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Prevalence of tick species infesting donkeys in Borno state, Nigeria

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Abstract
A survey of tick species infesting donkeys in Borno state was conducted to determine their infestation rate and the parasite burden on Donkeys. Ticks sample were collected by visiting ten herds at random periodically for five (5) consecutive visits. The ticks were identified for their genera in veterinary parasitology laboratory of University of Maiduguri, Borno State. The effect of month, age, State of body condition, housing and grazing systems on tick infestation were recorded. The result revealed that about 64(18.3%) out of 350 of the total breeds of donkey while 24% of Auraki (rust or red) donkey were found to be most susceptible to tick infestation followed by Duni (dark brown to black) with 22%, 18% was recorded in Fari (pale cream to white) and 15.5% Indabari (Grey to light medium brown) respectively. Infestation rate across different age groups, age had no significant effect ($p>0.005$) on tick infestation in donkey breeds, however, younger donkeys (below 1 year of age were found most affected across the donkey species). In Indabari (grey to light-medium brown) young stock aged below 1 year were most susceptible against 1-2 years donkeys with 4(17.4%) and 5(21.7%) in adults (above 2 years age). The same trend was observed in Fari (pale cream to white), Auraki (Rust or red) and Duni (Dark brown to black) Donkey respectively. However, out of the Donkey species examined 129 (36.8%) with maximum infestation rate was recorded in treated Indabari with 89(69.9%), 90(41.2%) in untreated Fari (grey to light medium brown). While minimum infestation rate was recorded in treated Fari (Grey to light medium brown) Donkey with 9(6.9%) and 13 (10%) in treated Duni (Dark-brown to black) Donkeys respectively. Post treatment did not have significant value ($p>0.05$) affect the infestation across different donkey species. However, those treated with acaricide were infested slightly lower than the treated one. It is obvious from the above findings that both the treated and untreated carry the tick load although differently. Tick presence in treated donkeys may be due to the application of poor-efficacy drugs available in market at the research area. However, infestation rate in donkeys across different months significantly ($p< 0.05$) affected ticks infestation rate in Donkey. Maximum infestation was observed in June with (12%) in Fari Donkey species, while lowest infestation rate was recorded in September with 3% in Fari and 4% Auraki Donkey species respectively. Infestation rate was highest in June, September and followed a diminishing trend in the succeeding months. This is attributed to an enhance ticks activity with increased hotness and dampness of the environment in the research area.

Keywords: Prevalence, species infesting, donkeys, Nigeria

Introduction
There are 44.3 Million Donkeys worldwide, this number has increased by 15.6% since 1981 (FAO 1992) [10]. A small number are kept in the western world as pets, as companions for horses or for work such as in occupational therapy programmes (FAO 1992) [10]. However, over 95% live in the developing world where they are kept mainly for work. They provide transport for people and goods and are often used in small scale agricultural systems for light tillage, seeding and weeding of crops. After years of being ignored their used is now being encouraged by both government and non-government development agencies (Wylam 1991, Artenzen 1984 and Ogle 1990) [24, 1, 20]. Yet despite their valuable contribution to human society, very little is known about Donkeys, they are given less consideration than other species of livestock and their welfare is often neglected. Indeed De Aluja and Lopez (1991) considered the Donkey as the most neglected and abused animal in Mexico

(Bakkoury and Belemih 1991) [9]. Good welfare should result if the Donkey is provided with adequate and appropriate food, water, shelter and health care, if attention is paid to its behavioral needs and if it is free from fear. In addition to the 44 million mules (created by crossing a male Donkey with a female horse and their population has also been rising) (FAO, 1997) [3]. Of Islamic Although the Donkey, Equus asinus, occurs throughout most of semi- arid Africa today, much of its distribution is recent and it is still spreading in eastern and southern Africa. The ass was probably domesticated in North East Africa. It seems to have spread to sub-SaharanWest Africa relatively late (Epstien, 1984, Blench, 1995) [8, 4]. In Nigeria, Donkeys are associated with areas Islamic influence and were probably introduced via the trans-Saharan caravan trade. There is some evidence that donkeys across Sudan and Chad reached the north-east via an east-west route (Blench, 1997) [3]. Donkeys are usually distinguished by coat-colour, although some colours are favored by buyers, there is little evidence that these colours are linked to the productivity or hardiness of donkeys. A number of factors help explain why donkeys have low status. They are usually the cheapest, often theonly affordable work animal and therefore tend to be associated with the poor. If donkeys are not available, women often have to do the same (Mohammed 1991) [17]. In contrast with cattle, buffalo and camels which are usually kept for their milk and meat as well as work, whose hides are cured for leathers and whose drug even as a number of uses (Pearson, 1992). Donkey type-products are not generally used, there are exceptions to this examples, there is trade in donkey meat in Nigeria from donkey producers in the North to donkey eaters in South, donkey hides are used (Camac, 1989) [5]. The donkey population of Nigeria is about 800,000 (FAO, 1989).

