**CHAPTER-II**

**REVIEW OF LITERATURE**

Pertinent literatures on gastrointestinal parasitism along with their prevalence in cattle are reviewed in this chapter. The main purpose of this chapter is to provide up-to-date information concerning the research work which is addressed here. Important information related to the present study was represented below under the following headings:

**2.1 Gastrointestinal Parasitism**

***2.1.1 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 sub-tropical regions:

* Humid tropical climate
* Savannah-type tropical and sub-tropical climate with a long dry season
* Arid tropical and sub-tropical climate

The humid tropical climate characterizes much of West Africa as well as the regions surrounding Lake Victoria and parts of coastal eastern Africa. It is also the climate of much of southeastern Asia, Central America and northern South America. The parasites' eggs or larva develops into in the fecal material or in the environment. To make themselves accessible to the ruminants by ingestion 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 fecal 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 temperature may fall below 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 this temperature. 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 among all climatic factors. **(Hansen and Perry, 1993)**

**2.2 Factors affecting the intensity of gastrointestinal infections**

The intensity of gastrointestinal nematode infection depends mainly on the following six 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).
* The intrinsic multiplication rates of the species of parasites present which are controlled by the fecundity, pre-patent period, environmental development and survival rates of these species.
* Management, particularly grazing patterns **(Radostits *et al.,* 1994).**
* Geographical distribution and availability intermediate hosts.
* Use of anthelmintics, including the timing and frequency of administration **(Radostits *et*  *al.,* 1994; Hansen and Perry, 1993).**

**2.3 Diagnosis of gastrointestinal parasitism**

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

* Collection of fecal samples
* Separation of eggs/larvae from fecal material
* Microscopic examination of prepared specimens
* Preparation of fecal cultures
* Isolation and identification of larvae from culture (Baermann apparatus techniques)

The following Qualitative and Quantitative tests are commonly used for the diagnosis of gastrointestinal parasitism **(Urquhart *et al*., 1996, Hansen and Perry, 1993, Soulsby, 1982 and Benbrook and Sloss, 1962)**:

Fecal sample



|  |  |  |
| --- | --- | --- |
| Qualitative test | Quantitative test |  |
|  |  |



|  |  |  |
| --- | --- | --- |
| Direct Method | Indirect Method |  |
|  |  |  |
|  |  |  | \* McMaster Technique |  |
| Direct Smear |  | \* Stools Ova counting |  |
|  | technique |  |
|  |  |  |  |
| Flotation | Sedimentation |  |



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Simple | Test tube | Centrifugal | Simple | Centrifugal |  |
|  |  |
| Flotation | Flotation | Flotation | Sedimentation | Sedimentation |  |
|  |  |

**2.4 Prevalence of gastrointestinal parasitic infection in Bangladesh**

During the era of East Pakistan (Now Bangladesh), the prevalence of gastrointestinal parasitic infection was detected after examination of 200 abomasums. The recorded species of nematode were *Mecistocirrus digitatus* (44%), *Haemonchus contotus* (10%), *Haemonchus similis* (21%), *Cooperia punctata* (37%), *Ostertagia trifurcate* (1%) and *Bunostomum spp* (4%) **(Rahman, 1970).** In another investigation, it was observed that overall prevalence of gastrointestinal parasitic infection was 71.6%, and 14.6% in cattle and goats, respectively **(Bhuyan, 1970).** In different areas of Bangladesh, several investigations were carried out on gastrointestinal parasitism. In an investigation, it was observed that can 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*, *Mecistocirrus digitatus*, *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%s **(Rahman and Ahmed, 1991).**

In Mymensingh, an investigation was conducted to determine the concurrent infection of gastrointestinal parasites and bacteria associated with diarrhea in calves. It was revealed that 67% calves affected with different parasites and 98% with different bacteria. Of the 67 and 98 calves affected with parasites and bacteria, 65.67% and 61.22% had single, 29.85% and 37.76% had dual and only 3.33% and 1.02% had triple concurrent infections. 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 spp* and *Moniezia spp* **(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 low and the rates were almost similar in both native and crossbred cattle. The infection 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 infection rate of *Ascaris* was highest in winter **(Sardar *et al.,* 2006)**.

