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Some Ectoparasites of *Camelus dromedarius* in Sokoto, Nigeria

¹M.D. Lawal, ²I.G. Ameh and ³A. Ahmed

¹Department of Parasitology and Entomology,
FVM. Usmanu DanFodiyo University, Sokoto

²Department of Pathology and Medical Microbiology,
CHS. Usmanu DanFodiyo University, Sokoto

³Epidemiological Research Lab. N.V.R.I., Sokoto

Abstract: Camels (*Camelus dromedarius*) at Sokoto abattoir livestock market were physically screened at random, for ectoparasites by macroscopic observation, grooming and scrapping of 3960 anatomical sites on 396 animals. 367 (92.7%) of the 396 camels were infested vis-à-vis 335 (91.28%) by ticks, 17 (4.63%) by flies, 13 (3.54%) by mites and 2 (0.55%) by lice. The ectoparasites identified and their relative abundance on the camels was as follows: *Hyalomma* sp. (48.0%), *Amblyomma* sp. (16.79%), *Boophilus* sp. (14.91%), *Rhipicephalus* sp. (14.71%), *Musca domestica* (2.48%), *Hippobosca cameli* (2.13%), *Sarcoptes scabiei var cameli* (0.44%), *Haematopinus tuberculatus* (0.27%), *Tabanus longicorins* (0.27%). *Hyalomma* species, which was the most prevalent species of the ectoparasites, was identified as *H. dromedarii* (46.9%), *H. rufipes* (22.9%), *H. impeltatum* (18.5%) and *H. truncatum* (11.7%). These ectoparasite fauna may have been imported across the border by traffics of camel caravan, which linked Sokoto and other sahelian countries. Although the impact of these parasites on host animals and the environment was not measured in this study, it was however, concluded that the number and species of infesting ectoparasites encountered were significant enough to pose a potential public health hazard, especially tick pestilence.

Key words: Ectoparasites, *Camelus*

INTRODUCTION

Many parasites attack the dromedary camels which are pad-footed artiodactyl domestic mammals belonging to the species *Camelus dromedarius* (Dolan *et al.*, 1983; Higgins, 1985; Dirie and Abdulrahman, 2003). The camels are popular as beast of burden and livestock among animal keepers, in the Sahel savannah regions of Northern Nigeria and other arid regions of Africa (Dirie and Abdulrahman, 2003; Nwosu *et al.*, 2003; Basu *et al.*, 1995). A large number of these animals are found in Sokoto state of Nigeria, where they are used for transportation of people and goods as well as for milk, meat, hides, game and socioeconomic prestige of the holder farmers (Basu *et al.*, 1995; Garba and Maigandi, 1995; Bakre, 1998). However, the parasites of camels, as in other domestic animals, may impose enormous burden of parasitism, which often affect the growth and productivity of these animals (Shillinger, 1987; Zeleke and Beleke, 2004). Their habit of rolling on the ground and constant trekking through the wild are common factors of camel predisposition to ectoparasitic attack (Higgins, 1983, 1985). Significant economic loss of camel productivity to ectoparasites and mange has been mentioned in several reports (Higgins, 1983; UNESCO-IPAL, 1985; Basu *et al.*, 1995). However, information on ectoparasitic infestation of camels in Sokoto is meager despite the comparatively large

Corresponding Author: Dr. I.G. Ameh, Department of Pathology and Medical Microbiology,
College of Health Sciences, Usmanu DanFodiy University, Sokoto, Nigeria
Tel: 08036431828

number of these animals in the area (Garba and Maigandi, 1995; Bakre, 1998). This study was therefore undertaken in contribution to such needed baseline information on the ectoparasites of camels found in Sokoto. It is hoped that this will also be of benefit as reference material to compliment the paucity of published research in this area.

