**Chapter-I**

**INTRODUCTION**

The total number of goat population in the world is over 767.90 million of which 109.8 million (FAO, 2003) are distributed in India, Pakistan and Bangladesh. Of the total livestock population of 64.84 million (DLS, 2001-2002) in Bangladesh, small ruminants constitute 39.2 millions, of which about 20 millions are goats (Hossain, 2003). About 97.90% of goats are distributed in rural areas and 2.10% in urban areas (FAO, 2003).

For rearing goats, a minimum investment of money is often required, even without specific arrangement of housing, grazing on barren and road-side grass land and least homemade supplied feed (rice gruel, boiled rice, skins of vegetables etc). In addition, goats are fed on leaves of jackfruits, which is available in most of the rearing areas. The higher demands for meat and especially for skin in the local as well as foreign markets focused the goat enterprise extremely prominent to the vulnerable group of people and the existing socioeconomic condition of the country. They also have important role in generating employment, income, capital storage and improving household nutrition (Devendra, 1992).

Parasitism is one of the major problem affecting health and productivity of livestock. Adverse effects of different species of helminthes include significant impairment in loss of body weight, and reduced milk production. In addition, helminthes lower resistance of the animals and predispose them to the secondary infections i.e. bacterial, viral and etc. which lead to heavy economic losses (Soulsby, 1982; Floate *et al.*, 2005) Parasitic infections especially gastrointestinal nematode and trematode pose a serious health threat and limit the productivity of livestock due to the associated morbidity, mortality, cost of treatment and control measures (Nwosu *et al.*, 2007). In a large number of developing countries, These nematodes are of major socioeconomic importance and cause disease, mainly as a consequence of anaemia (particularly in young animals), resulting in impaired development and sometimes deaths (Jex *et al.*, 2009).

The prevalence of ecto-and endo parasites was in goats were more common in Bangladesh. The prevalence of parasitic infestation depends on ecology, geographical and climatic condition prevailing in Bangladesh. High prevalence of different helminth parasites was reported in goats (Samad *et al.*, 1979; Howlader *et al.*, 1991; Mahbub, 1996). Among the problems encountered, parasitism is thought to be the major causes of hindering the goat production (Mahbub, 1996). Therefore, the present study was undertaken to study the prevalence, effects of age and sex on the prevalence of helminths in goats in Pabna, Bangladesh.

Chapter-II

**REVIEW OF LITERATURE**

**2.1 Trematodal Infection**

**2.1.1 Fascioliasis**

Among the parasitic diseases, fascioliasis is an economically important of livestock particularly in cattle, sheep and goats. Infection with *F.* *gigantica* is regarded as one of the most common single helminth infection of ruminants in Africa, Indian, Sub continent, central and Southeast Asia, other tropical and sub tropical areas of the World (Hensen and Perry, 1994; Radostits *et al.*, 1994).

This disease causes enormous economic losses all over the world and these losses are due to reduction in milk and meat production, condemnation of liver, loss of draught power, reproductive failure and mortality (Diaw *et al.,* 1998; Selim *et al.,* 1997).

The higher rate of infection with *F. gigantica* was observed in older animals in Bangladesh. The probable explanation for the lower prevalence in older age group compared to younger age group could be due to the so called self-cure phenomenon (Assanji, 1988; Mazid, 2006; Tasawar *et al.*, 2007).

The significant difference in the rate of infection between male and female animals as observed, apparently indicated that the female were more susceptible to *Fasciola gigantica* than male (Hossain *et al.*, 2011; Mazid, 2006; Selim *et al.*, 1997).

**2.1.2 Paramphistomiasis**

Paramphistomiasis is the commonest chronic parasitic diseases affecting grazing goat. Considerable economic losses incurred in terms of ill health and reduced growth, loss of weight and milk production (Regassa, 2006; Rangel-Ruis *et al.,* 2003).

The infection rate of *Paramphistomum* spp.was highest in old age group (Sardar *et al.*, 2006; Tariq *et al.*, 2008).

Males were more susceptible to *Paramphistomum* spp*.* than females. The influence of sex on the susceptibility of animals to infections could also be attributed to genetic predisposition and differential susceptibility owing to hormonal control. Testosterone is known for its immunosuppressive activity (Tariq *et al.*, 2008).

**2.2 Gastrointestinal Nematodiasis**

**2.2.1 Ascariasis**

Prevalence of ascariasis was related to overcrowding, large population size and use of same pasture year after year, feeding on floor, irregular deworming Ascarids may cause coughing and nasal discharge, due to larval migration from the intestines through the lungs, reduced weight gain, lack of condition, lethargy, anorexia, depression, anemia and pot belly and even death from intestinal obstructionof mature ascarids. (Thienpont and Keyser, 1981).

