Fijian Antimicrobial Prescribing Guidelines

For more information and further resources visit
www.science.unimelb.edu.au/vetantibiotics

THE UNIVERSITY OF MELBOURNE

APCAH
ASIA-PACIFIC CENTRE FOR ANIMAL HEALTH

NCAS
National Centre for Antimicrobial Stewardship

COMBATAMR
Working together to combat antimicrobial resistance in Pacific Island Countries

AGRICULTURE, WATERWAYS & SUGAR
For Fiji's Health & Wealth

Cattle | Sheep Goats | Poultry | Pigs | Horses | Dogs Cats

Cattle

Antimicrobial dose rates

Antimicrobial dose rates

ANTIMICROBIAL AGENT	RECOMMENDED DOSE	ROUTE	INTER-DOSING INTERVAL	WITHHOLDING PERIOD (days)
Procaine penicillin*	22,000 IU/kg	IM	12 - 24 hours	Milk: 4 Meat: 10*
Amoxicillin	7 mg/kg	SC or IM	24 hours	Milk: 2 Meat: 28
Oxytetracycline	10 mg/kg	IV or IM	12 - 24 hours	Milk: 5 Meat: 14
Oxytetracycline long acting	20 mg/kg	IM	72 hours	Milk: 7 Meat: 28
Trimethoprim-sulphonamide	24 mg/kg	IM	12 - 24 hours	Milk: 3 Meat: 28
Tulathromycin (beef and dairy heifers)	2.5 mg/kg	SC	Once	Meat: 35
Florfenicol (not in dairy cattle)	40 mg/kg 20 mg/kg	SC IM	Once 48 hours	Meat: 55 Meat: 36

*Based on the Canadian label for procaine penicillin. This represents off-label use of Australian/NZ products. Compliance with the legal requirements of your jurisdiction is your responsibility.

Note: Long-acting penicillin such as benzathine penicillin is not recommended as therapeutic concentrations are not achieved and slow absorption rate increases risk of volative residues.

Cattle

Chemical Restraint

Chemical restraint dose rates

SEDATION	RECOMMENDED DOSE	ROUTE	USED FOR	WITHHOLDING PERIOD (days)
Xylazine 100mg/ml - single agent	0.05 mg/kg (0.05 ml/100 kg) 0.1 mg/kg (0.1 ml/100 kg)	IV IM	Standing Sedation or darting + Local anaesthetic for surgery	Meat: 28*
Standing 'K-Stun' (One syringe) Xylazine (100 mg/ml) Ketamine (100 mg/ml) Butorphanol** (10 mg/ml)	0.04 mg/kg (0.04 ml/100 kg) 0.08 mg/kg (0.08 ml/100 kg) 0.01 mg/kg (0.1 ml/100 kg)	IM	Standing sedation or darting Aggressive animals + Local anaesthetic for surgery	Milk: 7* Meat: 28*
Xylazine (100 mg/ml) + Butorphanol**	0.05 mg/kg (0.05 ml/100 kg) 0.05 mg/kg (0.5 ml/100 kg)	IM	Standing sedation for short procedures	

*Some products not registered for use in cattle – check the label for withholding period.
**No butorphanol products registered for cattle, a withholding period recommended in horses for meat is 28 days

Cattle

Pain Relief/Analgesia

Pain relief dose rates

ANALGESIA / ANTI-INFLAMMATORY	RECOMMENDED DOSE	ROUTE	USED FOR	WITHHOLDING PERIOD (days)
Lignocaine 2% (e.g. Lopaine)	Up to 200 ml Local infiltration 4-6 ml Epidural	SC Epidural	Local anaesthetic Epidural	Milk: 6 Meat : 8
Meloxicam	0.5 mg/kg (2.5 ml/100 kg) One dose only	SC IV	Pain, Inflammation	Milk: 6 Meat : 8
Flunixin (Not breeding bulls)	2.2 mg/kg (4.4 ml/100 kg)	IV	Fever, Pain, Inflammation	Milk: 36 hours Meat: 4
Ketoprofen	3 mg/kg (3 mls/100 kg) Daily, up to 3 days	IM	Pain, Inflammation	Milk: 0 Meat: 4

WEIGHT ESTIMATION

WEIGHT CALCULATION

$$\text{WEIGHT in kgs} = \frac{\text{Length (cm) x Girth (cm) x Girth (cm)}}{10830}$$

e.g. If Body Length is 150 cm and Heart Girth is 120 cm = 150 x 120 x 120 / 10830 = 199kg

DRUG CALCULATION

$$\frac{\text{WEIGHT x DOSE OF DRUG}}{\text{CONCENTRATION}}$$

Worked example:
Oxytetracycline LA is 200 mg/ml concentration, and the dose is 20 mg/kg

For a 400 kg cow: $\frac{400 \times 20}{200}$ **= 40 ml**

Surgical prophylaxis

SURGICAL CONTAMINATION LEVEL	ANTIMICROBIAL RECOMMENDATION	DURATION OF THERAPY
CLEAN, NO MITIGATING FACTORS (e.g. Castration- aseptic technique, clean pasture, dry conditions)	**NONE**	**N/A**
CLEAN, MITIGATING FACTORS (e.g. Castration- dirty conditions or breach in aseptic technique)	**Oxytetracycline**	**Stop within 24 hours**
CLEAN CONTAMINATED (e.g. field c-section)	**Oxytetracycline**	**24-48 hours**
CONTAMINATED (major break in aseptic technique, e.g. spillage of gastrointestinal contents)	**Oxytetracycline**	**24-48 hours**
DIRTY (infection already present)	**Choose antimicrobial appropriate for infection**	**Treat till cured**

MITIGATING FACTORS

- Surgical duration >90 min.
- Rumenotomy.
- Unsanitary conditions.
- Periparturient.

TIMING

Tissue levels are required at the time of incision to confer protection from surgical site infection.

IV antimicrobials: 30-60 minutes prior to surgery.

IM oxytetracycline: 8 hours prior to surgery.

IM penicillin: 2 hours prior to surgery.

Lameness

COMMON CONDITIONS AND CLINICAL EXAMINATION

Diagnosis of the cause of lameness can be made from clinical signs alone in many lameness cases. The foot must always be lifted for thorough examination. Restrain the animal using physical restraint (leg rope) +/- sedation. Clean the hoof with scrubbing brush + water. Look for swelling and sole penetration. Ensure no foreign body is present in the interdigital space. Use hoof testers to localize pain.

Condition	Primary Location	Key Clinical Signs	Additional Characteristics
Hoof Abscess	Inside the hoof	• Severe lameness • Swelling above the affected claw • Heat in the affected area • Possible draining tract	• Usually affects a single claw • May see purulent discharge if abscess ruptures
White Line Disease	Junction between hoof wall and sole	• Moderate to severe lameness • Separation of the white line • Possible black marks along white line • Potential for secondary infection	• Usually affects outer claw • May lead to sole ulcers if untreated
Footrot	Between the claws	• Sudden onset of severe lameness • Swelling and redness between claws • Foul-smelling discharge • Symmetrical swelling above the hoof	• Often affects multiple animals • Associated with wet, muddy conditions
Digital Dermatitis	Skin above the heel bulbs	• Variable lameness (mild to severe) • Circular, raw, red lesions • "Strawberry-like" appearance • Possible hair loss around lesion	• Highly contagious • Often affects multiple animals • May become chronic if untreated • Usually affects hind feet

Lameness

DIAGNOSTICS

Diagnosis can be made from clinical signs alone.

The foot must be lifted for examination in all cases.

Restraint – physical (leg rope) +/- sedation.

Clean with scrubbing brush + water.

Look for swelling, sole penetration.

Hoof testers to localize pain.

Ensure no foreign body is present in the interdigital space.

FOOTROT

Lameness, fever, swelling/cracking/foul smell on skin between claws.

TREATMENT

Topical treatment with antibacterial disinfectant.

Procaine penicillin is highly effective.

Florfenicol is a suitable alternative in beef cattle.

DURATION OF THERAPY

3 days of daily procaine penicillin or a single dose of florfenicol is generally sufficient.

Treat until lesions have resolved.

FOOT ABSCESS / WHITE LINE DISEASE

TREATMENT

Antibiotics are not needed.

Opening lesion with hoof knife for drainage most important.

NSAIDs (e.g. meloxicam).

Add block to other claw to relieve pressure.

DIGITAL DERMATITIS

TREATMENT

Topical therapy with tetracycline is most effective.

Bandaging maintains tetracycline contact with lesions.

Wounds and lumps

WOUNDS

DIAGNOSTICS

Careful examination to determine what structures are damaged: skin, muscle, tendon, joint, chest or abdominal cavity penetration.

TREATMENT

Clip hair, clean and flush the wound with clean water or diluted betadine

Remove any gross contamination and dead tissue

Provide pain relief with NSAIDS (e.g. meloxicam)

Antimicrobials not indicated unless wound deep or involves joints or body cavities.

Oxytetracycline or penicillin

ABSCESSES

CLINICAL SIGNS

Round tense swelling under the skin. Pain, heat and swelling in early stage, then cold with a fibrous capsule.

DIAGNOSTICS

Clinical signs and needle aspiration of purulent (pus) material

TREATMENT

Surgically establish drainage (open abscess) and flush abscess cavity with clean water.

Antibiotics not required as they do not penetrate the abscess wall.

Provide protection from flystrike

LUMPY JAW

CLINICAL SIGNS

Caused by *Actinomyces bovis*. Slow growing firm non-painful mass attached to jawbone initiated by injury to oral mucosa.

DIAGNOSTICS

Diagnosis can be made from clinical signs alone.

TREATMENT

Sodium iodide at 70 mg/kg, diluted in sterile water for injection by slow IV and long-acting oxytetracycline at 30 mg/kg IM weekly.

Prognosis good if treatment initiated in the early stages. If extensive bone involvement, resolution unlikely.

Skin

RINGWORM

CLINICAL SIGNS

Localised areas of loss of hair, particularly around the head and neck. The skin may be scaly or crusted and slightly raised. The lesions may or may not be itchy.

DIAGNOSTICS

Diagnosis is generally made from clinical signs. Microscopic examination of skin scrapings can be used to confirm the diagnosis.

TREATMENT

Generally resolves on its own once stress resolves e.g. improved nutrition

For severe infections, topical application of antifungal (miconazole ointment or enilconazole leave-on rinse) to lesions

DURATION OF THERAPY

Treat until the lesions have resolved and no new lesions develop.

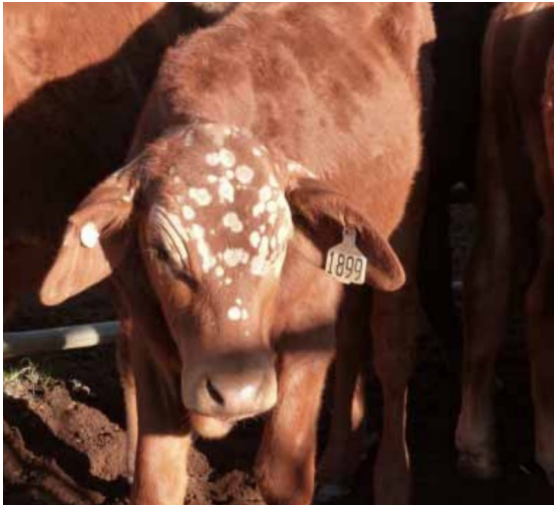

Image from David Beggs via The Australian Cattle Veterinarian Issue 68

Neonatal

SEPTIC ARTHRITIS "JOINT ILL"

CLINICAL SIGNS

Joint swelling, lameness. Common bacteria include *E. coli* (especially young calves), *Salmonella* spp. and *Mycoplasma* spp., *Trueperella pyogenes* (older calves) and streptococci.

DIAGNOSTICS

From clinical signs. Aseptic collection of joint fluid for cytology, culture and susceptibility testing. Mycoplasma spp. will not be apparent on cytology.

TREATMENT

Amoxicillin or trimethoprim-sulphonamide.

Oxytetracycline if *Mycoplasma* spp. suspected.

Joint flush and anti-inflammatory drugs.

DURATION OF THERAPY

2 weeks

NEONATAL SEPTICAEMIA

CLINICAL SIGNS

Depression, loss of suckle, fever or hypothermia, red mucous membranes, dehydration, slow capillary refill time (CRT), cold extremities.

DIAGNOSTICS

Diagnosis from clinical signs.

Consider bacterial cause (enteritis, navel ill) or failure of passive transfer (lack of colostrum).

TREATMENT

Oxytetracycline, but care should be taken with hypovolaemic animals as renal toxicity can occur.

Trimethoprim-sulphonamide is a suitable alternative.

