

**TOPOGRAPHICAL PREVALENCE OF LICE INFESTATION
IN GOATS AT DINAJPUR SADAR UPAZILA OF
BANGLADESH**

A THESIS

BY

**ARJU AKTER
REGISTRATION NO: 1705445
SEMESTER: JULY- DECEMBER, 2018
SESSION: 2017-2018**

**MASTER OF SCIENCE (M.S.)
IN
PARASITOLOGY**



**DEPARTMENT OF PATHOLOGY AND PARASITOLOGY
HAJEE MOHAMMAD DANESH SCIENCE AND
TECHNOLOGY UNIVERSITY, DINAJPUR, 5200**

DECEMBER, 2018

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Approved as to my style and content by

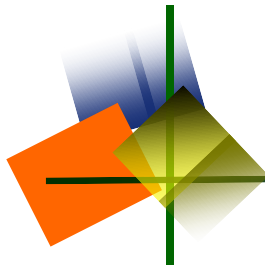
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DECEMBER, 2018



Dedicated to

**My
Beloved Parents**

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The author

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ABSTRACT

This study was conducted to identify topographical prevalence associated with the risk factors of lice infestations in 152 Black Bengal Goats at Dinajpur Sadar Upazila of Bangladesh from July to December, 2018. The results of the study showed that 46 goats were infested out of 152 goats by lice with the percentage of 30.26 %. The lice were collected through hand-picked and brushing methods. The collected lice were preserved in 70% ethanol. The number of lice were entered in Microsoft Excel spread sheet and analysed with Statistical Package for Social Sciences (SPSS) software version 22. Chi-square (χ^2) test was used to determine the associations between age and sex with the lice infestation in goats. Female goats were infested with lice with higher prevalence of lice 23.68% (36/105) than male goats 6.58% (10/48). With regard to age factor, young goats 21.05% (32/72) were more susceptible to lice infestation than adult goats 9.21% (14/80). The predilection site of lice infestation was mostly found on the body region (73.9%, n=782), neck (19.8%, n=209) and head (6.24%, n=66) of goats respectively. Here, n=number of lice. Age, poor hygienic condition and poor living arrangement enhanced the transmission of lice infestation. Education to the farmer, routinely use suitable insecticide and cost-effective control strategies need to be implemented to minimize lice infestation.

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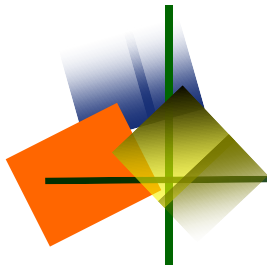
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Chapter 1

INTRODUCTION

CHAPTER 1

INTRODUCTION

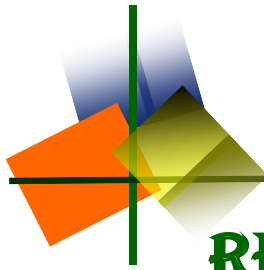
Asia represents the largest total world of goat population at about 56%. Goat population plays major contributor in an agricultural industry primarily in socio-economic aspect. In Bangladesh, livestock sector is one of the established sector in the agricultural field with a total number of goat populations was 261 lakh goat (Livestock Economy at a Glance, DLS 2018-19). They maintain an ecological niche in livestock industry.

The “Black Bengal Goat” is common choice among goat farmers in Bangladesh because of its high quality skin. Their skin is superior quality for leather goods and demanded in both domestic and foreign markets. The goat meat is very tender, palatable and source of animal protein. But goat rearing is hindered by various problems, among them parasitism is an important limiting factor especially in Bangladesh as because the climatic condition of the country favors the development and survival of various parasites.

Ectoparasites gave potential threats in goats, one of the most common ectoparasites infected goats is lice. Lice belongs to class insecta. Lice is host specific arthropods which infest goats to survive. Lice obtaining nutrition from the body of host by feeding on body fluid secretion such as sebaceous gland, blood, debris from epidermal tissue and fragment from the hair. Lice are transmitted via direct contact from one infected host to another host. Lice can only survive away from their host for a limited period. There are two types of lice that infected goats based on different feeding habits which are sucking lice and chewing lice. The sucking lice feed from their hosts by penetrating skin via tiny spike located at the mouthparts and suck blood from the capillaries of the host. The chewing lice or also known as biting lice use their mouthparts to grind the hair and skin of the host.

