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Proportional Prevalence of Bovine Parasitic Diseases at Mymensingh District of Bangladesh

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ABSTRACT

Parasitic diseases significantly hinder profitable cattle production in Bangladesh. This retrospective study aimed to determine the prevalence, risk factors, clinical signs, and treatment practices of common parasitic infections in cattle in the Mymensingh district. A total of 415 cases were analyzed from clinical records at the Veterinary Teaching Hospital, Bangladesh Agricultural University, between February 2022 and January 2023. The most common parasitic diseases were paramphistomiasis (49.81%), stomach worm infections (16.47%), fascioliasis (16.28%), ectoparasitoses (10.92%), balantidiasis (5.94%), and blood protozoal infections (0.57%). The highest number of cases was recorded from Mymensingh Sadar upazila (80.7%). Infections were more frequent in female cattle (51.80%) than in males (30.36%). Major clinical signs included diarrhea (39.80%), reduced milk production (22.33%), hair loss (17.47%), constipation (10.67%), abdominal distension (4.20%), fever (4.53%), and coffee-colored urine (0.97%). Mixed infections (73.97%) were more common than single infections (26.02%). Post-deworming recurrence was noted in cases of paramphistomiasis (28.95%), balantidiasis (26.31%), and fascioliasis (10.53%). The most prescribed treatment was a combination of triclabendazole and levamisole (52.30%), followed by fenbendazole (16.47%), ivermectin (10.92%), nitroxynil (9.19%), copper sulfate (5.94%), triclabendazole alone (4.56%), and imidocarb (0.57%). These findings highlight the high burden of parasitic infections and emphasize the need for routine deworming and improved management practices in cattle farming systems in Bangladesh.

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Introduction

Bangladesh, a developing country with an agriculture-based economy, derives approximately 1.85% of its gross domestic product (GDP) from the livestock sector (DLS, 2023). Among livestock species, cattle hold particular significance due to their economic, nutritional, and socio-cultural importance. Cattle farming, which utilizes large expanses of land across the country, plays a vital role in national economic development. Traditionally, cattle in Bangladesh are raised through a free-range system. However, the trend of commercial farming is increasingly gaining traction. The country's subtropical climate, characterized by low-lying terrain, high humidity, and substantial rainfall, creates favorable conditions for the proliferation of gastrointestinal parasites (GIPs) (Hossain et al., 2016). These parasites negatively affect the health and productivity of ruminants, particularly cattle, by causing calf mortality (Bilal et al., 2009), enteric diseases (Van Metre et al., 2000), reduced growth performance (Jittapalapong et al., 2011), decreased milk production (Charlier et al., 2009), and overall lower productivity (Zvinorova et al., 2016). Consequently, GIP infections impose a significant financial burden on farmers and the national economy (Biffa et al., 2006). The subclinical nature of these infections, often devoid of visible signs, may lead to underdiagnosis or misdiagnosis (Zafar et al., 2022).

Parasitic infections have wide-ranging impacts on cattle, including impaired growth, poor reproductive performance, lowered immunity, and in severe cases, death (Thapa et al., 2020). Clinical signs of acute GIP infections include diarrhea, anorexia, weight loss, infertility, bottle jaw, and increased susceptibility to other infections (Radostits et al., 1994). Chronic infections lead to significant economic losses through increased treatment costs and productivity decline. Several risk factors—such as age, sex, breed, body condition, and environmental conditions determine the severity and incidence of these infections (Badran et al., 2012). Specific parasitic diseases manifest distinct clinical symptoms. Fascioliasis is common in Bangladesh and presents with anorexia, weight loss, anemia, submandibular edema, indigestion, blackish soft stool, and jaundice (Srihakim et al., 1991). Paramphistomiasis leads to fetid, mucous-laden diarrhea, emaciation, dehydration, and weakness (Bida et al., 1977). Protozoal diseases like balantidiasis are characterized by foul-smelling diarrhea and fever (Hassan et al., 2017), while babesiosis causes abortions, high mortality, and loss of productivity. Ectoparasites cause dermatitis, alopecia, pruritus, crusting, and occasionally widespread skin involvement (Byford et al., 1992). Though pharmacological anthelmintics are commonly used, their overuse has led to alarming levels of resistance in parasite populations (Fissiha et al., 2021).