MATERIALS AND METHODS

This study was conducted at the Sokoto abattoir market, which served as a collection point for sale of camels and other livestock. Camels examined in this study were the one-humped species (*Camelus dromedarius*) brought for sale and slaughter, by local farmers and from neighbouring villages, other states of Zamfara, Kebbi and Katsina as well as across international borders from Sudan, Niger Republic and Chad (pers. Comm). Each animal was selected at random from the market flock and thoroughly screened for the presence of ectoparasites by direct macroscopic observation, grooming or scrapping of the exposed body (Hoogstraal, 1978; James-Rugu and Jidayi, 2004; Nwosu *et al.*, 2003). The larger ectoparasites such as ticks were spotted by direct observation and removed or hand picked with the aid of scalpel blade and tweezers. Isolated parasites were stored in pyrex petri-dishes, which were marked to show anatomical site of camel from where parasites were collected. At the laboratory, the ectoparasites were counted per dish and separately viewed and identified under the field microscope as in the key provided by Hoogstraal (1978), Walker (1994), Walker *et al.* (2003) and Richard and David (2003). Animals examined were also groomed with plastic comb into clean white sheets of paper, which were labeled to reflect part of camel from where groom debris collected. Parasites, which collect in the debris were viewed, counted and identified under the dissecting and light microscopes respectively. Scrapings for minute parasites were also made from mange, scab, active lesions and various lesion sites on the body of the animals. The scrapings were made into white sheets of paper, which were labeled to show the various sites of animal body examined. Specimen collected from groom and scrap sites, were separately preserved in borosilikat test tubes containing 10% potassium hydroxide. These were boiled in Gallenkamp water bath, left to cool and centrifuged at 2000 rounds per minute for two minutes. The supernatants were decanted, while the filtrates were transferred onto glass slides and viewed under various magnifications of the microscope. Ectoparasites seen were counted and identified as done above. Flying insects, which pestered, perched or hovered about the examined camels were trapped with hand swoop net and mounted for observation under the dissecting microscope. Engorged ticks were dissected and the internal content examined under the microscope.

RESULTS

The result shows that 367 (92.7%) out of 396 camels examined at the Sokoto abattoir market, were infested by various types of ectoparasites (Table 1). Three hundred and thirty-five (91.28%) of the infested camels harbored ticks, while 13 (3.54%) had mites, 2 (0.55%) had lice and 17 (4.63%) were pestered by flies (Table 1). Chi-square statistics showed no significant difference ($p > 0.05$) of infestation rates between the male and female camels (Table 1), although more of the male animals (249 or 97.3%) than the female animals (118 or 84.3%) were infested (Table 1). Ticks were the most prevalent of the ectoparasites seen and these occurred on 238 (99.6%) of the infested male animals and 97 (88.1%) of the infested female animals (Table 1). Ticks also constituted the largest population of the infesting ectoparasites with *Hyalomma* species occurring on 1762 (48.00%) out of 3960 anatomical sites examined on parasitized camels (Table 2). *Hyalomma* species found were identified (Hoogstraal, 1978; Walker, 1994; Walker *et al.*, 2003) as *Hyalomma dromedarii* (46.9%), *H. rufipes* (22.9%), *H. impeltatum* (18.5%) and *H. truncatum* (11.7%). Other ticks found included *Amblyomma variegatum* on 616 (16.79%) sites, *Boophilus* species on 547 (14.91%) sites and *Rhipicephalus sanguineus* on 540

Table 1: Distribution of ectoparasites on dromedary camels

Sex of camel	No. of camels examined	No. (%) of camels infested	No. (%) of camels infested by various types of ectoparasites			
			Ticks	Mites	Lice	Flies
Male	256	249 (97.3)	238 (99.6)	11 (4.3)	1 (0.4)	13 (5.1)
Female	140	118 (84.3)	97 (88.1)	2 (1.4)	1 (0.7)	4 (2.9)
Total	396	367 (92.7)	335 (91.28)	13 (3.54)	2 (0.55)	17 (4.63)

$\chi^2 = 0.88$, 5% confidence limit, $p > 0.05$. Values in parenthesis are percentage

Table 2: Relative abundance (%) of ectoparasite species at anatomical sites of camels

