Fijian Antimicrobial Prescribing Guidelines

For more information and further resources visit

www.science.unimelb.edu.au/vetantibiotics

www.combatamr.org.au

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

MASSEY UNIVERSITY TE KUNENGA KI PŪREHUROA UNIVERSITY OF NEW ZEALAND

AGRICULTURE For Fiji's Health & Wealth

Cattle

Sheep
Goats

Poultry

Pigs

Horses

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

* 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.

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

Cattle

Chemical Restraint

Chemical restraint dose rates (Veterinary Supervision only)

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

$$\text{WEIGHT in Kgs} = \frac{\text{Length (Cm)} \times \text{Girth (Cm)} \times \text{Girth (Cm)}}{10830}$$

e.g. If Body Length is 150 cm and Heart Girth is 120 cm = 150 x 120 x 120 / 10830 = 199.4kg

DRUG CALCULATION

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

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

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

Cattle

Surgical prophylaxis

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 mins.
- Rumenotomy.
- Unsanitary conditions.
- Periparturient.

TIMING

Tissue levels are required at the time ofincision 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

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 daily for 3 days is highly effective.

Oxytetracycline daily for 3 days or long-acting oxytetracycline once.

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 non-steroidal anti-inflammatories (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 and flush abscess cavity with clean water.

Systemic antimicrobials not indicated 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 70mg/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 early. If extensive bone involvement, resolution unlikely.

Neonatal

SEPTIC ARTHRITIS "JOINT ILL"

CLINICAL SIGNS

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

DIAGNOSTICS

From clinical signs. Aseptic collection of joint fluid for cytology, culture and susceptibility testing.

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 CRT, cold extremities

DIAGNOSTICS

Diagnosis from clinical signs.

Consider bacterial cause (enteritis, naval 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.

Bacterial commonly involved include *Trueperella pyogenes, Escherichia 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 resection 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 and susceptibility testing of post-mortem specimens should be considered in outbreaks.

TREATMENT

Oxytetracycline most appropriate.

Trimethoprim sulphonamide is a suitable alternative

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 BVD) or foreign body.

TREATMENT

Procaine penicillin is preferred.

Oxytetracycline is a suitable alternative.

Severe cases may require tracheotomy.

DURATION OF THERAPY

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

Gastrointestinal

CALF DIARRHOEA

DIAGNOSTICS

Rapid (patient side) diagnostics, performed on faeces, are available and should be utilised to confirm bacterial origin as most are not. *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 = 3L)

Dehydration = Body weight x % dehydration / 100

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

Total requirement = 3 L + 2.1 L = 5.1L

3) FLUID TYPE

If drinking = Oral rehydration

(Vytrate or Homemade)

(2 hours separation from milk feed)

If not drinking enough consider stomach tube

If not drinking = Intravenous Fluids

4) SODIUM BICARBONATE

Add to Intravenous fluids if calf is depressed, not drinking or unable to stand

Commercial preparations:

150mls 8.4% Sodium bicarbonate split between 2L of IV fluids – 0.9% Saline should be used only

Homemade: 32g of sodium bicarbonate powder, mixed with water for injection and split between first 2L of saline

5) MONITOR ONGOING FLUIDS

Give 2/3^{rds} of the dehydration fluid amount IV in the first hour then the remaining amount slowly over the next 2-3 hours

If drinking after IV fluids, switch to oral rehydration solution

6) PAIN RELIEF

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

Mastitis

GRAM NEGATIVE, SEVERE

CLINICAL SIGNS

Infection of mammary gland brief, most signs due to endotoxin. Severe cases have signs of systemic illness – profoundly depressed, fever initially then low temperature, high heart rate, diarrhoea ± gangrenous mastitis.

DIAGNOSTICS

Diagnosis is generally made from clinical signs alone. Milk samples should be obtained for culture and 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 sulfadiazine – 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 non-steroidal anti-inflammatory drugs).

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 and susceptibility results.

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

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 hydrochloride and 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 antimicrobial should only be used when 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, inappetence

DIAGNOSTICS

Diagnosis from clinical signs alone.

TREATMENT

Antimicrobial therapy is not indicated in cattle that are clinically well.

Systemic antimicrobials only used if systemic illness is present (see above)

Oxytetracycline is preferred.

Supportive therapy may be required (fluid therapy and non-steroidal anti-inflammatory drugs).

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 the size of a grapefruit or basketball 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 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 (NSAID) for pain and inflammation.

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

Oxytetracycline or trimethoprim sulphonamide .

If prolapsed tissue severely compromised or damaged- euthanase.

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.

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 (300mg) is useful in severe cases.

Avoid congregating cattle in dusty yards as 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).

