SHORT COMMUNCATION Indian Journal of Animal Research, Volume 59 Special Issue: 197-201 (November 2025)

Theileriosis in Caprine: The First Recorded Case in Nagaland, India

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10.18805/IJAR.B-5678

ABSTRACT

A 2 year old female goat weighing roughly 20 kg was brought to the Veterinary Clinical Complex at College of Veterinary Sciences and Animal Husbandry in Jalukie, Nagaland, with a complaint of reduced appetite for the last three days, the detailed clinical examination revealed tick infestation, elevated body temperature, swollen pre-scapular lymph node and ocular discharge, the goat had regular deworming history. Peripheral blood samples were collected for parasitological examination. 2 ml of whole blood was drawn from the cephalic vein into an EDTA vacutainer for hematological analysis, ticks were also collected for morphological studies. Haematological findings indicated a slight reduction in hemoglobin count with neutrophilia. Microscopically, a blood smear examination revealed the presence of *Theileria luwenshuni*. The goat was treated with a combination of Buparvaquone and Oxytetracycline drugs, along with other supportive supplements and fluid therapy, resulting in relieving the clinical symptoms and clearing the blood of *Theileria luwenshuni* organism from the animal.

Key words: Buparvaquone, Caprine theileriosis, *Haemaphysalis bispinosa*, Oxytetracycline, *Theileria luwenshuni.*

Theileriosis is a severe devastating disease caused by obligated haemoprotozoan parasites belonging to the genus *Theileria*. These intracellular organisms infect wild and domestic ruminants in various parts of the world including tropical and subtropical regions (Dolan and Mutugi, 1989). The disease has become a major issue to the livestock industry and also possesses a serious threat to the goat production due to its significance on International trade of animals and animal products (Abdela and Bekele, 2016; Hurtado and Giraldo-Ríos, 2018). Clinical Theileriosis of goat is mainly caused by *T. lestoquordi, T. luewenshuni* and *T. uilenbergi etc* (Kumar *et al.,* 2022). Caprine Theileriosis has been reported for the first time in China caused by *T. luwenshuni* which is widely distributed and highly pathogenic for goats; typical symptoms include continuous fever, severe anaemia and enlargement of lymph nodes (Yang *et al*., 2022). In India, *Theileria luwenshuni* was first detected from sheep in the state of Karnataka during 2015-16 by Mamatha *et al*. (2017); Later it was detected in Maharashtra by Dhaygude *et al*. (2021) and in the North Eastern state of Assam by (Began *et al*., 2022a). The parasites are distinguished on the basis of apical complex Bishop *et al*. (2004) which contains secretary granules needed for motility, attachment to host and invasion of mammals and arthropod cells (Striepen *et al*., 2007). *Theileria* species are mainly transmitted by Ixodid ticks, when an infected tick takes blood meal from healthy animal and then later invade healthy Red blood corpuscle (RBC), lymph nodes and eventually lead to lympho-proliferation and thus, it will decrease the immunity. *Theileria* causes high mortality and high morbidity as well as heavy economic loss in the livestock population (Haque *et al*., 2011). The diagnosis in the field is mainly based on

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How to cite this article: Kuotsu, K., Ozukum, S., Begam, R., Lalsangpuii, Laltlankimi, Suohu, S., Chutia, T., Devi, N.B., Malsawmkima, Imtiwati, Chakraborty, M. and Das, G. (2025). Theileriosis in Caprine: The First Recorded Case in Nagaland, India. *Indian Journal of Animal Research.* **59 (Special Issue):** 197-201. doi: 10.18805/IJAR.B-5678.

Submitted: 09-09-2025 **Accepted:** 13-11-2025 **Online:** 27-11-2025

clinical signs and symptoms with tick infestation and confirmation by Giemsa stained thin blood smear for the presence of piroplasms in the erythrocytes or Koch's blue bodies in the lymphocytes and monocytes of the swollen lymph node, which is the pathognomonic sign for the disease.

