**Chapter-I**

**INTRODUCTION TO ANTHELMINTICS**

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; Khan *et al*., 1989). 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; Raza *et al.*, 2010).

Anthelmintics are drugs that are used to treat infections with parasitic worms. This includes flat worms, e.g., flukes and tapeworms; round worms, i.e., nematodes and ectoparasite. Anthelmintics Tare of huge importance for veterinary medicine. Fenbendazole , Diminazine Aceturate , Imidocarb Dipropionate, Ivermectin, Levamisole, Piperazine citrate, Praziquantal, Pyrental, Niclosamide, Nitroxinil, Triclabendazol are commonly used to treatment of parasitic infestation.

Ivermectins are the active components of some insecticidal and Ectoparacidal products used in agriculture and the most used agents in veterinary medicine for several years in prevention of parasitic diseases (Boxall et al., 2003). Broad spectrum anthelmintics are effective against parasitic flat worms and nematodes. However, the majority of drugs are more limited in their action, e.g., praziquantel, a drug used in the treatment ofCestodiasis (tape worm). Nitroxinil is effective against flukes. Diminazine Aceturate and Imidocarb Dipropionate are used for babesiosis. In Gastrointestinal nematodiasis Benzimidazoles Levamisole, Piperazine citrate, Praziquantal, Pyrental, Niclosamide are very effective drug.

**Chapter-II**

**REVIEW OF THE LITERATURE**

**Trematodal infection :**

**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 (Amin and Samad, 1988; Hamond and Sewell, 1990; 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; Fabiyi, 1986; 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; Chowdhury, 1993; Haq and Shaikh, 1968; Keyyu *et al.,* 2005; Mazid, 2006; Rahman and Mondal 1983; 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 *F. gigantica* than male (Chowdhury, 1993; Hossain *et al*., 2011; Mazid, 2006; Selim *et al.*, 1997).

Nitroxynil is an anthelmintic used in the treatment of liver fluke. Fascioliasis in cattle, goat and sheep treated with nitroxynil at 10 mg/kg given subcutaneously ([Stammers](http://lib.bioinfo.pl/auth:Stammers,BM), 1976; Whelan *et al*., 2011).

**Paramphistomiasis:**

Paramphistomiasis is the commonest chronic parasitic diseases affecting grazing cattle and buffaloes. Considerable economic losses incurred in terms of ill health and reduced growth, loss of weight and milk production (Bharti, 2000; Biondani and Steffan, 1988; Rangel-Ruis *et al.,* 2003).

The infection rate of *Paramphistomum* was highest in the age group of > 36 months. The increase in prevalence of these parasites with the age ( Haq and Shaikh, 1968; Rahman and Mondol , 1983; Sardar *et al*., 2006; Tariq et al., 2008 ).

Males were more susceptible to *Paramphistomum*  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 (Gualy *et al*., 2006; Raza *et al*., 2007; Roberts *et al*., 2001; Tariq et al., 2008).

Treatment of Paramphistomiasis with Trichlobendazole and levamisole combination was effective. Therapeutic effect of the combination of trichlobendazole and levamisole combination was 96.9% for Trematodal infection, 87.1% and 99.9% for gastrointestinal nematode. Trichlobendazole and levamisole combination was effective in endoparasite infection. As recommended dose of 7.5 mg per kg bwt. It is a safe drugs in pregnant goat (Aceves *et al.,* 1970; Harold, 1986; Kaya *et al.,* 2000; Prasad *et al*., 2004; [Yüksek](http://www.cabdirect.org:80/search.html?q=au%3A%22Y%C3%BCksek%2C+N.%22) *et al*., 2007).

**Gastrointestinal nematodiasis:**

**Ascariasis:**

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. Prevalence of ascariasis was related to overcrowding, large population size and use of same pasture year after year, feeding on floor, irregular deworming (Clayton and Duncan, 1978; Clayton, 1986; Thienpont and Keyser, 1981).

The usual mode of infestation by Ascariasis is the ingestion of egg containing larvae but in case of *Neoascaris vitulorum* infestation occurs through ingestion of colostrums and milk. Transplacental transmission was also recorded in calves. 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 (Mia *et al,* 1975; Roberts *et al.,* 1992; Rahman and Mondol , 1983; Tasawar *et al*., 2007; Overend *et al*., 1984).

Sex wise prevalence of gastrointestinal parasites indicated that male calves were more affected than female calves (Bilal *et al.,* 2009;[Ferdushyf and Hasan,](http://gscience.gurpukur.com/product_info.php?cPath=7_8_118&products_id=590) 2008; Gupta , 1986; Tariq *et al*., 2008).

Piperazine is especially useful in the treatment of partial intestinal obstruction caused by *Ascaris* worms. Piperazine is indicated as alternative treatment for ascariasis caused by *Ascaris lumbricoides* (roundworm) and enterobiasis (oxyuriasis) caused by *Enterobius vermicularis* (pinworm) ( Conners, 1995; Hafeez and Venkataratnam, 1989; [Martin *et al.,* 1985](http://www.wormbook.org/chapters/www_anthelminticdrugs/anthelminticdrugs.html#bib54) ).

**Strongyloidiasis:**

Intestinal threadworm Strongyloides stercoralis is a parasite of dog, cat and primates that occurs worldwide being most prevalent in tropical and subtropical countries. The adult parasitic worm is about 2 mm long and slender. It possesses both parasitic and free-living lifecycles. The parasitic worms are females. Strongyloides stercoralis infects the host via percutaneous, peroral or transmammary transmission in addition to autoinfection. Clinical disease varies from inapparent to severe enteritis and pneumonia. Young animals with heavy burdens may show acute diarrhoea, weakness, emaciation; even sudden death may occur (**Dillard *et al.,* 2007;** Taylor *et al.,* 2007).

Prevalence increased with age. The younger ruminants were more infected than adult animal but there was no difference between male and female. In some study Female ruminants were also more infected than male (Biu *et al*., 2009; [Lindo](http://www.ncbi.nlm.nih.gov/pubmed?term=Lindo%20JF%5BAuthor%5D&cauthor=true&cauthor_uid=7845718), 1995; Ikeh *et al.,* 2006; Regassa *et al.,* 2004).

Fenbendazole is usually the drug of choice in treatment of *S. stercoralis* infection which has specific recommendations for treating roundworms. It is administered by addition to feed (Dillard *et al*., 2007 and Nolan, 2007).

**Hookworm Infection:**

Hookworms are parasitic helminths belonging to the order of strongylida (family Ancylostomatidae), and are typically harboured in the small intestine, where they attach to the mucosa and feed on blood *A. caninun* is a voracious bloodsucker and anemia accompanied by iron depletion is the principal consequence of its infestation (Bowman, 1999; Hotez and Pritchard, 1995)

*Ancylostominae* is common to observe intestinal parasites in canines of all ages, but the prevalence of infection is usually high in puppies, mainly due to the newly whelped or neonates and also because young dogs have not yet acquired immunity to parasites (Bowman, 1999 and Ramirez-barrios *et al.,* 2004).