DURATION OF THERAPY

5-7 days if uncomplicated, longer duration if umbilical infection or septic arthritis develop.

UMBILICAL INFECTION

DIAGNOSTICS

Diagnosis from clinical signs, palpation of umbilical stump.

Bacteria commonly involved include *Trueperella pyogenes, E. coli, Proteus* spp. and *Enterococcus* spp.

TREATMENT

Systemic antimicrobial therapy may be adequate to resolve early cases.

Oxytetracycline or trimethoprim-sulphonamide.

Surgical drainage of superficial abscessation.

Surgical removal of infected structures.

DURATION OF THERAPY

7-10 days depending on structures involved and extent of adhesions.

Respiratory

PNEUMONIA

CLINICAL SIGNS

Nasal discharge, fever, coughing, shallow rapid breathing, expiratory grunt, loss of condition, loss of appetite.

Most common pathogens are *Mannheimia haemolytica, Pasteurella multocida, Histophilus somni* and *Mycoplasma* spp., often in conjunction with viral pathogens.

DIAGNOSTICS

Culture & susceptibility testing of post-mortem specimens should be considered in outbreaks.

TREATMENT

Oxytetracycline most appropriate.

Florfenicol is a suitable alternative (not in veal calves or dairy cattle).

DURATION OF THERAPY

Dependent on severity. 2-3 days may be adequate in mild cases.

5-7 days in more severe cases.

CALF DIPHTHERIA

CLINICAL SIGNS

Cough, open mouth breathing, noisy breathing, salivation/drooling, nasal discharge, foul smelling breath, painful swallowing, fever, loss of appetite, depression.

DIAGNOSTICS

Diagnosis usually based on clinical signs. Gentle pressure across larynx exacerbates noisy breathing, confirming the origin.

Consider underlying disease (persistently infected with BVDV) or foreign body.

TREATMENT

Procaine penicillin is preferred.

Oxytetracycline is a suitable alternative.

DURATION OF THERAPY

5 days of daily procaine penicillin or 2 doses of long acting oxytetracycline (3 days apart) is generally sufficient.

Gastrointestinal

CALF DIARRHOEA

DIAGNOSTICS

Rapid (patient side) diagnostics, performed on faeces, where available, should be used to confirm bacterial origin as most are not bacterial. *E. coli* (< 3 days of age) and *Salmonella* are possible bacterial causes.

TREATMENT

Antimicrobial therapy is not indicated for diarrhoea caused by viruses or cryptosporidia.

Systemic antimicrobials are indicated when:

- Documented bacterial cause.
- Sepsis.
- High-risk of sepsis (e.g. the calf is unable to stand and severely depressed).

Trimethoprim-sulphonamide or oxytetracycline are suitable choices

DURATION OF THERAPY

5 days is generally considered adequate.

ENTERITIS IN ADULTS

DIAGNOSTICS

Faeces should be submitted for culture and susceptibility testing if salmonellosis is suspected.

TREATMENT

Antimicrobial therapy is not indicated for enteritis in cattle that are systemically well.

Systemic antimicrobials are indicated when:

- Invasive salmonellosis is suspected.
- Signs of sepsis.

Trimethoprim-sulphonamide or oxytetracycline are suitable choices.

Consider vaccination in herds with salmonellosis problems.

DURATION OF THERAPY

5 days is generally considered adequate.

Gastrointestinal

CALF DIARRHOEA - FLUID THERAPY GUIDELINES

1) ESTIMATE DEHYDRATION

Clinical Signs	% dehydration
Diarrhoea only, still drinking	5
Eyes slightly sunken, still drinking	7
Calf depressed, skin tent, not drinking	9
Calf cannot stand	12

2) CALCULATE FLUID NEEDED

Maintenance + Dehydration = Fluid Requirement for 24 hours

Maintenance = 10% of Body weight (e.g. 30 kg calf = 3 L)

Dehydration = Body weight x % dehydration / 100

(e.g. 7%, 30 kg calf = 30 x 7 /100 = 2.1 L

Total requirement = 3 L + 2.1 L = 5.1 L

3) FLUID TYPE

If drinking = Oral rehydration

Use Oralade or Vytrate or Homemade recipe:

100 g sodium chloride
100 g sodium bicarbonate
Add 20 g to 2 L of water

(2 hours separation from milk feed)

If not drinking enough, consider stomach tube

4) MONITOR ONGOING FLUIDS AND HYDRATION STATUS

Give milk in the morning and evening, give electrolyte solution in between. Always separate milk feeds and electrolyte feeds by 2 hours or more.

5) PAIN RELIEF

Meloxicam can be used for calf diarrhoea once the animal is rehydrated.

Mastitis

GRAM NEGATIVE, SEVERE

CLINICAL SIGNS

Infection of the mammary gland is brief, most signs are due to endotoxins. Severe cases have signs of systemic illness – profoundly depressed, fever initially then low temperature, high heart rate, diarrhoea and possibly gangrenous mastitis.

DIAGNOSTICS

Diagnosis is generally made from clinical signs alone. Milk samples should be obtained for culture & susceptibility testing.

TREATMENT

Mild cases self resolve.

In severe cases initiate systemic antimicrobials immediately following sample collection as disease progresses rapidly and is often fatal. Intramammary therapy has poor penetration.

Trimethoprim-sulphonamide – intravenous administration preferred. Drug absorption from intramuscular injection is reduced as perfusion of the muscles is often poor.

Oxytetracycline intravenously is also suitable.

Supportive therapy is strongly recommended (fluid therapy and NSAIDs).

DURATION OF THERAPY 5-7 days generally required.

GRAM POSITIVE

DIAGNOSTICS

Milk samples should be obtained for somatic cell count and for culture and susceptibility testing, especially in an outbreak.

Samples can be frozen, for later submission, if empirical treatment fails. Training of farmers on aseptic milk collection techniques is critical.

TREATMENT

Intramammary antimicrobials are preferred as they exert less pressure on resistance development at a farm level.

Antimicrobial selection should be guided by culture & susceptibility results.

Preparations containing cloxacillin or amoxicillin are generally effective against *Streptococcus* spp. (most frequently cultured organism)

Staphylococcus aureus is associated with biofilm formation, which worsens the prognosis. Treatment during lactation may not be successful.

If indicated, preferred systemic antimicrobials are penethamate or trimethoprim-sulphonamide.

DURATION OF THERAPY

Treat until clinical signs resolve and milk somatic cell count is normal. 2-3 days may be sufficient for mild cases.

Reproductive

RETAINED FOETAL MEMBRANES

CLINICAL SIGNS

Failure to pass foetal membranes within 24 hours of calving.

DIAGNOSTICS

Diagnosis from clinical signs.

TREATMENT

Systemic antimicrobials should only be used when there are systemic signs: fever, depression, inappetence.

Oxytetracycline IV or IM daily

Intrauterine antimicrobial therapy does not improve subsequent reproductive performance and may interfere with normal placental detachment.

DURATION OF THERAPY

3-5 days

METRITIS

CLINICAL SIGNS

Foul smelling watery-brown uterine discharge within 21 days of calving.

Systemic signs: fever, depression, loss of appetite

DIAGNOSTICS

Diagnosis from clinical signs alone.

TREATMENT

Antimicrobial therapy is not indicated in cattle that are cinically well

Systemic antimicrobials only used if systemic illness is present.

Oxytetracycline is preferred.

Supportive therapy may be required (fluid therapy and NSAIDs).

DURATION OF THERAPY

3 days is generally sufficient but longer may be necessary in severe cases.

ENDOMETRITIS

CLINICAL SIGNS

Purulent vaginal discharge more than 21 days after calving without systemic signs of disease.

DIAGNOSTICS

Diagnosis from clinical signs

TREATMENT

High self-cure rate

Systemic antimicrobial therapy not recommended

Reproductive

VAGINAL PROLAPSE

CLINICAL SIGNS

Pink mass (5-20 cm in diameter) protruding from vulva, usually before calving. Initially mass appears moist and pink, over time becomes swollen then dry, purple/black and cold.

DIAGNOSTICS

Diagnosis from clinical signs.

TREATMENT

Systemic antimicrobial only indicated if prolapsed tissue compromised (dry, purple/black, cold) or when high degree of contamination of the prolapsed tissue.

Oxytetracycline daily for 3 days or single long-acting oxytetracycline injection.

DURATION OF THERAPY

3 days

UTERINE PROLAPSE

CLINICAL SIGNS

Large pink to red mass hanging to level of hocks and covered in raised circular areas (caruncles where placenta was attached).

DIAGNOSTICS

Diagnosis from clinical signs alone.

TREATMENT

Epidural to allow replacement.

Clean prolapse with plenty of clean water containing diluted betadine. Cover prolapse with lubricant gel and replace.

Anti-inflammatory therapy (NSAIDs) for pain and inflammation.

Antimicrobial therapy if prolapsed tissue compromised (dry, purple/black, cold) or there is a high degree of contamination (with soil and/or faeces) of the prolapsed tissue.

Oxytetracycline or trimethoprim-sulphonamide.

Euthanase animal if prolapsed tissue is severely compromised or damaged.

DURATION OF THERAPY

3 days

Miscellaneous

LISTERIA

CLINICAL SIGNS

Head pressing, circling, blindness, one-sided facial paralysis caused by *Listeria monocytogenes*, **zoonotic**.

DIAGNOSTICS

Diagnosis is generally made from clinical signs.

TREATMENT

Procaine penicillin IM

Oxytetracycline IV or IM

Twice daily dosing is advised.

DURATION OF THERAPY

5-7 days is generally recommended.

Eyes

PINKEYE

CLINICAL SIGNS

Ocular discharge, increased tears, redness, partially closed eye, conjunctivitis caused by *Moraxella bovis*.

DIAGNOSTICS

Diagnosis from clinical signs.

TREATMENT

Topical therapy with cloxacillin is generally effective.

Use of topical eye treatment is preferred as the duration of action is longer.

Bulbar subconjunctival administration of penicillin (300 mg) is useful in severe cases.

Avoid congregating cattle in dusty yards as this will facilitate disease spread.

DURATION OF THERAPY

One application of cloxacillin ointment may be sufficient.

Severe cases may need treatment every 48 hours (1-2 additional applications).

Eyes

OCULAR NEOPLASIA (EYE TUMOUR)

Squamous cell carcinoma (SCC) complex is most commom. If involving the eyeball, it is usually lymphosarcoma. Mostly affects older cattle and cattle with lack of eyelid pigmentation.

CLINICAL SIGNS

Can start as smooth white plaques on conjunctival surface, progressing to papilloma then SCC.

Eyelid lesions start as ulcerative or hyperkeratotic lesions.

DIAGNOSTICS

Diagnosis from clinical signs.

TREATMENT

Surgical removal if lesions are small.

If eyeball involved, enucleation is the only option.

Cull affected animals as it can be heritable.

OCULAR FOREIGN BODY

Foreign bodies (grass seeds, feed material, dust) enter the eye when grazing or feeding

CLINICAL SIGNS

Can look very similar to pink eye. Increased tears, frequent blinking, partially closed eye, ulcer on cornea.

DIAGNOSTICS & TREATMENT

Check conjunctiva for presence of foreign body (often in the lower conjunctiva) and remove it.

Local anaesthetic required for thorough examination.

Usually resolves after foreign body removal. If corneal ulcers present, treat with topical antimicrobials. Systemic antimicrobials typically not needed.

Sheep/Goats

Dose rates

Antimicrobial dose rates

ANTIMICROBIAL AGENT	RECOMMENDED DOSE	ROUTE	INTER-DOSING INTERVAL	WITHHOLDING PERIOD (days)
Procaine penicillin	22,000 IU/kg	IM	12 - 24 hours	Milk: 4 Meat: 10*
Oxytetracycline	10 mg/kg	IV or IM	12 - 24 hours	Milk: 5 Meat: 14
Oxytetracycline long acting	20 mg/kg	IM	72 hours	Milk: 7 Meat: 28
Amoxicillin**	7 mg/kg	IM	24 hours	Milk: 3** Meat: 28
Amoxicillin long acting	15 mg/kg	IM	48 hours	Milk: 3 Meat: 28
Trimethoprim-sulphonamide**	24 mg/kg	IM	12 - 24 hours	Milk: 3** Meat: 28
Erythromycin	2-5 mg/kg	IM	24 hours	Meat: 3

***** Based on Canadian label for Procaine Penicillin, represents off-label use of Australian/NZ products. Compliance with the legal requirements of your jurisdiction is your responsibility.

