

Diseases caused by *Mycoplasma* spp.

Contagious bovine pleuropneumonia CBPP

This is an acute, subacute or chronic highly infectious disease of cattle caused by *Mycoplasma mycoides* var, *mycoides*.

Transmission : Aerosol and droplet infection from the infected animals. The recovered animal called “lungers” act as carriers and shedders, especially under stress.

Antemortem findings :

1. Incubation: acute 10 – 14 days, chronic 3 – 6 months
2. Morbidity: 90 % in susceptible cattle
3. Mortality: 10 – 50 %
4. Fever
5. Depression
6. Lack of appetite and loss of weight
7. Coughing on exercise
8. Shallow rapid respiration, grunting and gurgling
9. Extended neck, lowered head and open mouth
10. Arched back and outward rotated elbow
11. Arthritis in young animals

Postmortem findings :

1. Fibrinous inflammation of the pleura (pleuritis)
2. Straw coloured fluid in the thorax (Fig. 11)
3. Lobar pneumonia with red hepatization, marbled appearance of lung lobules (Fig. 12) due to thickening of interlobular septae and interlobular pulmonary edema
4. Enlarged mediastinal lymph nodes
5. Walled-off sequestra formation in chronic cases
6. Haemorrhage in the heart
7. Arthritis and tenosynovitis

Differential diagnosis : Shipping fever (Pasteurellosis). East coast fever, foreign body pneumonia, IBR, tuberculosis, chlamidial infections and lungworms



Fig. 11: Contagious bovine pleuropneumonia. Straw coloured fluid in the thorax and partial lung hepatization.

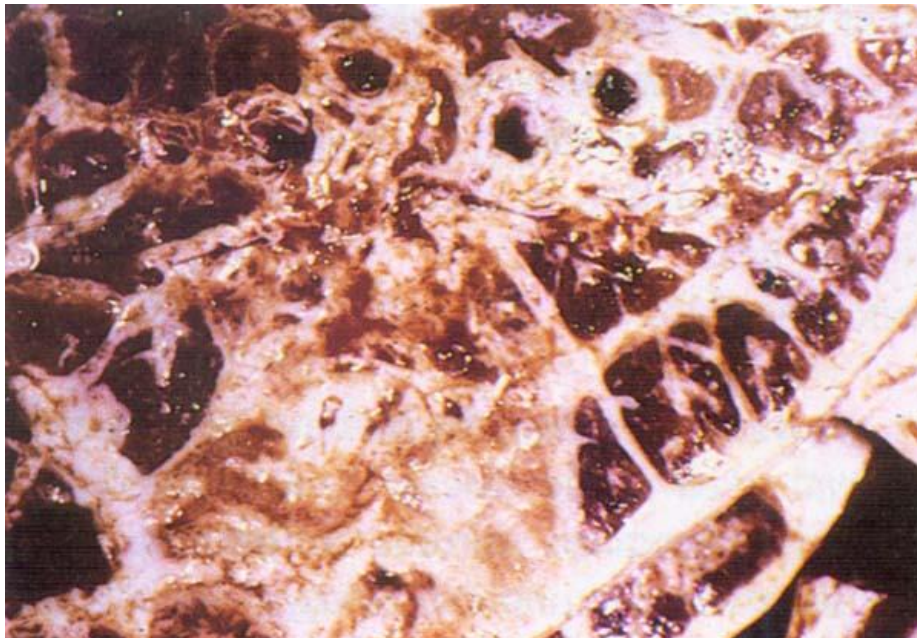


Fig. 12: Contagious bovine pleuropneumonia. Lobar pneumonia with red hepatization and marbled appearance of lung lobules.

Diseases caused by bacteria

Tuberculosis

Tuberculosis is a chronic disease of many animal species and poultry caused by bacteria of the genus *Mycobacterium*. It is characterized by development of tubercles in the organs of most species. Bovine tuberculosis is caused by *Mycobacterium bovis*. It is a significant zoonotic disease.

Transmission : An infected animal is the main source of transmission. The organisms are excreted in the exhaled air and in all secretions and excretions. Inhalation is the chief mode of entry and for calves infected milk is an important source of infection. When infection has occurred tuberculosis may spread:

- a) by primary complex (lesion at point of entry and the local lymph node) and
- b) by dissemination from primary complex.

Antemortem findings:

1. Low grade fever
2. Chronic intermittent hacking cough and associated pneumonia
3. Difficult breathing
4. Weakness and loss of appetite
5. Emaciation
6. Swelling superficial body lymph nodes

Postmortem findings:

1. Tuberculous granuloma in the lymph nodes of the head, lungs (Fig. 13), intestine and carcass. These have usually a well-defined capsule enclosing a caseous mass with a calcified centre. They are usually yellow in colour in cattle, white in buffaloes and greyish white in other animals.
2. Active lesions may have a reddened periphery and caseous mass in the centre of a lymph node.
3. Inactive lesions may be calcified and encapsulated
4. Nodules on the pleura and peritoneum
5. Lesions in the lungs (Fig. 14), liver, spleen, kidney
6. Bronchopneumonia
7. Firmer and enlarged udder, particularly rear quarters
8. Lesions in the meninges, bone marrow and joints

The diagnosis may be confirmed by making a smear of the lesion and with Ziehl-Neelsen. The TB bacterium is a very small red staining bacillus.



