**Prevalence of Gastrointestinal parasitic infestation in Cattle at Burichong Upazilla, Cumilla , Bangladesh.**

 **Abstract**

A survey on gastrointestinal parasitic infestations in cattle was conducted at Burichong upazila,

Cumilla district, Bangladesh during the period from 01 February to 29 March using coproscopy.

Examination of 75 fecal samples of Cattle revealed that 45.31% of the samples were positive for the gastrointestinal parasites. Among different gastrointestinal parasitic infestations, the overall prevalence of *Fasciola* spp infection was the highest (16.00 %) followed by *Paramphistomum* spp infection (9.33%). The lowest overall prevalence was recorded in *Trichuris* and *Strongyloides* *spp* infections (1.33%). Age specific prevalence was found higher in adult and young cattle where *Fasciola spp* infection was the highest (18.42%) in adult followed by young and calf. *Paramphistomum spp* infection was the highest in young (14.28%) where as *Moniezia* *spp* infection were more in adult cattle (7.89*%). Toxocara spp* infections were recorded highest (22.22%) in calf which was not statistically significant. Sex specific prevalence exposed that female cattle showed more susceptibility to different gastrointestinal parasitic infestations than male but it was not statistically significant. However, frequency of *Fasciola spp* infections was the highest in female crossbred cattle (9.51%) where as *Toxocara spp* (5.18%) and *Moniezia spp* (3.49%) were found more in male cattle. It could be stated that the current investigation was a limited study as topographical variation, seasonal pattern of the diseases as well as indigenous/native cattle were not included.

**Key words**: Gastro-intestinal parasites, Cattle, Sex, Age.

 **CHAPTER-I**

 **INTRODUCTION**

 Bangladesh is an agricultural country with low per capita income. Cattle is one of the most common and prominent domesticated livestock in Bangladesh. Among all agricultural activities cattle farming occupy large area and play a vital role in the national economy. In Bangladesh, the contribution of agricultural sector to the gross domestic product (GDP) is 21.11% Anonymous,(2007). The livestock sector contributes 2.97% of the GDP while cattle production solely contributes almost 2.1% of the total Economic index, (2012). Cattle is important for both meat and milk, despite the fact that there could be losses because of different diseases including parasitic infections. The amount of meat, milk and income acquired from domesticated animals is far beneath the national interest because of factors such as death and sickness with associated reduced productivity and expanded the expense of treatment Hossain et al,( 2011).

Herd health is important for economic profitability but Parasitic infestation is considered to be one of the major constraints that hinder the development of livestock population and also adversely affects the health and productivity of animals. *Hesterberg et al*,( 2007). Infection of cattle with gastro intestinal parasite is widely reported from all corners of the world and shown to be influenced by the type of cattle management practiced *Raza et al*., (2010). The most important predisposing factors for parasitic infestations are grazing habits, climate, nutritional deficiency, pasture management, poor immunological status, presence of vector and intermediate host, and the number of infective larvae and eggs in the environment *Edosomwan et al*, (2012). The effect of parasitic infestations is determined by a combination of factors, of which the varying susceptibility of the host species, the pathogenicity of the parasite species, the host/parasite interaction, and the infective dose are the most important FAO,(2000). Despite significant losses by gastrointestinal parasitism, the problems are often neglected and overlooked as majority of the infected animals show a number of little obvious clinical signs during their productive life and their effects are gradual and chronic *Raza et al*.,( 2010). Indirect losses associated with parasitic infections include the reduction in productive potential such as decreased growth rate, weight loss, diarrhea, anorexia, and sometimes anaemia *Swai et al*, (2006).

 Considering the above facts, the present study was undertaken to fulfill the following objectives:

1. To investigate the prevalence gastrointestinal parasitic infestation in Holstein Friesian crossbred at Burichong Upazilla, Cumilla.
2. To determine different factors such as, breed, age, sex, etc. in the occurrence of such disease.

