



Theileria parva infections

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Adapted from:

1. Lawrence, J.A., Perry, B.D. & Williamson, S.M., 2005. East Coast fever, in: *Infectious diseases of livestock*, edited by Coetzer, JAW & Tustin, RC. Cape Town: Oxford University Press Southern Africa.
2. Lawrence, J.A., Perry, B.D. & Williamson, S.M. 2005. Corridor disease, in: *Infectious diseases of livestock*, edited by Coetzer, JAW & Tustin, RC. Cape Town: Oxford University Press Southern Africa.

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Introduction

Theileria species are protozoan parasites infecting wild and domestic animals in most tropical and subtropical regions of the world. Theileriosis is a general term used for infections in cattle with one or more of a number of *Theileria* species. Some of these may cause only mild or subclinical disease in cattle (so-called benign theileriosis), whilst others are extremely pathogenic, resulting in high mortality and severe economic losses. By far the most important and pathogenic *Theileria* species affecting cattle in Africa south of the Sahara is *Theileria parva*, which is responsible for the disease syndromes often referred to as East Coast fever, Corridor disease or Zimbabwe theileriosis.

Salient features of *Theileria parva* infections

Theileria parva infection is considered by many to be the most important tick-borne disease of cattle in eastern, central and southern Africa and is transmitted mainly by the brown ear ticks *Rhipicephalus appendiculatus* and *Rhipicephalus zambeziensis*.



Rhipicephalus appendiculatus male

After an incubation period of about two weeks the clinical disease is typically characterised by a high fever, enlargement of the superficial lymph nodes, severe lung oedema (often manifesting as difficulty to breathe) and wasting, usually ending fatally. A small number of animals may recover, but recovery is prolonged and the animals may remain in poor condition and unproductive for months.



Terminal stage of East Coast fever: severe dyspnoea and recumbency



The most prominent feature seen in a carcass of an animal that died of East Coast fever or Corridor disease is often the severe accumulation of fluid in the lungs, frequently also accompanied by large amounts of froth in the trachea and bronchi. The lymph nodes are usually enlarged and sometimes severely congested. The spleen may also be enlarged and the kidneys often have whitish nodules of varying sizes on their surface. Ulcers or superficial erosions may be found in the abomasum or in the intestinal mucosa. Although not always very obvious, anaemia may also be present.

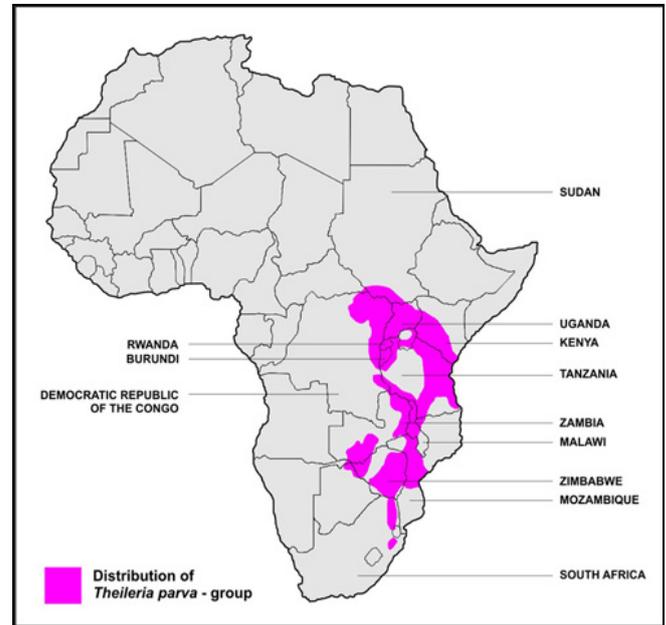


Severe pulmonary oedema and mild hydrothorax. Also note the petechiae on the serosal surfaces

Where does *Theileria parva* infections occur?