In a new investigation, two tracer animals (two cow calves and two goats) were released for a month in grassland used for communal grazing of livestock near school premise in Kanthal, Trishal, Mymensingh to determine the association of grassland with parasitic diseases of livestock. After slaughtering, the determined species were *Haemonchus contortus, Trichostrongylus axei, Mecistocirrus digitatus, Oesophagostomum spp*, *Trichuris spp, Bunostomum spp* and *Moniezia spp.* The numbers of parasites in each cow calf were from 42 to 154 for *Haemonchus contortus,* from 18 to 33 for *Trichostrongylus axei,* from 15 to 34 for *Mecistocirrus digitatus,* from 22 to 47 for *Oesophagostomum spp*, from 23 to 32 for *Trichuris spp*, from 13-32 in *Bunostomum spp* and from 3 to 16 for *Moniezia spp.* The numbers of parasites in each goat were from 22 to 45 for *H. contortus*, from 10 to 27 for T*. axei*, from 24 to

160 for *Oesophagostomum spp,* from 16 to 35 for *Trichuris spp*, from 2 to 8 for *Bunostomum spp* and from 12 to 21 for *Moniezia spp* **(Mondal *et al.,* 2000).**

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%, *Capillariabovis* 12.2%, *Strongylus spp* 34%, *Fasciola spp* 22.4%, *Balantidium coli* 13.6%, Coccidia12.2% 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 infection 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 infection 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).**

In Chittagong, a one year (2009-10) prevalence study on gastrointestinal parasitism was conducted in crossbred and local cattle where 216 crossbred and 432 local cattle of four representative areas were considered. The author recorded the overall prevalence of gastrointestinal parasitic infections 39.75% and 46.25% in crossbred and local cattle, respectively. Frequency of Trematodes and Nematodes infections was persistent in all the study areas. The highest prevalence of Trematodes infections was found in Boalkhali (32.41%) compared to Noakhali (23.14%), Rangunia (18.53%) and Khagrachori sadar Upazilla (17.60%).The investigation also revealed that prevalence of Nematodes infection was the highest (25.93%) in Noakhali sadar Upazilla in local cattle. Occurrence of gastrointestinal parasitic infections was reported more common in rainy season followed by summer and winter. **(Alim *et al.,* 2011).**

Significantly higher prevalence of *Paramphistomum spp* (20.13%) was found in rainy season, whereas *Haemonchus spp* (5.56%) and *Moniezia spp* (4.16%) were higher in summer (P<0.05). *Paramphistomum spp* infections were more frequent in adult while Toxocara spp were predominant in calf (P<0.05). Prevalence of *Haemonchus spp* (4.86%) infections was significantly higher in local adult cattle whereas *Trichostrongylus spp* (4.86%) infections were predominant in local young cattle (P<0.05). The author also suggested that breed and season, age were the important predictor of gastrointestinal parasitism **(Alim *et al.,* 2011).**

**2.5 Prevalence of gastrointestinal parasites diseases in other countries**

In Pakistan, the overall prevalence of endoparasites in young stock of Holstein-Friesian and Jersey breeds was 39% and 38.21%, respectively in Kasur district **(Zahid *et al.,* 2005)** whereas liver parasites in cows was 45.70% in Quetta city. The highest prevalence was found in *Fasciola hepatica* (16.16%) infection followed by *Fasciloa gigantica* (12.37%) and *Paramphistomum explanatum* (7.82%) **(Kakar *et al.,* 2008)**.