Feeding habits of lice causes irritation and discomfort to animal. Saliva and faeces of lice contains substances that lead to allergies and severe irritations to the skin of infested goats. Severe irritation of the skin lead to excessive rubbing, scratching and licking behavior of the goats that eventually cause restlessness to the hosts. Infested animals show several attributes of lice infestation such as frequent rubbing itself against objects, weight loss, matted, dull fleece, lameness etc. The behaviors affect the production and skin quality of goats and lead to economic losses to farm owners due to mortality and decreased production of the goats.

In view of above facts, it is assumed that lice infestation is major problem for goats but very few studies on lice infestations, it seems neglected, underreported or unreported. Therefore, the present study was undertaken to determine the prevalence of lice infestations of Black Bengal Goats in Dinajpur Sadar Upazila of Bangladesh.



Chapter 2

REVIEW OF LITERATURE

CHAPTER 2

REVIEW OF LITERATURE

The review of literatures related to the present study is briefly presented under the following headings:

Rahman *et al.*, (2014) observed that the result of prevalence of ectoparasitic diseases in goat 15.71% and adults are more susceptible than young for ectoparasitic infestation which mostly higher in summer season.

Beyecha *et al.*, (2014) conducted a study to determine the prevalence and risk factors for ectoparasites infestation in 979 goats in three agroecologies in central Oromia, Ethiopia from October 2009 through April 2010. The results of the study showed that of the total goats examined 487 (49.7 %) of them were infested with one or more ectoparasites.

Zangana *et al.*, (2013) were investigated into ectoparasites of sheep and goats was carried out in Duhok province North West region of Iraq, during six months of a year, from January to June 2010. One thousand and two hundred forty-eight (1248) sheep and 954 goats in 110 flocks from 80 villages were examined. Among them overall animals (66.89%) were infested with one or more species of ectoparasites. Of 720 (57.7%) and of 753 (78.9%) sheep and goats, respectively were infested. lice (3.8%, 33.8%) were identified sheep and goats. Two species of lice were infested each one of animal these namely, *Damalinia ovis* (75%) and *Linognathus stenopsis* (33.3%) on sheep, and *D. caprae* (80.74%) and *L. stenopsis* (19.2%) on goats.

Rony *et al.*, (2010) determine the prevalence of ectoparasitic infestation in goat at Gazipur district in Bangladesh. Among 165 Black Bengal goats examined, 114 (69.09%) were found to be infested with several species of ticks, lice and flea. The prevalence rate was highest in *Boophilus microplus* (45.45%) followed by *Rhipicephalus sanguineus* (31.51%), *Linognathusvituli* (25.45%), *Heamaphysalis*

bispinosa (20%), *Haematopinus eurysternus* (15.75%), *Damalinia caprae* (8.48%) and *Ctenocephalides canis* (4.84%). Young goats aged ≤ 6 months (75.86%) were more susceptible than adults aged $> 6-24$ months (65.51%) and older goats >24 months (59.32%). In female, prevalence was recorded significantly ($p < 0.05$) higher than male. Animal with poor health was found to be significantly more vulnerable to such parasitic infestation than normal healthy animals. Prevalence of ectoparasites was significantly ($P < 0.05$) higher in animals, reared under free-range system than that of semi-intensive system. Prevalence was highest ($P < 0.05$) in the summer (81.35%) followed by winter (62.96%) and rainy season (59.26%). Mean parasitic burden was 1.60 ± 0.12 per square inches of heavily infected area in goats.

Abebe *et al.*, (2011) conducted a cross-sectional study from October 2009 to May 2010 with the objective of estimating the prevalence of ectoparasites in small ruminants and identifying the potential risk factors in selected areas of Tigray region. A total of 991 small ruminants (600 sheep and 391 goats) were examined for presence of ectoparasites. Accordingly, a total of 310 (51.7 %) sheep and 233 (59.6%) goats were found infested with one or more ectoparasites. The overall prevalence for both host species was 54.8% ($n=543$). The major identified ectoparasites in sheep were lice (1.3%) and in goats were lice (6.1%). Among the risk factors, agro-climatic zone, body condition score, flock size and flock type were found to be significantly associated with the prevalence of ectoparasites in the study area. The prevalence of ectoparasites infestation was significantly higher in small ruminants of the lowland and midland, small ruminants with poor body condition score, large flocks and mixed flocks than in their contemporaries within the same comparison category ($P < 0.001$).

