NZVA
New Zealand Veterinary Association

Antibiotic judicious use guidelines

for the New Zealand veterinary profession

Equine

Published in September 2018 by

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Foreword

In many cases, antimicrobial agents are life-saving medicines both within human and veterinary medicine. One of the largest threats against public and animal health is, however, the increase in antimicrobial resistance. Antimicrobial-resistant bacteria can be transferred between animals and humans and thus, in the case of the veterinary use of antimicrobials, the benefits must be weighed-up against the possible effects on public health.

Resistance development can be counteracted by the responsible use of antimicrobials, good hygiene and active disease control. Active advice to animal owners on, for example, hygiene and vaccination also plays an important part.

In July 2015 the New Zealand Veterinary Association produced an aspirational statement, "By the year 2030 New Zealand Inc. will not need antibiotics for the maintenance of animal health and wellness." This is an aspirational statement that means the veterinary profession is taking leadership on the issue of antimicrobial stewardship.

Clearly antimicrobial therapy will still be relevant and animal welfare is the overriding factor. However, by taking this position the profession is removing itself from dependency on, and possible misuse of, antimicrobials in the effort to ensure that these drugs remain valuable weapons in the therapeutic armoury, not only of veterinarians themselves, but also the human medical profession.

The objective of this document has been to produce a guide that can be used when deciding upon a course of treatment and it is written for current New Zealand conditions and practices.

Antimicrobial treatment is normally only indicated if both of the criteria described below are fulfilled:

- There is a bacterial infection (or when there is sufficient cause to suspect that an actual bacterial infection is present).
- If the infection, in all likelihood, will not resolve without the support of antimicrobial therapy.

If there are equivalent methods of treatment by which antimicrobial agents are not used, these should be the chosen courses of therapy. It is of fundamental importance that antimicrobial agents should only be used when absolutely necessary and that the occurrence of infections should be counteracted, whenever possible, by means of preventative measures.

Prophylactic antimicrobial treatment can in few specific situations be motivated in connection with specific surgical procedures, where the risk for bacterial infection is high or where an infection can drastically worsen the prognosis. The prophylactic use of antimicrobial agents should never be implemented to compensate for poor hygiene.

When possible, the actual infectious agent should be demonstrated by means of laboratory examination. This is especially important in cases of therapy failure, relapse and on other occasions when antimicrobial resistance can be suspected. Samples should always be taken from infections that arise postoperatively.

The risk of antimicrobial resistance should always be taken into consideration when choosing an antimicrobial agent. This means that the antimicrobial agent and the route of administration should be chosen so that the animal's normal flora is affected as little as possible (so-called narrow-spectrum antimicrobials). With this in mind, local treatment when correctly implemented can, in fact, be preferable provided that its effect is thought to be sufficient. Any effect on the normal flora can also be minimised if the course of treatment is kept as short as possible and is then discontinued if the indication is no longer thought to be applicable.

These guidelines have been adapted from the British Equine Veterinary Association guidelines to better reflect New Zealand diseases and conditions.

These are guidelines not regulations; the aim is to provide a framework to support the responsible use of antimicrobial agents in equine practice.

As disease patterns, microbial sensitivities and resistance profiles may differ between regions, practices are encouraged to use these documents to develop their own practice protocols for antimicrobial stewardship.

The term "antimicrobial agent" is used rather than "antibiotic" in this Guide. The term antimicrobial agent is as defined by the World Organisation for Animal Health (OIE) and means a naturally occurring, semi-synthetic or synthetic substance that exhibits antimicrobial activity (kills or inhibits growth of microorganisms) at concentrations attainable *in vivo*.

Anthelmintics and substances classed as disinfectants or antiseptics are excluded from this definition. Antimicrobial agents are inclusive of anti-bacterials, anti-virals, anti-fungals and anti-protozoals.