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

* 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

Sheep/Goats

Pain relief and sedation

Pain relief and sedation

ANALGESIA / ANTIINFLAMMATORY	RECOMMENDED DOSE	ROUTE	USED FOR	WITHHOLDING PERIOD (days)
Lignocaine (e.g. Lopaine 2%)	Local infiltration up to 25ml (aim for 5mg/kg) Epidural 1-4mls (2ml average)	S/C Epidural	Local Anaesthesia Epidural	Nil
Flunixin	1.1- 2.2mg/kg (1-2ml/45kg)	IM or IV	NSAID – Can be repeated once a day for 5 days	Meat: 15 days
Meloxicam	1mg/kg (1ml/20kg)	S/C	NSAID – One off dose	Meat: 11 days
SEDATION (Veterinary Supervision only)	**RECOMMENDED DOSE**	**ROUTE**	**USED FOR**	**WITHHOLDING PERIOD (days)**
Xylazine	0.02mg/kg (sheep) 0.05 mg/kg (goats) 0.2mg/kg (sheep) 0.1mg/kg (goats)	IV IM	Sedation	Meat: 5 days
Ketamine	5mg/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 mins.
- Rumenotomy.
- Unsanitary conditions.
- Periparturient.

TIMING

Tissue levels are required at the time ofincision 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 with farmer.

Scald treatment: Management with zinc sulphate footbath only.

MANAGEMENT

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

Eradicate by culling, not treating

Antimicrobial treatment for salvage animals

Quarantine new arrivals, inspect before release

Consider vaccination '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 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 ± 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 non-steroidal anti-inflammatories (e.g. Meloxicam)

Antimicrobials not indicated unless wound deep or involves 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 staining smears.

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 and anti-inflammatories.

Respiratory

PNEUMONIA

DIAGNOSTICS

Post-weaning *Mycoplasma ovipneumoniae* and *M. argini* 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 and 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 lung 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 indicated 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 ovinoidallis* and *Eimeria crandallis* occurs mostly in post-weaning lambs 2-6 months of age.

DIAGNOSTICS

Diagnosis based on clinical signs, necropsy findings with typical gut lesions and high oocyst counts. Distinguish from bacterial enteritis.

TREATMENT

Sulphonamide or toltrazuril.

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.

TREATMENT

Infected lambs die rapidly, limiting success of antimicrobial therapy.

Oxytetracycline

PREVENTION

Address hygiene in lambing environment (paddocks better than in sheds).

Ensure adequate colostrum intake

Systemic disease / sudden death

SALMONELLOSIS

CLINICAL SIGNS

Depressed, anorectic, fever, putrid fluid diarrhoea (± 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 and 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.

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 NSAID (e.g. flunixin).

PREVENTION

Improve lambing environment hygiene

Ensure adequate colostrum intake

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, 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 and 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 important.

TREATMENT

Remove aborted ewes from lambing flock.

Spread remaining ewes into clean paddocks

SEPTIC METRITIS

Most common after abortion, 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 protruding from vulva, size of tennis ball to a melon. Overtime 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 tears. 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 early and vigorous treatment. 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.

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	20mg/kg	Drinking water***	24 hours	Eggs: Nil** Meat: 2
Chlortetracycline (CTC)	60mg/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
Sulfaquinoxaline†	350-420 mg/ L	Drinking water***	24hours	Eggs: DO NOT USE Meat: 14

*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 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.

†Sulfaquinoxaline - risk of causing **vitamin K deficiency**

Poultry

In water medication

Water requirements & medication

POULTRY TYPE	DAILY WATER REQUIREMENT	CALCULATION EXAMPLE
Non-laying hens	19 L/100 birds	**Medication calculation example:** Dose rate: 20 mg/kg per bird Each bird: ~2 kg x 20 mg = 40 mg/bird **How many birds?** If 40 birds: 40 birds x 40 mg/bird = 1600 mg total **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 Add to 24 hours of water then remove and replace with fresh solution daily
Laying hens	19-28 L/100 birds	
Broilers 4 weeks	7.6 L/100 birds	
Broilers 8 weeks	15.5 L/100 birds	
Broilers 12 weeks	21 L/100 birds	

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 coccidia 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: Sulfaquinoxaline* (70 g/L) at a dose rate of 6 ml/L in the DW for 2 days, followed by 3 days on plain water, then 5 ml/L in the DW for 2 days, followed by plain drinking water for 3 days.

*Sulfaquinoxaline has a risk of causing vitamin K deficiency and therefore is the least preferred 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 DW, 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 appearing ballooned, fragile or friable and containing a foul-smelling brown fluid.

DIAGNOSTICS

Frequently associated with coccidiosis. A direct smear of the intestinal 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 hepaticum*.

DIAGNOSTICS

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

TREATMENT

Chlortetracycline

DURATION OF THERAPY

5 days.

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 **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 **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.); 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 cause.

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 **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 (*Escherichia 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 **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 caused by 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, 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 (*Escherichia 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 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 **NOT** suitable for birds laying eggs for human consumption.

Staphylococcus aureus or enterococci infection: always follow culture and sensitivity results. If laboratory 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), 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 **NOT** suitable for birds laying eggs for human consumption.

DURATION OF THERAPY

3-5 days

SUB-ACUTE/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 (*Escherichia coli*), *Staphylococcus aureus, Riemerella anatiipestifer* (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 *Escherichia 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 of over heating, or elevated ammonia levels.

TREATMENT

Antimicrobial treatment is **NOT** recommended.