Ascariasis, was very high in the young animals starting from the age group of less than 12 months and gradually declined. Younger animals were more susceptible to nematode parasites compared to older age animals (Tasawar *et al.*, 2007).

Sex wise prevalence indicated that male was more affected than female (Bilal *et al.,* 2009;[Ferdushyf and Hasan,](http://gscience.gurpukur.com/product_info.php?cPath=7_8_118&products_id=590) 2008; Tariq *et al.*, 2008).

**2.2.2 Hookworm Infection**

*Bunostomum spp.*is small intestinal endoparasites of large and small ruminants. They are grayish-white worms, 1-3cm in length and stout in stature, especially when compared to other [nematodes](http://en.wikivet.net/Nematodes). Among small intestine nematode it is an important nematode because the adult worms attach to the intestinal mucosa and suck blood (Biu *et al.*, 2009).

*Bunostomosis* is a leading cause of iron deficiency anemia, which, in heavy infections, can cause physical retardation and deaths. Other clinical signs of include inappetence, illthrift and prostration, weakness, persistent diarrhoea and having a rough coat. Skin disease usually manifests in the feet and limbs as pruritus, erythema, oedema, alopecia, and hyperkeratosis and papule/pustule formation. Claws and hooves also exhibit defective growth, fragility and overgrowth (Jayathangaraj *et al.*, 2000).

*Bunostomosis* is common to observe intestinal parasites in goat of all ages, but the prevalence of infection is usually high in kid. Young animals 5-8 months old are most commonly infected (Odoi *et al.*, 2007). Female were more susceptible than male (Hossain *et al.*, 2011; Mazid, 2006).

**2.3 Tapeworm infestation**

*Moniezia expansa* is usually affecting the animal of Asia and Africa countries. The symptoms of tape worms in sheep and goats may not be too obvious, and the clinical effects such as rough hair coat, digestive disturbances, constipation followed by diarrhea, pot belly, anemia, and edema may also be caused by round worms. However, when large numbers of tape worms are present, they may cause obstruction of the intestine and precipitate enterotoxemia or overeating disease (Karki, 2005; Parsani *et al.,* 2008).

All age groups are susceptible, but in adult have deleterious effect and heavy infestation are necessary to cause clinical illness (Radostits *et al.,* 1994). The higher rate of infection with *M. expansa* and *M. benedeni* was observed in young animals than old. The infection with *Moniezia* spp. was higher in male than female (Mazid, 2006; Rahman *et al.,* 1996).

**2.4 Ectoparasitic Infestation**

**2.4.1 Tick infestation**

Ticks are arthropods belonging to the class Arachnida, which are generally obligate and temporary ectoparasites of vertebrates, feeding on blood and tissue fluids of their hosts. They are the second most important group next to insects of arthropod vectors of diseases transmissible to animals and human beings. Tick borne diseases commonly transmitted to human beings include Lyme disease, Ehrlichiosis, Babesiosis, Rocky Mountain spotted fever, Colorado tick fever, Tularaemia, Q fever, Tick paralysis, Spotted fever and Tick encephalitis ([Ghosh](http://www.springerlink.com/content/?Author=Srikant+Ghosh) *et al.,* 2007).The percentage of infestation of ticks on adult goat was higher than in the young goat. Female goat were more susceptible to tick infestations than males (Mekuria and Gezahegn, 2010)

**2.4.2 Mange**

Sarcoptes scabiei is a parasitic mite that borrows into the skin of animals and man causing a disease condition known as scabies or sarcoptic mange. *S. scabiei* is the cause of dermatitis. They cause marked irritation of the skin and itching, which provokes scratching or biting of the skin. This leads to alopecia and hyperkeratosis of the skin. Red papules and vesicles appear on the skin that is followed by appearance of crusts formed of dry lymph. The connective tissue of the skin proliferates and keratinisation is increased so that the skin becomes thickened and wrinkled (Bond, 1998; Dorny *et al.*, 1994).

Sarcoptic mange was very high in the young animals, oder animal less infected by *S. scabiei.* Sex had no influence on the occurrence and severity of the disease (Bornstein *et al.*, 2001).

**2.4.3 Myiasis**

The clinical manifestations of myiasis are not specific and vary according to the involved area of the body. General signs and symptoms including fever, myalgia, arthralgia, hypereosinophilia, elevated erythrocyte sedimentation rate (ESR) and inflammatory reaction at the site of infection are commonly seen (Bolognia *et al.,* 2008, Cestari *et al.,* 2007; Dorchies, 1997)

The economic impacts are the loss of hides for the leather industry, loss in weight gain, milk production, and also decreasing carcass value due to inflammatory reactions. The pathogenicity results from inflammation and toxins secreted by the larvae, leading to chronic inflammatory reaction (Beristain *et al.,* 2001).

