Queensland Government Business Queensland

Managing tick fever in cattle

Tick fever or 'red water' is a disease of cattle caused by blood parasites that are transmitted by the cattle tick (*Rhipicephalus microplus*). The cost of a tick fever outbreak can be substantial.

Tick fever kills cattle. In Queensland, on average, about 5% of at-risk animals die during an outbreak. Pregnant animals may abort.

Sick cattle lose condition, which is especially important if cattle are ready for market. High fever may reduce bull fertility for up to one breeding season and treatment costs and vet bills can be expensive. Additional musters may be necessary.

Live cattle export markets might be lost for 6 to 12 months after a tick fever outbreak. This can be far more costly than the outbreak.

Milk production may decrease substantially, and some cows may 'dry up' for their whole lactation cycle.

By understanding the disease itself and the various disease-control strategies, you can implement management practices to minimise the risk in your situation.

This guide provides information about managing and controlling tick fever.

Tick fever in Australia

Tick fever is a cattle disease caused by any one of the following blood parasites:

- *Babesia bovis*
- *Babesia bigemina*
- *Anaplasma marginale.*

These parasites are all transmitted by the cattle tick (*Rhipicephalus microplus*). Disease caused by *Babesia bovis* or *Babesia bigemina* is called babesiosis, often referred to as 'red water'. Disease caused by *Anaplasma marginale* is called anaplasmosis.

Babesia bovis is the most important parasite, causing more than 80% of outbreaks of tick fever in Queensland each year.

Clinical signs of tick fever

Signs of tick fever include:

- weakness
- depression
- loss of appetite.

These signs are mainly due to the associated fever and red blood cell destruction (causing anaemia).

Despite the common name 'red water', red urine is only occasionally present and late in the course of the disease. Other clinical signs may include jaundice and neurological signs.

Cattle with *Babesia bovis* infections may be quite sick even in the absence of anaemia and red urine.

Diagnosing tick fever

It is difficult to diagnose tick fever based on clinical signs alone.

The best way to diagnose tick fever is to send blood smears to a laboratory [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/manage/services] for examination.

Risk factors for tick fever

Breed

British, European and other *Bos taurus* cattle breeds are more susceptible to tick fever caused by *Babesia* organisms than Brahman and *Bos indicus* breeds. Cross breeds (*Bos taurus* x *Bos indicus*) have intermediate susceptibility determined by the percentage of each breed type.

All breeds, including *Bos indicus* breeds, are highly susceptible to disease caused by *Anaplasma marginale.*

Age

There is a strong link between age and resistance. Most outbreaks occur in animals 18 to 36 months of age. Calves exposed to tick fever organisms between 3 to 9 months of age rarely show clinical signs and develop a solid, long-lasting immunity.

Exposure

Cattle born and raised in areas where cattle ticks are endemic can develop natural immunity through exposure to ticks infected with tick fever.

However, exposure of calves to ticks infected with tick fever (and subsequent development of protective immunity) can be highly unpredictable. Exposure is influenced by factors such as breed, season and tick-control strategies.

All cattle raised in areas free from cattle ticks are at risk of tick fever if introduced into areas where ticks are present.

Also consider...

- Learn more about vaccinating cattle for tick fever [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/vaccine].

Controlling tick fever outbreaks in cattle

Tick fever outbreaks can be costly, and you will need to act quickly to control the disease. If you suspect tick fever, contact your veterinarian for expert assistance. The following tips will help minimise losses.

Steps to control tick fever outbreaks

1. Confirm diagnosis

A fast and accurate diagnosis is vital for treating animals and managing the outbreak. Consult your local veterinarian, a government field veterinarian or staff at Biosecurity Queensland's Tick Fever Centre [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/manage/services].

In most cases, a diagnosis can be made by examination of blood smears under the microscope. Wherever possible, these samples should be taken prior to treatment or, in the case of dead animals, as soon as possible after death. The samples should be sent to a diagnostic laboratory [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/manage/services] for examination.