Fig. 13: Tuberculous granuloma in the mediastinal lymph nodes. *M. bovis* was isolated.



Fig. 14: Lesion of tuberculosis in the lungs.

Discussion : Mycobacteria invade cattle by respiratory (90 – 95 %) and oral routes (5–10 %). Congenital infection in the bovine fetus occurs from an infected dam. Tuberculosis lesions can be classified as *acute miliary*, *nodular lesions* and *chronic organ* tuberculosis. Young calves are infected by ingestion of contaminated milk. The incidence of human tuberculosis caused by *Mycobacterium bovis* has markedly dropped with the pasteurization of milk. It also has dropped in areas where programs of tuberculosis eradication are in place. Man is susceptible to the *bovine type*. In cattle, lesions of tuberculosis caused by the *avian type* are commonly found in the mesenteric lymph nodes. Tuberculosis in small

ruminants is rare. In pigs the disease may be caused by the *bovine and avian types*. Superinfection is specific in cattle.

Differential diagnosis : Lung and lymph node abscess, pleurisy, pericarditis, chronic contagious pleuropneumonia, actinobacillosis, mycotic and parasitic lesions, tumours, caseous lymphadenitis Johne's disease, adrenal gland tumour and lymphomatosis

Leptospirosis

Leptospirosis is an important and relatively common disease of domestic and wild animals and humans. In cattle, it is manifested by interstitial nephritis, anaemia and mastitis and abortion in most species. *Leptospira spp.* are the causative agents.

Transmission : Animals contract the disease by eating and drinking leptospira-contaminated urine, water, or by direct contact of broken skin or mucous membranes with mud, vegetation or aborted fetuses of infected or carrier animals. Recovered animals and animals with unapparent (subclinical) leptospirosis frequently excrete billions of leptospiras in their urine for several months or years.

Antemortem findings :

Acute and subacute forms

1. Transient fever
2. Loss of appetite
3. Lactating cows may stop milking
4. Mastitis
5. Milk may be yellow, clotted and frequently blood stained

Severely affected animals

6. Jaundice and anaemia
7. Pneumonia
8. Abortion with frequent retention of the placenta (afterbirth)

Severe illness in young calves may be associated with yellowish discoloration of mucous membranes and reddish-brown urine before death. The chronic form has mild clinical signs and only abortion may be observed. If meningitis occurs, the animal may show incoordination, salivation and muscular rigidity.

Postmortem findings :

1. Anaemia and jaundice
2. Subserosal and submucosal haemorrhage
3. Ulcers and haemorrhages in the abomasal mucosa
4. Rarely pulmonary edema or emphysema
5. Interstitial nephritis (Fig. 15)
6. Septicaemia



Fig. 15 : Leptospirosis. Interstitial nephritis in a bovine.

.Differential diagnosis : Acute and subacute forms to be differentiated from babesiosis, anaplasmosis, rape and kale poisoning, bacillary haemoglobinuria, post parturient haemoglobinuria and acute haemolytic anaemia in calves. The presence of blood in the milk is a characteristic clinical sign which will differentiate leptospirosis from other infectious diseases.

Discussion : Leptospirosis is a zoonosis and is also an occupational hazard for farmers, veterinarians and butchers.

Human infection may occur by contamination with infected urine and urine contents. The bacteria may be also found in milk in acute cases, however, it does not survive for long period of time in milk. Pasteurization will also kill leptospiras. They can survive for months in moist and humid environments, particularly in swamps, ponds and streams or poorly drained pastures.

Haemorrhagic septicemia

Haemorrhagic septicemia is a systemic disease of cattle, buffalo, pigs, yaks and camels. It is caused by *Pasteurella multocida* type B of Carter.

Outbreaks of this disease are associated with environmental stresses such as wet chilly weather and overworked, exhausted animals. It is specific type of pasteurellosis distinct from other forms of pasteurella infections.

Transmission: By ingestion of contaminated feedstuff.

Antemortem findings:

1. Disease more severe in buffalo than in cattle
2. High fever up to 42°C
3. Salivation and difficulties in swallowing
4. Cough, and difficult breathing and associated pneumonia in later stages
5. Edematous swelling of throat, dewlap, brisket and peritoneum
6. Diarrhoea

Postmortem findings:

1. Subcutaneous swellings characterized with yellowish gelatinous fluid especially around the throat region, brisket and perineum
2. Enlarged haemorrhagic lymph nodes
3. Haemorrhage in the organs
4. Pneumonia (Fig. 16)
5. Rarely haemorrhagic gastroenteritis
6. Petechial haemorrhage in the serous membranes which are extensive in some cases .