Case history and observation

A 2 year old female goat weighing roughly 20 kg was brought to the Veterinary Clinical Complex at College of Veterinary Sciences and Animal Husbandry in Jalukie, Nagaland, with a complaint of reduced appetite for the last three days, on clinical examination, the goat showed mild pyrexia (104°F), with normal respiratory and heart rate, bilateral nasal discharge (Fig 1), pale mucous membranes (Fig 2) and enlargement of the pre-scapular lymph nodes (Fig 3).

Collection of blood sample

The peripheral blood samples were collected for parasitological examination. By following the protocol of Begam *et al*. (2022b), for haematological examination, 2 ml whole blood was collected in an Ethylene diamine tetraacetic acid (EDTA) vial from the jugular vein on day 1 and day 16 post treatment. The anticoagulated blood was transported on the same day in a sterile container to Veterinary Laboratory Diagnostic section of Veterinary Clinical Complex where the levels of haematological parameters; Haemoglobin (Hb), Pack Cell volume (PCV), Red blood cells (RBC), White blood cells (WBC), Platelets, Neutrophils and lymphocytes were examined using hematology analyzer. Peripheral blood smears were prepared, fixed with methanol and stained with Giemsa stain (Merck Life Science Private Limited, India) and then the blood smears were screened for the presence of haemoprotozoa under microscope examination (Magnus MLXi plus).

Collection of ticks

Tick were collected randomly from different body parts of the animal in a plastic container and labelled properly indicating owner's name, animal's age, breed and sex. The ticks were then sent to the laboratory of Veterinary Parasitology Department for further morphological identification using 45x stereo zoom microscope.

Microscopic examination confirmed the presence of different forms of piroplasms of *Theileria luwenshuni* and *Haemaphysalis bispinosa*

Parasitological examination of blood smears under oil immersion (100x) of microscope confirmed the presence of different forms of piroplasms of *Theileria luwenshuni i.e* comma shaped (Fig 4A), dot shaped (Fig 4B), ring form (Fig 4C), pyriform (Fig 4D) and finger form (Fig 4E) which were similar to the morphological findings reported by Begam, (2016); Yin *et al*. (2007) and Arif *et al*. (2025). The morphological analysis of tick revealed typical characteristics of *Haemaphysalis bispinosa* such as anterior absent of eyes, rectangular basis capitulum (Fig 5a), scutum (Fig 5b), presence of festoon (Fig 5c), lateral projection on palpal article-II (Fig 5d) and dorsal projection on the trochanter (Fig 5e) and anal groove posteriorly (Fig 5f) which were consistent with the findings of Begam *et al*. (2022b) and Hornok *et al*. (2025).

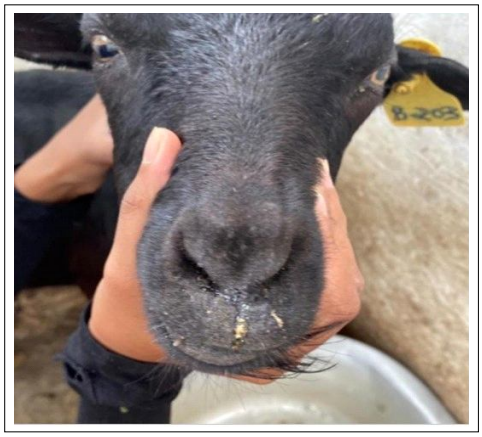


Fig 1: Bilateral nasal discharge.



Fig 2: Pale mucous membrane.



Fig 3: Swollen pre-scapular lymph node.

