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Prevalence of Ectoparasite Infestation of Goats and Sheep in Katsina Metropolis

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Abstract

An epidemiological study was carried out to determine the prevalence of ectoparasite infestation of goats and sheep in Katsina from March and June 2019. A total of 310 animals comprising of 161 goats and 149 sheep were examined using the hand picking and hair brushing methods and some ectoparasites present on the animals were collected. Of the 310 animals examined, 30 goats representing 18.63% and 27 sheep representing 18.12% were infested. The ectoparasites identified on goats were Mites: *Sarcoptes scabiei* 5 (3.11%), Ticks: *Rhipicephalus sp*. 4 (2.48%), *Amblyomma sp*. 6 (3.73%), *Boophilus sp*. 3 (1.86%), *Hyalomma* sp. 4 (2.48%) and *Ixodes ricinus* 2 (1.24%), Lice: *Damalinia ovis* 6 (3.73%). The ectoparasites identified on sheep were Fleas: *Ctenocephalides felis* 9 (6.04%), Ticks: *Rhipicephalus sp*. 5 (3.36%), *Amblyomma sp*. 3 (2.01%), *Boophilus sp*. 4 (2.68%) and Lice: *Damalinia ovis* 6 (4.03%). The predilection sites were mostly; ears, neck, back, shoulders, testes and belly in both goats and sheep. The age related infestation was more among 1 – 2 years goat and sheep with percentage infestations of 53.42% and 52.35% respectively. Chi square test revealed statistical significant differences in the prevalence of ectoparasite infestations between goats and sheep ($p<0.05$) with respect to age. Infestation was more in male animals for goats 17 (56.7%) and in female animals for sheep 19 (70.4%). Chi square test revealed no statistical significant differences in the prevalence of ectoparasite infestations between goats and sheep ($p>0.05$). This study showed that ectoparasitic species were abundant and prevalence of infection was very high which deserves quick intervention to reduce the risk of transmission as well as the economic and market value of the animals.

Keywords: Ectoparasites; Infestation; Goats; Sheep; Katsina; Nigeria

Introduction

Ectoparasites are organisms that live on the surface of bigger animals upon which they depend for food, shelter and other basic needs to survive [1]. It has been observed that ectoparasites do not only have direct effects on their host, they may also transmit pathogens, thereby acting as vectors of diseases [2]. Ectoparasites generally affect the health of animals and the quality of hides and skin. The leather industries have suffered great loses over the years because of infestation of animal skin. Goats and sheep maintain an available economic and ecological niche in Nigerian agriculture [3]. The owners of these animals earn their livelihood through the sales of their surplus and by products. A major challenge in the production of goats and sheep has been parasite infestation [4]. West African dwarf goat (Capra hircus) and sheep (Ovis jibatus) were proned to ectoparasite such as ticks, fleas and mites. This was also observed, in Northern Nigeria. In Southwestern Nigeria, recorded Sarcoptes scabiei among free roaming goats and sheep as a major case of mortality in goats [5]. Feeding activity of these ectoparasites, result in significant blood loss, secondary infestation, pruritus, and excoriation and in some cases premature death [6]. In recent times, several studies have been carried out to determine the different ectoparasites of cattle and small ruminants (sheep and goats). This, however, will help in advancing their production; better management and good health. The types of ectoparasite infestations found in goats and sheep are not uniform in geographical distribution but depend on