In Karachi, 8.50% **(Baliquees and Alam, 1988)** and 8.00% **(Sabri *et al.,* 1981)** incidence of Fascioliasis and 17.64% *Paramphistomiasis* **(Reza *et al.,* 2009)** was recorded in cows in Tehsil Jatoi district. However, infestation of Paramphistomiasis varies from 0.70 to 88.89% from place to place **(Georgiev *et al.,* 1980 and Gupta *et al.,* 1978**) due to variation in geo-climatic conditions of the areas. In Panjab, another study was carried out to determine the prevalence of gastrointestinal helminthiasis in ruminants. The overall prevalence of helminthiasis was 51% in cattle, 47% in buffaloes, 62% in sheep and 52% in goat, with nematodes being the most common helminthes. It was also found that the prevalence of helminthes was higher in young animals compared to adult cattle. Sex-wise prevalence of helminthes was higher in males than females for buffaloes and sheep in contrast to cattle and goats **(Reza *et al.,* 2007).**

 In district Toba Tek Singh, Punjab, the prevalence of GI helminthes was significantly higher in sheep (44.17%) followed by goats (40.15%), buffaloes (39.82%), and cattle (33.68%). The prevalence of GI helminthes except *Fasciola hepatica* and *Fasciola gigantica* was significantly higher in grazing animals, females and young when compared with stall-fed animals, males and adults, respectively **(Khan *et al.,* 2010).** In Farooqa area, the total point prevalence of gastrointestinal parasites was found to be 85.75%. The highly prevalent species were *Fasciola hepatica* (70.62%) followed by *Ascaris vitulorum* (21.36%) and *Haemonchus contortus* (8.01%). In Kot Addu, the total prevalence of gastrointestinal parasites was found to be (60.81%). The prevalent species of this area included *Haemonchus contortus* (31.85%) followed *Ascaris vitulorum (*28.14%) *Bunostomum phlebotomum*  (23.7%) and *Fasciola hepatica* (16.29%). In the area of Dunya Pur, the prevalence of worm infection was (51.88%) The highest prevalence was observed for *Haemonchus contortus* (46.66%) followed in order by *Fasciola hepatica* (32.12%) *Ascaris vitulorum* (8.48%) Ostertagia *circumcinta* (6.66%) *Bunostomum phlebotomum* (6.06%). In Layyah, the prevalence of different species of helminthes was (19.7%). The highly reported species included *Ascaris vitulorum* (33.92%) followed in order by *Haemonchus contortus* (30.35%), *Fasciola hepatica* (21.42%) and *Oesophagostomum radiatum* (14.28%). The survey of Mor Mandi area of district Jhang revealed that the total prevalence of helminthes in this area was (54.16%). The species-wise prevalence was found highest for *Fasciola hepatica* (40.0%) followed in order by *Haemonchus contortus* (23.07%), *Oesophagostomum radiatum* (20.0%), *Ascaris vitulorum* (16.92%). In district Shorkot, prevalence of helminthes was found to be (52.84%). The prevalent species included *Fasciola hepatica* (46.23%) followed in order by *Haemonchus contortus* (21.5%), *Trichostrongylus spp* (20.43%) and *Ascaris vitulorum* (11.82%). **(Iqbal *et al.,* 2007).**

At Multan, the point prevalence of *Toxocara vitulorum* in buffalo and cattle slaughtered at abattoir was ( 63.83%) and (37.50%) in buffaloes and cattle, respectively. Sex wise prevalence of *Toxocara vitulorum* was recorded as (39.46%) in male and (72.72%) in female **(Raza *et al.,* 2010).**

In India, the overall prevalence of gastrointestinal parasitic infections in crossbred cows and buffaloes of Namakkal was 30.0% and 24.6%, respectively. The prevalence rates of round worms, intestinal coccidia, flukes and tapeworms were 18.6%, 4.3%, 2.9%, and 1.0%, respectively. The percentage of animals infected with *Strongyles, Eimeria spp, Amphistoma spp, Trichuris spp, Toxocara spp, Schistosoma spp, Moniezia spp* and *Strongyloides spp* were 14.8% (composed of *Haemochus* and others at 77.4% and 22.5%, respectively), 4.3%, 1.9%, 1.9%, 1.4%, 1.0%, 1.0% and 0.5%, respectively. Mixed infection of coocidial oocysts and Strongyles was observed in 2.4% animals. The age-wise prevalence rate of gastrointestinal parasites among the total number of animals examined were 22.6%, 27.8%, 27.0%, 25.8% and 41.7% for calves and heifers (2.5 years old), first calving (2.5-3.5 years old), second calving (3.5-4.5 years old), third calving (4.5-5.5 years old) and fourth calving (5.5-6.5 years old) animals, respectively **(Saravanana *et al.,* 2009).**