Benzimidazoles is effective against Hookworm infection. Benzimidazoles were introduced to the market in 1961 beginning with thiabendazole followed by albendazole and fenbendazole, Trichlobendazole (Aceves *et al.,* 1970). Combination of Trichlobendazole and levamisole is also effective in Hookworm infection ( Kaya *et al.,* 2000; Prasad et al., 2004; [Yüksek](http://www.cabdirect.org:80/search.html?q=au%3A%22Y%C3%BCksek%2C+N.%22) *et al.,* 2007). Pyrantel also had an 89 to 96% efficacy against Hookworms ( Kaplan *et al*., 2002; Lyons *et al.,* 1974).

**Ascaridiasis:**

The Ascaridia species, such as *A. galli*, are the largest internal parasitic nematodes or roundworms causing [helminthiasis](http://www.organic-vet.reading.ac.uk/Poultryweb/disease/helm/helm1.htm) in poultry. They infest the small intestine and can cause ill-thrift and intestinal compaction (enteritis). Droopiness, emaciation and diarrhoea are the common clinical symptoms. Heavy infestations can cause death within 12 days of infection (Jacobs *et al.,* 2003; Yamaguti, 1961).

Although age does not seem to play a major role in resistance to *A. galli* infections in layers, older chickens, of more than 3 months, tend to show a degree of resistance to the *A. galli*. This is due to the development of goblet cells in the duodenum of birds over 3 months. A bird's hormonal and immune status, related to laying activity, seems to have a significant negative impact on resistance ([Gauly *et al*., 2005](http://www.organicvet.co.uk/Poultryweb/disease/asca/ref.htm#Gauly05); [Idi *et al*., 2004](http://www.organicvet.co.uk/Poultryweb/disease/asca/ref.htm#Idi_)). It may be the case that free range chickens are at higher risk of being subjected to outbreaks of fowl cholera (*P. multocida*) when they are infected with *A. galli* ([Dahl *et al*., 2002](http://www.organicvet.co.uk/Poultryweb/disease/asca/ref.htm#Dahl_)).

Ascaridia has traditionally been treated with piperazine powder. Piperazine may be administered to chickens in the feed (0.2-0.4%) or water (0.1-0.2%), or as a single treatment (50–100 mg/bird). However, piperazine is quite in effective for young. However, the recovery in piperazine treatment is much higher compare with other treatment (Conners, G.P., 1995; Hafeez and Venkataratnam, 1989; [Yazwinski *et al.,* 2003](http://www.organicvet.co.uk/Poultryweb/disease/asca/ref.htm#Yazwinski)).

**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 (Boray *et al.,* 1986; 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).

Praziquantel is an anthelmintic for treatment of tapeworm infestation in animals. Niclosamide, morantel, pyrantel and the newer benzimidazoles (albendazole, fenbendazole, and oxfendazole) are effective against tapeworms in cattle and sheep (Andrews et al. 1983; Molento, 2005). Nitazoxanide also has been reported to be effective, safe, inexpensive, and well-tolerated drug for the treatment of tapeworm infection ([Lateef](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Lateef%20M%22%5BAuthor%5D) *et al*., 2008; [Varma](http://www.cabdirect.org:80/search.html?q=au%3A%22Varma%2C+T.+K.%22) *et al*., 1990) Niclosamide is also used as a molluscicide.( Richard *et al*., 1985).

**Babesiosis:**

Babesiosis, caused by *Babesia bigemina,* continues to be one of the important tick-borne diseases of cattle in a tropical country like India, and the disease impact varies from region to region with a state of enzootic stability of the tick-borne infection. There is a need for improved capability to diagnose carrier animals (Ristic, 1988; Taboada, 1998).

In case of Babesiosis Adult are more infected than young mainly more than 24 month age group. António, 2011; Terefe, 2012). The clinical manifestations of an acute presentation of the disease include fever, anorexia, dullness, weakness, ataxia, haemoglobinuria, icterus, anaemia and presence of intra-erythrocytic parasites (Bose *et al.,* 1995; Birkenheuer et al.1999; Taboada, 1998).

Many drugs have been applied in management of canine babesiosis, including babesiacidal agents (imidocarb diproprionate, diminazene aceturate). Two injections of Imidocarb diproprionate at 5.0 to 6.6 mg/kg given subcutaneously or intramuscularly at an interval of 2 to 3 weeks are reputed to be effective (Perkins, 2000). Another possible treatment is a single intramuscular injection of Dimenazene aceturate at a dosage of 5 mg/kg (Birkenheuer et al., 1999; Mallick *et al.,* 1987; [Schwint](http://aac.asm.org/search?author1=O.+Nicolas+Schwint&sortspec=date&submit=Submit) *et al.,* 2009; Taboada, 1998). The babesiacide diminazene diaceturate is mainly used in horses, donkeys and cows (Rashid, 2008; Vial and Gorenflot, 2006).

**Ectoparasitic Infestation:**

**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. Tickborne 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; Madsen et al., 1990).

The percentage of infestation of ticks on adult cattle was higher than in the young cattle. Female cattle were more susceptible to tick infestations than males (Mekuria and Gezahegn, 2010; Yakhchali and Hasanzadehzarza, 2004).

Ivermectins are the active components of some insecticidal and Ectoparacidal products used in agriculture and the most used agents in veterinary medicine for several years in prevention of parasitic diseases (Boxall *et al.,* 2003; McCracken, 1993; McKellar, 1997; Floate et al., 2005).

**Mite Infestation:**

**Sarcoptic 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; Newman, 2002).

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; Newman et al., 2002).

Animal with sarcoptic mange received one treatment with ivermectin. This was followed by the marked regression Ivermectin is a major advance in the treatment and control of mange (Boxall *et al.,* 2003; Floate *et al.,* 2005; Yazwinski et al., 1981).

**Demodicosis:**

*Demodex canisis* is the common follicle mites of dog and caused demodectic mange. Infestation was common in both pet dogs as well as Laboratory dogs. Symptoms include alopecia, dry scaly dermatitis. In advance cases chronic moist dermatitis were observed. The mite occurs throughout the world in all breeds of dogs (Chao-Kai, 2009; Yunker, 1973).

There was no relationship between Demodex and the sex of the subject between males and females (Kemal et al., 2005) but another report shown a higher detection rate of Demodex in male patients (Türk et al., 2007), whereas another report a shown higher detection rate in female patients (Forton *et al.,* 2005).

Like the localized cases, shave affected areas and wash skin with a benzoyl peroxide shampoo to help "flush" out the hair follicles and keep secondary bacterial infections under control. Ivermectin is considered the best treatment option by many vets. This drug is used off-label for *Demodex* mites and not to be used in Collies or Collie-crosses (Floate *et al.,* 2005; Yazwinski *et al.,* 1981).

**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 pathogenicity results from inflammation and toxins secreted by the larvae, leading to chronic inflammatory reaction. The treatment involves uses of antilarval measures, followed by the removal of larvae and treatment with ivermectin. A broad-spectrum antibiotic cover is recommended to prevent secondary infections (Beristain *et al.,* 2001; Mahfooz , 2008).

**Chapter-III**

**MATERIALS AND METHODS**

3.1. Study placement and period:

The study was performed in Veterinary Clinics of Madras Veterinary College and Namakkal Veterinary College, India and Shajahanpur Upzilla Veterinary Hospital, Bogra and SAQ Teaching Veterinary Hospital of Chittagong Veterinary and Animal Sciences University, Bangladesh. These placements were chosen to study clinical cases affected by endo and ecto-parasites with the treatment details. The study was conducted from September 2011 and January 2012.