2. Treat sick cattle

Treat sick cattle with a suitable drug as soon as possible and identify those that have been treated. If treatment is delayed, sick animals may not recover.

If the organism responsible for the outbreak has been determined, use the following treatments:

Cause	Drug	Dose rate	Route of inoculation
Babesia	Imidocarb (Imidox®)	1mL/100kg	Under the skin
Anaplasma	Imidocarb (Imidox®)	2.5mL/100kg	Under the skin
Anaplasma	Oxytetracycline	As per your veterinarian's recommendations	As per your veterinarian's recommendations

If you are unsure which tick fever parasite is causing the problem, contact your local veterinarian for a diagnosis and advice on the most appropriate treatment. In general, when the specific cause is unknown, imidocarb (Imidox®) at the high dose rate of 2.5mL/100kg is often used as it covers both Babesia and Anaplasma infections. Alternatively, your veterinarian may recommend using imidocarb at 1mL/100kg in combination with oxytetracycline.

The imidocarb withholding period for meat is 28 days.

Note: imidocarb is not registered for use in lactating dairy cattle. However, an Australian Pesticides and Veterinary Medicines Authority 'minor use' permit does allow its use in Queensland and New South Wales. There is a 14-day milk withholding period when lactating dairy cows are treated once at a dose rate of 1mL/100kg.

Oxytetracycline is marketed under a number of trade names with differing withholding periods. Restrictions apply to the supply of oxytetracylines—consult your veterinarian. Your veterinarian can also advise you regarding supportive treatment for very sick animals.

Observe the manufacturer's instructions when using any drug treatments. Reduce tissue damage when using large volumes of these drugs by injecting them in multiple sites.

3. Remove ticks

Use a tickicide (acaricide) to remove ticks from all animals. This helps prevent a secondary outbreak caused by future generations of ticks. Contact your local biosecurity officer [https://www.dpi.qld.gov.au/contact] for advice on suitable tickicides and the best tick control strategies in your area.

If possible, transfer the mob to a new paddock where you can closely monitor them.

4. Assess the severity

Assess the severity of the outbreak and risk of further cases. In consultation with your veterinarian or Tick Fever Centre [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/manage/services] staff, decide whether to treat the entire mob (refer to step 2 above on how to treat sick cattle), or monitor cattle closely and treat individuals as clinical signs develop.

New cases can occur for up to 3 weeks after the initial cases.

5. Vaccinate all 'at-risk' animals

Vaccinate all 'at-risk' animals in the affected mob with tick fever vaccine, except those treated with imidocarb or showing clinical signs of tick fever.

There are 2 options:

Option 1

Wait 1 to 2 weeks for the outbreak to abate. Treat any sick animals during this time, then vaccinate all animals that have not been treated, and monitor for incubating cases and possible reactions to the vaccine. Do not vaccinate animals treated with imidocarb for at least 8 weeks after treatment, as the treatment may interfere with the development of immunity. Apply tick treatments to reduce tick burdens on the cattle.

Option 2

Vaccinate as soon as possible, and then monitor for both natural cases of tick fever and possible reactions to the vaccine. Overall, you will spend less time monitoring the mob as field cases of tick fever will usually show up before or during vaccine reaction periods. You will need to revaccinate any animals that require treatment with imidocarb (see option 1).

It takes about 3 to 4 weeks for immunity to develop to the two *Babesia* parasites, and up to 2 months to develop to *Anaplasma marginale*.

6. Monitor cattle in adjoining paddocks

Monitor cattle in adjoining paddocks, collect samples from any suspect cases and treat if necessary.

7. Protect the rest of the herd

Protect the rest of the herd by developing a dipping and vaccination strategy, starting with groups that are most at risk.

8. Start a long-term risk management strategy

This should include annual vaccination of all calves 3 to 9 months of age, and vaccination of all introduced cattle, plus appropriate tick control strategies.

