

## Research

# A Severe Clinical Case of Theileriosis with Terminal Wasting in Adult Cattle: A Veterinary Clinical and Pathology Case Report

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## ABSTRAK

This veterinary clinical and pathology case report describes a severe clinical case of theileriosis in adult cattle with prolonged recumbency and terminal wasting because of complications due to chronic theileriosis in two adult (2-year-old) Jersey-Friesian Cross. The case was referred to the large animal clinic of the University Veterinary Hospital (UVH), Faculty of Veterinary Medicine, Universiti Putra Malaysia (UPM). The animals were presented as recumbent, dull, depressed, hypothermic, dehydrated, and cachexic. There were poor responses of the patients to fluid therapy and non-steroidal anti-inflammatory treatments, and they both died within 24 hrs of clinical presentation. Haematology (complete blood count and serum biochemistry) results revealed haemoconcentration and faecal examinations were negative for liver fluke infestation and blood smear examination was positive for intraerythrocytic piroplasms of *Theileria* (0.01% parasitaemia). Post-mortem examination further revealed advanced cachexia, generalised serous atrophy of fat, hepatomegaly, hepatic congestion, pulmonary congestion, and pulmonary oedema. Histological findings revealed atrophy of the hepatic cord, hepatic congestion, splenic hemosiderosis, pulmonary oedema and congestion. The clinicopathological findings supported an aetiological diagnosis of a severe clinical case of Theileriosis with terminal wasting because of complications due to chronic Theileriosis infection.

**Key words:** Cattle, clinical pathology, malnutrition, theileriosis, wasting

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## INTRODUCTION

Theileriosis, caused by protozoan parasites of the genus *Theileria*, is a significant tick-borne disease affecting cattle globally. Theileriosis in cattle is primarily caused by the protozoan parasites *Theileria annulata* and *Theileria parva* leading to systemic disease characterized by fever, anemia, and lymphadenopathy (Morrison, 2009; Bishop *et al.*, 2020). Clinical signs of theileriosis in cattle vary depending on factors such as the parasite species, host immunity, and environmental conditions. Acute theileriosis is characterized by fever, anorexia, lethargy, and enlarged lymph nodes, while chronic forms may manifest as weight loss, anemia, abortion, and eventual death if left untreated (Bishop *et al.*, 2020; Florin-Christensen & Schnittger, 2020). Diagnosing theileriosis in cattle involves a combination of clinical examination, laboratory testing, and molecular techniques. Microscopic examination of Giemsa-stained

blood smears may reveal intracellular piroplasms, while molecular methods such as PCR assays can detect parasite DNA in blood or tissue samples with greater sensitivity and specificity (Morrison, 2009; Florin-Christensen & Schnittger, 2020). Theileriosis has significant economic implications for cattle farming communities worldwide. The disease can lead to decreased milk production, reduced weight gain, abortion, and mortality, resulting in substantial economic losses due to treatment costs, decreased productivity, and trade restrictions in endemic regions (Morrison, 2009; Bishop *et al.*, 2020). Treatment of theileriosis in cattle typically involves a combination of supportive care and anti-parasitic medications. Supportive care measures may include fluid therapy to address dehydration, nutritional support to combat weight loss, and administration of anti-inflammatory drugs to alleviate fever and pain. Anti-parasitic medications such as buparvaquone or diminazene aceturate may be used to target the *Theileria* parasites directly. However, treatment efficacy can vary depending on the stage of the disease and the host's immune response (Morrison, 2009; Bishop *et al.*, 2020). Pathological changes associated with theileriosis in cattle primarily involve the lymphoid organs, including lymph nodes, spleen, and bone marrow. Gross lesions may include lymphadenopathy, splenomegaly, and hepatomegaly. Histopathological examination typically reveals lymphoid hyperplasia, with infiltration of lymphocytes and macrophages, along with erythrophagocytosis and the presence of schizonts or piroplasms within host cells. Additionally, hemorrhagic lesions and necrosis may be observed in affected tissues (Morrison, 2009; Florin-Christensen & Schnittger, 2020). Effective management of theileriosis in cattle requires a multifaceted approach, including tick control, vaccination, and strategic husbandry practices. Tick control measures such as acaricide application, pasture management, and the use of tick-resistant cattle breeds can help reduce the risk of transmission. Additionally, vaccination with live attenuated or recombinant vaccines can confer protective immunity against theileriosis, although vaccine efficacy may vary depending on parasite strains and host factors (Morrison, 2009; Florin-Christensen & Schnittger, 2020; Bishop *et al.*, 2020).

