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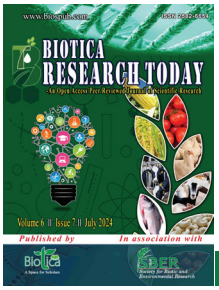

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Parasites of Mithun (*Bos frontalis*)

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Abstract

Mithun (*Bos frontalis*) is a rare bovine species in the hilly regions of Northeast India, Bangladesh, Myanmar, Bhutan and China, significantly contributing to indigenous communities' socio-economic and cultural lives. However, their health and productivity are compromised by various parasitic diseases. This article provides a comprehensive overview of the parasitic infections affecting Mithun, categorized into helminths, protozoa and arthropods. Helminth infections include trematodes (*Fasciola* spp.), nematodes (*Haemonchus contortus*, *Trichostrongylus* spp., *Ostertagia* spp.) and cestodes (*Moniezia* spp.). Protozoan infections are primarily caused by blood protozoa (*Theileria orientalis*) and tissue protozoa (*Eimeria* spp.). Arthropod parasites include ticks (*Rhipicephalus* spp., *Haemaphysalis* spp., *Ixodes* spp.) and various flies. Effective control and management strategies are crucial for mitigating these parasitic threats and enhancing the well-being and productivity of Mithun populations.

Keywords: Arthropods, Helminths, Mithun, Protozoa

Introduction

Mithun (*Bos frontalis*), a semi-domesticated bovine species, holds significant socio-economic and cultural value for the tribal communities in Northeastern India. However, the region's agro-climatic conditions favor the proliferation of various parasites, adversely impacting the's health and productivity of mithun. These parasites include helminths, protozoa and ectoparasites like ticks and leeches, which can cause a range of health issues from gastrointestinal disturbances to severe systemic infections (Chamuah *et al.*, 2009; Chamuah *et al.*, 2013). Effective control and treatment measures are crucial to mitigate these impacts and ensure the well-being and productivity of mithun. This document provides a comprehensive overview of the major parasitic infections affecting mithun, along with detailed strategies for their prevention and control.

Importance of Mithun and the Impact of Parasitic Diseases

Mithun (*Bos frontalis*) holds a place of high significance in the socio-economic and cultural lives of the indigenous communities in the hilly regions of Northeast India, Bangladesh, Myanmar, Bhutan and China. These animals are a source of high-quality meat, milk and hide and play a pivotal role in traditional rituals, festivals and social ceremonies. The robust nature of mithun makes them well-suited to the rugged terrains they inhabit, where other livestock might struggle to thrive. However, parasitic diseases pose a significant threat to the health and productivity of mithun. These infections can lead to severe health issues, including anemia, weight loss, decreased milk production and in extreme cases, death. Parasitic infestations can also cause economic losses due to reduced growth rates, lower reproductive performance and increased veterinary costs. The impact of these diseases extends beyond the individual animals, affecting the livelihoods of the communities that depend on them.

I. Helminth Infection

1. Amphistome Infection

✓ *Classification*: Trematodes (Flukes).

✓ *Prevalence*: Common in Arunachal Pradesh and Nagaland, post-monsoon and drier months.

✓ *Pathology*: Mechanical damage by immature flukes to intestinal mucosa, causing anorexia, weight loss and edema.

✓ *Symptoms*: Edema, anorexia, projectile diarrhea, polydipsia, reduced feed efficiency, weight loss.

✓ *Control Measures and Treatment*: Use of anthelmintics effective against amphistomes and proper pasture

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management to reduce snail populations (intermediate hosts). Use of oxyclozanide, nitroxinil, rafoxanide, triclabendazole, albendazole, *etc*.

2. Fasciolosis

✓ *Classification*: Trematodes (Flukes)

✓ *Causative Agent*: *Fasciola gigantica*.

✓ *Symptoms*: Liver damage, fibrosis, reduced feed efficiency, weight loss, anemia.

✓ *Control Measures and Treatment*: Use of flukicides such as triclabendazole, oxyclozanide, nitroxynil, rafoxanide, closantel, *etc.* and pasture management to avoid wet areas where intermediate hosts thrive.

3. Strongyle Infections

✓ *Classification*: Nematodes (Gastrointestinal Nematodes).

✓ *Common Species*: *Haemonchus contortus*, *Trichostrongylus* spp., *Ostertagia* spp.

✓ *Symptoms*: Anemia, diarrhea, weight loss, reduced growth rates.

✓ *Control Measures*: Regular deworming with anthelmintics (*e.g.*, Ivermectin, fenbendazole), pasture rotation, nutritional supplementation.

4. Mecistocirrus digitatus Infection

✓ *Affected Group*: Young calves.

✓ *Classification*: Nematodes (Gastrointestinal Nematodes).

✓ *Causative Agent*: Nematode affecting the gastrointestinal tract.

✓ *Symptoms*: Severe gastroenteritis, digestive disturbances, potential weight loss, severe anemia.

✓ *Prevention, Control and Treatment*: Deworming with appropriate anthelmintics such as Ivermectin, albendazole, fenbendazole, doramectin, praziquantel, *etc.* and maintaining pasture hygiene.