 **CHAPTER-II**

 **REVIEW OF LITERATURE**

**2.Gastrointestinal Parasitism**

**2.1 Epidemiology**

The development and survival pattern of infective larvae in the environment differs according to the climate. Three broad types of climate are found in tropical and subtropical regions:

• Humid tropical climate

• Savannah-type tropical and sub-tropical climate with a long dry season

• Arid tropical and sub-tropical climate

 It is also the climate of much of southeastern Asia, Central America and northern South America. The parasites' eggs or larva developed into in the fecal material or in environment to make themselves accessible to ingestion by ruminants, the larvae have to migrate or be transported from the faces in which they were deposited on the ground to any nearby herbage. Such movement occurs in two ways: Horizontal migration/transport and vertical migration/transport. Embryonation and hatching of the eggs depends on light, temperature, humidity and oxygen and this process does not take place while the eggs are in the faecal mass. The development of larvae in the environment depends upon warm temperature and adequate moisture. In most tropical and sub-tropical countries, temperatures are permanently favourable for larval development in the environment. Exceptions to this are the highland and mountainous regions throughout the world and the winters of southern Africa and Latin America where temperatures may fall below those favourable for the development larvae. The ideal temperature for larval development of many species in the microclimate of the tuft of grass or vegetation is between 22° and 26°C. Some parasite species will continue to develop at temperatures as low as 5°C, but at a much slower rate. Development can also occur at higher temperatures, even over 30°C, but larval mortality is high at these temperatures. The ideal humidity for larval development in this microclimate is 100%, the minimum humidity required for development is about 85%. The survival of larvae in the environment depends upon adequate moisture and shade. Desiccation from lack of rainfall kills eggs and larvae rapidly and it is the most lethal of all climatic factors. *Hansen and Perry*, (1993)

**2.2 Factors affecting the size of gastrointestinal infestations**

The size of any gastrointestinal nematode infestation depends on the following six main factors:

• The number of infective larvae/eggs ingested by the host, which in turn is influenced by the climate, the amount of protection provided by vegetation, the livestock density and the grazing pattern of the ruminants present.

• The rate at which acquired resistance develops in the host, which is influenced by the species of the parasite and host, genetic factors, nutrition and physiological stress (e.g., parturition).

**2.3 Diagnosis of gastrointestinal parasitism**

To diagnose gastrointestinal parasitic infestations of ruminants, the parasites or their eggs/larvae must be recovered from the digestive tract of the animal or from faecal material. These are subsequently identified and quantified. The following are the main tasks involved in this process:

At first Collection of faecal samples than Separation of eggs/larvae from faecal material and their concentration than Microscopical examination of prepared specimens after that Preparation of faecal cultures lastly Isolation and identification of larvae from culture (Baermann apparatus techniques) .

The following Qualitative and Quantitative tests were used for the diagnosis of gastrointestinal parasitism:

* Qualitative test:

 1.Direct method

 2.Indirect method (Direct, Flotation, Sedimentation)

* Quantitative test

1.Mc master technique

2.Stools ova counting technique

(Urquhart et al., 1996, Hansen and Perry, 1993, Soulsby, 1982 and Benbrook and Sloss, 1962).

**2.4 Clinical Signs of Gastrointestinal parasitic infestation:**

**Fasciolosis-**Sudden death where blood stained froth appears at the nostrils& anus, weakness, mucosal edema, abdominal pain indicate acute fasciolosis.on the oter hand anemia, bottle jawindicate chronic fasciolosis. **kamaruddin *et al.,(* 2007)**

**Paramphistomiasis-**A characteristic& persistent foetid diarrhea, depression ,dehydration & anemia followed by sudden death were the important clinical signs of paraamphistomiasis**. Amalendu, (2005)**

**Moneiziasis-** Poor coat, less than optimal growth ,afebrile diarrhea& occassionaly colic are the common signs of ascariasis. **Blood, (2003)**

**Strongyloidosis**- Diarrhoea in young animal is the most common clinical sign but the passage of massive number of larvae through the skin may also provoke dermatitis**. Blood, (2003)**

**Toxocariosis-** Fever,enlargement and necrosis of the liver,enlargement of the spleen. **Amalendu, (2005)**

**Morphology parasite egg:**

**Fasciolosis**- Eggs are oval, operculated, yellow-brown color and measure 130 to 150 by 60 to 90 µm**. Hendrix, (1998)**

