





University of Sadat City Faculty of Veterinary Medicine

Department of Animal Medicine and Infectious Diseases

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا سبحانك لا علم لنا إلا ما علمتنا

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صدق الله العظيم

سورة البقرة- الآية 32

CATTLE INFECTIOUS DISEASES

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Diseases causing red urine

**Babesiosis, Anaplasmosis, post parturient
haemoglobinurea, bacillary
haemoglobinurea and acute hemolytic
anemia in calves)**

Babesiosis

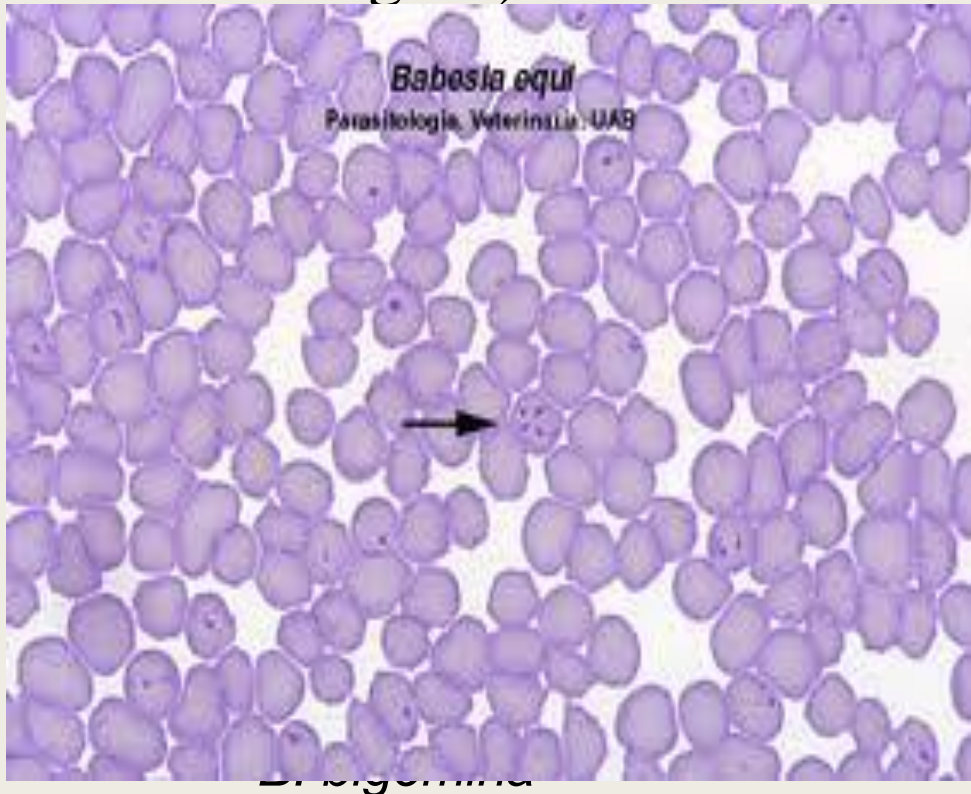
(Texas fever, Red water fever and Cattle tick fever)