****** Some products say **DO NOT USE** in female goats or sheep which are producing or may in the future produce milk or milk products for human consumption – check the label

Note: Long-acting penicillin does not reach therapeutic concentrations and should not be used

Pain relief and sedation

ANALGESIA / ANTIINFLAMMATORY	RECOMMENDED DOSE	ROUTE	USED FOR	WITHHOLDING PERIOD (days)
Lignocaine (e.g. Lopaine 2%)	Local infiltration up to 25 ml (aim for 5 mg/kg)	SC	Local Anaesthesia	Nil
	Epidural 1-4 ml (average 2 ml)	Epidural	Epidural	
Flunixin	1.1- 2.2 mg/kg (1-2 ml/45 kg)	IM or IV	NSAID – Can be repeated once a day for 5 days	Meat: 15 days
Meloxicam	1 mg/kg (1 ml/20 kg)	SC	NSAID – One off dose	Meat: 11 days
SEDATION	**RECOMMENDED DOSE**	**ROUTE**	**USED FOR**	**WITHHOLDING PERIOD (days)**
Xylazine	0.02 mg/kg 0.2 mg/kg	IV IM	Sedation	Meat: 5 days
Ketamine	5 mg/kg	IV	Deep Sedation or General Anaesthesia	Meat: 3 days

Surgical prophylaxis

SURGICAL CONTAMINATION LEVEL	ANTIMICROBIAL RECOMMENDATION	DURATION OF THERAPY
CLEAN, NO MITIGATING FACTORS	NONE	N/A
CLEAN, MITIGATING FACTORS	Oxytetracycline	Stop within 24 hours
CLEAN CONTAMINATED	Oxytetracycline	24-48 hours
CONTAMINATED	Oxytetracycline	24-48 hours
DIRTY (Infection already present)	**Choose antimicrobial appropriate for infection**	**Treat till cured**

MITIGATING FACTORS

- Surgical duration >90 min.
- Rumenotomy.
- Unsanitary conditions.
- Periparturient.

TIMING

Tissue levels are required at the time of incision to confer protection from surgical site infection.

IV antimicrobials: 30-60 minutes prior to surgery.

IM oxytetracycline: 8 hours prior to surgery.

IM penicillin: 2 hours prior to surgery.

Lameness

FOOTROT (*Dichelobacter nodosus*)

DIAGNOSTICS

Diagnosis can be made from clinical signs.

Usually more than one foot, putrid smell, interdigital dermatitis.

Under-run heel, sole, and walls of hoof.

Differentiate from Scald – redness and lameness without any smell or damage to hoof.

TREATMENT

Footrot: 2 doses of long-acting oxytetracycline (3 days apart) and establish footbath protocol.

Scald treatment: Management with zinc sulphate footbath only.

MANAGEMENT

Footbath (e.g. zinc sulphate) then hold on dry surface for a few hours.

Eradicate by culling, not treating.

Antimicrobial treatment for salvage animals.

Quarantine new arrivals, inspect before release.

Consider vaccination with 'FootVax'.

FOOT ABSCESS

DIAGNOSTICS

Diagnosis can be made from examination of the foot.

TREATMENT

Antimicrobials are not needed.

Establishing drainage is the critical factor.

NSAIDs (meloxicam) especially for pregnant ewes.

STRAWBERRY FOOTROT

Caused by *Dermatophilus congolensis*

DIAGNOSTICS

Diagnosis can be made from examination of the foot for proliferative, exudative dermatitis from coronary band to canon.

TREATMENT

Long-acting oxytetracycline, may need second dose 72 hours later.

Or intramuscular procaine penicillin twice daily for 3 days.

Skin

WOUNDS

DIAGNOSTICS

Careful examination to determine what structures are damaged: skin, muscle, tendon, joint, chest or abdominal cavity penetration.

TREATMENT

Clip hair, clean and flush the wound with clean water or diluted betadine

Remove any gross contamination and dead tissue

Provide pain relief with NSAIDs (e.g. meloxicam)

Antimicrobials not required unless the wound is deep or involving joints or body cavities.

Oxytetracycline or penicillin

LUMPY WOOL

CLINICAL SIGNS

Caused by *Dermatophilus congolensis*. Scabs lift from the skin causing lumps in the wool. Susceptible to fly strike.

DIAGNOSTICS

Diagnosis is generally made from clinical signs and Gram staining smears For cytology to observe Gram-positive cocci in 'tracks' formations.

TREATMENT

Oxytetracycline treatment 6-8 weeks before shearing to allow time for the scabs to lift and grow out in the wool enough to allow shearing.

PREVENTION

Avoid prolonged yarding or transport of wet sheep

MALIGNANT OEDEMA

CLINICAL SIGNS

Depression, lameness, swelling, oedema, crepitus around wounds or injection sites. Rapid signs of shock followed by death.

DIAGNOSTICS

Diagnosis is generally made from clinical signs and cytology of aspirated fluid showing Gram-positive rods.

TREATMENT

Treat immediately with procaine penicillin or penethamate.

Surgical incision of affected area to establish drainage.

Supportive fluid therapy and anti-inflammatories.

Skin

SCABIES (SHEEP SCAB)

CLINICAL SIGNS

Intensely itchy, causing scratching, biting at the skin and restlessness. The skin is scabbed and thickened, and can have serous exudates and secondary infections. Scratching and rubbing results in loss of wool. Can cause significant weight loss.

DIAGNOSTICS

Diagnosis is generally made from clinical signs. Microscopic examination of skin scrapings can reveal the typical *Psoroptes ovis* mites to confirm the diagnosis.

TREATMENT

Two injections of ivermectin 7 days apart at 0.2 ml (2 mg)/10 kg.

PREVENTION

Quarantine new arrivals separately

Maintain clean housing conditions

ORF (SCABBY MOUTH)

CLINICAL SIGNS

Caused by the orf, or scabby mouth, virus. The poxvirus lesions are seen particularly around the mouth.

DIAGNOSTICS

Diagnosis is generally made from clinical signs.

TREATMENT

No antimicrobial treatment is needed, as this is a viral disease.

PREVENTION

A vaccine is available in some countries and is highly effective.

Respiratory

PNEUMONIA

DIAGNOSTICS

Post-weaning *Mycoplasma ovipneumoniae* and *M. arginini* infections are common but frequently asymptomatic. Mycoplasma infections are the precursor for invasion by the pathogenic bacteria *Mannheimia haemolytica* and *Pasteurella multocida*.

Although diagnostics are rarely pursued, they should be considered in outbreaks. Culture & susceptibility testing can be performed from post-mortem specimens.

TREATMENT

Long-acting oxytetracycline.

Avoid yarding and handling sheep in dusty conditions.

Multiple shade points may reduce excessive mobbing.

DURATION OF THERAPY

Dependent on severity. 2-3 days may be adequate in mild cases.

CASEOUS LYMPHADENITIS

CLINICAL SIGNS

Pyogranulomas in lymph nodes and lungs caused by *Corynebacterium pseudotuberculosis*. Superficial lesions may discharge.

Zoonotic.

DIAGNOSTICS

Characteristic lesions in lymph nodes with thick, non-smelly pus.

TREATMENT

Does not respond to antimicrobial treatment.

Control by vaccination and attention to hygiene when shearing.

Gastrointestinal

BACTERIAL ENTERITIS

DIAGNOSTICS

Culture and susceptibility testing for *Salmonella* spp., *Campylobacter* spp. (rare, mostly in weaned sheep), and *Yersinia* spp. (mild and chronic, more common in winter). Rule out coccidiosis, rotavirus and nematodiasis.

TREATMENT

Antimicrobial therapy is not needed for diarrhoea caused by viruses or cryptosporidia.

Systemic antimicrobials are indicated when:

- Documented bacterial cause.
- Sepsis.
- High-risk of sepsis.

Trimethoprim-sulphonamide or oxytetracycline are suitable choices.

DURATION OF THERAPY

5 days is generally considered adequate.

COCCIDIOSIS

CLINICAL SIGNS

Depression, anorexia, diarrhoea due to *Eimeria ovinoidalis* and *Eimeria crandallis* occurs mostly in post-weaning lambs 2-6 months of age.

DIAGNOSTICS

Diagnosis based on clinical signs, post-mortem findings with typical gut lesions and high oocyst counts.

Distinguish from bacterial enteritis.

TREATMENT

Sulphonamide or toltrazuril (Baycox)

DURATION OF THERAPY

One dose, can be repeated 10-14 days later if case is severe.

Gastrointestinal

ENTEROTOXIGENIC *E. COLI*

Severe, watery diarrhoea in 1-4 day old lambs born in unhygienic conditions. Rapid dehydration.

DIAGNOSTICS
Culture and identification of fimbriae and enterotoxin genes.

TREATMENT
Infected lambs die rapidly, limiting success of antimicrobial therapy.

Oxytetracycline once daily for 3 days

Supportive care such as oral electrolytes (refer to recipe for calf oral rehydration solution). Do not feed more than 200-300 ml of rehydration solution per feed. Ensure 2 hr gap between milk feed and electrolytes.

CALCULATE FLUID NEEDED

Maintenance + Dehydration = Fluid Requirement for 24 hours

Maintenance = 10% of Body weight (e.g. 3 kg lamb = 300ml)

Dehydration = Body weight x % dehydration / 100

e.g. 7% dehyrated, 3 kg lamb= 3x 7 /100 = 0.21 L (210 ml)

Total requirement = 300 ml+ 210 ml = 510 ml per 24 hours

PREVENTION
Address hygiene in lambing environment (paddocks better than in sheds). Ensure adequate colostrum intake.

GASTROINTESTINAL HELMINTHS

CLINICAL SIGNS

Heavy infestations with *Haemonchus contortus* (Barbers' pole worm) causes anaemia, with weakness and pale mucous membranes.

DIAGNOSTICS
Faecal egg counts to determine likely loads.

TREATMENT
Respond well to appropriate anthelminthic treatments. Antimicrobial treatment is not justified. Management by controlling use of heavily contaminated pasture is critical.

Systemic disease / sudden death

SALMONELLOSIS

CLINICAL SIGNS

Depressed, not eating, fever, putrid fluid diarrhoea (possibly with mucosa and blood).

Generally occurs in outbreaks, with high morbidity and fatality rates. May cause spontaneous abortions

Associated with crowding and stress.

Caused by *Salmonella enterica*.

Zoonotic

DIAGNOSTICS

Clinical signs, culture & susceptibility testing of faeces and post-mortem samples.

TREATMENT

Trimethoprim-sulphonamide

Oral or intravenous electrolyte fluid therapy.

PASTEURELLOSIS

CLINICAL SIGNS

Caused by *Pasteurella multocida*. Severe depression, nasal discharge, coughing, diarrhoea, fever, anorexia. May occur in feedlots or after sudden change to better feed. Most lambs found dead.

TREATMENT

Procaine penicillin

Penethamate

Long-acting oxytetracycline

Early antimicrobial treatment critical.

DURATION OF THERAPY

To be guided by clinical improvement

E. COLI

CLINICAL SIGNS

Non-enterotoxigenic *E. coli* (watery mouth) causes disease in day-old lambs. Failure to suck, drooling saliva, abdominal distension. No diarrhoea.

Few survive long enough to be treated.

TREATMENT

Oxytetracycline

Oral electrolyte fluid therapy and NSAIDs (e.g. flunixin).

PREVENTION

Improve hygiene of lambing environment.

Ensure adequate colostrum intake

DURATION OF THERAPY

To be guided by clinical improvement.

Reproductive

GANGRENOUS MASTITIS

CLINICAL SIGNS

Common pathogens are *Staphylococcus aureus, Mannheimia haemolytica* and *Mannheimia glucosida*.

Severe mastitis in less than 24 hours – initially udder enlarged, painful, hot. Udder then blackens and becomes cold to touch. Ewe is usually depressed and may be lame.

DIAGNOSTICS

Clinical signs and milk sample for culture and susceptibility testing.

TREATMENT

Antimicrobial therapy should be initiated immediately as the disease progresses rapidly.

Oxytetracycline IV or IM, procaine penicillin or penethamate.

Intramammary therapy has poor penetration.

DURATION OF THERAPY

At least 3 days generally required.

BACTERIAL ABORTION

The most common agents are *Campylobacter fetus ss. fetus, C. jejuni* and *Toxoplasma gondii*. Less common agents are *Listeria monocytogenes, Yersinia pseudotuberculosis* and *Histophilus somni*.

DIAGNOSTICS

Diagnosis is based on placental lesions and culture & susceptibility testing of placenta and foetal tissue samples.

Clinical signs of fever, gastroenteritis and septicaemia are suggestive of *Salmonella* spp.

Some causes are zoonotic – hand hygiene is important.

TREATMENT

Remove aborted ewes from the lambing flock.

Spread remaining ewes into clean paddocks.

SEPTIC METRITIS

Most common after abortion or lambing intervention.

DIAGNOSTICS

Diagnosis is generally made from clinical signs alone.