Kassayeq *et al.*, (2010) showed that the prevalence of lice infestation in goats was 11.98% (95% CI 11.5466 -12.4301). During the dry season, animals were exposed to lice infestation 2 times (OR=2.18, 95% 1.51-1.77) more than in the in wet season. Statistically significant difference ($P < 0.05$) in lice infestation was recorded between lowland (6.89%) and highland (3.75%), < 1 year age (7.19%)

and >2 years (5.53%) and male (8.3%) and female (5.28%). The Overall prevalence of sheep kids was 11.67%. Statistically significant difference ($P < 0.05$) was also observed between highland (19.48%) and lowland (1.84%).

Sarkar *et al.*, (2010) showed that Epidemiology and pathology of ectoparasitic infestations in Black Bengal goats were studied in different areas of Mymensingh and Gaibandha districts, Bangladesh from December, 2006 to November, 2007. A total of 125 Black Bengal goats were examined. Among them 91 (72.8%) were infested with one or more species of ectoparasites. The ectoparasitic infestation was higher in case of kids (82%) and older goats (79.55%) than that of young (51.61%) goats. The female goats (77.63%) were more susceptible than male (65.31%) to ectoparasitic infestation. The prevalence of ectoparasites was higher in Mymensingh (87.5%) than that of Gaibandha region (57.38%). In lice infestation, the skin was red and slightly elevated.

Kusiluka *et al.*, (1995) carried out a study to determine the prevalence of various ectoparasites infesting goats in Tanzania. Fifty-four herds were surveyed out of which 44% were lice. Of the 415 goats examined, 47.7% were lice the louse species were *Damalinia caprae* and *Linognathus stenopsis*.

Ugochukwu *et al.*, (1985) studied over a period of one year (January 1983 to December 1983), an investigation was mounted to determine common ectoparasitic infestation of small ruminants in selected farms in Nsukka, Nigeria. The species identified in goats included *Ctenocephalides canis*, *Boophilus decolouratus* while those recovered from parasitized sheep were *Ctenocephalides canis* and *Damalinia ovis*. Out of a total of 148 sheep and goats examined for ectoparasites, 68 (45.95%) were infested. A further breakdown of this figure shows that 10 (18.52%) out of a total number of 54 sheep screened were infested, while 58 (61.70%) of the goats (94) examined were infested. Identification of these ectoparasites was by anatomical and morphological characteristics. Result of the investigation indicated that there was variation in the degree of ectoparasitic infestation from one animal to another.



Chapter 3

MATERIALS AND METHODS

CHAPTER 3

MATERIALS AND METHODS

3.1 Study area and study period

The study was conducted at Sadar upazila in Dinajpur district of Bangladesh. A total of 152 goat population were recorded during the study period.

3.2 Selection of animals

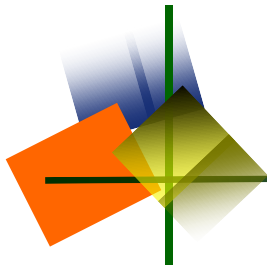
A total 152 goats were divided based on the sex (105 females: 47 males) and age (72 young: 80 adults) of goats. Here, Young (less than one-year old) and adult (more than one-year old). Goats were thoroughly investigated by close inspection, parting the hairs against their natural direction for the detection of lice. After that, a thorough epidemiological investigation was performed using a semi-structured questionnaire including the animal level variables as age, sex, health status and rearing system. Age was determined by asking the owner and farm attendant and by visual inspection and also by dentition whenever possible. In terms of healthiness, goats are in good condition with a regular veterinary examination.

3.3 Clinical examination and Sample preservation

Goats were inspected and screened for lice by using hand magnifying lens and collected on three predilection sites which are head, neck and body of each goat. Collections of lice were taken place in the morning as suggested by Elsaid *et al.* Two methods namely hand-picked method and brushing method were applied in this study. The lice were hand-picked with the help of light gloves and a pair of forceps. Brushing method also pertained for lice. The hair of goats was combed out onto a white cloth for the lice to drop. The plastic comb was dipped into the container with 70% ethanol and later decanted into the labelled container.

3.4 Counting of lice and Statistical analysis

The number of lice were entered in Microsoft Excel spread sheet and analysed with Statistical Package for the Social Sciences (SPSS) version 22. Chi-square (χ^2) test was used to determine the association between age and sex with the lice infestation in goats. The study was considered 95% as confidence interval with 5% precision level. The associated factor was known as significant if the value of $P < 0.05$.



