Abstract

The prevalence of ectoparasitic arthropods of cattle and goats in Boalkhali upazila of Chattogram district were investigated. A total of 344 animals were observed for this study and 67 (19.5%) of them were infested with one or more than one species of ectoparasite. Among them 18 cattle and 49 goats were infested. Eleven species of ectoparasites were identified and they are *Damalinia caprae*, *Bovicola bovis, Stomoxys calcitrans, Musca domestica*, *Tabanus* spp., *Culex sp., Anopheles sp., Ctenocephalides felis, Haemaphysalis longicornis*, *Dermacentor reticulatus*, and *Rhipicephalus appendiculatus.* Among them *Haemaphysalis longicornis* was the most prevalent. A total of 32 animals (9.3%) were infested with *Haemaphysalis longicornis,* 14 (4.07%) with *Dermacentor reticulatus* and 6 (1.75%) with *Rhipicephalus appendiculatus.* In case of lice, 6 (1.75%) goats were infested with *Damalinia caprae* and 2 (0.6%) cattle with *Bovicola bovis.* And in case of flea, was 7 (2.03%) animals were infested with *Ctenocephalides felis.*

In case of cattle, 42 ectoparasites were collected from 18 infested hosts where 63 cattle were examined. The prevalence and intensity were 28.6% and 1.61 respectively. Among them *Haemaphysalis longicornis* was the most prevalent. A total of 32 animals (9.3%) were infested with *Haemaphysalis longicornis,* 14 (4.07%) with *Dermacentor reticulatus* and 6 (1.75%) with *Rhipicephalus appendiculatus.* In case of lice, 2 (3.2%) cattle with *Bovicola bovis* and in case of flea, 2 (3.2%) animals were infested with *Ctenocephalids felis*.

A total of 88 ectoparasites of goat were collected from 49 infested hosts where 281 goats were examined. The prevalence and intensity were 17.4% and 1.79 respectively. Among them *Haemaphysalis longicornis* was the most prevalent. A total of 23 goats (8.19%) were infested with *Haemaphysalis longicornis,* 11 (3.9%) with *Dermacentor reticulatus* and 4 (1.4%) with *Rhipicephalus appendiculatus.* In case of lice, 6 (2.1%) goats with *Bovicola bovis* and in case of flea, 5 (1.78%) animals were infested with *Ctenocephalids felis*.

About 45 other arthropod samples were collected. Among them, 16 (35.5%) *Anopheles sp.,* 10 (22.22%) *Culex sp.,* 10 (22.22%) *Musca domestica*, 5(11.11%) *Stomoxys calcitrans* and 4 (8.88%) *Tabanus sp.* were collected. The samples were collected from different type of farms and also from Upazila Veterinary Hospital of Boalkhali Upazila.

In case of comparison of the prevalence of ectoparasite infestation in cattle between different age groups, young group (18 months old or less) had higher prevalence (30.4%) than adult group (>18 months) (27.5%). In case of sex, female had higher prevalence (30.3%) than males (26.7%).

On the other hand, in case of comparison of the prevalence of ectoparasite infestation in goat between different age groups, young group (15 months old or less) had higher prevalence (20.5%) than adult group (>15 months) (16.3%). In case of sex, female had higher prevalence (18.1%) than males (16.8%).

Key words: Cattle, Goats, Ectoparasites, Prevalence, Intensity, Boalkhali, Bangladesh.

1. Introduction

Arthropod, the member of the Arthropoda phylum, is the largest phylum in the animal kingdom which includes crustaceans, arachnids, insects, centipedes, and millipedes. About 84 percent of all known species of animals are members of this phylum (*Bernes, 2006*). They are found in basically every known marine (ocean-based), freshwater, and terrestrial (land-based) ecosystem, and vary tremendously in their habitats and dietary preferences. Due to diversity in their activity, arthropod ectoparasites have a variety of direct and indirect effects on their hosts (*Wall & Shearer, 2001*). Ectoparasites are important parasites because of their unquenchable blood-feeding activity and as vectors for various agents of diseases in both man and livestock (*Cumming, 1998; Hendrix, 1998*).

