



ASSESSMENT OF ECTOPARASITES OF DOMESTICATED GOATS AND ASSOCIATED ZOOBOTIC RISK FACTORS IN ABUA/ODUAL LOCAL GOVERNMENT AREA, RIVERS STATE

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Abstract

This study was embarked to assess the ectoparasites of domesticated goats and associated zoonotic risk factors. Two hundred domesticated goats from 80 households in Agada I, Egbolom, Emoh, and Omelema communities in Abua/Odual Local Government Area were randomly selected for the study. The ectoparasites were taken off the animal skin by the use of forceps and skin brushing. The ectoparasites were preserved in specimen bottles with 5% formalin. Out of the 200 goats assessed, 139 (69.5%) were infected, representing a high rate of infestation. The rate of infestation in Egbolom was (23.5%) and Agada I had (21.5%). However, the result in Emoh showed an infestation rate of 15.5% and Omelema had 9.0%. There was a significant effect of sex-related infestation across the four communities. However, the infestation was more in male goats (40.5%) when compared with the females (29.0%). Nevertheless, there was no significant effect on the age-related infestation. The most prevalent ectoparasites reported in this study were fleas (53.0%), and tick, (33.5%) while lice had 13.2%. However, mite (0.3%) recorded an insignificant figure. In this study, field feeding and poor attention to the animals are significant factors predisposing goats to ectoparasite infestation while lack of orientation on zoonosis uncovers goat owners to zoonotic infections.

Keywords: Abua, Emoh, fauna, Goats, household, risk factor, Zoonosis

Introduction

Following its importance, goats are highly valued and domesticated in Nigeria as well as in the study area. This is because of its reliability in producing meat, hide and dung as organic manure (Dawit et al., 2012). Goat rearing can be profitable to owners as management is relatively cheap, and easily available with a friendly deposition (Sharmin et al., 2010; Byaruhanga et al., 2015). Goats are capable of surviving virtually in every agro-climatic condition. The habit of domesticating goats is on the high side in the land of Abua with minimal care. The habit of showing less attention to domesticated animals increases their risk of ectoparasites infestation and infections with parasites of zoonotic importance (Ekine et al., 2021). These animals are domesticated for a variety of purposes including meat production, source of income, and companion. Despite the enormous benefits of domesticating goats, people should be advised of the significant role domestic animals play in transmitting diseases of zoonotic importance.

Reports have shown that ectoparasites infestations constitute a major challenge in livestock production (Bekele et al., 2011; Mosallanejad et al., 2011). Infections of ectoparasites lower the productive ability of animals (Ekine et al., 2021). Reduction in animal productivity due to ectoparasite infestation is serious for the reared and domesticated animal host, including goats. These outer body parasites shelter a variety of microbes that are pathogenic to animals (Atilola & Dipeolu, 2010; Colebrook & Wall, 2014). Ectoparasites ranging from ticks, lice, mites, and fleas are biotrophs and could not survive without a blood meal from their host (Tanasak et al., 2009; Ekine et al., 2021). Their mode of feeding antagonises the health status of animals and predisposes animals' owners to zoonotic infections of a different kind (Dohoo et al., 2003; Fantahun & Mohammed, 2012).

Choi et al. (2007), reports that ectoparasites are a significant cause of skin disease in domesticated, wild, and exotic animals. They convey pathogens of a different kind and are responsible for the heightening of immune response to antigens in animals. They are a common cause of blood inability to transport oxygen in young animals (Fantahun & Mohammed, 2012). According to Pawelczyk et al. (2016), ectoparasites cause the transmission of about 55% of veterinary infections of public health concern. This group of organisms is adequately adapted and may inhabit the outer body surface of other animals usually mammals. They possess the ability to alter the health and general well-being of animals including domesticated species, those in the bush, and commercial stocks (Colebrook & Wall, 2014; Ekine et al., 2021). Infestations of ectoparasites may bring about a reduction in meat quality, milk production, and overall animal performance in livestock. The injuries ectoparasites inflict on animals may be life-threatening especially anaemia in juvenile and weak animals (Horak et al., 2005; Tanasak et al., 2009; Ekine et al., 2021).