Retrospective studies, using previously recorded clinical data, offer a cost-effective method for understanding disease epidemiology, including prevalence, frequency, and associated risk factors (Majumder et al., 2022). Environmental variables such as vegetation, rainfall, temperature, and farm management practices influence parasite dynamics. Comprehensive epidemiological surveillance is thus essential for strategic control across various agro-climatic zones (Biswas et al., 2014). Veterinary Teaching Hospital (VTH) at Bangladesh Agricultural University, Mymensingh, provides critical veterinary services, including diagnosis, treatment, and follow-up of clinical cases. Its well-maintained clinical records offer a rich source of epidemiological data and contribute to understanding the natural history, spatial distribution, and risk factors of parasitic diseases, as well as to evaluating treatment efficacy and identifying emerging zoonoses. Given the importance of environmental and individual animal-level risk factors—such as ecology, climate, geography, age, sex, breed, and season—this study seeks to bridge existing knowledge gaps. In particular, limited data exist regarding the role of farm management practices, including hygiene and biosecurity measures, in parasitic infections in Bangladesh (Ahmed et al., 2015; Akanda et al., 2014). Therefore, this retrospective study aims to assess the proportional prevalence, distribution, associated risk factors, and treatment practices related to parasitic infections in cattle presented to the Veterinary Teaching Hospital in Mymensingh, Bangladesh, across diverse production systems.

Materials and Methods

Ethical consideration

Prior consent was taken from the Director, Veterinary Teaching Hospital, BAU for using the data set for this study.

Study area and period

This retrospective epidemiological study of bovine parasitic diseases was based on hospital case records of the Veterinary Teaching Hospital (VTH) of Bangladesh Agricultural University, Mymensingh. Cattle with variety of illness are presents to VTH from different upazilas of Mymensingh include Muktagachha, Valuka, Dhobaura, Mymensingh Sadar, Trishal, Tarakhanda, Gauripur, Ishwarganj, Gaffargaon, Phulpur and Nandail (Figure 1). The research activities were carried out on data for a period of one year from February, 2022 to January 2023.

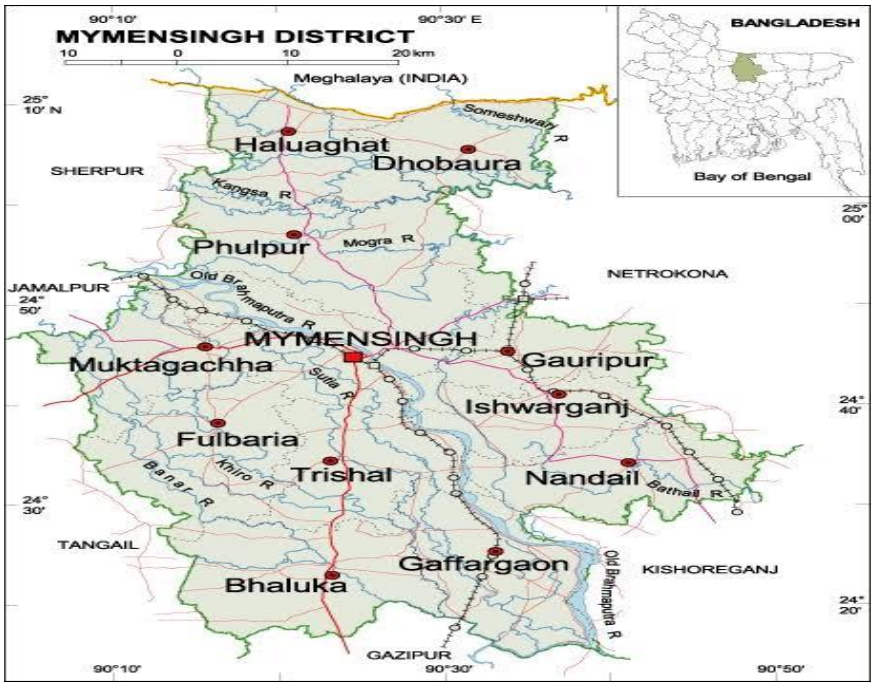

Figure 1. Location map of study area indicating different upazilas of Mymensingh district