Control measures should focus on identifying underlying causes and improving brooding conditions, 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*, 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 improve 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 10mg/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

Pigs

Sedation and pain relief

Sedation and pain relief

SEDATION (Veterinary Supervision Only)	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	0.4mg/kg (2ml/100kg) repeat once after 24 hours	IM	Meat: 6
Flunixin	1.1-2.2 mg/kg (1-2ml/45kg) daily for 3 days	IM	Meat: 28

*Check the label for withholding period as 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 ofincision 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, *Haemophilus 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, space allowance, hygienic environment

POLYSEROSITIS (*Mycoplasma hyorhinis*)

3-10 weeks of age, polyserositis, sudden death

TREATMENT

Oxytetracycline
2nd choice – tylosin

PREVENTION

Improve air quality, 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, postmortem 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 non-steroidal anti-inflammatories (e.g. Meloxicam).

Antimicrobials not indicated unless wound 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, Bordatella bronchiseptica,* streptococci and *Haemophilus 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. Necropsy findings include bleeding from the snout and fibrinous pleuropneumonia. Pleurisy in survivors leads to ill thrift.

DIAGNOSTICS

Post-mortem findings and culture and 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*, 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 hydodysenteriae* from 7 weeks of age, mucus and blood in diarrhoea is indicative.

DIAGNOSTICS

Postmortem findings and culture and 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 (electrolytes ± glucose) 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: 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.

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 anti-septic and gloves used.

Fat sows may be predisposed.

Ensure sows have adequate water.

TREATMENT

Sows should receive an injection of an anti-inflammatory (NSAID) 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.

Miscellaneous

SUDDEN DEATH

CLINICAL SIGNS

Enterotoxigenic & enterotoxaemic *E. coli*.

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

DIAGNOSTICS

Postmortem findings: fluid filled bowel, oedema around stomach and colon.

Culture and 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).

Haemophilus parasuis causes meningitis and polyserositis.

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 4.4mg/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

Horses

Chemical restraint

Chemical restraint dose rates (Veterinary Supervision only)

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 mins), 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 mins), 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 PROPHYLAXIS – Tetanus Vaccine +/- Antitoxin if not up to date on vaccines

MITIGATING FACTORS

- Surgical duration >90 mins.
- 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 ofincision to confer protection from surgical site infection.

IV antimicrobials: <60 minutes prior to surgery.

IM procaine penicillin: 3.5 hours prior to surgery.

Horses

Skin/Feet

Skin/Feet

WOUNDS

NO SYNOVIAL (JOINT) STRUCTURES INVOLVED

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

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 and susceptibility testing.

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

Ensure horses are vaccinated for 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 for 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 and 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 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 resolves.

Vaccination Schedules

CATTLE	SHEEP/GOATS
CLOSTRIDIAL VACCINES (e.g. Ultravac 5 in 1)	**CLOSTRIDIAL VACCINES (e.g. Ultravac 5 in 1)**
Dose: 2mls 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	**Dose:** 1ml 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

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:** 1ml 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:** 1ml 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.

Anthelmintics

TRADE NAME (active ingredient)	SPECIES	DOSE	ROUTE	WITHHOLDING PERIOD
Ivomec* Ivermectin 10 mg/ml	Cattle / Sheep Pigs	1 ml/ 50 kg 1 ml/ 33 kg	S/C	Meat: 49 days (cattle) 22 days (sheep) 18 days (pigs)
Nilverm Oral Levamisole 68 mg/ml	Cattle Sheep	5 ml/ 50 kg 1 ml/ 10 kg	PO	Meat: 3 days Milk: 0 days
Kilverm Pigs & Poultry Levamisole 16.6 mg/ml	Pigs Poultry	5 ml/ 10 kg 40 ml/L water	PO Drinking water	Meat: 3 days Meat: 7 days, Eggs: 0 days
WSD Levimasole* Levimasole 27 mg/ml	Sheep Cattle	2 ml/10 kg 10 ml/45 kg	PO	Meat: 3 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: 4 days (cattle) 35 days (sheep/goat)

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

All species

Normal Clinical Parameters

Normal Clinical Parameters

SPECIES	HEART RATE Beats per minute	RESPIRATORY RATE Breaths per minute	TEMPERATURE °C	PREGNANCY LENGTH (Days)	RUMEN MOVEMENTS Per minute
Cattle	40-80 (Adult) 80-120 (Calf)	15-30	38-39 (Adult) 38.5-39.5 (Calf)	279-291	1-2
Sheep	70-90 (Adult) 80-130 (Lamb)	20-30 (Adult) 30-45 (Lamb)	38.5-40 (Adult) 39-40 (Lamb)	150 (140-160)	1-2
Goat	70-90 (Adult) 90-150 (Kid)	15-40	38.5-39.5	150	1-2
Pig	60-110 (Adult) 200-220 (Piglet)	10-20 (Adult) 24-36 (Piglet)	38.5-39.5	115 (110-116)	
Poultry	200-400	15-30	40.5-42.0	21 (egg incubation)	
Horse	28-40 (Adult) 60-100 (Foal)	8-16 (Adult) 20-80 (Foal)	37.0- 38.5	320-380	

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

www.combatamr.org.au













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