Ectoparasites are versatile and constitute a common impediment reducing the efficiency of both reared and domesticated animals, especially in the rural setting with poor management strategies for the animals. Management of domestic animals could influence vulnerability to ectoparasites infestation including species of zoonotic relevance. Nevertheless, this study is aimed at assessing the ectoparasites fauna of domesticated goats and associated risk factors of zoonosis.

Materials and Methods

Study area

This study was carried out in Abua, Abua/Odual Local Government Area of Rivers State. Abua is located at 4°49.502'N, 6°39.067'E with an average rainfall of about 2500-5500 mm, the temperature of 27 °C – 35 °C, and relative humidity ranges between 80-90 Atm which is typical of rainforest vegetation type. The indigenes are commercial farmers that concentrate mostly on cassava and vegetable crops such as cucumber, pepper, and tomato. They domesticate and rear animals for a variety of purposes. It is hardly a house without a domestic animal mostly a goat.

Participants

The sampled goats were gotten from Agada I (GPS: 4°51'55' N 6°38'50' E), Egbolom (GPS: 4°49'40'N 6°39'28' E), Emoh (GPS: 4°50'7' N 6°39'19' E) and Omelema (GPS: 4°50'12' N 6°39'30' E) communities. In each community, twenty households domesticating goats were randomly selected and visited for evaluation of their goats. Fifty goats were screened in each community for the presence of ectoparasites. The goats selected for this study were classified as young (1-2 years) and adult (>2 years). The sex and age of the animals were also noted by physical observations. In each household designated for sample collection, a structured questionnaire was administered to ascertain the veterinary condition of the goats and the management system employed by animal owners. The questionnaire employed contains multiple choices such as Yes or No. Questions to goat owners to confidentially select from among the options. In each case, one questionnaire was also given to the neighborhood to authenticate the answers provided by goat owners. A total of 200 goats were thoroughly examined for the presence of ectoparasites in this study. Ectoparasites attached to the skin of goats were removed using forceps and brushing of the skin. The removal of ectoparasites was circumspectly done to avoid inflicting injuries to the goats. These ectoparasites were later stored in specimen bottles and preserved in 5% formalin and were transported for laboratory diagnosis.

Laboratory diagnosis

The recovered ectoparasites from goats were transferred into Petric dishes and examined under a light microscope of x4 and x10 objectives and were identified using an identification key (Soulsby, 1982) and also on account of their observable physical features.

Data analysis

Data were analyzed using ANOVA. A simple percentage was used in the presentation of data.

Results

Prevalence of ectoparasites of goats in the samples communities

In this survey, a total of 200 domesticated goats from four communities were examined for the presence of ectoparasites. Out of the 200 sampled goats, 139 (69.5%) were infected with a variety of ectoparasites. The distribution of infestation showed that 23.5% of infestation occurs in the Egbolom community, 21.5% of infestation occurs in Agada I community while infestation rates in Emoh and Omelema communities were 15.5% and 9% respectively.

Table 1: Prevalence of ectoparasites of goats in the samples communities

Sampled community	No, examined	infected	% prevalence	p-value
Agada I	50	43	21.5	
Egbolom	50	47	23.5	
Emoh	50	31	15.5	
Omelema	50	18	9.0	
Total	200	139	69.5	0.000

Sex-related prevalence of ectoparasites on domesticated goats

In Agada I community, the rate of infestation was slightly higher in males (15.5%) than the observation in females (6.0%). Nevertheless, more males goats (14.5%) were infected when compared with females (9.0%) in the Egbolom community. However, male and female infestation in Emoh and Omelema were (5.0%) and (10.5%) and (5.5%) and (3.5%) respectively. But the overall infestation was higher in males (40.5%) than in female goats (29.0%), an observation that was not statistically significant ($p < 0.05$).

Table 2: Sex-related prevalence of ectoparasites on domesticated goats

community	No infected	Sex (%)		Total (%)	p-value
		Female	Male		
Adaga I	43	12 (6.0)	31 (15.5)	43 (21.5)	
Egbolom	47	18 (9.0)	29 (14.5)	47 (23.5)	
Emoh	31	21 (10.5)	10 (5.0)	31 (15.5)	
Omelema	18	7 (3.5)	11 (5.5)	18 (9.0)	
Total	139	58 (29.0)	81 (40.5)	139 (69.5)	0.000

Age-related infestation of ectoparasites on domesticated goats

Infestation of ectoparasites concerning age revealed more infestation rate in adult goats (37.0%) > 2 years old than the observation among young goats (32.5%) between 1-2 years old. However, the infection rate was not significant.