Chapter 4

RESULTS

CHAPTER 4

RESULTS

4.1 PERCENTAGE OF LICE INFESTATION IN GOATS BASED ON THREE PREDILECTION SITES

A total of 1057 lice were collected from 46 Black Bengal Goats. Among three predilection sites, body had the highest number of lice infestation with the percentage of 73.9% (n = 782). The lowest number of lice infestation was on the head part with the percentage of 6.2% (n = 66). The percentage of 19.8% (n = 209) lice were infested on neck part of goats. Here, n= number of lice (Table 1).

Table 1: Percentage of lice infestation in goats based on three predilection sites.

Predilection Sites	Number of lice	Percentage (%)
Head	66	6.24
Neck	209	19.8
Body	782	73.9
Total	1057	100

4.2 ASSOCIATION OF SEX AND AGE AS RISK FACTORS WITH THE LICE INFESTATION IN GOATS

Table 2 & table 3 shows the association of sex as a risk factor with the lice infestation in goats. The result revealed that female goats had higher risk to be infested by lice on body part with the percentage of 37.9% than male goats with the percentage of 36.1%. Overall, the prevalence of lice infestation, 6.58% (10/47) of lice were infested in male goats while 23.68% (36/105) lice were infested in female goats. Thus, lice were more common in female goats than male goats with the chi-square (χ^2) value, 21.14. The result shows that there was a significant association ($P < 0.05$) between predilection sites and sex of goats.

Table 4 & Table 5 shows the association of age as a risk factor with the lice infestation in goats. Lice were more infested on neck and body area of goats with the percentage of 33% for adult goats and 52.6% for young goats.

Table 2: Overall prevalence of lice infestation (sex wise)

Sex	Predilection sites		
	Head (%)	Neck (%)	Body (groin, axilla, ventral abdomen) (%)
Male (n=47)	1.0	9.6	36.1
Female (n=105)	5.3	10.3	37.9
Chi-square value	15.35	19.96	21.14*

Table 3: Topographic prevalence of lice infestation (sex wise)

Sex	Animal	Affected	Prevalence	P-value
Male	47	10	6.58%	0.155(NS)
Female	105	36	23.68%	
Total	152	46	30.26%	

NS= Non significant ($P < 0.05$)

Table 4: Overall Prevalence of lice infestation (age wise)

Age	Animal	Affected	Prevalence	P-value
Young	72	32	21.05%	0.001*
Adult	80	14	9.21%	
Total	152	46	30.26%	

* = Significant ($P < 0.05$)

Table 5: Topographic prevalence of lice infestation (age wise)

Age	Predilection sites		
	Head (%)	Neck (%)	Body (groin, axilla, ventral abdomen) (%)
Young (72)	2.1	12.3	52.6
Adult (80)	4.2	7.5	33.0
Chi-square value	12.5	18.7	25.6*

Overall, the prevalence of lice infestation was 21.05% (32/72) in young goats while 9.21% (14/80) lice were infested in adult goats. Thus, lice were more common in young goats than adult goats with the chi-square (χ^2) value, 25.6. The result shows that there was a significant association ($P < 0.05$) between predilection sites and age of goats.



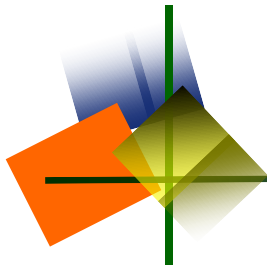
Figure 1: *Linognathusi stenopsis*



Figure 2: *Damalinia caprae*



Figure 3: Goat with lice



Chapter 5

DISCUSSION

CHAPTER 5

DISCUSSION

In the present study, 46 goats were infested with lice out of 152 goats by lice with the percentage of 30.26 %. The present study observed the omnipresent of lice infestation in goats could be due to different climatic condition. It was documented that the lice infestation were influenced by climatic condition and not conformed to geographical distribution. In the present study, the climatic condition was warm and humid which can stimulate the infestation of lice among goats. According to Dadas *et al.* (2016) lice infestations were higher in winter, declining in spring and low during summer season. Optimum temperature and humidity attributed to reproduction of lice. Furthermore, lice infestation act as an indicator of some other latent problems such as malnutrition or chronic diseases. Moreover, the prevalence of lice was higher in debilitated animal which exacerbated by lack of nourishment.