Acknowledgments

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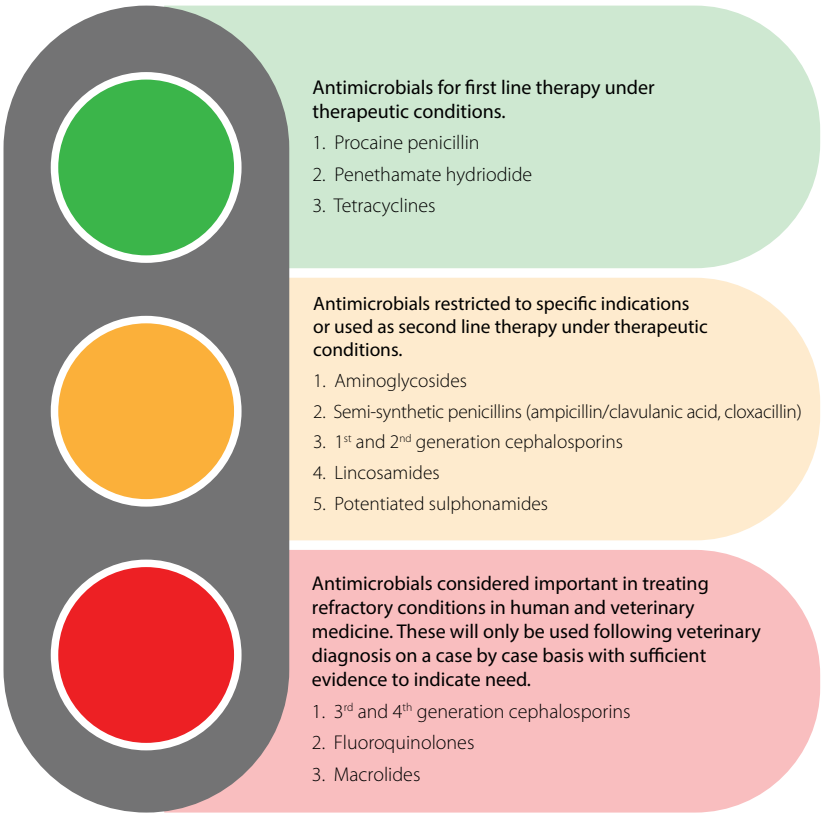
Core Principles

1. Consideration of the impacts of antimicrobial use on human and animal health is made by all people handling or administering antimicrobial agents.
2. Prevention of conditions that could require antimicrobial therapy is a key focus of veterinary practice.
3. Animals receive antimicrobial agents only as required to maintain their health and welfare.
4. Strategies reducing the number of animals given antimicrobial agents are employed where this will not compromise animal health or welfare.
5. When antimicrobial agents are used, dose rates and regimes are designed to improve efficacy and limit re-treatment.
6. Antimicrobial agents considered more important in human medicine are not used as first line treatment and only employed where use is likely to deliver superior outcomes.



Dose and routes of administration of common antimicrobial drugs

Colours represent likely use:

- Green – first line
- Yellow – alternative
- Red – clinically important to human medicine

Clinically important drugs are used only if culture and sensitivity testing suggest they are the only effective option.