Livestock plays a significant role in the agricultural production territory of a country. Statistics reveal that about 1.44% of the national GDP is covered by the livestock sector and its annual rate of growth is 3.8% (*DLS, 2021*). About 20% of the people in Bangladesh achieve their livelihood through work connected with rearing cattle and poultry. The current population of cattle and goat in the country is 24.54 million and 26.60 million respectively. . Livestock not only assist to upgrade the financial condition but also made a substantial contribution to human nutrition. Livestock also plays a vital role in the sustenance of landless people.

Ectoparasites, including ticks, mites, fleas, flies and mosquitoes, take advantage of livestock animals for their nutrition and multiplication. The tropical climate of Bangladesh and low sanitary maintenance of farms render adequate requirements for rapid multiplication and spreading of these parasites. This study was embarked to investigate the prevalence of tick, lice, fleas, flies and mosquitoes as veterinary ectoparasites in Chattogram division, Bangladesh.

The objectives of this study were:

- To determine the prevalence of ectoparasites in domestic animal population in Boalkhali Upazila.
- To morphologically identify different species of ectoparasites infesting in domestic animals.
- To record the clinical signs of ectoparasite infestations.

2. Materials and Methods

2.1 Study area and population:

The study was conducted for 3 months and 7 days from 1st February 2021 to 7th May 2021. The data were obtained from 4 dairy cattle farms, 2 goat farms and Upazilla Veterinary Hospital (UVH) in Boalkhali upazilla under the Rangamati district. The collection of the samples was completed from 10 am to 3 pm. Random sampling was done in the selected area and 5 to 7 animals were examined from each farm and 10 animals in UVH for ectoparasites. Total animals (cattle and goat) were selected randomly for the convenience of the study and the availability of the animals. The age of the cattle was above 2 weeks and was determined by examining the teeth and birth record.