In the present study, the goats were reared under intensive management system which defines that the goats were kept in a closed setting with a limited type of pasture. Therefore, goats were less exposure on open grazing behavior. Less grazing behavior attributed for a lesser number of lice to be identified. Although the goats were not exposed to open grazing, goats were placed too close to one another with four to six goats in each pen. Packed condition in the pens will increase the stress level among goats. Goats with higher level of stress will exhibits higher lice infestations than goats with lower stress level. The arrangement facilitated lice infestation from one goat to another goat by direct physical contact. This finding with the agreement from a study done by Bekele *et al.* (2011) which reported that this type of arrangement create opportunity for lice to infest through direct physical contact easily. Apart from that, lice can also transmit their diseases through attachment of flies called as phoresy as an alternative mode of transmission.

Lice was characterized as a site-specific which influenced by its capability to reach blood capillary of the host easily. The present study shows that body area had the highest susceptibility of lice infestation in goats. The finding in agreement with Adang *et al.* which discovered that lice were more likely to infest on body parts as lice able to reach blood capillary area easily. Higher prevalence of lice infestation on body region might be explained by the nature of lice which require fleece for their development. The presence of hairs or feathers were required for the development and survival of lice.

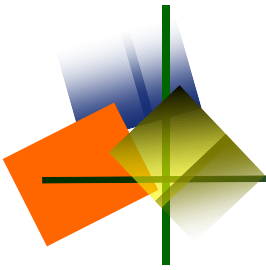
Apart from surrounding environment, age and sex of the animals are vital factors of lice infestations. In the present study, the prevalence of lice was significantly higher in female 23.68% (36/105) goats than male 6.58% (10/47) goats. The present study similar to a previous research that reported the female goats were more vulnerable to lice infestations as compared to male goats. The prevalence of lice infestations was influenced by hormonal changes which experienced by female goats during lactation and pregnancy stages. This is due to higher level of progesterone and prolactin which induced higher vulnerability of lice infestations on female goats. Female goats exhibit higher level of lice infestation due to low immunity and less activity level than male goats. Similarly, the finding was associated with another study that found higher lice infestation on female goats because of low level immunity during lactation and pregnancy. Besides, infected male goats can transmit the lice to healthy female goats during mating.

The present study also found that young 21.05% (32/72) goats had higher prevalence of lice infestation than adult 9.21% (14/80) goats because poor living condition in the pen. Congested living arrangement for young goats in the pen favored lice to transmit from one to another easily. Moreover, poor sanitation condition of pen increased the transmission of lice. Apart from that, in this study, the young goats were placed apart from their mothers. The separation can cause lacking grooming behavior from mothers to their kids. Behavior known as maternal grooming may help in reducing the lice infestations of young goats.

Lack of grooming weakened goats' body condition as lice were left undisturbed. The behavior attributed to the higher occurrence of lice infestations among young goats. Poor body condition of young goats than adult goats stimulates higher lice infestation in young goats. Besides that, the lower prevalence of lice infestation in adult goats due to most of adult goats are killed for meat while only few of adult goats are kept for further production.

Finally, high level of immunity on adult goats shielded them from lice infestations. Weak defense mechanism of young goats also might contribute to lice infestations. Moreover, goats were active at the young age and competing for survival which eventually exposed to lice infestations. Hence, in this study, young goats were significantly higher occurrence of lice infestation than the adult. On the other hand, a study done by Sarkar *et al.* (2010) showed higher prevalence of lice infestation in goat kids due to less developed of goat kids immune system and exhausted immune system of adult goats.

To decrease the prevalence of lice infestation among goat herds, farm owners need to apply suitable insecticide routinely especially before warm and wet season arrival. Thorough education to the farm owners and cost-effective control strategies need to be implemented to minimize this problem. Further research to investigate the effect of lice infestation on the production, health and performance of goat herds are suggested.



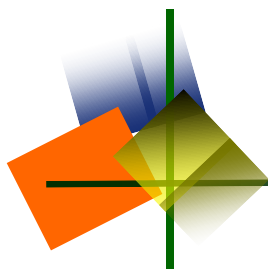
Chapter 6

CONCLUSIONS

CHAPTER 6

CONCLUSIONS

The prevalence of lice infestation in the goats and the variation in occurrence of lice in relation to topography, age and sex was studied. The body of goats was vulnerable to lice infestation. The study revealed that sex of goat significantly influences the prevalence of lice infestation. Age had effect to some extent on the prevalence of lice infestation in the goat. Poor hygienic condition and poor living arrangement of goats enhanced the transmission of lice infestation. It is concluded that the problem of lice infestation in the goat is highly prevalent in this study area as such a through and extensive work on different aspect of lice in goat including its control measures are necessary.



Chapter 7

REFERENCES

CHAPTER 7

REFERENCES

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