In Tamil Nadu, India, a systematic survey was conducted to determine the prevalence of *Schistosoma spindale* in cattle, buffalo and goat slaughtered at Chennai. Examination of mesenteries collected from slaughter houses revealed 30.7% cattle, 19.64 % buffalo and 9.52% goat harbouring *S. spindale*. The prevalence of *S. spindale* was higher in cattle followed by buffalo and goat. The seasonal pattern of prevalence showed a moderate peak in monsoon season in cattle and winter season in buffalo and goat **(Jeyathilakan *et al.,* 2008)**. However, in Assam, prevalence of *Schistosoma spindale* was 2.9% in cattle, 2.7% in goat and 16% in buffalo **(Rajkhoa *et al.,* 1992)**.

In Akola district of Western vidarbha region, India, out of total 232 positive samples, (62.29%) had single and (6.00%) had mixed infection of *Haemonchus* and *Trichuris spp.* The prevalence of intestinal helminthes were *Strongyles spp* (19.39%), *Strongyloides spp* (11.14%), *Trichoderma spp (*8.28%), *Haemonchus spp* (6.57%), *Trichuris spp* (5.42%), *Trichostrongylus spp* (4.85%), *Moniezia spp* (4.18%), *Fasciola spp* (3.71%) and *Coccidia spp* (3.14%) in cattle. The seasonal prevalence of gastrointestinal helminthes infection revealed higher prevalence of parasites in rainy season (91.20%), followed by winter (69.5%) and summer (40.91%) **(Shirale *et al.*, 2008).**

In Himachal Prodesh, the overall percentage of infection of gastrointestinal parasites (either singly or mixed infection) in cattle during the period of 1986-90 and 1993-98 were 87.2 % and 54.2%. The prevalence of *Fasciola spp, Amphistome spp, Dicrocoelium spp, Schistosoma spp, Moniezia spp, Strongyle spp, Strongyloides spp, Toxocara spp, Dictyocaulys spp, Trichuris spp* and *Capillaria spp* were 36%, 16.6%, 11.4%, 0.6%, 2.9%, 31.4% 9.1% 3.9%,1.9%, 5.2%,and 1.4% ,respectively in 1986-1990, whereas percentage of infection with the same species reduced to 6.3%, 15.1%, 2.1%, 0.0%, 0.9%, 13.5%, 1.7%, 2.1%, 0.7%, 0.0% and 0.9%, respectively in 1993-1997 **(Annual reports. 1990-98)**, Himachal Pradesh Krishi Vishwa Vidyalaya, Palampur, Himachal Pradesh). In Gujarat, a two years long investigation revealed that prevalence of gastrointestinal parasites in cattle was 45.8% where amphistomes (17.9%), Strongyles (14.2%) and Coccidia (7.5%) were predominant parasites and highest infection rate was found in rainy season **(Hirani *et al.,* 2006).**

In Karnataka, overall prevalence of nematode infection was 18.2% and 20.9% in cattle and buffalos, respectively. *Strongylus spp* was found more predominating in cattle and *Neoascaris spp* in buffalo **(Muraleedharan, 2005)**.