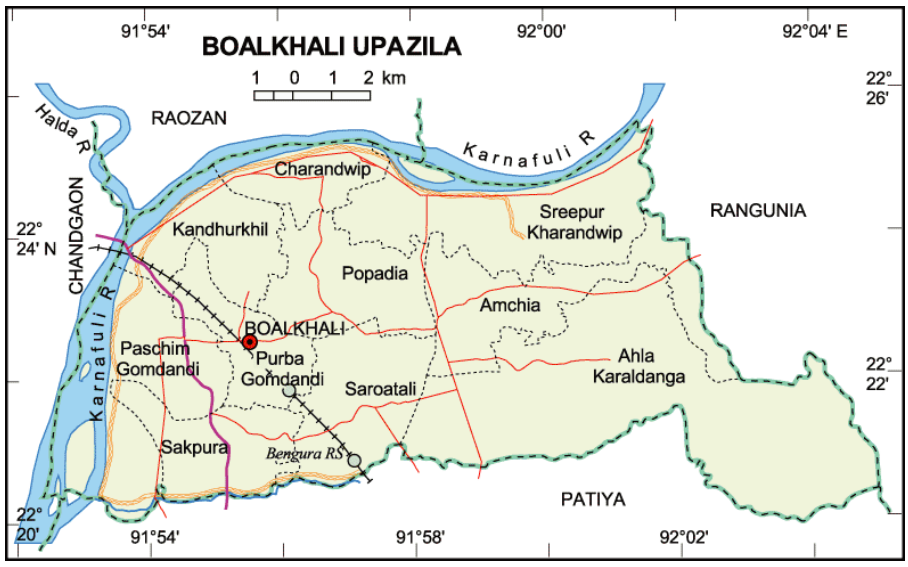

Fig-1: Geographical location of data collection site

2.2 Collection of ectoparasites:

The animals were fully examined for 5-10 minutes by close inspection, parting the hairs against their natural direction for the detection of ectoparasites. Ectoparasites were collected from the different parts of the body of the individual animals. Lice were acquired by a small hairbrush or comb. To collect the ticks from the host body, the point of attachment of the ticks was rubbed with 70% ethanol to relax attachment with the host body surface. Then they were collected by slow and gentle pull with fine forceps or hand picking. A sheet of white paper was positioned just underneath the host's body hair to prevent the chances of losing the ectoparasites during collection. Mosquitoes and flies' specimens were collected with the help of an aerosol spray and sometimes by the hand with great care so that they were not destroyed or missed. The ectoparasites were collected from different parts of the body such as around the face, horn, and base of the ears, head, abdomen, tail and legs. For the collection of fleas, the hairs of the host body were carefully explored and after locating the flea, hairs are pressed from two sides by the tip of a finger and smeared a drop with 70% ethanol. Then they were obtained by hand picking.

2.3 Preservation of the samples

Fig-2: Collection of ectoparasites

The collected specimens were kept in vials containing 70% ethanol for longer preservation. The vials were labelled with important information about the samples *i.e.,* type of sample (tick/ lice/ mosquito/ fly), date, place, host's species, age, sex etc.

Fig-3: Sample preservation

2.4 Identification of the samples

Ectoparasites were identified on the basis of their external morphological characters (Body shape, size, color, appendages present or absent) with the help of dissecting (4x), compound (10x, 40x) and stereo microscope. Identification of ectoparasites up to genera and species labelling were done following *Soulsby (1982), Wall & Shearer (1997), Ahmad (2010).*

Fig-4: Identification of the samples

3. Result and Discussion

A total of 163 ectoparasites and arthropods were obtained from the animal body in which 42 from cattle and 121 from goats. Eleven types of ectoparasites were identified namely *Damalinia caprae*, *Bovicola bovis*, *Stomoxys calcitrans*, *Musca domestica*, *Tabanus* spp., *Culex sp.*, *Anopheles sp.*, *Ctenocephalides felis*, *Haemaphysalis longicornis*, *Dermacentor reticulatus*, and *Rhipicephalus appendiculatus.* A total of 344 animals were observed for this study and 67 (19.5%) of them were infested with one or more than one species of ectoparasite. Among them 18 cattle and 49 goats were infested. (Table-1)

Table-1: Prevalence of ectoparasites and arthropods of domestic animals (cattle and goats) at Boalkhali upazilla in Chattogram district

No. of hosts examined	**No. of hosts infested**	**Total no. of ectoparasites collected**	**Prevalence (%) of host infested**	**Intensity (per host)**
344	67	163	19.5	2.43

3.1 Overall prevalence:

Highest infestation was found with tick. Three species of tick were identified: *Haemaphysalis longicornis, Dermacentor reticulatus* and *Rhipicephalus appendiculatus.* Among them *Haemaphysalis longicornis* was the most prevalent. A total of 32 animals (9.3%) were infested with *Haemaphysalis longicornis,* 14 (4.07%) with *Dermacentor reticulatus* and 6 (1.75%) with *Rhipicephalus appendiculatus.*

After tick, the most prevalent type of ectoparasites were lice and flea. In case of lice, 6 (1.75%) goats were infested with *Damalinia caprae* and 2 (0.6%) cattle with *Bovicola bovis.* And in case of flea, only one species of *Ctenocephalides felis* was identified. 7 (2.03%) animals were infested with it.

Some other arthropod species were collected from four different farms like mosquito and fly. In case of mosquito, *Anopheles sp.* and *Culex sp.* And in case of fly *Musca domestica*, *Stomoxys calcitrans* and *Tabanus sp*. were identified. About 45 arthropod samples were collected. Among them, 16 (35.5%) *Anopheles sp.*, 10 (22.22%) *Culex sp.*, 10 (22.22%) *Musca domestica*, 5(11.11%) *Stomoxys calcitrans* and 4 (8.88%) *Tabanus sp.* were collected.

Overall prevalence of ectoparasites is listed in below table: (Table-2,3)

Table-2: Overall prevalence of ectoparasites on examined animals (N=63)

Species	Number of infested animals	Prevalence %	Sample collected	Intensity
Haemaphysalis longicornis	32	9.3	54	1.69
Dermacentor reticulatus	14	4.07	24	1.71
Rhipicephalus appendiculatus	6	1.75	12	2
Damalinia caprae	6	1.75	12	2
Bovicola bovis	2	0.6	4	2
Ctenocephalids felis	7	2.03	12	1.71
Total	67	19.5	118	1.76 (avg.)