the prevailing climatic conditions in the region. In Nigeria, though a good number of tick species have been identified to attack cattle, goats and sheep, identified four common species as Amblyoma variegatus, Boophilus, Hyalomma rufipes and Hyalomma truncatum [7]. The common fleas on goats and sheep in Sub-Saharan were Ctenocephalides canis, and C. felis [8]. Considering the place of these animals (goats and sheep) in the socioeconomic and livelihood of some farmers, there is need for regular check on ectoparasites infestation on them, to increase their economic values and productivity. Parasitic skin diseases of small ruminants caused by lice, fleas, ticks, and mites are among the major diseases causing serious economic loss to small holder farmer, the tanning industry, and the country as a whole [9]. The losses due to parasites can be categorised into (i) those affecting the productivity of an individual animal and (ii) those influencing herd productivity. The first category includes mortality, lower market value (slaughter house condemnations), reduction in body weight gain, reduced wool and milk yield, reduced draught power, reduced dung output (for fuel and fertilizer) and reduced efficiency in food conversion. The second category includes the reduced productive life span of animals, the disturbance of the genetic selection effort and the possibility of immunosuppression and increased susceptibility to diseases [10]. Goat and sheep rearing is one of the main animal husbandry activities in Katsina and the entire North Eastern region of Nigeria. The aim of this study therefore, was to determine the prevalence of ectoparasites infesting goats and sheep in Katsina State, Nigeria.

Materials and Methods

Study area

Katsina is located between latitude 12°15 N 7°30 E, covering an area of 23,938km² in northern Nigeria. It is bounded to the north by Niger republic, to the east by Kano and Jigawa states, to the south by Kaduna state and by Zamfara to the west. According to the Census figures of 2006, Katsina LGA has a population of 369,620. The occupation of most of the inhabitants is agriculture which includes; goat and sheep rearing under the extensive and semi-intensive animal husbandry management systems. The annual rainfall ranges between 750-900 mm, with two distinct seasons. The rainy season which starts from May to October and dry season, from November-April (Figure 1).

Collection of samples

The owners of farm animals were approached seeking their consent to allow the work to be carried out from March to June 2019. A total of 161 goats and 149 sheep were sampled randomly irrespective of their age and sex. Lice and mites were obtained by brushing the skins of the animals onto a white cloth while ticks and fleas were obtained from the animals by direct picking using forceps [11]. Age and sex of the animals were determined by asking the owners and farm attendants and by visual inspection respectively. The ectoparasites (lice, mites, ticks and fleas) were collected from the different parts of the body of the animals (belly, back, udder, ear, testes and thigh) and were preserved in separate sampling bottles containing 70% alcohol which were well labelled and transported to the Biological Sciences Laboratory of Federal University Dutsinma for identification.

Figure 1: *Map showing the Katsina metropolis.*

Examination and identification of ectoparasites

Ectoparasite morphology was identified in the laboratory with the aid of the dissecting microscope according to the keys and descriptions [12].

Statistical analysis

Data collected were entered on Microsoft excel spreadsheets and analysed using the Statistical Package for Social Sciences (SPSS Version 20.0). Chi square test was used to test for the possible association of species, sex and age of animal with ectoparasite infestation. This study considered 95% confidence interval.

Results

Of the 161 goats examined from Table 1, 30 (18.63%) were infested with ectoparasites, with Boophilus sp (17.39%) recording the highest prevalence followed by Damalinia ovis (16.15%), then Sarcoptes scabiei (15.53%) and Amblyomma sp (9.94%) with the least prevalence recorded in goats. The thigh and belly where sites were the highest number of ectoparasites were collected (Table 1).

Table 2 showed the result of ectoparasite infestation in sheep, 27 (18.12%) were infested with ectoparasites, with Ctenocephalides felis (25.50%) recording the highest prevalence followed by Damalinia ovis (21.48%), then Phipicephalus sp (19.46%) and Amblyomma sp (15.44%) with the least prevalence recorded in sheep. The back and shoulders where sites were the highest number of ectoparasites were collected from sheep (Table 2).

Ectoparasite infestations were higher in goats of between 1 – 2 years and 0 – 1 year (53.42% and 29.81%) than older goats 27(16.77%) and in sheep, ectoparasite infestation was higher in the age group of 1 – 2 years and 0 – 1 year (52.35% and 24.16%

respectively) than the older sheep 35(23.49%) as reported in Table 2. Chi square test revealed significant difference in ectoparasite infestation (Table 3).

Table 4 showed that male goats 17 (56.7%) were more infested than female goats 13(43.3%) while infestation was more in female sheep 19(70.4%) than the male 8 (29.6%). Chi square test revealed no significant difference in ectoparasite infestations between male and female goats and sheep (X2 = 0.011, df = 1, P value = 0.916) (Table 4).