In Nagpur, a year round study at two villages namely, Chicholi and Bodala revealed that the overall prevalence of nematodes infections were (39.34%). The infection rate in buffalo, cattle and goat was 41.63%, 32.18% and 51.94%, respectively. Higher infection was recorded during monsoon (63.07%) followed by winter (32.22%) and summer (21.33%). The percentage of animals infected with *Haemonchus spp, Toxocara spp, Trichuris spp, Strongyloides spp*. and mixed infection was found to be 38.01%, 27.68%, 14.87%, 11.98% and 7.43%, respectively **(Chavhan *et al.,* 2008).**

In USSAR, Trichostrongylid represented 92.2% of all nematode infection in small ruminants. It was observed that prevalence of such parasitic infections arose from 84% in spring to 100% in winter. The dominant species were Marshallagia marshalli (65%), *Haemonchus contortus* (48.3%) and *Ostertagia circumcincta* (38.3%). The prevalence of *Haemonchus contortus* decreased during summer grazing, as the ova do not survive in pasture at 200 meters above sea level **(Dadaev and Zimin, 1981).**

In Italy, an epidemiological investigation on GI parasitic infections in 5 to 12 years old cattle of Cuneo province showed that the prevalence of *Ostertagia ostertagi* infection was 82% followed by *Haemonchus placei* (61%), *Cooperia oncophora* (27%) and *Trichostrongylus axei* (25%). The highest infection was recorded during spring when animals were put on pasture **(Bulbo, 1973).**

In Turkey, a prevalence survey in cattle of central Afyonkarashisar revealed that Strongyle types of eggs were observed in 26.39% of the fecal samples. The infection was found to be less prevalent in the spring (22%) and most prevalent in autumn (32.53%). The genus of larvae observed in fecal cultures were *Haemonchus spp* (25.25%), *Trichostrongylus spp* (23.71%), *Nematodirus spp* (16.49%), *Ostertagia spp* (10.30%), *Cooperia spp* (8.76%), *Bunostomum spp* (6.70%), *Oesophagostomum spp* (6.18%) and *Chabertia ovina* (2.57%). *H. contortus* and *Oesophagostomum venulosum* (20.83%), *O. radiatum* (16.66%), *Cooperia onchophora* and *Ostertagia ostertagi* (8.3%), O. *trifurcata, C. punctata* and *Chabertia ovina* (4.16%) were found during inspections of the gastrointestinal tract **(Seyimli *et al.,* 2007).**

In Erzurum region, it was revealed that *Toxocara vitulorum* eggs were found in 22.2% of the calves' feces. The prevalence in calves smaller than 6 months of age was 24% and 10.6% in 6-12 months old **(Avicoglu and Balkaya 2011).** In Hakkari, eastern region of Turkey, prevalence of *T. vitulorum* infection was 28.96%. 34.4% infection rate was found in 1-6 month age cattle, followed by 6.6% in 6 months - 1 year old cattle and 3.3% in >1 year old cattle **(Aydin *et al.,* 2006).** On the other hand, in Bursa, prevalence of *Toxocara vitulorum* was 5.1% in calves younger than 6months old and 2.2% in all ages of animals **(Akyol, 1993).** In barns in Kayseri province, the prevalence of *Parmphistomum spp* was 14.5%, *Strongyles spp* 12%, *Toxocara vitulorum* 0.5%, *Moniezia spp* 1% and *Fasciola spp* 7.5% **(Yldrm *et al.,* 2000).**

In Syria, examination of 34 stomach and small intestine and large intestine of 4 more Syrian cattle revealed the prevalence of nematodes which were as follows: *Ostertagiaostertagi* 76%, *Cooperia oncophora* 76%, *Cooperia punctata* 05%, *Trichostrongylus axei* 17%, *Cooperia zurnabada* 23%, *Bunostomum phlebotomum* 58%, *Haemonchus contortus* 64% and *Trichostrongylus vitrinus* 76% **(Moukdad, 1979).**

In Japan, a parasitological survey by post-mortem examination of the abomasum and the upper small intestine of cattle of Hokkaido region revealed that the prevalence of GI nematodes were (56%). They were *Ostertagia ostertagi* (47%), *Mecistocirrus digitatus* (29%), *Haemonchus placei* (1%), *Namatodirus helvetianus* (1%), *Bunostomumphle botomum* (1%), *Trichostrongylus axei* (3%), *Cooperia oncophora* (3%) and *C.punctata* (1%). In another investigation, eggs of GI nematodes were found in (74%) of the 231 cattle fecal samples examined. The incidences of the various species were Ostertagia (62.7%), Oesophagostomum (23.2%), *Trichuris* (17.3%), *Mecistocirrus* (13.4%), *Nematodirus* (11.7%), *Bunostomum* (7.0%), *Strongyloides* (5.6%), *Capillaria* (3.9%), *Trichostrongylus* (3.5%) and *Cooperia* (1.2%). Eggs of *Moniezia* were detected in 1.7%, Eimeria oocysts in 59.7% and eggs of mites in 41.1% of fecal samples examined **(Nakazawa, 1986).**