Table-3: Percentage of arthropods collected in the study area

Species	Sample collected	Percentage (%)
Musca domestica	10	22.2
Stomoxys calcitrans	5	11.11
Tabanus sp.	4	8.88
Anopheles sp.	16	35.5
Culex sp.	10	22.22
Total	45	100

3.2 Prevalence in cattle

A total of 42 ectoparasites of cattle were collected from 18 infested hosts where 63 cattle were examined. The prevalence and intensity were 28.6% and 1.61 respectively (Table-4).

Table-4: Prevalence of ectoparasites of cattle at Boalkhali upazilla in Chattogram district

No. of hosts examined	**No. of hosts infested**	**Total no. of ectoparasites collected**	**Prevalence (%) of host infested**	**Intensity (per host)**
63	18	30	28.6	1.67

Three species of tick were identified: *Haemaphysalis longicornis, Dermacentor reticulatus* and *Rhipicephalus appendiculatus.* Among them *Haemaphysalis longicornis* was the most prevalent. A total of 9 cattle (14.3%) were infested with *Haemaphysalis longicornis,* 3 (4.5%) with *Dermacentor reticulatus* and 2 (3.2%) with *Rhipicephalus appendiculatus.*

In case of lice, 2 (3.2%) cattle with *Bovicola bovis* and in case of flea, 2 (3.2%) animals were infested with *Ctenocephalids felis*. (Table-5)

Table-5: Prevalence of ectoparasites species in cattle

Species	**Number of infested animals**	**Prevalence %**	**Sample collected**	**Intensity**
Haemaphysalis longicornis	9	14.3	14	1.56
Dermacentor reticulatus	3	4.7	6	2
Rhipicephalus appendiculatus	2	3.2	3	1.5
Bovicola bovis	2	3.2	4	2
Ctenocephalids felis	2	3.2	3	1.5
Total	18	28.6	30	1.67 (avg.)

3.3 Prevalence in goat

A total of 88 ectoparasites of goat were collected from 49 infested hosts where 281 goats were examined. The prevalence and intensity were 17.4% and 1.79 respectively (Table-6).

Table-6: Prevalence of ectoparasites of goat at Boalkhali upazilla in Chattogram district

No. of hosts examined	**No. of hosts infested**	**Total no. of ectoparasites collected**	**Prevalence (%) of host infested**	**Intensity (per host)**
281	49	88	17.4	1.79

Three species of tick were identified: *Haemaphysalis longicornis, Dermacentor reticulatus* and *Rhipicephalus appendiculatus.* Among them *Haemaphysalis longicornis* was the most prevalent. A total of 23 goats (8.19%) were infested with *Haemaphysalis longicornis,* 11 (3.9%) with *Dermacentor reticulatus* and 4 (1.4%) with *Rhipicephalus appendiculatus.*

In case of lice, 6 (2.1%) goats with *Bovicola bovis* and in case of flea, 5 (1.78%) animals were infested with *Ctenocephalids felis*. (Table-7)

Table-7: Prevalence of ectoparasites species in goats

Species	**Number of infested animals**	**Prevalence %**	**Sample collected**	**Intensity**
Haemaphysalis longicornis	23	8.19	40	1.74
Dermacentor reticulatus	11	3.9	18	1.64
Rhipicephalus appendiculatus	4	1.4	9	2.25
Damalinia caprae	6	2.1	12	2
Ctenocephalids felis	5	1.78	9	1.8
Total	49	17.4	88	1.79 (avg.)

3.4 Comparative study of the result in cattle

To compare the prevalence of ectoparasite infestation in cattle between different age groups, the population was divided into two groups, one was young group (18 months old or less) and another was adult group (more than 18 months old). Table-8 stated that young group had higher prevalence (30.4%) than adult group (27.5%). This might be due to the underdeveloped immune system in the young animals. The total number of young and adult animal were 23 and 40 respectively where infested young and adult were 7 and 11 respectively. According to *Musa et al. (2018),* prevalence of ectoparasites was higher in young animals than adults.