Table 1: *Prevalence of ectoparasites in goats in Katsina metropolis (N=161).*

Ectoparasites Isolated	Number of goats infected	Number of ectoparasites collected	Prevalence (%)	Predilection site
Sarcoptes scabiei	5(3.11%)	25	15.53	Back, Thigh, testes
Phipicephalus sp	4(2.48%)	21	13.04	Ears, shoulders, testes, belly, udder,
Amblyomma sp	6(3.73%)	16	9.94	
Boophilus sp	3(1.86%)	28	17.39	
Hyalomma sp	4(2.48%)	22	13.66	
Ixodes ricinus	2(1.24%)	23	14.29	
Damalinia ovis	6(3.73%)	26	16.15	Back, shoulders, tail, neck,
Total	30(18.63%)	161	100.0	

Table 2: *Prevalence of ectoparasites in sheep in Katsina metropolis (N=149).*

Ectoparasites Isolated	Number of goats infected	Number of ectoparasites collected	Prevalence (%)	Predilection site
Ctenocephalides felis	9(6.04%)	38	25.50	Belly, Back, Thigh, Leg
Phipicephalus sp	5(3.36%)	29	19.46	Ears, shoulders, testes, belly, udder, trunk
Amblyomma sp	3(2.01%)	23	15.44	
Boophilus sp	4(2.68%)	27	18.12	
Damalinia ovis	6(4.04%)	32	21.48	Back, shoulders, tail, head
Total	27(18.12%)	149	100.0	

Table 3: *Age related prevalence of goats and sheep.*

	Goats			Sheep		
Age	**Number infested**	**Number of ectoparasites collected**	**Prevalence (%)**	**Number infested**	**Number of ectoparasites collected**	**Prevalence (%)**
0-1 year	6	48	29.81	7	36	24.16
1-2 years	9	86	53.42	8	78	52.35
2-5 years	15	27	16.77	12	35	23.49
Total	30	161	100	27	149	100

Seven ectoparasite species were reported from goats including *Sarcoptes scabiei, Rhipicephalus sp, Amblyomma sp, Boophilus sp, Hyalomma sp, Ixodes ricinus and Damalinia ovis* while 5 were seen in sheep *Ctenocephalides felis, Rhipicephalus sp, Amblyomma sp, Boophilus sp*, and *Damalinia ovis*. This study showed that *Ctenocephalides felis* was not collected from goats but only in sheep while *Sarcoptes scabiei, Hyalomma sp* and *Ixodes ricinus* were not collected from sheep but found only in goats (Figure 2).

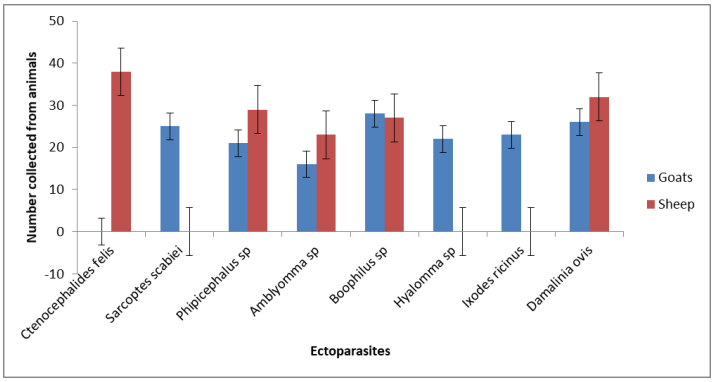

Figure 2: *Number of ectoparasites collected from goats and sheep.*

Discussion

The overall prevalence of ectoparasite infestation 18.39% recorded in this study is slightly higher than that of who reported 16.7% in sheep and goats in Gombe [13]. Prevalence of 10.0% in sheep and goats in Gwagwalada Abuja, Nigeria which is lower than the report of this study [14]. The report of this study disagrees with very high prevalence of 45.95%, 55.1%, 68.1% reported in Anambra respectively [15-17]. The 18.63% prevalence reported in goats in this study is lower than 61.70% reported 85.0% reported by Onojafe (2008), 19.0% and 70.7% reported lower prevalence of 3.7% and 14.0% respectively than reported in this study [18]. Goats are browsers, prefer bushes/shrubs, tree leaves and rough browse plants and need more space to roam about freely during browsing, thus could be more exposed to a variety of ectoparasite species.