Above 6 months aged animals (75.5%) and cross breeds (34.2%) were mostly infected where females (64.5%) were more prone to myiasis (Imtiaz *et al.*, 2014).

**Chapter-III**

**MATERIALS AND METHODS**

**3.1 Study placement and period:**

The study was performed in Upazila Veterinary Hospital, Santhia, Pabna. This area was chosen to study clinical cases affected by endo and ecto-parasites in goat. The study was conducted from May to July 2013.

**3.2 Number of clinical cases studied:**

The study subjects composed of 150 goats of which 60 goats (40%) were affected with parasitic infestation where 40 cases were endoparasitic and rest 20 cases were ectoparasitic infestation. Among 60 goats 36 were female and 24 were male.

**3.3 Diagnosis of cases:**

Cases were presumptively diagnosed by physical examination on the bases of clinical sign and in some cases microscopic examination of fecal samples, skin scrapping and combined parting of hair. The physical examination (clinical signs), microscopic examination and other examination techniques as follows:

**3.3.1** **Physical examination:**

A presumptive diagnosis of different diseases was made on history of enzootic area and most of the suspected animals were showed following signs (Urquhart *et al.*, 1996).

**Fascioliasis:** Diarrhoea, dehydration, emaciation, Sub mandibular oedema.

**Paramphistomiasis:** Diarrhoea, dehydration, loss of body weight.

**Ascariasis:** Diarrhoea, dehydration, loss of body weight.

**Hook worm infection:** Severe anemia, emaciation, unthriftiness.

**Tape worm infection:** Unthriftiness, poor coat, anemia, digestive disturbance.

**Mange infestation**: Alopecia, scal, erythema, loss of body Weight.

**Tick infestion:** Itching, anorexia, unthiriftiness, pale of the mucosa and conjunctiva.

**Maggot infestations:** Wound filled with larvae, odorous exudates comes out from the wound.

**3.3.2** **Microscopic examination:**

**a) Direct smear method**

A drop of fecal sample was taken on a glass slide, thoroughly diluted with few drop of water, covered with cover slip and examined under microscope using both low (10x) and high (40x) power of magnification for the identification of egg.

**b) Sedimentation method**

5 gm of fecal sample was diluted with 20ml of water in a cylinder, after which the cylinder was kept standing for one hour. After this, supernatant fluid was decanted off, examined under microscope for the presence of Fasciola egg. The fasciola eggs were identified on the basis of their morphological feature as described by Soulsby (1982).

**3.3.3 Skin scrapping****:**

Skin scraping is performed by collecting a sample of skin cells with the use of a scalpel blade. The blade was used to gently scrape layers of the skin, usually until a small amount of blood was seen, so that helps to gather cells deep in the skin. Sample was placed on a microscope slide, mixed with liquid containing 10% [potassium hydroxide](http://www.nlm.nih.gov/medlineplus/ency/article/002482.htm) solution (KOH) and examined under the microscope. Most often, results are available within 5 minutes.

**3.3.4 Combined parting of hair:**

A close inspection (aided or unaided) of the whole skin surface during parting of hair or fleece in opposite direction and palpation by fingers and palm is a valuable technique for detection of ectoparasites (e.g. ticks, mites, fleas etc.) and other smaller skin and subcutaneous lesion hidden under the hair or fleece.

**Table 3.1 Recording of data of different parasitic infestation**

|  |  |  |  |
| --- | --- | --- | --- |
| Diseases | No. of Frequency | Common Clinical Sign | Diagnosis |
|  Fascioliasis | 12 | Diarrhoea, dehydration, emaciation | Coproscopy |
| Paramphistomiasis | 7 | Diarrhoea, dehydration, loss of body weight | Do |
| Ascariasis | 4 | Diarrhoea, dehydration, progressive loss of body weight | Do |
|  Bunostomosis | 8 | Sever anaemia, emaciation, unthriftiness | Do |
| Tape worm infection | 10 | Unthriftiness, poor hair coat, anaemia, digestive disturbance | Do |
| Tick Infestation | 8 | Itching, anorexia, unthriftiness | Detection of tick by hair partening test |
| Mange Infestation | 4 | Alopecia, erythema | Skin Scraping |
| Maggot Infestations | 7 | Wound filled with larvae, odorous exudates comes out from the wound | Detection of larvae within the wound |

**3.4 Statistical analysis**

The age and sex of each animal was recorded and stored in a Microsoft Excel spreadsheet, 2007 (Microsoft Corporation). The data were analyzed by STATA 11 for descriptive analysis. Descriptive statistics such as percentages and frequency were calculated. In all the analyses, confidence levels were held at 95% and p <0.05 was set for level of significance.