Table-8: Prevalence of ectoparasites with variables (age) in cattle (N=63)

Variable	Categories	Total number	Positive	Prevalence (%)
Age	Young (18 months old or less)	23	7	30.4
	Adult (>18 months)	40	11	27.5

Table-9 displayed that female had higher prevalence (30.3%) than males (26.7%). The total number of male and female animal were 30 and 33 respectively while the infested male and female were 8 and 10 respectively.

Table-9: Prevalence of ectoparasites with variables (sex) in cattle (N=63)

Variable	Categories	Total number	Positive	Prevalence (%)
Sex	Male	30	8	26.7
	Female	33	10	30.3

3.5 Comparative study of the result in goat

To compare the prevalence of ectoparasite infestation in goat between different age groups, the population was divided into two groups, one was young group (15 months old or less) and another was adult group (more than 15 months old). Table-10 stated that young group had higher prevalence (20.5%) than adult group (16.3%). This might be due to the underdeveloped immune system in the young animals. The total number of young and adult animal were 73 and 208 respectively where infested young and adult were 15 and 34 respectively.

Table-10: Prevalence of ectoparasites with variables (age) in goat (N=281)

Variable	Categories	Total number	Positive	Prevalence (%)
Age	Young (15 months old or less)	73	15	20.5
	Adult (>15 months)	208	34	16.3

Table-11 displayed that female had higher prevalence (18.1%) than males (16.8%). The total number of male and female animal were 138 and 143 respectively while the infested male and female were 23 and 26 respectively.

Table-11: Prevalence of ectoparasites with variables (sex) in goat (N=281)

Variable	Categories	Total number	Positive	Prevalence (%)
Sex	Male	138	23	16.8
	Female	143	26	18.1