Theileria parva depends on its main tick vectors *R. appendiculatus* and *R. zambeziensis* for transmission from host to host. The potential distribution of East Coast fever is thus restricted to those areas of eastern, central and southern Africa where cattle and/or African buffalo and the vector ticks co-exist. In eastern and central Africa, this includes much of Kenya, Uganda, Rwanda, Burundi, the eastern part of the Democratic Republic of Congo, areas of southern Sudan bordering Uganda and much of Tanzania. In southern Africa its range is more limited, and it is confined to the northern and central regions of Malawi, the northern, eastern and central regions of Zambia, and the Tete Province of Mozambique, all lying to the north of the Zambezi River. Zimbabwe theileriosis occurs sporadically on the highveld of Zimbabwe. Buffalo-derived *T. parva* can be considered to be a group of *T. parva* strains which are

adapted to tick transmission within the African buffalo population, including the red dwarf buffalo (*Syncerus caffer nanus*) of Angola. It is universally distributed in wild buffalo throughout eastern, central and southern Africa, except in some game reserves in South Africa where 'Corridor disease-free' buffalo herds have been established.



Distribution of the *Theileria parva*-group parasites in Africa

What triggers an outbreak of theileriosis?

Theileria parva is probably originally a parasite of African buffalo (*Syncerus caffer*) that has become adapted to cattle. The classical disease is seen in cattle of European origin which have been exposed to infected ticks. Cattle of African origin have a highly variable response to infection and the disease may be insignificant or subclinical in Zebu calves born from immune dams and raised in endemically infected areas.

Within the infected areas, the incidence of the disease can vary widely depending on numerous factors, including the abundance of the vector and the susceptibility of the host. This situation and is now commonly referred to as endemic stability. However, endemic stability to *T. parva* infection appears to be relatively limited in its distribution and may not be achieved easily. The more common situation seen in



the region is that of endemic instability, in which varying degrees of clinical disease are experienced.

Epidemic East Coast fever occurs when the disease is introduced to areas previously free of the disease, and often occurs at the margins of *R. appendiculatus* distribution. Corridor disease occurs where cattle and infected buffalo share grazing or occur in close proximity to one another in the presence of vector ticks.

Prevention and control

Bovine theileriosis is generally controlled by the use of acaricides to kill ticks, but this method is not sustainable. More sustainable and reliable methods for the control of theileriosis that deploy a combination of strategic tick control and vaccination are desirable; however, these have yet to be successfully applied on a large scale in endemic areas.

In countries such as South Africa, where cattle-associated *Theileria parva* (or classical East Coast fever) has been eradicated, control of buffalo-associated *Theileria parva* (or Corridor disease) depends mainly on maintaining infected buffalo in well-fenced game reserves to avoid any contact with cattle.

Buparvaquone has proved to be a valuable therapeutic agent for the treatment of clinical theileriosis. Treatment does not eliminate the parasite from the host, however, and recovered animals usually remain carriers. For this reason, the treatment of *Theileria parva* infections in some countries, like South Africa, has been prohibited.

Vaccination against *T. parva* is based on a method of infection and treatment in which cattle are given a subcutaneous dose of tick-derived sporozoites and a simultaneous treatment with a long-acting tetracycline formulation. This treatment results in a mild or inapparent reaction followed by recovery. Recovered animals demonstrate a robust immunity to homologous challenge, which usually lasts for the lifetime of an

animal. Immunisation of animals with a parasite stock(s) engendering a broad-spectrum immunity is desirable to cover a range of immunological *T. parva* strains that exist in the field. Immunised animals usually become carriers of the immunising parasite stock(s). A liquid nitrogen cold chain is essential in order to maintain parasite viability and, compared to other veterinary immunisations, more training and expertise are required for the vaccine to be delivered safely and effectively.

Find out more

In the CPD module on theileriosis some historical background to the recognition of the disease syndromes referred to as East Coast fever, Corridor disease and Zimbabwe theileriosis is provided, as well as details regarding their complex epidemiology and diagnosis in live and dead animals. This information is further supplemented with notes on the socio-economic importance of theileriosis in sub-Saharan Africa and the measures employed to control losses due to *T. parva* infections.