Uterine discharge, fever, depression, lack of appetite.

TREATMENT

Systemic antimicrobials should only be used when systemic illness is present.

Long-acting oxytetracycline.

Reproductive

VAGINAL PROLAPSE

CLINICAL SIGNS

Smooth red mass (5 – 10 cm) protruding from vulva. Over time becomes swollen, then dry, purple/black and cold. Generally last month of pregnancy. Ewe may be isolated from flock, long periods lying down, abdominal straining.

DIAGNOSTICS

Diagnosis is generally made from clinical signs. Differentiate from rectal prolapse.

TREATMENT

Replace promptly to prevent trauma and tearing. Bladder may prolapse within vaginal prolapse, elevate prolapse gently to allow urination.

Clean with plenty of clean water containing diluted betadine. Cover prolapse with lubricant and replace. Retain with truss or vulval stitch (remove for lambing).

Antimicrobials if severe tissue damage or contamination (faeces, soil). Treat with oxytetracycline.

Identify factors that may increase risk of prolapses.

DURATION OF THERAPY

3 days is generally recommended.

UTERINE PROLAPSE

CLINICAL SIGNS

Large pink to red mass hanging to the level of hocks and covered in raised circular areas (caruncles where placenta was attached).

DIAGNOSTICS

Diagnosis can be made from clinical signs alone. Distinguish from prolapsed vagina and rectum by presence of caruncles.

TREATMENT

Epidural to prevent straining and enable replacement.

Clean prolapse with plenty of clean water containing diluted betadine. Cover with lubricant gel and replace.

Anti-inflammatory (NSAIDs) for pain and inflammation.

Antimicrobials if severe tissue damage or contamination (faeces, soil). Treat with oxytetracycline.

DURATION OF THERAPY

3 days

Neurological

LISTERIA

CLINICAL SIGNS

Head tilt, circling, drooping lip/ear, nasal deviation.

Caused by *Listeria monocytogenes* – usually associated with spoiled silage. **Zoonotic.**

DIAGNOSTICS

Diagnosis is generally made from clinical signs.

TREATMENT

Procaine penicillin or oxytetracycline IM twice daily

Prognosis poor unless treatment is early and vigorous. If severely ill or recumbent, treatment rarely successful.

DURATION OF THERAPY

5-7 days is generally recommended.

TETANUS

CLINICAL SIGNS

Stiff gait, saw-horse stance, erect ears, noise triggers tetany.

Occurs when *Clostridium tetani* contaminates wounds.

Outbreaks may occur after lamb marking.

DIAGNOSTICS

Diagnosis can be made from clinical signs alone.

TREATMENT

No antimicrobial treatment indicated as prognosis hopeless. Euthanasia is appropriate.

PREVENTION

Vaccinate ewes with 5-in-1 vaccines. See vaccination schedule for details.

Attention to marking hygiene.

Miscellaneous

INFECTIOUS ARTHRITIS

Generally perinatal or after lamb marking or shearing.

Suppurative arthritis: common bacteria include *E. coli, Fusobacterium necrophorum, Staphylococcus* spp., *Streptococcus* spp. and *Histophilus somni*.

Fibrinous arthritis: *Erysipelothrix rhusiopathiae* and *Chlamydia Pecorum*.

DIAGNOSTICS

Diagnosis is generally made from clinical signs and culture and susceptibility testing of joint fluid.

TREATMENT

Early antimicrobial treatment critical.

Procaine penicillin or oxytetracycline.

Joint damage often severe leaving animals permanently lame and ill-thrifty.

UMBILICAL INFECTION

CLINICAL SIGNS

Enlarged umbilicus, pain on palpation

DIAGNOSTICS

Diagnosis is generally made from clinical signs.

TREATMENT

Systemic antimicrobial therapy may be adequate to resolve early cases:

Oxytetracycline or trimethoprim-sulphonamide

Surgical drainage of superficial abscessation.

Surgical resection of infected structures.

DURATION OF THERAPY

7-10 days depending on structures involved and extent of adhesions.

PINKEYE

DIAGNOSTICS

Diagnosis is generally made from clinical signs. Bacteria involved include *Chlamydia pecorum, Mycoplasma conjunctivae* and *Moraxella ovis*.

TREATMENT

Many recover without treatment.

Yarding sheep may induce new cases.

Long-acting oxytetracycline

Topical therapy with cloxacillin is effective against *M. ovis*. Use of ophthalmological formulations is preferred as the duration of action is longer.

DURATION OF THERAPY

One application of treatment may be sufficient.

Severe cases may need treatment every 48 hours (1-2 additional applications).

Poultry

Dose rates

Antimicrobial dose rates

ANTIBIOTIC AGENT	RECOMMENDED DOSE	ROUTE	INTER-DOSING INTERVAL	WITHHOLDING PERIOD (days)
Amoxicillin	20 mg/kg	Drinking water***	24 hours	Eggs: Nil** Meat: 2
Chlortetracycline (CTC)	60 mg/kg	Drinking water***	24 hours	Eggs: Nil Meat: 3
Oxytetracycline	70 mg/kg	Drinking water***	24 hours	Eggs: DO NOT USE Meat: 5
Trimethoprim-sulphonamide	30 mg/kg* < 2wk old 15 mg/kg* > 2wk old	Drinking water***	24 hours	Eggs: DO NOT USE Meat: 14
Amprolium	250 mg/L	Drinking water***	24 hours	Eggs: Nil Meat: Nil
Toltrazuril (Baycox)	3 L/1000 L 7 mg/kg/day	Drinking water***	48 hours	Eggs: DO NOT USE Meat: 16

*Dose rate represents concentration of combined ingredients.

- 30 mg/kg = 25 mg/kg sulphonamide + 5 mg/kg trimethoprim
- 15 mg/kg = 12.5 mg/kg suphonamide + 2.5 mg/kg trimethoprim
- 1 level small scoop of Trimidine powder = 1.5 g combined ingredients = 1.25 g sulfadimidine + 0.25 g trimethoprim.

**Only one amoxicillin trihydrate product registered with a Nil WHP for eggs. However, it has a 14-day export egg WHP

*** Discard any unused water and prepare fresh every day.

Poultry

In water medication

Water requirements & medication

POULTRY TYPE	DAILY WATER REQUIREMENT	CALCULATION EXAMPLE
Non-laying hens	19 L/100 birds	**Use an average weight for the flock – local chickens may weigh less than commercial chickens**
Laying hens	19-28 L/100 birds	**Medication calculation example:** Dose rate: 20 mg/kg per bird Each bird: ~2 kg x 20 mg = 40 mg/bird
Broilers 4 weeks	7.6 L/100 birds	**How many birds?** If 40 birds: 40 birds x 40 mg/bird = 1600 mg total
Broilers 8 weeks	15.5 L/100 birds	**What is the concentration of the antibiotic per gram of the commercial product?** 870 mg/g amoxicillin Calculate total g required: 1600/870 = 1.84 g of the commercial product
Broilers 12 weeks	21 L/100 birds	Add to 24 hours of water then remove and replace with fresh solution daily

Gastrointestinal

COCCIDIOSIS

CLINICAL SIGNS AND PATHOLOGY

Diarrhoea, depression, lethargy, runting/stunting, mortality. Abnormal intestinal or caecal droppings. Lesions (like salt and pepper and/or haemorrhagic) of the intestinal mucosa upon post-mortem examination.

DIAGNOSTICS

Faecal floatation to identify coccidial oocysts in the faeces.

TREATMENT

Outbreak in short-lived birds: Amprolium 250 mg/L in the drinking water (DW) for 5-7 days, followed by 150 mg/L for 5-7 days.

Outbreak in long-lived birds laying eggs for human consumption: Amprolium 250 mg/L in the DW for 5-7 days, followed by 150 mg/L for 5-7 days.

Outbreak in long-lived birds **NOT** laying eggs for human consumption: Toltrazuril 3 L/1000 L DW, for 2 days.

DURATION OF THERAPY

Amprolium: 5-7 days, followed by 5-7 days at a reduced dose (see above).

Toltrazuril: 2 consecutive days (cannot be used in birds that will be laying eggs within 8 weeks of treatment).

INTESTINAL WORMS

CLINICAL SIGNS AND PATHOLOGY

Diarrhoea, depression, lethargy, runting/stunting, mortality.

Abnormal intestinal or caecal droppings. Observation of worms in faeces or during post-mortem examination.

DIAGNOSTICS

Faecal floatation to detect eggs or tapeworm segments in the faeces.

TREATMENT

Round worms (nematodes): levamisole 28 mg/kg in the drinking water. Should be consumed within 12 h.

DURATION OF THERAPY

2 days is generally sufficient to treat the infection. When treating a severe infection, treatment must be repeated 17-21 days later.

Gastrointestinal

NECROTIC ENTERITIS

CLINICAL SIGNS

Diarrhoea, depression, lethargy, mortality.
Necrotic lesions of the small intestine which appears ballooned, fragile or friable and contains a foul-smelling brown fluid.

DIAGNOSTICS

Frequently associated with coccidiosis.
A direct smear of the ntestinal mucosa to look for overgrowth of *Clostridium perfringens*, using a Gram stain to identify the organism which looks like Gram positive rods.

TREATMENT

1st choice: amoxicillin

2nd choice: chlortetracycline

DURATION OF THERAPY

3-5 days is generally sufficient to treat the infection.

SPOTTY LIVER DISEASE

CLINICAL SIGNS

Most commonly seen in layer and breeder birds. Non-specific clinical signs such as decreased egg production and increased mortality rates can be observed. Livers have multiple areas of focal necrosis. The causative agent is *Campylobacter hepaticus*.

DIAGNOSTICS

Culture & sensitivity of liver samples collected during post-mortem examination.

TREATMENT

Chlortetracycline

DURATION OF THERAPY

5 days.

PREVENTION

Decreasing flies, rodents, mites, litter beetles and wild birds, which all carry the bacteria. Improve cleaning with sheds and ensuring good terminal disinfection.

Respiratory

CONJUNCTIVITIS

CLINICAL SIGNS

Conjunctivitis, keratitis, photophobia, excess lacrimation.

Most common bacterial causes of conjunctivitis are psittacosis (*Chlamydia psittaci*) and mycoplasmosis (*Mycoplasma gallisepticum*).

DIAGNOSTICS

Post-mortem findings. Viral infection (e.g.: influenza A, infectious bronchitis virus, infectious laryngotracheitis); fungal infection (e.g.: *Aspergillus* spp.); high levels of ammonia or nutritional (e.g.: vitamin A toxicity) causes should be ruled out prior to antimicrobial prescription.

TREATMENT

Chlortetracycline: effective against most bacterial pathogens.

Amoxicillin: if *E. coli* infection is suspected. Do **NOT** treat most cases of colibacillosis, instead try to investigate and correct the root cause.

Oxytetracycline is **NOT** suitable for birds laying eggs for human consumption.

DURATION OF THERAPY

3-5 days

RHINITIS AND SINUSITIS

CLINICAL SIGNS

Sneezing and nasal discharge, facial swelling, periorbital swelling and excess lacrimation.

Most common bacterial causes of rhinitis and sinusitis are psittacosis (*Chlamydia psittaci*), mycoplasmosis (*Mycoplasma gallisepticum*), infectious coryza (*Avibacterium paragallinarum*), fowl cholera (*Pasteurella multocida*), or infections with *Ornithobacterium rhinotracheale* and *Riemerella Anatipestifer* in ducks.

DIAGNOSTICS

Post-mortem findings. Viral infection (e.g.: influenza A, Infectious bronchitis virus, infectious laryngotracheitis) should be ruled out prior to antimicrobial prescription.

TREATMENT

Chlortetracycline: effective against most bacterial pathogens.

Amoxicillin: if *E. coli* infection is suspected. Do **NOT** treat most cases of colibacillosis, instead try to investigate and correct the root cause.

Oxytetracycline is **NOT** suitable for birds laying eggs for human consumption.

DURATION OF THERAPY

3-5 days

Respiratory

TRACHEITIS

CLINICAL SIGNS

Coughing, gasping.

Most common bacterial causes of tracheitis are mycoplasmosis (*Mycoplasma gallisepticum),* colibacillosis (*Escherichia coli*), *Bordetella avium, Ornithobacterium rhinotracheale* and fowl cholera (*Pasteurella multocida*).

DIAGNOSTICS

Post-mortem findings. Viral infection (e.g.: infectious laryngotracheitis, infectious bronchitis, avian influenza A, turkey rhinotracheitis and Newcastle disease); fungal infection (e.g. *Aspergillus* spp.) and high levels of ammonia or dust should be ruled out prior to antimicrobial prescription.

TREATMENT

Chlortetracycline: effective against most bacterial pathogens.