Photo Gallery

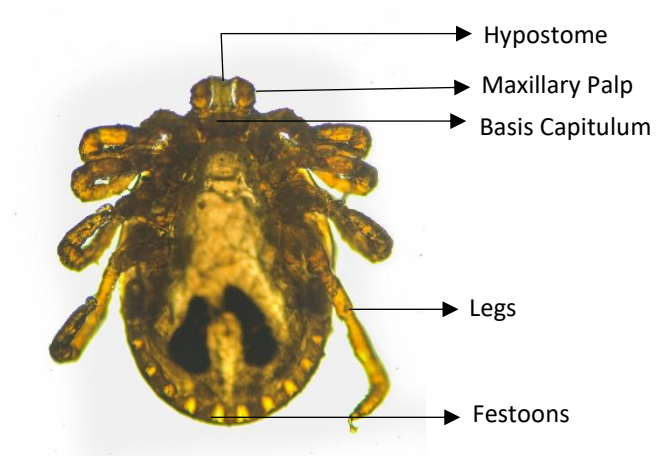

Fig 1: *Haemaphysalis longicornis*

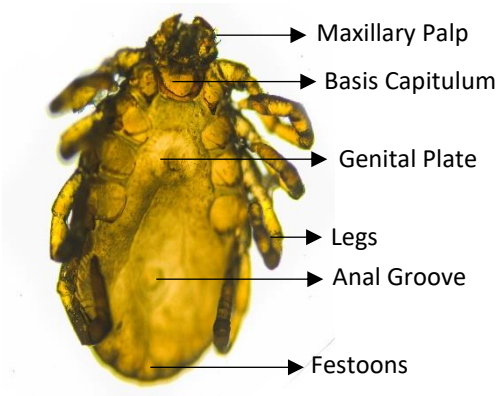

Fig 2: *Dermacentor reticulatus*

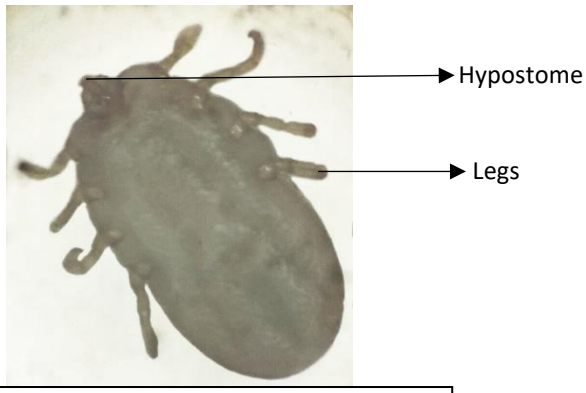

Fig 3: *Rhipicephalus appendiculatus*

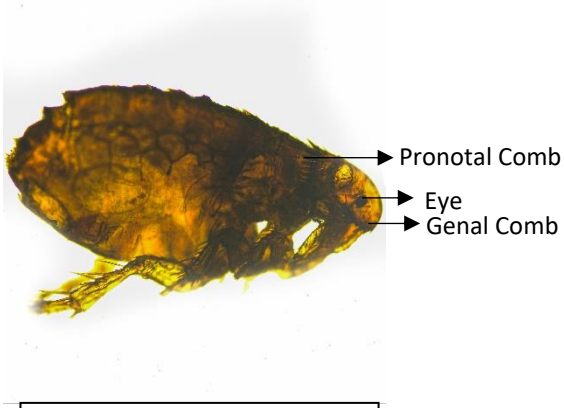

Fig 4: *Ctenocephalids felis*

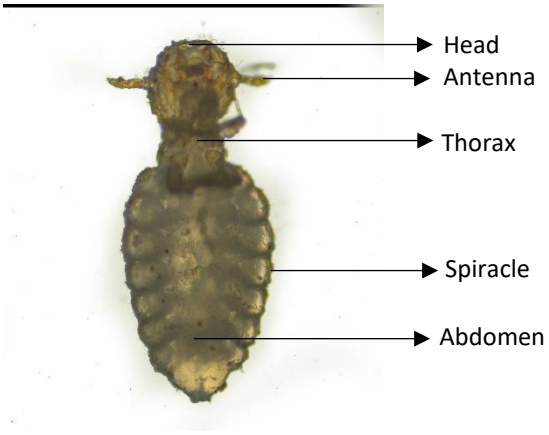

Fig 5: *Damalinia caprae*

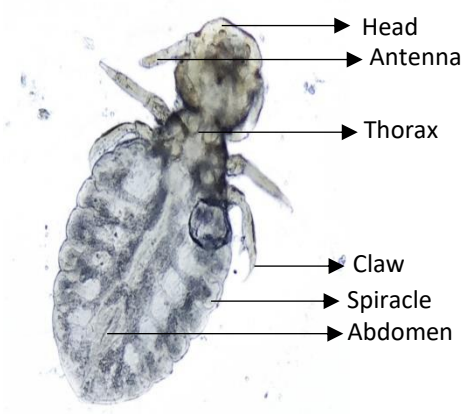

Fig 6: *Bovicola bovis*

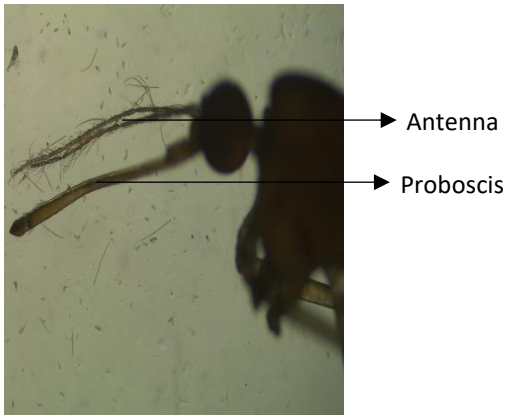

Fig 7: Anopheles sp.

