Theileriosis in cattle

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Introduction

Ticks and tick-borne diseases (TBDs) cause major economic losses, and affect many domestic animals, mainly cattle, in tropical and subtropical regions. **Bovine tropical theileriosis** is a TBD caused by a protozoon called ***Theileria annulata*** transmitted by several tick species of the genus ***Hyalomma***. Theileriosis and babesiosis are the most important and dangerous blood protozoan diseases of the cattle; these are transmitted by ticks especially in countries which have intensive animal industries. Tropical theileriosis is a frequent fatal disease of cattle caused by the protozoan parasite *Theileria annulata.*

Theileriosis:

Theileriosis caused by *Theileria annulata* and transmitted through the bites of *Hyalomma anatolicum anatolicum* with higher incidence in the crossbred cow of all age groups (young calves are more susceptible) with the general epidemiology of the disease in tropical areas. This disease is seasonal, starts in the second part of April, and adds to its abundance increase in June and July. Cases of theileriosis are generally observed during summer or rainy season when the ticks have higher activity although sporadic outbreaks have been recorded year around. Tropical theileriosis caused by *T. annulata* may result in 80% mortality in susceptible animals.

Indigenous cattle are resistant to this disease but cross bred cattle are highly sensitive to *Theileria* spp. The *Theileria* parasites have detrimental effect on the cows as it causes high mortality in the animals and there is an irreversible loss of production and reproduction.

Vector – *Hyalomma* spp.

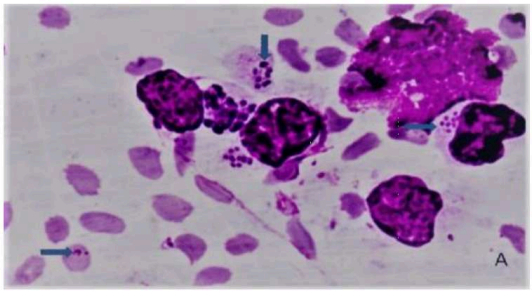
Source: d-nb.info

Tick infestation in cattle infestation
Source: indiancattle.com

Morphology:

Parasite is pleomorphic as round, oval, ring-shaped, rod like and comma shaped in RBCs (1-2 µ). 70-80% are ring-shaped, oval or round. Macroschizonts and microschizonts are

found in the lymphocyte and other RE cells of the spleen and lymph nodes and are traditionally known as **Koch's blue bodies.**

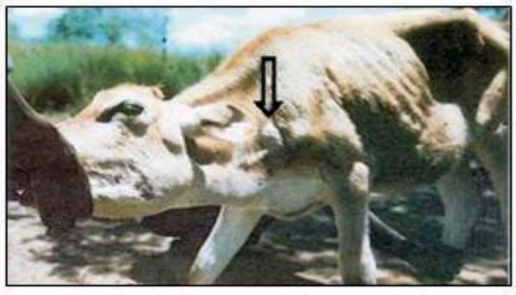


Koch blue bodies in lymphocytes

Source: academicjournals.org

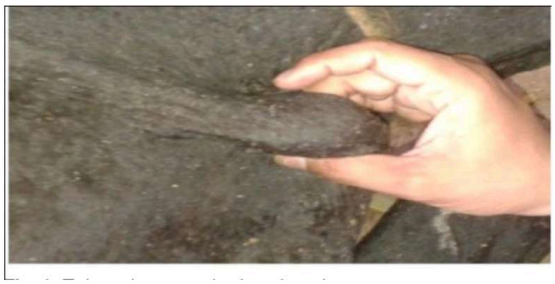
Clinical signs:

Acute form of the disease is the most common, lasting 10-23 days. Clinically commences with fever, the temperature rising to 40-41.5°C or 107°F and enlarged superficial lymph nodes accompanied by dullness, anorexia, salivation, lacrimation, discharge from nostrils, swelling of the eyelids and ears. The heart beat is rapid, diarrhoea with blood and mucus in the faeces may occur and there is marked emaciation. Lung oedema occurs in this which is probably the immediate cause of death. Concurrent infection of *Theileria, Babesia* and *Anaplasma* can be encountered. Progressive leucocytosis, increased leucocyte count from 10,000-12,000/µl to 36,000/ µl, mainly due to increased number of lymphocytes, and low RBC count due to removal of infected RBC by spleen and liver resulting in anemia are few more clinical signs observed during the infection.