3.2. Number of clinical cases studied

A total of 50 parasitic cases of different species were studied during the study period of which 21 cases were recorded from India placements and 29 cases were from placements of Bangladesh.

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, blood smear and combined parting of hair. The common clinical signs, microscopic examination, clinical pathology 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).

**Clinical signs:**

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

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

**Demodecosis:** Patches of alopecia, pustular lesion, anorexia, roughened coat.

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

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

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

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

**Strongyloidiasis:** Watery diarrhoea, anemia, progressive loss of body weight.

**Ascardiasis:** Watery diarrhoea, anemia, progressive loss of body weight.

**Hook Worm Infection:** severe anemia, emaciation, unthriftiness

**Tape Worm Infection:** Unthriftiness, poor coat, anemia, digestive disturbance

**Babesiosis:** High fever, hemoglobinuria, anorexia**.**

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. Blood smear:

Several thick and thin blood smears collected from superficial skin capillaries (e.g. tip of the ear or tip of the tail) of live animals during the acute phase of the disease (appearance of fever).

a) Thin blood smears:

A very small drop of blood was placed near the end of a slide. The end of another slide (the "spreader") was placed on the sample slide so that the edge of the spreader was just ahead of the drop of blood. Holding the spreader at an angle of about 45 degrees (relative to the sample slide),

it was drawn until its edge just touches the drop of blood. The blood was then run along the entire edge of the spreader slide. It was air-dried, fixed in absolute methanol for 1 minute and stained in 10% Giemsa stain for 20–30 minutes and examined under a microscope.

**b) Thick blood smear:**

Thick films were made by placing a small drop (approximately 50 μl) of blood on to a clean glass slide. The droplet was air-dried, heat-fixed at 80°C for 5 minutes, and stained (without fixing in methanol) in 10% Giemsa for 15 minutes and examined under a microscope.

**3.3.5. 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.

**3.3.6. Clinical pathology:**

**Packed Cell Volume**:

Blood samples (5 ml) were collected from jugular vein of animal via disposable syringe into tube containing EDTA and brought to laboratory for analysis. The PCV was determined using a microhaematocrit centrifugation method according to the techniques described by Coles (1986).

**3.4. Recording of data of different parasitic infestation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Diseases | No. of Frequency | Common Clinical Sign | Diagnosis | Anthelmintics |
| Sarcoptic Mange Infestation | 4 | Alopecia, scal, erythema | Skin Scraping | Ivermectin |
| Tick Infestion | 9 | Itching, anorexia, unthiriftiness. | Detection of tick by hair partening test | Ivermectin |
| Demodecosis | 3 | Patches of alopecia, pustular lesion, anorexia | Skin scraping | Ivermectin |
| Maggot Infestations | 5 | Wound filled with larvae, odorous exudates comes out from the wound | Detection of larvae within the wound | Ivermectin |
| Fascioliasis | 11 | Diarrhoea, dehydration, emaciation | Coproscopy | Nitroxinil |
| Paramphistomiasis | 2 | Diarrhoea, dehydration, loss of body weight | Do | Triclabendazole+Levamisole |
| Ascariasis | 4 | Diarrhoea, dehydration, progressive loss of body weight | Do | Praziquantal+Pyrental (India)  and  Piperazine citrate (Bangladesh) |
| Strongyloidiasis | 1 | Watery diarrhoea, anaemia, progressive loss of body weight | Do | Fenbendazole |
| Ascardiasis | 2 | Watery diarrhoea, anaemia, progressive loss of body weight | Do | Piperazine citrate |
| Hook Worm Infection | 3 | Sever anaemia, emaciation, unthriftiness | Do | Praziquantal+Pyrental+ Fenbendazole(india) ,  Triclabendazole+Levamisole(Bangladesh) |
| Tape worm infection | 2 | Unthriftiness, poor coat, anaemia, digestive disturbance | Do | Praziquantal+Pyrental (India),  Niclosamide (Bangladesh) |
| Babesiosis | 4 | High fever, hemoglobinuria, anorexia | Blood Smear | Diminazine Aceturate (India) and  Imidocarb Dipropionate  (Bangladesh) |

**3.5. Statistical analysis**

The breed, age, sex , clinical findings and prescribed anthelmintics 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**

4.1. Types of clinical cases according to different factors and placements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Factors | Category | Diagnosis | N(%), 95% CI | Placement |
| Species | Cattle | Fascioliasis, Tape Worm Infection, Babesiosis | 3(14.2%; 2.0-30.6) | India |
| Goat | Strongyloidiasis | 1(4.7%; 5.1-4.6) |
| Dog | Sarcoptic Mange Infestation, Tick Infestion, Demodecosis, Maggot Infestations, Ascariasis, Hook Worm Infection | 15(71.4%; 50.3-92.4) |
| Cat | Sarcoptic Mange Infestation | 1(4.76%; 5.1-14.6) |
|  | Rabbit | Demodecosis | 1(4.76%; 5.1-14.6) |
| Age | Under 12 months | Sarcoptic Mange Infestation, Demodecosis, Ascariasis | 8(38.0%; 15.4-60.7) |
| Between 12 to 24 months | Tick Infestion, Hook Worm Infection, Strongyloidiasis | 6(28.5%; 7.5-49.6) |
|  | Over 24 months | Maggot Infestations, Fascioliasis, Tape Worm Infection, Babesiosis | 7(33.3%; 11.3-55.3) |
| Sex | Male | Sarcoptic Mange Infestation, Tick Infestion, Demodecosis, Maggot Infestations, Ascariasis, Hook Worm Infection, Babesiosis | 12(57.1%; 34.0-80.2) |  |
| Female | Sarcoptic Mange Infestation, Tick Infestion, Ascariasis, Hook Worm Infection, Babesiosis, Fascioliasis, Tape Worm Infection, Strongyloidiasis | 9(42.8%; 19.7-65.9) |
| Species | Cattle | Tick Infestion, Ascariasis, Babesiosis, Fascioliasis, Tape Worm Infection | 14(48.2%; 28.9-67.6) | Bangladesh |
| Goat | Tick Infestion, Maggot Infestations, Fascioliasis, Paramphistomiasis. | 9(31.0%; 13.1-48.9) |
| Dog | Tick Infestion, Maggot Infestations, Hook Worm Infection | 3(10.3%; 1.4-22.1) |
|  | Rabbit | Sarcoptic Mange Infestation | 1(3.4%; 3.6-10.5) |  |
|  | Hen | Ascardiasis | 2(6.8%; 2.9-16.7) |
| Age | Under 12 months | Sarcoptic Mange Infestation, Tick Infestion, Maggot Infestations, Ascariasis, Ascardiasis, Tape Worm Infection. | 9(31.0%; 13.1-48.9) |
| Between 12 to 24 months | Tick Infestion, Maggot Infestations, Fascioliasis, Paramphistomiasis, Hook Worm Infection. | 10(34.4%; 16.0-52.8) |
| Over 24 months | Tick Infestion, Fascioliasis, Paramphistomiasis, Babesiosis. | 10(34.4% ;16.0-52.8) |
| Sex | Male | Tick Infestion, Sarcoptic Mange Infestation, Maggot Infestations, Paramphistomiasis, Ascariasis. | 9(31.0%; 13.1-48.9) |
| Female | Ascardiasis, Maggot Infestation, Fascioliasis, Tick Infestion, Babesiosis, Tape Worm Infection, Hook Worm Infection . | 20(68.9%; 51.0-86.8) |