Definition

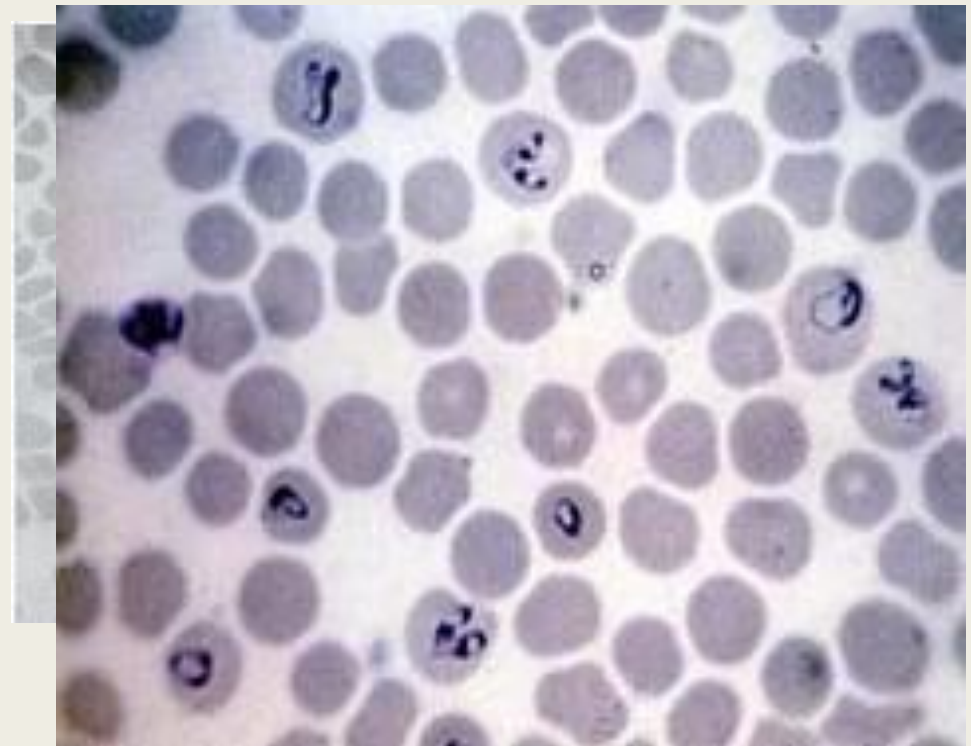
Infectious tick born disease caused by Babesia species transmitted by tick and characterized by fever, intravascular hemolysis, anemia and hemoglobinurea

Etiology

- ✧ The disease caused by intra-erythrocytic parasite babesia spp.
- ✧ Babesia spp. Infesting cattle are
- ✧ (B. bovis, B. argentina, B. berbera, B. bigemina, B. major and B. divergens).



Theileria equi (*B. equi*)



Babesia Caballi

Epidemiology

Geographical distribution

- ✧ The distribution of the causative protozoa is related to the geographical and seasonal distribution of the tick.
- ✧ *B.bigemina* and *B.bovis* predominant in tropics and subtropics (south and central America, Africa, west India and Australia).
- ✧ *B.major* and *B. divergens* predominant in temperate regions (north-west Europe, Spain and UK).
- ✧ *B.berbera* predominant in Mediterranean Europe and North Africa.

Host susceptibility and immunity:

- ✧ Cattle & buffalo are susceptible to infection.
- ✧ Greatest infection rate mainly in animal 6-12 month of age group and uncommon in animals over 5 year of age (subclinical cases in young cattle).

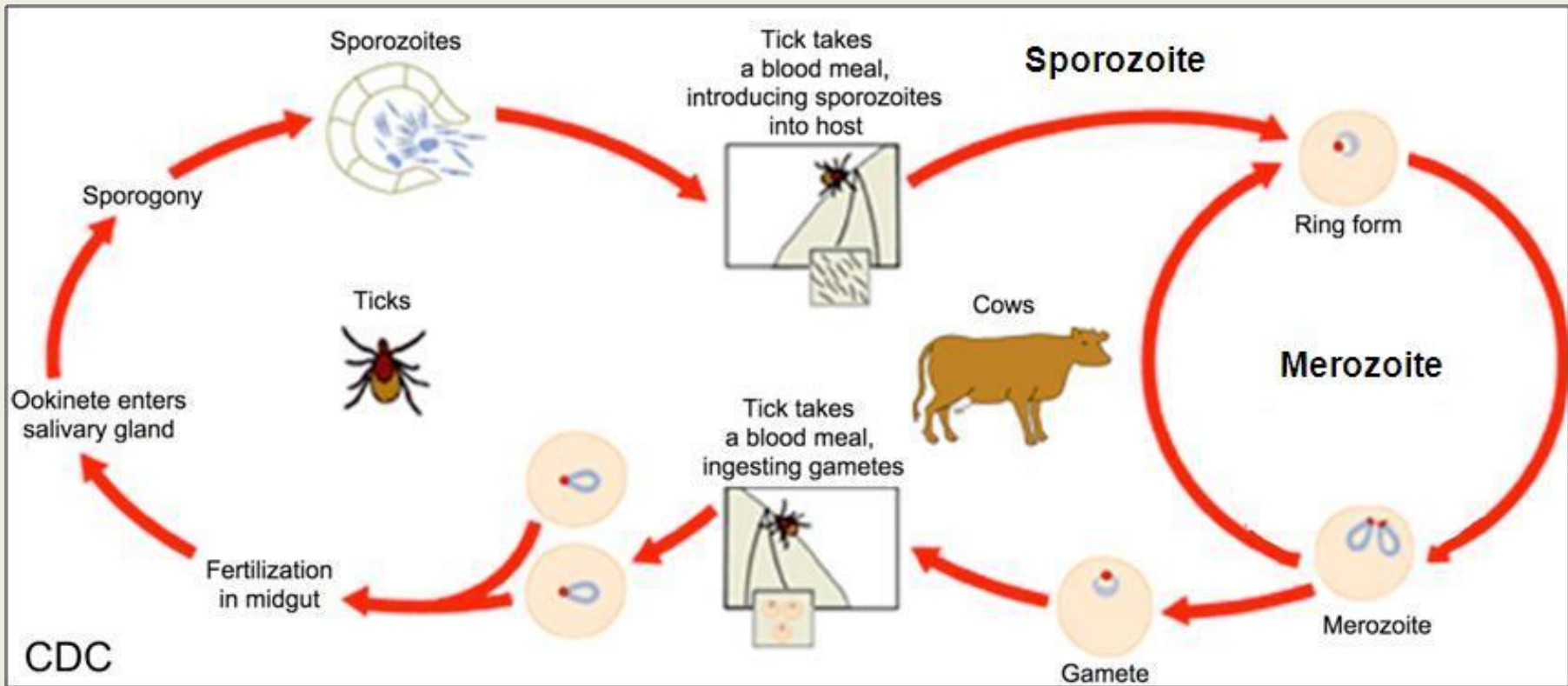
Immunity:

- ✧ Strong immunity occurs after natural infection.
- ✧ If the infection repeated the immunity is permanent.

- ✧ If the infection is not repeated the protozoan survives in host for about 6 months. i.e, the host is susceptible to reinfection after a year.
- ✧ If the disease treated rapidly and efficiently and protozoans are killed before antibody production no immune response occurred.

Sources of infection (carrier and reservoir)

- The infected animal with parasitemia and infected tick vectors are the main source of infection.
- Infected animals act as a carrier for variable period about 2 years.



Life cycle of *Babesia*

Method of transmission

Mainly through ticks (*Boophilus* and *haemphsalia* spp.). In which the protozoan spend part of its developmental cycle and may remain in it from one generation to another because there is transovarian transmission occur.



Host risk factors

- ❖ The very young are naturally resistant and take passive immunity from its dam and this passive immunity replaced by active immunity when become adult.
- ❖ Clinical cases mainly occur after exposure to stress factors such as parturition, starvation **and intercurrent disease.**

Environmental risk factors

- ❖ The disease has seasonal incidence
- ❖ season for tick multiplication the disease spreads quickly between animals.
- ❖ Under unfavorable season tick disappear and infection die out and immunity lost.

Economic importance

- ❖ Direct losses from costs of (treatment and vaccination and animal deaths 5%).
- ❖ Many animals undergo long period of convalescence with loss of meat and milk production.
- ❖ Restriction of animal movement.

Clinical signs

- ❖ Incubation period 2-3 wks.
- ❖ Acute onset of high fever 41° c with anorexia, depression, weakness, cessation of rumination and fall in milk yield.
- ❖ Respiratory and heart rates increased with brick red conjunctiva, mucus membranes which change later to pale anemic color.
- ❖ Terminally there's sever jaundice and the urine is dark red to brown in color and produce a very stable froth.

- ❖ Many severely affected animals die after 24hrs of illness.
- ❖ Those survive the febrile stage usually lasts for about a 2 wks and recovered gradually with emaciation and anemia.
- ❖ Pregnant animals may abort.
- ❖ Sub acute syndrome occurs in young animals with mild fever and no hemoglobinuria.

- ❖ Very rare cases infected with *Babesia bigemina* show cerebral babesiosis which manifested by incoordination followed by posterior paralysis or by mania, convulsions and coma with high mortality.
- ❖ Infection with *B. divergens* characterized by spasm of anal sphincter causing the passage of pipe stems feces (feces evacuated with great force in long, thin, even in absence of diarrhea).