Source and Collection of Data

Clinical data were retrospectively collected from patient case records maintained at the Veterinary Teaching Hospital (VTH), Bangladesh Agricultural University (BAU), Mymensingh. Each case record contained detailed information including: case number, date, owner's name and contact, animal address/location, species, breed, age, sex, body weight, presenting complaints, and clinical observations. Recorded clinical parameters included appetite, demeanor, physical condition, rumination, salivation, lacrimation, nasal discharge, dehydration, mucous membrane status, respiration rate, pulse rate, body temperature, rumen motility, and disease history. Further documentation included prior treatment history, management conditions, findings from rectal palpation, necropsy, imaging (X-ray/ultrasound), laboratory test results, clinical diagnosis, prognosis, prescribed treatments, veterinarian's advice, and the attending veterinarian's signature.

Data Retrieval Procedure from Hospital Records

At the VTH, veterinarians routinely collect clinical histories through interviews with animal owners. General physical examinations include assessment of behavior, posture, gait, superficial wounds, prolapse (uterine/vaginal), salivation, nasal discharge, abdominal distension, and signs of locomotor abnormalities. A thorough physical examination is carried out using palpation, auscultation, percussion, needle puncture (when necessary), and motion assessment of different body systems. Vital parameters such as body temperature, pulse, and respiratory rate are recorded. Based on clinical suspicion, appropriate biological samples are collected for laboratory analysis particularly in cases suggestive of parasitic infections. These include fecal, blood, and skin scraping samples.

Diagnostic Procedures of Parasitic Cases

Coproscopic Examination

Coproscopy was conducted to detect eggs, cysts, or oocysts associated with helminthic or protozoal infections. Fecal samples were collected directly from the rectum or brought by the owner in sterile bottles or polythene bags. Samples were analyzed using standard flotation or sedimentation techniques, following the protocol described by Rahman et al. (1996). The processed samples were examined under light microscopy (magnification: 4× and 10×) for the presence of parasitic elements such as ova, cysts, oocysts, or trophozoites.

Hematological Examination

Blood samples were aseptically collected from the jugular vein of suspected animals. Thin blood smears were prepared on sterile glass slides, air-dried, fixed, and stained appropriately. Smears were then examined under a compound microscope at high magnification (40× and 100× with immersion oil) to identify intraerythrocytic protozoa such as *Babesia* and *Theileria* species.

Ectoparasite Examination

Suspected cases of ectoparasitism were investigated through careful visual inspection of the animal's entire body, with particular attention to regions typically affected (e.g., ears, tail, udder, neck). Collected ectoparasites were examined under stereomicroscopes or compound microscopes using 4× and 10× magnifications for identification based on morphological characteristics.

Treatment and Follow-up Recommendations

Treatment protocols were designed and recorded by professional veterinarians at the VTH. Based on the specific parasitic diagnosis, appropriate commercial anthelmintic or antiprotozoal agents were prescribed. Owners were advised on follow-up visits and biosecurity measures. Recommendations often included strategic deworming, environmental hygiene, and nutritional support to reduce reinfection and promote recovery.

Data analysis

Statistical analysis is performed using Microsoft excel version 11 and expressed as proportion percentage. A 95% confidence interval of the estimates were calculated using online available tool- sample-size.net (https://sample-size.net/confidence-interval-proportion).