Differential diagnosis: Anthrax, blackleg, acute leptospirosis, rinderpest, other pasteurellosis, snake bite and lightning stroke.



Fig. 16: Haemorrhagic septicemia Fibrinous bronchopneumoni

Calf diphtheria

Calf diphtheria is an acute oral infection of calves less than 3 months old. It is caused by *Fusobacterium (Sphaerophorus) necrophorum*. This agent also causes liver abscesses and “foot rot” in cattle.

Transmission: *Fusobacterium necrophorum* is an inhabitant of cattle's digestive tract and the environment. Under unhygienic conditions, infection may be spread on feeding troughs and dirty milk pails. Some of the contributory factors for occurrence of this disease include abrasions in the oral mucosa, animals suffering from poor nutrition and other (intercurrent) disease present in young calves.

Antemortem findings:

1. High temperature
2. Coughing
3. Loss of appetite and depression
4. Difficult breathing, chewing and swallowing
5. Swollen pharyngeal region
6. Deep ulcers on the tongue, palate, and inside of cheeks

7. Pneumonia

Postmortem findings:

1. Inflammation and ulceration with large masses of yellow-grey material in the mouth, tongue, pharynx and larynx
2. Often aspiration pneumonia

Differential diagnosis: Vesicular diseases, neoplasms and abscesses

Actinobacillosis

Actinobacillosis is a chronic disease of cattle caused by *Actinobacillus lignieresii*. It is manifested by inflammation of the tongue and less frequently lymph nodes of the head and of even the viscera and carcass.

Antemortem findings:

1. Loss of appetite
2. Salivation and chewing
3. Swollen tongue
4. Mouth erosions
5. Enlarged parotid and retropharyngeal lymph nodes

Postmortem findings:

1. Enlarged tongue showing tough fibrous consistency. (“wooden tongue”)(Fig. 17)
2. A cluster of small yellowish nodules and erosions of tongue mucosa
3. Granulomatous lesions in the lymph nodes (Fig. 18)
4. Marked thickening of the lower part of oesophagus and stomach wall
5. Raised plaques and erosions in the mucosa of rumen and reticulum
6. Liver and diaphragm lesions due to contact spread from reticulum

Typical actinobacillosis lesions in the lymph nodes and organs consist of greenish-yellow thick creamy pus with “sulphur granules”. These are bacterial colonies surrounded by club like structures

Differential diagnosis: Neoplasms, tuberculosis, abscesses in the lymph nodes, foreign body, salivary cysts, fungal granulomas, chronic pneumonia and parasites

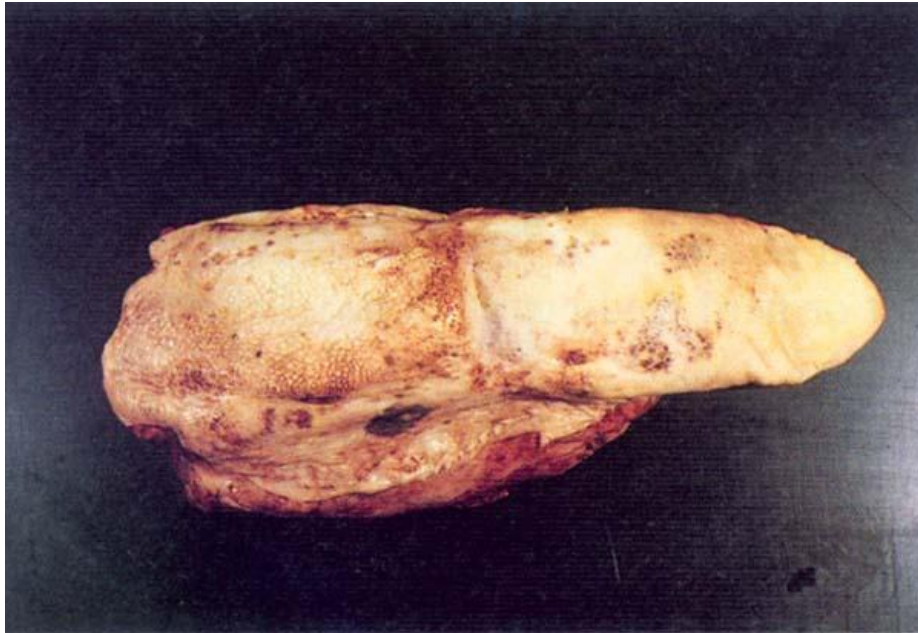


Fig. 17: Actinobacillosis. Actinobacillosis of the tongue. The tongue is enlarged, firm and contains numerous granulomatous lesions. It is called “wooden tongue” because of its firmness due to diffuse proliferation of fibrous tissue.



