

Bovine Tropical Theileriosis

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Introduction

Bovine tropical theileriosis in cattle caused by a haemoprotozoan parasite, *Theileria annulata*. It is mainly lymph node-proliferative and erythrolytic disease characterized by swollen lymph node, splenomegaly, high fever, anaemia, weakness, conjunctivitis, loss of body weight, low milk production yield and poor productivity. The stages of the parasite (piroplasms) found in red blood cells are usually round or annular form (0.5-1.5 µm). microschizonts (Koch's blue bodies) and later microschizonts are mainly present in the lymphoid tissue, especially lymphnode and spleen. Schizonts are first detected in smears made from superficial lymphnodes 1-4 weeks after infection and the piroplasmic stages appear in the erythrocyte 1-3 days after the first appearance of schizonts. The piroplasms may be present in very large number in fatal cases. In chronic or subacute infections that can be seen in blood films are infective for ticks.

Which is important species of theileria?

Theileria parva: This parasite is primarily found in Africa and is responsible for East Coast fever, a severe and often fatal disease in cattle. It can cause high fever, swollen lymph nodes, and respiratory distress, leading to significant economic losses in affected regions. *T. annulata*: This parasite is more prevalent in tropical and subtropical regions, including Asia and the Middle East. It causes Tropical theileriosis, which is characterized by fever, anemia, and enlarged lymph nodes, and can also lead to significant mortality in cattle. *T. orientalis*: This species, sometimes referred to as the *T. orientalis/buffeli* complex, can cause *Theileria*-associated bovine anemia (TABA) or Oriental theileriosis. *T. lestoquardi*: This species,

also known as *T. hirci*, is a significant pathogen of small ruminants (sheep and goats) causing Malignant ovine theileriosis. *T. mutans*: Generally causes benign theileriosis in cattle. *T. taurotragi*: Generally causes asymptomatic or mild infections in cattle.

How the disease is transmitting to susceptible animals?



Bovine tropical theileriosis in dairy cattle in India is a non-contagious disease transmitted by three host ixodid ticks of the genus *Hyalomma*, mainly *H. anatolicum* (Fig. 1). The disease is transmitted by infected ticks possessing large number of uninucleate infected particles (sporozoites) in its salivary gland and during the time of attachment of ticks to the susceptible animals for engorgement, the infection will get transmitted. The sporozoites invade the local lymphnode of the host, enter into the lymphnode and develop into multinucleated macroschizonts. Such lymphocytes come into circulation, mricschizonts liberated,

containing merozoites which invade the erythrocytes (Fig.2). ticks may live for 1-2 years, but they lose their infection within 11 months. Mechanical transmission by biting flies does not seem to occur.

Susceptible animals:

Even though the disease is responsible for high mortality and morbidity in exotic and cross bred cattle, young indigenous cattle are suffered severely. Pregnant, lactating and stressed cows tends to be at greatest risk, due to reduction in immunity. Adult indigenous cattle remain as a silent carrier of infection without showing any external clinical signs, but can act as source of infection to the susceptible animals. In endemic areas, where there is a constant tick challenge, infection usually produces a mild disease, although 10-20% of calves can die whereas in areas where tick challenges is more sporadic, major outbreaks with very high mortalities in all ages of cattle may occur.

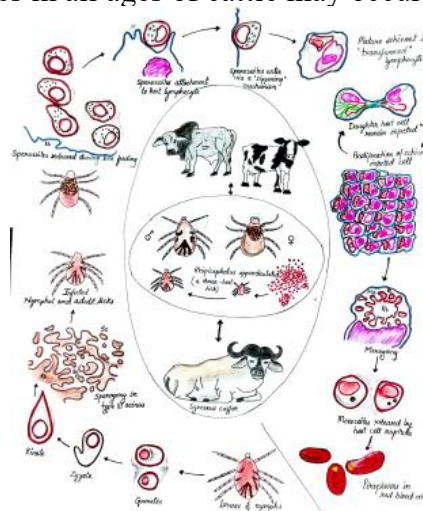


Fig.2 Life cycle of *Theileria annulata*

What are the key clinical signs of the disease?

