Australian Veterinary Prescribing Guidelines

For more information and further resources visit

www.fvas.unimelb.edu.au/vetantibiotics

NCAS National Centre for Antimicrobial Stewardship

APCAH Asia-Pacific Centre for Animal Health

THE UNIVERSITY OF MELBOURNE

AGRICULTURE VICTORIA

Cattle

Horses

NOT ALL
BUGS
NEED
DRUGS

AGRICULTURE VICTORIA

Play your part in preventing antibiotic resistant infections.

For more information visit

agriculture.vic.gov.au/amr

AGRICULTURE VICTORIA

We all have an important role to play in the fight against antimicrobial resistance.

As part of our commitment to the implementation of the National Antimicrobial Resistance Strategy 2015-2019, AgVic and The University of Melbourne have created education materials about antimicrobial resistance (AMR) and antimicrobial stewardship (AMS).

The resources aim to provide a practical guide for the prescribing of antimicrobials that can help start the conversation about AMR with clients.

FREE RESOURCES

- A5 antibiotic category cards for dogs and cats
- A5 antibiotic category cards for cattle, horses and sheep
- A3 waiting room posters
- A5 prescribing tearaway pads
- DL Double-sided prescribing leaflets
- A6 sticker sheets
- Antibiotic Guardian lapel pins

You can order our resources by emailing **animal.biosecurity@djpr.vic.gov.au**

Cattle

Dose rates

Dose rates

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

ANTIMICROBIAL AGENT	RECOMMENDED DOSE	ROUTE	INTER-DOSING INTERVAL	WITHHOLDING PERIOD (days)
Procaine penicillin*	22,000 IU/kg	IM	12 - 24 hours	Not established, test
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
Amoxycillin/clavulanate (pre-ruminant calves)	10 mg/kg	PO	12 hours	Meat: 4
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

*Many of the recommendations in this guide represent off-label use of antimicrobials. Compliance with the legal requirements of your jurisdiction is your responsibility.

Cattle

Surgical prophylaxis

Surgical prophylaxis

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

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	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 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.

Foot disease

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

FOOTROT

DIAGNOSTICS

Diagnosis can be made from clinical signs alone.

The foot must be lifted for examination in all cases.

Ensure no foreign body is present in the interdigital space.

TREATMENT

Topical therapy with antibacterial disinfectant.

Procaine penicillin is highly effective.

Florfenicol is a suitable alternative in beef cattle.

DURATION OF THERAPY

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

Treat until lesions have resolved.

FOOT ABSCESS

DIAGNOSTICS

Diagnosis can be made from examination of the foot.

TREATMENT

Antimicrobials are not indicated.

Establishing drainage is the critical factor.

DIGITAL DERMATITIS

"Hairy Heelwart"

DIAGNOSTICS

Diagnosis can be made from examination of the foot.

TREATMENT

Topical therapy with tetracycline is most effective.

Bandaging maintains tetracycline contact with lesions.

Respiratory

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

PNEUMONIA

DIAGNOSTICS

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

Although diagnostics are rarely pursued, they should be considered for valuable animals or in outbreaks.

Culture and susceptibility testing can be performed from transtracheal wash, bronchoalveolar lavage or post-mortem specimens.

Mannheimia can be associated with pleuropneumonia, which carries a very poor prognosis.

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.

Treat until disease resolved, which may take > 1 week in severe cases.

CALF DIPTHERIA

DIAGNOSTICS

Diagnosis usually based on clinical signs.

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

Cattle

Gastrointestinal

Gastrointestinal

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

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 *crytosporidia*.

Systemic antimicrobials are indicated when:

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

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.

PERITONITIS

DIAGNOSTICS

Abdominocentesis is recommended for cytological evaluation at a minimum and preferably also for culture and susceptibility testing.

Consider origin of bacterial contamination as this affects prognosis.

TREATMENT

Broad-spectrum coverage is required as a mixed population of bacteria are usually present, including anaerobes.

Oxytetracycline is preferred.

Trimethoprim/sulphonamide is a suitable alternative.