**Paramphistomiasis-** Presence of posterior knob, distinct operculum and measure 114 to 176 µm by 73 to 100 µm**. Foreyt, (2001)**

**Moneiziasis**-Eggs with a square or irregularly triangular shape, Have row of interproglotial glands at the posterior borderand measuring 56 µm to 67 µm in diameter**. Hendrix, (1998)**

**Strongyloidosis**- Larvated egg , thin shell, blunt ends measuring 50x22 µm**. Foreyt, (2001)**

**Toxocariosis-** Cylindrical shape and length (adult measure 10 cm for males and 18 cm for females)**. Foreyt, (2001)**

**2.5 Pevalence of gastrointestinal parasitic infestation in Bangladesh**

In different areas of Bangladesh, several investigations were carried out on gastrointestinal parasitism. In an investigation, it was observed that cattle harbor at least 10 species of trematodes, 2 adult cestodes, two larval cestodes and 21 species of nematode. Multiple infections with different species of helminthes were recorded in fifty one cattle. Concurrent infection with most harmful helminthes recorded as *Fasciola gaigantica*, *Schistosoma indicum, Schistosoma spindalis, Trichostrongylus axei, Oesophagostomum radiatum, Haemonchus spp* were recorded in twenty one cattle above six years of age Rahman and Mondal,(1983). In another study, prevalence of gastrointestinal parasitism in cattle was recorded as *Toxocara spp* 7.1%, *Strongyles spp* 26.4%, *Strongyloides spp* 9.2% and *Trichuris spp* 5.8% Rahman and Ahmed ,(1991). Highest rate of gastrointestinal nematodes (GIN) infection (48%) was recorded in calves, followed by *Eimeria spp* (27%), *Toxocara vitulorum* (14%) and lowest (1%) with each of the Strongyloides, Paramphistomum and Moniezia sp (Samad et al., 2004). In a different study, it was showed that the overall prevalence of Paramphistomum spp infection was 25%, 30.56%, Ascaris 17.22%, 21.67%, Strongyloides spp 8.89%, 9.17%, Trichuris spp 6.11%, 8.61%, Schistosoma spp 29.44%, 37.78% and Moniezia spp 8.33%, 9.44% in native and crossbred cattle, respectively. It was also observed that infection rates of Ascaris, Strongylid and Strongyloids were very high in the young animals starting from the age group < 12 months and gradually declined. In the age group > 24-36 months and > 36 months, the infection rates were very much and the rates were almost similar in both native and crossbred cattle. The infestation rates of Fasciola, Paramphistomum, Trichuris and Schistosoma were highest in the age group > 36 months and lowest in age group < 12 months. The highest prevalence rates of different parasites were observed in the rainy season (July to October) except in case of Ascaris. The infestation rate of Ascaris was highest in winter (Sardar et al., 2006 In comilla, an epidemiological investigation was conducted on gastrointestinal parasites of cattle where 37% animals were found positive, infected with one or more helminthes. The prevalence of *Paramphistomum spp* was 62.60%, *Fasciola gaigantica* 16.3%, *Schistosoma indicum* 1%, *Neoascaris vitulorum* 0.9%, *Trichutris spp* 8.8%, *Strongyloides spp* 3% and *Strongylus spp* 36.70% where Strongylus infection increased in monsoon and winter whereas *Fasciola spp* and *Paramphistomum spp* increased only in monsoon Rahman and Razzak,( 1973). In Tangail district, prevalence of *Paramphistomum spp* infection was 64.4%, *Capillaria bovis* 12.2%, *Strongylus spp* 34%, *Fasciola spp* 22.4%, *Balantidium coli* 13.6%, *Coccidia* 12.2% and *Strongyloides papillosus* 1.6% where 50% of the studied cattle were infected with two or more different parasitic species Garrels, (1975). In Savar, the highest prevalence of gastrointestinal parasitic infestation was *Strongylus spp* (77.2%) followed by *Trichuris spp* (11%), *Capillaria spp* (8.8%), *Strongyloides spp* (7.4%) and *Toxocara spp* (6.6%) where *Strongyloides spp* was significantly higher in male calves *Chowdhury et al*.(1993). The highest prevalence of gastrointestinal parasitic infestation was recorded in summer (27.6%) followed by autumn (11.4%), spring (10.6%) and winter (9.3%) in cattle of Savar Military Dairy Farm, Dhaka Afazuddin,( 1985). On the other hand, similar type of result was found in Gazipur, which was 12.7% in summer, 11.7% in spring, 10.4% in autumn and 9.4% in winter Amin and Samad, (1987).