Drug	Dose per kg	Route	Dosing interval	Spectrum +ve	Spectrum -ve	Spectrum An02	Notes
Sodium penicillin	22,000–44,000 iu*	IV	6 hours*	++	+	++	WWide distribution, poor penetration into CNS, abscess, sites or necrosis. Procaine penicillin at higher doses is above MIC at SID.
Procaine penicillin	22,000–44,000 iu*	IM	24 hours*	++	+	++	
Benthazine penicillin (LA)	Fails to reach MIC – avoid						
Ceftiofur*	2mg	IM IV*	12 hours*	+++	++	++	Clinically important Higher dose for foals/ neonates
Cefquinome*	0.5–1mg	IV	12 hours*	+++	++	++	Clinically important
Oxytetracycline	5mg	IV	12 hours*	++	++	+	NB also Ehrlichia, richetsia and anaplasma
Doxycycline*	20mg	PO	12 hours*	++	++	+	
Trimethoprim / Sulphadiazine	15–24mg 30mg	IV PO	8–12 hours* 12 hours*	++	++	-	Ineffective in S equi equi. Oral bioavailability reduced in the presence of food. Do not use IV form with detomidine.
Gentamicin	6.6mg	IV	24 hours	+	+++	-	Note dose in the neonate should be adjusted to reflect high total body water.
Streptomycin	20mg	IM	24 hours	+	+	-	Resistance common
Rifampin*	5mg	PO	12 hours	+++	+	++	Always use in combination (not for use with quinolones)
Azithromycin*	10mg	PO	24 hours	+++	+	+	Contraindicated in adults, Foals only, IV only
Clarithromycin	7.5mg	PO	12 hours	+++	+	+	
Enrofloxacin	6 mg 7.5mg	IV PO	24 hours	+	+++	-	Clinically important
Marbofloxacin	2mg 3–3.5 mg	IV PO	24 hours	+	+++	-	
Metronidazole*	25mg 15mg	PO IV	12 hours 12 hours	-	-	+++	Not in food producing animals
Drug	**Dose**	**Route**	**Frequency**	-	-	-	**Other drug**

+++ Effective against most important pathogens, including staphylococci for Gram positive and pseudomonas for Gram negative bacteria

++ Effective against many important bacteria

+ Some effect, but many clinically significant bacteria may not be susceptible

- Poor effectiveness

* Indicates a drug, dose, route or dosing frequency that is not listed in the ACVM authorisation for that product, i.e. "off label use"

Note: + signs indicate spectrum rather than potency

Responsible antimicrobial use policy

Condition	First Line	Alternatives	Notes
Upper Respiratory Tract Disease			
Strangles Formed abscess (uncomplicated strangles)	Not indicated	Penicillin	TMS is contraindicated since it is inactivated in the presence of pus.
Primary Sinusitis	Penicillin	Trimethoprim & Sulphadiazine	NB secondary sinusitis see GI disease TMPS inactivated by pus, so must have lavage as well
Guttural pouch empyema / chondroids	Penicillin	Oxytetracycline or Doxycycline	*St equi* most commonly implicated
Lower Respiratory Tract Disease			
Primary pneumonia	Penicillin & Gentamicin	Oxytetracycline/Doxycyline	Extremely uncommon Affected animals systemically ill Metronidazole if anaerobes suspected
.RAO/COPD (Equine asthma)	Not indicated	Not indicated	Secondary pneumonia more common than primary
Rhodococcus pneumonia	Azithromycin/ Clarithromycin+Rifampin	Rifampin & Doxycycline (10mg/kg BID PO)	Only if large or multiple abscess and/or sick foal. ACVIM 2011
Wounds			
Contaminated wounds with synovial sepsis	Penicillin & Gentamicin	Oxytetracycline/ Doxycycline & Metronidazole IVRP	Synovial debridement and lavage most often indicated
Contaminated wound with open fracture	Penicillin & Gentamicin	IVRP (adjust aminoglycoside dose if adding via IVRP)	Metronidazole if anaerobes suspected Fracture care is more important than antimicrobial therapy
Contaminated wounds (non complicated)	Not indicated	Not indicated	Debridement and drainage is far more important than antibiosis
Skin / Hoof			
Cellulitis	Penicillin/gentamycin if severe	Oxytetracycline or Doxycycline	Consider IVRP
Subsolar abscess	Not indicated	Not indicated	Drainage alone usually curative
Subsolar abscess with P3 involvement	Oxytetracycline / Doxycycline	Penicillin & Gentamicin & Metronidazole	If recurrent, rule out keratoma
Folliculitis	Not indicated	Penicillin for Strep infections	Topical treatment including antiparasitic and/or antifungal treatment
Gastrointestinal			
Periodontal disease	Trimethoprim & Sulphadiazine	Oxytetracycline or Doxycycline	
Periapical abscessation	Oxytetracycline or Doxycycline	Penicillin	
Acute diarrhoea	Controversial	Controversial	AM use is controversial. Consider FEC. If neutropenic penicillin/gentamycin.
Peritonitis MILD	Trimethoprim & Sulphadiazine	Oxytetracycline or Doxycycline	If parasitic Abs not indicated unless necrosis of bowel
Peritonitis SEVERE	Penicillin & Gentamicin	Penicillin & Gentamicin & Metronidazole	If parasitic Abs not indicated unless necrosis of bowel
Bacterial cholangiohepatitis	Trimethoprim & Sulphadiazine	Penicillin & Gentamicin	Biopsy sample should be submitted for culture