Both should be used twice daily.

DURATION OF THERAPY

Dependent on severity. Mild cases (post-surgery) may respond in 5 days.

GI contamination (i.e. following rupture of an abomasal ulcer) may require 2-3 weeks of therapy.

Mastitis

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

GRAM NEGATIVE, SEVERE

DIAGNOSTICS

Diagnosis is generally made from clinical signs alone.

Milk samples should be obtained for culture and susceptibility testing.

TREATMENT

Antimicrobial therapy should be initiated immediately following sample collection as the disease progresses rapidly, and is often fatal.

Oxytetracycline should be administered intravenously as perfusion of the muscles is often poor so drug absorption is reduced.

Intramammary therapy has poor penetration.

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 amoxycillin 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.

Neurological

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

LISTERIA

DIAGNOSTICS

Diagnosis is generally made from clinical signs.

CSF can be collected for cytological evaluation, culture is rarely successful.

TREATMENT

Intravenous oxytetracycline or crystalline penicillin is strongly recommended.

Twice daily dosing is advised.

DURATION OF THERAPY

5-7 days is generally recommended.

THROMBOEMBOLIC MENINGOENCEPHALITIS

DIAGNOSTICS

Pneumonia is generally present concurrently, or in other in-contact animals, helping to differentiate this disease from listeriosis.

TREATMENT

Intravenous oxytetracycline is strongly recommended.

Twice daily dosing is advised.

DURATION OF THERAPY

5-7 days is generally recommended.

OTITIS MEDIA

DIAGNOSTICS

Frequently secondary to pneumonia in calves kept in poorly ventilated areas.

Diagnosis can be made from clinical signs alone.

TREATMENT

Oxytetracycline is preferred.

Tulathromycin is a suitable alternative.

DURATION OF THERAPY

3-5 days of oxytetracycline is generally required.

A single dose of tulathromycin is sufficient.

Miscellaneous

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

METRITIS

DIAGNOSTICS

Diagnosis is generally made from clinical signs alone.

TREATMENT

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

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

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.

NEONATAL SEPTICAEMIA

DIAGNOSTICS

Diagnosis is generally made from clinical signs.

Consider bacterial aetiology (enteritis, omphalophlebitis/naval ill) or failure of passive transfer.

TREATMENT

Oxytetracycline can be used 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 may be sufficient in uncomplicated disease.

Longer durations are necessary when omphalophlebitis or septic arthritis develop.

Up to 2 weeks may be necessary.

PINKEYE

DIAGNOSTICS

Diagnosis is generally made from clinical signs.

TREATMENT

Topical therapy with cloxacillin is generally effective.

Use of ophthalmological formulations is preferred as the duration of action is longer.

Subpalpebral administration of penicillin is useful in severe cases.

Covering the eye with a patch aids in recovery and reduces transmission of disease.

DURATION OF THERAPY

One application of cloxacillin ointment may be sufficient.

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

Dose rates

For more information and further resources visit
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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
Metronidazole*	20mg/kg	PO	12 hours

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Surgical prophylaxis

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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	Choose antimicrobial appropriate for infection	Treat till cured

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 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

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

WOUNDS

NO SYNOVIAL STRUCTURES INVOLVED

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

Systemic antimicrobials only when:

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

SYNOVIAL STRUCTURE INVOLVED

Lavage 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.

FOOT ABSCESS

No antimicrobial therapy indicated.

Curette to establish drainage.

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 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.

Respiratory

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

STRANGLES

DIAGNOSTICS

Notifiable disease, samples should be submitted for serology, culture or PCR to confirm diagnosis.

TREATMENT

No antimicrobial recommended.

Most cases resolve quickly once drainage has been established.

A small percentage continue to shed (carriers).

Systemic antimicrobials only when:

- Respiratory compromise.
- Metastatic disease (Bastard strangles).

In these cases, penicillin is first line therapy.

SINUSITIS

DIAGNOSTICS

A sample of fluid from the sinus should be obtained to confirm the diagnosis.

Assess underlying disease (dental or equine Cushing's) especially if recurs.