Equine babesiosis has posed threat to the international movement of equids (Friedhoff *et al*, 1990) [11], because when horses and donkeys from a babesia free area are introduced into their death. Hence, restriction was imposed on the entry of piroplasm seropositive horses into American territory during Alanta Olympic Games 1996 (Losson, 1994) [16]. In equines two different protozoa Babesia cabali and Babesia equi are known to cause infection and disease was described by Wilshire as anthrax fever. Babesia equi is known to be more virulent and tends to cause a fulmigating parasitaemia (Gersenberg *et al*, 1998) [12]. Development of progressive anaemia and haemoglobinuria in the last clinical phase of the disease is pathogonomonic sign in, B.equi infection in horses and also in donkeys (Holbrook *et al*, 1973) [14]. Donkeys that died of B.equi infection show varying degrees of emaciation, gross enlargement of liver and spleen, flabby kidney. In addition to production losses various fatal haemototozoan disease like theileriosis, anaplasmosis and many ricketsial diseases are also transmitted through ticks which further increases the losses to the livestock industry and province (Gray and Potgieter, 1982) [13]. The most common ticks of horses and donkeys include: Hyalomma aponommoides, Hyalomma bispinosa, Hyalomma detritum, Hyalomma dromemedarii, Rhipicephalus sanguineus (Irfan, 1984) [15]. Norval (1979) [19] found that the distribution and population of important ticks in Rhodesia were influenced by climate and vegetation. At temperature of 25 ^{0}C and relative humidity (RH) of 84%, the average pre-oviposition period of hyalomma lusitanicum was 47 days, the oviposition lasted an average 36 days and the total egg production was 6320 per female. At 16oc the females did not lay eggs at all, but those which survived for one year and were transferred thereafter to 25oc and 84oc RH laid viable eggs. At 35oc, the oviposition was identical at all level of RH tested (25%, 62% and 93%). At 25 ^{o}C, the pre-oviposition period was shortened at 93% RH. The eggs hatched in 32-42days, the hatching percentage being lower in batches of eggs laid at the gaining and at the end of the oviposition period. The larval and nymph moultings were not influenced by the type of host. As temperature increased, the pre-moult period became shortened. The engorged larvae were more sensitive to the low RH than the engorged nymphs, whose moulting percentage was always greater than 72 in all regimes. Low temperature and high humidity had a favorable effect on the survival of unfed nymphs. The female to male ratio, was 1:2 HYalomma lustanicum always behaved as a 3-host tick. The female ticks engorged on calves weighed an average 543 mg. ticks maintained at 25oc and 84% RH and engorged on calves completed the lifecycle in 138-196 days, which does not include the period of chintinization of about 30 days. More than half of this period was spent in eggs laying and hatching.

Materials and Methods

Study Area

A survey of tick species infesting donkeys was carried out in Borno state. Borno state located in North-eastern part of Nigeria with an area of 69435 sq km has a physical setting which arises from an amalgam of factors well as the intensity of resources exploitation in the area. Since the state lies between latitude 10^{o}N 13^{o}N and longitude 12^{o}N and 15^{o}N, because of the broad geographical extent, physical setting is bound to be varied.

Tick Collection

Part of the data was collected from survey and field observation while further examination leading to general identification were carried out veterinary parasitology laboratory, University of Maiduguri. The effect of month, age, status of body condition post treatment effect of acaricides, housing and grazing systems on tick's infestation was recorded. Representative sample from 30 household (herds) were studied periodically for 5 consecutive visits. The infestation rate was categorically determined by examining difference body parts of host species through naked eye. The following field information supporting the study was collected using a worksheet encompasses of the Name of farmer (Owner), Color of Animals, Species of Animals, Age of Animals (1 years, 1-2 years, 2 years), Sex (Male or Female), Health status (Fatty, Fair and Bony), post acaricide infestation (Yes or No) etc. subsequently, ticks were collected from all infested body arts into labeled capped bottle. Collection was made using forceps and care was taken to avoid recapitulation. Ticks were transferred to empty petri dish and left 15-20 minuates for bring back to relax status at the laboratory. Enough ethanol (70%) was added to petri dish containing ticks as preservation. Ticks were remained floating in the ethanol for unidentified period till the ticks were identified.

