

## THEILERIASIS

Theileriasis is a tick-borne protozoan disease caused by *Theileria* sp. in cattle, buffaloes, sheep and goats, as well as in wild and captive animals. The disease is characterized by fever and lymphoproliferative disorders which may be associated with leukopaenia and/or anaemia.

European breeds of cattle are more susceptible than Zebu breeds. Like Babesia, protozoan parasites of the genus *Theileria* (Family Theileriidae) are found in the **ERYTHROCYTES**, but reproduce by schizogony (not binary fission) in **LYMPHOCYTES**.

**Theileria**                           **Animals affected**

*T. annulata*                       Cattle, Zebu Cattle, Buffaloes

(*T. dispar*)

*Theileria lestoquardi*           **Sheep, Goats**

(formerly *Theileria hirci*)

*T. lawrencei*                      Cattle, buffaloes

*T. mutans*                          Cattle, Deer

*T. ovis*                             Sheep, Goats

*T. parva*                          Cattle, Buffaloes

The most important species affecting cattle are *T parva* and *T annulata*. *Theileria parva* the causal agent of **East Coast Fever (ECF)** - an acute disease of cattle, characterized by high fever, swelling of the lymph nodes, dyspnea, and high mortality. Transmitted by the tick vector *Rhipicephalus appendiculatus* – seen in Africa. • A fatal condition called '**TURNING SICKNESS**' is associated with the blocking of brain capillaries by infected cells and results in neurological signs

*Theileria orientalis* (*T. orientalis/buffeli* group), which causes **Oriental Theileriosis (OT)** or **Theileria-Associated Bovine Anaemia (TABA)**.

*Theileria lestoquardi* (earlier *T. hirci*), which causes **Malignant Ovine Theileriosis (MOT)**,

*Theileria annulata*, the causal agent of **Mediterranean / Tropical Theileriosis (TT)** – seen in India. Characteristic signs include fever and swollen superficial lymph nodes. Tropical theileriosis is transmitted by species of *Hyalomma*, especially *Hyalomma anatomicum*.

The incubation period for **ECF** is **8–12 days** on average and for **TT** is **10–25 days**

### Transmission and Life Cycle

*Theileria parva*, the cause of East Coast fever, a disease of cattle of great importance in Africa (and now also in India) is transmitted by several species of ticks, the most important of which is *Rhipicephalus*.

However, following introduction into the host by saliva of the tick, *Theileria* invade lymphocytes and histiocytes, first in the regional lymph nodes, but later in all the Lymph nodes, spleen, liver, and other organs, as well as the circulating cells. Here, they develop in the cytoplasm of affected cells into **MACROSCHIZONTS**, which contain 8 or more nuclei. These large bodies, known as "**Koch's bodies**" after their discoverer, are considered characteristic and diagnostic of the disease.

After about 10 days, forms known as "microschizonts" appear in lymphocytes. These are characterized by more nuclei (up to 100 or more). Released '**Micromerozoites**' (they destroy the cell in the process), parasitize **Erythrocytes** as tiny rod, comma, or ring-shaped bodies. They are smaller than Babesia and do not undergo further division. Their pleomorphism distinguishes them from Babesia.

### Pathogenesis

In general, the pathogenesis of various forms of theileriasis is dependent on the production of **schizonts** in lymphocytes and **Piroplasms** in erythrocytes.

Sporozoites (e.g., of *T. parva*) are introduced into bovine host by the vector tick in its saliva when it is feeding. One tick can transmit sufficient sporozoites to cause a fatal infection in a susceptible animal. The sporozoites then enter lymphocytes and develop into **schizonts in the lymph node** draining the area of attachment of the tick, usually the parotid node. Infected lymphocytes are transformed to lymphoblasts, which divide along with the schizonts so that each daughter cell is also infected.

During the acute phase of the disease, more than 60% of lymphocytes may contain schizonts, also called **Koch's bodies**. *The acute disease appears to be caused by massive lympholysis and progressive anemia.*

Finally, infected lymphocytes are disseminated throughout the lymphoid system. Later, some schizonts, differentiate into **merozoites**, are released from the lymphoblasts, and they invade erythrocytes. In the red blood cells, the parasites transform to become **piroplasms** which are infective again back to another healthy tick when it feeds.

## Clinical Signs

The clinical signs begin with fever, which appears about 15 days following the bite of infected ticks. After few days, Theileria become demonstrable in the blood.

The appetite is then gradually lost, rumination ceases, and milk secretion decreases.

**The superficial lymph nodes become visibly enlarged**, the muzzle dry, the hair coat rough, and salivation and lachrymation become excessive.

In terminal cases, there may be Diarrhoea often Blood-stained. Petechial Hemorrhages may occur under Tongue & on the Vulva.

Respiratory distress may follow pulmonary oedema, and death may result from asphyxia.

As the disease progresses, severe Pan-leukopaenia develops, and enlarged lymph nodes may regress to less than normal size. Anaemia may be present.

## Gross Lesions

- The most constant and most important gross lesion is **Generalized Enlargement Of Lymph Nodes**. Lymph nodes are Oedematous and may show haemorrhage.
- Kidneys show, White foci of various sizes in the renal cortex - **and Punched out Ulcers in Abomasum**.
- Pulmonary oedema and emphysema, subcutaneous and intramuscular oedema, and excessive pericardial and pleural fluids are present.
- Liver enlarged, yellowish, and mottled.
- The meninges may be congested and focal haemorrhages are present in the brain.

## Microscopic Lesion:

- **Proliferation of lymphocytic cells** in lymph nodes, spleen, Peyer's patches, liver, kidneys, and elsewhere.
- Blood vessels, including cerebral vessels, are filled with parasitized lymphocytes. These obstruct the blood flow and cause focal infarction.
- **Koch's bodies** may be found in tissue sections of many organs.

## Diagnosis

- The diagnosis of theileriasis depends upon demonstration of the organisms in erythrocytes and in lymphocytes (Koch's bodies). **Koch's bodies (i.e., schizonts)** are seen only sometimes in circulating lymphocytes, but mostly in biopsy smears of enlarged lymph nodes stained with Giemsa.

- Piroplasms are seen easily in erythrocytes from day 16 after tick attachment, and they increase in number until death.
- These include Complement Fixation Test (CFT), Indirect Haemagglutination and Immunofluorescence.
- Antibodies to *T. parva* and *T. annulata* can be detected with an **Enzyme-Linked Immunosorbent Assay (ELISA)** or an **IFA (indirect fluorescence antibody) test.**
- Polymerase chain reaction (PCR) tests and DNA probes are used to detect and identify *Theileria* species

### Differential Diagnosis

- Babesiosis
- Anaplasmosis
- Heartwater
- Trypanosomosis
- Malignant catarrhal fever
- Contagious bovine pleuropneumonia

### KEYWORDS:

Different common forms / names; its etiology ; vector

Generalized Enlargement of Lymph Nodes

Punched-Out Ulcers in Abomasum

Micromerozoites; Piroplasms; Koch's Blue Bodies (schizonts);