5. Toxocara vitulorum Infection

✓ *Transmission*: Through colostrum, transmammary, transplacental.

✓ *Affected Group*: Calves.

✓ *Symptoms*: Severe diarrhea, digestive disturbances, stunted growth.

✓ *Control Measures*: Deworming and proper management practices

✓ *Deworming*: Use of anthelmintics such as piperazine, fenbendazole in calves.

✓ *Management Practices*: Ensuring proper colostrum management, keeping calving areas clean.

6. Setaria digitata

✓ *Classification*: Nematodes (Gastrointestinal Nematodes).

✓ *Causative Agent*: Nematode affecting the peritoneal cavity.

✓ *Symptoms*: Mild to no clinical signs unless in high numbers.

✓ *Control Measures*: Deworming with appropriate anthelmintics, pasture management.

✓ *Deworming*: Use of Diethylcarbamazine (DEC), Ivermectin.

✓ *Vector Control*: Reducing mosquito populations through insecticides, eliminating standing water.

7. Moniezia Infection

✓ *Classification*: Cestodes (Tapeworms).

✓ *Symptoms*: Poor nutrient absorption, intestinal blockage, reduced productivity, potential weight loss, pot belly.

✓ *Management*: Use of anti-cestodal drugs like praziquantel, febendazole and Ivermectin and pasture management to reduce exposure to intermediate hosts like orbatid mite.

7. Hydatid Cyst

✓ *Classification*: Cestodes (Tapeworms)

✓ *Causative Agent*: *Echinococcus granulosus*.

✓ *Symptoms*: Cysts in the liver, lungs and other organs, potentially life-threatening.

✓ *Control Measures and Treatment*: Preventing access to infected offal, deworming dogs (definitive hosts). Use of albendazole, mebendazole and Ivermectin, *etc*.

8. Pimply Gut

✓ *Causative Agent*: Oesophagostomum infection.

✓ *Symptoms*: Diarrhea, Nodular lesions in intestines, poor nutrient absorption, weight loss, weakness, digestive disturbances.

✓ *Management and Treatment*: Improve hygiene, ensure clean water sources and provide supportive care. Use of Ivermectin, albendazole and fenbendazole, *etc*.

II. Protozoa Infection

1. Coccidiosis

✓ *Classification*: Protozoa (Tissue Protozoa).

✓ *Causative Agent*: Various species of Eimeria affect the intestinal tract.

✓ *Symptoms*: Diarrhea, dehydration, weight loss in calves, straining during defaecation.

✓ *Management and Treatment*: Improve hygiene and use of coccidiostats in feed. Use of sulphonamide, enteroquinol, trimethoprim, Sulfaquinoxaline, amprolium and sulphamethoxazole.

2. Babesiosis

✓ Classification: Protozoa (Blood Protozoa).

✓ *Causative Agent*: *Babesia* spp.

✓ *Symptoms*: High fever, anemia, jaundice, hemoglobinuria (dark urine) and overall weakness.

✓ *Transmission*: Transmitted by ticks, particularly *Rhipicephalus* (Boophilus) *microplus.*

✓ *Control and Treatment*: Control tick populations using acaricides, administer blood transfusions in severe cases and treat with antiprotozoal drugs such as diminazene aceturate.

III. Arthropod Infection

1. Ticks

✓ *Classification*: Arthropods.

✓ *Common Species*: *Rhipicephalus (Boophilus) microplus*, *Haemaphysalis* spp., *Ixodes* spp.

✓ *Symptoms*: Skin irritation, blood loss, potential transmission of tick-borne diseases (*e.g.*, babesiosis, theileriosis).

✓ *Control Measures*: Regular use of acaricides, pasture management, mechanical removal of ticks.

2. Flies

✓ *Common Types*: *Musca domestica*, *Stomoxy calcitrans*, Tabanus fly, *etc*.

✓ *Symptoms*: Irritation, blood loss, decreased productivity and transmission of other diseases.

✓ *Control and Treatment*: Use of insecticides, fly traps and maintaining clean living conditions to reduce fly populations.

Other Major Infection: Leech Infestation

✓ *Classification*: Annelida.

✓ *Causative Agent*: Various species of aquatic and land leeches.

✓ *Symptoms*: Skin irritation, blood loss, asphyxia and death of animals.

✓ *Control Measures and Treatment*: Improve hygiene, maintain clean water sources and reduce leech habitats. Mechanical removal, injection of ivermectin in high doses, instillation of 0.25% formalin and mechanical removal of aquatic leeches from the nose.

Conclusion

Parasitic diseases pose a significant threat to the health and productivity of mithun, impacting their well-being and the livelihoods of the communities that rely on them. A comprehensive understanding of these parasites classified into helminths (trematodes, nematodes, cestodes), protozoa (blood and tissue protozoa) and arthropods (ticks, flies, leeches) is crucial for effective management and control. Implementing targeted control measures, including regular deworming, pasture management, improved hygiene and appropriate treatments, can significantly reduce the prevalence of these infections. By addressing these parasitic challenges, we can enhance the health and productivity of mithun, ensuring their sustainable contribution to the society.

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