Theileria parva infections

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INTRODUCTION

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.

Video link: http://www.youtube.com/watch?v=km9tKR_oJ3M
The terminal stage of East Coast fever is characterized by severe dyspnoea and recumbency.

The distribution of Theileria parva-group parasites in Africa is widespread in eastern, central, and southern Africa, with a focus in countries such as Kenya, Tanzania, and Mozambique.

*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*. Infections typically cause an acute, often fatal disease of cattle, characterized by fever, enlargement of the lymph nodes and dyspnoea.
Based on certain clinical and epidemiological parameters observed in some countries of southern Africa, three forms of the disease are usually recognised: East Coast fever, Corridor disease (or buffalo disease) and Zimbabwean theileriosis (or January disease), each respectively caused by one of the three sub-types of *T. parva*. Although these are unlikely to be true subspecies of *T. parva*, the trinomial nomenclature is often retained for convenience to differentiate, firstly, those parasites transmitted mainly between cattle, causing classical East Coast fever (ECF) and characterised by large numbers of schizonts and piroplasms (*T. parva parva* or cattle-derived *T. parva*);
secondly, strains from the African buffalo (Syncerus caffer) causing Corridor disease or Buffalo disease in cattle and characterised by the presence of small numbers of schizonts and very few or no piroplasms (T. parva lawrencei or buffalo-derived T. parva), and thirdly, parasites of intermediate character, maintained in cattle in the absence of buffalo and producing the generally less pathogenic Zimbabwean theileriosis or January disease (T. parva bovis infection). However, differentiation into three subspecies seems to be an over-simplification of the situation as it exists in nature, since there appears rather to be a gradual range of parasites between the two extremes and infections of genetically diverse populations of parasites may occur concurrently in the same host.

East Coast fever occurs widely through the range of its main vector in eastern, central and southern Africa north of the Zambezi River. It was introduced into the region south of the Zambezi River in 1901/02 and spread through most of the range of its vector but was subsequently eradicated.

The disease was first described in 1902, following its introduction into Zimbabwe, as an unusually virulent form of babesiosis. It was initially named Rhodesian redwater, but later referred to as African Coast fever, the name being subsequently modified to East Coast fever. Although it has been proposed that the organism be named Theileria parva parva to distinguish it from other subspecies of T. parva which cause diseases that can be differentiated from East Coast fever on epidemiological grounds, it has since been agreed that classical East Coast fever be known as cattle-derived theileriosis and that it is caused by the same parasite as that causing Corridor disease and January disease.

East Coast fever has long been endemic in eastern Africa. The parasite probably originated from buffalo populations in eastern Africa and became adapted to cattle following their introduction and dissemination
in the region. It spread widely through the region during the early part of the 19th Century as a result of European settlement, which involved changes in patterns of movement, extensive use of ox-drawn transport, and importation of susceptible cattle from overseas.

East Coast fever was introduced into the area south of the Zambezi River in the period 1901 to 1903 by cattle which were imported from Kenya and Tanzania for the purpose of restocking the region after the ravages of the rinderpest epidemic of 1896 and the Anglo-Boer War. The disease was subsequently eradicated in a prolonged campaign consisting of movement control, tick control, destocking of infected pastures, and slaughter. The disease has persisted in the region north of the Zambezi River to the present day and is a major constraint on the development of cattle production.

Corridor disease closely resembles East Coast fever and is caused by infection with buffalo-derived *Theileria parva* strains transmitted by ticks from African buffaloes. The disease was first recognized in 1934 in Zimbabwe as a form of pathogenic theilerial infection distinguishable from East Coast fever on clinical, pathological, parasitological and epidemiological grounds. Previous occurrences in the region may well have been obscured by the widespread prevalence of East Coast fever. Twenty years later the disease was recognized in South Africa and the causal organism was then identified as a new species, *Theileria lawrencei*, in 1955. It was later proposed as a subspecies of *T. parva*, namely, *T. parva lawrencei*. Subsequent investigation has revealed that the parasite is *T. parva* and is the same as that causing East Coast fever and Zimbabwe theileriosis, although the distinction between these diseases has been retained and remains useful for descriptive purposes.

The disease was named buffalo disease, for obvious reasons, and Corridor disease, because the first outbreak in South Africa occurred in the corridor between the Hluhluwe and Umfolozi Game Reserves in KwaZulu-Natal. It occurs sporadically throughout East, Central and southern Africa wherever there is contact between cattle and infected African buffaloes in the presence of the ticks, *Rhipicephalus appendiculatus*, *R. zambeziensis* and *R. duttoni*. After foot-and-mouth disease, it is the most important disease transmitted from the African buffalo to cattle and is a major constraint to the acceptance of the presence of buffaloes in cattle-raising areas for purposes of conservation or recreation.

Zimbabwe theileriosis similarly is an acute, frequently fatal disease of cattle caused by *T. parva* infection. The disease was first recognized and distinguished from classical ECF in Zimbabwe in 1936. It has been variously known as January disease, because of its seasonal occurrence, and Fortuna disease, after the farm on which it was first recognized. It is known officially in Zimbabwe as "theileriosis". The disease was described by Neitz under the name Rhodesian malignant bovine gonderiosis, and attributed to a new species, *Theileria (Gonderia) bovis*, but the parasite was declared in a footnote to that paper to be synonymous with *T. lawrencei*, the causal organism of Corridor disease. The name *T. parva bovis* was subsequently proposed for the parasite to differentiate the disease which it causes from Corridor disease. The disease resembles ECF, but the seasonal occurrence of theileriosis in Zimbabwe, and the fact that infections can be milder than in ECF, justifies the continued use of the terms January disease and Zimbabwe theileriosis. There is currently no sound scientific reason for retaining the subspecies classification, as the parasite causing the disease is indistinguishable from cattle-derived *T. parva* from
elsewhere in East and southern Africa. It is worth noting that *T. parva* isolates have been made in East Africa which show either the lower virulence or parasitological features associated with some *T. parva* strains causing January disease. The disease causes a significant number of deaths each year in Zimbabwe, necessitating the implementation of intensive dipping regulations to control its vector.