

Full Length Research Paper

## Survey on Prevalence of Haemoparasites of Trade Camels (*Camelus dromedarius*) in Maiduguri; Nigeria

Y. Wakil<sup>1\*</sup>, J. R. Lawal<sup>1</sup>, Y. A. Gazali<sup>2</sup>, F. B. Mustapha<sup>3</sup>, A. M. Bello<sup>1</sup>, E. S. Mshelia<sup>1</sup> and A. M. Ayomikun<sup>1</sup>

<sup>1</sup>Department of Veterinary Medicine, Faculty of Veterinary Medicine, University of Maiduguri, PMB 1069, Maiduguri, Borno State, Nigeria.

<sup>2</sup>Department of Veterinary Anatomy, Faculty of Veterinary Medicine, University of Maiduguri, PMB 1069, Maiduguri, Borno State, Nigeria.

<sup>3</sup>Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Maiduguri, P M B 1069, Maiduguri, Borno State, Nigeria.

Accepted 28th July; 2016

### Abstract

In an attempt to evaluate the prevalence of haemoparasites in trade camels (*Camelus dromedarius*) slaughtered at the Maiduguri abattoir, whole blood samples were collected and tested. Out of 202 total blood samples collected and examined microscopically for the presence of one or more haemoparasite species an overall prevalence rate of 60.4% was found in Maiduguri. *Babesia* species 49(24.3%) were found to be more prevalent, followed by *Anaplasma* species 41(20.3%) and *Trypanosoma* species 32(15.8%) respectively. Considering the risk factors associated with prevalence of haemoparasites in camels in the study area, higher prevalence was found in female camels 73(36.1%) than the male camels 49(24.3%), although there was no significant statistical difference in prevalence rate amongst the sexes. However, haemoparasitic infection was found to be more frequent in camels during the rainy season 82(40.6%) as compared to dry season 40(19.8%), there was a statistical significant difference ( $p < 0.0001$ ) between the prevalent rates among the season. It was therefore concluded that there is a high prevalence of haemoparasitic infections in trade camel which may constitute a major health and economic problem in the camel production; therefore there is a need for routine vaccination and periodic medication against haemoparasitic infections of camels in the Arid and Semiarid Northeastern Nigeria.

**Keywords:** Prevalence, haemoparasites, Trade camels (*Camelus dromedarius*), Maiduguri, Northeastern Nigeria.

---

### INTRODUCTION

Camel production in developing countries of Africa including Nigeria suffers heavy economic losses due to haemoparasitic and gastrointestinal infections (Kamani *et al.*

*et al.*, 2008). The most common manifestations of parasites in camels are anaemia, emaciation, rough hair coat, retarded growth, reduced ability and ill thrift (Kamani *et al.*, 2008). Haematological and biochemical analysis of blood can often provide valuable information regarding the health and the sickness status of the animals (Dessouky, 2006; Rabana *et al.*, 2011; Qablan *et al.*, 2012).

---

Corresponding author email: [rabanajallailudeen@yahoo.com](mailto:rabanajallailudeen@yahoo.com)

Camels in the northern part of the country are bred under free range nomadic system of management over a wide expanse of uncultivated pasture with a poor or even no veterinary attention (Bathia, 2010; Ukashatu *et al.*, 2012). The one humped dromedary camels (*Camelus dromedarius*) obtained its name from the Greek word "dromedros" meaning "running" while the two humped Bactrian camel (*Camelus bactrianus*) is named after the area of Bactriana in central Asia where they are primarily found, (Higgins *et al.*, 1983).

In Nigeria the camel population has been estimated to stand at about 92,494 as at 2000 (Felsner, 2002). The Nigerian camel population is mainly found around the arid zone of the country and this is shown from the slaughter figures recorded at 11,000 camels per annum in Borno state (Ghaji and Adogia, 1986).

Diseases are the major factors affecting the camel production in many developing countries, causing lower productivity and increase morbidity and mortality rate in the animal (Radostits *et al.*, 2007). Previous studies conducted have revealed that camels are usually infected by gastrointestinal parasites as well as haemoparasites which tend to affect their health and are of economic importance (Parsani *et al.*, 2008; Borji *et al.*, 2010). Prevalence studies on haemoparasites of camels in Maiduguri have not been critically addressed. This present study, therefore, aimed to determine the current status of the prevalence of haemoparasitic infections amongst trade camels (*Camelus dromedarius*) slaughtered at Maiduguri Abattoir and to evaluate the risk factors such as sex and season associated with the occurrence of the parasites.