TREATMENT

Sinus lavage alone may be sufficient and is almost always required for successful outcome (minimally invasive technique in the field can be used).

Systemic antimicrobials when:

- Recurrent disease.
- Systemically unwell.

In these cases, penicillin or trimethoprim/sulphonamide is first line therapy.

PNEUMONIA

DIAGNOSTICS

Transtracheal wash, or endoscopic tracheal wash with a triple guarded catheter, should be performed for cytological evaluation.

Culture and susceptibility testing should be performed in all cases.

Culture of bronchoalveolar lavage specimens is never appropriate as these samples are contaminated by the upper airway.

TREATMENT

Should be based on culture and susceptibility results.

Empirical therapy with penicillin & gentamicin should be initiated pending results.

Metronidazole should be added if anaerobes are suspected (foul smell to tracheal fluid).

Foals

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

PNEUMONIA

DIAGNOSTICS

Streptococcus zooepidemicus and *Rhodococcus equi* are equally common.

Transtracheal wash is required for cytological examination and culture and susceptibility testing in all cases.

TREATMENT

Based on culture and susceptibility results. Empiric therapy can be initiated while results pending.

If *S. zooepidemicus* is suspected penicillin is appropriate.

If *R. equi* is suspected clarithromycin and rifampin is recommended.

DURATION OF THERAPY

Varies by pathogen.

1 week generally adequate for *S. zooepidemicus*.

4-6 week generally recommended for *R. equi*.

SEPSIS

DIAGNOSTICS

Sepsis score can be used to assess risk (see website).

Blood for culture and susceptibility should be collected but false negatives are common.

TREATMENT

Based on culture and susceptibility results if possible. Empiric therapy can be initiated while results pending.

Penicillin & gentamicin is recommended.

Care with gentamicin if renal function is compromised. Intravenous trimethoprim/sulphonamide is alternate.

DURATION OF THERAPY

2 weeks is generally considered to be adequate, unless focal infection develops (i.e. septic arthritis).

SEPTIC ARTHRITIS

DIAGNOSTICS

Arthrocentesis should be performed to obtain fluid for cytological evaluation and for culture and susceptibility testing in all cases.

Radiographs should be taken to investigate bone involvement.

TREATMENT

Based on culture and susceptibility results. Empiric therapy can be initiated while results pending.

Penicillin & gentamicin is recommended.

Oxytetracycline is an alternative, especially if osteomyelitis is diagnosed.

DURATION OF THERAPY

Treat for 1 week past resolution of clinical signs, longer if osteomyelitis is present.

Foals

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

PATENT URACHUS

DIAGNOSTICS

Ultrasound evaluation should be performed to rule out omphalophlebitis.

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.

OMPHALOPHLEBITIS (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.

HIGH-RISK FOALS

Premature foal and those with neonatal encephalopathy ('Dummy Foal Syndrome') are at increased risk of sepsis.

Failure of passive transfer should be addressed with plasma transfusion.

There is no evidence for any benefit from prophylactic antimicrobials in place of plasma transfusion.

DIAGNOSTICS

Serial haematologic evaluation and sepsis score may guide necessity for antimicrobial therapy.

TREATMENT

Prophylactic therapy is warranted when leukopaenia is present or sepsis score is high.

Penicillin & gentamicin is most appropriate but care should be taken in foals with impaired renal function.

Trimethoprim/sulphonamide IV is an alternative.

Gastrointestinal

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

DIARRHOEA

ACUTE DIARRHOEA

DIAGNOSTICS

Culture should be performed for *Salmonella*. Diagnosis of clostridial disease requires toxin test.

TREATMENT

Antimicrobial therapy rarely indicated.

Only if:

- Confirmed clostridial cause.
- Severe leukopaenia and neutropaenia.

If clostridial: Metronidazole.

If leukopaenic: Penicillin & gentamicin.

DURATION OF THERAPY

Clostridial: Until diarrhoea resolves.

Leukopaenic: Until leukopaenia resolves.

CHRONIC DIARRHOEA

Antimicrobial therapy rarely indicated.