Amoxicillin: if *E. coli* infection is suspected. Do **NOT** treat most cases of colibacillosis, instead try to investigate and correct the root disease.

Oxytetracycline **NOT** suitable for birds laying eggs for human consumption.

DURATION OF THERAPY

3-5 days

PNEUMONIA

CLINICAL SIGNS

Coughing.

Most common bacterial causes of pneumonia are colibacillosis (*Escherichia coli*), *Ornithobacterium rhinotracheale* and fowl cholera (*Pasteurella multocida*).

DIAGNOSTICS

Post-mortem findings. Viral infection (e.g.: influenza A, turkey rhinotracheitis) and fungal infection (e.g.: *Aspergillus* spp.) should be ruled out prior to antimicrobial prescription.

TREATMENT

Chlortetracycline: effective against most bacterial pathogens.

Amoxicillin: if *E. coli* infection is suspected. Do **NOT** treat most cases of colibacillosis, instead try to investigate and correct the root cause.

Oxytetracycline is **NOT** suitable for birds laying eggs for human consumption.

DURATION OF THERAPY

3-5 days

Poultry

Respiratory & Reproductive

Respiratory

AIRSACCULITIS

CLINICAL SIGNS

Gasping, coughing.

Most common bacterial causes of airsacculitis are mycoplasmosis (*Mycoplasma gallisepticum/synoviae*), colibacillosis (*E. coli*), fowl cholera (*Pasteurella multocida*), psittacosis (*Chlamydia psittaci*), or infections with *Bordetella avium, Ornithobacterium rhinotracheale* and *Riemerella anatipestifer* (in ducks).

DIAGNOSTICS

Post-mortem findings. Viral infection (e.g.: infectious bronchitis, avian influenza A, turkey rhinotracheitis and Newcastle disease) and fungal infection (e.g.: *Aspergillus* spp.) should be ruled out prior to antimicrobial prescription.

TREATMENT

Chlortetracycline: effective against most bacterial pathogens.

Amoxicillin: if *E. coli* infection is suspected. Do **NOT** treat most cases of colibacillosis, instead try to investigate and correct the root cause.

Oxytetracycline is **NOT** suitable for birds laying eggs for human consumption.

DURATION OF THERAPY

3-5 days

Reproductive

EGG PRODUCTION DROPS

CLINICAL SIGNS

Egg production drops, internal laying (egg peritonitis), shell deformities, changes in albumen quality or yolk colour. Pasty vent. Infertility.

DIAGNOSTICS

Post-mortem findings. In all cases of egg production drops, husbandry, lighting, feed and water intake, nutrition and environmental stresses must be considered early in the investigation. Cases of reproductive disease can be due to viral, bacterial or coccidial infections, as well as nutritional, environmental, management, toxic or traumatic causes.

TREATMENT

Most causes of reproductive disease are non-infectious. Bacterial causes of reproductive disease are uncommon. Antimicrobial treatment should only be used when a specific diagnosis has been made.

Chlortetracycline: effective against most bacterial pathogens.

Amoxicillin: if erysipelas or colibacillosis are suspected. Do **NOT** treat most cases of colibacillosis, instead try to investigate and correct the root cause.

Oxytetracycline **NOT** suitable for birds laying eggs for human consumption.

DURATION OF THERAPY 3-5 days

Poultry

Foot and neurological disease

Foot disease

LAMENESS / RELUCTANCE TO MOVE

CLINICAL SIGNS AND PATHOLOGY

Lameness is usually chronic, with a number of causes, including viral, bacterial and fungal infections, or metabolic and nutritional causes. Clinical signs and pathology vary depending on the cause and location of the lesions causing the disease.

DIAGNOSTICS

Post-mortem findings. Culture and antibiotic sensitivity when Bacterial infection is suspected. Common bacterial infections: Mycoplasmosis (*Mycoplasma synoviae*), colibacillosis (*E. coli*), fowl cholera (*Pasteurella multocida*), *Staphylococcus aureus* or enterococci, which may be accompanied by other clinical signs and pathological findings.

TREATMENT

Being a chronic disease, treatment with antimicrobials is **NOT** recommended, unless there is a clear indication of bacterial infection.

Chlortetracycline: effective against most bacterial pathogens.

Amoxicillin: if *E. coli* infection is suspected. Do **NOT** treat most cases of colibacillosis, instead investigate and correct the underlying cause.

Oxytetracycline is **NOT** suitable for birds laying eggs for human consumption.

Staphylococcus aureus or Enterococcus spp. infection: always follow culture & sensitivity results.

If laboratory testing is not available, use amoxicillin.

DURATION OF THERAPY 3-5 days

Neurological disease

CLINICAL SIGNS

Paresis or paralysis; leg misplacement; tremors; incoordination; blindness; head in abnormal positions (opisthotonous, torticollis); depression.

DIAGNOSTICS

Post-mortem findings. Very few cases of neurological disease are caused by bacterial infection, with viral or fungal infections, toxic, nutritional or management deficiencies being implicated in most cases. A thorough examination of the birds and clinical history will provide the bases for diagnosis.

TREATMENT

Bacterial causes of neurological disease in poultry are uncommon. Antimicrobial treatment is **NOT** recommended unless a specific diagnosis has been made.

Systemic disease

PERACUTE/ACUTE SEPTICAEMIA

CLINICAL SIGNS

Sudden increase in mortality with or without clinical signs or lesions found during post-mortem examination.

Most common bacterial causes of peracute/acute systemic disease are erysipelas (*Erysipelothrix rhusiopathiae*), fowl cholera (*Pasteurella multocida*), necrotic enteritis (*Clostridium perfringens*) and spotty liver disease (*Campylobacter hepaticum*).

DIAGNOSTICS

Post-mortem findings. Viral infection (e.g.: avian influenza A, Newcastle disease and duck plague), coccidial infection and problems associated with management (e.g.: heat stress, smothering) and nutrition (e.g.: calcium tetany) should be ruled out prior to antimicrobial prescription.

TREATMENT

Chlortetracycline: effective against most bacterial pathogens.

Amoxicillin: if erysipelas or colibacillosis are suspected. Do **NOT** treat most cases of colibacillosis, instead try to investigate and correct the root cause.

Oxytetracycline is **NOT** suitable for birds laying eggs for human consumption.

DURATION OF THERAPY

3-5 days

SUBACUTE/CHRONIC SEPTICAEMIA

CLINICAL SIGNS

Increase in mortality and/or depression with chronic signs of septicaemia, such as pericarditis, perihepatitis or focal liver necrosis.

Most common bacterial causes of sub-acute/chronic systemic disease are psittacosis (*Chlamydia psittaci*), erysipelas (*Erysipelothrix rhusiopathiae*), fowl cholera (*Pasteurella multocida*), spotty liver disease (*Campylobacter hepaticum*), colibacillosis (*E. coli*) *Staphylococcus aureus, Riemerella anatipestifer* (in ducks).

DIAGNOSTICS

Post-mortem findings. Culture and sensitivity of samples collected from lesions observed during post-mortem examination.

TREATMENT

Chlortetracycline: effective against most bacterial pathogens.

Amoxicillin: if erysipelas, or colibacillosis are suspected. If laboratory not available, use amoxicillin to treat *S. aureus* infections. Do **NOT** treat most cases of colibacillosis, instead try to investigate and correct the root cause.

Oxytetracycline **NOT** suitable for birds laying eggs for human consumption.

DURATION OF THERAPY

3-5 days

Young chicks

HIGH MORTALITY 1-7 DAYS

CLINICAL SIGNS

High mortality. Yolk-sac infection, omphalitis. Caseous material in the respiratory tract (aspergillosis). Dehydration.

DIAGNOSTICS

Post-mortem findings and clinical history.

A thorough investigation of underlying causes is required to reach a diagnosis as most cases of mortality during this period are associated with poor management or environmental conditions. Bacterial causes of young chick mortality are not uncommon.

TREATMENT

Antimicrobial treatment is **NOT** recommended. Young chicks that are sick do not eat or drink.

Control measures should focus on identifying underlying causes and improving management conditions such as hatchery hygiene, brooding conditions (under or over heating), food and water availability, stocking density and drinker management.

HIGH MORTALITY 7-14 DAYS

CLINICAL SIGNS

High mortality. Liver lesions. Caseous material in the respiratory tract (aspergillosis).

DIAGNOSTICS

Post-mortem findings and clinical history.

A thorough investigation of underlying causes is required to reach a diagnosis as most cases of mortality during this period are associated with poor brooding conditions.

TREATMENT

Antimicrobial treatment is **NOT** recommended.

Control measures should focus on identifying underlying causes and improving management conditions such as brooding conditions (under or over heating), feed and water availability, ventilation, litter management and stocking density.

Young chicks

DIARRHOEA/WET FLOORS

CLINICAL SIGNS

Diarrhoea, wet floors. Runting-stunting. Lesions in the kidneys consistent with nephrosis (kidneys or ureters appear white).

DIAGNOSTICS

Post-mortem findings and clinical history.

A thorough investigation of underlying causes is required to reach a diagnosis as most cases of diarrhoea in young chicks are associated with poor management at the hatchery or poor brooding conditions.

TREATMENT

Antimicrobial treatment is **NOT** recommended.

Control measures should focus on identifying underlying causes and improving hatchery hygiene, brooding conditions (under or over heating), feed quality, ventilation, litter management, stocking density and drinker management.

SWOLLEN ABDOMEN

CLINICAL SIGNS

Swollen abdomen, yolk sac infection.

DIAGNOSTICS

Post-mortem findings and clinical history.

A thorough investigation of underlying causes is required to reach a diagnosis as most cases of yolk sac infection are associated with poor management at the hatchery or environmental conditions in the farm. Yolk sac infection is frequently caused by *E. coli*, *Staphylococcus aureus* or enterococci.

TREATMENT

Antimicrobial treatment is **NOT** recommended.

Control measures should focus on identifying underlying causes and improving management conditions such as reducing faecal contamination of hatching eggs or early contamination at hatch, reducing stress and ensuring good litter management, good sanitation practices, appropriate ventilation and air quality.

Young chicks

RESPIRATORY OR OCULAR SIGNS

CLINICAL SIGNS

Difficulty breathing, gasping, conjunctivitis, eyes closed.

DIAGNOSTICS

Post-mortem findings. Cheesy lesions in the respiratory tract are indicative of fungal infection (aspergillosis).
Viral causes of respiratory or ocular clinical signs include infectious bronchitis.
A thorough investigation of underlying causes is required to reach a diagnosis, as most cases of respiratory/ocular disease in young chicks are associated with poor management of brooding conditions, such as under or over heating, or elevated ammonia levels.

TREATMENT

Antimicrobial treatment is **NOT** recommended.

Control measures should focus on identifying underlying causes and improving management conditions such as reducing faecal contamination of hatching eggs or early contamination at hatch, reducing stress and ensuring good litter management, good sanitation practices, temperature regulation, appropriate ventilation and air quality.

LAMENESS

CLINICAL SIGNS

Lameness or difficulty to move. Deformities of the legs.

DIAGNOSTICS

Post-mortem findings. Observation of the femoral heads for evidence of necrosis, which is indicative of bacterial infection (e.g.: *Staphylococcus aureus*, *E. coli* or enterococci).

A thorough investigation of underlying causes is required to reach a diagnosis, as most cases of leg deformities in young chicks are associated with poor management at the hatchery or nutritional deficiencies (rickets or vitamin A deficiencies).

TREATMENT

Antimicrobial treatment is **NOT** recommended.

Control measures should focus on identifying underlying causes and improving management conditions at the hatchery or nutritional deficiencies.

Pigs

Dose rates

Antimicrobial dose rates

ANTIMICROBIAL AGENT	RECOMMENDED DOSE	ROUTE	INTER-DOSING INTERVAL	WITHHOLDING PERIOD (days)
Procaine penicillin	15,000 IU/kg	IM	24 hours	Meat: 5
Amoxicillin	7 mg/kg 20 mg/kg	IM Oral in feed or water	24 hours	Meat: 14-28 Meat: 14
Oxytetracycline	4-9 mg/kg	IM	24 hours	Meat: 8-14
Oxytetracycline long acting	20-30 mg/kg*	IM	Once	Meat: 28-42**
Tylosin	5-10 mg/kg	IM	Daily, do not exceed 3 days	Meat: 3

*Check product label – Engemycin long-acting formulation dose rate 10 mg/kg
**Check the label for withholding period as variation between products.
Note: Long-acting penicillin does not reach therapeutic concentrations and should not be used

Sedation and pain relief

SEDATION	RECOMMENDED DOSE	ROUTE	WITHHOLDING PERIOD (days)
Xylazine	1-3 mg/kg	IM	Meat: 28 Off-label in pigs
Ketamine	5-10 mg/kg	IM	Meat: 28
ANALGESIA / ANTI-INFLAMMATORY	**RECOMMENDED DOSE**	**ROUTE**	**WITHHOLDING PERIOD (days)**
Meloxicam	0.4 mg/kg (2 ml/100 kg) repeat once after 24 hours	IM	Meat: 6
Flunixin	1.1-2.2 mg/kg (1-2 ml/45 kg) daily for 3 days	IM	Meat: 28

*Check the label for withholding period as there is variation between products.