Postmortem findings

Enlarged and friable spleen

Swollen liver with an enlarged gallbladder containing thick granular bile

Congested, dark-colored kidneys

Generalized anemia and jaundice.

There is severe intravascular clotting.

Laboratory diagnosis

Samples

- ❖ Blood smears from ear vein and ticks on the animals.
- ❖ Blood with anticoagulant (citrated blood) for transmission test.
- ❖ Serum.
- ❖ Smear from spleen during postmortem examination.

Examination:

- ❖ Examination of blood smears and haemolymph of tick stained with giemsa showing intracellular protozoan. (absence of protozoan in stained smears did not canceled the infection).

- ❖ Transmission test by injecting 5-10ml blood from diseased animal to susceptible animal either subcutaneously or i/v then the inoculated animal is examined for signs and daily blood samples examine for the presence of the parasites.
- ❖ CFT, passive agglutination test and IFAT and ELISA can be applied in diagnosis.
- ❖ DNA probes can be detect specific parasitemia at very low level of infection.

Treatment

Control of ticks

- ❖ Using acaricides with short interval dipping for two or three host ticks will dramatically alter the population of one host tick.
- ❖ Regular change of acaricides to avoid development of resistance by ticks.

Specific treatment

A variety of drugs have been used to treat babesiosis in the past, but only diminazene aceturate and imidocarb dipropionate are still in common use.

Diminazene is given deep IM at 3-5 mg/kg. For treatment, imidocarb is given SC at 1.2 mg/kg.

At a dosage of 3.0 mg/kg, imidocarb provides protection from babesiosis for about 4 wk and will also eliminate *B bovis* and *B bigemina* from carrier animals.

Long-acting tetracycline (20 mg/kg) may reduce the severity of babesiosis if treatment begins before or soon after infection.

Supportive treatment

Use of anti-inflammatory drugs, antioxidants, and corticosteroids.

Blood transfusions may be life-saving in very anemic animals.

Prevention

Control of ticks

Prevention measures which are currently applied to bovine babesiosis are

- ❖ Immunization of susceptible stock.
- ❖ Treatment of diseased animals.
- ❖ Control of ticks by acaricides.
- ❖ Control of cattle movement.

Immunization of susceptible host:

- ❖ Vaccination with killed vaccine or live attenuated vaccine.
- ❖ **Chemoprophylaxis:**
- ❖ Administration of drug such as imidocarb which has a residual effect and therefore allows the animals to become infected gradually while the chemotherapeutic influence is fading
- ❖ **Chemoimmunization**

Includes vaccination with virulent organisms and simultaneous or subsequent administration of an appropriate chemical babesicides

Theileriosis

(East coast fever-Egyptian fever)