Condition	First Line	Alternatives	Notes
Urogenital			
Cystitis	Trimethoprim & Sulphadiazine	Penicillin & Gentamicin	Caution with aminoglycoside nephrotoxicity
Pyelonephritis	Trimethoprim & Sulphadiazine	Penicillin & Gentamicin	Caution with aminoglycoside nephrotoxicity
Post foaling endometritis	Penicillin	Penicillin & Gentamicin	Ecbolics
Post covering endometritis	Penicillin (IU)	Penicillin & Gentamicin (IU)	Ecbolics more imp than Abs. Abs only in problem mares
Mastitis	Penicillin	Penicillin & Neomycin	
Ocular			
Conjunctivitis	Fusidic acid	Neosporin	Local therapy for all ocular problems
Mild corneal ulceration	Consider artificial tears/ plasma	Gentamicin	Most cases trauma
Severe corneal ulceration	Gentamicin	Ciprofloxacin	
Melting corneal ulceration	Ciprofloxacin		Consider keratomycosis
Miscellaneous			
Endocarditis	Penicillin & Gentamicin	Trimethoprim & Sulphadiazine & Rifampin Fluoroquinolones	Blood and urine cultures before therapy
Neutropenia >1 & <2.5x10^9/l **Pyrexia of unknown origin**	Trimethoprim & Sulpha	Penicillin & Gentamicin	Blood cultures at peak fever BEFORE Abs
Neutropenia <1x x10^9/l	Penicillin & Gentamicin	Penicillin & Gentamicin & Metronidazole	Avoid antimicrobials where viral cause, e.g. equine corona virus, is suspected
NEONATE < 3 WEEKS			
Neonatal pneumonia	Ceftiofur	Penicillin & Gentamicin	*Clinically important but justified in neonate due to high mortality
Septic arthritis/synovitis	Penicillin & Gentamicin	Trimethoprim & Sulpha Oxytetracycline/ Doxycycline	Consider source, (lungs, GI, umbilicus) If iatrogenic consider MRSA (Macrolides/ Fluoroquinolones)
Patent urachus	Not indicated	Oxytetracycline/ Doxycycline	Abs not indicated unless sepsis is involved Avoid dehydration at all costs
Umbilical infection	Trimethoprim & Sulpha	Penicillin & Gentamicin	
SEPSIS	Ceftiofur high doses (5-10 mg/g TID)	Penicillin & Gentamicin	Infection + 2 of: tachycardia, abnormal Temp, Resp, WBC
SEVERE SEPSIS	Ceftiofur/Gentamycin	Penicillin & Gentamicin & Metronidazole	Defined as sepsis with organ dysfunction, hypoperfusion, or hypotension
Meningitis	Ceftiofur	Penicillin & Gentamicin	No BBB in meningitis Consider source
Prophylaxis	**Pre-Operative**	**Postoperative**	Duration of post operative treatment
Clean surgery	Penicillin		24 hours, i.e. one dose
Contaminated surgery	Penicillin & Gentamicin	Penicillin & Gentamicin	5 days
High risk surgery	Penicillin & Gentamicin	Penicillin & Gentamicin	10 days then reassess. Consider TMP-S if longer treatment required

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