4.2. Anthelmentics prescribed against different types of clinical cases between placements (India versus Bangladesh)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | India | | |  | |  | Bangladesh |  | |  |
| Group | | | | Types of anthelmintics | | | Trade names | generic names | Doses (mg/kg body weight | Types of anthelmintics | Trade names | generic names | Doses |
| Trematodal infection (Facioliasis, Paramphistomiasis) | | Facioliasis | | Subustituted Phenols | | | Nitroxynil | Nitroxynil 25% | 10.0 | Subustituted Phenols | Nitroxynil | Nitronil, Nitronex | 10.0 |
| Paramphistomiasis | |  | | |  |  |  | Benzimidazole + Imidazothiazides | Triclabendazole+Levamisole | Lezol-4 | 225+50 |
| Tape Worm Infection (Moniezia expansa) | | | | Pyrozinoisoquinololines+Tetrahydropyrimidines+ Benzimidazole | | | Praziquantal+Pyrental+ Fenbendazole | Prazital Plus | 30.o | Salicylamide | Niclosamide | Niclosam | 10-15 |
| Gastrointestinal nematodiasis (Ascariasis, Strongyloidiasis, Ascardiasis, Hook Worm Infection) | Ascariasis | | | Pyrozinoiso  quinololines  +Tetrahydr  opyrimidin  es | | | Praziquantal+Pyrental | Prazivet | 7.5 | Piperazine derivatives | Piperazine citrate | Therazine | 32.0 |
| Strongyloidis | | | Benzimidazole | | | Fenbendazole | Prasi Plus | 5.0 | \_ | \_ | \_ | \_ |
| Ascardiasis | | | \_ | | | \_ | \_ | \_ | Piperazine derivatives | Piperazine citrate | Pipervet | 32.0 |
| Hook Worm | |  | | Madras | Tetrahydropyrimidines | Pyrental Sodium | Pyrate | 7.5 | Benzimidazole + Imidazothiazides | Triclabendazole+Levamisole | LT-Vet | 900+600 |
| Infection | |  | |
|  | | Namakkal | Imidazothiazides | Levamisole | Vermisol | 5 |
| Ectoparasitic infestation (Sarcoptic Mange Infestation, Tick infestation, Demodecosis, Maggot infestation, | | | | Macrocylic Lactone Acaricides | | | Ivermectin | Cipermectin, Trumectin, Neomec,  Imectin | 0.2 | Avermectins | Ivermectin | Ivertin | 0.2 |
| Babesiosis | | | |  | | | Diminazine Aceturate | Nilbery | 5.0 |  | Imidocarb Dipropionate | Babenil | 5.0-6.6 |

4.3Common anthelmintics used in India and Bangladesh

|  |  |  |
| --- | --- | --- |
| Sl. No. | Anthelmintics | N(%),95% CI |
| 1 | Ivermectin | 21(42.0%; 27.8-56.1) |
| 2 | Praziquantal+ Pyrental+ Fenbendazole | 3(6.0%; 0.8-12.8) |
| 3 | Praziquantal+ Pyrental | 1(2.0%; 2.0-6.0) |
| 4 | Fenbendazole | 1(2.0%; 2.0-6.0) |
| 5 | Diminazine Aceturate | 2(4.0%; 1.6-9.6) |
| 6 | Niclosamide | 1(2.0%; 2.0-6.0) |
| 7 | Piperazine citrate | 5(10.0%; 1.3-18.6) |
| 8 | Nitroxinil | 11(22.0%; 10.1-33.8) |
| 9 | Triclabendazole+Levamisole | 3(6.0%; 0.8-12.8) |
| 10 | Imidocarb Dipropionate | 2(4.0%; 1.6-9.6) |

Ivermectin (42.0%; 27.8-56.1) are commonly used in ectoparasitic infestion both Bangladesh and india. Praziquantal and Pyrental (6.0%; 0.8-12.8) was used only India for the treatment of ascariasis, hook worm and tape worm infection. Nitroxinil (22.0%; 10.1-33.8) is commonly used in Facioliasis both Bangladesh and india. Imidocarb Dipropionate (4.0%; 1.6-9.6) is used in Bangladesh and Diminazine Aceturate in India (4.0%; 1.6-9.6) for babesiosis. Piperazine citrate (10.0%; 1.3-18.6) is used for treatment of Ascariasis and Ascardiasis in Bangladesh. Niclosamide (2.0%; 2.0-6.0)Used in Bangladesh in case of Tape Worm Infection.Combination of Triclabendazole and Levamisole (6.0%; 0.8-12.8) are used in Bangladesh for treatment of Hook Worm infection and Paramphistomiasis

Chapter-V

**DISCUSSION**

The results of this study showed that the animal of both country are commonly infested with a variety of Ectoparasitic infestation (Sarcoptic mange infestation, Tick infestation, Demodecosis, Maggot infestation), Trematodal infection (Facioliasis, Paramphistomiasis), Gastrointestinal nematodiasis (Ascariasis, Strongyloidiasis, Ascardiasis, Hook Worm Infection), Tape Worm Infection (*Moniezia expansa*) and Babesiosis respectively.

Facioliasis and Paramphistomiasis is more frequent in Bangladesh than India. The higher rate of infection with *F. gigantica* was observed in older animals in Bangladesh. The result is in agreement with Keyyu (2005). Similarly Mazid (2006) and Tasawar *et al*. (2007) found that younger animals were less susceptible. The significant difference in the rate of infection between male and female animals as observed, apparently indicated that the female were more susceptible to *F. gigantica* than male.This inline with Hossain (2011). Similarly Mazid (2006) and Selim (1997) found the same result.

The infection rate of *Paramphistomum* was highest in the age group of > 24 months. The result is similar to Tariq (2008) . Blood and Radostits (1989) has shown that young animals are the usual subjects, especially those that are newly pastured.

The male were more susceptible to *Paramphistomum*  than female. This is similar to other study (Gualy *et al*.,2006; Raza *et al*., 2007 ; Roberts *et al*., 2001).

Younger animals were more susceptible to nematode parasites compared to older age animals which is in agreement with Mia (1975). Similerly Roberts (1992) and Sarda (2006) found that younger animals were more susceptible.

Sex wise observations revealed that the prevalence of gastrointestinal parasites was more common in males (P<0.05) than females. The results of the present study is supported by Raza (2007) who found females were more resistant to infection than males after puberty, although there were no differences before puberty. other Other researchers (Bilal et al., **2009;** Gupta ,1986; Tariq, 2008) also found same result.

All age groups are susceptible inTapeworm infestation which is similar to Radostits (1994). Mazid (2006) reported that the higher rate of infection with *M. expansa* and *M. benedeni* was observed in young animals.

In case of Babesiosis Adult are more infected than young mainly >24 month age group.This result is in agreement with António (2011). Similerly Terefe (2012) was found that adult animals were more susceptible.

The percentage of infestation of ticks on adult cattle was higher than in the young cattle.Tick Infestation was highest in the age group of > 24 months. Female cattle were more susceptible to tick infestations than males.This is in line with *Mekuria and Gezahegn* (*2010).*Yakhchali and Hasanzadehzarza (2004) also shown the same result.

sarcoptic mange was very high in the young animals. Mainly <12 months age group are susceptible. Bornstein (2001) also shown that young animals are more susceptible. Sex had no influence on the occurrence and severity of the disease. This result is in agreement with Newman ( 2002).