In Cambodia, prevalence and seasonal variations of helminthes infections and their association with morbidity parameters were studied in traditionally reared Cambodian cattle. The overall proportion of samples that was positive for gastrointestinal nematodes was 52%, 44% and 37% in calves (from 1 to 6 months), young animals (6 to 24 months) and adults (over 24 months), respectively, while geometric mean fecal egg counts (FECs) for each of these age categories were 125, 66 and 15 eggs per gram respectively. The prevalence of Fasciola and Paramphistomum, estimated by coproscopical examination, varied between 5-20% and 45-95%, respectively **(Dorny *et al.,* 2011).**

In Germany, a survey was made know the influence of re-wetting of pastures on the occurrence of important endo parasites in cattle was monitored over the course of three years. A total of 692 samples were tested where the overall prevalence was 29.5% for Eimeria spp and 42.2% for nematodes **(Kemper and Henze, 2009).**

In Greece, a two years long study was carried out to know the GI parasitic infections in beef cattle of 15 farms in Mediterranean climate. Among a total of 262 fecal samples, 42 (16%) samples were positive where Strongyle-type eggs were found in 28 (10.7%) samples, Strongyloides spp and *Toxocara spp* eggs in 8 (3.1%) samples and *Capillaria spp* and *Moniezia spp* eggs in 1 (0.4%) sample followed by Coccidian oocysts were found in 123 (46.9%) samples. It was also revealed that a four-fold increase in the risk of coccidian infections in calves less than 12 months old compared with animals that were more than 36 months old **(Theodoropoulos *et* *al.,* 2010).**

In Ethiopia, an epidemiological investigation in western Oromia region was conducted to determine the prevalence and risk factors associated with gastrointestinal parasitism. The investigation showed that the overall prevalence of gastrointestinal parasites was 69.6% with 50.2%, 75.3%, and 84.1% in cattle, sheep, and goats, respectively. Strongyles and Eimeria were the most prevalent parasites encountered. Most of the cattle (44.4%), sheep (45.1%) and goats (47.8%) were infected by single parasite while the remaining 5.8%, 30.2%, and 35.3%, respectively, were infected by 2 and more than 2 types of parasites, where most of the combinations were Strongyles and Eimeria **(Regassa *et al.,* 2006).**

In Tanzania, a survey was conducted to know the prevalence of GI parasitic infection in grazing Maasai cattle in pastoral farming area where Coccidian oocyst, nematodes and trematodes infections were found in 2.2%, 20% and 56.6% in cattle, respectively. The overall prevalence was estimated to be 47% **(Swai *et al.,* 2006).** However an abattoir survey showed that the infection rate of *Schistosoma bovis* was estimated a 31 % **(Masaba *et al.,* 1977).**

In Algeria, a total of 222 calves varying of 1 to 18 months of age were examined to evaluate the prevalence of gastrointestinal helminthiasis of calves. The prevalence of eggs of *Strongyloidea, Trichuris spp, Moniezia spp, Strongyloides papillosus and*  Coccidial oocysts were, in properties and calves: 100 and 66, 100 and 57.8, 50 and 8.2, 25 and 1.8, and 33.3 and 7.8%, respectively. Of the 66 for eggs of the Strongyloidea, 64 were attributed to *Haemonchus spp* and 53.75% to *Cooperia spp* **(Repossi *et al.,* 2006).**

