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***Research Article***

# SEASONAL OCCURRENCE OF GASTROINTESTINAL HELMINTH PARASITES IN CATTLE AND BUFFALOES IN BANKURA DISTRICT, WEST BENGAL, INDIA

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**ABSTRACT: Parasitic infestation is a major constraint of livestock and causes great economic loss to animal husbandry by the way of retarded growth, low productivity and increased susceptibility of animals to other infections. In view of the parasitism, the present study was aimed to elucidate the incidence of gastrointestinal (GI) helminth parasites in cattle and buffaloes in Bankura district, West Bengal. A total of 1200 fecal samples (200 samples/ species/season) were collected directly from the farmers' end in three different seasons namely winter, summer and rainy seasons. The stool samples were examined initially by direct smear followed by sedimentation and floatation techniques within 24h of collection. All three major parasites *i.e.* nematode (*Toxocara, Strongyloides,* Strongyle and *Trichuris*), cestode (*Moniezia*) and trematode (Paramphistomes and *Fasciola*) were observed and analyzed based on the morphology of eggs. The degree of incidence was superior in buffaloes compared to the cattle irrespective of the seasonal variations. The rainy season showed the highest degree of parasitic occurrence (67.00%) compared to winter (52.25) and summer (38.75%) seasons. The study of species-wise incidence demonstrated a highest peak of Paramphistomes (32.17%) where very few samples were positive for *Trichuris* sp. (2.42%). Among the sub-divisions, Bishnupur represented the maximum occurrence of helminth parasites (62.05%) as compared to Bankura sadar (58.47%) and Khatra (40.16%). Significantly (P<0.05) higher percent of trematode and nematodes were prevalent in Bishnupur though the same observation was manifested for cestodal infection in Khatra. It can be concluded that a favorable hot and humid condition during rainy season favors the growth of propagation of developmental stages which would be the reason of peak prevalence. It can also be focused that a micro level agro-climatic disparity may lead to the variation within the study sites.**

**Key words:** Bankura, Helminth parasites, Prevalence, Seasons, Cattle and buffalo.

## INTRODUCTION

Livestock and poultry rearing is an imperative factor for improving the nutritional security of rural poor in this country with a major contribution to Indian economy, accounting for about 25 percent of agricultural GDP (Nath *et al.* 2012). Similar to environmental and other life risk cues, parasitism in all respect of animal husbandry practices is now a challenge for the sustainable production. Because of wide range of suitable agro-ecological factors, the gastrointestinal (GI) helminth parasites are a world-wide problem for both small and large-scale farmers (Regassa *et al.* 2006). The problems associated with the parasitism are often classified as production disease which results in reduced feed intake and alteration of GI motility leading to diarrhea (Rupa and Portugaliza 2016). Helminth parasite causes poor growth due to mal-absorption of essential nutrients (Murthy and Rao 2014) and become major constraint to the production potential of the ruminants (Biu *et al.* 2009) on a clinical and subclinical level (Martinez-Ganzalez 1998). GI parasitism changes the host metabolism accounting for much of the reduced protein and energy retention, and disturbed mineral and water balance (Blackburn *et al.* 1991). Therefore, the economic losses

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**Table 1. Species wise incidence of gastrointestinal helminths in cattle and buffaloes in Bankura district, West Bengal, India.**

| Sl No | Species | Samples examined | Total positive | Incidence (%) |
|---|---|---|---|---|
| 1 | *Toxocara* sp. | 1200 | 223 | 18.58 |
| 2 | *Strongyloides* spp. | 1200 | 98 | 08.17 |
| 3 | Strongyle | 1200 | 151 | 12.58 |
| 4 | *Trichuris* spp. | 1200 | 29 | 02.42 |
| 5 | *Moniezia* spp. | 1200 | 83 | 06.17 |
| 6 | Paramphistomes | 1200 | 386 | 32.17 |
| 7 | *Fasciola* spp. | 1200 | 169 | 14.08 |

are attributed to low production, high cost of prevention and treatment and death of infected animals (Solaiman 2010). However, the prevalence of gastrointestinal parasites, the genera of helminth parasites involved, species and the severity of infection also vary considerably depending on local environmental conditions such as humidity, temperature, rainfall, vegetation and management practices (Teklye 1991). Despite the immense progress made for the prevention and control of parasitosis, farmers at the grass root level are still traditional and continue to incur significant losses due to insufficient availability of information on the epidemiology of the parasites. Improper dosing and indiscriminate use of anthelmintic compounds may suppose to resist the helminth parasites which negatively affect the production potential of the animals. The qualified professionals need to be sentient about the prevalence in their respective geographical locations that definitely expedite the diagnosis and treatment process and helps in mitigating the unwanted consequences.