Anthelmintics are drugs that are used to treat infections with parasitic worms. The results of this study showed that the parasitic infestation were treated with Fenbendazole , Diminazine Aceturate , Imidocarb Dipropionate, Ivermectin, Levamisole, Piperazine citrate, Praziquantal, Pyrental, Niclosamide, Nitroxinil, Triclabendazol in Bangladesh and India.

Nitroxynil is an anthelmintic used in the treatment of liver fluke both India and Bangladesh. Facino (1984) also found Nitroxynil was more effective against liver fluke. Similar trends was observed by Whelanet (2011). Trichlobendazole and levamisole combination was effective in endoparasite infection. The results of the present study is similar to the studies reported by Kaya (2000) and Prasad (2004). Piperazine is especially useful in the treatment of Ascariasis and Ascaridiasis. This is in line with Conners (1995). Fenbendazole is effective against Strongyloidiasis. The results of the present study is similar to the studies reported by Dillard (2007) and Nolan (2007). Benzimidazoles and Pyrantel are effective against Hookworm infection. This result is in agreement with Kaplan (2002). Praziquantel and Niclosamide are effective against tapeworms in animal. Othes study was reported the same (Andrews et al. 1983; Molento, 2005). Ivermectins are the active anthelmemtics against all ectoparasite. The present study is showed that ivermectin is effective in tick, mite, fly etc. The results of the present study is similar to Boxall (2003). Imidocarb diproprionate and Diminazene aceturate are effective drug against babesiosis. Rashid ( 2008) and Vial and Gorenflot (2006) also found the same.

**Chapter-VI**

**CONCLUSION**

Parasite control in animal is an economically significant management decision. Losses and diseases due to parasites are often an invisible drain on livestock operation profits. Anthelmintics drugs used to treat infections with parasitic worms. Anthelmintics should be administered considering species, age, sex of animal. Different parasite show susceptibility at defferent lavel of age and Susceptibility also differ from male to female. It is important to maximize the effect of a single treatment. Without proper dosing is a leading cause of anthelmintic resistance.

**Chapter-VII**

**REFERENCES**

Aceves, J., D. Erlij, and R. Martinez-Maranon. 1970. The mechanism of the paralysing action of tetramisole on Ascaris somatic muscle. *British Journal of Pharmacology*. **38**: 602-607.

Amin, M.R. and Samed. 1988. Clinico-therapeutic study on bovine *Fascioliasis* Bangladesh *Vet. j*. **5**:20-22.

Andrews, P., H.,Thomas, R. Pohlke, and J. Seubert. 1983. Praziquantel. *Medicinal Research Reviews*. **3**:147–200.

### António, A.M.T., Fábio J.M. Silva, Jenevaldo B. Silva, Tiago M. Santos. 2011. Risk factors associated with the frequency of antibodies against *Babesia bovis* and *Babesia bigemina* in cattle in southern Mozambique. *Pesq. Vet. Bras*. 31 (8): 425-445.

Assanji, F.M. 1988. Helminth infection in livestock. *J Helminthol*. **62**: 243-249.

Beristain, X., M. Alkorta and L. Egnasa. 2001. Nasopharyngeal myiasis by third stage larvae of *Oestrus ovis*. *Enferm Infecc Microbiol Clin*. **19**: 86-97.

Bharti, P. ,2000. Prevalence, therapeutic control and pathophysiology of common helminths infecting stallfed and grazing cattle and buffaloes in and around Ranchi, Bihar M.V.Sc. Thesis, BirsaAgricultural University. P- 103.

Bilal, M.Q., A. Hameed and T. Ahmad. 2009. Prevalence of gastrointestinal parasites in buffalo and cow calves. *The Journal of Animal and Plant Sciences* **19**(2): 67-70.

Biondani, C.A. and P.E. Steffan. 1988. Effects of gastrointestinal parasites on milk production in dairy herds. *Veterinaria Argentina*. **5** (42) : 116-127.

Birkenheuer, A.J., M.G. Levy, K.C. Savary 1999. Babesia gibsoniinfections in dogs from North Carolina. *J Am Anim Hosp Assoc*. **35**: 125-128.

Biu, A. A., A. Maimunatu, A. F. Salamatuand E. T. Agbadu. 2009. A faecal survey of gastrointestinal parasites of ruminants on the University of Maiduguri Research Farm. *Int. Biomed. and Hlth. Sci.* **5** (4): 232-253.

Bolognia, J.L., J.L. Jorizzo, R. Rapini. 2008.Cutaneous myiasis. In: Dermatology. 2nd ed. *Mosby Elsevier.* **1**: 130-155.

Bond, R. 1998. Diagnosis and treatment of canine scabies. *In Practice*, **20**: 308-315.

Boray, J.C., W.C. Eds, Cambell and Rew.1986. Trematode Infection of Domestic Animals In “Chemotherapy of Parasitic Diseases”. Plenum press, NY and London. pp: 401–425.

# Bornstein, S., T. Mörner, W.M. Samuel. 2001. Sarcoptes scabiei **and sarcoptic mange.** In Parasitic Diseases of Wild Mammals. **19**: 107

Bose, R., W.K. Jorgensen, R. J. Dalgliesh, K.T. Friedhoff .1995. Current state and future trends in the diagnosis of babesiosis.*Vet Parasitol***. 57**:61-74.

Bowman, D.D. (1999). Georgis Parasitology for veterinarian. Saunders. **10**: 414

Boxall, A.B., L.A. Fogg,P. Kay, P.A. Blackwel. 2003. 2003a. Prioritisation of veterinary medicines in the UK environment*. Pemberton, E.J., Croxford, A*. **14**: 207-218.

Cestari TF, Pessato S, Ramos-e-Silva M. 2007. Tungiasis and myiasis. Clin Dermatol. **25**(2):158-64.

Chao-Kai, H., Hsu, Mark Ming-Long; Lee, Julia Yu-Yun .2009. "Demodicosis: A clinicopathological study". *Journal of the American Academy of Dermatology.* **60** (3): 453–62.

Chowdhury, S.M.Z.H., Moin, M.F. and Debnath, N.C. 1993. Prevalence of helminths infestation in zebu cattle (*Bos indicus*) at Savar, Bangladesh. *Asian-Australasian Journal of Animal Science* **6**: 427-431.

Clayton, H. M. 1986. Ascarids: Recent advances. Vet. Clinics of N. Am. Equine Pract. **2**: 313-328.

Clayton, H. M., and J. L. Duncan. 1978. Clinical signs associated with *Parascaris equorum* infection in worm-free pony foals and yearlings. *Vet. Parasitol*. **4**: 69-78.

Conners GP. 1995.Piperazine neurotoxicity: worm wobble revisited. *J Emerg Med*. *13*(3): 341-3.

Dahl C, A. Permin, J.P. Christensen, M. Bisgaard. 2002. The effect of concurrent infections with Pasteurella multocida and Ascaridia galli on free range chickens. *Veterinary Microbiology*. **86** (4): 313-324.

Diaw DT, M Seye and Y Sarr. 1998. Epidemiology of trematodiases in livestock in the Kolda region, Casamance. *Rev Elev Med Pays Vet Trop*. **41**: 257- 264.

