

Redwater

Rebecca Carroll, programme manager, Beef HealthCheck Programme, Animal Health Ireland, and member of the Animal Health Ireland Parasite Control Technical Working Group, discusses the tick-borne disease, Bovine babesiosis, more commonly known as redwater



Bovine babesiosis (BB) is a tick-borne disease caused, in Ireland, by the protozoan parasite *Babesia divergens*. Infection with the intraerythrocytic parasite causes red-blood cell destruction, which can lead to haemoglobinuria. This frothy red-brown urine gives the disease its commonly used name: redwater.

LIFECYCLE

The parasite is transmitted to cattle by *Ixodes ricinus*, the most common tick seen on Irish livestock. The tick has a three-year lifecycle with four stages – egg, larva, nymph and adult. When any of the blood-feeding stages bites a bovine animal, they are capable of transmitting the redwater parasite. Ticks chiefly appear to acquire infection as adult females by feeding on an infected host. Transovarial transmission can occur and once established in the tick host, *B. divergens* can apparently persist through the nymph and larval stages even if the intervening tick stages feed on uninfected blood (Bonnet et al, 2007). Infection can also pass from generation to generation of ticks using other hosts such as deer, sheep or other wild mammals or birds as hosts. Therefore, infected ticks can survive and persist even if there are no cattle in an area. Apart from the three to nine days (depending on the stage) each year that the ticks spend attached to an animal, they tend to live in the moist, sheltered microclimate at the base of the pasture sward. Densely vegetated or under-grazed rough pasture provides an ideal tick habitat, and the risk of redwater is greatest in these areas. Well-managed and closely-grazed swards will hold much smaller numbers of ticks, and animals grazing in these areas are at a lower risk from redwater but can still become infected, particularly from field margins in recently improved pastures.

When the tick leaves the shelter of the vegetation to seek out a host on which to feed, it is very vulnerable

to adverse environmental conditions – particularly desiccation. Therefore, the ticks tend to avoid questing for hosts during hot, dry periods. In continental Europe, tick activity generally follows a bimodal pattern with peaks in spring/early summer and autumn. One peak occurs in Ireland in the early summer (Zintl et al, 2014) but the mild, wet climate means that tick activity can continue throughout the summer and into the autumn, and BB cases can be seen throughout the year, depending on weather conditions (Gray, 1980).

ENDEMIC STABILITY

One of the unusual features of redwater is that calves exhibit some natural resistance compared to adult cattle. Cattle under six to nine months of age are as susceptible to infections with the parasite as adult cattle but tend not to develop clinical symptoms. The phenomenon is known as inverse-age resistance and explains why many closed herds in the most heavily-infested areas of the country rarely get clinical cases of redwater. However, if older animals are introduced from a non-endemic area into the endemic area, they will be highly susceptible to infection and serious illness.

PRESENTATION OF DISEASE

Subclinical infections can occur and, as such, are missed by the farmer and veterinary practitioner. These animals have low levels of parasitaemia, may experience a mild fever and a period of anorexia but tend to make an uneventful recovery (Zintl et al, 2003). Clinical signs in more severe cases can include increased body temperature, respiratory rate, heart rate and skin tent time, together with anorexia, depression and pipestem diarrhoea. Mucous membranes may be pale but a study of BB cases in Ireland found mucous membrane colour to be an unreliable indicator of packed cell volume (Sherlock et al, 2000). Red urine is frequently the first clinical sign detected by the farmer but, at this point, the animal is in the midst of a haemolytic crisis. Later, and often terminal signs include: weakness, sub-normal temperature, constipation, loud-heart sounds and normal urine colour. Generally, clinical disease occurs in cattle aged more than six months but, rarely, clinical signs can be seen in animals as young as four months of age (Donal Toolan, personal communication, July 2017). The incubation period can be up to three weeks. Careful and frequent observation is the best way to detect cases in the early stages of disease. In particular, regular checking of recently-introduced cattle at pasture is essential in order to detect cases as soon as possible. Subtle changes to normal cattle behaviours such as eating, chewing the cud

and cattle lying away from the herd are often the first sign that something is wrong.

TREATMENT AND MANAGEMENT OF AFFECTED ANIMALS

The only babesicide on the market in Ireland today is a prescription-only medicine containing imidocarb dipropionate. This is an effective therapeutic agent and can also act as a prophylactic. It is important to note that the withdrawal periods for this drug are protracted (213 days and 21 days for meat and milk respectively). Blood transfusions and other supportive treatment can also be administered to severely affected animals. Even with prompt treatment, this is a serious disease with a significant mortality rate.

Animals without previous exposure to the redwater parasite, cows (particularly in advanced pregnancy) and poorly nourished animals tend to be more severely affected. Even when animals survive, pregnant heifers/cows may abort. It can be life-threatening to agitate or move an animal in the advanced stage of the disease, as it may die of heart failure if stressed. Severely anaemic animals may behave unpredictably or become dangerously aggressive because of the effect on brain function of lowered blood oxygen.

PREVENTION AND CONTROL

Redwater can be avoided by preventing animals from being bitten by ticks, by, for example, not grazing cattle on land prone to tick infestation. Grassland-improvement practices, including reclamation and reseeded will help reduce the tick-habitat areas where cattle can be exposed to ticks and therefore, *B. divergens*. However, ticks can persist in the margins of reclaimed fields and sporadic cases may still occur.

If cattle must graze areas infested with ticks, options to reduce the incidence of redwater include:

- Using home-bred stock that have been exposed to these areas as young calves in their first six months of life;
- Ensuring any bought-in animals are younger than six months of age, and exposed to tick areas before their resistance to the redwater parasite wears off;
- Buying in animals which are known to have grazed tick-infested areas as calves.

These methods rely on cattle being exposed to the redwater parasite as young animals and developing immunity. Cattle will not develop immunity if they have not been bitten by an infected tick before six months of age and there is no practical way to determine if cattle are protected against redwater.

Topical treatments with products containing the active ingredients flumethrin or amitraz will control ticks and prevent cattle from being infected with the redwater parasite. When the effect of these products wears off, the animal's susceptibility to ticks and infection with *B. divergens* is the same as that of untreated animals. Product directions should be followed closely to ensure cattle are

protected for high-risk periods.

Imidocarb dipropionate used prophylactically at twice the treatment dose will limit the multiplication of the redwater parasite for approximately four weeks. Cattle should be allowed to become infected while protected by the drug, so that they can develop a natural immunity. This is achieved by commencing treatment when one or two animals in the group show clinical signs or when animals suspected of having no immunity are put on known tick-infested land during periods of high-tick activity. It is important to note that imidocarb dipropionate used prophylactically is not a vaccine; it will only help if infected ticks are active in the four weeks after it is administered. The protracted withdrawal periods described previously, limits the usefulness of this drug as a prophylactic, particularly in dairy cows.

INCIDENCE

Questionnaire surveys indicate the incidence of BB has declined dramatically from an estimated 1.7% in the 1980s to 0.06% in 2013, although it must be stressed that most of the survey participants did not farm in the areas that were most severely affected historically (Zintl et al., 2014). Suggested reasons for this decline include improvements and clearing of pastures which remove tick habitats. Although there is no scientific evidence to support it, there is also a widely-held belief among farmers and veterinary practitioners that the widespread use of macrocyclic lactones has also led to a decrease in tick burdens on pastures (Zintl et al, 2017). This decreased incidence means that awareness of the disease among farmers and veterinary practitioners is reducing and immunity of cattle in endemic areas is likely to be waning. The downward trend is to be welcomed but any reversal could be devastating.

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