

## Prevalence and distribution of gastrointestinal parasites of working camels in Sokoto metropolis

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Received: 20-12-2013, Revised: 21-01-2014, Accepted: 28-01-2014, Published online: 02-03-2014

doi: 10.14202/vetworld.2014.108-112 How to cite this article: Mahmuda A, Mohammed AA, Alayande MO, Habila YI, Lawal MD, Usman M, Raji AA, Saidu B, Yahaya MS and Suleiman N (2014) Prevalence and distribution of gastrointestinal parasites of working camels in Sokoto metropolis, *Veterinary World* 7(3): 108-112

### Abstract

**Aim:** An epidemiological study of gastrointestinal parasites of working camels in Sokoto metropolis was conducted between March and September, 2013, where the general prevalence and seasonal distribution were identified.

**Materials and Methods:** A total of 100 faecal samples from working camels were examined using standard parasitological techniques (Centrifugal sedimentation and simple flotation). Microscopic examination of faecal samples revealed that some samples were positive for at least one or more parasite eggs/oocysts.

**Results:** The overall prevalence of gastrointestinal parasites was found to be 78 (78.0%) and seasonal prevalence of gastrointestinal parasites was found to be 35 (70.0%) for the dry season and 43 (86.0%) for the rainy season. Overall, the prevalence of nematodes, trematodes, cestodes, and protozoa were 87 (80.56%), 7 (6.48%), 4 (3.71%) and 10 (9.26%), respectively. The prevalence of helminths parasites indicated as most dominant eggs of *Strongyles* 68 (62.96%) followed by *Strongyloides* spp 10 (9.26%), and *Trichuris* spp 8 (7.41%), while Protozoan oocyst from the faecal samples recorded *Coccidia* spp 9 (8.33%). The prevalence by sex, age, and breed were also determined in the study animals.

**Conclusion:** The presence of polyparasitism with high prevalence is an indication that favorable environmental conditions for infection, survival and perpetuation of the parasites exist in Sokoto metropolis.

**Keywords:** gastrointestinal parasites, prevalence, seasonal distribution, Sokoto, working camels.

### Introduction

Camel is an animal well known in the history of human civilization. It is an even-toed ungulate, but differs from others of their order in having soft-padded feet [1]. They are generally referred to as ruminants or pseudo-ruminants because of their ruminating habit. Camel is a both Saharan and sub-Saharan animal. It is also important to the people of Sahel Savanna for many economic and agricultural purposes [2]. Until the advent of motorized transport and the development of certain nomadic economies, the camel remained almost the only beast of burden and means of transport in the areas to which it is adapted [3, 4].

The teaming increase in human population, coupled with poor economic potentials of some countries have transformed the traditional uses of camel to serve as milk and meat sources [2, 5]. In East Africa (Kenya, Ethiopia, Sudan and Somalia), camel is bred for meat [2]. In the northern part of Nigeria, where camels are found, they are used mainly as traction animals, in addition to meat production, even though cattle are the most predominant [6]. In Sokoto and

Maiduguri where camels are slaughtered for human consumption, the meat was ranked second to that of cattle in these areas. The need for an extensive study on gastrointestinal parasitism in camels is desirable considering the economic importance of its contribution to meat production in the study area [7].

Among domestic animals, camel is known to tolerate a lot of parasitic infections of economic importance [8, 9]. It is also known to be infected with various helminths parasites which can cause diarrhoea and other clinical signs [10], and in severe cases, these internal parasites are generally known to contribute to a great loss of production [11,12]. Some of these helminths parasites also have zoonotic implication to those who work closely with the camels [13, 14].

Epidemiological studies of gastrointestinal parasites of camels in the tropics have been few and conclusions are based largely on the prevalence and the distribution from camel slaughter units [7, 15].

Hence, this study is designed to determine the prevalence and seasonal distribution of gastrointestinal parasite of working camels from camel herds, so that effective control measures could be well suggested.

### Materials and Methods

**Ethical approval:** This study was approved by the

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Table-1. Overall and seasonal prevalence of gastrointestinal parasites of camels at different seasons of the year.

Seasons	Number of samples	Herds					Number positive	Prevalence(%)
		A	B	C	D	E		
Dry	50	10	15	16	9	0	35	70.0
Rainy	50	10	10	10	10	10	43	86
Total	100	20	25	26	19	10	78	78.0

Table-2. Prevalence of gastrointestinal parasites of camels by age groups in Sokoto metropolis.

Age groups (Years)	Sex		Number positive	Prevalence (%)
	Male	Female		
<3	5	5	9	90.0
3-6	31	29	48	80.0
>6	18	12	21	70.0
Total	54	46	78	78.0

Table-3. Prevalence of gastrointestinal parasites of camels by sex in Sokoto metropolis.