Wasting and recumbency represent critical challenges to livestock enterprises globally because of their negative effects on production. The most common causes of recumbency in cattle include bone fractures in the axial and appendicular skeleton; traumatic injuries of the skeletal muscles and tendons; nutritional problems such as imbalances in the supply of minerals, protein, and energy; diseases of the nervous system; and the end stage of a chronic systemic illness (Richards & Edwards, 1986; Jonas *et al.*, 1993; Rodriguez *et al.*, 2018). This veterinary clinical and pathology case report describes a severe clinical case of chronic theileriosis with prolonged recumbency and terminal wasting in two adult (2-year-old) Jersey-Friesian Cross cattle.

## CASE PRESENTATION

### History

Two adult (2-years old) Jersey-Friesian Cross cattle (1 male - Brownly & 1 female - Whitey) were referred to the large animal clinic of the University Veterinary Hospital, Faculty of Veterinary Medicine, Universiti Putra Malaysia with a chief complaint of progressive weakness and recumbency. They were from a semi-intensively managed dual-purpose smallholder farm that practiced partial grazing supplemented with hay and silage. They were both vaccinated with the foot and mouth disease vaccine (FMDV) and hemorrhagic septicemia vaccine (HSV), and routinely treated against internal and external parasites.

### Clinical findings

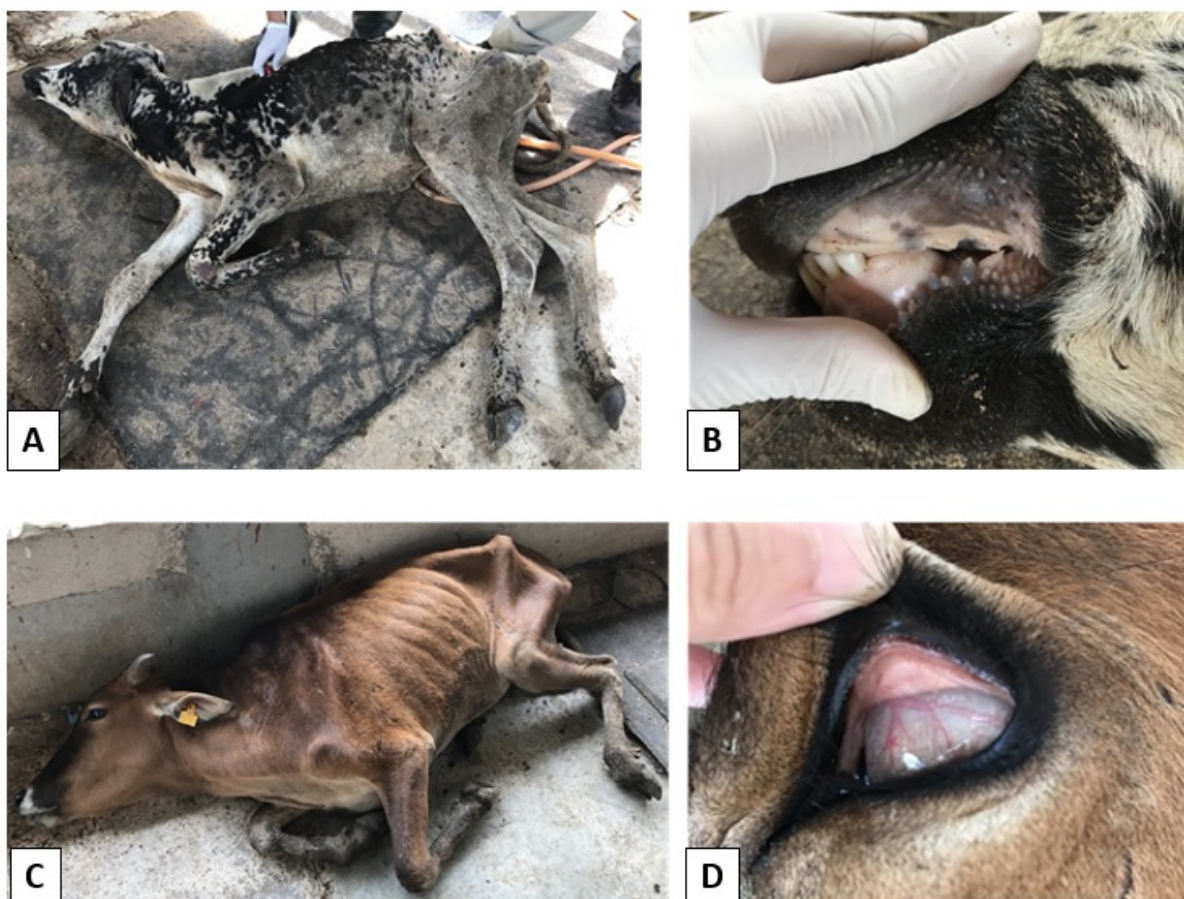
All animals were clinically examined to assess their physical condition and collect samples for laboratory examination (Jackson *et al.*, 2007). The body condition score (BCS) was poor for Brownly (BCS 2/5) and emaciated for Whitey (BCS 1/5). The general clinical signs observed in both cattle were right lateral recumbency, hypothermia (temperature, 34 °C), dullness, depression, dehydration (7-10%), yellowish mucous membrane, and cold extremities. Thoracic auscultation revealed a faint heartbeat and shallow breathing pattern in both cases. Differential diagnosis was severe malnutrition, fascioliasis, and piroplasmosis. Microscopic examination of blood smear detected *Theileria piroplasms* with 0.01% parasitemia in both cases but hematology (complete blood count & serum biochemistry) investigation showed only haemoconcentration where the PCV (L/L) parameter for Whitey (0.28) and Brownly (0.37) was within the normal range (0.24-0.46) and plasma protein (g/L) parameter for Whitey (62) and Brownly (68) and all other parameters was within normal range. Moreover, the fecal examination test was negative for liver fluke infestation and strongyle infection.

### Treatment

Intravenous 50% glucose and Lactated Ringer's solution were initially given as supportive therapy to replace fluid and electrolyte loss and provide energy. An intramuscular injection of flunixin meglumine (2.2 mg/kg) was given to reduce pain and inflammatory reactions. Both animals died the next day, and the carcasses were sent for postmortem examination to ascertain the cause of death.