Fig. 18: Actinobacillosis. Multifocal, well demarcated yellow lesions in the retropharyngeal lymph node of a bovine animal.

Actinomycosis (“Lumpy Jaw”)

Actinomycosis is a chronic granulomatous disease of cattle and pigs and rarely in sheep and horses. It is caused by *Actinomyces bovis* which is an obligatory parasite in the mucous membrane of the mouth and pharynx. Infection occurs following injury with a sharp object or hard feed pieces to the oral mucosa.

Antemortem findings:

1. Painful swelling of the maxilla and mandible (lumpy jaw); rarely in feet.

2. Suppurative tracts in the granulation tissue breaking towards oral cavity or skin
3. Ulceration of cheeks and gums and wart like granulations outward on head
4. Difficult breathing and salivation
5. Loss of weight
6. Diarrhoea and bloat

Postmortem findings:

1. Lesions in the mandible (Lumpy jaw) or maxilla (Fig. 77)
2. Granulomatous lesions in lower part oesophagus or anterior part of the reticulum
3. Local peritonitis
4. Mild abomasitis and enteritis

Differential diagnosis: Tooth infection, impacted food, bone injury, neoplasms and osteomyelitis due to other causes

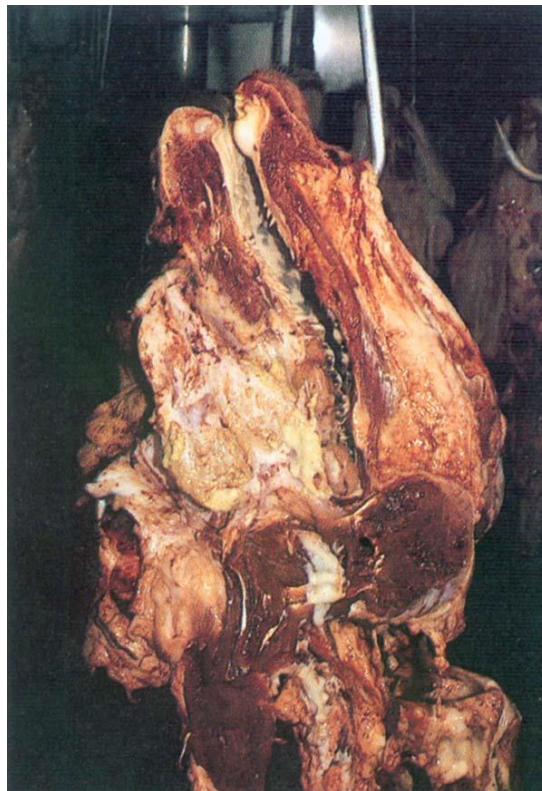


Fig. 77: Actinomycosis. Diffuse granulomas in maxilla and formation of green yellow pus. "Sulphur granules" are found in the pus.

Colibacillosis (White scours)

It is one of the most common serious enteric diseases of the young animals (calves and lambs) characterized by high morbidity and

mortality (100 %) The principal signs are diarrhea (loss of fluid) resulting in dehydration and acute enteritis.

Etiology Bacteria E coli (rod shape Gram negative produce potent enterotoxin.

Lesion varying depending serotype

Enterotoxigenic Colibacillosis

This form of colibacillosis is characterized by varying degree of diarrhea .it occur in all species especially in the very young less than one year old. Specific serotypes causes this form and they have two way virulence factors

1. Fimbrial antigens enable them to attach to and colonize the villi of small intestine of neonatal calves in the first days of life(pilus) attachment antigens that allow them to attach to the enterocyte
2. The ability to produce enterotoxin that after fluid absorption and excretion in the small intestine.

The cardinal signs is diarrhea

Parasitic diseases

Diseases caused by protozoa

Trypanosomiasis

This is a protozoan disease of animals and humans caused by parasites of the genus Trypanosoma, which are found in blood plasma, various body tissues and fluids.

Transmission : Trypanosoma are transmitted primarily by the Glossina spp., tsetse fly, Stomoxys, tabanid and reduviid bugs, and by venereal contact. Trypanosoma species in the insect vector undergo one or two cycles of development.

Antemortem findings :

3. Intermittent fever
4. Anaemia

5. Weight loss and weakness
6. Edema, particularly observed in the face and legs
7. Enlarged body lymph nodes
8. Haemorrhage
9. Opacity of the cornea, keratitis and photophobia

Chronic form of trypanosomiasis is sometimes manifested by progressive weakness, despite absent parasitemia, and death.

