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# Helminth parasites of mithun (*Bos frontalis*) -An overview

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ABSTRACT

Mithun *(Bos frontalis*), a pride animal of north eastern states of India, belongs to Family Bovidae. Infestation of helminth parasite is one of the important causes for reduction of productivity in mithun both in terms of meat and milk. Different genera of helminth parasites are known to infect mithun. Among nematodes in mithun *Trichostrongylus* spp, *Oesophagostomum* spp, *Haemonchus* spp, *Bunostomum* spp, *Trichuris* spp, *Mecistocirrus* spp, *Toxocara vitulorum* and *Strongyloid papillosus* are most important. Among tape worm infestations, *Moniezia expansa* and *M.benedeni* are the common tapeworms in both adult and young animals.

**Key words**: Fluke, Gastrointestinal helminths, Mithun, Tapeworms

Mithun is considered to be one of the precious gifts among rich biodiversity of north east region of the country and are maintained by people of Arunachal Pradesh, Nagaland, Manipur and Mizoram. Climatic condition of relative humidity (80%), moderate temperature (15–37°C), high rainfall and acidic to neutral pH in the entire north eastern region is very conducive for the growth and propagation of various parasites. Parasitic infestation is the major cause of reduce production potential of mithun. So the present communication is aimed to highlight the different helminths parasites harboured by this precious animal in north eastern region of country.

*Gastrointestinal nematodiasis*

Parasitic gastroenteritis is considered to be one of the major causes of pathogenic condition in mithun which directly or indirectly associated with mortality and morbidity of animals. Most commonly recorded gastrointestinal parasites in mithun are *Haemonchus contortus, Oesophagostomum* spp*, Trichostrongylus* spp, *Mecistocirrus* spp*, Cooperia* spp*, Trichuris* spp*, Toxocara* spp*, Strogyloides* spp and *Bunostomum* spp (Chamuah *et al.* 2009). Among these, *Toxocara vitulorum, Strongyloides papillosus* and *Bunostmum phlebotomum* and *Haemonchus contortus* are the major causes of anaemia and mortality in calves below 1 year of age. Seasonal incidence of gastrointestinal nematodiasis was significantly higher during monsoon and post-monsoon season (Chamuah *et al.* 2009). Intensity of *Strongyloid papillsosus* infection is high in less than 1 months old animal, due to prenatal transmission or through colostrum (Nwaorgu and Onyali 1990). The gastrointestinal nematodiasis due to *Trichostrongylus* spp and *Cooperia* spp shown no significant difference in respect to age, sex and season, but infection due to strongyle species is significantly high during monsoon season in animals (Chamuah *et al.* 2009). In some strongyle infection, animals above 3 years of age was found to be free from infection, viz. *Bunostomum* spp (Chamuah *et al.* 2009), whereas in other strongyle infection mean seasonal egg show no significant difference in different age group (viz. *Haemonchus* spp and *Oesophagostomum* spp) (Chamuah 2005). *Trichuris* spp isolated from colon and sometimes from large intestine during post mortem is responsible for formation of tunnel in intestinal mucosa (Chakraborty 2001). Pimply gut condition, caused by *Oesophagostomum* spp is also a common in mithun calves, which are characterized by nodule formation in large intestine and might be due to immunopathological condition incited by migrating larvae and it indicates always chronic level of infection (Soulsby 1986).

The development, survival and transmission of eggs and infective larvae are influenced by climatic and environmental factors such as temperature, humidity and precipitation and population density. Changes in the combination of these factors cause seasonal fluctuation in the availability of infective larvae and subsequently in the prevalence of infections and worm burdens in the animals.

*Clinical sign and symptoms*

The clinical signs and symptoms vary depending on species

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of parasites involved. In haemonchosis, the predominant clinical signs are anaemia, palor of mucous membrane, bloody diarrhoea and animal become progressively weak and debilated. This infection is considered to be is one of the most common causes of calf mortality. In necropsy findings, the abomasums contains reddish brown fluid, ingesta mixed with large number of worms and presence of small red bite marks in abomasum (Rajkhowa *et al.* 2003a). Significant changes in haemotobiological parameter are also found changes in gastrointestinal nematodiasis of mithun (Rajkhowa *et al.* 2003a).