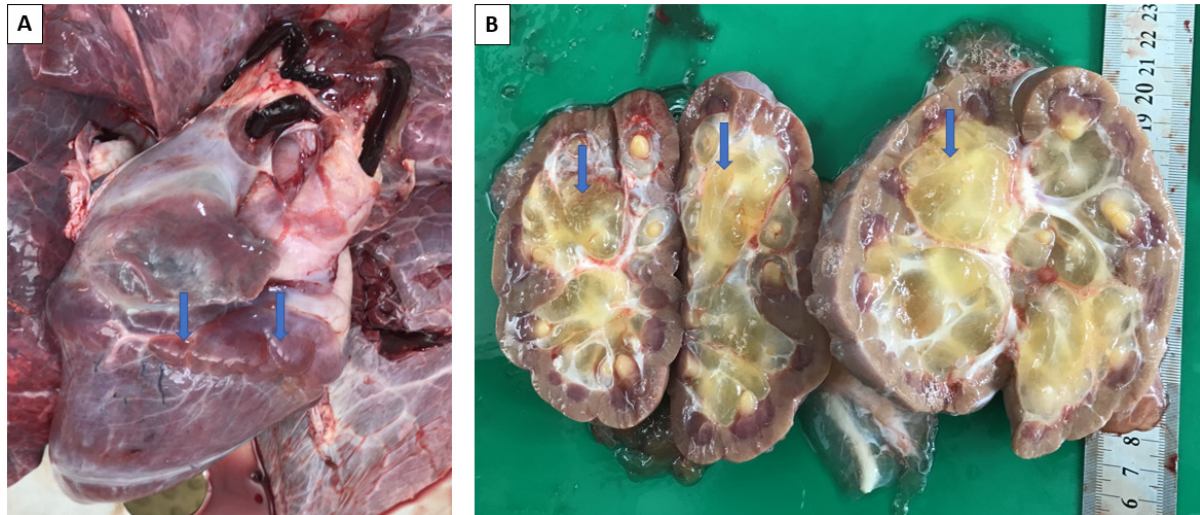
### Pathological findings

Major postmortem findings include advanced cachexia (2/2), prominent ribs, and bony protuberances (2/2) which indicates cachexia (Figure 1). The coronary groove of the heart, gastrointestinal tract, and kidneys were covered with a yellowish gelatinous fluid (2/2), suggesting generalized serous atrophy of the abdominal, renal, and cardiac fat (Figure 2). The liver was dark, congested, and swollen with a distended gallbladder (2/2), suggesting hepatomegaly and hepatic congestion (Figure 3). Additionally, the lungs were diffusely dark-red and firm, failed to collapse, and had an obvious lobular meaty pattern on the cut section with a nodular consolidation of the cranial lobe and frothy exudates in the trachea suggesting pulmonary congestion, edema, consolidation, and pneumonia (Figure 4). There was also generalized congestion of mucous membranes (2/2), edema in the subcutaneous, subserous, and intramuscular connective tissue and fats (2/2), and the accumulation of straw-colored fluid in various body cavities (2/2). For the cellular changes, the spleen shows hyperplasia of the red pulp evidenced by an increased mononuclear cell density and the presence of numerous macrophages containing intracytoplasmic brown pigment suggesting a histopathological diagnosis of splenic hemosiderosis which is a characteristic of piroplasmosis due to hemolytic anemia (Figure 5). In summary, the clinical signs, results of physical examination, laboratory diagnosis, postmortem, and histopathological findings suggest an aetiological diagnosis of severe wasting with possible involvement of *Theileria*.