**Chapter-IV**

**RESULTS**

Out of the 150 goats 60 goats (40%) were positive for parasitic infestation. Table 4.1 illustrates that paramphistomiasis (20±5.20) is more prevalent than other parasitic diseases. Whereas tape worm infestation, tick infestation, bunostomosis, maggot infestation and ascariasis recorded 16.6±4.8, 13.33±4.4, 13.3±4.4, 11.6±4 and 110±3.9 respectively.

**Table 4.1 Prevalence of parasitic diseases**

|  |  |  |
| --- | --- | --- |
| **Diseases** | **Mean ± SE (%)** | **95% Confidence Interval (CI)** |
| Fascioliasis | 8.33±3.5 | 1.13-15.50 |
| Paramphistomiasis | 20±5.2 | 9.50-30.40 |
| Ascariasis | 10±3.9 | 2.18-17.80 |
| Bunostomosis | 13.3±4.4 | 4.40-22.18 |
| Tape worm infestation | 16.6±4.8 | 6.90-26.30 |
| Tick infestation | 13.33±4.4 | 4.40-22.10 |
| Maggot infestation | 11.6±4.1 | 3.30-20.00 |
| Mange | 6.6±3.2 | 0.16-13.16 |

It was observed from table 4.2 that parasitic infestation is more prevalent in between 6 to 24 month of age (61.67±6.30) and comparatively less prevalent >24 month (13.33±4.4 ) of ages of animal. And in table 4.3 showed that Female (58.33±6.41) were more affected than male (41.66±6.41).

**Table 4.2 Proportion of disease prevalence according to age category**

|  |  |  |
| --- | --- | --- |
| **Age** | **Mean ± SE (%)** | **95% Confidence Interval (CI)** |
| <6 month | 25±5.6 | 13.71-36.28 |
| 6-24 month | 61.67±6.3 | 49.00-74.33 |
| >24 month | 13.33±4.4 | 4.04-22.18 |

**Table 4.3 Proportion of disease prevalence according to sex category**

|  |  |  |
| --- | --- | --- |
| **Sex** | **Mean ± SE (%)** | **95% Confidence Interval (CI)** |
| Male | 41.66±6.41 | 28.82-54.50 |
| Female | 58.33±6.41 | 45.49-71.17 |

Table 4.4 illustrates the prevalence of ecto and endo parasitic infestation according to age found that 6-24 month ages goats were more affected in parasitic infestation like than younger goats with a significant difference (P value < 0.05).

**4.4 Table: Prevalence of parasitic diseases & relationship with age category**

|  |  |
| --- | --- |
| **Age** | **Parasitic diseases** |
| <6 month | Ascariasis (6.67%)Bunostomosis (20%)Tape worm infestation (40%)Mange (13.33%)Maggot infestation (20%) |
| 6-24 month | Fascioliasis (10.8%)Paramphistomiasis (21.62%)Ascariasis (13.51%)Bunostomosis (13.51%)Tape worm infestation (10.8%)Tick infestation (16.22%)Mange (5.41%)Maggot infestation (8.11%) |
| >24 month | Fascioliasis (12.50%)Paramphistomiasis (50%)Tick infestation (25%)Maggot infestation (12.50%) |

**4.5 Table: Prevalence of parasitic diseases & relationship with sex category**

|  |  |
| --- | --- |
| **Sex** | **Parasitic diseases** |
| Male | Fascioliasis (8%)Paramphistomiasis (24%)Ascariasis (12%)Bunostomosis (12%) Tape worm infestation (16%)Tick infestation (12%)Mange (8%)Maggot infestation (8%) |
| Female | Fascioliasis (8.57%)Paramphistomiasis (17.17%)Ascariasis (8.57%)Bunostomosis (14.29%)Tape worm infestation (17.14%)Tick infestation (14.29%)Mange (5.71%) Maggot infestation (14.29%) |

Prevalence of parasitic diseases & relationship with sex showed that both male and female are susceptible in parasitic diseases and the p value is >0.05 that means this data is insignificant.

**4.6 Table: Relationship of parasitic infestation with sex**

|  |  |  |
| --- | --- | --- |
| **Sex** | **Endoparasitc infestation** | **Ectoparasitc infestation** |
| Male | 72.0% | 28.0% |
| Female | 65.71% | 34.29% |

It was observed from this table that both male & female are equally susceptible in endo and ectoparasitic infestation and the p value is >0.05 that means there is no relationship of parasitic infestation with sex.

**4.7 Table: Relationship of parasitic infestation with age**

|  |  |  |
| --- | --- | --- |
| **Age** | **Endoparasitc infestation** | **Ectoparasitc infestation** |
| <6 month | 66.67% | 33.33% |
| 6-24 month | 70.27% | 29.73% |
| >24 month | 62.50% | 37.50% |

From this table we observed that endoparasitic infestation is more than ectoparasitic infestation and the p value is >0.05 that is insignificant means no relationship between parasitic infestation with age.