Postmortem findings :

1. Enlarged lymph nodes
2. The enlargement of spleen, liver and kidney may also occur.
3. Edematous and emaciated carcass
4. Mild icterus

Differential diagnosis : Helminthiasis, malnutrition and other chronic wasting diseases, equine infectious anaemia, heartwater, babesiosis and anaplasmosis

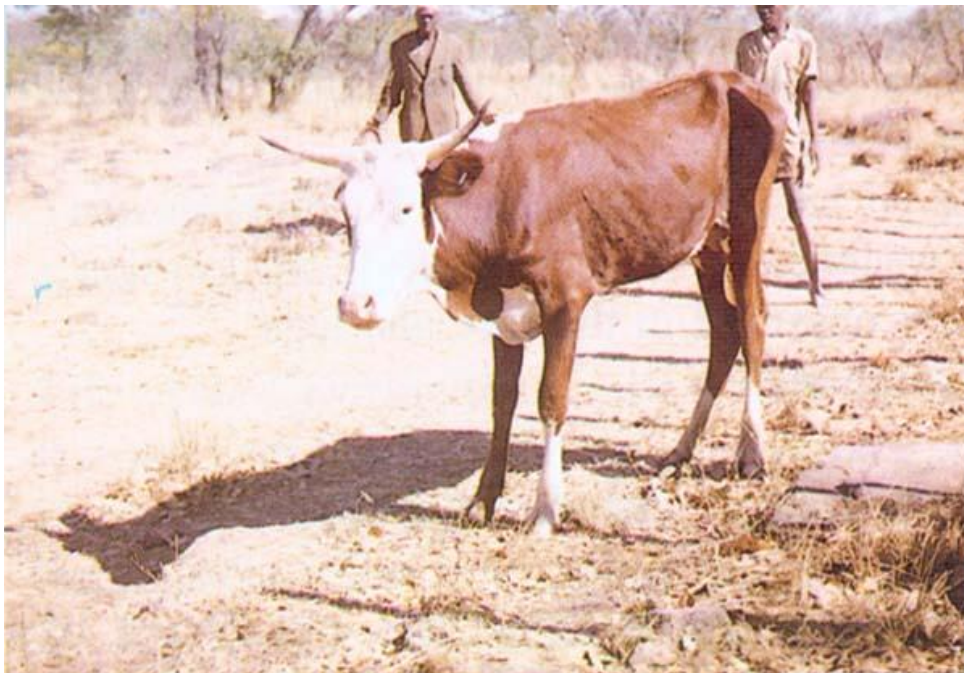


Fig. 19: Trypanosomiasis. This animal shows icteric mucous membranes, weakness in leg muscles and emaciation.

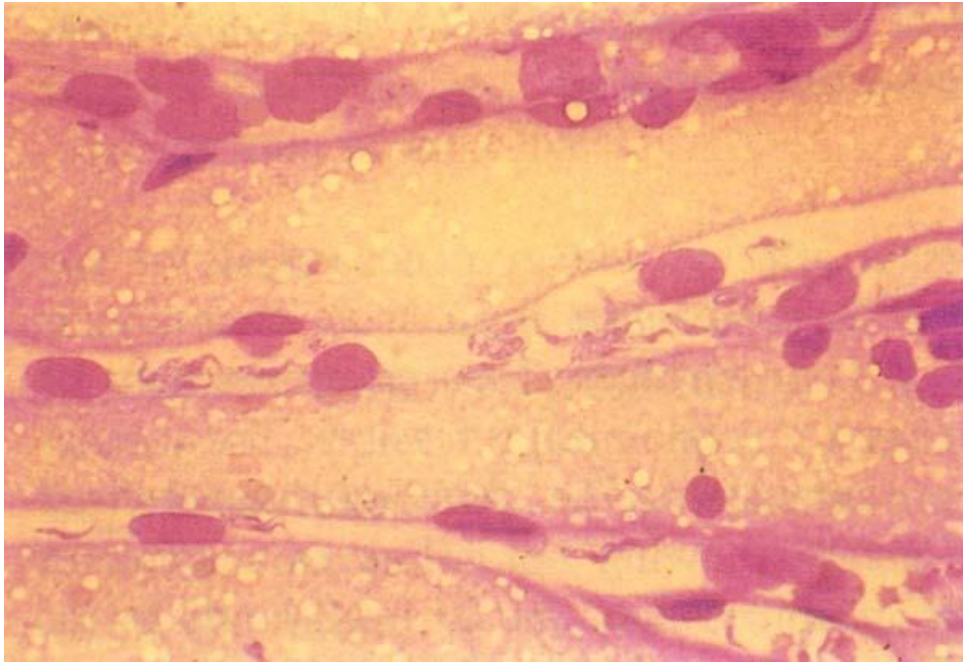


Fig. 20: An impression smear of the trypanosomes and the RBC in the capillaries.