Results

Frequency of bovine parasitic diseases reported at VTH

In the present study, the most frequently observed parasitic disease among cattle presented to the Veterinary Teaching Hospital (VTH), BAU, was paramphistomiasis, accounting for 49.81% of all parasitic cases. This was followed by stomach worm infections (16.47%), fascioliasis (16.28%), ectoparasitic infestations (10.92%), balantidiasis (5.94%), and blood protozoal infections (0.57%). Thus, paramphistomiasis showed the highest frequency, while blood protozoal infections were the least reported. The high frequency of paramphistomiasis in this study suggests that trematode infections remain a dominant parasitic threat in the region. Additionally, the relatively low frequency of protozoal infections may reflect lower vector activity or underdiagnosis due to subclinical presentations or limitations in routine diagnostics.

Table 1. Relative frequency of encountered bovine parasitic diseases at VTH, BAU

Diseases	Number of infected cattle	Proportion (%)	95% CI
Paramphistomiasis	260	49.81%	45.43-54.18
Fascioliasis	85	16.28%	13.22-19.74
Stomach worm infection	86	16.47%	13.39-19.94
Balantidiasis	31	5.94%	04.07-08.32
Ectoparasitic Infestation	57	10.92%	08.38-13.92
Blood Protozoa Infection	03	0.57%	0.12-01.67
Total	415		

CI= Confidence Interval

Upazila-wise distribution of bovine parasitic cases reported to VTH

This retrospective study analyzed clinical records from the register book of the Veterinary Teaching Hospital (VTH), Bangladesh Agricultural University, Mymensingh. The cases were reported from eight different upazilas within the Mymensingh district (Table 2).

Table 2. Distribution of bovine parasitic cases reported from different upazilas of Mymensingh district to VTH

Upazila	Relative frequency	95% CI
Mymensingh Sadar	80.7%	76.59-84.41
Trishal	9.15%	6.56-12.35
Gouripur	3.37%	1.86-5.60
Ishwarganj	3.37%	1.86-5.60
Tarakanda	1.68%	0.68-1.86
Gafargaon	0.96%	1.86-5.60
Phulpur	0.24%	0.01-1.34
Nandail	0.48%	0.06-1.73

CI= Confidence Interval

A notable difference in infection prevalence was observed between sexes. The prevalence of parasitic infections was relatively higher in female cattle (51.80%) compared to male cattle (30.36%) (Figure 2a). This disparity may be associated with physiological stress factors such as pregnancy and lactation in females, which are known to influence susceptibility to parasitic infections. Additionally, mixed-type parasitic infections were found to be highly prevalent. Of the total cases, 26.02% were single infections, while a significantly higher proportion, 73.97%, involved mixed infections (Figure 2b). This predominance of mixed infections underscores the complexity of parasitic disease dynamics in cattle, particularly under traditional and semi-intensive farming systems, where animals are frequently exposed to diverse parasitic species due to shared grazing areas, poor deworming practices, and suboptimal farm hygiene. These findings suggest that integrated parasite control strategies targeting multiple parasite types and addressing both host and environmental factors are essential for effective parasitic disease management in the region.