Also consider...

- Learn more about vaccinating cattle for tick fever [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/vaccine].

Risk management strategies for tick fever

You can use this page to assess the advantages and disadvantages of a range of strategies to minimise the risk of a tick fever outbreak.

Vaccination against tick fever

Advantages

- It provides protection against all 3 parasites and takes the guesswork out of tick fever control.
- You can vaccinate cattle of any age, provided you take precautions, though it is best to vaccinate calves.
- One vaccination is usually enough to protect cattle for life. In some circumstances a second vaccination may be warranted, especially if introducing cattle into the tick-infested areas from tick-free country.
- It markedly reduces the risk of losing your disease-free status for live cattle exports.
- It provides essential protection if you are in a tick eradication project.

Disadvantages

- Chilled tick fever vaccine has a short shelf life of 4 days.
- Immunity takes 3 to 4 weeks to develop for both *Babesia* parasites, and longer for *Anaplasma*.
- Although the risk is low, some adult animals can experience adverse vaccine reactions.

Resistant breeds of cattle

Advantages

- *Bos indicus* breeds and *Bos indicus* cross cattle are more resistant to both cattle ticks and tick fever caused by *Babesia bovis* and *Babesia bigemina*.

- Using *Bos indicus* breeds will reduce losses due to tick fever. However, resistance to *Babesia bovis*, the major cause of tick fever, reduces as the percentage of *Bos indicus* genotype in the herd is reduced.

Disadvantages

- Despite their resistance to both *Babesia* organisms, *Bos indicus* breeds are still highly susceptible to anaplasmosis and historically nearly 20% of confirmed tick fever cases have involved these breeds.

Treatment with imidocarb (Imidox®)

Advantages

- Imidocarb is the only registered treatment for tick fever cases. It is particularly effective against *Babesia* infections.
- You can use imidocarb for short-term prevention of tick fever in cattle moving through tick-infested areas. A single injection of imidocarb at a high dose rate will provide protection from both types of *Babesia* parasites for about 4 weeks.

Disadvantages

- Imidocarb used at a high dose rate will provide protection from *Babesia* parasites for only about 4 weeks. Longer protection will require further treatments.
- Imidocarb has no protective effect against *Anaplasma marginale*.
- Treating animals with imidocarb can interfere with the development of immunity to tick fever.
- Restrictions apply to the use of imidocarb in lactating dairy cattle.
- Imidocarb is costly, especially if using as a preventative for multiple animals or multiple times.

Keeping animals tick-free

Advantages

- Regional tick eradication campaigns have worked well in areas not heavily infested with cattle ticks.

Disadvantages

- It is very difficult and costly to maintain tick-free cattle on an individual property in the cattle tick-infested areas.
- This approach means no natural immunity to tick fever develops, so if there is a breakdown in the tick-free status of the herd, large losses can occur.

Taking the risk and accepting the losses

Advantages

- This is the easiest option.

Disadvantages

- This option carries the greatest risk and is potentially the most expensive.
- Relies on consistent tick populations being either so low that exposure and disease do not occur, or so high such that all calves become naturally immune to all 3 tick fever organisms before calfhood resistance wanes. However, tick populations can be quite variable.
- Field research in Queensland shows that many cattle herds do not have enough cattle-tick exposure to ensure the development of natural tick fever immunity [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/manage/immunity] in calves.

Also consider...

- Learn more about vaccinating cattle for tick fever [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/vaccine].

Natural tick fever immunity

Cattle can develop natural lifelong immunity to tick fever if they are exposed to enough infected ticks early in life. The age of cattle when first exposed to tick fever determines whether disease is likely to occur.

Exposing calves to enough ticks so they are infected with all 3 tick fever organisms before 9 to 10 months of age is the key to developing natural immunity to tick fever. Field research in Queensland shows that many cattle herds do not have sufficient exposure to achieve this.