**Dillard**, K.J. and **Marjukka Anttila. 2007.** Strongyloides stercoralis infection in a Finnish kenne. Acta Veterinaria Scandinavica. **49**:37.

Dorchies, P. 1997. Comparative physiopathology of *Oestrus ovis* (Linne, 1761) myiasis in man and animals. *Bull Acad Natl Med*. **181**: 673-84.

Dorny, Wynagaarden, J. Vercruysse , and A. Jalila. 1994. Survey on the importance of mange in the etiology of skin lesions in goats in peninsular Malaysia. *Vet. Parasitol*. **26**(2): 121-123.

Fabiyi, J.P.1986. Production losses and control of helminthes in ruminants of tropical regions. *Parasitol*. **17**: 435-442.

[Ferdushyf, T. and M. T. Hasan.](http://gscience.gurpukur.com/product_info.php?cPath=7_8_118&products_id=590) 2008. Prevalence of ascariasis (Neoascaris vitulorum) in calves. *Vet. Parasitol*. **01**: 109-110.

Floate, K.D., K.G. Wardhaugh, A.B. Boxall, T.N. Sherratt. 2005. Fecal residues of veterinary parasiticides: nontarget effects in the pasture environment. *Annual Review of Entomology*. **50**: 153-179.

Forton, F., M.A. Germaux, T. Brasseur. *2005.* Demodicosis and rosacea: epidemiology and significance in daily dermatologic practice. *J Am Acad Dermatol.* **52**(1):74–87.

Gauly, M., T. Homann and G. Erhardt. 2005. Age-related differences of Ascaridia galli egg output and worm burden in chickens following a single dose Infection. *Veterinary Parasitology*. **128** (1-2): 141-148.

Geary, T.G. 2005. Ivermectin 20 years on: maturation of a wonder drug. *Trends Parasitol*. ***21***: 530–532.

[Ghosh](http://www.springerlink.com/content/?Author=Srikant+Ghosh), S., [Gyan Chand Bansal](http://www.springerlink.com/content/?Author=Gyan+Chand+Bansal), [Muhammad Qasim Khan](http://www.springerlink.com/content/?Author=Muhammad+Qasim+Khan), [Hamid Irshad](http://www.springerlink.com/content/?Author=Hamid+Irshad), [Md. Shahiduzzaman](http://www.springerlink.com/content/?Author=Md.+Shahiduzzaman) and  [S. Ahmed](http://www.springerlink.com/content/?Author=Jabbar+S.+Ahmed). 2007. [Status of tick distribution in Bangladesh, India and Pakistan](http://www.springerlink.com/content/11032g5w67734512/). [*Biomedical and Life Sciences*](http://www.springerlink.com/biomedical-and-life-sciences/)[*Parasitology Research*](http://www.springerlink.com/content/0932-0113/). [**101**(2](http://www.springerlink.com/content/0932-0113/101/s2/)): 207-216.

Gupta, S.G. 1986. Pattern and control of *N.vitulorum* infection in calves. *Indian*  *Veteterinary Journal*. **53**: 965-966.

**Hafeez, M., A. Venkataratnam.** 1989. Wopell - an effective anthelmintic against ascaridiasis in poultry. *Indian Journal of Indigenous Medicines*. 6: 9-12.

Hansen and Perry Brian. 1994. The Epidemiological diagnosis control of helminthes parasites of ruminants. *Trends Parasitol*. **32**: 45-54.

Haq, S. and H. Shaikh. 1968. A survey of helminth parasiting the gastro-intestinal tracts of goats and sheep in East Pakistan. *East Pakistan Journal Veterinary Science.* **2**: 54-62.

Hossain, M.M., S Paul, M.M. Rahman and F.M.A. Hossain . 2011. Prevalence and economic significance of caprine fascioliasis at Sylhet district of Bangladesh. *Pak Vet J*, **31**(2): 113-116.

### Hotez, P and Pritchard,D.I ., 1995. Hookworm infection. *Scientific American*. 272: 42-48.

Idi A, A. Permin , K.D. Murrell. 2004. Host age only partially affects resistance to primary and secondary infections with Ascaridia galli (Schrank, 1788) in chickens. *Veterinary Parasitology*. **122** (3): 221-231.

Ikeh, E.I., M. Obadofin, B. Brindeiro, C. Baugher, F. Frost, D. Vanderjagt, R. Glew. 2006. Intestinal Parasitism In Rural And Urban Areas Of North Central Nigeria: An Update. *The Internet Journal of Microbiology*. **2** (1): 178-189.

Kaplan, R. M. 2002. Anthelmintic resistance in nematodes of horses. *Vet. Res.* **33**: 491- 507.

Kaya, S. 2000. Levamizol. In Veteriner Uygulamal Farmakoloji. *Vet. Parasitol* . **71**: 451-453.

Kemal M, Z. Sümer, M.I. Toker 2005. The prevalence of Demodex folliculorum in blepharitis patients and the normal population. *Ophthalmic Epidemiol.;***12**(4): 287-290.

Keyyu , J.D.J, N.C. Monrad, Kyvsgaard and A.A. Kassuku. 2005. Epidemiology of Fasciola gigantica and Amphistomes in Cattle on Traditional, Small-scale Dairy and Large-scale Dairy Farms in the Southern Highlands of Tanzania. *Trop Anim Health Prod.* **37**:303-314.

[Lateef , M](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Lateef%20M%22%5BAuthor%5D).,  [S.A](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Zargar%20SA%22%5BAuthor%5D). Zargar, M. [Nazir](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Nazir%20M%22%5BAuthor%5D), A. [Shoukat](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Shoukat%20A%22%5BAuthor%5D). 2008. Successful treatment of niclosamide- and praziquantel-resistant beef tapeworm infection with nitazoxanide. [*Int J Infect Dis*.](http://www.ncbi.nlm.nih.gov/pubmed/17962058) **12** (1):80-2.

Leon-Vizcaino, L., M.J. Cubero, E. Gonzalez-Capitel, F. Alonso. 2001. **Experimental ivermectin treatment of sarcoptic mange and establishment of a mange-free population of Spanish ibex.** J Wildl Dis. **37:**775-85.

Lyons, E. T., J. H. Drudge, and S. C. Tolliver. 1974. Critical tests of three salts of pyrantel against internal parasites of the horse. *Am. J. Vet. Res*. **35**: 1515-1522.

Mahfooz, A.,M. Z. Masood, A. Yousaf, N. Akhtar and M. A. Zafar. 2008.. Prevalence and anthelmentic efficacy of Ivermectin against gastrointestinal parasites in horses.*Pakistan Vet. J.* **28**(2): 76-78.

Mallick K. P., Dwivedi S. K., Srivastana N. K. 1987. A report on the occurrence of hemoprotozoan infections in rural livestock. Indiana J. Parasitol. **11**:25–26.

Mazid, M. A., J. Bhattacharjee, N. Begum, M. H. Rahman. 2006. Helminth parasites of digestive system of sheep in Mymensing,Bangadesh. *Bangl. J. Vet. Med.* **4** (2): 117–122.

McCracken, D. I. 1993. The potential for avermectins to affect wildlife. Veterinary *Parasitology.* **48**: 273–280.

McKellar, Q.A., 1997. Ecotoxicology and residues of anthelmintic compounds. *Veterinary Parasitology*. **72**: 413-435.