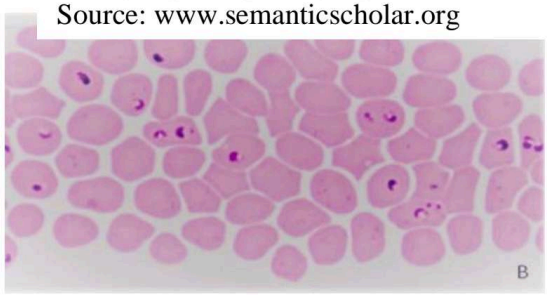


Swollen lymph node in a theileria infected calf.

Source: www.dairyknowledge.in



Enlarged prescapular lymph node
Source: www.semanticscholar.org



Piroplasms in RBCs

Post-mortem findings:

- Pin point hemorrhages on all the mucus membranes.
- Splenomegaly and hepatomegaly, infarcts in the kidneys, lungs are usually oedematous having frothy fluid, and swollen lymph nodes.
- Pale mucous membranes, punched out necrotic ulcers in abomasum and small intestine.

Diagnosis:

Clinical examination: High fever and enlarged lymph glands

Microscopic examination: *Theileria annulata* infection in cattle is usually based on the detection of macroschizonts in Giemsa's-stained lymph node biopsy smears in live animals and impression smears of lymph node and spleen in dead animals. Blood smear stained with Giemsa stain shows piroplasmic stages.

Serological tests: Complement fixation test (CFT), Indirect fluorescent antibody test, and capillary tube agglutination test.

Differential diagnosis:

1. **Heartwater disease** because of pulmonary oedema and hydrothorax. Examination of brain smears and lymph node or spleen impression smears can differentiate between the two diseases.

2. **Trypanosomiasis** because of oedema, lymphadenopathy, and anaemia. In trypanosomiasis there is nervous signs but absent in theileriosis. Blood and lymph node smear examination will normally differentiate between the two diseases.
3. **Babesiosis and anaplasmosis** because of anaemia. In babesiosis, haemoglobinuria is present as well as icterus in both babesiosis and anaplasmosis, which are absent in theileriosis. These diseases can easily be differentiated from theileriosis on examination of blood smears.

Treatment:

- In early infection period, chlortetracycline and oxytetracycline (long acting tetracyclines) alone or in combination with other antibiotics.
- Buparvaquone (Butalex) @ 2.5 mg/kg I/M or one ml/20kg body weight – drug of choice.
- Halofuginone @ 1.2 mg/kg orally, have been shown to be active against clinical infections with *T. annulata.*
- Diminazine aceturate (Berenil) @ 3.5-5 mg/kg b.wt. I/M may prove effective in isolated cases. However, in advance cases no effect is there.
- Supportive therapy with B-complex vitamins, Haematinics should also provide.

Control:

Tropical bovine theileriosis may be controlled by one or more of the following methods:

- Management, with particular emphasis on movement control,
- **Tick control**: The infection can be prevented by adequate tick control measures which keep animals free from tick infestation. This can be done by the regular dipping/spraying of cattle and regular disinfection of sheds/shelter of animals.

i. Coumaphos 50% (Asuntol): used as @0.05% i.e. 15 gram packet is dissolved in 15 litre.

ii. Amitraz (Ectodex) 6ml/litre.

iii. Synthetic pyrethroids is another largest group which include Flumethrin, Decamethrin, Cypermethrin, Cypomethrin and Permethrin. Butox contains deltamethrin used as 2ml/litre.

iv. Ivermectin: available as Ivomec, used @ 0.2 mg/kg or 1ml/50kg by S/C route.

- Treatment of clinical disease using specific chemotherapeutics.
- Immunization with live vaccines and use of cattle resistant to ticks or the disease.

Immuno prophylaxis:

Vaccine against *T. annulata* was prepared in India by NDDB, Anand (Gujarat) and commercialized as Rakshavac-T by Indian Immunological, Hyderabad. This vaccine is said to be effective in calves more than 3 months of age.

Source: www.pashudhanpraharee.com/

It is a live attenuated tissue cultured macroschizont vaccine, and contains tissue cultured attenuated *T. annulata* schizont given @ 3 ml by s/c route.