Tick processing and examination

Ticks were shifted into potato tubes having 15% of potassium hydroxide (KOH), the solution containing ticks was boiled for 15-20 minute and then allowed to cool. After cooling, ticks were removed and passed through grades of ethanol (20%, 40%, 505, 60%, 70%, 80%, 90% and 95%) in each grade of ethanol ticks were kept consecutively for 2 hours, before shifting to the higher grade. Ticks were then washed with tap

water and transferred to clove oil for 24-48 hours, then examined under microscope using proper keys. Permanent mounts of ticks were prepared on glass slide using Canada balsam as sticking agent. A cover slip was applied over the slide to make it permanently mounting.

Results and Discussion

The study revealed that, about 64 (18.3%) out of the 350 of the total donkey breeds observed indicated that 24% of Auraki (Rust or Red) were found to be most susceptible to ticks infestation followed by Fari (Pale cream to White) with 18.0% and Indabari (Grey to light medium brown) with 15.3% respectively. Table 2 indicates infestation rate across different age groups, age had no effect ($p>0.05$) on tick infestation in donkey breeds, however, younger donkeys (below 1 year of age) were found most affected across the donkey species. In Indabari (Grey top light-medium brown) young stock aged below 1 year were most susceptible against 1-2 years donkey with 4(17.4%) and 5(21.7%) in adult (above 2 years age).the same trend was observed in Fari (Rust or Red) and Duni (Dark brown to Black) Donkey respectively. Likewise infestation was high in young stock (donkey) in Indabari (Grey to light medium brown) with 4 (17.4%) in 8-12 months old donkey, 5 (27.8%) in 1-2 years old donkeys and 5 (27.8%) in >2 years old donkey respectively. However, 6 (26.1%) was maximum infestation recorded in 1 year old Indabari (Grey to light brown), 5 (21.7%) in >2 years, 4 (17.4%) in <8 months and 1-2 years respectively. However, minimal infestation <8 months with 1(8.3%) infestation. As the age advances donkey become more adaptable than in younger state irrespective of the breeds. However, Soulsby (1986) [23] reported that younger donkey were susceptible to tick infestation. Table 3 show tick infestation in different body condition did not affect ticks infestation across different donkey breeds significantly ($p>0.05$). In Indabari (Grey to light medium brown), the result shows that higher infestation was recorded in Bony 8 (34.8%) followed by Fair 8 (34.8%) and 7 (30.4%) in Fatty respectively. Similarly, in Fari (Pale cream to white) 8 (44.4%) was recorded in Bony condition, 5 (27.8%) in both Fair and Fatty respectively. In Duni (Dark brown to black) with 8 (66.7%) infestation was recorded in Bony, 26 (16.7%) in both Fair and Fatty condition. Donkeys are least susceptible and more resistant to tick incidence in young donkeys. Besides, Sort (1973) [22] reported that young donkeys were more susceptible to ticks infestation. Whereas, table 4 show that out of 2220 Ixodid ticks sample collected, only 1440 were eligible for genera identification. The most common ticks genera identified were belonging to genus Hyalomma (30.6%), followed by Rhipicephalus (25.8%), Amblyomma (22.1%) and Boophilus (21.5%). Different other studies reported higher number of genera involved in donkey infestation. Table 5 shows post-acaricide infestation rate of tick in donkeys species, it revealed that out of the 350 donkey species examined 129 (36.8%) has maximum infestation rate was recorded in treated Indabari 89 (69.9%) followed by untreated Fari (Grey to light medium brown) with 90 (41.2%) respectively. While minimum infestation rate was recorded in treated Fari (Grey to light medium brown) donkey with 9 (6.9%) and 13 (10%) in treated Duni (Dark brown to black) donkeys respectively. Post treatment did not significantly ($p>0.05$) affect the infestation across different donkey species. However, those treated with acaricides were infested slightly lower than the untreated one. It is obvious from the above findings that both the treated and untreated donkeys may be due to the application of poor concentration of acaricide or the use of poor-efficacy drugs available in market. Similarly, spraying only the animals and leaving the tick's sanctuaries untouched, do not relieve the stock from the tick load. Table 6 shows infestation rate in donkeys across different months significantly ($p<0.05$) affected tick infestation rate in donkey. Maximum infestation was observed in June. (12%) of Indabari was observed in in June, (12%) Fari in September and lowest infestation with (3%) in Fari and 4% in Auraki respectively. The results showed that infestation rate was highest in June, September and followed a diminishing trend in the succeeding months. This explains the association of an enhance tick's activity with increased hotness and dampness of the environment. Tick infestation was influence by temperature and humidity. Dass-ss (1994) [6] reported a similar trend for tick's activity examined the seasonal activity of ticks on sheep, goat and cattle in India and reported their high infestation in rainy season.