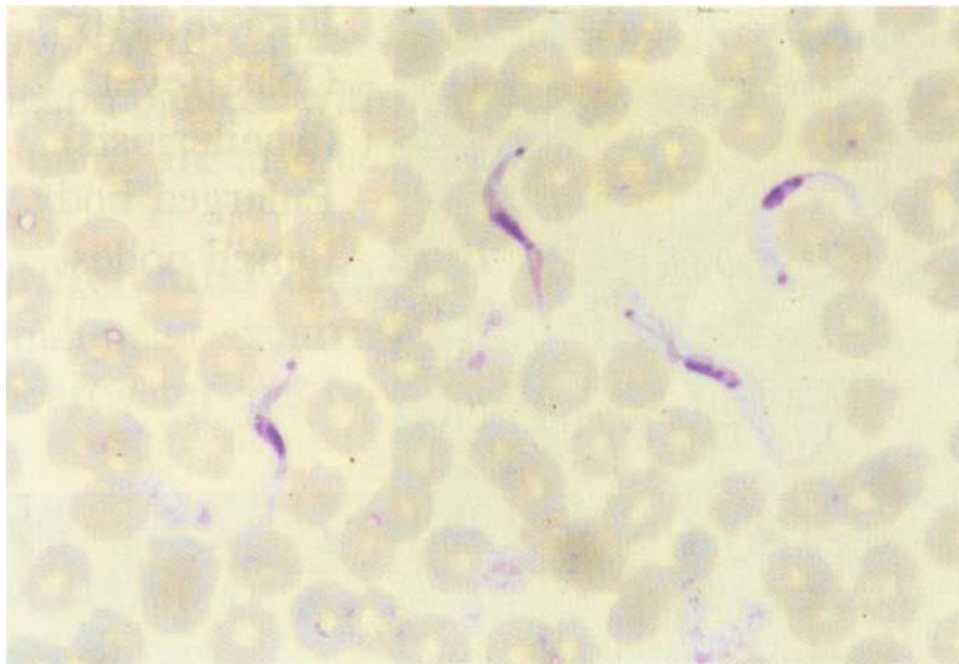


Fig. 21: Trypanosoma vivax in blood smear.

Theileriosis (East coast fever)

East coast fever is a subacute haemoprotozoan disease of cattle caused by *Theileria parva*. Theileriosis is characterized by fever, enlarged lymph nodes, dyspnea and death. In chronic cases loss of condition, emaciation, diarrhoea, blindness, etc. can be seen.

Transmission : Vectors are ixodid ticks of the species *Rhipicephalus*.

Antemortem findings :

1. Mortality up to 90 %
2. High temperature (up to 41 °C)
3. Difficult breathing and coughing
4. Nasal discharge, salivation and watery eyes
5. Swelling of the lymph nodes draining the area where the infected tick fed (Fig. 22)
6. Cerebral signs manifested by circling to one side, convulsions and death



Fig.22: East Coast fever (Theileriosis). Enlarged body lymph nodes.

Postmortem findings:

1. Froth in nostrils and bronchi associated with pulmonary edema and emphysema
2. Swollen, edematous lungs (Fig. 23) and interstitial pneumonia
3. Enlarged and haemorrhagic lymph nodes and splenic lymphoid hypertrophy (Fig. 24)
4. Enlarged and mottled liver
5. Infarcts, thrombosis and lymphoid hypertrophy in spleen (Fig. 100)
6. White spots of lymphoid aggregates in a kidneys
7. Brownish coloration of fat
8. Haemorrhagic and rarely ulcerative enteritis

Confirmation of diagnosis is only made through detection of parasites in a Giemsa stained lymph node biopsy smear and/or blood smear..

Differential diagnosis: Haemorrhagic septicemia, babesiosis, malignant catarrhal fever, trypanosomiasis, Rift Valley fever, heartwater and bovine leucosis

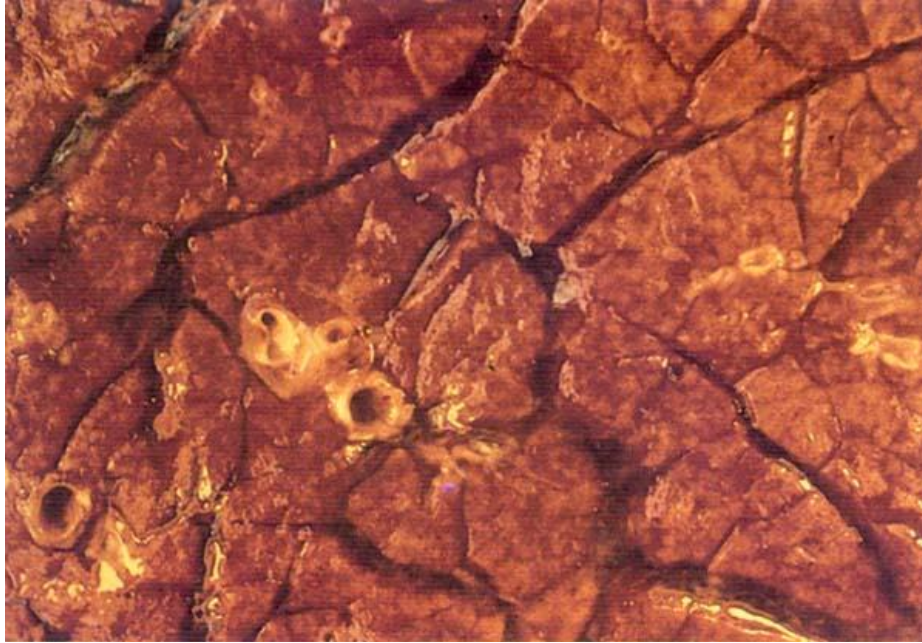


Fig.23: Theileriosis. Swollen edematous lungs and interstitial pneumonia.