Calf immunity from birth

Cows with tick fever immunity can pass temporary protection (maternal antibody) to their calves through the colostrum. This colostral protection lasts approximately 3 months.

If cows have no immunity to tick fever, their calves will also be susceptible during their first few months of life, but disease in young calves is not common in the field.

Age-related resistance

Most calves develop an age-related resistance that protects them from about 3 months until about 9 months of age. This is irrespective of breed and whether dams are immune.

Calves exposed to tick fever when the age-related resistance is present rarely show clinical signs and develop a solid, long-lasting immunity.

If immunity develops in all your calves, tick fever will not be a problem, but they must be exposed to all 3 parasites. This requires exposure to thousands of ticks because not all ticks carry the infection.

The age-related resistance gradually wanes from 9 months of age. If they haven't been exposed to and developed immunity to tick fever, they will become highly susceptible to tick fever. If then exposed to infected ticks later in life, these cattle are likely to develop a severe, life-threatening infection.

Likelihood of developing immunity

An engorged female tick can produce more than 3,000 seed (larval) ticks, but only a very small number of seed ticks (less than 1 in 1,000) will carry the tick fever organisms. For this reason, calves do not always become infected (then protected) following exposure to ticks, even though it only takes 1 infected tick to transmit tick fever.

If you rely on natural tick exposure for long-term protection of your calves, thousands of ticks will need to bite the animals. Low tick numbers, as a result of dry seasons or tick control strategies, can delay transmission of tick fever parasites for months or even years.

More calves develop immunity to *Babesia bigemina* because a higher proportion of ticks carry this parasite than carry *Babesia bovis*. This high rate of natural infection and resulting immunity, plus the fact that *Babesia bigemina* is less virulent than *Babesia bovis*, is the reason *Babesia bigemina* causes relatively few outbreaks in Australia.

By contrast, *Babesia bovis* is transmitted more sporadically, and so weaned calves can still be susceptible as the age-related resistance wears off. *Babesia bovis* is a highly virulent parasite and the most common cause of disease outbreaks.

Calf exposure to *Anaplasma marginale* is difficult to predict. Transmission depends mainly on male ticks feeding on infected cattle and then transferring to susceptible cattle within the same life cycle.

Also consider...

- Learn more about vaccinating cattle for tick fever [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/vaccine].

Tick fever diagnosis advice and laboratory services

It is difficult to diagnose tick fever by clinical signs alone, as tick fever can produce clinical signs similar to many other diseases.

You should seek professional advice and support with diagnosis.

Samples to collect

Blood and organ smears

Microscopic examination of blood and organ smears from sick or dead animals is the most commonly used procedure to confirm tick fever. These smears are best included as part of a general sample submission after examination by a veterinarian. Clinical examination and

submission of a broad range of appropriate samples give the best chance of making an accurate and useful diagnosis.

You can, however, prepare your own smears from affected animals and send them to our Biosecurity Sciences Laboratory for a quick diagnosis of tick fever see 'Submit samples to the Biosecurity Sciences Laboratory' below).

Blood smears are easy to make, and we can provide a smear-making kit free of charge for this purpose.

Organ smears are also a valuable aid to diagnosis and can be made from animals that have been dead for up to 24 hours.

Learn more about taking blood and organ smears [https://www.publications.qld.gov.au/dataset/making-smears-for-tick-fever-diagnosis/resource/672a342c-5d9b-4fda-a9c1-f563dc46f605].

Blood and serum samples

Occasionally, it is helpful to provide other blood samples in addition to smears if you are investigating disease in vaccinated animals. Contact the Tick Fever Centre to discuss whether additional samples are required and which samples to collect (see 'Diagnostic services and advice' below).