Definition

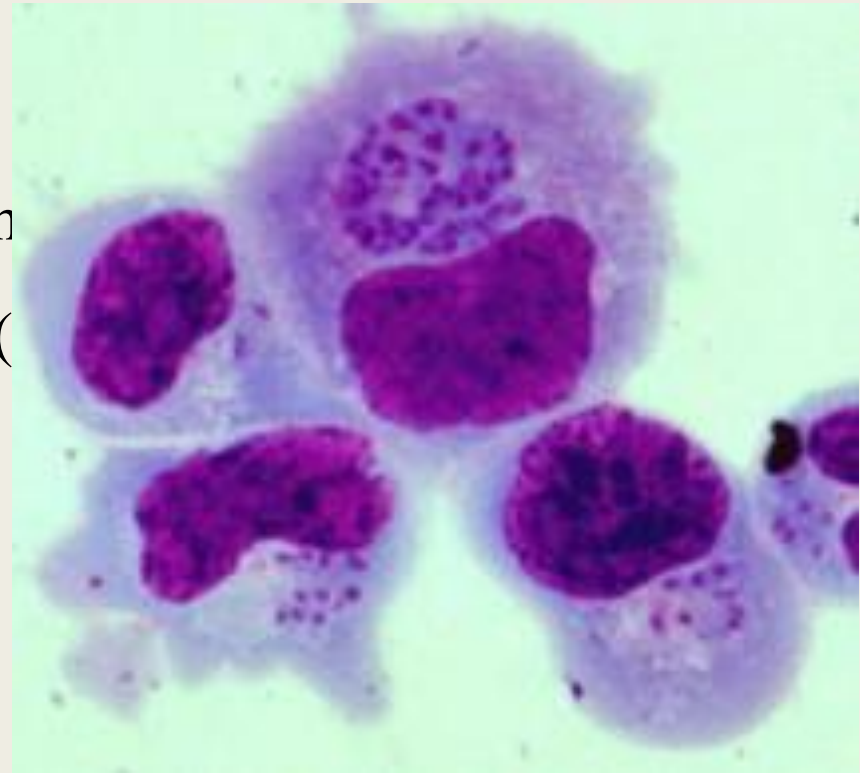
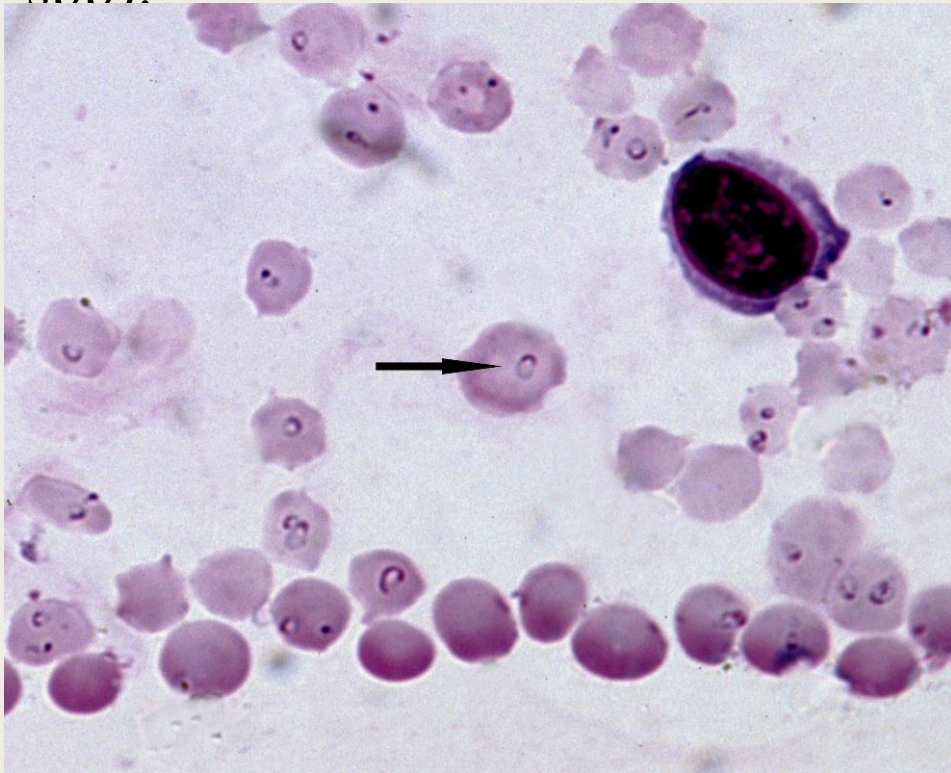
Acute tick born disease of cattle and buffalo caused by theileria spp. Characterized by high fever (dyspnea, weakness, emaciation and high mortality rate), lymphnode enlargement, frothy nasal discharge, eye exudation and corneal opacity

Etiology

Theileria parva

Cause east coast fever in east and central Africa.

Transmitted from cattle to cattle by brown ear tick (*Rhipicephalus* spp).



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Epidemiology

Geographical distribution

The disease present in Mediterranean basin, Asia and Africa.

Host susceptibility

Cattle and buffalo are susceptible host.

- ✧ Buffalo are less susceptible than cattle but they act as a carrier.
- ✧ The infection is usually benign in African buffalo but the Asiatic water buffalo are fully susceptible.
- ✧ Young animals are less susceptible than adults. Indigenous breeds are less clinically affected than exotic breeds.

Morbidity and case fatality

90-100% in exotic breeds and unexposed indigenous breeds.

Indigenous breeds of cattle in enzootic areas have a natural resistance to the diseases and calf hood mortality about 2%.

Source of infection

Infected animal and infected ticks are the main source of infection.

Ticks may live for 1-2 years but lose their infectivity within 11 months.