## MATERIALS AND METHOD

### Study area

This study was conducted in Maiduguri, Borno State which lies within the semi-arid zone of the Northeastern part of Nigeria, lies between Latitude 11°N and Longitude 13°E. The relative humidity is generally low throughout the state, ranging from as low as 13% in the driest months of February and March to the highest values of 70-80% in the rainy season months of July and August. The raining season last for less than eighty days in the extreme north; the mean annual rainfall is about 600mm or less than 500mm in the extreme north around the Chad Republic.

The semiarid nature of the Sahel and the northern Sudan savannah consist mainly of open Acacia tree vegetation which can no longer support a livestock population of the state. There is an increase in camel rearing in this region to meet up with the increasing animal demand of animal protein need in the area (Nwonsu *et al.*, 2007).

## Study design and sample size determination

A stratified random sampling technique was adopted to determine the prevalence of haemoparasites in trade camels slaughtered in Maiduguri abattoir. Blood samples were collected from the Maiduguri abattoir between January to December, 2015. The sample size was estimated based on the formula described by Thrusfield (2005) and previous prevalence of 92.4% as reported by (Pwaveno and Arunsi, 2011). But about 202 camels were sampled.

## Sample collection

Blood sample was collected for haematological analysis, about 3 - 5ml of blood was collected directly from the severed jugular vein of each camel during slaughter with a sterile tube containing Sodium Ethylene Diamine Tetra Acetic acid (Na<sub>2</sub>EDTA) as an anticoagulant and labeled appropriately. The tubes were gently rotated to ensure proper mixing of the blood with the anticoagulant (EDTA) without damaging the integrity and transported immediately in an ice pack to the University of Maiduguri, Department of Veterinary Medicine Research Laboratory for hematological analysis. Microscopic identification of the presence of haemoparasites was carried out as previously described by Swelum *et al.* (2014). Haemoparasites were identified based on morphological features described by Soulsby (1982).

## DATA ANALYSIS

The data collected were analyzed by a Chi square test using Graph Pad InStat version 3.05.

## RESULTS

The prevalence of haemoparasites infection in trade camels in Maiduguri, Northeastern Nigeria, which indicated that *Babesia* species 49(24.3%) had the highest prevalence rates, followed by *Anaplasma* species 41(20.3%) and *Trypanosoma* species 32(15.8%) respectively (Table 1). The result of risk factors associated with the prevalence of haemoparasitic infections among trade camels in Maiduguri shows that infections are more common among the female camels 73 (36.1%) than in the males 49(24.3%). There was no statistical association between the sex and occurrence of the parasites ( $p= 0.3764$ ). However, haemoparasitic infections in camels were found to be more prevalent during the rainy season 82(40.6%) than in the dry season 40(19.8%). There was a statistical significant difference between the seasons and occurrence of infection ( $p < 0.0001$ ) (Table 2).

**Table 1.** The prevalence of various haemoparasites examined in the camels in Maiduguri

Haemoparasites	Number of examined (y = 202)	Number of positives (x)	Prevalence % (x/y X 100)
<i>Babesia species</i>	202	49	24.3
<i>Anaplasma species</i>	202	41	20.3
<i>Trypanosome spp</i>	202	32	15.8
Total	202	122	60.4

**Table 2.** The prevalence of haemoparasites in relation to sex of camel in Maiduguri

Risk factors	Parameter	No. examined (N= 202)	No. infected (%)	No. uninfected (%)	95% CI L-U	p-value
Sex	Male	87	49 (24.3)	38 (18.8)	0.4526 – 0.6689	0.3764
	Female	115	73 (36.1)	42 (20.8)	0.5395 – 0.7229	
Season	Rainy	100	82 (40.6)	18 (8.9)	0.7378 – 0.8895	< 0.0001
	Dry	102	40 (19.8)	62 (30.7)	0.2969 – 0.4934	

**Key:** N = total number of camels examined; 95% CI = Confidence interval; L – U = Lower limit and Upper limit

## DISCUSSION

The overall prevalence of haemoparasitic infection in camels was found to be 60.4% which is higher than 14.2% previously reported by Kamani *et al.* (2008), lower than 79.0% reported by Rabana *et al.* (2011) in the study area. The difference may be associated with the numbers of samples collected and season of sampling. Amongst the haemoparasites found in the studied camels, the *Babesia species*, *Anaplasma species* and *Trypanosoma species* were found at different prevalence rates of 24.3%, 20.3% and 15.8% respectively in a descending order of frequency. This finding is consistent with the previously reported haemoparasites of trade camels in Nigeria and some countries of Africa such as Libya (Bernawe, 2013) Sudan and Niger (Swelum *et al.*, 2014) which were shown to cause significant health problems in infected camels.