Table 3: Age-related infestation of ectoparasites on domesticated goats

Community	Infected (%)		Total (%)	p-value
	1-2 yrs	> 2 yrs		
Adaga I	17 (26.2)	26 (35.1)	43 (21.5)	
Egbolom	20 (30.8)	27 (36.5)	47 (23.5)	
Emoh	24 (36.0)	7 (9.5)	31 (15.5)	
Omelema	4 (6.1)	14 (18.9)	18 (9.0)	
Total	65 (32.5)	74 (37.0)	139 (69.5)	0.37

Ectoparasites of goats in Abua

In this study, a total of 281 ectoparasites including Tick (*Amblyomma* species), Flea (*Ctenocephalides* species), mite (*Holothyrus* species), and Lice (*Pediculus* species) were reported across the sampled communities. Out of the 281 ectoparasites recovered in this study, Fleas were 53.0%, Tick recorded 33.5% while Lice had 13.2% and Mites were 0.3%. These ectoparasites were recovered from the sampled goats from the four communities. The occurrence was Egbolom (33.0%), Omelema (31.3%), Adaga I (18.9%), and Emoh had 16.7%.

Table 4: Actual incidence of ectoparasites on goats in Abua

Adaga I (%)	Egbolom (%)	Emoh (%)	Omelema	Total (%)	p-value
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						(%)
Ectoparasite						
Lice	17	14	0	6	37 (13.2)	
Fleas	15	62	37	35	149 (53.0)	
Mite	0	0	1	0	1 (0.3)	
Tick	21	17	9	47	94 (33.5)	
Toata	53 (18.9)	93 (33.0)	47 (16.7)	88 (31.3)	281 (100)	0.74

Table 5: Attitude and awareness of goat owners on zoonosis
How do you remove parasites from your goats

	Adaga I (%)	Egbolom (%)	Emoh (%)	Omelema(%)	Total (%)
Combing	12 (60)	3 (15)	2 (10)	17 (85)	34 (43.8)
Hand picking	2 (10)	9 (45)	12 (60)	0	25 (31.2)
I don't care	6 (30)	8 (40)	6 (30)	3 (15)	23 (28.8)
Total	20 (100)	20 (100)	20 (100)	20 (100)	80 (100)

Do you subject your goats to veterinary check

	Adaga I (%)	Egbolom (%)	Emoh (%)	Omelema(%)	Total (%)
Yes	0	0	3 (15)	8 (40)	11 (13.8)
No	10 (50)	15 (45)	10 (50)	6 (30)	41 (51.2)
No ideas	10 (50)	5 (25)	7 ((35)	6 (30)	28 (35.0)
Total	20(100)	20 (100)	20 (100)	20 (100)	80 (100)

Method of feeding the goats

	Adaga I (%)	Egbolom (%)	Emoh (%)	Omelema(%)	Total (%)
Field	6 (30)	5 (25)	6 (30)	4 (20)	21 (26.2)
Self	6 (30)	8 (40)	6 (30)	12 (60)	32 (40.0)
Any how	8 (40)	7	8 (40)	4 (20)	27 (33.8)
Total	20 (100)	20 (100)	20 (100)	20 (100)	80 (100)

Is it true that you and children play with these goats

	Adaga I (%)	Egbolom (%)	Emoh (%)	Omelema(%)	Total (%)
Some how	9 (45)	4 (20)	6 (30)	3 (15)	22 (27.5)
No	6 (30)	8 (40)	5 (25)	14 (70)	33 (41.3)
Children	5 (20)	8 (40)	9 (45)	3 (15)	25 (31.2)
Total	20 (100)	20 (100)	20 (100)	20 (100)	80 (100)

Have you heard about zoonosis

	Adaga I (%)	Egbolom (%)	Emoh (%)	Omelema(%)	Total (%)
Yes	2 (10)	4 (20)	1 (5)	12 (60)	21 (26.2)
No	13 (65)	6 (30)	11 (55)	4 (20)	34 (41.3)
Strange	5 (20)	10 (50)	8 (40)	4 (20)	27 (31.2)
Total	20 (100)	20 (100)	20 (100)	20 (100)	80 (100)

Discussion

The result of this survey revealed the presence of ectoparasites on the skin of domesticated goats in Abua with an overall prevalence of 69.5%, representing high infestation. The high infestation rate observed in this study could be ascribed to field feeding and poor management strategy exhibited by animal owners. This result is in contrast with Mosallanejad et al (2011) who reported a low prevalence of ectoparasites on companion animals in Iran. This disparity could be attributed to the nature and type of domesticated animal investigated. However, it agrees with Ekine et al (2021).