Mekuria, S. and Elsabet Gezahegn. 2010; Prevalence of External parasite of poultry in intensive and backyard chicken farm at Wolayta Soddo town, Southern Ethiopia. [*Vet. World*](http://www.scopemed.org/?jid=2)*.*  [**3**(12)](http://www.scopemed.org/?jid=2&iid=2010-3-12.000): 533-538.

Mia, S.A., M.L. Dewan, M. Uddin and M.U.A. Chowdhury. 1975. The route of infection of buffalo calves by Toxocara ( Neoscaris) vitulorum. *Tropical Animal Health* *Production*. **7**: 153-156.

Molento, B.M. 2005. Resistencia parasitaria em helmintos de equideos e propostas de manejo. Cieˆncia Rural. **35**: 1469–1477.

Newman, T.J. and S. Harris. 2002. **Nutritional condition and survival of red foxes with sarcoptic mange.** Can. J. Zool . **80:**154-61.

Nolan. J. 1987. New approaches to the development and management of drugs used in ectoparasitic control. [*Vet Parasitol*.](http://www.ncbi.nlm.nih.gov/pubmed/3307119) **25**(2):135-145*.*

Nwosu, C.O., P.P. Madu and W.S. Richards. 2007. Prevalence and seasonal changes in the population of gastrointestinal nematodes of small ruminants in the semi-arid zone of North-Eastern Nigeria*. Vet Parasitol.* **144**: 118-124.

Overend D, P.I. Veale and J.W. Copeland .1984. An epidemiological study of Trichostrongylidiasis in dairy cattle grazing in irrigated pasture. *Australian Veterinary Journal.***61**: 6-8.

Parsani, H.R., Veer Singh and R.R. Momin. 2008 .Common Parasitic Diseases of Camel. *Veterinary World*. **01**(10): 129-146.

Perkins, S.C. 2000. Babesia and the pet travel scheme. *Vet Rec* **12**: 147:460.

Prasad, K.D. ,R.K.Sharma and A. Kumar. 2004. Evaluation of Triclabendazole and Tetramisole control packages against paramphistomiasis and G.I. nematodiasis in cattle and buffaloes. *Journal of Parasitic Diseases*. **28** (2): 115-117.

Radostits,O. M.; D. C. Blood, C. C Gay. 1994.Veterinary Medicine*;* Ed. 8. ELBS Publication.

Rahman,M.H. and M.H. Mondol. 1983. Helminth parasites of cattle (*Bos indicus*) in Bangladesh. *Indian Parasitology .* **7**: 173-174.

Ramirez-Barrios, R.A., J. Munoz, Henandez, E.Gonzalez and F. Escalona. 2004. Prevalence of intestinal parasites in dogs.Undverterinary are aracanbo. *Venezuela-veterinary parasitology.* **121**:11-20.

Rangel-Ruis, L.J., S.T. Albores-Brahms and J. Gamboa-Anguilar. 2003. Seasonal trends of *Paramphistomum cervi* in Tabasco, Mexico. *Vet. Parasitol.* **116**: 217-232.

Rashid, H.B., M. Chaudhry, H. Rashid , K. Pervez , A.K. Mahmood. 2008. Comparative efficacy of diminazene diaceturate and diminazene aceturate for the treatment of babesiosis in horses. *Trop Anim Hlth Prod*. **40**:463–467.

# Regassa, F., Sori T, Dhuguma R, Kiros Y. 2006. Epidemiology of Gastrointestinal Parasites of Ruminants in Western Oromia. Ethiopia. *Intern J. Appl. Res. Vet. Med.* **4**(1): 57-64.

[Richard, D.,](http://www.annals.org/search?author1=RICHARD+D.+PEARSON&sortspec=date&submit=Submit)  M.D. Pearson and [M.D. Hewlett](http://www.annals.org/search?author1=ERIK+L.+HEWLETT&sortspec=date&submit=Submit).1985.Niclosamide Therapy for Tapeworm Infections. *Annals of Internal Medicine*. **102** (4): 550-551.

Ristic, M. 1988. Babesiosis of domestic animals and man CRC Press Boca, Raton, Florida.pp. 1-227.

Roberts J. A. 1992. Preventive treatment against toxocariasis in bovine calves. *Veterinary Parasitology*. **44**: 118-119.

Sardar, S.A.,M. A. Ehsan, A. K. M. M. Anower, M. M. Rahman and M. A. Islam. 2006. Incidence of liver flukes and gastro-intestinal parasites in cattle. *Bangl. J. Vet. Med*. **4** (1): 39–42

[Schwint](http://aac.asm.org/search?author1=O.+Nicolas+Schwint&sortspec=date&submit=Submit), O.N., [Guy H. Palmer](http://aac.asm.org/search?author1=Guy+H.+Palmer&sortspec=date&submit=Submit), [Lowell S. Kappmeyer](http://aac.asm.org/search?author1=Lowell+S.+Kappmeyer&sortspec=date&submit=Submit) and [Melissa T. Hines](http://aac.asm.org/search?author1=Melissa+T.+Hines&sortspec=date&submit=Submit).2009. Imidocarb Dipropionate Clears Persistent Babesia caballi Infection with Elimination of Transmission Potential. Antimicrob. Agents Chemother.**53** (10):4327-4332.

Selim, M., M.M. Sen and A. Rahman. 1997. An abattoir survey on the Liver Diseases of Black Bengal goats. *Bangladesh Vet J*. **31**: 113-114.

Soulsby, E. J. L.; Helminths, Arthopodes and Protozoa of Domestic Animals, Ed. 7; 1982.

[Stammers](http://lib.bioinfo.pl/auth:Stammers,BM), B. M., 1976. [The effects of nitroxynil on the survival, growth and morphology of Fasciola hepatica in sheep.](http://lib.bioinfo.pl/pmid:1265355)  [*Res Vet Sci.* **20** (2):174-183.](http://lib.bioinfo.pl/pmid/journal/Res%20Vet%20Sci)

Taboada, J. 1998. Babesiosis. In: Greene CE (ed), Infectious Diseases of the Dog and Cat. *WB Saunders*. 473-481.

Tariq, K.A., M.Z. Chishti, Fayaz Ahmad and A.S. Shawl. 2008. Epidemiologial study on Paramphistomum infection in goat – Kashmir Valley. *World Journal of Agricultural sciences*. **4**(1): 61-66.

Tasawar, Z, U. Minir, C.S. Hayat and M.H. Lashari. 2007. The prevalence of Fasciola hepatica in goats around Multan. *Pak Vet J.* **27**: 5-7.

Taylor, M.A., R.L. Coop , R.L. Wall. 2007. **Parasites of dogs and cats and the laboratory diagnosis of parasitism.** In Veterinary Parasitology. 3rd edition. Oxford, Blackwell Publishing. Pages:798–847.

Terefe, D., Daniel Demissie, Desta Beyene and Samuel Haile .2012. A prevalence study of internal parasites infecting Boer goats at Adami Tulu Agricultural Research Center, Ethiopia. *Journal of Veterinary Medicine and Animal Health*. **4** (2): 12-16.

Türk M., I. Oztürk and A.G. Sener. 2007. Comparison of incidence of Demodex folliculorum on the eyelash follicule in normal people and blepharitis patients. *Turkiye Parazitol Derg*. **31**(4):296–297.

### Urquhart, G.M., J. Armour, J.L. Duncan, A.M. Dunn, F.W. Jennings. 1996. Veterinary Parasitology. Blackwell Publishing Professional; 2 edition . pages: 320.