 **CHAPTER-III**

 **MATERIALS AND METHODS**

**3.1 Description of the study area and duration**

 The study was conducted at Burichong of Cumilla districts. The study was undertaken for a period of 2 months starting from February’ 2018 to March’2018.

**3.2** **Selection of animal**

 The study was taken on 75 sick cattle which were brought at the Hospital for treatmentl. The cattle were suspected to be affected with gastro-intestinal parasitic infestation on the basis of owner complaint, clinical history- emaciation and gastro-intestinal disturbances; clinical signs- diarrhoea, inappetite, unthriftiness ; and physical examination .

**3.3 Target animals and age groups**

 Holstein Friesian (HF) crossbred cattle were selected for this study as target animals. To determine the age susceptibility to different parasites, cattle were categorized into three different sub- groups as calf (≤1 year), Young (>1 – < 2.5 years) and Adult (≥2.5years) (Sastrt et al., 2005).

**3.4 Sample collection & examination**

 At first fecal samples were collected from the rectum of cattle. Three different types of qualitative tests, like direct smear, flotation techniques were used to examine the fecal samples .

**3.4.A. Direct Smear**

1. Placed a small amount of feces on a microscope slide.

2. Added a drop of saline water to the feces and mix thoroughly.

3. Cover with a cover slip. Moved the cover slip around until it lays flat.

4. Examined the slide using the 10X objective, and then go over it with the 40X objective.

**3.4.B.Simple test tube flotation**

Equipment

 · Beakers

 · A tea strainer

 · Measuring cylinder

 · Stirring rod

 · Test tube

 · Test tube rack

 · Microscope

 · Microslides, coverslips

 · Teaspoon

 · Flotation fluid ( 500 gram sugar + 400 gram salt + 1 litter water )

**Procedure**

(a) Putted approximately 3g of faeces (weigh or measure with a precalibrated teaspoon) into Container 1.

(b) Poured 50 ml flotation fluid into Container 1.

(c) Mixed (stir) feces and flotation fluid thoroughly with a stirring device (tongue blade, fork).

(d) Poured the resulting fecal suspension through a tea strainer or a double-layer of cheesecloth into Container 2.

(e) Poured the fecal suspension into a test tube from Container 2.

(f) Placed the test tube in a test tube rack or stand.

(g) Gently top up the test tube with the suspension, leaving a convex meniscus at the top of the tube and carefully place a coverslip on top of the test tube.

(h) Let the test tube stand for 20 minutes.

(i) Carefully lifted off the coverslip from the tube, together with the drop of fluid adhering to it, and immediately place the coverslip on a microscope slide.

**3.5 Experimental Design (at a glance)**

 Sample

Sedimentation

Flotation

Direct smear

Qualitative test

 Feces

 **CHAPTER-**

 **Chapter - IV**

 **Results**

**4. Prevalence of gastrointestinal parasitic infestations**

 **4.1 Overall prevalence of gastrointestinal parasitic infestations**

 The current investigation was revealed 7 helminths species as 1 Cestodes, 2 Trematodes and 3 species of Nematodes in cattle population.

The overall prevalence of gastrointestinal parasitic infestation(either single or mixed infections) was 45.31% in study population.

**Table 1: Overall prevalence of gastrointestinal parasitic infestations in crossbred cattle**

|  |  |  |
| --- | --- | --- |
| Gastrointestinal Parasitic infections | Percentage % | 95% Confidence Interval |
| *Fasciola* spp |  | 16.00 | 7.65-11.87 |
| *Paramphistomum* spp |  | 9.33 | 5.93-11.45 |
| *Toxocara* spp |  | 9.33 | 5.93-11.45 |
| *Trichuris* spp |  | 2.66 | -0.68-1.79 |
| *Strongyloides* spp |  | 1.33 | -0.28-1.09 |
| *Moniezia* spp |  | 6.66 | 2.67-5.75 |

Total 45.31%

 Among different gastrointestinal parasitic infestations, prevalence of *Fasciola spp* infestations was the highest and it was 16.00 % in studied cattle. The lowest parasitic infection was recorded in *Trichuris (2.66%)* and *Strongyloides* spp infections (1.33%). However, slightly higher prevalence was recorded in *Parasmphistomum* spp, *Toxocara* spp, and *Moniezia* sp infections in thestudy population (Table 1).

