PRELIMINARY SURVEY OF GASTRO-INTESTINAL HELMINTH INFECTION IN HERBIVOROUS LIVESTOCK OF MOUNTAINOUS REGIONS OF BHUTAN AND ARUNACHAL PRADESH

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Abstract

A coprological survey was made to assess the spectrum of helminth parasites in Mithun and other co-existing wild livestock in Bhutan and neighbouring Arunachal Pradesh (India). Nematodes with direct life cycle were found to be most predominant helminth infection among these animals. Cestodes and trematodes were poorly represented as their occurrence is primarily determined by the presence of the invertebrate intermediate hosts in the locality of the final host.

Keywords

Arunachal Pradesh, Bhutan, Gaur, Helminth parasite, Mithun, Siri cow

The Mithun (*Bos frontalis*), an endangered and indigenous species of Indo-Burma region, is mostly found in the mountainous regions of northeastern India, Arunachal Pradesh in particular. This species has also spread to some parts of Myanmar and Bhutan either through government purchase or through direct farmer purchase. It has socio-economic, religious and cultural importance in the tribal society of the region. The animal prefers evergreen forests and can adapt well to altitudes ranging between 600 and 3000m. In the present study the helminth parasite spectrum of Mithun along with other herbivorous livestock such as Gaur and local siri cows was explored in selected localities of Bhutan and in neighbouring Arunachal Pradesh (India).

Methods

In Bhutan the survey areas included the Regional Mithun Breeding Farm (RMBF) at Aerong (2500m) where Mithuns and Gaurs (*Bos gaurus*) are kept, and Wamrong (2800m) where only the local Siri cows (*Bos indicus*) are reared and maintained on free-range basis. Faecal samples were collected from 50 Siri cows from Wamrong farm, and from 79 Mithuns and three Gaurs at RMBF. The collected samples were preserved in AFA (alcohol, formalin and acetic acid medium), brought to the laboratory and examined for parasitic infection as per Georgi's technique (1995). Some preserved adult specimens of parasites kept at the Khaling Satellite Laboratory at Deothang (10km down south from Aerong) were also examined for identification. In Arunachal Pradesh, coprological samples were collected from three wild mithuns at Along (2200m) that were freshly slaughtered for some local ceremonial activity; the gut contents of the sacrificed animals were also examined.

Results and Discussion

The coprological survey revealed the occurrence of some helminth parasites among the Mithun, Gaur and Siri cows in Bhutan (Table 1). The parasites prevalent include *Trichuris*, *Capillaria*, *Strongyloides*, *Toxocara*, *Ascaris*, *Oesophagostomum*, *Bunostomum*, *Mecistocirrus*, *Cooperia*, *Ostertagia* and *Thelazia* representing the nematode group that included the larvae of *Dictyocaulus* (lung worm) also, and *Moniezia* and *Anoplocephala* from the cestode group; the trematodes included *Fasciola* and certain paramphistomids including *Gastrodiscoides*, *Gastrothylax* and *Paramphistomum*. While the nematode group emerged as the most predominant helminth infection with *Strongyloides* and *Trichuris* common to all the three host species, the cestode and trematode groups were conspicuous by their absence in Gaur. Further, while *Fasciola* and *Moniezia* were found to be prevalent in both Siri and Mithun (Table 1) in which taeniid eggs were also present, the *Anoplocephala* infection was restricted to Siri only and that of parampistomids, to Mithun. The adult specimens retrieved from the preserved stock at Deothang could be identified only up to generic level and included *Trichuris*, *Dictyocaulus*, *Ascaris*, *Taenia*, *Fasciola*, *Gastrothylax*, *Gastrodiscoides* and *Paramphistomum*.

From Along (Arunachal Pradesh), only adult *Strongyloides* sp. were recovered from the intestine of Mithun and the intensity of infection was high, with ~150 worms per infected host. In faecal examination, presence of *Dictyocaulus* (lungworm) infection was also revealed (Table 1).