A high number of goats was infested in the Egbolom community (23.5%) while the rate of infestation was low in Omelema (9.0%). However, the infestation of ectoparasites on goats in Emoh and Agada I communities was 15.5% and 21.5% respectively. The high infestation rate observed in Egbolom could be attributed to the people's way of life and the poor caring attitudes of goat owners. For instance, in Omelema (9.0%); the majority of the households from which goats were examined provide feed for their animals and also have awareness of zoonotic infections. Nevertheless, in Egbolom and Agada I communities virtually all the households subject their goats to field finding

which is a significant risk behavior predisposing the animals to ectoparasites infestation. This observation agrees with (Ekine et al., 2021) who reported a high assemblage of surface body parasites on domestic animals with an extensive feeding model. The result of the study revealed that caring methods for domestic animals could influence vulnerability to ectoparasites infestation including those of zoonotic importance.

In the present survey, the sex-related infestation was statistically significant ($p < 0.05$). However, the age-related infestation was not significant. Ectoparasites infestation was higher in male goats 40.5% when compared with the rate of infestation in females 29.0%. The high infestation observed on male goats could be attributed to the wandering lifestyle that they are subjected to in the study area. In the study area, male goats are allowed to wander about once at a particular time of the day to enable them to visit households with no male goats. However, the female goats are confined to enable the males to mate with them. This result is in agreement with Tadesse et al. (2011) and Natala et al. (2009) who reported a high infestation of skin parasites on male animals. From table 3, the result revealed that infestation on adult goats (37.0%) was slightly higher than the observation on young goats (32.5%). This observation disagrees with Agu et al (2020) who reported a high prevalence of ectoparasites on young companion animals in Nsukka, Nigeria. This variation could be attributed to the caring strategy adopted by animal owners in the different study areas. The distribution of ectoparasites among young and adult animals could also be affected by the season and place of investigation.

The prominent ectoparasites reported in this study were mites, ticks, fleas, and lice. Out of the recovered ectoparasites, fleas (53.0%) had the highest prevalence followed by Tick (33.5%) while the overall prevalence for Lice and Mite was (13.2%) and (0.3%) respectively. This result disagrees with Ekine et al. (2021) who recorded a high prevalence of ticks over fleas on domesticated Dogs and goats elsewhere. The variation regarding the most prevalent ectoparasite in the different studies could be ascribed to unapparent factors prevailing in the study locations. The high prevalence of fleas in this study could be associated with their extremely thin nature which enables them to move freely against the host. Fleas on the skin of the host animal may result in itching and skin inflammation (Robertson et al., 2000; Omudu et al., 2010). The low prevalence of mites (0.3%) in this study is indicative that the prevailing condition of the study area does not support the rapid survival of mites. It also suggests that goats in the study area are mite resistant.

The majority of the respondents affirm adopting field feeding for goats and poor sanitary habits on goat houses which are significant factors exposing goats to outer skin parasites and increasing the risk of zoonotic infections on animal owners. It was, however, observed that the infestation rate was low in Omelema (9.0%) with good knowledge about public health issues like zoonosis, and exhibition of good sanitary practices on goat houses. Poor sanitary practice exposes animals and human beings to parasitic infections (Osei-Adu et al., 2015; Byaruhuang et al., 2018). Good sanitary actions are significant in reducing infections of parasites among animals and humans.

Conclusion

The study revealed that field feeding and poor sanitary practice common in the study area are significant factors making goats visible for ectoparasites infestation. From the present study, close association with animals due to lack of awareness of zoonosis predisposes goat owners to zoonotic infections. Hence, we recommend that the public health sector embarks on rural campaigns to enlighten the rural inhabitation on the detriments of maintaining a close association with domesticated animals. Also, encourage animal owners on the necessity of adopting the good sanitary practice in animal houses.

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