**4.2 Age specific prevalence of gastrointestinal parasitic infestations**

 Occurrences of gastrointestinal parasitic infestations were influenced by the age of animals. During this investigation, it was observed that adult and young cattle were affected more by different gastrointestinal parasitic infestations. Among different parasitism, *Fasciola* spp infestation was the highest (18.42%) in adult followed by young and calf. *Paramphistomum* spp infestation was the highest in young (14.28%) where as *Moniezia* spp infestation were more in adult cattle (3.25%). *Toxocara* spp infestations were recorded highest (13.50%) in calf where as *Strongylus* spp and *Trichuris* spp were only recorded in adult cattle of this study (Table 2).

**Table 2: Age-specific prevalence of gastrointestinal parasitic infestations in crossbred cattle**

|  |  |  |  |
| --- | --- | --- | --- |
| Gastrointestinal | Calf | Young |  Adult |
| Parasitic infections | (N=9) | (N=28) | (N=38) |
| *Fasciola* spp | 11.11 | 14.2 | 18.42 |
|  | (1) | (4) | (7) |
|  |  |  |  |
| *Paramphistomum* spp | 11.11 | 14.28 | 5.26 |
|  | (1) | (4) | (2) |
| *Toxocara* spp | 22.22 | 10.71 | 5.26 |
|  | (2) | (3) | (2) |
|  |  |  |  |
| *Trichuris* spp | 0.0 | 0.0 | 5.26 |
|  | (2) |
|  |  |  |
| *Strongyloides* spp | 0.0 | 0.0 | 2.63 |
|  | (1) |
|  |  |  |
|  |  |  |  |
| *Moniezia* spp | 0.0 | 7.14 | 7.89 |
|  |  | (2) | (3) |

  **N= Total no. of population**

**4.3 Sex-specific prevalence of gastrointestinal parasitic infestations**

 In the current study, it was exposed that female cattle showed more susceptibility to different gastrointestinal parasites than male but it was not statistically significant. However, prevalence of *Fasciola* spp infestations was the highest in female crossbred cattle (9.27%) while occurrence of *Paramphistomum spp* infestations (7.91%) along with *Toxocara* spp *and Moniezia* spp were found more in male cattle. *Trichuris* spp and *Strongyloides* spp infestation were only recorded in female cattle of this study (Fig.1).



 **Fig 1**.: **Sex-specific prevalence of gastrointestinal parasitic infestation in crossbred cattle**

 **CHAPTER-V**

 **DISCUSSION**

 The overall prevalence of gastrointestinal parasitic infestations in crossbred cattle of this study showed somewhat similarity with the report of *Khan et al.* (2010), Saravana *et.* (2009) and Rahman and Razzak (1973) who recorded 30.0% in India and 37% in Cumilla district, Bangladesh. Higher prevalence of *Faciola* spp might be due to geo-climatic condition Kakar *et al*.,(2008) or poor same size Bachal.(2002).

Alim *et al.* (2011) recorded 14.81% and 12.96% of Paramphistomiasis in Holstein Friesian crossbred and indigenous cattle, respectively which was slightly higher with the findings of this study. There was found contradictory result with sardar et al.(2006) and Raza et al.(2009) in case of pramphistomum spp. Infestation that was higher in other country than Bangladesh, might be due to geo-climatic condition. Prevalence of *Toxocara* spp infestation in cattle was found partially similar with the report of Iqbal *et al.* (2007) and Alim *et al.* (2011), who reported 8.48% infection in Pakistan, 5.1% in Turkey and 6.6% and 5.55% in different areas of Bangladesh, respectively.