The presence of helminth parasites in the herbivores can be explained in the light of their feeding habits. The ingestion of food contaminated with the parasitic eggs and third stage larvae (L_3) is a common mode of transmission of geohelminthic nematodes. *Trichuris* and *Strongyloides* spp. are reported to be present in zoo animals including cattle (Adkoli *et al.*, 1986; Modi *et al.*, 1995) and other mammals (Joseph *et al.*, 1999; Rajendran *et al.*, 2003). In the present study, these two infections were found among all the host species surveyed in Bhutan, though in Mithun from Along (Arunachal Pradesh) only *Strongyloides* and *Dictyocaulus* were found. A wider exploration with more samples is needed to assess the true status of helminthiasis in Mithun in Arunachal Pradesh, which has similar geo-climatic conditions as in Bhutan. *Trichuris*, *Capillaria*, *Strongyloides*, *Ascaris*, *Oesophagostomum*, *Bunostomum* and *Mecistocirrus* have been reported in the

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Table 1. Eggs of helminth parasites in faecal samples of cattle livestock in Bhutan and neighbouring Arunachal Pradesh

Host: locality	Nematodes	Cestodes	Trematodes
Siri cows (*Bos indicus*): Wamrong, Bhutan	*Trichuris, Strongyloides, Toxocara, Ascaris, Oesophagostomum, Bunostomum, Mecistocirrus*	*Anoplocephala, Moniezia, Taeniid* species	*Fasciola*
Mithun (*B. frontalis*): Aerong, Bhutan	*Trichuris, Capillaria, Strongyloides, Toxocara, Ascaris, Oesophagostomum, Bunostomum, Mecistocirrus, Cooperia, Ostertagia, Thelazia, Dictyocaulus*	*Moniezia, Taeniid* species	*Fasciola, Gastrodiscoides, Gastrothylax, Paramphistomum*
Along, Arunachal Pradesh	*Strongyloides, Dictyocaulus*	-	-
Gaur (*B. gaurus*): Aerong, Bhutan	*Trichuris, Strongyloides*	-	-

livestock in northeastern India, Meghalaya in particular (Yadav & Tandon, 1988, 1989; Mahanta *et al.*, 1996; Tandon, 2003) irrespective of the altitudinal differences of the various regions. *Trichuris* sp. is of common occurrence in captive wild herbivores including Mithun in the region (Chakraborty, 1992). *Mecistocirrus* adult nematodes have also been recovered from ruminant mammals in Sikkim Himalayas (Dr. Papri Dutta, ICAR Lab, Gangtok, pers. comm.). However, the cattle hosts in Bhutan were found to harbour *Toxocara*, *Cooperia*, *Ostertagia* and *Thelazia*, besides the afore-mentioned parasites. *Toxocara* is found in most parts of the world, whereas the species of *Cooperia* are mostly distributed in North America, Europe, Africa and Australian continents. The occurrence of *Cooperia* sp. has also been recorded earlier from captive herbivores in Assam, India (Chakraborty *et al.*, 1994). Of *Ostergia* spp., mostly found in cattle, only one species, namely *O. pinnata*, has been reported in India from sheep. *Thelazia* spp., reported to inhabit the orbital cavity of a variety of mammals including cattle, horse, pig, rodents, dog etc. around the world, are also common parasites of cattle in India and neighbouring South Asian and Neareast countries (Soulsby, 1982). *Anoplocephala* occurs as a common parasite of horses and donkeys (Soulsby, 1982) and has also been reported from captive wild herbivores including rhinoceros (Chakraborty & Islam, 1993). The occurrence of *Anoplocephala* in Siri cows and also of taeniid eggs in faecal samples from both Siri cows and Mithuns in Bhutan as reported in the present study seem to be stray or incidental cases, as there might be contamination by parasite eggs originating from faeces of horses and carnivorous animals like dogs or cats at the sample collection sites (grazing pastures). While the distribution of cestode infection in livestock is influenced by the occurrence of the invertebrate arthropod fauna that harbour the infective metacestode, that of trematodes is affected by the presence/absence of the snail intermediate hosts in the vicinity. The poor representation or no occurrence of trematodes can be attributed to the fact that gastropod molluscs that form an important link in the life cycle of majority of them do not have a rich faunal diversity or do not prevail in the hostile environmental conditions at the higher altitudinal areas.

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