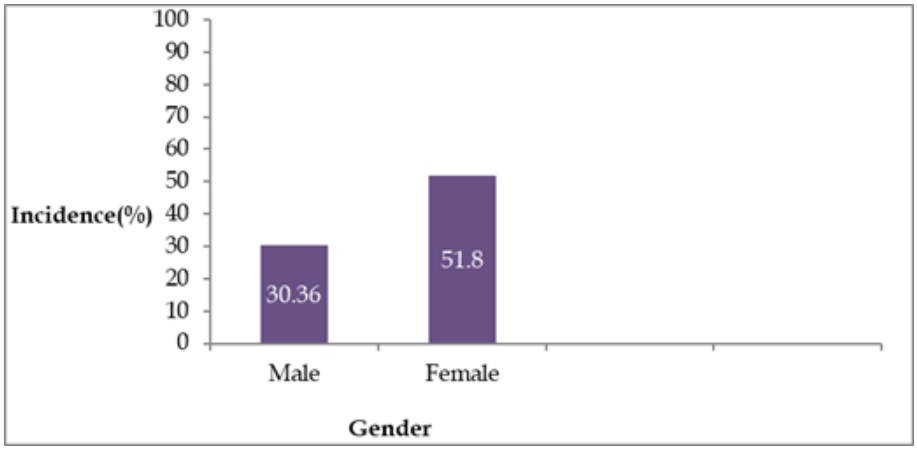

Figure 2(a): Distribution of bovine parasitic cased in terms of host's sex.

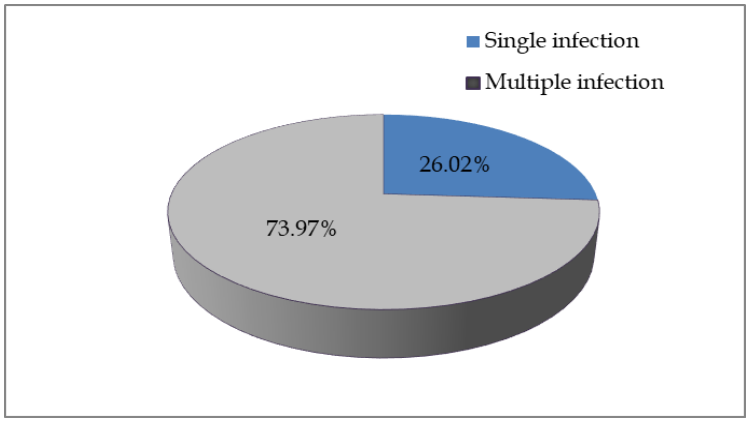

Figure 2(b): Distribution of bovine parasitic cased in terms of infection types (single or mixed).

Clinical manifestations associated with bovine parasitic cases reported at VTH

Clinical signs observed in parasitic infections varied depending on the parasite species involved. In this study, diarrhea was the most frequently observed clinical sign and was associated with several parasitic infections, including paramphistomiasis, fascioliasis, balantidiasis, and stomach worm infections. Diarrhea was recorded in 39.80% of the total parasitic cases (Table 3), indicating its prominence as a non-specific but important indicator of gastrointestinal parasitism in cattle.

The pathophysiology of diarrhea in these conditions may be linked to the irritation of the gastrointestinal mucosa, altered fluid absorption, and mucosal damage caused by parasite migration, feeding, or toxin release. In particular: paramphistomes and fasciolids cause mucosal inflammation and damage during larval migration, often leading to profuse, fetid diarrhea. Balantidium coli, a ciliate protozoan, induces mucoid to bloody diarrhea due to its invasion of the large intestinal mucosa. Strongyle-type stomach worms impair digestion and absorption, further contributing to lose stools and nutrient loss. These findings emphasize the importance of including parasitic infections in the differential diagnosis when cattle present with diarrhea, particularly in endemic regions. Early detection and targeted anthelmintic treatment are crucial for improving clinical outcomes and minimizing productivity losses.

Table 3. Clinical manifestations associated with parasitic cases presented at VTH

Clinical manifestations	Number of cases in proportion (%)	95% CI
Diarrhea	123(39.80)	34.31-45.50
Constipation	33(10.68)	07.47-14.67
Abdominal distension	13(4.21)	02.26-07.09
Fever	14(4.53)	02.50-07.49
Hair loss	54(17.47)	13.41-22.18
Coffee color urine	03(0.97)	0.20-02.81
Reduced milk production	69(22.33)	17.81-27.39
Total	**309**	

CI= Confidence Interval

Antiparasitic drugs commonly used at VTH, BAU

In the present study, the most commonly prescribed antiparasitic regimen at the Veterinary Teaching Hospital (VTH), Bangladesh Agricultural University, was a combination of triclabendazole and levamisole, accounting for 52.30% of treatments administered for parasitic infections. This combination was frequently used due to its broad-spectrum efficacy against both trematodes and nematodes, particularly in cases of mixed infections. Other antiparasitic agents used included fenbendazole (16.47%), ivermectin (10.92%), nitroxynil (9.19%), copper sulfate (5.94%), triclabendazole alone (4.56%), and imidocarb (0.57%). These drugs were selected based on the suspected or confirmed parasite species, clinical presentation, and practitioner experience.