In Mali, post-mortem inspections on 51 calves were conducted to investigate acquisition and spectrum of gastrointestinal parasites in young calves in periurban livestock production. It was observed that parasite number and burden increased with age. In the age class 4-13 months animals carried already up to eight different gastrointestinal parasite species. The most frequent parasite species found were *Haemonchus placei* (age class 0-1 month: 7%, 1-4 months: 38%, 4-13 months: 69%), *Cooperia pectinata* (0%, 33% and 44%) and *C. punctata* (0%, 33% and 38%). Calves born during the rainy season had higher parasite burden and species diversity than calves born during the dry season **(Wymann *et al.,* 2007).**

In Costa Rica, a longitudinal survey was carried out to determine, describe the prevalence and intensity of gastrointestinal parasite infections in two different ecological zones. The most prevalent gastrointestinal parasites detected on both farms (dairy cattle, A, beef cattle, B) were *Eimeria spp* (94.7%, 93.7%), *Strongylidae* (75.0%, 81.4%), *Buxtonella sulcata* (38.0%, 21.6%) and *Strongyloides papillosus* (29.8%, 31.7%), whereas *Moniezia benedeni* (4.8%, 9.1%), *Trichuris spp* (7.3%, 13.2%), *Toxocara vitulorum* (0.0%, 1.8%) and *Entamoeba bovis* (2.5%, 1.1%) were less prevalent **(Jiméneza *et al.,* 2007).**

In Zimbabwe, in the highveld and lowveld communal grazing areas, an epidemiological investigation was conducted to find out the prevalence of gastrointestinal nematodes, cestodes, coccidia infection in cattle. Faecal egg and oocyst counts showed an overall prevalence of GI nematodes of 43%, coccidia 19.8% and cestodes 4.8%. It was also observed higher prevalence of infection with GI nematodes, cestodes and coccidia was recorded in calves than in adults. Pregnant and lactating cows had significantly higher prevalence than bulls, oxen and dry cows **(Pfukenyi *et al.,* 2007**). In another investigation, it was revealed that the most prevalent species were *Cooperia spp* (35%) followed by Haemonchus spp (18%), Oesophagostomum spp (11.1%) and *Strongyloides papillosus* (3%) **(Vassilev, 1999).** Prevalence of Fasciola gaigantica in slaughtered cattle was 37.1% **(Pfukenyi and Mukaratirwa, 2004).**

In Kenya, a study in Magadi division revealed the overall prevalence of nematodes in the calves, sheep and goats was 69.2%, 80% and 82%, respectively. The overall prevalence of Coccidial oocysts in calves, sheep and goats was 30%, 44% and 45%, respectively **(Maichomo *et al.,* 2004).**

In Brazil, 42 Holstein-zebu mixed breeding animals, 8 to 14 month old, were necropsed to examine the Helminthes parasites of cattle from Jaboticabal, São Paulo State. The prevalence and intensity of infection were as follow: *Haemonchus placei* (97.62%) *Cooperia punctata* (92.86%) *Oesophagostomum radiatum* (73.81%) *Trichuris discolor* (38.19%) *Trichostrongylus axei* (26.19%) *H.simillis* (21.43%) *C. pectinata* (19.05%) *Bunostomum phlebotomum* (16.66%) *Dictyocaulus viviparous* (16.66%) *C.spatulata* (14.29%) *Capillaria bovis* (11.90%) *Ostertagia ostertagi* (7.14%) *O.lyrata* (4.76%) *Eurytrema coelomaticum* (4.76%) *Moniezia benedeni*, (4.76%) *T.colubriformis* (2.38%) *Strongyloides papillosus* (2.38%) Each calf had an average worm burden of 10804 helminths, *Haemonchus* (18.5%) and *Cooperia* were the most frequently observed helminthes **(Borges *et al.,* 2001).**

In Minas Gerais state, examination of tracer calves revealed that highest worm burden occurred in rainy season. Among different parasites, *Cooperia* was most prevalent, representing 74.4% of the total of all nematodes recovered followed by *Haemonchus spp* was 19.2%, *Oesophagostomum spp* 4.5%. Infections caused by *Trichostrongylus spp, Trichuris spp,* and *Bunostomum spp* were less than 1% of the total **(Lima, 1998).**