



FIRST REPORT OF SURRA (*TRYPANOSOMA EVANSI* INFECTION) IN IRANIAN SHEEP

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Summary

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Clinical trypanosomiasis in sheep is described for the first time in Iran after history taking, complete physical examination and blood samples collected for laboratory investigations. The client emphasised on animal weight loss dating back to one week ago. The clinical examination revealed enlargements of the pre-scapular and pre-femoral lymph nodes and pale mucous membranes. Laboratory investigation showed that the sheep had anaemia with hyperproteinaemia. Thin blood smear examination revealed the presence of *Trypanosoma*. Treatment included diminazene aceturate (3.5 mg/kg, IM) for three consecutive days, flunixin meglumine (1.1 mg/kg, IM), and oxytetracycline (10 mg/kg, IM). The examination of the blood film after treatment showed no parasite. Trypanosomiasis may occur in our climatic condition in sheep. In two cases studied here, two consecutive doses of diminazene aceturate administration led to clinical cure. The control of trypanosomiasis in farms may be possible through methods for the control of vectors, such as prophylactic treatment and observing of hygiene in husbandry systems for animals at risk.

Key words: blood parasite, diminazene, sheep, *Trypanosoma*

Trypanosomes are flagellated protozoan parasites belonging to the genus *Trypanosoma*, family *Trypanosomatidae*. The parasites generally possess a kinetoplast and undergo cyclical development in an arthropod vector but could be transmitted mechanically. They live in the blood and other body fluids of vertebrate hosts, where some of them cause disease. The pathogenicity of *Trypanosoma* depends on several factors, including parasite-related

aspects (virulence and species), host (breed, species, age, nutritional status, immunological status, presence of co-infection and physical condition), vector, epidemiological situation and the environment (Van den Bossche & Delespaux, 2011). Major clinical features consistent with trypanosomiasis in livestock are fever and anaemia (Taylor & Authié, 2004). In conjunction with other systemic lesions, they could contribute to death

through eventual congestive heart failure. Other clinical findings include pyrexia, spleen and lymph node enlargement, lethargy, ataxia, weight loss, abortion and decrease in milk production. The immunosuppression caused by trypanosomes can affect animal health by increasing susceptibility of the host to other infections. Inflammatory, degenerative lesions are also observed and can damage various organs such as heart, central nervous system (CNS), eyes, testes, ovary, and pituitary gland (Morrison *et al.*, 1983; Taylor & Authié, 2004). This case is the first report of sheep trypanosomiasis in Iran. The importance of this disease in animal production and the need for its early detection and management, the probability of occurrence of trypanosomiasis in our specific conditions suggest that clinicians should consider its occurrence in their differential diagnosis list.

Case description

In the summer of 2019, two sheep about 1 year of age were referred to the Veterinary Clinic and Hospital, School of Veterinary Medicine, Urmia University, Iran. The body condition score (BCS) was 2. Du-

ring the physical examination, the sheep were dull but responsive to environmental insults and showed tachypnea, tachycardia, and fever (40.6 °C). The mucous membrane was pale and capillary refill time (CRT) was more than 3 sec. There was a bilateral enlargement of prescapular, prefemoral lymph nodes.

Laboratory findings. The haematological evaluation showed anaemia (Table 1) and hyperproteinaemia. Buffy coat examination revealed a high trypanosomes count. The microscopic examination of thin blood smear revealed trypanosomes and no other blood protozoa (Fig. 1). Therefore, the final diagnosis established was sheep trypanosomiasis.

Treatment. Anti-parasite therapy with diminazene aceturate dosed at 3.5 mg/kg intramuscularly (IM) was administered for 3 consecutive days. Another 2 doses were given once every 2 days following the first injection. One mL of Cyanoferrin® (iron dextran and cyanocobalamin combination) was given intramuscularly once as an iron supplement to treat anaemia caused by trypanosomiasis. At the same time, oxytetracycline (10 mg/kg) and flunixin meglumine (1.1 mg/kg) were given once a day.

Table 1. Average haematological alterations in sheep affected with *Trypanosoma*

Parameter	Normal range	Affected sheep
PCV (%)	24–49	11.9
HB (g/L)	90–150	40.6
RBC ($\times 10^{12}/L$)	9.0–15.0	3.96
MCV (fL)	28–40	30.2
MCH (pg)	8.0–12.0	11.70
MCHC (g/L)	310–340	380.7
Total WBC ($\times 10^9/L$)	4.0–12.0	6.20
Platelets $\times 10^9/L$	3–8	9.96
Total protein (g/L)	60–79	89
Fibrinogen (g/L)	1–5	9