Table 4. Commonly used antiparasitic drugs at VTH, BAU

Drugs used	Number of cases treated	Proportion (%)	95% CI
Triclabendazole+Levamisole	273	52.299%	48.89-57.71
Copper Sulfate	31	5.94%	04.15-08.48
Fenbendazole	86	16.47%	13.66-20.32
Nitroxynil	48	9.19%	06.99-12.24
Triclabendazole	24	4.60%	03.03-06.89
Ivermectin	57	10.92	08.54-14.18
Imidocarb	03	0.57%	0.12-01.70
Total	**522**	**99.97%**	

CI= Confidence Interval

Recurrence of bovine parasitic diseases after deworming

Post-deworming recurrence of parasitic infections in cattle was documented based on clinical records and case histories at the Veterinary Teaching Hospital (VTH), Bangladesh Agricultural University. A total of 38 recurrence cases were identified, indicating that despite prior anthelmintic treatment, reinfection or ineffective deworming remained a concern. Among the recurrent cases: Paramphistomiasis was the most common, occurring in 11 cases (28.95%); Balantidiasis was observed in 10 cases (26.31%); Fascioliasis was reported in 4 cases (10.53%) (Table 4).

A considerable proportion of the recurrent infections involved mixed parasitic infestations: paramphistomiasis with balantidiasis occurred in 8 cases (21.05%); fascioliasis with balantidiasis was seen in 2 cases (5.26%), and fascioliasis with paramphistomiasis was also detected in 2 cases (5.26%). A rare instance of triple parasitic infection involving fascioliasis, paramphistomiasis, and balantidiasis was identified in 1 case (2.63%).

Table 5. Frequency of recurrent cases of bovine parasitic disease treated at VTH

Parasitic cases at post-anthelmintic treatment	Number of cases (%)	95% CI
Paramphistomiasis	11(28.95)	15.42-45.90
Balantidiasis	10(26.31)	13.40-43.10
Fascioliasis	04(10.53)	02.94-24.81
Paramphistomiasis+Balantidiasis	08(21.05)	09.55-37.32
Fascioliasis+ Balantidiasis	02(5.26)	0.64-17.75
Fascioliasis+ Paramphistomiasis	02(5.26)	0.64-17.75
Fascioliasis+ Paramphistomiasis+Balantidiasis	01(2.63)	0.07-13.81
Total	**38 (99.98%)**	

CI= Confidence Interval

Discussion

This retrospective clinical study analyzed 415 parasitic disease cases in cattle presented at the Veterinary Teaching Hospital (VTH), Bangladesh Agricultural University, between February 2022 and January 2023. The most prevalent parasitic diseases recorded were paramphistomiasis (49.81%), stomach worm infections (16.47%), fascioliasis (16.28%), ectoparasitoses (10.92%), balantidiasis (5.94%), and blood protozoal infections (0.57%). These findings contrast with the report of Ola-Fadunsin et al. (2017), who documented helminthoses (59.8%), babesiosis (1.5%), trypanosomiasis (77.9%), and tick infestation (4.6%). The variation may stem from differences in geographical regions, climatic conditions, diagnostic approaches, host genetics, management practices, and study periods.