PERITONITIS

DIAGNOSTICS

Abdominocentesis should be performed to collect fluid for cytological evaluation and culture and susceptibility testing.

Differentiation between primary and secondary origins is critical as secondary peritonitis is typically due to leakage from the gastrointestinal or reproductive tracts and surgery should be considered.

TREATMENT

Systemic antimicrobial therapy should be instituted immediately following sample collection.

Penicillin & gentamicin & metronidazole are appropriate.

DURATION OF THERAPY

Resolution of clinical signs and serial abdominocentesis should guide therapy.

Treat for one week past resolution of disease.

LAWSONIA (PROLIFERATIVE ENTEROPATHY)

DIAGNOSTICS

Diagnosis can be made via serology (ELISA) or by faecal PCR.

TREATMENT

Mild to moderate disease: Doxycycline PO.

Severe disease: Oxytetracycline IV.

DURATION OF THERAPY

Mild to moderate disease: Generally 3 weeks is recommended.

Severe disease: 3-4 weeks.

Reproduction

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

RETAINED PLACENTA

DIAGNOSTICS

Diagnosis can be made on clinical signs alone.

TREATMENT

Large volume uterine lavage is critical for stimulating placental detachment and removing endotoxins thereby preventing absorption.

Systemic antimicrobials are always required.

Penicillin, gentamicin and metronidazole should be administered.

NSAIDs are also critical.

DURATION OF THERAPY

1 week past resolution of clinical disease.

PLACENTITIS

DIAGNOSTICS

Ultrasonographic examination of the placenta is necessary.

Samples should be collected for culture and susceptibility testing if the cervix is open.

There is no evidence for prophylactic or pulse therapy for placentitis.

TREATMENT

Trimethoprim/sulphonamide is preferable.

Gentamicin may not cross the placenta.

DURATION OF THERAPY

1 week past resolution of ultrasonographic and clinical disease or until foaling.

Generally requires therapy until foaling.

ENDOMETRITIS

DIAGNOSTICS

Cytological evaluation and culture and susceptibility testing is required for diagnosis.

Consider underlying disease.

TREATMENT

There is no evidence for routine treatment of mares post-service.

Therapy should be guided by culture and susceptibility results.

Intrauterine penicillin and aminoglycoside appears effective in most cases.

Your animal/s received antibiotics today – this means your vet:

- [ ] Found evidence of a bacterial infection that may not improve without antibiotics.
- [ ] Investigated and treated any underlying non-bacterial diseases.
- [ ] Considered other treatment options.
- [ ] Took a sample to identify the bacteria and the effective antibiotics.
- [ ] Selected the appropriate drug, dose and duration to treat the infection.
- [ ] Referred to Australian antibiotic prescribing guidelines.

It is important that you:

- Give the antibiotics as prescribed on the label even if symptoms improve.
- Monitor your animal/s closely and contact your vet if they do not improve or have side effects.
- Schedule vet revisits if requested.
- Understand that further tests and treatments may be required if the condition does not improve.

Why didn't your animal/s receive antibiotics today?

- [ ] Your vet has assessed your animal/s and decided antibiotics are not necessary right now.
- [ ] Many conditions, like viral infections, will get better without antibiotics.
- [ ] Further tests may be required to decide which antibiotic to use, if any.

It is important that you:

- Give any medications as prescribed and follow your vet's advice.
- Monitor your animal/s closely and contact your vet if they do not improve.

Why animals should only receive antibiotics when absolutely necessary:

- Antibiotic use can cause 'resistance', where the bacteria adapt so the antibiotic no longer works.
- Antibiotic resistant infections will increase if antibiotics are used unnecessarily in animals.
- You can catch antibiotic resistant bacteria from your animal/s, meaning antibiotics may not work next time you get sick.
- Some antibiotics can cause negative side effects or allergic reactions.

Play your part in preventing antibiotic resistant infections.
For more information visit **agriculture.vic.gov.au/amr**

NOT ALL BUGS NEED DRUGS

AGRICULTURE VICTORIA

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