*Babesia species* (24.3%) occur more frequently in the infected camels with the highest prevalence rate, followed by *Anaplasma species* and *Trypanosoma species* which occurred at prevalence rates of 39 (20.3%) and 32 (15.8%), respectively. This respective prevalence rates agrees with those reported in dromedary camels (Gray and Weiss, 2008; Bamaïyi *et al.*, 2011; Schnittger *et al.*, 2012; Salih *et al.*, 2015), although the occurrence of babesiosis in our study is higher than 13.17% reported by Swelum *et al.*, (2014) in Saudi Arabia. This finding of this study also shows that haemoparasitic infection is more frequent in infected female camels (36.1%) than in the male camels (24.3%). The difference in the frequency rates is not significant in both sexes of camels ( $p =$

0.3764). This implies that both sexes share equal chances of getting infected, especially where they are exposed to the same environmental circumstances and arthropod vectors that warrant transmission of infections to the risk camels. In most cases both sexes of camels are usually allowed to graze and roam together on the same field under the nomadic rearing system by the pastoralists. This finding agrees with previous reports by Bernawe (2013) in Libya and Tadesse *et al.* (2013) in Ethiopia. The findings of this present study revealed that haemoparasitic infections in camels in the study area are more frequent in the rainy season (40.6%) as compared to its occurrence in the dry season (19.8%). The difference in the prevalence rate between the seasons is statistically significant ( $p < 0.0001$ ). This may be attributed to the abundance of arthropod vectors (ticks, biting flies and others) that are considered to play active role in the transmission of the parasite, especially during the rainy season which serves as favorable breeding period for the of the arthropods.

## CONCLUSION

The results of this study have shown that haemoparasitic diseases are still prevalent among trade camels in Maiduguri, Nigeria, with *Babesia species* most frequently encountered compared with the other haemoparasites. Most of these camels are brought into Nigeria from neighboring countries, especially those that shares borders, therefore the risk of trans-boundary infection.

The haemoparasites that have been reported to date from

dromedary camels can be either specific to these hosts or may represent species identified in other host organisms, which have been transmitted to camels via shared arthropod vectors such as ticks. There is a need for further study of the pathogenesis of these parasites to clearly understand their pathological effect on the health of camels because these parasites may have a significant economic in the productivity of camels and zoonotic importance as public health hazards. All newly introduced camels into Nigeria from other African countries meant for restocking or breeding purposes must be quarantined, properly screened, and treated to prevent environmental contamination with vectors that transmits haemoparasites. It is recommended that further studies using molecular identification of the infecting haemoparasite species are necessary, as are also studies focusing on host specificity and on the genetic diversity of parasitic infection in camels.