Ascariasis is also another disease responsible for calves' mortality in mithun. Due to this infection, animal defecate mud coloured watery feces which is most charactertics symptom. The animal also shows potbellied condition, intermittent diarrhoea followed by constipation, emaciation and rough body coat. In postmortem, the whole intestine is packed with *Toxocara vitulorum* parasite and mild catarrhal inflammation of intestine. Significant changes in haemotobiological parameters, viz. Hb level, packed cell volume, total erythrocyte count, serum glucose, serum protein and serum albumin level of asparatate aminotransferase (AST) due to this infection in calves (Rajkhowa *et al.* 2003a). Pimply gut is a common phenomena in chronic infection of Oesophagostomum spp, parasites. This condition occurs due to chronic delayed type of hypersensitivity reaction which ultimately rises to greyish white nodule formation. Inside the nodule, larvae incite chronic granulomatous inflammation. The affected animals show intermittent diarrhoea followed by constipation. Infection with *Strongyloid papillosus* is a common in younger age group of 1–2 months (Chamuah 2005). The most common clinical signs are palor of mucous membrane, moderate diarrhoea followed by constipation. The other parasites like *Trichuris spp Trichostrongylus* spp*, Cooperia* spp and *Mecistocirrus* spp. are in general not much pathogenic, however in heavy infestation; they showed clinical symptoms according to the degree of infestation and some significant changes in haemotobiological parameters in affected mithun (Rajkhowa *et al.* 2003a).

*Fluke infection in mithun*

Among parasites, fluke infestation is major cause of clinical manifestation in mithun among fluke, fascioliosis and amphistomiasis are playing pivotal role for mortality in ruminants, but in mithun incidence of fluke infestation is comparatively low as compare to other gastrointestinal parasites (Chamuah 2005).

*Fascioliasis:* Fascioliasis is a major fluke infestation in north eastern region and it is predominantly cause by *Fasciola gigantica* in ruminants as well as in mithun from this part of locality (Chamuah 2005). During post-mortem examination of mithun at Itanagar, Arunachal Pradesh, incidence of Fasciola *gigantica* was found to be in 16.6% of animals having a greyish coloured liver and the consistency of liver was hard. Bile duct was distended due to the presence of parasites and tissue debris. Microscopically, there was fibrosis, mild fatty changes, coagulative necrosis and thickening of bile duct with cholangitis (Chamuah 2005). The scanning electron microscopic study showed that both the lateral and cuticular spines of the parasites which causes distortion and disruption of biliary epithelium (Chakraborty 2001).

Clinical cases of fasciolosis have yet to be been recorded, although chronic form was much common in mithun characterized by digestive disturbances with intermittent diarrhoea followed by constipation.

Immature amphistomosis is an acute and fatal disease of young mithun characterized by profuse diarrhoea, dehydration, pale mucous membrane, rough body coat followed by death of the animal. The seasonal egg counts of amphistome showed a significant difference between monsoon and winter season in animals in age group of 3 years and above (Chamuah *et al.* 2009).

*Cestode infestation*

*Monieziasis:* The presence of suitable intermediate host of cestode and favourable climatic condition was influence in the epidemiology and prevalence of tapeworms in mithun. Among Cestode infection, *Moniezia expansa* and *M. benedeni* are the most common in mithun, this might be due to presence of oribatid mite in the environment during winter and highest mean seasonal egg count was found in animals below 1year of age (Chamuah *et al.* 2009).

Cestode infected mithun calves showed potbellied condition rough body coat, palor of mucous membrane, reduce body weight gain, constipation etc. However, in post mortem, the whole small intestine was packed with *Moniezia* species ultimately interfere with nutrient absorption.

*Hydatidosis*

Hydatidosis was also affecting huge number of mithun population (Rajkhowa 2000 – 2001) due to rearing of this anima in sylvatic and non-sylvatic environment, since, the animal was confined to forest, hence, there was every possibility of maintaining of sylvatic cycle as wild carnivores like fox, jackal was acted as reservoir host of the parasite. Post mortem finding of the affected mithun showed the calcification of the cyst and as a result there was pressure atrophy of hepatic lobule, marked fibrosis of liver and infiltration of mononuclear cells (Chamuah 2005).

