

# Prevalence of trypanosomosis in camel calves: A pilot study in Laikipia District of Kenya

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## Key words

Dromedary - Young animal -  
*Trypanosoma evansi* - Trypanosomosis -  
Kenya.

## Summary

Trypanosomosis is one of the most important diseases affecting camel calves. It presents itself as an acute form and is usually fatal if treatment is not carried out. A study was initiated at Mogwooni ranch in Laikipia District of Kenya to survey the prevalence of trypanosomosis in camel calves of mixed breeds, and to evaluate the microhematocrit centrifugation technique (MHCT), monoclonal antibody based card latex agglutination test (Suratex<sup>®</sup>), wet smear and mouse inoculation (MI) in the diagnosis of the disease in camels. The tests were assessed for a period of 16 months. Mean *Trypanosoma evansi* prevalence ranged from 4.5% as determined by the wet smear, 11.1% by MHCT, 14.6% by MI, to 28.3% by Suratex<sup>®</sup>. Young calf death rate due to trypanosomosis was 12.3%, while overall mortality was 15%. The cost of veterinary care (anthelmintics, acaricides and trypanocides) was on average US\$4.6 per calf per year. It is thus recommended that diagnosis accompanied by proper treatment be carried out routinely for the survival of camel calves in trypanosomosis endemic areas.

## ■ INTRODUCTION

Camels have been a neglected domestic species in the promotion of livestock health and production. Only recently have they become the subject of intense and systematic interest in connection with increasing productivity of the arid and semiarid lands (ASALs). Kenya has a camel population estimated at 1 million (2) of which 99% are reared in trypanosomosis endemic areas. More than half (60%) of Kenya's land mass lies in the ASAL, where the camel has proved to be the most suitable livestock species. For pastoralists who live on these lands, the camel plays a major economic role in subsistence, particularly in the provision of milk, and forms the corner stone of the social organization of the pastoral society (1).

Information on camel calf diseases in Kenya is sparse. Data on the prevalence of trypanosomosis, which is a major killer disease in calves, is particularly lacking. Olaho *et al.* (7) noted that trypanosomosis causes anemia, mortality and impaired growth. Moreover, recent studies in Kenya have shown that camel trypanosomosis is endemic in Laikipia District and is by far the most important disease affecting the camel (5). The disease is caused by *Trypanosoma evansi* and runs an acute course.

More emphasis is being placed on camel calf improvement because it forms the future of the camel stock. Thus, more and systematic studies need to be carried out on this age group in camel herds. The primary objective of the present study was to investigate trypanosomosis prevalence in camel calves (suckling and immature) under an extensive ranch management system and to further validate the available diagnostic tests for camel trypanosomosis.

## ■ MATERIALS AND METHODS

### Study area

The study was conducted at Mogwooni Ranch, in Laikipia District of Kenya. Laikipia District is one of the 24 ASAL districts in Kenya. It lies between longitudes 36°4' W and 37°27' E and between latitudes 0°17' S and 0°45' N. During the study period the annual rainfall ranged from 600 to 900 mm. The vegetation is predominantly Savannah with scattered acacia and shrubs. Large numbers of biting flies (*Stomoxys* spp.) inhabit the dry riverbeds, especially during the wet season (5).

### Herd structure

Data on 84 calves was collected monthly for 16 months from July 1997 to October 1998. All animals were kept under an extensive ranch management system and grazed as a single herd. Two age

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groups were recognized in the herd: suckling (up to 18 months of age) and immature (between 19 and 36 months). They were of Pakistan, Somali and Turkana breeds and their crosses. Introduction of Pakistan breeds in Kenya was an effort to improve camel husbandry especially in terms of milk production (9).

### Parasitological examinations and packed cell volume (PCV)

Trypanosome infections were detected using the Suratex<sup>®</sup> (3) microhematocrit centrifugation technique (MHCT), mouse inoculation (MI) and wet blood smear method. PCV was determined monthly using EDTA-blood and MHCT (7).

### Indicators of mortality

Two basic mortality rates were calculated for the time covering the study period:

$$\text{Crude death rate (\%)} = \frac{\text{Num. of deaths/year} \times 100}{\text{Average herd size}}$$

Young stock death rate (%)

$$= \frac{\text{Num. of deaths of animal} \leq 3 \text{ years/year} \times 100}{\text{Num. of live births}}$$

### Cost of drugs

Data on the type, amount and cost of drugs administered to each camel calf was recorded. From this, the cost of drugs used during the study period was calculated.