Fig.24: Theileriosis. Infarcts, thrombosis and lymphoid hyperplasia in spleen.

Anaplasmosis (gallsickness)

Anaplasmosis is a rickettsial disease characterized by severe debility, emaciation, anaemia and jaundice and is caused by *Anaplasma* spp.. They are obligate intracellular parasites. *Anaplasma marginale* is the causative agent in cattle and wild ruminants.

Transmission: Boophilus species of ticks transmit anaplasmosis. Mosquitoes and the horsefly are mechanical transmitters. Transmission is also possible through injection needles.

Antemortem findings:

Acute infection with *A. marginale*

1. High fever
2. Jaundice and anaemia demonstrated by pale mucous membranes
3. Frequent urination and constipation Chronic infection
4. Emaciation

Postmortem findings :

1. Enlarged and congested spleen (splenomegaly) showing soft pulp
2. Distended gall bladder with dark tarry bile
3. Thin, watery blood, which clots poorly
4. Enlarged, icteric liver, deep orange in colour and distended bile ducts (Fig. 25)
5. Lemon yellow carcass and connective tissue of the sclera of the eye, tendons, pleura, peritoneum, and attachments of diaphragm.

Diagnosis can only be confirmed by detecting parasites in a blood smear stained with Giemsa.

Differential diagnosis : Icterus and anaemia of different causes, anthrax, leptospirosis, emaciation caused by parasitism and malignant lymphoma, babesiosis.

Remarks : The access of biting insects to contaminated fresh blood should be prevented. Blood from suspicious carcasses should not be salvaged.

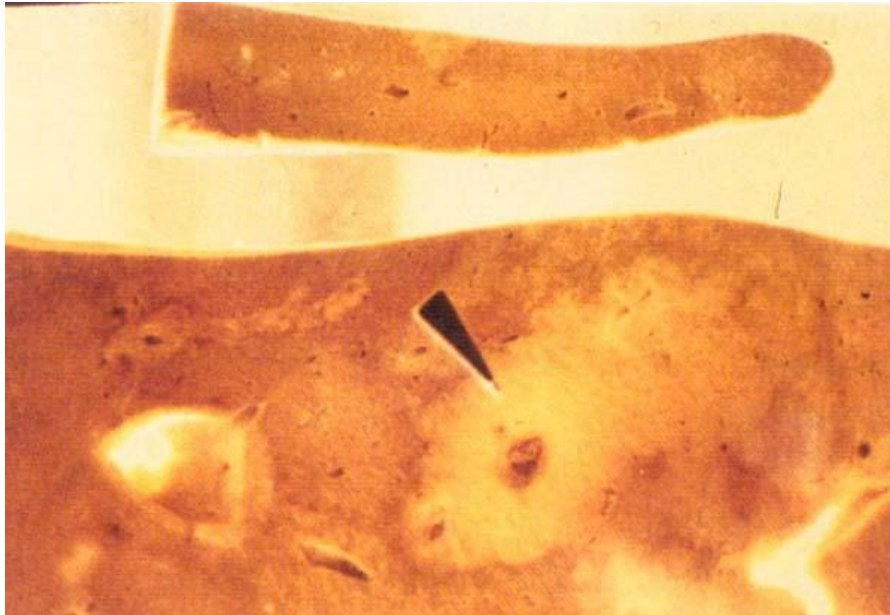


Fig. 25: Anaplasmosis. Ox liver affected with disease showing distended bile ducts.

Babesiosis (Piroplasmosis, Texas fever, Red water fever, Tick fever)

Babesiosis of cattle, horses, sheep and swine is a febrile, tick borne disease caused by various species of the protozoan genus *Babesia*.

Transmission : Different species of ticks in the family Ixodidae serve as vectors in different locations. The *Babesia* parasites can be transmitted transstadially and transovarially within a tick species.

Antemortem findings :

1. Incubation 7–10 days
2. Mortality up to 50 % or over depending on age, breed, etc.
3. High fever (41.5° C)
4. Dark reddish brown urine in the terminal stage
5. Reddened and injected mucous membranes at the early stages and later, anaemic mucous membranes
6. Clinical signs may resemble rabies in cerebral form of babesiosis.