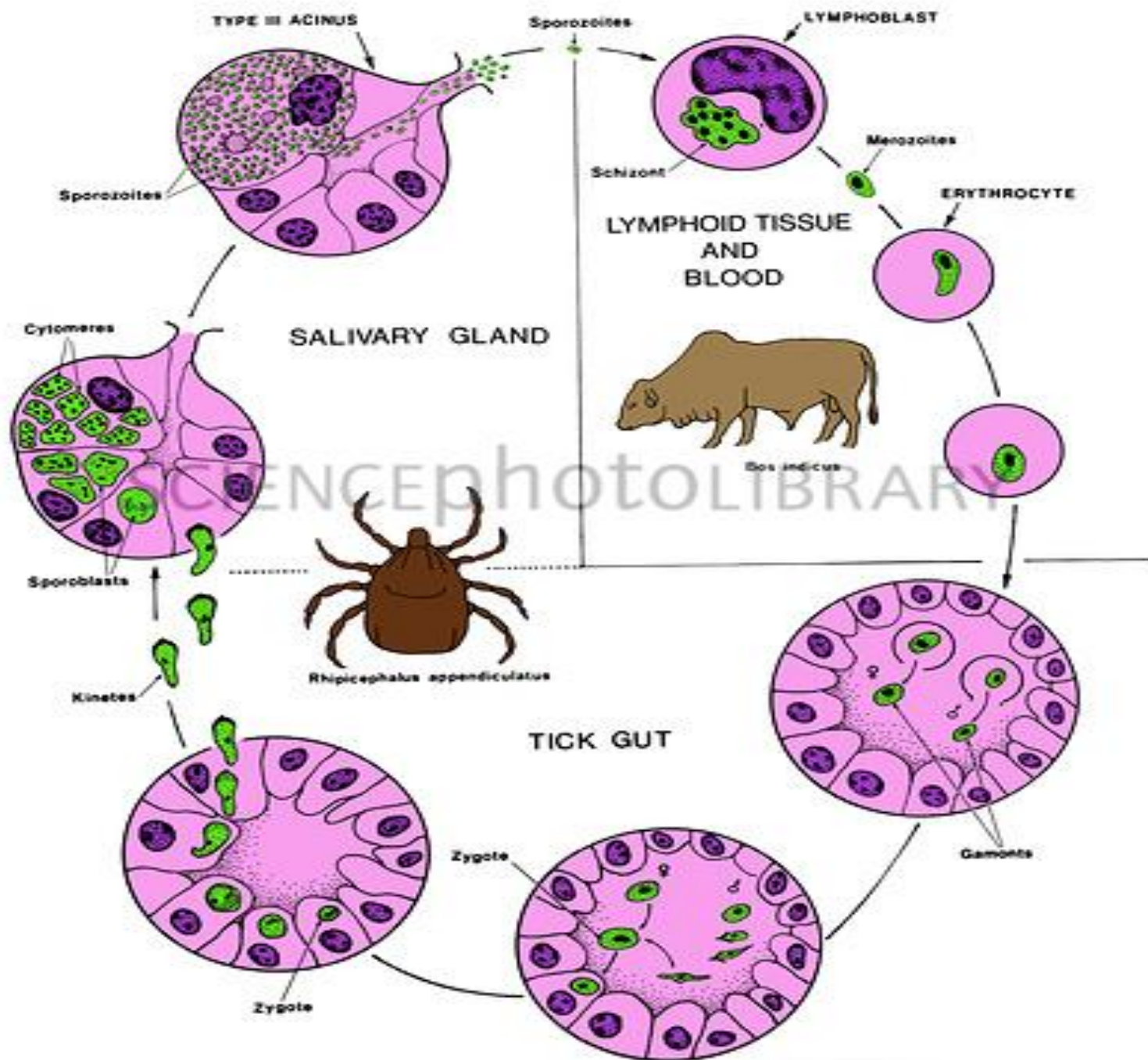
Mode of transmission

- ❖ Occur by tick either *Rhipicephalus* or *Hyalomma* spp.
- ❖ Transovarian transmission (larva----- nymph----- adult).'
- ❖ Transmission increase when there is favorable condition for tick in its habitat.