*Cysticercus tenuicollis*

*C. tenuicollis* was mostly found in sheep and goat in north-eastern states of the country, but first incidence of first record of occurrence of cyst of *C.tenuicollis* in mithun was recorded in Itanagar, Arunachal Pradesh (Chamuah 2005). Since, these animals have been reared in wild habitats, like hydatidosis; there is every possibility of maintaining sylvatic cycle with wild carnivores.

*Future strategy for control of gastrointestinal helminths parasites in mithun*

*Anthelmintic:* Among the vast array of commercial formulations available for control of gastrointestinal helminths parasites, a limited number of anthelmintics were effective as anthelmintic in mithun. Fenbendazole @10 mg/kg body weight was effective against monieziasis, piperazine was effective against *Toxocara vitulorum* infection(Rajkhowa *et al.* 2003a), albendazole @15 mg/kg body weight was effective as broad spectrum anthelmintics and ivermectin @ 1 ml/50kg bodyweight subcutaneously was very effective against both endo and ectoparaites (Rajkhowa *et al.* 2003a).

*Herbal anthelmintics:* It is worth mentioning that plant based remedies were widely employed as anthelmintic before the era of synthetic drugs. Many currently available therapeutic agents were plant derived. In the recent past, there had been concerted efforts to search for valid phytotherapeutical substitute for allopathic pharmaceutical which may represent important means for livestock production. Moreover, access to synthetic drugs is not easy in many rural and far flung areas (Chamuah *et al.* 2010).

In view of emerging resistance to synthetic anthelmintic therapy, there is a need for alternative anthelmintic with different mode of action. Unlike synthetic anthelmintic drugs which leaves residue in faeces after treatment leading to deleterious effect on the environment, plant derived anthelmintic are easily biodegradable, ecofriendly and potentially sustainable (Chamuah *et al.* 2010). Now, we are collecting and surveying different plant based remedies for gastrointestinal parasites on mithun, validating them in a scientific manner to achieve sustainable control measure.

*Grazing management:* Although there is widespread agreement that grazing management techniques can offer relatively simple and rapid solutions for improving helminths control and reducing anthelmintic usage, it remains a salutary fact that there are literally no examples of helminths control in highly productive grazing systems where the need for anthelmintics has been entirely obviated. In a future where the very real possibility exists that resistance will have rendered all chemical families of anthelmintics ineffective, this is cause for serious concern and for escalation of efforts to develop sustainable helminths control technologies. In this paper, the role of grazing management in reducing anthelmintic use and improving helminths control will be considered.

*Grazing management based on epidemiological knowledge:* The role of grazing management in worm control programme based on epidemiological knowledge is simply to provide clean pasture/forest on which may safely graze.

1. Alteration host species: To the extent that two or more host species in any given environment don't share common parasite species, alteration between species can be successful means of enhancing worm control.
2. Rotational grazing: It comprises the withdrawal of the susceptible host from the pasture/forest until the free living stages have died due to aging and environmental exposure before the animals are replaced. It is impractical under intensive farming condition and in the temperate climate since the long survival time of the infective larvae on pasture required longer periods of resting. Nevertheless, classical pasture spelling may be practical methods of control in more extensive farming condition in tropical countries where grazing field are abundant.
3. Clean pasture/forest approach: Collection and removal of deposits by pasture sweeping or vacuuming twice weekly costly but effective measure applied in USA. However, in mithun rearing is an impractical task in north eastern region of India.
4. Forecasting: On the basis of data on environmental factors (e.g.) number of days in rain, amount of rainfall, temperature and prevalence of helminths infection in last year, it is possible to estimate pasture/forest infectivity and risk of future worm infection. By adopting such forecasting system, farmers will be able to implement timely and appropriate measure against parasitic infestation.

From the present discussion it is worth to say that the north-eastern region is "heaven of parasitic" flora due to its congenial atmosphere and favourable climatic condition. In order to sustain economic growth, veterinarian has the prime duty to control parasitic burden considering the livelihood importance of the ethnic people. Therefore, a concrete and rigid control of worm burden of mithun should be taken to enhance socio-economic growth of this region.

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