Sex	Number of samples	Number positive	Prevalence (%)
Male	54	45	57.69
Female	46	33	42.31
Total	100	78	78.0

Ministry of Animal Health and Forestry, Sokoto State, Nigeria.

**Study area:** The study was conducted from March to September, 2013 in Sokoto located in the Sudan Savannah vegetation belt with sandy soil and a humidity of below 40% year round except during the rainy season when it rises to 60% [16]. With a land area of approximately 56,000square Kilometers, it is located between longitudes 11° 30" to 13° 50" East and latitude 4° to 6° North [17]. The two dominant seasons are the wet (June-October) and dry (November-May) seasons. Sokoto State is endowed with livestock resources; indeed the state is placed second with regard to livestock population which has a mean livestock population for cattle (3 million), Goat (4 million), Sheep (3.85 million), Camels (0.8 million) and 1 million Poultry [18].

Data obtained from the Nigerian Meteorological Agency (NIMET), Sultan Abubakar III International Airport, Sokoto Nigeria recorded 550mm and 1300mm, 28-45 °C and 15-40% for mean annual rainfall, mean annual temperature and mean monthly relative humidity respectively for the year 2013.

**Identification of camels and sample collection:** Five camel herds were identified with a total of 50 camels of different sex, age [19] and breed categories. Base on the consent of the proprietors, a total of 100 individual faecal samples were collected per rectum using sterile polythene bags and were transported to the Parasitology and Entomology Laboratory of the Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto, and were examined during the two major seasons (dry and wet). Maximum effort was made to characterize and classify the different eggs/ oocysts observed under 10x magnifications to the genus level.

**Coprological examination:** Following collection of samples, the faeces were examined for eggs of

gastrointestinal parasites. Concentration methods which include centrifugal sedimentation and simple flotation (Saturated salt solution) techniques were conducted [20]. Morphological differentiation was based on microscopic appearance of the eggs/oocysts encountered. Eggs/oocysts encountered were then compared to those in standard texts, micrographs and literatures.

**Statistical analysis:** Data obtained was analyzed using descriptive statistic.

## Results

Microscopic examination of faecal samples revealed that some samples were positive for at least one or more parasite eggs/oocysts. The overall prevalence of gastrointestinal parasites was found to be 78 (78.0%) and seasonal prevalence of gastrointestinal parasites was found to be 35 (70.0%) for the dry season and 43 (86.0%) for the rainy season (Table-1).

From the results of this study, gastrointestinal parasite infections were observed to be 9 (90.0%) in camels less than 3 years old, 48 (80.0%) in camels between 3-6 years old, and 21 (70.0%) in camels above 6 years old (Table-2). Single infections were observed in 47 samples while concurrent infections with two or more genera of the parasites were also observed in 31 samples.

Out of the 100 samples examined, 45 (57.69%) of the male samples were positive while 33 (42.31%) of the female samples were positive (Table-3). Based on breeds, prevalence of gastrointestinal parasites was 49 (62.82%) in Ja, 23 (29.49%) in Bakinbiri and 6 (7.69%) in Mahari (Table-4).

The prevalence of helminths parasites as shown in Table-5, indicated as most dominant eggs of *Strongyles* 68 (62.96%), followed by *Strongyloides* spp 10 (9.26%), *Trichuris* spp 8 (7.41%), *Paramphistomum* spp 4 (3.70%), *Moniezia* spp 3 (2.78%), *Fasciola* spp 2

Table-4. Prevalence of gastrointestinal parasites of camels by breeds in Sokoto metropolis.

Breeds	Sex		Number positive	Prevalence (%)
	Male	Female		
Ja	32	29	49	62.82
Bakinbiri	17	15	23	29.49
Mahari	4	3	6	7.69
Total	53	47	78	100

Table-5. Prevalence of gastrointestinal parasites (egg/oocyst) in faeces of camels in Sokoto metropolis.

Parasites	Seasons		N	Prevalence (%)
	Dry season	Rainy season		
<b>Nematodes</b>				
Strongyles	29	39	68	62.96
Strongyloides spp	4	6	10	9.26
Trichuris spp	3	5	8	7.41
Toxocara spp	0	1	1	0.93
<b>Cestodes</b>				
Moniezia spp	0	0	3	2.78
Diphylobothrium spp	0	1	1	0.93
<b>Trematodes</b>				
Fasciola spp	0	2	2	1.85
Paramphistomum spp	2	2	4	3.70
Dicrocoelium spp	1	0	1	0.93
<b>Protozoa</b>				
Coccidia spp	4	5	9	8.33
Balantidium coli	0	1	1	0.93
Total	43	65	108	100

N = number of appearance of worm eggs and protozoan oocysts



Figure-1. Photomicrograph of Trichurid egg isolated from faecal sample of camel in Sokoto metropolis (X10)

