinary Assay Laboratory (NVAL)
JAPAN

École Inter-Etats des Sciences et Médecine Vétérinaires (EISMV)
SENEGAL

Centre National de Veille Zoosanitaire (CNVZ)
TUNISIA

US Food and Drug Administration (FDA)
UNITED STATES OF AMERICA