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A Comprehensive Image Dataset of Clinically Significant Ruminant Parasites in Bangladesh

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ABSTRACT

This article presents a curated dataset comprising high-resolution images of five parasitic egg types commonly identified in fecal samples of ruminants in Bangladesh and the Indian subcontinent: *Fasciola* spp., *Paramphistomum* spp., *Balantidium coli*, *Ascaris* spp., and stomach worms belonging to the family *Trichostrongylidae*. The images were collected from a range of publicly available and academic sources, including peer-reviewed scientific journals, research articles, veterinary teaching hospital laboratories, and existing open-access datasets. All images were standardized to a uniform format and resolution, and each was annotated with the corresponding parasite genus to facilitate computer-based image analysis. The dataset also includes a set of negative control images that do not contain any parasitic structures. A consistent naming convention (ParasiteName_ImageNumber) and standardized file extensions were applied to ensure systematic organization and compatibility with automated processing pipelines. This dataset is intended for reuse in the development and evaluation of computer vision and artificial intelligence models for parasite identification in fecal samples, particularly for veterinary diagnostic applications. It offers a valuable resource for advancing image-based research in parasitology and has potential utility in diagnostic workflows, especially in resource-limited settings where conventional microscopy is unavailable. The dataset is openly accessible and designed to support a wide range of research and teaching activities in veterinary science, animal health, and computational biology.

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Introduction

Parasitic diseases significantly hinder livestock production by diminishing productivity due to nutrient competition, tissue damage, blood loss, and immunological stress (Perry and Randolph, 2025), while negatively impacting growth and fertility. This jeopardizes food security and rural livelihoods, highlighting the need for integrated control strategies (Rizwan et al., 2023). Environmental factors have a huge impact on the spread and persistence of important parasitic infections. The main factors that affect infection pressure are soil conditions (moisture, temperature, texture) and the availability or quality of water (Perry and Randolph, 2025). Bangladesh is actually a developing country with an agriculturally dominated economy with the livestock sector among its major sub-sectors making a significant contribution to the national economy (Abdullah Al Mamun et al., 2020).

Recent statistics indicate that the sector contributes to national GDP by 3.23% and offers an enormous number of employment opportunities (Bangladesh Economic Review 2023). Parasitic infections are a major constraint to ruminant production in Bangladesh, causing acute mortality and chronic health problems (Abdullah Al Mamun et al., 2020). Fascioliasis is endemic in Bangladeshi ruminants, causing over 1.7 million cases between 2013 and 2015 (Rahman et al., 2017). These infections further reduce productivity and result in substantial economic losses due to treatment, prevention, and control measures (Thapa Shrestha et al., 2020), while also causing liver condemnation, reduced growth rates, anaemia, decreased production, severe morbidity, and sudden death (Dey et al., 2022). Due to the lack of rural diagnostic infrastructure, underdiagnosis is common, highlighting the need for rapid and accurate egg identification to enable targeted parasite control.

This dataset fulfills the need for a reliable, detailed, and openly accessible visual resource for identifying parasitic eggs in ruminants, focusing on Bangladesh and the Indian subcontinent. Even though these species, like *Fasciola spp., Paramphistomum spp., Balantidium coli, Ascaris spp.*, and *Trichostrongylidae* nematodes, are very common, there is no complete, annotated high-resolution image collection for them. To solve this problem, images were carefully chosen from peer-reviewed journals, open-access repositories, and verified databases to make sure they all had the same resolution and format. This opens the door for machine learning and image-based diagnostics, which could replace traditional microscopy in places with few resources. This would speed up diagnosis, make treatment more accurate, and cut down on unnecessary use of anthelmintics, which is important for stopping drug resistance.

Materials and Methods

Data Sources

Images were collected from three major streams: (i) peer-reviewed journals and research publications, (ii) open-access repositories and datasets, and (iii) real-time fecal samples processed at the Bangladesh Agricultural University Veterinary Teaching Hospital. Only images that clearly depicted diagnostically relevant features were included.

Standardization and File Formats

To maintain compatibility with computational workflows, all images were standardized into common file formats (.jpg, .jpeg, .png). File names follow a consistent convention of *ParasiteName_ImageNumber.extension* (e.g., *Fasciola_023.jpg* or *Negative_045.jpeg*), which enables reproducibility and integration into automated machine learning pipelines.

Dataset Structure

The information is arranged in six broad folders: Fasciola, *Paramphistomum, Balantidium coli, Ascaris* sp., Trichostrongylidae stomach worms, and Negative controls. The structure of the folders is shown in **(Figure 1.**) and is designed for easy access and optimal distribution among categories.