[Varma, T. K.](http://www.cabdirect.org:80/search.html?q=au%3A%22Varma%2C+T.+K.%22); [Shinghal, T. N.](http://www.cabdirect.org:80/search.html?q=au%3A%22Shinghal%2C+T.+N.%22); [Saxena, M.](http://www.cabdirect.org:80/search.html?q=au%3A%22Saxena%2C+M.%22); [Ahluwalia, S. S.](http://www.cabdirect.org:80/search.html?q=au%3A%22Ahluwalia%2C+S.+S.%22)1990. Studies on the comparative efficacy of mebendazole, flubendazole and niclosamide against human tapeworm infections.[Indian Journal of Public Health](http://www.cabdirect.org:80/search.html?q=do%3A%22Indian+Journal+of+Public+Health%22) Vol. 34 No. 3 pp. 163-167.

Vial, H.J., Gorenflot A. Chemotherapy against babesiosis. Vet Parasitol. 2006;138:147–160.

Waller, P. J., 2003. The future of anthelmintics in sustainable parasite control programme for livestock, helminthologia, 40(2):97-102.

Whelan, M., Yris Bloemhoff, Ambrose Furey, Ríona Sayers, and Martin Danaher. 2011. Investigation of the Persistence of Nitroxynil Residues in Milk from Lactating Dairy Cows by Ultra Performance Liquid Chromatography Tandem Mass Spectrometry.J. Agric. Food Chem., 2011, 59 (14), pp 7793–7797.

Yazwinski, T.A. Pote, L., Tilley, Greenway, T. 1981.Efficacy of ivermectin against Sarcoptes scabiei and Otadectesc Ynotis infestations of dogs. Vet Med .76: 1749-1751.

Yazwinski, T.A., Chapman HD, Davis RB, Letonja T, Pote L, Maes L, Vercruysse J, Jacobs DE. 2003. World Association for the Advancement of Veterinary Parasitology (WAAVP) guidelines for evaluating the effectiveness of anthelmintics in chickens and turkeys. Veterinary Parasitology, 116 (2): 159-173.

[Yüksek, N.](http://www.cabdirect.org:80/search.html?q=au%3A%22Y%C3%BCksek%2C+N.%22); [Altuğ, N.](http://www.cabdirect.org:80/search.html?q=au%3A%22Altug%CC%86%2C+N.%22); [Gül, A.](http://www.cabdirect.org:80/search.html?q=au%3A%22G%C3%BCl%2C+A.%22)T. 2007. herapeutic effect of the combination of trichlobendazole and levamisole in sheep with endoparasite infection. [Yüzüncü yıl Üniversitesi Veteriner Fakültesi Dergisi](http://www.cabdirect.org:80/search.html?q=do%3A%22Y%C3%BCz%C3%BCnc%C3%BC+y%C4%B1l+%C3%9Cniversitesi+Veteriner+Fak%C3%BCltesi+Dergisi%22) . Vol. 18 No. 1 pp. 19-24 ISSN [1308-3651](http://www.cabdirect.org:80/search.html?q=sn%3A%221308-3651%22)

Yunker, C.E. 1973. In: Parasites ofLaboratoryAnimals. R.J. Flynm, (ed.) Iowa State Ul7iv. Press Ames. pp. 425-492.

**ANTHELMINTICS PRESCRIBED BY VETERINARIAN AGAINST DIFFERENT ANIMAL SPECIES INFESTED BY PARASITES.**



**SUBMITTED BY**

**Intern ID : B-09**

**Roll No. : 2006/11**

**Reg. No. : 249**

**Session : 2005-2006.**

**A CLINICAL REPORT**

**AS THE PARTIAL FULFILLMENT FOR THE DEGREE**

**OF DOCTOR OF VETERINARY MEDICINE (DVM)**

**Faculty of Veterinary Medicine,**

**Chittagong Veterinary and Animal Sciences University**

**Khulshi, Chittagong - 4202.**

**ANTHELMINTICS PRESCRIBED BY VETERINARIAN AGAINST DIFFERENT ANIMAL SPECIES INFESTED BY PARASITES.**



**A Report Submitted as Per Approved Style and Content**

|  |  |
| --- | --- |
| **Signature of Author**  **NAME: SALMA SULTANA**  **Intern ID: B-09**  **Roll No. : 2006/11**  **Reg. No. : 249**  **Session: 2005-2006.** | **Signature of Supervisor**  **NAME: DR. MD. AHASANUL HOQUE**  **Professor**  **Dept. of Physiology, Biochemistryand Pharmacology.** |

***Chittagong Veterinary and Animal Sciences University***

***Khulshi, Chittagong – 4202.***

**ACKNOWLEDGEMENT**

All praises are due to Almighty Allah, the creator and supreme authority of the universe; who enabled me to complete this work successfully.

It is deemed as a proud privilege and extra terrestrial pleasure to express author ever indebtedness, deepest sense of gratitude, sincere appreciations, profound regards to reverend and beloved teacher and supervisor Professor **Dr. Md. Ahasanul Hoque,** Dept. of Physiology, Biochemistry and Pharmacology, Chittagong Veterinary and Animal Sciences University for his scholastic guidance, sympathetic supervision, valuable advice, constant inspiration, affectionate feeling, radical investigation and constructive criticism in all phases of this study .

The Author

**CONTENTS**

|  |  |  |
| --- | --- | --- |
| **Chapters** | **Contents** | **Page no.** |
|  | Abstract | 01 |
| I | Introduction | 02-03 |
| II | Review of the literature |  |
| III | Materials and methods |  |
| IV | Results and discussion |  |
| V | Conclusion |  |
| VI | References |  |
| VII | Appendix |  |

**ABSTRACT**

A clinical study was carried out to record clinical cases of different species at different internship placement. The study aimed to evaluate prescribed anthelmintic drugs against the recorded parasitic disease. The structured record keeping sheet was used to obtain the necessary information. The most prevalent cases were Sarcoptic Mange Infestation, Tick infestation, Demodecosis, Maggot infestation, Facioliasis, Ascariasis, Strongyloidiasis, Hook Worm Infection, Tape Worm Infection and Babesiosis respectively in India. Similar cases were found in Bagladesh.However Ascardiasis and Paramphistomiasis were found only Bangladesh not India but Demodecosis was not found and. Ectoparasitic infestation are more commom in India than Bangladesh.

The prevalence of parasitic disease were studied in (n = 50) cases in different species with 3 age groups (<12 months, >12-24 months, and >24 months) and sex. Sex wise prevalence of Trematodal infection was higher in male, in Gastrointestinal nematodiasis was higher in male than female hosts.

The anthelmintic drugs show their effects on the animal body and their regular activities by causing helminthiasis which is a very severe parasitic disease. Benzimidazoles Ivermectin,Levamisole, Nitroxynil, Piperazine were commonly used both India and Bangladesh but Praziquantal and Pyrental were only used in India for the treatment of ascariasis, hook worm and tape worm infection. The purpose of this report is to focus on drugs which are used in veterinary medicine to treat parasitic infection.

**Keywords**: Trematodal infection, Gastrointestinal nematodiasis, Ectoparasitic infestation, Benzimidazoles Ivermectin,Levamisole, Nitroxynil, Piperazine, Praziquantal and Pyrental.