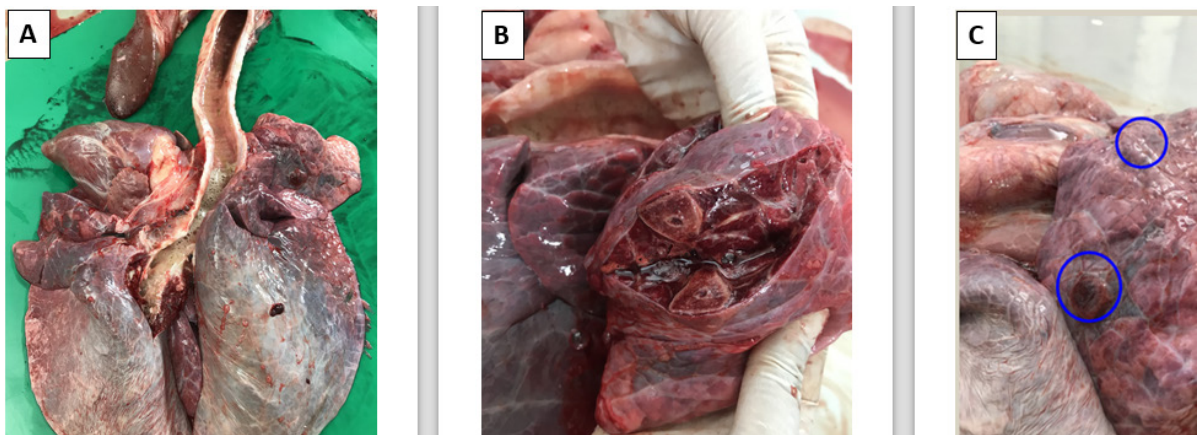


**Fig. 1.** A. Whitey (female) in right lateral recumbency showing emaciation (BCS 1/5) with yellowish mucous membrane (B). C: Brownly (male) in right lateral recumbency showing poor body condition (BCS 2/5) and pale mucous membrane (D).