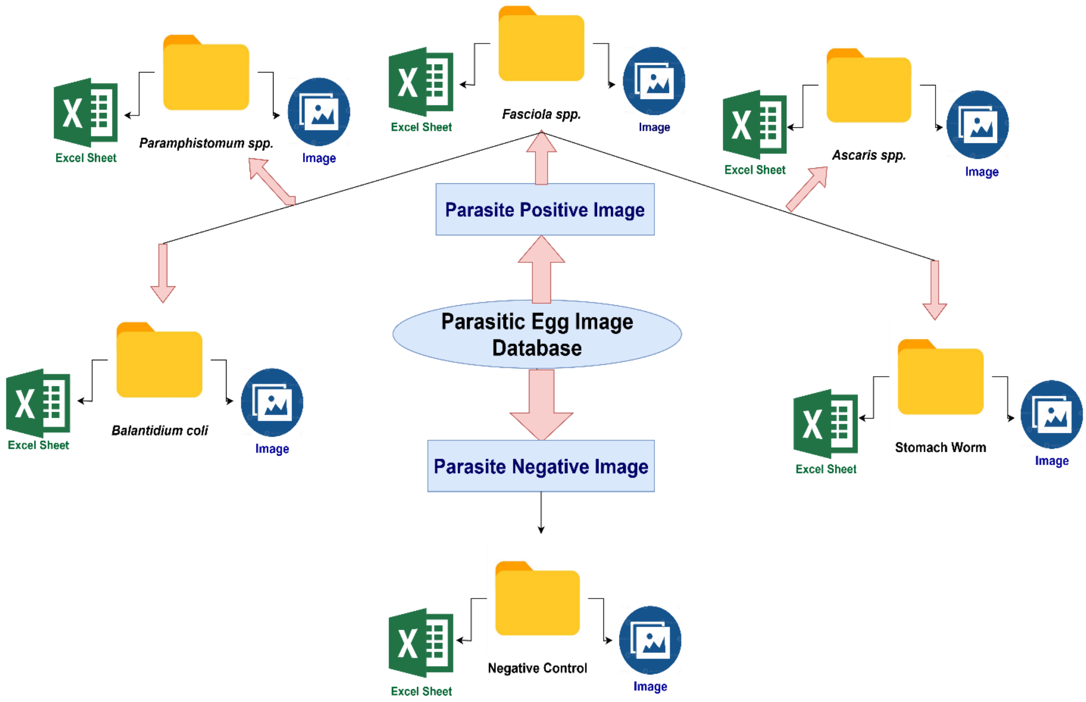

Figure 1. Schematic of the ruminant parasite image dataset folder structure comprising six subfolders

Annotation and Quality Control

Each image was manually reviewed by trained curators. Two reviewers independently verified parasite identification, and disagreements were resolved through consensus. Negative controls were intentionally selected to include confounding objects such as pollen grains, starch granules, and air bubbles, to increase dataset robustness for model training.

Accessibility

The dataset is permanently archived in Mendeley Data and is freely available for download and reuse (Rupai, 2025) (Table 1).

Table 1. Specifications of the ruminant parasite image dataset, including subject area, data type and formats, sources of collection, and accessibility details

Specific subject area	**Parasitology**
Type of data	Type of data: Images Data format: JPEG (.jpeg); PNG (.png); JPG (.jpg); Excel (.xlsx)
Data collection	Collected from peer-reviewed publications, research datasets, and public image repositories. Moreover, from clinics real time data.
Data source location	Publicly available data, Bangladesh Agricultural University Veterinary Teaching Hospital, Bangladesh
Data accessibility	Repository name: Mendeley Data Data identification number: 10.17632/wbvb4whbks.1 Direct URL to data: https://data.mendeley.com/datasets/wbvb4whbks/1 DOI: 10.17632/wbvb4whbks.1 The dataset is publicly available and can be accessed without any restrictions. Simply visit the URL and download the files directly.

Result

The compiled dataset provides a balanced representation of ruminant parasite eggs and negative controls. Each of the five parasite genera *Fasciola, Paramphistomum, Balantidium coli, Ascaris*, and *Trichostrongylidae* stomach worms is represented by 50 annotated images, while 300 negative control images capture common fecal debris (Figure 2) such as air bubbles, starch granules, and plant fragments. This balanced distribution ensures not only sufficient examples for algorithm training but also robustness against misclassification. A quantitative summary of the dataset is presented, showing the counts of images within each parasite class and the negative control group. The even allocation across categories, together with an ample number of negatives, reflects diagnostic conditions in practice, where parasites often coexist with diverse background structures.