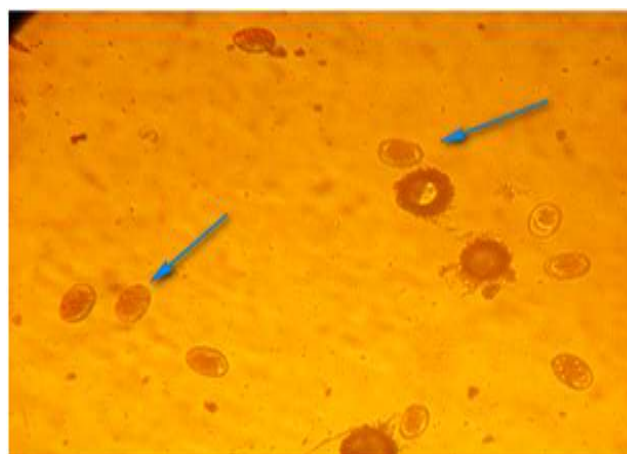


Figure-2. Photomicrograph of Strongyle eggs isolated from faecal sample of camel during the rainy season in Sokoto metropolis (X10)

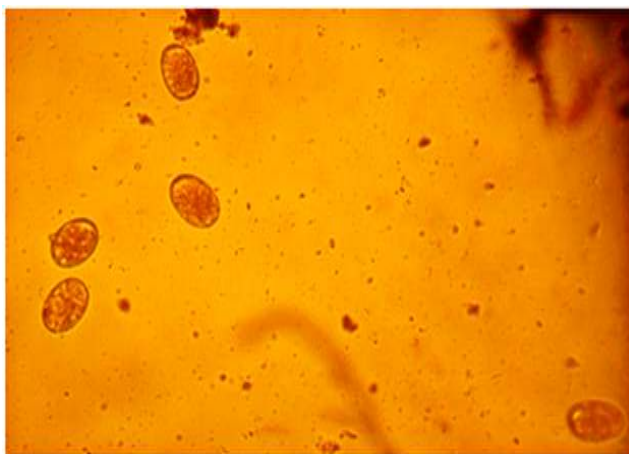


Figure-3. Photomicrograph of Strongyle eggs isolated from faecal sample of camel during the dry season in Sokoto metropolis (X10)

(1.85%) *Diphylobothrium* spp 1 (0.93%), *Toxocara* spp 1 (0.93%) and *Dicrocoelium* spp (Table-5).

Protozoan oocyst from the faecal samples recorded *Coccidia* spp 9 (8.33%) followed by *Balantidium* spp 1 (0.93%). Photomicrographs of the helminths eggs isolated in the study area are presented in Figure-1,2 and 3.

#### Discussion

Our study revealed an overall prevalence of gastrointestinal parasites 78.0%. Musadiq et al [21] observed 84.80% prevalence in a study conducted on working camels in Cholistan Desert of Pakistan. Alvi et al [22] observed 28.36% prevalence in camel population of the Desert Thal and Azhar et al [23] observed 37.33% prevalence in camel population of Lahore/Faisalabad [23]. The findings of 78.5% prevalence in Kano,

Nigeria [8], 87.3% prevalence in Sokoto, Nigeria [17] and 75.1% prevalence in Khorasan Razavi Province, Iran [4], where abattoir surveys were conducted to determine the prevalence of gastrointestinal parasites of camels at slaughter. In each case, *Strongyle* spp eggs were found more prevalent.

These similarities/differences observed in the prevalence are difficult to explain due to the different geographical locations of the study areas, time periods and variation in the methods of sample analysis or may be due to the management system being employed by the camel owners.

Single infections were observed in 47 (60.28%) samples while concurrent (mixed) infections with two or more genera of the parasites were also observed in 31 (39.74%) samples. This is contrary to the findings of 7.36% as reported for mixed infections in a survey conducted in the desert Thal, Pakistan [22] which may be attributed to illiteracy, poor management and lack of deworming practices.

The finding of 80.56 % prevalence of nematode parasites {*Strongyles* (62.96%), *Strongyloides* spp (9.26%), *Trichuris* spp (7.41%), and *Toxocara* spp (0.93%)}, 3.71% cestodes, 6.48% trematodes and 8.33% coccidia also concur with the findings of 71.20%, 2.4%, 5.2% and 6.0% for nematodes, cestodes, trematodes and coccidia respectively, in Cholistan Desert of Pakistan [21].

The high prevalence rate in males than in females and in Ja breed than the two other breeds, may be due to differences in exposure to infection as a result of variation in stocking density (sex/breed ratio). The findings of higher prevalence rate found at the age range of less than 3 years 9 (90.0%) suggests a possibility of early introduction of young camels to grazing fields and subsequent increase in larval uptake.

#### Conclusion

The presence of polyparasitism with high prevalence is an indication that favours environmental conditions for infection, survival and perpetuation of the parasites exist in Sokoto metropolis.