Table 1: Total number of Donkeys examined infested with Ticks

Breeds of Donkey	No. of Donkeys observed	Donkey infested	
		NO.	%
Indabari (Grey to light brown)	150	23	15.3
Fari (Pale cream to white)	100	18	18
Duri (Dark brown to black)	50	11	22
Auraki (Rust or Red)	50	12	24
Total	350	64	18.3

Table 2: Infestation rate (%) in Donkeys across different age groups

Age group	Indabari	Fari	Auraki	Duni
<8 months	4(17.4%)	3(16.7%)	1(8.3%)	2(18.2%)
8-12 months	4(17.4%)	3(16.7%)	2 (16.7%)	21(9.1%)
>1 year	6(26.1%)	2(11.1%)	2(16.7%)	2(18.2%)
1-2 years	4(17.4%)	5(27.8%)	3(25%)	3(27.8%)
>years	5(21.7%)	5(27.8%)	4(33.3%)	3(27.3%)
Total	23	18	12	11

Table 3: Infestation rate of (%) in Donkey species across different body conditional status

Donkey species	Different body conditional status				
	Body	Fair	Fatty	Total	
Indabari	8(34.8%)	8(34.8%)	7(30.4%)	23	150
Fari	8(44.4%)	5(27.8%)	5(27.8%)	18	100
Auraki	5(45.5%)	3(27.3%)	3(27.8%)	11	50
Duni	8(66.7%)	2(16.7%)	2(16.7%)	12	50

Key:
Indabari –Grey to light medium brown
Fari-Pale cream to white
Auraki-Rust or Red
Dari- Dark brown to black

Table 4: infestation rate (%) of identified tick genera on donkeys examined

Donkey species	Total No. Ticks harvested	Boophilus	Hyalomma	Rhipicephalus	Amblomma
Indabari	450(31.1%)	50(16.1%)	100(27.7%)	150(40.3%)	150(47.2%)
Fari	360(25%)	80(25.8%)	100(27.7%)	100(26.9%)	80(25.2%)
Auraki	420(20%)	120(38.7%)	160(36.4%)	80(21.5%)	60(18.9%)
Duni	210(14.6%)	60(19.3%)	80(18.0%)	42(11.3%)	28(8.8%)
Total	1440	310(21.5%)	440(30.6%)	372 (25.8%)	318(22.1%)

Table 5: Post acaricide infestation rate (%) of Tick in Donkeys

Donkey species	Treated	Untreated	Total	Percentage (%)
Indabari	89(69.9%)	61(27.6%)	150	42.9
Fari	9(6.9%)	91(41.9%)	100	28.3
Auraki	18(13.9%)	32(14.56%)	50	14.3
Duni	13(10%)	37(16.7%)	50	14.3
Total	129(36.8%)	221(63.1%)	350	100.0

Table 6: Infestation rate (%) in Donkey Different months

Months	Indabari	Fari	Auraki	Duni
December	19(6.7%)	8(8%)	5(10%)	3(6%)
January	10(6.7%)	7(7%)	5(10%)	3(6%)
February	10 (6.7%)	6(6%)	7(14%)	5(10%)
March	10(6.7%)	6(6%)	3(6%)	5(10%)
April	9(9%)	8(8%)	3(6%)	2(4%)
May	12(8%)	3(3%)	2(4%)	2(4%)
June	18(12%)	8(8%)	2(4%)	5(10%)
July	14(9.3%)	10(10%)	3(6%)	3(6%)
August	10 (6.7%)	10(10%)	5(10%)	5(10%)
September	16(10.7%)	12(12%)	5(10%)	7(14%)
October	15(10%)	11(11%)	5(5%)	5(10%)
November	16(10.7%)	11(11%)	5(5%)	5(10%)
Total	150(42.8%)	100(28.6%)	50(14.3%)	50(14.3%)

Conclusion

On conclusion, it was observed a higher tick's infestation in donkey is at its peak during June-September and followed a diminishing trend in the succeeding months due to an enhance tick's activity with increased hotness and dampness of the environment.

Recommendation

Accurate concentration of acaricide should be administered and avoid use of poor efficacy drugs available in market around the study area.

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