The 18.12% prevalence reported in sheep in this study agrees with 18.52% reported 8.7% and reported 13.1% which were lower than the prevalence in this study. Reported 47.0%, 69.8% and 19.0% respectively in sheep which were higher than that in this study. The high prevalence of ectoparasites in sheep could be attributed to less body habits of self-grooming, licking, scratching, rubbing and grazing behaviour which could contribute to ectoparasites infestation. Seven ectoparasite species were reported from goats in this study and which have also been reported including *Sarcoptes scabiei, Rhipicephalus sp, Amblyomma sp, Boophilus sp, Hyalomma sp, Ixodes ricinus and Damalinia ovis*. The five ectoparasite species reported from sheep in this study have been reported by *Ctenocephalides felis, Rhipicephalus sp, Amblyomma sp, Boophilus sp, and Damalinia ovis*. The presence and or absence of ectoparasites reported may be due to seasonal variations in the months of study, rainfall, temperature, relative humidity and number of animals examined [19,20]. The predilection sites (back, belly neck, ear, thigh, shoulders, udder, testes, head and trunk) of these ectoparasites have been reported in previous studies of who reported ticks on the tail, ears and testis of goats and Damalinia ovis around the neck and back area of sheep [21]. Genital distribution of ticks on sheep and goats with more ticks concentration around the testes. *Damalinia ovis* on head, neck and trunk of sheep and head and neck of goats, *Rhipicephalus spp*. on head, neck, abdomen, trunk, leg, tail and pelvic of sheep and goats, *Boophilus sp*. on abdomen, trunk and pelvic of sheep. Neck and trunk of sheep and head and neck of goats for *Rhipicephalus spp, Boophilus sp, Damalinia ovis*. The predilection sites of these ectoparasites are likely areas where capillary blood can be reached easily by the ectoparasites [22].

Table 4: *Sex related prevalence of goats and sheep.*

Animal type	Number of animals infested	Male	Female	Infestation (%)	Chi square	P value
Goats	30	17(56.7%)	13(43.3%)	18.63	0.011	0.916
Sheep	27	8(29.6%)	19(70.4%)	18.12		
Total	57	25(43.9%)	32(56.1%)	18.39		

This study reports that middle age (52.35%) and young animals (24.16%) were more susceptible to ectoparasite infestations than adults (24.16%). This agrees with the reports but contrary who reported higher prevalence in adult animals than young animals. Attributed the greater susceptibility of young animals to ectoparasite infestations to a higher ratio of accessible surface to body volume and poor grooming behaviour [23-25]. The wool and hair of the young animals is not fully developed to be able to protect them from ectoparasite infestations.

The report from this study showed that there were more ectoparasite infestations in female than in male which agrees with the findings of reported that higher levels of prolactin and

progesterone make females more susceptible to infestation as a result of pregnancy and lactation. Thus, it could be hypothesized that some hormonal influence is associated with the higher prevalence of ectoparasitic infestations in females than in males. This study showed that goats were more susceptible to ectoparasite infestations than sheep. This is in agreement with the reports of who reported sheep to be more infested than goats. The susceptibility to ectoparasite infestations being more in goats than in sheep could be as a result of varying agro-climatic conditions and ectoparasite species composition in goats and sheep. In conclusion, goats and sheep are potential carriers or host of ectoparasites in Katsina which can be of veterinary and medical importance [26,27]. Female and young animals are the more susceptible to ectoparasite infestations in this study area. Good sanitation and hygiene should be employed in animal pens and houses as well as proper and adequate health care of the animals which can reduce ectoparasite infestation [28-31].

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