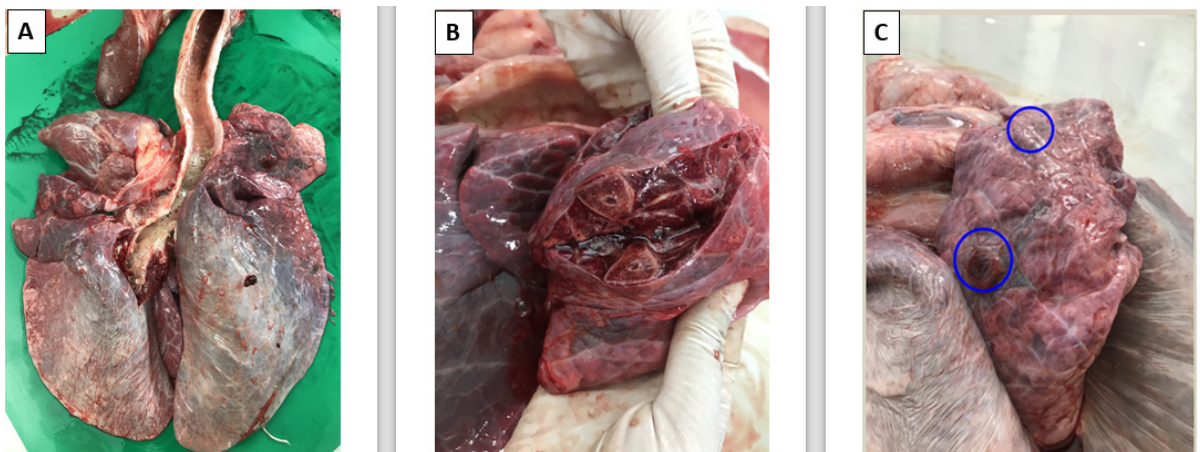




**Fig. 2.** Presence of yellowish jelly-like fluid surrounding the heart (A) and kidneys (B).

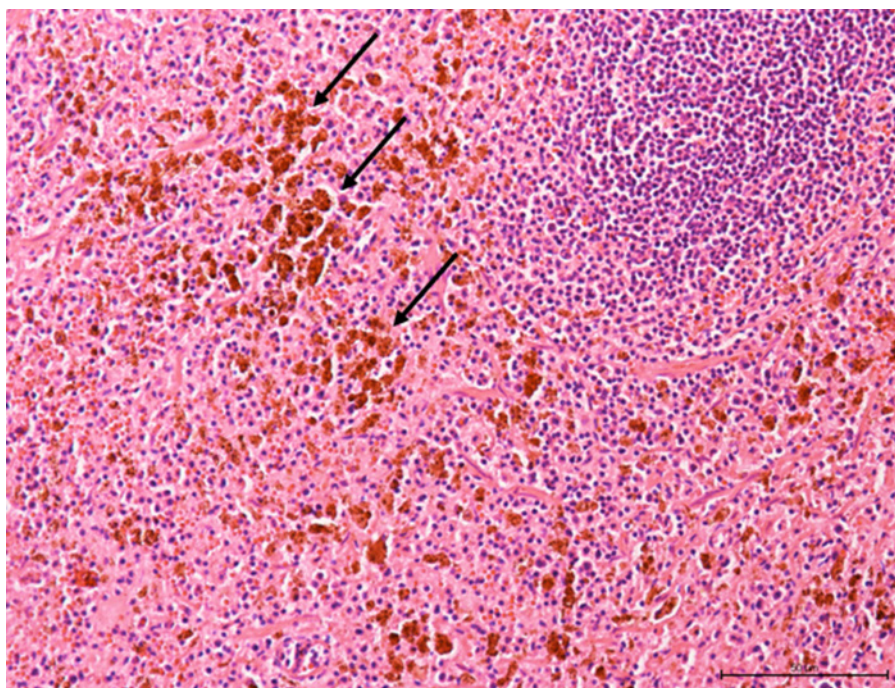


**Fig. 3.** A: Congested liver with swollen edges (blue arrow) and distended gallbladder (red arrows) (Brownly). B: Severely congested and dark liver with a severely distended gallbladder (Whitey).



**Fig. 4.** A: Pulmonary edema marked by the presence of froth in the trachea. B: Pulmonary congestion marked by a dark red discoloration and the presence of blood in the lung. C: Pneumonia and consolidation marked by the presence of multiple nodules in the right cranial lobe of the lung.





**Fig. 5.** Spleen showing macrophages containing intracytoplasmic brown pigment (hemosiderin) (black arrows) and increased mononuclear cell density in the red pulp (red circles). H&E stain 100x magnification.

## DISCUSSION

The two animals presented to our large animal clinic were laterally recumbent, dull, depressed, and cachexic. Both were clinically dehydrated with hypothermia and cold extremities, yellowish mucus membranes, and faint heartbeats. Blood smear examination revealed the presence of *Theileria* species, suggesting piroplasmosis, but haematobiochemical findings suggest a normal haemogram and plasma chemistry, and fecal examination showed negative results. Our diagnosis for this case is severe theileriosis infection with wasting. The poor body condition and recumbency observed in the present case report are due to chronic theileriosis infection and in accord with Richards and Edwards (1986), Jonas *et al.* (1993) and Rodriguez *et al.* (2018) who stated that chronic illness in livestock can lead to poor body condition and recumbency. Bishop *et al.