Habitat	Relative abundance (%) of infesting species of ectoparasites									Total
	<i>Hyalomma</i>	<i>Amblyomma</i>	<i>Boophilus</i>	<i>Rhipicephalus</i>	<i>Sarcoptes</i>	<i>Hematopinus</i>	<i>Musca</i>	<i>Hippobosca</i>	<i>Tabanus</i>	
Face/	3	-	-	18	3	-	21	5	-	50
Nostrils	(6.0)			(36.0)	(6.0)		(42.0)	(10.0)		(1.36)
Earlobe/	10	-	-	4	4	3	4	-	2	27
Neck	(37.0)			(14.8)	(14.8)	(11.1)	(14.8)		(7.4)	(0.74)
Axilla	46	-	150	-	-	-	-	-	-	196
	(23.5)		(76.5)							(5.34)
Abdomen	31	-	29	33	3	3	7	4	5	115
	(27.7)		(29.9)	(29.5)	(2.6)	(2.6)	(6.1)	(3.5)	(4.5)	(3.13)
Back/Hump	11	-	1	-	-	-	5	-	-	17
	(64.7)		(5.9)				(29.4)			(0.46)
Interdigital/	388	128	93	36	-	-	5	27	3	680
Limbs	(57.1)	(18.8)	(13.7)	(5.3)			(0.7)	(4.0)	(0.4)	(18.53)
Perineal	141	142	3	11	-	-	10	31	-	338
Region	(41.7)	(42.0)	(0.9)	(3.3)			(3.0)	(9.2)		(9.21)
Scrotal wall/	23	-	6	5	-	-	6	5	-	45
Udder	(51.1)		(13.3)	(11.1)			(13.3)	(11.1)		(1.23)
Tail	1092	346	265	433	-	-	3	3	-	2142
	(51.0)	(16.2)	(12.4)	(20.2)			(0.1)	(0.1)		(58.37)
Mange/	17	-	-	-	6	4	30	3	-	60
Scab	(28.3)				(10.0)	(6.7)	(50.0)	(5.0)		(1.63)
Total	1762	616	547	540	16	10	91	78	10	3670
	(48.0)	(16.79)	(14.91)	(14.71)	(0.44)	(0.27)	(2.48)	(2.13)	(0.27)	

Values in parenthesis are percentages

(14.71%) sites (Table 2). Dipterous flies were the second most common ectoparasites of the camels examined. They were found perching, hovering or pestering on 17 (4.63%) of 367 infested camels (Table 1). The flies were identified as *Musca* species, which were found at 90 (2.45%) of the body sites of infested camels (Table 2). Other flies recovered were *Hippobosca camelina*, which were found on 78 (2.13%) sites and *Tabanus* species on 10 (0.27%) body sites of infested camels (Table 2). Only one species of mite was encountered and this was *Sarcoptes var cameli* at 16 (0.44%) anatomical sites of 13 (3.54%) of the parasitized camels (Table 1 and 2). Similarly *Hematopinus cameli* was the only type of lice found and this occurred on 11 (0.30%) body sites of 2 (0.55%) of the infested camels (Table 1 and 2). Underside of the tail was the most frequently infested anatomical site of camel and this had 2142 (58.37%) cases of ectoparasitic infestation (Table 2). Ticks (2136 or 99.72%) were the most abundant parasites found at this site. They occurred in clusters at the base of the tail. The species and relative abundance of ticks found at this site (Table 2) were *Hyalomma* sp. (1092 or 51.0%), *Rhipicephalus* sp. (433 or 20.2%), *Amblyomma* sp. (346 or 16.2%) and *Boophilus* sp. (265 or 12.4%). Other body sites of camel commonly infested include the interdigital spaces, perineal region, axilla and abdomen, which had 683 (18.61%), 339 (9.24%), 196 (5.34%) and 112 (3.05%) cases of ectoparasites, respectively (Table 2). There were also more *Hyalomma* sp. (388 or 57.1%) at the interdigital spaces than *Amblyomma* sp. (128 or 18.8%), *Boophilus* sp. (93 or 13.7%) or *Rhipicephalus* sp. (36 or 5.5%) found here (Table 2). However, *Hyalomma* sp. (141 or 41.7%) and *Amblyomma* sp. (142 or 42.0%) were almost equally abundant at the perineal region. The axilla

harboured more *Boophilus* sp. (150 or 76.5%) than any other parasites while *Rhipicephalus* sp. (33 or 28.7%) was the commonest parasite recovered from the abdominal region (Table 2). The result also showed that ectoparasite populations were relatively moderate (Table 2) at the mange/scab (57 or 1.55%), nostrils and face region (50 or 1.36%) as well as the scrotal wall/udder (45 or 1.23%) of infested camel. Mange/Scab harbored more *Musca* sp. (30 or 50%) followed by *Hyalomma* sp. (17 or 28.3%) than other parasites (Table 2). *Musca* sp. (21 or 42.0%) was also the commonest parasite at the nostril/face region. The Earlobe/neck and the back/hump of infested camels had the least populations of ectoparasites and these were 27 (0.74%) and 17 (0.46%), respectively (Table 2). It was observed that 76.9% of ticks recovered from host animals were engorged, apparently with host blood and tissue fluid. The engorged ectoparasites however vary in size and weight. When stained and viewed under the microscope, their fluid content had identifiable protozoan parasites but this was not considered in this study.