#### Recommendation

A detailed study of the epidemiology, pathogenicity, treatment and control strategies, and the immune response of working camels to the infection of each parasitic genera/species is highly recommended.

#### Authors' contributions

AAM, MOA and MDL supervised the research. AM, BS, AAR and MU made available relevant literatures. AM, YIH, MSY and NS participated in sampling and coprology. All authors participated in draft and revision of the manuscript. All authors read and approved the final manuscript.

#### Acknowledgements

The authors acknowledge the financial support from the management of Usmanu Danfodiyo University, Sokoto Nigeria. The authors sincerely acknowledge

the effort of the laboratory technicians of the Veterinary Parasitology and Entomology, Usmanu Danfodiyo University, Sokoto Nigeria, for their participation in the laboratory analysis of the samples.

#### Competing interests

The authors declare that they have no competing interests.

#### References

- Allen, K. (2013) *Camel fossils discovered in Canada's Arctic shed light on animal's evolution*. Toronto Star.
- Hare, J. (2012) "*Camelus ferus*". International Union for Conservation of Nature and Natural Resources.
- 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.
- Wilson, R.T. (1998): *The Tropical Agriculturist. Camels*. Pp 102-105.
- Khanna, N.D. (1990) An Overview of Work Performance of Camels as drought and Riding Animals. *Camel Newsletter*, No. 7 Pp. 87.
- Tukur, H.M. and Maigandi, S.A. (1999) Studies on Animal Traction in North-western Nigeria. II Evaluation of the efficiency of different breeds/species for drought power. *Tropical Journal of Animal Science*, 1 (1): 29-35.
- 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.
- Al Haj, O.A. and Al Kanhai, A. A. (2010) Compositional, technological and nutritional aspects of dromedary camel milk. *Int Dairy J*, 20 (12): 811-821.
- Retwaker S.G., Deshmich, S.S., Deshkar, S.K., Maske, D.K., Jumde P.D. and Bhangale, G.N. (2009) Gastrointestinal helminthes in migratory camel. *Vet. World*, 2(7): 32-38.
- Parsani, H.R., Veer, S. and Momin, R.R. (2008) Common Parasitic Diseases of Camels. *Vet. World*, 1 (10): 317- 318.
- 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.
- 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
- Worboys, G. L., Francis, W. L. and Lockwood, M. (2010) *Connectivity, Conservation and Management: A Global Guide*. Earthscan. Pp. 142.
- McCarthy, J. and Moore, T.A. (2000): Emerging Helminth Zoonoses. *Int J Parasitol*, 30(12-13):1351-1359.
- Kulla, D.J.U., Abdussamad, A.M., Abubakar, M., Ngele, M.B. and Abba, M.I. (2006): Prevalence of gastrointestinal helminthes in camels slaughtered in Kano abattoir, Kano, Nigeria. *Anim Prod Res Adv*, 2(3): 164-167.
- Iloje, N.P. (1971) Where is Nigeria and who are Nigerians? In: A New Geography of Nigeria, Longman Nigeria Ltd, Nigeria. Vol. I., Pp14.
- Mahmuda, A., Mohammed, A. A., Alayande, M. O., Magaji, A. A., Salihu, M. D., Fabiyi, J.P., Lawal, M.D., Yakubu, Y., Usman, M. and Danmaigoro, A. (2012) Seasonal prevalence of gastrointestinal nematodes of calves in Sokoto, North-western Nigeria. *Sci J Vet Adv*, 1 (3): 82-89.
- SSIPC (2008) Beef up Your Profits by Investing in Sokoto State's Livestock Sector, 1-8.
- Alexander, de L. and Robert, E.H. (1986) *Applied Veterinary Anatomy*. 5th Edition. W.B. Saunders Company, London, UK.
- Taylor, M. A., Coop, R. L. and Wall, R. L. (2007) *Veterinary Parasitology* 3<sup>rd</sup> ed. Blackwell Publishing Ltd. Pp.771.
- Musadiq, I., Malik, J., Ahmad, F., Mehmood, K., Rehman, T., Samad, H.A., Riaz, M.T. and Sattar, K. (2013) An Epidemiological Survey of Gastrointestinal Parasites of

- Camels in Cholistan Desert. *International Camel Conference*, Pp. 35.
22. Alvi, R.F., Muhammad, S.S., Iqbal, Z., Asi, M.N. and Quratul-Ain (2013) Descriptive Epidemiology of Gastrointestinal Parasitic Fauna of One Humped Camel (*Camelus dromedarius*) Population of the Desert Thal, Pakistan. *International Camel Conference*, Pp. 35.
23. Azhar, M., Lateef, M. And Zahid, M.I. (2013): Prevalence and Chemotherapy of Gastrointestinal Parasites of Camels. *International Camel Conference*, Pp. 44.

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