Postmortem findings :

1. Edema and congested lungs
2. Enlarged and yellow liver and distended gall bladder with thick dark green bile.
3. Enlarged spleen
4. Anaemia and pale muscles
5. Jaundice particularly noted in the connective tissue

6. Edematous and haemorrhagic lymph nodes
7. Yellowish-orange colour of musculature (mild cases)
8. Occasionally dark kidneys with no other findings
9. Pink haemorrhage of a bovine brain (Fig. 26)

Diagnosis can only be confirmed by identification of parasite in the peripheral blood smear stained with Giemsa (Fig. 27)..

Differential diagnosis : Anaplasmosis, trypanosomiasis, theileriosis, leptospirosis and bacillary haemoglobinuria.

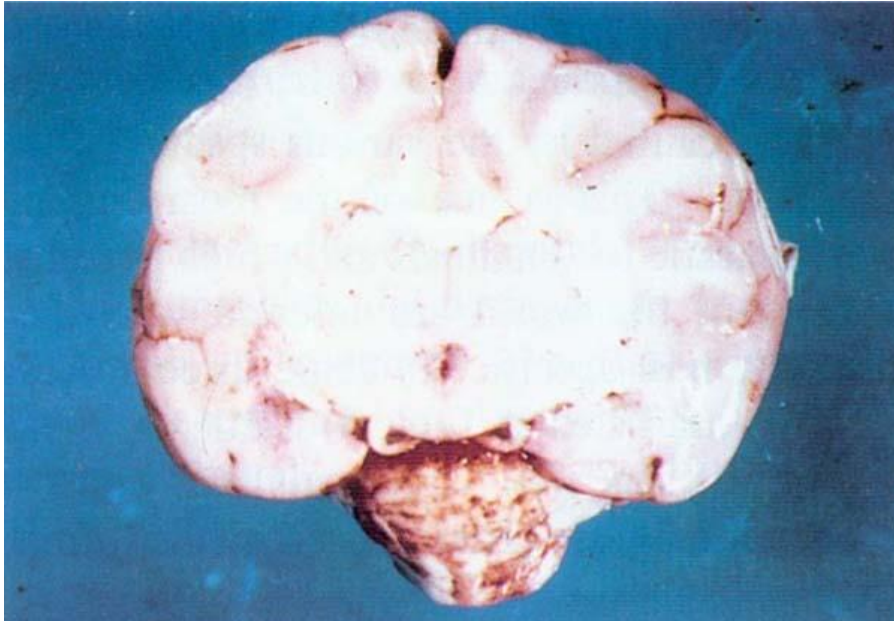


Fig. 26: Pink haemorrhage. Cerebral form of babesiosis caused by *B. bovis*. It is characterized by formation of thrombi and emboli in brain capillaries.

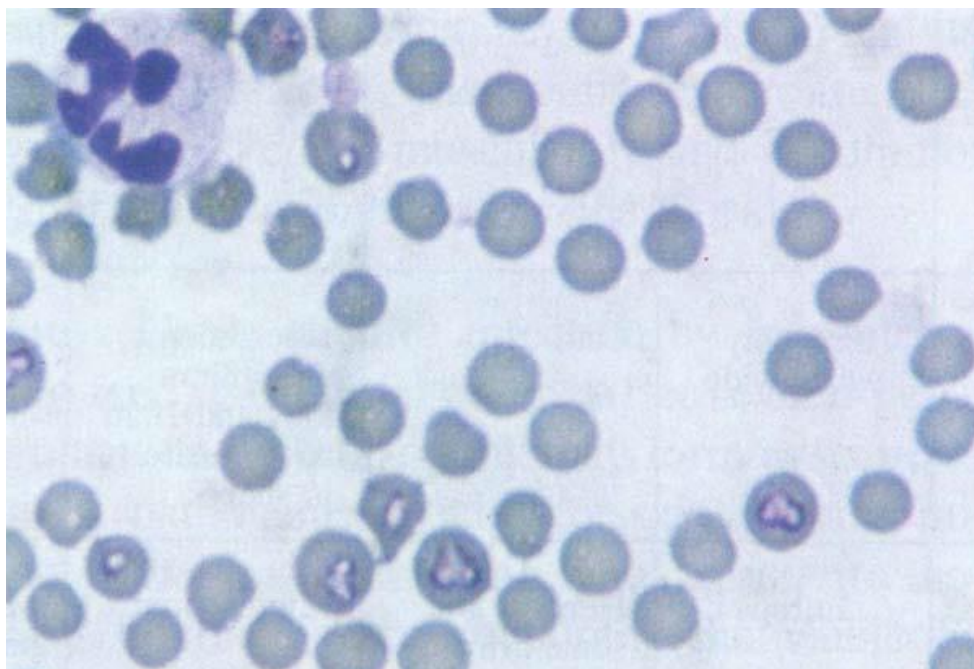


Fig. 27: *Babesia bigemina* in American bison blood.