DISCUSSION

This study reveals that a variety of ectoparasite species infest camels in Sokoto, as found in other arid zones of Africa (UNESCO-IPAL, 1985; Teel *et al.*, 1988; Zeleke and Beleke, 2004). *Hyalomma* species of ticks was the most prevalent (48.0%) of these ectoparasites and this finding compares with other reports (Al-Asgah *et al.*, 1985; Zeleke and Beleke, 2004). The frequency and relative abundance of *Hyalomma* species of ticks found on camels in Sokoto agree with suggestions of others that these ticks are the most important of the camel ectoparasites (Pegram and Higgins, 1992; Al-Asgah *et al.*, 1985). *Amblyomma* species, *Boophilus* species and *Rhipicephalus* species were other ticks which infested the camels and these together with *Hyalomma* species ranked ticks as the commonest ectoparasites of camels found in Sokoto. Indeed ticks accounted for 94.4% of all the various species of ectoparasites found on camels in the study area. It is possible that these ticks, as suggested by Higgins (1983), Pegram and Higgins (1992) probably originated from central Asia, through North African countries including Sudan, Chad and Niger, along with camel caravans trekked into arid sub-saharan communities such as Sokoto. A possible evidence to back this speculation is that the same species of ticks found on camels in Sokoto had also been reported from sahel regions such as Sudan and Mali, which have a traffic of caravan linkage to Sokoto (Osman, 1978; Teel *et al.*, 1988). The distribution of ticks on camels in this study, showed no significant discrimination in their infestation of the male or female animals. This underlines the potential for these ectoparasites to multiply and spread rapidly, in large number, among host animals with adverse consequence for the environment (Hoogstraal, 1978; Higgins, 1985). Another important feature of all tick species encountered in this study is that they have multiple host habit of development by which they also attack and imbibe blood from other domestic animals and human hosts alike (James-Rugu and Jidayi, 2004; Nwosu *et al.*, 2003; Hoogstraal, 1978). This habit enhances the role of ticks as vector of many pathogenic diseases of man and livestock (McCartan *et al.*, 1978; Higgins, 1985 and therefore making camel owners and other domestic animals in Sokoto vulnerable to camel tick-borne diseases of man and livestock (McCartan *et al.*, 1978; Walker *et al.*, 2003). Accordingly, this report calls for greater recognition and interest in tick fauna parasiting on camels in Sokoto because of the great economic impact of ticks on camel production (Dolan *et al.*, 1983; Nwosu *et al.*, 2003; Zeleke and Beleke, 2004) and also because of the significance of camels as reservoir of human and livestock parasites (McCartan *et al.*, 1978; Nwosu *et al.*, 2003; Walker *et al.*, 2003). If the tick fauna found on camels in Sokoto was imported as suggested, then it is recommended that livestock check points at the boarders arrest, quarantine and de-infest in-coming animals before release, to prevent potential tick pestilence in Sokoto. On the other hand, if ticks of Sokoto camels were indigenous species, then their prevalence in this study poses a potential tick-related public health hazard (Higgins, 1985; McCartan *et al.*, 1978; Nwosu *et al.*, 2003;

Walker *et al.*, 2003). Other ectoparasites, including species of *Sarcoptes*, *Hematopinus*, *Musca*, *Hippobosca* and *Tabanus* found on the camels are also significant because of their capacity to cause and transmit diseases, which are zoonotic or important economic constraints to productivity and performance of camels in other countries that are engaged in intensive raising of camels (Pegram and Higgins, 1992; Schillinger, 1987; Dolan *et al.*, 1983). The anatomical sites, which harbored these ectoparasites, are common sites for mange and tick paralysis, which also frequently hinder the performance and productivity of camels (Hoogstraal, 1978; Schillinger, 1987; Basu *et al.*, 1995). Although some of the ectoparasites recovered were associated with mange, scab and other lesions of camels examined, further studies are necessary to determine the impact of this and other pathogenic features of ectoparasites of camels in Sokoto.