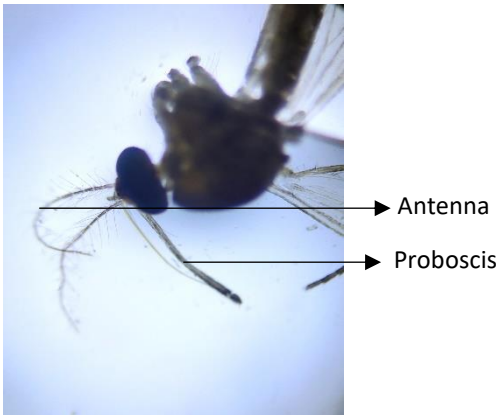

Fig 8: Culex sp.

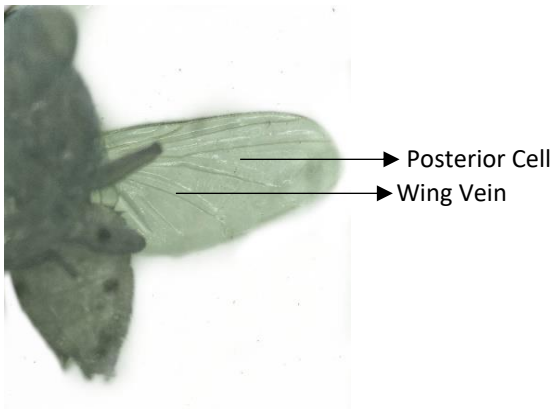

Fig 9: *Musca domestica*

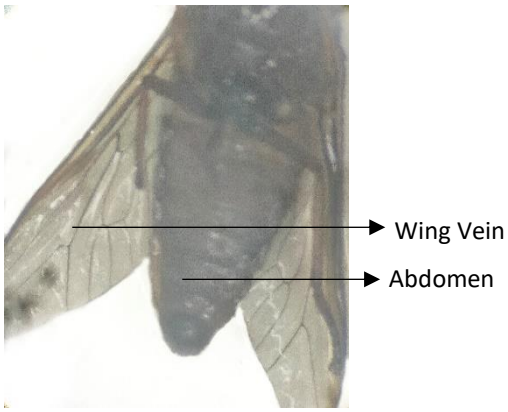

Fig 10: Tabanus sp.

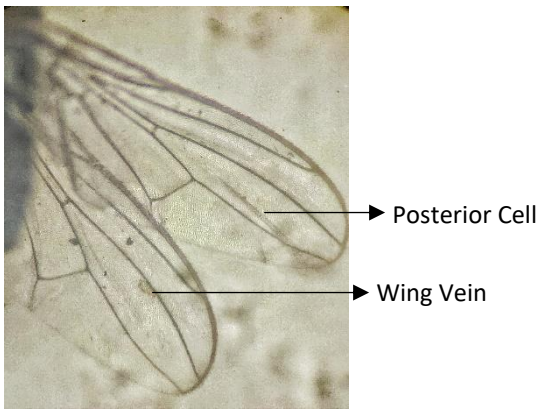

Fig 11: *Stomoxys calcitrans*

4. Conclusion

With a view to the findings, it is possible to conclude that different species of ectoparasites and arthropods represent common health, welfare and hygienic problems of cattle and goats in Boalkhali upazila. This not only affect the health and welfare of animal but also economic value of the animal. I hope that the obtained data might encourage veterinary practitioners to educate farm owners about the risk of zoonotic infections, the merits of hygienic management and prophylactic treatment to control ectoparasites infestation in farm animals.

5. Limitation

There were some limitations in this study. The study period was limited and study area restricted to a particular area. An ongoing pandemic also limited proper data collection from the selected area. Also, in Upazila Veterinary Hospital, patient owners were reluctant to bring their animal to hospital. For this reason, the findings may not literally reflect the region.

6. References

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Biography

This is Pronab Das, doing his graduation on Doctor of Veterinary Medicine (DVM) at Chattogram Veterinary and Animal Sciences University under Faculty of Veterinary Medicine. He passed the Secondary School Certificate Examination (SSC) in 2013 from Nasirabad Govt. High School, Chattogram and then Higher Secondary Certificate Examination (HSC) in 2015 from Chattogram Cantonment Public College, Chattogram. Currently he is doing his yearlong internship. He has a great interest in research on parasitology & pathology.