Haematological test revealed reduced levels of hemoglobin and lymphocyte count in haemoparasite infected goat

Hematological tests conducted on day 1 indicated a reduction in hemoglobin levels (7.5 g/dl) as compared to normal level (8-12 g/dl). There is also a reduction in lymphocyte count (34.9%) in comparison to the normal reference value (50-70%). However, as compared to the normal value (30-56%), there is an increase in neutrophils level (68.1%). Other haematological parameters such as PCV (%), RBC (m/mm^3), WBC (m/mm^3) and Platelets (m/mm^3) were within normal ranges (Table 1). The observed reduced hemoglobin level might be due to destruction of erythrocytes causing anaemia which is similar to the findings of Villanueva-Saz *et al*. (2022) who reported that anaemia mainly results from the destruction of infected erythrocytes in *Theileria* infections. Additionally, Arif *et al*. (2024) also reported that due to the increased phagocytic activity of macrophages, infected red blood cells and platelets gets removed causing anaemia. Anaemia is an abnormal condition mainly occurs by the reduction in hematocrit (PCV), RBCs and haemoglobin concentration.

The observed reduction in lymphocytes count (34.9%) could be due to their destruction in lymphoid organs and their infiltration into various tissues (Çöl and Uslu, 2006). However, both PCV and RBC counts remained within normal limits as the infection might be at initial stage. On day 16 post treatment, hematological parameters were in normal range with mild reduction in WBS and platelets counts Table 1.

Treatment

Following confirmation of haemoprotozoan infection, treatment was initiated with Buparvaquone which was given



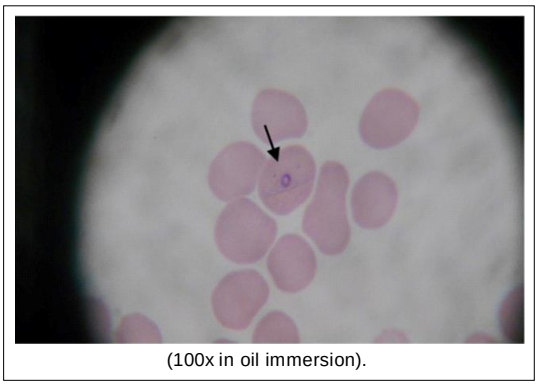
(100x in oil immersion).

Fig 4A: Comma form of giemsa stained blood smear showing multiform of *Theileria luwenshuni* inside the erythrocytes.



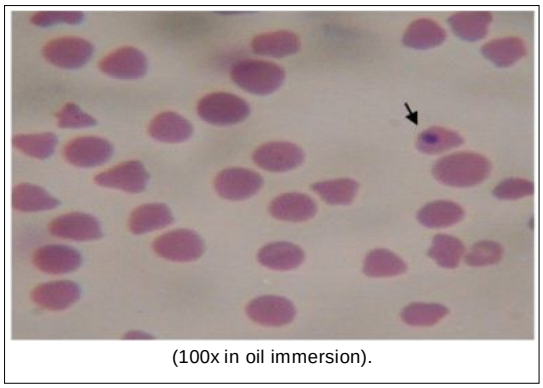
(100x in oil immersion).

Fig 4B: Dot form of giemsa stained blood smear showing multiform of *Theileria luwenshuni* inside the erythrocytes.



(100x in oil immersion).

Fig 4C: Ring form of giemsa stained blood smear showing multiform of *Theileria luwenshuni* inside the erythrocytes.



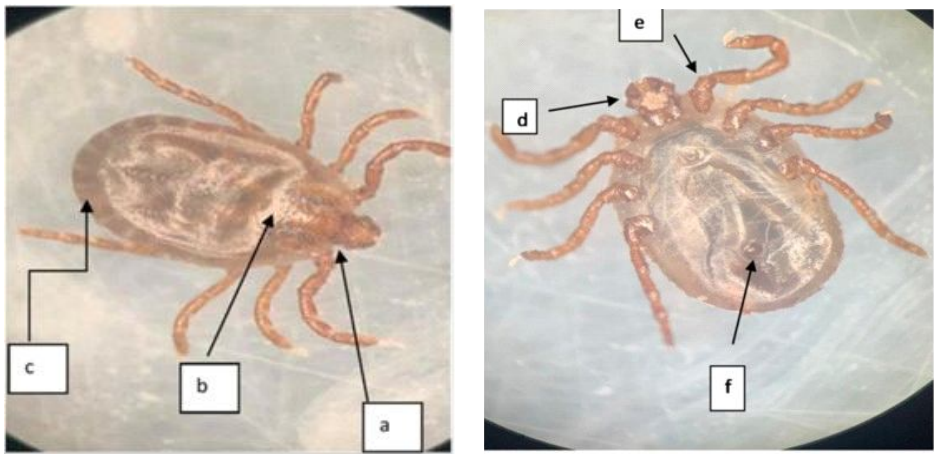
(100x in oil immersion).