Prevalence of *Trichuris* spp infection of this study was consistent with the findings of Saravanana *et al.* (2009) and Lima (1998) who recorded 1.9% in Namakkal, India and less than 1% in Minas Gerais State, Brazil, respectively. Higher prevalence of *Trichuris* spp infection was recorded by Shirale *et al.* (2008), Jiméneza *et al.* (2007) and Sardar *et* *al*. (2006) in different corners of the world. Variation in the occurrence of *Trichuris* sppinfection in this study might be due to geo-climatic conditions of the study areas as well as husbandry practices.

Prevalence of *Strongyloides* spp infection strongly similar to Alim *et al.* (2011), Sardar *et al.* (2006) who recorded 1.38% in Chittagong division, 1% infection in Mymensingh and 1.6% in Tangail, Bangladesh, respectively. Occurrence of *Strongyloides* spp of this study showed higher variation from the reports of Shirale *et al.* (2008) who recorded 11.14% in Akola district, India and 11.98% in Nagpur India, 5.6% in Hokkaido, Japan, 7.4% in Savar and 8.89% in Comilla district, Bangladesh, respectively.

**5.2 Age specific prevalence of gastrointestinal parasitic infestations**

 In current study, influences of age on the occurrence of gastrointestinal parasitic diseases were observed. The frequency of GI parasitic infections especially, *Fasciola* spp, Trichuris spp and Moniezia spp were found more in adult cattle than young and calf. Higher prevalence of gastrointestinal parasitic infestations in adult cattle of this study showed consistency with the observation of Sardar *et al.* (2006), who reported that *Fasciola, Paramphistomum, Trichuris* and *Schistosoma* were highest in the age groupgreater than 36 months and lowest in age group less than 12 months. Prevelence of *Paramphistomum* spp were found more in young cattle which was similar with theobservation of Reza *et al.* (2007) Regassa *et al*. (2006) who recorded significantly higher prevalence of helminths in younger animals than adult. In this study, higher prevalence of parasitic infestation in adult cattle might be due to keeping them for a longer period of time in breeding and milk production purposes or supply inadequate feed against their high demand. The Occurrence of *Toxocara* spp infection was highest in young which was supported by the reports of Lay *et al.* (2008), Sarder *et al.* (2006), Aydin *et al.* (2006) and Bachal *et al.* (2002), who recorded the infection in early months of life. Higher prevalence might be due to prenatal infection through transfer of 3rd larval stage and post-natal infection by poor hygienic condition.Lay etal,(2008)Urquhaetal*etal.(*2008),Urquhart*etal.,(*1996)andSoulsby,(1982).

**5.3 Sex-specific prevalence of gastrointestinal parasitic infestations**

 In the present study, infestation caused by *Fasciola* spp, *Trichuris* spp *Strongyloides* spp, were found predominant in female than male cattle. Findings of this study was found in accordance with the reports of Davila *et al*. (2010), Raza *et al.* ( 2010) and Al-Shaibani *et* *al.* (2008) who also reported higher prevalence of helminths in female cattle. On otherhand, *Toxocara* spp infestation e was more in male than female cattle which was found in accordance with the reports of *F.& Gilleard,J.S* (2008). In this study, variation in occurrence of such helminths in male and female animals might be due to the variation in sample size Bachal *et al.,* (2002), lowered resistance of female animals or on the part of their reproductive events or temporary loss of acquired immunity near parturition Garcia *et al.,* (2007), stress, genetic resistance of host and insufficient/imbalanced feed against higher needs Raza *et al.,(* 2010).

 **Chapter-** **VI**

 **CONCLUSION**

The explored data of this survey will furnish an overall idea about the distribution of gastrointestinal parasitic infestations along with the study areas. Yet, this survey will construct the approach to take further widespread study related to these infections which will help to take obligatory preventive and control measures against parasitism. The study revealed comparatively higher prevalence of *Fasciola spp*, *Paramphistomum* spp and *Toxocara* spp in cattle in relation to age and sex.The occurrence of gastrointestinal parasitic infestations was observed higher in adult and female cattle. It is predicted that Gastrointestinal parasitism were more might be due to hot and humid climate which was ideally suitable for the development of such parasites.However, poor management, insufficient diet, lack of awareness about deworming also enhances the high incidence of the infection.

**CHAPTER-VII**

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