### Data analysis

PCV between infected and non-infected calves in the different age groups was done by analysis of variance (ANOVA) while agreement between tests was measured by the kappa test. For ANOVA, a value of  $P \leq 0.05$  was considered significant.

## RESULTS

### Herd investigation

Table I shows the percentage infection rates in each age group. Immature calves were the most affected group. Out of the total number of calves that were infected, 35 (23.17%) were suckling and 112 (76.8%) were immature. The Pakistan breed had the highest number of infected calves with 51 (34.4%), followed by the Pakistan-Somali crossbreed with 41 (27.8%), the Somali breed with 33 (22.2%), the Turkana and Somali-Turkana crossbreeds with 11 (7.8%) each.

### Hematology and serology

Table II shows the analysis of variance for PCV between infected and non-infected calves in different age groups. Significant differences were observed between the suckling and immature groups of animals.

### Diagnosis

The most sensitive method of detecting trypanosome infection was Suratex<sup>®</sup> (table III). It however failed to detect 13 MHCT positive

Table I

Percentage of infections detected in each camel age group using the microhematocrit centrifugation technique

Group	Total num.	Infected	%
Suckling	480	35	7.3
Immature	844	112	13.3

Table II

Analysis of variance of PCV between infected and non-infected camel calves in the different age groups

Group	n	Moyenne $\pm$ SEM	P
Suckling			
Infected	35	22.4 $\pm$ 0.58	0.001
Non-infected	445	24.9 $\pm$ 0.18	
Immature			
Infected	112	23.7 $\pm$ 0.19	0.001
Non-infected	732	27.5 $\pm$ 0.11	

Table III

Prevalence of trypanosomosis in camels at Mogwooni Ranch (July 1997-October 1998)

Detection method	Num. of tests	<i>T. evansi</i>
Wet blood smear	1324	60 (4.5%)
Microhematocrit centrifugation technique	1324	147 (11.1%)
Mouse inoculation	1324	193 (14.6%)
Suratex <sup>®</sup>	1324	372 (28.1%)

cases with large numbers of trypanosomes (+ 6) in the blood. Suratex<sup>®</sup> detected 137 (91.1%) MHCT positive samples and 175 (90.7%) MI positive samples. All infecting trypanosomes were identified as *Trypanosoma evansi*. The calves that were infected with *T. evansi* were reported to eat soil. The test of agreement between Suratex<sup>®</sup> and MHCT, Suratex<sup>®</sup> and MI, and Suratex<sup>®</sup> and WS were 0.8, 0.5 and 0.1, respectively.

### Mortality due to trypanosomosis

Most deaths were recorded during the wet season. The crude and young stock death rates were 10 (11.9%) and 5 (10.6%) during the wet season (March-June and November-December), and 3 (3.5%) and 1 (2.1%) during the dry season (January-February and July-October), respectively. Other causes of deaths were diarrhea and accidents.

### Cost of treatment

Trypanocides were the most used drugs, followed by acaricides, while the use of antibiotics and anthelmintics was low. The total costs of trypanocides, acaricides, anthelmintics, and antibiotics

were US\$ 200, 102, 87 and 21, respectively. The average costs of trypanocides per camel calf per year for Pakistan, Somali, Turkana, Pakistan-Somali and Somali-Turkana breeds were US\$ 4.5, 1.5, 1.5, 2.5 and 0.5, respectively.

## ■ DISCUSSION

Trypanosomosis is endemic in most camel herds in Kenya. The results of the present study show that the disease was endemic in this herd as evidenced by the serological and parasitological results. Correct diagnosis of the disease is essential to administrate the appropriate treatment. This effort, however, is hindered by the lack of a sensitive and specific diagnostic kit. Suratex<sup>®</sup>, a test that detects circulating trypanosomose antigens, was the most sensitive in detecting infections, although it failed to detect some parasitologically positive cases. This may occur during the early stages of the disease before sufficient trypanosomes have been destroyed by the host immune response to release measurable quantities of antigen in peripheral circulation (4). In some instances some positive camel calves were reported to lick soil. This behavior was not recorded in other calves. The authors do not have an explanation for this, but it may indicate depletion of some minerals and/or depraved appetite (PICA), which might be trypanosomosis-related.

Infections and mortality due to trypanosomosis were high during the wet season, possibly due to the increase in fly numbers. The only trypanosome species recorded was *T. evansi*. The absence of other trypanosome species could be due to the lack of tsetse fly vectors in the study area. Immature camels had a higher disease incidence, suggesting a higher exposure to biting flies and/or higher susceptibility to trypanosomosis. The lower disease incidence observed in suckling camels may be attributed to less exposure to biting flies and protection by maternal antibodies during suckling. The devastating effects of the disease were evident in the anemic state of the immature camels. This may result in a slow growth rate, a longer duration to maturity in cases of chronic infections, and even death.