The incubation period varies from 6-21 days and the course of the disease varies from 4-28 days. The symptoms and severity of the infection depend up to the virulence, pathogenicity of the parasite, strain variation, susceptibility and age of the host. The disease is mainly characterized by fever, lymphadenopathy (Fig.3), lymphocytic proliferation, severe anaemia, conjunctivitis and watery diarrhea. In peracute form of the disease, which occurs due to entry of highly susceptible animals to highly endemic area, there will be marked pyrexia with anorexia, depression and weakness and death with 3-5 days. On the other

hand, acute form of the disease occurs when susceptible animals enter into endemic area with marginal tick activity. It is characterized by pyrexia for several days, inappetance, lethargy, ruminal stasis, superficial lymphnode swelling, ocularo-nasal discharge with respiratory distress. After few days of infection animal showing anaemia, pale mucus membrane, rapid heart rate and then later stages infection shows haemoglobinuria, icterus, dark brown urine because of bilirubinaemia, marked drop in milk production, abortion in pregnant animals. The animals become rapidly emaciated and about 40-80 % die over a period of 8-18 days.

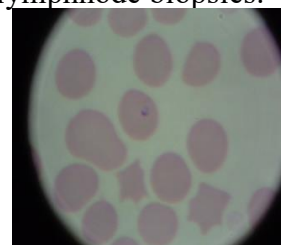


Fig.3 Showing enlargement of pre-scapular lymphnode in infected animals

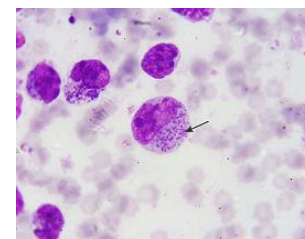
How to diagnose the disease in cattle?

Clinical signs: A tentative diagnosis of cute tropical theileriosis in endemic area can be made from the clinical signs of fever, anemia, icterus and enlargement of superficial lymph-nodes.

Blood smear examination: The tentative diagnosis can be confirmed by detection of the intra-erythrocytic piroplasms in Giemsa- stained blood smears, or detection of intra-lymphocytic schizonts or macro-schizonts (Koch's blue bodies) in Giemsa- stained smears from liver, enlarged lymphnode biopsies.



Theileria organism in piroplasm



Koch's blue bodies in Giemsa- stained smears

Serological tests: The fluorescent antibody test (IFAT) is the most commonly used, complement fixation test (CFT) and ELISA may also be used.

Molecular tests: Polymerase Chain Reaction (PCR) can be used detect carriers.

Differential diagnosis: Tropical theileriosis may be confused with other theileriosis, trypanosomosis, babesiosis, and other conditions that result in anemia and jaundice, such as anaplasmosis and leptospirosis.

Treatment: Buparvaquone is the drug of choice and the dose is 2.5mg/kg intramuscular as a single dose.

How to control the disease?

Eradication of tropical theileriosis is possible, if eradication of ticks is possible. Carrier cattle can be detected serologically and eliminated and the non-infected cattle should be kept away from potential carriers. Where theileriosis is endemic, control programs are aimed to limit outbreaks and to restrict the spread the disease. The control program involves the control of tick and increasing the resistance of the population by chemi-immunization or vaccination. For controlling the tick population, cattle must be spray or dipped with acaricide weekly. Periodic dusting of the floor and walls of infest barns after removal of litter and manure are recommended.

Chemo-immunization (infection and treatment):

A state of premunity can be created by chem-immunization, by using prefed ticks “Sporozoites vaccine” and simultaneous tetracycline or buparvaquone treatments. A mild or inapparent reaction usually occurs and the immune response controls the infection. Calves in endemic area are immunized with this vaccine and buparvaquone is reserved for treating clinical cases. Cattle should be immunized 3-4 weeks before being turned out to infected pasture.

Raksh vac-T: Vaccine is produced by Indian immunologicals. It is the most widely used attenuated schizonts cell culture vaccine that prepared from live schizonts grown on lymphoid cell culture and attenuated by prolonged passage. They do not produce piroplasms, so the animals cannot infect ticks, and vaccination cattle show good resistance to the disease for at least 3.5 years.

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