In general, if you are investigating:

- **potential vaccine breakdown (disease in animals previously vaccinated)** – a serum sample is useful to assess vaccination status. It may also be worth collecting sera from a number of cattle vaccinated at the same time as the sick animals to assess vaccine 'take' across the group. Heparin or EDTA blood samples may also be useful to isolate a virulent strain if there is evidence of a number of vaccinated animals becoming sick
- **potential vaccine reaction (disease in animals vaccinated within the last month)** – an EDTA blood sample may be useful to distinguish vaccine organisms from naturally transmitted field organisms.

Diagnostic services and advice

Biosecurity Queensland provides routine diagnostic testing free of charge, but health and export tests attract a fee. Prices are available on application.

Contact the Tick Fever Centre for advice

You can contact the Tick Fever Centre for advice about:

- diagnosis of tick fever
- what samples to collect in your situation.

Tick Fever Centre
Phone: (07) 3270 9600 [tel:0732709600]
Email: tfc@dpi.qld.gov.au [mailto:tfc@dpi.qld.gov.au]

Submit samples to the Biosecurity Sciences Laboratory

You should submit samples to the Biosecurity Sciences Laboratory, unless you are advised otherwise.

Address samples to:

Specimen Receipt
Biosecurity Sciences Laboratory
(Loading Dock 12) Health and Food Science Precinct
39 Kessels Rd
COOPERS PLAINS QLD 4108

You can contact the Biosecurity Sciences Laboratory for assistance when submitting your samples.

Biosecurity Sciences Laboratory
Phone: (07) 3708 8762 [tel:0737088762]
Email: bslclo@dpi.qld.gov.au [mailto:bslclo@dpi.qld.gov.au]

Also consider...

- Learn more about the diagnosis of tick fever disease: Australian and New Zealand Standard Diagnostic Procedure (PDF, 263.5KB) [https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/animal/ahl/ANZSDP-Tick_borne_diseases.pdf].
- Learn more about vaccinating cattle for tick fever [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/vaccine].

Controlling tick fever in tick eradication areas

Take care to prevent tick fever outbreaks when you embark on a cattle tick eradication program or if your property is in an area where tick numbers are normally very low.

In these situations, very few cattle are likely to have natural immunity to tick fever. If tick control fails or ticks are reintroduced, tick fever could cause significant mortality and production loss.

The following tick fever control recommendations have been developed for cattle producers participating in a tick eradication program.

Recommendations for tick fever control

- Vaccinate all heifer replacements and weaners with tick fever vaccine.
- Vaccinate at or before 9 to 10 months of age - at weaning is often a convenient time.
- Vaccinate for at least 3 years, and then reassess the need for vaccination when you can evaluate the success and scale of the eradication effort.
- Depending on the risk, consider vaccinating existing adult stock and introductions.
- Submit samples of any suspected cases of tick fever to our Biosecurity Sciences Laboratory [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/manage/services].

Reasons to vaccinate while conducting tick eradication

Vaccination is a safety net against an outbreak of tick fever if tick eradication fails or ticks are reintroduced.

At 3 to 9 months of age, calves are naturally resistant to tick fever. Parasites carried by ticks can infect calves of this age with minimal clinical effects, and long-term immunity will result.

Tick eradication will stop calf exposure to tick fever parasites and the number of susceptible cattle will increase. If a tick control program fails or ticks are reintroduced, the losses in unvaccinated cattle are likely to be substantial.

Even in non-eradication areas, the level of natural exposure from ticks for all 3 tick fever parasites is often insufficient to ensure naturally acquired resistance by 9 months of age.

Risks of not vaccinating

If you don't vaccinate, the number of susceptible animals in your herd will increase, as more calves born after the start of tick eradication join the herd.

If eradication is successful, the risk of losses from tick fever will not increase, but if eradication fails or ticks are reintroduced, there is potential for large losses.

Vaccination costs only a few dollars per head. While you may never need the protection, it offers good insurance.

Also consider...

- Learn more about vaccinating cattle for tick fever [https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/diseases/cattle-tick-fever/vaccine].

Contact: General enquiries 13 QGOV (13 74 68)