Surgical prophylaxis

SURGICAL CONTAMINATION LEVEL	ANTIMICROBIAL RECOMMENDATION	DURATION OF THERAPY
CLEAN, NO MITIGATING FACTORS	NONE	N/A
CLEAN, MITIGATING FACTORS	Oxytetracycline	Stop within 24 hours
CLEAN CONTAMINATED	Oxytetracycline	24-48 hours
CONTAMINATED	Oxytetracycline	24-48 hours
DIRTY (Infection already present)	Choose antimicrobial appropriate for infection	Treat till cured

MITIGATING FACTORS

- Surgical duration >90 mins.
- Unsanitary conditions.
- Periparturient.

TIMING

Tissue levels are required at the time of incision to confer protection from surgical site infection.

IV antimicrobials: 30-60 minutes prior to surgery.

IM oxytetracycline: 8 hours prior to surgery.

IM penicillin: 2 hours prior to surgery.

Lameness

SKIN ABRASIONS

Neonatal piglets - common organisms are streptococci and staphylococci (*E. coli* in a minority).

Skin abrasion over carpus/hock, erosion sole of foot, Penetrating interdigital wounds. Shifting lameness, struggle to compete for nursing, weakness, leading to starvation, diarrhoea, septicaemia.

TREATMENT

Procaine penicillin

PREVENTION

Floor surface – avoid abrasive floors (concrete/wire). Provide extra straw bedding.

ARTHRITIS

Common organisms are streptococci, staphylococci, *Glaeserella parasuis*. Occurs following teeth clipping or umbilical infection

TREATMENT

Antimicrobials are not indicated.

Establishing drainage is the critical factor.

PREVENTION

Umbilical hygiene, cease teeth clipping

Mycoplasma hyosynoviae

Lameness, swollen joints, reluctance to rise

TREATMENT

Oxytetracycline
2nd choice – tylosin

PREVENTION

Improve air quality, increase space allowance, hygienic environment

POLYSEROSITIS (*Mycoplasma hyorhinis*)

3-10 weeks of age, polyserositis, sudden death

TREATMENT

Oxytetracycline
2nd choice – tylosin

PREVENTION

Improve air quality, increase space allowance, hygienic environment

Skin lesions

ERYSIPELAS

CLINICAL SIGNS

Diamond shaped skin lesions, lameness (synovitis), inappetence, depression, fever and abortion caused by *Erysipelothrix rhusiopathiae*. Most commonly seen in growing, replacement breeding stock and mature sows.

Early signs resemble septicaemia or viraemia.

Zoonotic

DIAGNOSTICS

Clinical signs, post-mortem findings with widespread vascular lesions and microthrombi. Culture of lesions with susceptibility testing.

TREATMENT

Penicillin is the drug of choice.

EXUDATIVE EPIDERMITIS

CLINICAL SIGNS

Caused by *Staphylococcus hyicus*, part of the pig's normal skin flora. Skin trauma (biting, abrasions) contributes to risk of disease. Initial reddening of the skin develops into reddish brown spots that exude serum and become crusty.

Rule out sarcoptic mange and zinc deficiency (parakeratosis).

DIAGNOSTICS

Clinical signs and bacterial culture of lesions.

TREATMENT

Topical antiseptics (0.05% chlorhexidine) applied to entire body surface.

Isolate affected pigs.

Procaine penicillin or trimethoprim-sulphonamide once daily for 3 days.

Improve environment – better ventilation, cleaner and drier pens, reduced stocking density.

WOUNDS

DIAGNOSTICS

Careful examination to determine what structures are damaged: skin, muscle, tendon, joint, chest or abdominal cavity penetration.

TREATMENT

Clean and flush the wound with clean water or diluted betadine.

Remove any gross contamination and dead tissue.

Provide pain relief with NSAIDs (e.g. meloxicam).

Antimicrobials not required unless the wound is deep or involves joints or body cavities.

Oxytetracycline or penicillin

Respiratory

PNEUMONIA

CLINICAL SIGNS

Coughing, open mouthed breathing, sudden death

Mycoplasma hyopneumoniae has an immunosuppressive effect, causes dry cough. Secondary infection with *Pasteurella multicoda, Bordetella bronchiseptica,* streptococci and *Glaeserella parasuis* cause bronchopneumonia.

Exacerbated by porcine circovirus.

Actinobacillus pleuropneumoniae can occur concurrently with *M. hypopneumoniae* or be a serious primary pathogen resulting in sudden death.

Post-mortem findings include bleeding from the snout and fibrinous pleuropneumonia. Pleurisy in survivors leads to ill thrift.

DIAGNOSTICS

Post-mortem findings and culture & susceptibility testing for *P. multocida.*

Consider migrating ascarids and lung worms.

PREVENTION

Improve hygiene, air quality and space allowance.

Vaccination against *M. hyopneumoniae* and *Actinobacillus pleuropneumoniae*

TREATMENT

Treatment generally not focused on *M. hyopneumoniae*, but rather on secondary pathogens.

First line treatment while waiting for susceptibility results:

Procaine penicillin or amoxicillin IM once daily 3-5 days

Or amoxicillin in water medication for 3 days.

For uncomplicated *M. hyopneumoniae* in weaners, oxytetracycline IM once daily for 3 days or long-acting as a single dose

Gastrointestinal

DIARRHOEA

NEW-BORN PIGLETS

E. coli (non-haemolytic), Salmonella sp. and *Clostridium perfringens* are possible bacterial causes.

Rotavirus rarely causes fatal disease.

PRE-WEANING

Enterotoxigenic *E. coli* with severe diarrhoea, dehydration or sudden death.

Clostridium perfringens may be acute, bloody diarrhoea, sudden death, or chronic yellow diarrhoea.

POST-WEANING

E. coli most likely cause in first 7-14 days after weaning. *Salmonella* spp. infection more common than disease.

Lawsonia intracellularis infection 7-11 weeks of age, moderate diarrhoea, wasting, and failure to thrive.

Brachyspira pilosicoli and *Brachyspira hyodysenteriae* from 7 weeks of age, mucus and blood in diarrhoea is indicative.

DIAGNOSTICS

Post-mortem findings and culture & susceptibility testing of faeces, faecal PCR (*L. intracellularis*, *Brachyspira* spp.).

PREVENTION

Review hygiene of piglet and farrowing environment.

Ensure thorough cleaning and drying of farrowing pens or moving outdoor farrowing huts and providing clean bedding.

Vaccination of sows against *E. coli*.

TREATMENT

Antimicrobial therapy is not indicated for diarrhoea caused by viruses.

Fluid therapy in drinking bowls or by stomach tube.

Systemic antimicrobials are Indicated when:

- Known bacterial cause.
- Sepsis or high-risk of sepsis.

E. coli: trimethoprim-sulphonamide or oxytetracycline once daily for 3-5 days

L. intracellularis: oxytetracycline or tylosin once daily for 3 days.

Coccidiosis: toltrazuril or trimethoprim-sulphonamide

Reproduction

METRITIS, MASTITIS AND AGALACTIA

CLINICAL SIGNS

Sows affected in first few days post farrowing.

May have mastitis (hot, firm glands) +/- urogenital infection (discharge from vulva). Infection is of bacterial origin: often *E. coli*, can involve streptococci and staphylococci.

Sows: fever, loss of appetite, depression, reluctance to rise or reluctance to lie for piglets to feed. Vulval discharge with bad odour, one or more glands affected with mastitis.

Piglets may appear malnourished, hungry or lose weight.

DIAGNOSTICS

Diagnosis often made on clinical signs.

PREVENTION

Correct management and hygiene.

Review hygiene of farrowing environment, ensure prompt removal of faecal material.

Ensure hygiene of the nursing area. Must be cleaned, disinfected and dry.

If intervention needed for farrowing, vulva should be washed with antiseptic and gloves used.

Fat sows may be predisposed.

Ensure sows have adequate water.

TREATMENT

Sows should receive an injection of NSAIDs e.g. flunixin.

Oxytocin can be used if piglets are not suckling.

Oxytetracycline injection for 3-5 days.

Cases of mastitis later in lactation can be treated with penicillin.

Parasitic diseases

SCABIES

CLINICAL SIGNS

Intense itching, head-shaking, hyperkeratosis, white patches on the skin and ears, crusting lesions, small red papules

DIAGNOSTICS

Skin scraping from ear pinnae or body

TREATMENT

A single injection of ivermectin is usually effective. Treat all in-contact pigs.

A second injection 14 days later may be required.

Keep external wounds clean.

INTERNAL PARASITES

CLINICAL SIGNS

Ascariasis (*Ascaris suum*): respiratory signs including abdominal breathing, intestinal impaction, poor growth
Trichuris suis: diarrhoea, poor growth, inappetence
Trichinella spiralis: Clinical signs are not usually observed in pigs, but infection poses a zoonotic risk to humans.
Cysticercosis (*Taenia solium*): clinical signs are not usually observed in pigs but can include neurological signs. Infection poses a zoonotic risk to humans.

POST-MORTEM FINDINGS

Larval migration of *Ascaris suum* can result in focal hepatitis (milk spots on the liver) and lesions in the lungs.

Encysted larvae in meat is a significant indicator of infection of the herd with cysticercosis (*Taenia solium*) or *Trichinella spiralis*.

DIAGNOSTICS

Faecal floatation may detect ascarid ova during the patent period for *Ascaris suum* and *Trichuris suis*.

TREATMENT

A single oral dose of 30 mg/kg of oxfendazole will treat cysticercosis and ascariasis. Mebendazole at 100 mg/kg has some efficacy against *Trichinella spiralis* if it is given every 48 hours for 3 doses, but the best prevention of the risk to humans is to cook all pig meat thoroughly before consumption. A vaccine is available against *Taenia solium* and there are significant synergistic benefits when it is used with oxfendazole for control and eradication of this disease.

Miscellaneous

SUDDEN DEATH

CLINICAL SIGNS

Enterotoxigenic & enterotoxaemic *E. coli.*

Diarrhoea, lack of appetite, swollen eyelids, ataxia, recumbency, death.

DIAGNOSTICS

Post-mortem findings: fluid-filled bowel, oedema around stomach and colon.

Culture & susceptibility testing.

TREATMENT

Response to treatment is poor.

MENINGITIS

CLINICAL SIGNS

Streptococcus suis causes meningitis, as well as septicaemia, arthritis, pneumonia, and endocarditis (in pigs recovered from acute disease). **Zoonotic**.

Glaeserella parasuis causes meningitis and polyserositis.

African swine fever, classical swine fever and Japanese encephalitis can cause tremors and paralysis

DIAGNOSTICS

CSF can be collected for cytological evaluation. Culture is rarely successful.

TREATMENT

Penicillin or amoxicillin IM once daily for 3-5 days

Horses

Dose rates

Antimicrobial dose rates

ANTIMICROBIAL AGENT	RECOMMENDED DOSE	ROUTE	INTER-DOSING INTERVAL
Procaine penicillin	22,000 IU/kg	IM	12 hours
Gentamicin	7.7-9.7 mg/kg	IV or IM	24 hours
Trimethoprim-sulphonamide	30 mg/kg	PO or IV	12 hours
Doxycycline	10 mg/kg	PO	12 hours
Oxytetracycline	6.6 mg/kg	Slow IV	12 hours

Non-steroidal anti-inflammatory dose rates - for pain, inflammation, fever

ANTI-INFLAMMATORY AGENT	RECOMMENDED DOSE	ROUTE	INTER-DOSING INTERVAL
Phenylbutazone	2.2–4.4** mg/kg **Only use 4.4 mg/kg dose for first 48 hours	PO or IV	12 – 24 hours
Flunixin (50 mg/ml)	1.1 mg/kg	IV	12 – 24 hours
Meloxicam (20 mg/ml)	0.6 mg/kg daily	PO or IV	24 hours

Chemical restraint dose rates

SEDATION/ANALGESIA*	RECOMMENDED DOSE	ML/400 KG HORSE	ROUTE	USED FOR
Xylazine 100 mg/ml	0.3 – 0.6 mg/kg 0.6 - 1.1 mg/kg	2 ml 4 ml	IV IM	Standing sedation (15-20 min), pain
Detomidine 10 mg/ml	0.01-0.03 mg/kg 0.02-0.04 mg/kg	0.5 ml 1 ml	IV IM	Standing sedation (30-60 min), pain
Detomidine 10 mg/ml + Butorphanol 10 mg/ml	0.01-0.02 mg/kg + 0.02-0.04 mg/kg	0.5 ml + 0.5 ml	IV	Heavier standing sedation (prolonged duration and additional Analgesia)
GENERAL ANASESTHESIA*	**RECOMMENDED DOSE**	**ML/400 KG HORSE**	**ROUTE**	**USED FOR**
Xylazine (100 mg/ml) + Diazepam (5 mg/ml) + Ketamine (100 mg/ml)	1.1 – 1.5 **mg/kg 0.05-0.1 **mg/kg 2.2 - 2.5 **mg/kg	4.4-6 ml 4-8 ml 10 ml	IV IV IV	General anaesthesia for short surgery (~20 mins) e.g. castration **Use higher end of dose range for unhandled/ excited horses. Once profoundly sedated with xylazine administer diazepam, then ketamine.

