Studies on the parasite spectrum of mithun, *Bos frontalis*
Lambert and yak, *B. grunniens* Linnaeus in Northeast India

Abstract

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By

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ABSTRACT

The present thesis entitled “Studies on the parasite spectrum of mithun, *Bos frontalis* Lambert and yak, *B. grunniens* Linnaeus in Northeast India” was aimed to explore the endo and ecto-parasitic spectrum from mithun and yak from Arunachal Pradesh, Nagaland and Sikkim. The thesis consists of five chapters.

Chapter I, deals with the study of light microscopy, scanning electron microscopy and molecular taxonomy on endo-parasites recovered from mithun and yak. With a view to identify the endo-parasites, morphological criteria based on light microscopy and electron microscopy and standard literature references were used. Six different types of protozoan parasite like *Eimeria bovis*, *E. zurenii*, *E. cylindrica*, *E. bukidnonensis*, *E. pellita* and *Entamoeba coli* were recovered from mithun (*Bos frontalis*), whereas from yak (*B. grunniens*) *E. bovis*, *E. zurenii*, *E. cylindrica* and *E. bukidnonensis* were recovered during the study period. A total of 9 different species of trematode (*Paramphistomum epiclitum*, *P.cervi*, *P. gracile*, *Calicophoron calicophorum*, *C. shillongensis*, *Orthocoelium parvipapillatum*, *Fischoederius cobboldi*, *Gastrothylax crumenifer* and *Fasciola gigantica*) and only one nematode (*Setaria digitata*) were recovered from mithun (*B. frontalis*) and only 4 trematode species namely *P. cervi*, *P. gracile*, *C. calicophorum* and *F. gigantica* were recovered from yak (*B. grunniens*). A molecular study was also conducted for some of the trematode parasites (*P. cervi*, *P. epiclitum*, *F. cobboldi* and *G. crumenifer*).

Chapter II, deals with the light microscopy and scanning electron microscopy of ecto-parasites of mithun and yak. A total of 9 different ecto-parasites namely,
*Rhipicephalus (Boophilus) microplus*, *R. (B.) geigy*, *Ixodes acutitarsus*, *I. rubicundus*, *Haemaphysalis davisi*, *H. darjeeling*, *H. bispinosa*, *H. longicornis* and *R. sanguineus* were recovered from mithun (*Bos frontalis*) and only three ecto-parasite namely, *R. (B.) microplus*, *H. davisi* and *I. acutitarsus* were recovered from yak (*B. grunniens*) during the study period.

In Chapter III, a detailed study of the external morphology and distribution pattern of different sensilla present in dorsal and ventral surface of both male and female haematophagous ecto-parasites, recovered from semi-wild cattle mithun (*B. frontalis*) and yak (*B. grunniens*) were done. Scanning electron microscopic observations revealed the occurrence of 31 different types of sensilla namely sensilla trichodea type I, sensilla trichodea type II, sensilla trichodea type III, sensilla chaetica type I, sensilla chaetica type II, sensilla chaetica type III, sensilla chaetica type IV, sensilla basiconica type I, sensilla basiconica type II, sensilla basiconica type III, sensilla basiconica type IV, thorny sensilla type I, thorny sensilla type II, thorny sensilla type III, thorny sensilla type IV, thorny sensilla type V, thorny sensilla type VI, gustatory sensilla, serrated sensilla, sensilla bifid type I, sensilla bifid type II, sensilla styloconica, hair-plate sensilla, cuticular pit sensilla, coeloconic sensilla, sensilla auricillica, multiporous sensilla type I, multiporous sensilla type II, clubbed shaped sensilla, hooked shaped sensilla and sickle shaped sensilla. The occurrence and distribution pattern of these structures in different regions of the body (dorsal, ventral, basis and in legs) seem to be species specific. The physiological and adaptational significance in the distribution pattern of different sensilla are discussed. The findings of the present study assumes
significance because, surface micro structural characteristics of the ecto-parasites are extremely important in understanding their roles in searching behavior and to locate specific sites during feeding.

Chapter IV, deals with the Prevalence, abundance and mean intensity of endo-parasites of mithun and yak. The study related to the pattern of prevalence and intensity of major infections in mithun of Arunachal Pradesh for three annual cycle revealed that the infection occurred throughout the year with a peak period of prevalence due to *P. cervi, P. gracile, C. calicophorum, C. shillongensis, O. parvipapillatum, F. gigantica* and *S. digitata* during rainy seasons. The abundance of all the paramphistomid flukes and the nematode *S. digitata* were recorded more during rainy season, whereas *F. gigantica* showed maximum abundance in winter. Likewise the intensity of the entire helminth parasites except *P. gracile, C. calicophorum* and *C. shillongensis* showed maximum during rainy seasons. In yak all the endo-parasites showed higher rate of infections during rainy season except for *F. gigantica* which showed highest rate of infection during winter. The abundance and intensity of these species was also more during summer season. Similarly, in both the hosts *Eimerian spp* showed highest rate of infections in the rainy season.

Chapter V, deals with the Prevalence, abundance and mean intensity of ecto-parasites of mithun and yak. Out of 176 mithun examined during the survey *R. (B.) microplus* and *H. davisi* showed 100% prevalence of infections throughout the year. However, *R. (B.) geigy, H. longicornis, H. bispinosa, I. acutitarsus, R. sanguineus, H. darjeeling*, and *I. rubicundus* showed 59.13±7.88%, 43.34±5.92%, 43.05±7.15%,
34.87±9.65%, 20.99±6.17%, 19.49±6.17% and 17.11±4.71% highest rate of infections in rainy seasons respectively. Similarly, all 38 yak examined revealed to be infected with \textit{R. (B.) microplus} (100%) and \textit{H. davisi} (100%) throughout the year except \textit{I. acutitarsus} which showed highest rate of infections during winter (78.33±1.66%). In mithun the rate of infection due to all the nine ecto-parasites rose to a peak during June to August. Except for the winter season, \textit{R. (B.) geigy} occurred throughout the year. \textit{I. acutitarsus} and \textit{H. darjeeling} showed their occurrence throughout the year except during spring, however, \textit{I. rubicundus} and \textit{R. sanguineus} occurs only during rainy season.