Introduction of Pakistan breeds in Kenya was an effort to improve camel husbandry especially in terms of milk production (9). It has however been shown from previous studies that these breeds are more susceptible to trypanosomosis than local ones (5). This is further supported by the amount of trypanocides used on them when compared to other breeds. The Pakistan camel is therefore being crossbred with local breeds in order to overcome the high susceptibility to infection. Crossbred calves were less susceptible to trypanosomosis than pure Pakistan ones. Longitudinal studies

are however necessary in order to monitor their reproductive and productive performance in trypanosomosis endemic areas.

Although trypanosomosis is a major constraint to camel husbandry, constant surveillance followed by instant and proper treatment could contain the situation. As a strategic control of trypanosomosis calves should avoid areas where vectors are in large numbers, and there should be applications of pour-on rather than blanket treatment with trypanocides. This would improve the camel calf health, and therefore the camel stock performance.

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**Résumé**

**Njiru Z.K., Ole-Mapeny I.M., Ouma J.O., Ndung'u J.M., Olaho-Mukani W.** Prévalence de la trypanosomose chez le chamelon : une étude pilote dans le district de Laikipia au Kenya

La trypanosomose est l'une des maladies les plus importantes du chamelon. Elle se présente sous une forme aiguë et est généralement fatale si aucun traitement n'est administré. Une étude a été effectuée au ranch de Mogwooni dans le district de Laikipia au Kenya pour déterminer la prévalence de la trypanosomose chez des chamelons de races diverses et pour évaluer la technique de centrifugation en tube pour microhématocrite (Tcmh), le test d'agglutination sur carte au latex sensibilisé avec des anticorps monoclonaux (Suratex®), l'examen à l'état frais et l'inoculation à la souris (IS) dans le diagnostic de la maladie chez le chamelon. Les tests ont été évalués pendant une période de 16 mois. Les prévalences moyennes de *Trypanosoma evansi* ont été de 4,5 p. 100 (test à l'état frais), 11,1 p. 100 (Tcmh), 14,6 p. 100 (IS) et 28,3 p. 100 (Suratex®). Le taux de mortalité des chamelons dû à la trypanosomose a été de 12,3 p. 100 pour un taux global de mortalité de 15 p. 100. Le coût des soins vétérinaires (anthelminthiques, acaricides et trypanocides) a été en moyenne de 4,6 dollars américains par chamelon et par an. Il est donc recommandé que le diagnostic soit systématiquement accompagné d'un traitement approprié pour assurer la survie des chamelons dans les zones où la trypanosomose est endémique.

**Mots-clés :** Dromadaire - Jeune animal - *Trypanosoma evansi* - Trypanosomose - Kenya.

**Resumen**

**Njiru Z.K., Ole-Mapeny I.M., Ouma J.O., Ndung'u J.M., Olaho-Mukani W.** Prevalencia de la tripanosomiasis en camellos jóvenes: estudio piloto en el distrito de Laikipia en Kenia

La tripanosomosis es una de las principales enfermedades que afectan a los jóvenes camellos. Se presenta en forma aguda y, si el tratamiento no es administrado, es usualmente fatal. Se inició un estudio en el rancho Mogwooni, en el distrito de Laikipia, en Kenia, con el fin de observar la prevalencia de la tripanosomosis en camellos jóvenes de varias razas, así como para evaluar la técnica de centrifugación del microhematocrito (MHCT), el test de aglutinación en tarjeta de látex de anticuerpos monoclonales (Suratex®), frotis húmedo e inoculación en ratones (MI) para el diagnóstico de la enfermedad en camellos. Los exámenes fueron realizados durante un periodo de 16 meses. La prevalencia media de *Trypanosoma evansi* varió de 4,5 %, determinada mediante el frotis húmedo, 11,1 % con el MHCT, 14,6 % con el MI hasta 28,3 % con Suratex®. La tasa de mortalidad del joven, debido a tripanosomosis fue de 12,3 %, mientras que la mortalidad general fue de 15,0 %. El costo en cuidados veterinarios (anti-helmínticos, acaricidas y tripanocidas) fue en promedio de US\$4,6 por joven por año. Para la sobre vivencia de los jóvenes camellos en las áreas endémicas con tripanosomosis, se recomienda llevar a cabo de forma rutinaria, un diagnóstico acompañado por un tratamiento apropiado.

**Palabras clave:** Dromedario - Animal joven - *Trypanosoma evansi* - Tripanosomosis - Kenia.