Risk factors

- ❖ *Theileria parva* highly virulent for native cattle especially exotic breeds.
- ❖ Infection rate in enzootic area is usually low 1-2% and there is high percentage of immune animals.
- ❖ Animals survive the infection have a solid immunity.
- ❖ An average of less than one tick allows sporadic cases.
- ❖ Areas that are too high, too cool or too dry affect tick life cycle decreasing infection rate

LIFE CYCLE OF THEILERIA PARVA



Clinical signs

- ❖ IP is about 2-3 wks depending on virulence of the strain and dose of infection.
- ❖ The first clinical sign is the enlargement of the local drained lymph node at the area of tick attachment.
- ❖ Fever, depression, anorexia and drop in milk production.
- ❖ Nasal and ocular discharges, dyspnea, and generalized lymph nodes enlargement.
- ❖ Corneal opacity may be developed from center toward peripheral.

- ❖ Frothy nasal discharge.
- ❖ In sever cases there is diarrhea with dysentery.
- ❖ Emaciation, weakness and recumbency lead to death from asphyxia (7-10 days).
- ❖ Occasional cases develop cerebral theileriosis characterized by circling, localized nervous signs and convulsions with tremor, profuse salivation and head pressing.

❖ Infection with *Theileria annulata* there is anemia develops with few days and icteric mucus membrane.

❖ **Malignant ovine theileriasis**, Fever, inappetence, corneal opacity with enlargement of superficial lymphnodes and there is oculo-nasal discharge with respiratory distress. Animals are anemic and frequently icteric and there is transitory hemoglobinuria.

Postmortem findings

- ❖ The carcass emaciated and hemorrhages are evident in a variety of organs.
- ❖ Massive pulmonary edema, hyperemia and emphysema with hydrothorax and hydropericardium.
- ❖ Enlargement of liver, spleen, lymphnodes and ulceration of abomasums and intestine.

- ❖ Small lymphoid nodules are present in liver and spleen and kidney and GIT called pseudoinfarct.
- ❖ Macroscopically: the nodules characterized by proliferating lymphoblastoid cells and varying amounts of necrosis in lymphoid organs, liver, lung, kidneys and GIT.

Diagnosis

- ❖ Clinical signs with tick presence usually suggestive for theileriosis.
- ❖ The parasites are evident as schizont sometimes in circulating lymphocyte but mainly in lymph smears
- ❖ Piroplasms are also easily visible in RBCS.
- ❖ There is panleukopenia and thrombocytopenia with little or no anemia.
- ❖ CFT-ELISA-IHA AND FAT.

Differential diagnosis

- Heartwater
- Trypanosomosis
- Babesiosis
- Anaplasmosis
- Malignant catarrhal fever
- Contagious bovine pleuropneumoniae
- The parasites must also be differentiated from other species of Theileria.

Treatment

Control of ticks

- ❖ Using acaricides with short interval dipping for two or three host ticks will dramatically alter the population of one host tick.
- ❖ Regular change of acaricides to avoid development of resistance by ticks.

Specific treatment

Treatment and control

Parvaquone and, subsequently, its derivative buparvaquone (Butalex) 1 ml Butalex per 20 kg b.w. (2.5 mg buparvaquone per kg). Treatment with these compounds is highly effective when applied in the early stages of clinical disease but is less effective in the advanced stages in which there is extensive destruction of lymphoid and hematopoietic tissues. Chlortetracycline is also effective.

Supportive treatment

Use of anti-inflammatory drugs, antioxidants, and corticosteroids.

Blood transfusions may be life-saving in very anemic animals.

Prevention

Control of ticks

Prevention measures which are currently applied to bovine theileriosis are

- ❖ Immunization of susceptible stock.
- ❖ Treatment of diseased animals.
- ❖ Control of ticks by acaricides.
- ❖ Control of cattle movement.

Medical prophylaxis

- Chemotherapeutic agents such as buparvaquone are available to treat *T. parva* and *T. annulata* infections
- Treatments with these agents do not completely eradicate theilerial infections and lead to the development of carrier states in their hosts

- Recovery from one strain of *T. annulata* confers cross-protection against most other strains
- Complete cross-protection does not occur with *T. parva*
- Inactivated vaccines None are available
- Live attenuated vaccines