## REFERENCES

- Bamaiyi, P. H., Kalu, A. U. and Ali, M. (2011). Haemoparasites of the trade Camel (*Camelus dromedaries*) arriving for slaughter at Maiduguri, Borno State, Nigeria. *Continental J. Veterinary Sciences* 5 (1): 18 –21.
- Bathia, B. B., Pathak, K. M. C. and Junyal, P. D. (2010). *Textbook of Veterinary Parasitology*. 3<sup>rd</sup> Revised Edition. Kalyani publishers, India
- Bernawe, A. A. A. (2013). Trypanosoma of Imported Camels in Sebha Province. *International Journal of Engineering Science and Innovative Technology (IJESIT)* 2 (2): 7 – 9.
- Borji, A., Razmi, G. H., Movassaghi, A. R., Naghibi, A. G. H. and Maleki, M. (2010). A study on gastrointestinal helminthes of camels in Mashad abattoir, Iran. *Iranian Journal of Veterinary Research*, 11(2):21 – 27.
- Dessouky, M. I. (2006). Haematological and biochemical serum constituents of camels in health and disease. *Proceedings of the International Scientific Conference on Camels. Part III. Qassim University College of Agriculture and Veterinary Medicine, KSA*, pp. 1269 – 1277.
- Felsner, G. (2002). *Unido Technical Report; US/NIR/E01/11-51*.
- Ghaji, A. and Adogwa, A. O. (1986). The significance of Camel production in Nigeria. *Nigerian Journal of Animal Production*; 13:29 – 35.
- Gray, J. S. and Weiss, L. M. (2008). *Babesiamicroti*. In: Khan, N. (Ed.), *Emerging Protozoan Pathogens*. Taylor and Francis, Abingdon, UK, pp. 303–349.
- Higgins, A. J. and Kock, R. A. (1984). A guide to the clinical examination, chemical restraint and medication of the camel. *Brit. Vet. J.*, 140: 485 – 489.
- Kamani, J., Turaki, A. U., Egwu, G. O., Mani, A. U., Saidu, M. K., Abdullahi, J. G and Kumshe, H. A. (2008). Haemoparasites of camels (*Camelus dromedarius*) in Maiduguri, Nigeria. *Animal Research International* (2008) 5(2):838 – 839.
- Parsani, H. R., Veer, S. and Momin, R. R. (2008). Common Parasitic Diseases of Camels. *Vet World*, 1 (10): 317 – 318.
- Pwaveno, H. B. and Arunsi, U. K. (2011). Gastrointestinal parasite infections in one humped camel (*Camelus dromedarius*) of Nigeria. *Vet. Res. Forum*, 2(4): 278 – 881.
- Qablan, M. A., Sloboda, M., Jirku, M., Obornik, M., Dwairic, S., Amr, Z. S., Horin, P., Lukes, J., Modry, D. (2012). Quest for the piroplasms in camels: identification of *Theileriaequi* and *Babesiacabali* in Jordanian dromedaries by PCR. *Vet. Parasitol.*, 186, 456–460.
- Rabana, J. L., Kumshe, H. A., Kamani, J., Grema H., Turaki, U. A. and Harrison, K. D. (2011). Effects of Parasitic Infections on Erythrocyte Indices of Camels in Nigeria. *Veterinary Research forum*, 2(1): 59 – 63.
- Radostits, O. M., Gay, C. C., Hinchcliff, K. W. and Constable, P. D. (2007). Babesiosis. In: *Veterinary Medicine: A textbook of the diseases of cattle, horses, sheep, pigs, and goats*. 10th ed. Saunders/Elsevier, Edinburgh, London, New York, Oxford, Philadelphia, St Louis, Sydney, Toronto, pp. 1483–1498.
- Salih, D. A., Hussein, A. M. and El- Singla, L. D. (2015). Diagnostic approaches for tick-borne haemoparasitic diseases in livestock. *J. Vet. Med. Animal Health*, 7(2):45 – 56.
- Schnittger, L., Rodriguez, A. E., Florin-Christensen, M., Morrison, D. A. (2012). *Babesia*: a world emerging. *Infect. Genet. Evol.*, 12, 1788–1809.
- Singh, R. P., Saravanan, P., Sreenivasa, B. P., Singh, R. K. and Bandyopadhyay, S. K. (2004). Prevalence and distribution of *peste des petits ruminants* virus infection in small ruminants in India. *Rev. Sci. Tech.*, 23: 807 – 819.
- Soulsby, E. J. L. (1982). *Helminthes, Arthropods and Protozoa parasites of domesticated Animals*, Bailere Tindal, London; pp. 232 – 233.
- Swelum, A. A., Ismael, A. B., Khalaf, A. F. and Abouheif, M. A. (2014). Clinical and laboratory findings associated with naturally occurring babesiosis in dromedary camels. *Bull. Vet. Inst Pulawy*, 58, 229 – 233.
- Tadesse A., Omar A., Aragaw K., Mekbib B. and Sheferaw D. (2012). A Study on Camel Trypanosomosis in Jijiga Zone, Eastern Ethiopia. *J. Vet. Adv.*, 2(5): 216 – 219.
- Thrusfield (2005). *Veterinary epidemiology*. 3rd Edition ed. oxford: Blackwell Publishing.
- Ukashatu, S., Saulawa, M. A. and Magaji, A. A. (2012). Epidemiology of Gastrointestinal parasites slaughtered in Sokoto abattoir. *Sci. J. Vet. Adv.*, 1(3): 34 – 38.