REFERENCES

- Al-Asgah, N.A., H.S. Hussein, M.S. Al-Khalifa and F.M. Diab, 1985. *Hyalomma schlzei* (The large Camel Tick): Distribution in Saudi Arabia. *J. Med. Entomol.*, 22: 230-231.
- Bakre, R.K., 1998. Survey of ectoparasites of camels (*Camelus dromedarius*) slaughtered at Sokoto metropolitan abattoir. DVM Thesis, Usmanu DanFodiyo University. DVM/FVM/14460., pp: 71.
- Basu, A.K., A.L. Aliyu and A. Mohammed, 1995. Prevalence of Sarcoptic mange in Camels (*Camelus dromedarius*) in Nigeria. *J. Camel Prac. Res.*, 2: 141
- Dirie, M.F. and O. Abdulrahman, 2003. Observations on little known diseases of camels (*Camelus dromedarius*) in the horn of Africa. *Rev. Sci. Tech. Off. Int. Epiz.*, 22: 1043-1049.
- Dolan, R., A.J. Wilson, H.J. Schwartz, R.M. Newson and C.R. Field, 1983. Camel production in Kenya and its constraints II: Ticks infestation. *Trop. Anim. Health Prod.*, 15: 179-185.
- Garba, H.S. and S. Maigandi, 1995. Diseases of camels (*Camelus dromedarius*) slaughtered at abattoir in Sokoto. *Nig. Trop. Vet.*, 13: 95-102.
- Higgins, A.J., 1983. Observations on the diseases of the Arabian camel (*Camelus dromedarius*) and their control: A review. *Vet. Bull.*, 53: 1089-1100.
- Higgins, A.J., 1985. Common ectoparasites of camel and their control. *Br. Vet. J.*, 141: 197-216.
- Hoogstraal, H., 1978. Biology of Ticks. In: Tickborne Diseases and Their Vectors. J.K.H. (Ed.), Wilde. *Proc. Int. Conf. Edinburgh*, pp: 3-14.
- James-Rugu, N.N. and S. Jidayi, 2004. A survey on the ectoparasites of some livestock from some areas of Borno and Yobe States. *Nig. Vet. J.*, 25: 48-55.
- McCartan, B.M., A.G. Hunter, R.G. Pegram and A.S., 1978. Tick infestations on livestock in the Yemen Arab Republic and their potential as vectors of livestock diseases. *Trop. Anim. Health Prod. Health*, 19: 21-31.
- Nwosu, C.O., M.S. Adamu, P.A. Shinggu and M.I. Ahmed, 2003. Parasites of camels (*Camelus dromedarius*) in Borno state, Nigeria. *Nig. J. Exp. Applied Biol.*, 4: 65-70.
- Osman, O.M., 1978. Preliminary notes on the distribution of ticks (Acarina: Ixodidae) in Darfur Province, Sudan. *Bull. Anim. Health Prod. Afr.*, 26: 329-333.
- Pegram, R.G. and A.J. Higgins, 1992. Camel Ectoparasites: A review. *Suffolk, UK Proc. 1st Camel Conf.* pp: 67-78.
- Richard, W and S. David, 2003. *Veterinary Ectoparasites, Biology, Pathology and Control*. 2nd Edn., Blackwell Scientific publication, pp: 179-182.
- Schillinger, D., 1987. Mange in camels an important zoonosis. *Rev. Sci. Tech. Off. Int. Des. Epiz.*, 6: 478-480.

- Teel, P.D., D.E. Bay and P.A. Ajidagba, 1988. Ecology, distribution and host relationships of Ticks (Acari: Ixodidae) infesting livestock in Mali. *Bull. Entomol. Res.*, 78: 407-424.
- UNESCO-IPAL, 1985. Camel diseases and productivity in arid lands of northern Kenya. Techn. Rep. No. E-7, pp: 236.
- Walker, A., 1994. *Arthropods of Humans and Domestic Animals: A Guide to Preliminary Identification*. Pub: Chapman and Hall London, UK.
- Walker, A.R., J.L. Bouattour, I.G. Estrada-Pena, A.A. Horak, R.G. Pegram and P.M. Preston, 2003. *Ticks of Domestic Animals in Africa: A Guide to Identification of Species*. Bioscience Reports. Edinburgh, UK., pp: 21-24.
- Zelege, M. and T. Belege, 2004. Species of ticks on camels and their seasonal population dynamics in eastern Ethiopia. *Trop. Anim. Health Prod.*, 36: 225-231.