*Withhold feed and water from horses while sedated.

Surgical prophylaxis

SURGICAL CONTAMINATION LEVEL	ANTIMICROBIAL RECOMMENDATION	DURATION OF THERAPY
CLEAN, NO MITIGATING FACTORS	NONE	N/A
CLEAN, MITIGATING FACTORS	Penicillin & Gentamicin	Stop within 24 hours
CLEAN CONTAMINATED	Penicillin & Gentamicin	24-48 hours
CONTAMINATED	Penicillin & Gentamicin	24-48 hours
DIRTY (infection already present)	Choose antimicrobial appropriate for infection	Treat till cured

REMEMBER TETANUS PREVENTION
Horses need tetanus vaccine +/- antitoxin if not up to date on vaccines

MITIGATING FACTORS

- Surgical duration >90 min.
- Surgery involving an implant.
- Surgical site infection would be a major threat to the patient (i.e. central nervous system surgery).

TIMING

Tissue levels are required at the time of incision to confer protection from surgical site infection.

IV antimicrobials: <60 minutes prior to surgery.

IM procaine penicillin: 3.5 hours prior to surgery.

Skin/Feet

WOUNDS

NO SYNOVIAL (JOINT) STRUCTURES INVOLVED

No antimicrobial therapy indicated, even if contamination of the wound is present.

Clean thoroughly and provide pain relief.

Systemic antimicrobials only when:

- Systemically unwell.
- Potential synovial involvement (see below).
- Immunosuppressed patient.

SYNOVIAL (JOINT) STRUCTURE INVOLVED

Surgical flushing is almost always required for successful outcome.

Systemic antimicrobials always indicated.

Therapy should be based on culture & susceptibility testing.

Empirical therapy with penicillin and gentamicin should be initiated pending culture results.

Ensure horses are vaccinated against tetanus.

FOOT ABSCESS

No antimicrobial therapy indicated.

Establish drainage with hoof knife.

If recurrent consider underlying disease.

Radiographs should be taken to investigate for pedal osteitis & ACTH measured to investigate for equine Cushing's disease (PPID).

Systemic antimicrobials only when:

- Immunosuppressed patient.
- If severe cellulitis is present.

Ensure horses are vaccinated against tetanus.

CELLULITIS

PRIMARY

No obvious underlying cause.

Often more severe than secondary cases.

SECONDARY

An underlying cause can be identified (surgery, joint injection, wound, blunt trauma).

DIAGNOSTICS

Fine-needle aspirate should be collected for culture & susceptibility testing.

Care is needed for cellulitis occurring over synovial (joint and tendon sheath) structures.

TREATMENT

IVRP: gentamicin 1/3 systemic dose.

Systemic antimicrobials: penicillin & gentamicin (adjust dose if IVRP performed) or oxytetracycline.

Topical therapy: cold water hosing and pressure bandage.

Analgesia especially if non-weight Bearing as risk of laminitis in contralateral limb.

Horses

Reproduction and Foals

Reproduction Foals

RETAINED PLACENTA

DIAGNOSTICS

Diagnosis can be made on clinical signs alone.

TREATMENT

Uterine lavage is critical for stimulating placental detachment and removing endotoxins, thereby preventing absorption.

Systemic antimicrobials are always required.

Penicillin and gentamicin should be administered.

NSAIDs are also critical.

DURATION OF THERAPY

1 week past resolution of clinical disease.

UMBILICAL INFECTION (NAVEL ILL)

DIAGNOSTICS

Ultrasound evaluation should be performed to define the infected structure and to allow for monitoring with treatment.

TREATMENT

Penicillin & gentamicin is most effective but often not tolerated well.

Trimethoprim-sulphonamide or doxycycline are suitable alternatives that can be given orally.

DURATION OF THERAPY

Serial ultrasonographic examination should be performed and therapy continued until 1 week after resolution of disease.

PATENT URACHUS (URINE DRIBBLING)

DIAGNOSTICS

Ultrasound evaluation should be performed to rule out umbilical infection (navel ill).

If no enlargement of the umbilical remnants is identified antimicrobial therapy is not indicated.

TREATMENT

No antimicrobial therapy indicated.

Frequent topical antibacterial therapy with chlorhexidine is recommended until patency (urine dribbling from the navel) resolves.

Dogs & Cats

Dose rates

Antimicrobial dose rates

ANTIMICROBIAL AGENT	RECOMMENDED DOSE	ROUTE	INTER-DOSING INTERVAL
Procaine penicillin 300 mg/ml	15 mg/kg (1 ml/10 kg)	IM	24 hours
Amoxicillin	15 mg/kg (1 ml/10 kg)	IM	48 hours
Amoxicillin tablets	11 - 22 mg/kg	PO	Every 8-12 hours
Cephalexin tablets	22 - 30 mg/kg	PO	Every 12 hours
Doxycycline	10 mg/kg (1 tablet/10 kg)	PO	24 hours
Metronidazole	10-15 mg/kg (20 ml/10 kg)	Slowly IV (over 10 min)	12 hours
Trimethoprim-sulphonamide	30 mg/kg (1.25 ml/10 kg)	SC	24 hours

Pain relief dose rates

ANALGESIA / ANTI-INFLAMMATORY	RECOMMENDED DOSE	ROUTE	USED FOR
Dexamethasone	0.1-0.2 mg/kg	SC, IM, IV	Pain, inflammation
Tolfenamic acid	4 mg/kg (1 mL /10 kg)	SC, IM	Pain, inflammation
Meloxicam	0.1 mg/kg	SC	Pain, inflammation

Surgical prophylaxis

SURGICAL CONTAMINATION LEVEL	ANTIMICROBIAL RECOMMENDATION	DURATION OF THERAPY
CLEAN, NO MITIGATING FACTORS	NONE	N/A
CLEAN, MITIGATING FACTORS	Amoxicillin	Stop within 24 hours. Except if dermatitis present – treat till cured
CLEAN CONTAMINATED (e.g. enterotomy, cystotomy)	Amoxicillin	Stop within 24 hours.
CONTAMINATED (infection already present, e.g. pyometra, prostatic abscess, significant bowel leakage)	Amoxicillin ± metronidazole	24-48 hours.
DIRTY	Use antimicrobial appropriate for infection, ideally based on culture and susceptibility	Treat until cured.

MITIGATING FACTORS

- Hypotension
- Surgical duration > 90 mins
- Obese dogs
- Endocrine disorder
- Bacterial dermatitis
- Surgery involves implant

TIMING

- Tissue levels are required at the time of incision to protect against surgical site infection.
- IV antimicrobials: 30-60 minutes prior to surgery.
- IM antimicrobials: 30-60 mins prior to surgery, repeat amoxicillin every 2 hours.
- SC antimicrobials: 2 hours prior to surgery

Skin

PYODERMA

DIAGNOSTICS

Cytological evaluation is needed to identify the existence of a bacterial pyoderma. Use adhesive tape, direct smear, or fine needle aspiration (for pustules or nodules). Culture & susceptibility testing recommended in all cases of bacterial pyoderma in which systemic antimicrobials are being considered.

Also strongly encouraged when:
- Rods are present on cytology.
- Lack of response to antimicrobial therapy.
- New lesions develop during treatment.
- Chronic or recurrent pyoderma.

Consider underlying disease, including skin allergies and external parasites (scabies, fleas)

TREATMENT

Surface, superficial, and localised deep pyoderma.

FIRST LINE: topical antiseptic shampoo treatment, allow contact with skin for 5-10 min.

SYSTEMIC ANTIMICROBIALS: in cases where large areas of body affected or when hair follicles and surrounding skin involved: amoxycillin/clavulanate.

Shampoo with chlorhexidine handwash solution twice weekly and chlorhexidine spray daily is comparable to cephalexin or amoxicillin.

Re-evaluate within 2-3 weeks and before end of treatment course.

Administer ectoparasiticides, such as ivermectin, to control mites and fleas

CELLULITIS, ABSCESSES AND TRAUMATIC WOUNDS

DIAGNOSTICS

History, clinical presentation & cytology.

Culture and susceptibility testing recommended when: lack of response to antimicrobial therapy.

If doesn't respond, consider underlying disease.

TREATMENT

FIRST LINE: draining & flushing alone.

Systemic antimicrobials only when:
- Systemically unwell.
- Diffuse tissue involvement.
- Potential joint involvement.
- Immunosuppressed patient.

DURATION OF THERAPY

Amoxicillin for 5-10 days.

Mange

DEMODICOSIS

Demodex canis

CLINICAL SIGNS

Young (<1 year old) or immunosuppressed dogs are susceptible

Location: eyes, muzzle or can be generalized

Patchy hair loss, red and scaly skin.

Itchiness tends to be mild or absent. May have secondary infection which can be itchy.

DIAGNOSTICS

Deep skin scraping

Hair pluck examination

Check for secondary infection using sticky tape preparation

TREATMENT

Ivermectin or isoxazoline medication (e.g. NexGard)

Repeat skin scraping every month, treat until at least 2 consecutive negative skin scrapings.

SCABIES

Sarcoptes scabei var canis

CLINICAL SIGNS

Locations: abdomen, chest, ears, elbows, legs

Itchy, redness of skin, hair loss, thickening of skin, crusty lesions.

Secondary bacteria or yeast infection often present.

Contagious to other dogs.

DIAGNOSTICS

Superficial skin scraping

Check for secondary infection using sticky tape preparation

TREATMENT

Ivermectin or isoxazoline medication (e.g. NexGard)

Gastrointestinal

DENTAL SURGERY

ROUTINE DENTAL WORK

NO ANTIMICROBIALS

DENTALS WITH EXTRACTIONS:

Bacteraemia expected for approximately 20 min.

Prophylactic antimicrobials only in patients that can not tolerate transient bacteraemia (~20 min).

Recommended for:

- Immunosuppressed.
- Geriatrics.
- Patients with severe heart disease.
- Patients with systemic illness.

FIRST LINE
Amoxicillin IV 30 min (2 hours if IM/SC) prior to surgery.

DURATION OF THERAPY

One dose only or 2nd dose 6 hours later.

ACUTE GASTROENTERITIS

ACUTE GASTROENTERITIS
TREATMENT

Antimicrobials only when severely ill. Address dehydration first with administration of fluids (subcutaneous, intravenous, intraperitoneal). Most bacterial enteropathogens are associated with self-limiting diarrhea, and the injudicious administration of antimicrobials could be more harmful than beneficial. Supportive therapy and appropriate hygiene control should be considered in all dogs.

ACUTE HAEMORRHAGIC DIARRHOEA

3 CATEGORIES

1. Mild bloody diarrhoea, normovolaemic and systemically well.
2. Severe bloody diarrhoea with hypovolaemia but not septic.
3. Severe bloody diarrhoea with hypovolaemia and sepsis.

FIRST LINE TREATMENT

GROUP 1: No antimicrobials.
GROUP 2: Fluid therapy and monitor for deterioration.
GROUP 3: Fluid therapy and amoxicillin + metronidazole.

Upper Respiratory

UPPER RESPIRATORY DISEASE

FELINE RHINITIS ≤ 10 days

Limited benefit of cytology or culture & susceptibility testing.

Serous nasal or ocular discharge: no antimicrobials needed

Mucopurulent nasal or ocular discharge (pus) but systemically well: no antimicrobials needed

Mucopurulent (pus) nasal or ocular discharge but systemically unwell: doxycycline for 7-10 days.

FELINE RHINITIS > 10 days

Antimicrobials should ideally be selected based on culture & susceptibility testing.

If C&S is not available, use doxycycline. If doxycycline is not available, use amoxicillin.

DURATION OF THERAPY

Up to 1 week after resolution of clinical signs.