Fig 4D: Pyriform of giemsa stained blood smear showing multiform of *Theileria luwenshuni* inside the erythrocytes.



(100x in oil immersion).

Fig 4E: Finger form of giemsa stained blood smear showing multiform of *Theileria luwenshuni* inside the erythrocytes.



a: Rectangular basis capitulum, b: Scutum, c: Festoon, d: Lateral projection on palpal article II. e: Dorsal projection on trochanter I.

Fig 5: Dorsal view of *Haemaphysalis bispinosa.*

Table 1: Hematological changes in goat on day 1 and day 16 (pre and post therapy).

Blood parameters	Values		Reference standard
	Day 1	Day 16	
Hb (g/dl)	7.5	8.5	8.0-12.0
PCV (%)	23.1	27.8	22.0-39.0
RBC (m/mm^3)	14.64	16.2	8.0-18.0
WBC (m/mm^3)	10.01	09.06	4.0-13.0
Platelets (m/mm^3)	264	241	200-600
Neutrophils (%)	68.1	49.2	30.0-56.0
Lymphocytes (%)	34.9	52.4	50.0-70.0

intramuscularly @ 2.5 mg/kg b.wt and was repeated at 48 hrs interval along with a combination therapy of Oxytetracycline @ 5 mg/ kg I/V for 5days to target secondary bacterial infection. Tick control was carried out by using Ivermectin @ 0.2 mg/kg S/C with a repeated dose recommended after one week. Supportive treatment with fluid therapy, Non-steroidal anti-inflammatory drugs (NSAIDs), multi-vitamin injection and hematinics were also administered parenterally for 5 days in order to maintain hydration, reduce fever and to support haematopoiesis.

The treatment protocol followed resulted in improvement of haematopoiesis showing an increase in the Hb count, RBC count and PCV percentage. The advantage of using supportive therapy along with Buparvaquone is also reported by Dhaygude *et al*. (2021), which emphasized that Buparvaquone alone even though it is the preferred drug for treating Caprine theileriosis and Theileriosis in other ruminants; is often not sufficient unless accompanied with other supportive and combined therapy. The use of Ivermectin for tick control was proved to be effective as the blood smear made after 2 weeks *i.e* 16 days post treatment was negative for *T. luwenshuni*. The overall effect of Buvarpaquone with supportive treatment and Ivermectin has shown to remove the ticks and the animal restored appetite and there in an observable weight gain.

CONCLUSION

This study represents the first documented case of *Theileria luwenshuni* infection in small ruminants from Nagaland in the Northeast India region, with the first incidence reported in the state of Assam in 2018. This highlights about the importance of quick diagnosis, increased awareness, effective treatment and tick control to lessen the impact of this parasite.The current weather in Jalukie includes high humidity, frequent rainfall and temperatures between 24°C and 32°C which create an environment that increase the survivability of the ticks and raising the risk of tick-borne diseases like *T. luwenshuni.* Regular use of acaricide, pasture management and livestock monitoring are essential to control the spread of *T. luwenshuni* and other tick-borne diseases.

ACKNOWLEDGEMENT

Authors acknowledge Dean, College of Veterinary Science and Animal Husbandry, Jalukie, Nagaland for support and facilities in the Veterinary Clinical Complex.

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Funding details

No funding was received from any source.

Conflict of interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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