* (2020) and Florin-Christensen and Schnittger (2020) stated that chronic theileriosis can lead to weight loss and the findings of gross pathology, observed in this case, where the generalized serous atrophy of the abdominal, renal, and cardiac fat observed at postmortem examination of the carcasses. As observed in this case, low metabolic rate and loss of muscle mass and fats, caused lethargy, weakness, recumbency, and hypothermia in the affected animals. Poor body condition and severe emaciation are most commonly associated with severe parasitic gastroenteritis and protein-losing enteropathy (Paul *et al.*, 2020), chronic fasciolosis and tuberculosis in ruminants (Biu *et al.*, 2013; Egeh *et al.*, 2015). The accumulation of hemosiderin in the spleen is also a common finding in animals that survived the acute hemolytic phase of piroplasmosis. Moreover, macrophage hyperplasia in the red pulp in this case suggests a chronic infection. Theileriosis caused by *Theileria buffeli*, *Theileria sergenti*, and *Theileria sinensis* is very rampant among cattle in Malaysia, and disease in cattle is associated with anemia, jaundice, lethargy, and weakness (Kho *et al.*, 2017; Ola-Fadusin *et al.*, 2020). The farmer was educated on the importance of herd health program and to control and prevent *Theileria* infection among the livestock and highlighted the sustenance of healthy and well-nourished animals depends on good animal welfare, proper management, and nutrition (OIE Terrestrial Animal Health Code, 2021). The farmer was educated on the provisions of Malaysia's Animal Welfare Act 2015.

## CONCLUSION

This veterinary case report therefore highlights the clinical diagnosis, management, and pathology findings seen in severe theileriosis in large ruminants. The farmer was advised to strictly comply with proper herd health programs via proper farm management that will aid the farmers to have maximum production and profitability from their farm.

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## ETHICAL STATEMENT

Ethical approval is not required for this study.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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