CANINE INFECTIOUS RESPIRATORY DISEASE COMPLEX

Interpreting cytology and culture & susceptibility testing difficult.

NO EVIDENCE OF PNEUMONIA & SYSTEMICALLY WELL: NONE.

NO EVIDENCE OF PNEUMONIA & SYSTEMICALLY UNWELL: doxycycline or amoxicillin.

DURATION OF THERAPY: 7-10 days.

Usually responds quickly, consider further work-up if poor response.

Ears

OTITIS EXTERNA

DIAGNOSTICS

Cytological evaluation should always be performed to identify pathogens and inflammatory cells.

Ensure tympanic membrane is intact, ear flushing under general anaesthesia may be necessary.

Collect specimens before flushing.

If recurrent otitis externa, underlying disease should be investigated (foreign body, atopy, anatomical abnormality).

TREATMENT

Ear flushing (under general anaesthesia if necessary): warm sterile saline under controlled pressure.

FIRST LINE: *Malassezia* sp. OR cocci only OR cocci & rods:

- Intact tympanic membrane – ear cleaning or flushing if severe, topical therapy with PMP (polymyxin B, miconazole, prednisolone) ear drops.
- Perforated tympanic membrane – ear flushing and non-ototoxic cleaners, avoid topical antimicrobials.

DURATION OF THERAPY: 10-14 days.

Rods only:

- Intact tympanic membrane – ear flushing, topical therapy with PMP (polymyxin B, miconazole, prednisolone) ear drops. Consider compounded enrofloxacin in ear cleaner or consider human ear products with gentamicin.
- Perforated tympanic membrane – ear flushing and non-ototoxic cleaners, avoid topical antimicrobials.

DURATION OF THERAPY: 10-14 days.

Systemic antimicrobials – often ineffective and usually only indicated when middle or inner ear is involved. Base therapy on culture & susceptibility.

Lower Respiratory

PNEUMONIA

DIAGNOSTICS

Bronchoalveolar lavage for cytology and culture & susceptibility testing is strongly recommended prior to antimicrobial therapy.

Consider underlying disease process that predisposed to pneumonia.

Interpret culture results carefully as airway contaminants can be present.

TREATMENT

FIRST LINE: Mild – Doxycycline.

MILD ASPIRATION: No treatment or amoxycillin or 1st generation cephalosporin.

PNEUMONIA & SEPSIS: enrofloxacin and amoxycillin pending culture & susceptibility results. Consider metronidazole if anaerobes are suspected.

DURATION OF THERAPY

Review after 10-14 days.

CANINE INFECTIOUS RESPIRATORY DISEASE COMPLEX

DIAGNOSIS

Interpreting cytology and culture & susceptibility testing is difficult.

TREATMENT

If there is no evidence of pneumonia and the animal is systemically well, do not use antimicrobials.

If there is no evidence of pneumonia but the animal is systemically unwell, use doxycycline or amoxicillin.

DURATION OF THERAPY

7-10 days. Signs usually resolve quickly. Consider further work-up if there is a poor response to treatment.

Lower Urinary

LOWER URINARY TRACT DISEASE

DIAGNOSTICS

Urinalysis to check for presence of bacteria and other signs of inflammation. Usually includes:

- Dipstick urine strip test – check for presence of haemoglobin, glucose and bilirubin in urine
- Urine specific gravity – concentration of urine
- Unstained sediment examination – presence of urinary crystals
- Stained sediment cytology – presence of bacteria, inflammatory cells (white blood cells), red blood cells

Culture & susceptibility testing of urine sample recommended.

TREATMENT

REMEMBER the majority of cats (particularly young cats) with lower urinary tract signs do not have bacterial cystitis.

INTACT MALE DOGS: cystitis rare, consider bacterial prostatitis.

IDIOPATHIC CYSTITIS OF CATS: no antimicrobial therapy.

SPORADIC (UNCOMPLICATED) CYSTITIS IN DOGS AND CATS: amoxycillin or trimethoprim-sulphonamide.

DURATION OF THERAPY

3-5 days. Should respond in 48 hours. Investigate further if not responding.

DO NOT change antimicrobials empirically.

If responding to therapy and culture results indicate resistance, don't change antimicrobials.

Urine culture should NOT be performed after resolution of clinical signs.

RECURRENT (COMPLICATED) CYSTITIS:

Amoxycillin or trimethoprim-sulphonamide (pending culture & susceptibility testing). Consider work-up for co-morbidities.

DURATION OF THERAPY

Goal is for clinical cure NOT microbiological cure.

If it is a reinfection, treat for 3-5 days based on culture & susceptibility test.

If there have been persistent relapsing infections or there are urinary tract abnormalities, treat for 7-14 days.

Side effects can occur with long term trimethoprim-sulphonamide use.

Systemic diseases

LEPTOSPIROSIS

CLINICAL SIGNS

Vomiting, diarrhoea, dehydration, lethargy, inappetence, icterus, polyuria, polydipsia, oliguria, anuria, abdominal pain, rapid respiratory rate, bleeding into the airways, haematuria, melaena, haematemesis, epistaxis, anaemia, oedema, ascites, vomiting, uveitis, conjunctivitis, retinal haemorrhages, arrhythmias, reluctance to move, abortion, infertility, calcinosis cutis.

DIAGNOSTICS

Consider leptospirosis likely based on the clinical signs above. Diagnosis can be confirmed by PCR testing of a blood sample.

TREATMENT

Doxycycline, or amoxicillin if doxycycline is not tolerated by the dog.

DURATION OF THERAPY

2 weeks

TICK-BORNE DISEASES

CLINICAL SIGNS

In the acute stage signs can include fever, lethargy, rapid heart rate, enlarged lymph nodes, anorexia, weight loss, reluctance to move, lameness, diarrhoea, discharge from the nose and eyes, bleeding disorders, including nosebleeds, purpura or bruising.

In the chronic phase, signs can include fever, weakness, weight loss, bleeding disorders, pale mucous membranes, eye abnormalities or neurological abnormalities.

DIAGNOSTICS

Consider anaplasmosis, babesiosis or ehrlichiosis likely based on the clinical signs above. Diagnosis can be confirmed by PCR testing of a blood sample or by serological testing for antibodies. The organisms can also be detected by examination of stained blood smears, although this is not a very sensitive method of detection.

TREATMENT

Doxycycline for 4 weeks for ehrlichiosis and anaplasmosis. Two doses of pentamidine at 16.5 mg/kg IM with a 24 h dosing interval can be used to treat all *Babesia* species. One dose of 6.6 mg/kg of imidocarb dipropionate IM or SC has greater efficacy for *Babesia vogeli*. Atovaquone at 13.5 mg/kg, orally every 8 h with fatty food, in combination with azithromycin at 10 mg/kg orally for 10 days has greater efficacy for *Babesia gibsoni*.

Vaccination Schedules

CATTLE

CLOSTRIDIAL VACCINES (e.g. Ultravac 5 in 1)

Dose: 2 ml per animal subcutaneously (behind ear)

Withdrawal Period = 0 days

Calves: initial dose at 6 weeks of age, 2nd dose 4-6 weeks later. Annual Booster vaccine required.

Cows: dose 4 weeks before calving.

SHEEP

CLOSTRIDIAL VACCINES (e.g. Ultravac 5 in 1)

Dose: 1 ml per animal subcutaneously (behind ear)

Withdrawal Period = 0 days

Lambs: initial dose at marking, 2nd dose 4-6 weeks later. Annual booster vaccine required.

Ewes: dose 4 weeks before lambing.

FOOTVAX (Footrot Vaccine)

Dose: 1 ml subcutaneously (behind ear)

Withdrawal Period = 0 days

Initial Course: 2 injections 6 weeks apart.

Booster: as required depending on clinical signs.

Warning: do not give to ewes within the period 4 weeks before or after lambing.
May leave a sterile lump for several weeks.

Vaccination Schedules

PIGS	HORSES
GILTS AT SELECTION	**TETANUS (e.g. Equivac T)**
Vaccinate against: Leptospirosis, erysipelas, *E. coli* and parvovirus **4-6 weeks later give second vaccine for:** Leptospirosis, erysipelas and parvovirus	**Dose:** 1 ml Intramuscularly **Withdrawal Period:** 0 days **Primary Course:** horses 3 months and older – 2 vaccines 4-6 weeks apart **Booster:** once a year
3-4 WEEKS BEFORE FARROWING	**TETANUS ANTI-TOXIN (e.g. Equivac TAT)**
Vaccinate for: Leptospirosis, erysipelas and *E. coli*	**Dose:** 1 ml subcutaneously **Withdrawal Period:** 0 days **Instructions:** to be given at the time of injury/surgery in an unvaccinated horse. If given at the same time as tetanus vaccine, use a different site. Will protect against tetanus for approximately 2-3 weeks.

All species

Anthelmintics

Anthelmintics

TRADE NAME (active ingredient)	SPECIES	DOSE	ROUTE	WITHHOLDING PERIOD
Ivomec Antiparasitic Injection* (Ivermectin 10 mg/ml)	Cattle / Sheep Pigs	1 ml/50 kg 1 ml/33 kg	SC	Meat: 49 days (cattle) 22 days (sheep) 18 days (pigs)
Dectomax Injectable* (Doramectin 10 mg/ml)	Cattle Pigs	1 ml/50 kg 1 ml/33 kg	SC IM	Meat : 42 days (cattle) 24 days (pigs)
Q-Drench* (Levamisole 40 mg/ml, closantel 37.5 mg/ml, albendazole 25 mg/ml, abamectin 1 mg/ml)	Sheep	1 ml/5 kg	PO	Meat: 28 days
Arrest High Mineral* (Levamisole 37.5 mg/ml, albendazole 23.8 mg/ml)	Sheep	1 ml/5 kg	PO	Meat: 10 days
Exodus Se (Moxidectin 1 mg/ml)	Sheep	1 ml/5 kg	PO	Meat: 10 days
Matrix (Abamectin 1 mg/ml, levamisole 40 mg/ml, oxfendazole 22.7 mg/ml)	Sheep	1 ml/5 kg	PO	Meat: 14 days
Panacur 100 Oral (Fenbendazole 100 mg/ml)	Cattle/Horses Sheep/Goats	0.75 ml/10 kg 1 ml/20 kg	PO	Meat: 10 days Milk: 96 hours (cattle) 35 days (sheep/goat)

***Not for use in animals producing milk for human consumption**

Anthelmintics

TRADE NAME (active ingredient)	SPECIES	DOSE	ROUTE	WITHHOLDING PERIOD
Genesis Horse Wormer Boehringer Ingelheim (Abamectin 4 mg/ml, praziquantel 50 mg/ml)	Horse	1 ml/20 kg 1 syringe/600 kg bodyweight	PO	Meat: 63 days
Razor Equine Wormer (Praziquantel 100 mg/g, ivermectin 8 mg/g)	Horse	1 ml/40 kg ½ syringe/600 kg bodyweight	PO	Meat: 28 days
Aviverm (Levamisole 240 mg/ml)	Poultry	1 ml/9 kg liveweight	Drinking water	Meat: 7 days Eggs: 6 days
Levimasole (powder)	Poultry	8 g/10 L water	Drinking water	Meat: 7 days Eggs: 0 days
Ivermectin	Dogs	0.2 – 0.4 mg/kg	SC PO	
Ivermectin	Cats	0.3 – 0.6 mg/kg	SC	

All species

Normal Clinical Parameters

Normal Clinical Parameters

PARAMETER	CATTLE	SHEEP	PIG	POULTRY	HORSE	DOG	CAT
Heart rate (beats per minute)	60-80 (Adult) 80-120 (Calf)	70-90	60-110 (Adult) 200-220 (Piglet)	200-400	28-40 (Adult) 60-100 (Foal)	70-120 (Adult) 90-140 (Puppy)	120-140 (Adult) 120-180 (Kitten)
Respiratory rate (breaths per minute)	15-30	20-30 (Adult) 30-45 (Lamb)	10-20 (Adult) 24-36 (Piglet)	15-30	8-16 (Adult) 20-80 (Foal)	10-30	16-40
Temperature (°C)	38-39 (Adult) 38.5-39.5 (Calf)	38.5-40 (Adult) 39-40 (Lamb)	38.5-39.5	40.5-42.0	37.0- 38.5	38.0-39.0	38.5-39.5
Pregnancy Length (days)	279-291	150 (140-160)	115 (110-116)	21 (egg incubation)	320-380	57-68	63-65
Rumen Movements (per minute)	1-2	1-2					

One Health, One Future: Collaborating to Combat Antimicrobial Resistance in Pacific Island Countries

For more information and further resources visit

www.science.unimelb.edu.au/vetantibiotics

Version 2 (2026)