The overall prevalence of gastrointestinal parasites (GIPs) in Bangladesh and neighboring India ranges from 61.1% to 84.8% (Ahmed et al., 2015; Alim et al., 2012; Marskole et al., 2016; Nath et al., 2016). Endemic conditions, such as humid climates, favor parasitic survival and transmission. In Mymensingh, most cases originated from the Sadar upazila (80.72%), likely due to proximity to the VTH. The high incidence of mixed infections (73.97%) aligns with prior findings (Choisy et al., 2010; Islam et al., 1989), indicating frequent coinfection with multiple parasites.

Previous studies have shown that parasites are a problem in the Mymensingh district. According to Khan et al. (2017), almost all livestock in the district are thought to be affected with one or more parasite species due to the district's humid and damp climate, which provides perfect circumstances for parasitic infections. According to this report, Mymensingh Sadar Upazila has the greatest prevalence of parasitic infections. Mymensingh Sadar has 335 cases (80.72%). Trishal upazila has the next highest prevalence (9.15%, 38 cases), followed by Ishwarganj and Gauripur (3.37%, 14 cases), Tarakanda (1.68%, 7 cases), Gaffargaon (0.96%, 4 cases), and Nandail (0.48%, 2 cases). Phulpur upazila has the lowest prevalence, at 0.24% (1 case). This discrepancy can result from the various upazilas' distances from Bangladesh Agricultural University's Veterinary Teaching Hospital. Mixed-type parasite infections are common in nature. In this study, relative percentage of single infection was 26.02% and relative percentage of mixed infection was 73.97%. Animals often become coinfected with different genotypes of the same parasite species Choisy *et al*. (2010). In this study, mixed infection is found (paramphistomiasis+ balantidiasis, fascioliasis +paramphistomiasis, fascioliasis +balantidiasis and fascioliasis+paramphistomiasis +balantidiasis). This study is similar to Islam *et al*. (1989) who reported fascioliasis with paramphistomiasis in cattle. Ahmed *et al*. reported fascioliasis+ paramphistomiasis+schistosomiasis in sheep, this variation may be due to different species of animal.

Female cattle had higher infection rates, possibly due to hormonal influences (e.g., prolactin, progesterone), nutritional deficits, and immune suppression (Jahan et al., 2018). Diarrhea was frequently associated with fascioliasis, paramphistomiasis, and balantidiasis (Hashem et al., 2017; Rolfe et al., 1991), while fever and coffee-colored urine were seen in babesiosis (Bock et al., 2004; Vannier et al., 2020). Ectoparasitic infestations often resulted in hair loss (Trueb et al., 2023). A notable observation from this study was the recurrence of parasitic infections after deworming, particularly paramphistomiasis (28.95%), balantidiasis (26.31%), and fascioliasis (10.53%). Mixed recurrence was also evident. These recurrences could be attributed to inadequate deworming practices, incorrect dosing, drug resistance, re-infection from contaminated pastures, and poor parasite control in intermediate hosts. These findings emphasize the critical need for targeted deworming schedules, routine fecal examination, and integrated parasite control strategies tailored to endemic settings like Mymensingh. Recurrence of infections post-deworming suggests potential anthelmintic resistance, improper dosing, or reinfection from environmental sources. These findings highlight the need for routine monitoring, appropriate deworming protocols, and integrated parasite control strategies.

Conclusion

Parasitic infections remain a major constraint to sustainable cattle production in Bangladesh. This study, conducted at the Veterinary Teaching Hospital, BAU, revealed that paramphistomiasis was the most common parasitic disease, while blood protozoal infections were the least frequent. Female cattle showed higher infection rates, potentially due to hormonal and management factors. Mixed infections were common, and diarrhea was the most prevalent clinical sign. The recurrence of infections after treatment suggests potential anthelmintic resistance or reinfection due to poor sanitation and management. Triclabendazole combined with levamisole was the most frequently used treatment. To reduce the parasitic burden, strategic deworming, proper drug selection, and improved husbandry practices are essential. Integrated parasite management, including regular monitoring and environmental hygiene, is crucial for enhancing cattle health and productivity in endemic regions like Mymensingh in Bangladesh.

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Conflict of interest

No conflict of interest exists.

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