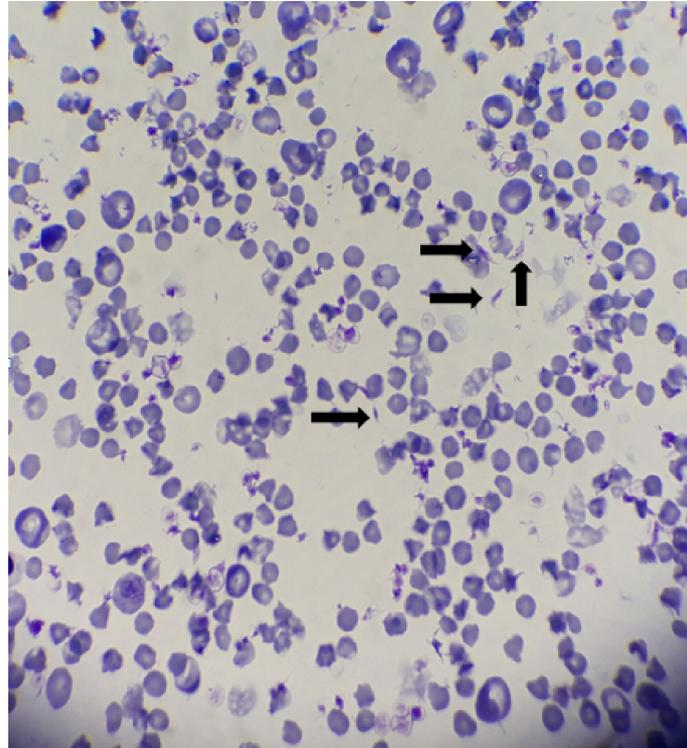


Fig. 1. *Trypanosoma evansi* demonstrated by thin blood smear.

Follow up. The sheep were revisited one week after treatment. The animal responded well to the treatment as the appetite recovered and they became more active within one week of treatment. Another blood sample was taken to check for presence of trypanosomes. The microscopic examination of the second blood smear revealed neither trypanosomes nor other blood protozoa.

Few records exist on the effect of trypanosomiasis in small ruminants. To the best of our knowledge, this is the first documented case of trypanosomiasis in Iran. This disease in sheep is of economic importance and proper diagnosis and treatment are very important. Our goal with this case report was to make veterinarians in Iran paying attention to *Try-*

panosoma and consider this infection in the differential diagnosis of diseases.

The golden diagnostic test for trypanosomiasis is direct parasitological detection using a microscopic examination of blood smear. However, the sensitivity of blood smear is limited because less than 50% of infected animals could be identified with blood smear (Sivajothi *et al.*, 2016). In acute trypanosomiasis, it is always associated with high parasitaemia which increases the detection rate via blood smear. The detection window decreases as the disease progresses into a more chronic form due to low parasitaemia (Desquesnes *et al.*, 2013a). *Trypanosoma evansi* is a parasite from the subgenus *Trypanozoon* that has a wide host range and geographical distribution worldwide. Horseflies

(*Tabanus* spp.) and stableflies (*Stomoxys* spp.) can mechanically transmit *T. evansi* from one infected host to another (Brun *et al.*, 1998). As sheep and goats are not regular hosts of *T. evansi*, based on the reports available, it is difficult to decide on their susceptibility (Desquesnes *et al.*, 2013b). Natural infection with *T. evansi* is generally considered as mild or asymptomatic in sheep. The experimental infections can cause several symptoms such as fever (40 °C), lack of appetite, and anaemia; prolonged hyperthermia, modification of behaviour such as exhaustion or sudden aggressiveness. In some cases, parasitaemia is generally low (10⁵ parasites/mL) and decreases until undetectable for several months; however, under certain circumstances such as food restriction or transport stress, parasites can relapse into the blood and clinical signs reappear (Desquesnes *et al.*, 2013a).

In this study, decrease in blood Hb, PCV, RBC was observed as main features of the disease. The presence of live trypanosomes could be the cause of the anaemia (Holmes & Jennings, 1976). This is in line with previous studies in goats, sheep, Friesian calves and buffaloes infected with *T. evansi* (Ngeranwa *et al.*, 1991; Onah *et al.*, 1996).

The observed pyrexia in the present study is partly due to metabolic disorder from the presence of circulating trypanosomes, and their by-products which could play significant role in the process of haemolysis, and consequently induce fall in PCV (Audu *et al.*, 1999). The reduced body weight of infected sheep is an indication of the wasting nature of trypanosomiasis (Audu *et al.*, 1999).

Treatment of trypanosomiasis caused by *T. evansi* is based on the drugs suramin, diminazene, quinapyramine and cymelarsan (Brun *et al.*, 1998). Choice of drug,

dosage and route of application depend on the animal species and the management in a given area as well as on the chemosensitivity of the *Trypanosoma* strains (Brun *et al.*, 1998). Diminazene aceturate (at 3.5–7.0 mg/kg BWt, IM) is the first option of treatment in trypanosomiasis. There are many documents that emphasised these 2 doses at 5-day interval can totally eliminate the trypanosomes (Radostits *et al.*, 2006).

This case report describes the first case of sheep trypanosomiasis in Iran. Individual cases of trypanosomiasis can be treated with diminazene aceturate. In this case, 2 doses of diminazene aceturate led to clinical cure. The control of trypanosomiasis at farms may involve control of vectors, prophylactic treatment and good husbandry of animals at risk.

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