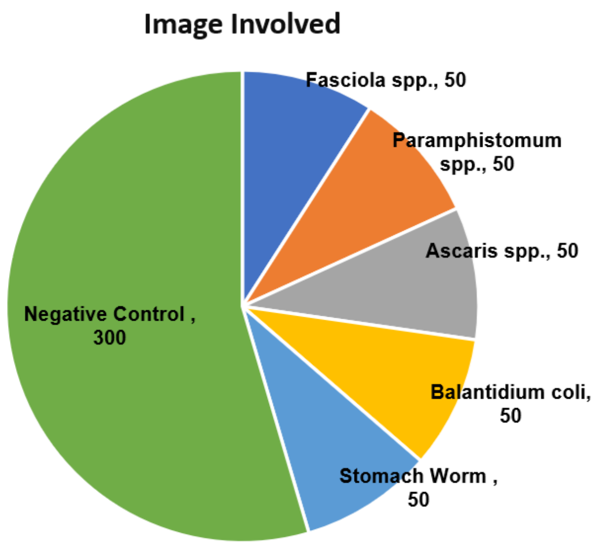

Figure 2. Distribution of images across parasite genera and negative controls

Representative microscopic images are included in (Figure 3) to illustrate the diagnostic clarity of curated examples. Key features such as the operculum of *Fasciola* spp. and the thick shell of *Ascaris* spp. are readily visible, while negative samples demonstrate non-parasitic artifacts that can mimic parasite morphology. These examples highlight the dataset's dual role in algorithm training and in veterinary education. The complete dataset, including all annotated images and metadata, is permanently archived in Mendeley Data and is freely available for reuse (Rupai, 2025).

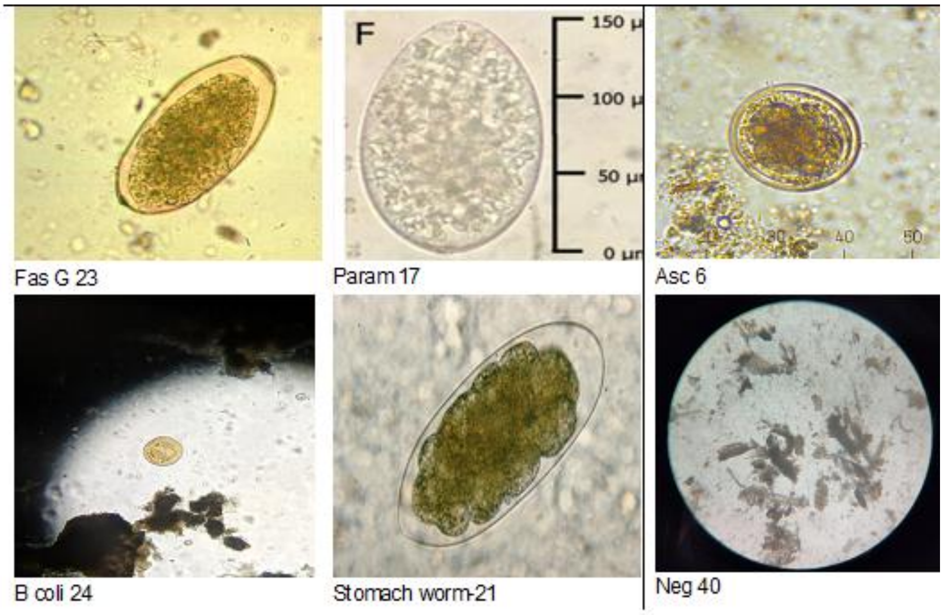

Figure 3. Representative microscopic images: *A) Fasciola spp., B) Paramphistomum spp., C) Balantidium coli, D) Ascaris spp., E) Trichostrongylidae, F) Negative control*

Discussion

Here is one unique and regionally accessible resource of veterinary parasitology comprising diagnostically valuable classes of parasites as well as negative controls that are representative of fecal sample complexity. This two-design renders the dataset ideal for machine learning since distinguishing actual parasite eggs from artifacts is important. Such similarly labeled sets have already been shown to significantly enhance model accuracy on problems of parasite detection. (AlDahoul et al., 2023; Xu et al., 2024). This work can be a great tool for diagnostic innovation by providing openly accessible, curated, and standardized images. Lightweight deep learning models like YAC-Net have shown that they can classify parasitic eggs well even when resources are limited (Xu et al., 2024). It may also increase learning and training since cheap microscopy coupled with transfer learning has been used successfully to detect eggs of parasites, thereby facilitating building capacity in low-resource laboratory settings (Suwannaphong et al., 2023).

Moreover, improved parasite identification can contribute to better drug resistance management, reducing indiscriminate use of anthelmintics, which has already been recognized as a growing issue in ruminant fasciolosis in South Asia (Mehmood et al., 2017; Rahman et al., 2017). However, the dataset has some problems. Most of the positive images came from publications and repositories, which may limit diversity and cause differences in resolution and imaging conditions. This is a problem that has been seen in other multiclass helminth egg detection studies where domain shift made model generalization harder (Oyibo et al., 2025). In spite of these limitations, the dataset is a substantial milestone towards crafting AI-based parasitology for Bangladesh and other countries according to recent invitations to extend open, standardized, and region-specific veterinary diagnostic datasets to make artificial intelligence use more reliable within animal health (Burti et al., 2024).

Conclusion

This collection is the first widely published, standardized set of Indian subcontinent and Bangladeshi common ruminant parasites. It gives balanced representation across multiple genera and includes varied negative controls, and is thus appropriate for both veterinary instruction and diagnostic AI research. Wider adoption and expansion of this dataset can strengthen livestock health management and improve parasite control strategies in South Asia.

Competing Interest

The authors declare no competing interests.

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