In view of the above cues, the present study aimed to analyze the incidence of the gastrointestinal helminth parasites in cattle and buffaloes for future holistic prevention and control strategies in the area. The results gathered from this epidemiological investigation may also serve as a point of reference to those dwelling in the same management and climatic condition.

## MATERIALS AND METHODS

### Ethical approval

The protocols involving the care and use of animals for these experiments were in accordance with the guideline of the revised framework of animals (Scientific Procedures) Act of 2002 of Government of India on Animal welfare. A non-invasive fecal collection was performed therefore handling was minimal based on the guide for the care and use of agricultural animals in research (Curtis and Nimz 1988).

### Description of the study area

The district has been described as the "connecting link between the plains of Bengal on the east and Chotta Nagpur plateau on the west". The western part of the district has poor, ferruginous soil and hard beds of laterite with scrub jungles and Sal (*Shorea robusta*) woods. During the long dry season, large extents of red soil with hardly any trees lend the country a scorched and dreary appearance. The district is situated between 22° 38' and 23° 38' north latitude and between 86° 36' and 87° 46' east longitude. The climate, especially in the upland tracts to the west, is much drier than in eastern or southern Bengal. From the beginning of March to early June, hot westerly winds prevail, the thermometer in the shade rising to around $45^0$C ($113^0$F). The agro-climatic condition of the district seems to be suitable for the propagation of the animal resources with an outline of 8.26% cattle and 12.92% buffalo of the state (ARDD 2009).

### Collection and Coproscopy

The study was conducted in between October 2014 to September 2015. The faecal samples were collected directly from the farmers' end throughout the district during three main seasons *i.e.* winter (October 2014 to January 2015), summer (February-May 2015) and rainy (June 2015 to September 2015). The minimum sample size required for this study was 1200 (200 samples/season/species) as determined by sample determination formula (Thrusfield 1995). Samples were randomly collected in the plastic zipper pouch from the different locations of the study area. After suitable labeling, samples were stored immediately in ice chilled container and carried to the working station (Additional Block Animal health Centre, Khatra) where samples were processed and examined for helminth parasites egg initially by direct smear followed by sedimentation technique and floatation analysis (Foriet 1999). The eggs of the helminth parasites were identified after observing the size and morphological characteristics of eggs (Soulsby 1986) using low and high-power illuminations.

**Table 2. Season wise occurrence of gastrointestinal helminth parasites in cattle and buffaloes in Bankura district, West Bengal, India.**

| Season | Cattle | | | Buffalo | | | Both | | |
|---|---|---|---|---|---|---|---|---|---|
| | No of samples | No. of positive | infection % | No of samples | No. of positive | infection % | No of samples | No. of positive | infection % |
| Winter | 200 | 103 | 46.0 | 200 | 106 | 53.0 | 400 | 209 | 52.25 |
| Summer | 200 | 73 | 36.5 | 200 | 82 | 41.0 | 400 | 155 | 38.75 |
| Rainy | 200 | 127 | 63.5 | 200 | 141 | 70.5 | 400 | 268 | 67.00 |

**Table 3. Sub-division wise occurrence of individual gastrointestinal helminths in study population in Bankura district, West Bengal, India.**

| Sub-division | Nematode (%) | | | | | Cestode (%) | Trematode (%) | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | Total | E | F | G | Total |
| Bankura sadar | 23.11 | 7.85 | 9.45 | 0.08 | 40.49 | 4.17 | 31.58 | 17.48 | 49.06 |
| Bishnupur | 19.32 | 10.61 | 11.76 | 3.56 | 45.25 | 5.53 | 37.25 | 15.26 | 52.51 |
| Khatra | 13.32 | 6.05 | 16.53 | 3.63 | 39.53 | 8.82 | 27.69 | 9.51 | 37.20 |

A-Toxocara; B-Strongyloides; C-Strongyle; D-Trituris; E-Moniezia; F-Paramphistomes; G-Fasciola.

**Data analysis**

The data generated in this study were organized using Microsoft Excel and the incidence study was analyzed by dividing the number of animals harboring a given parasite by the total number of animals examined. Occurrence study was also assessed by one-way analysis of variance (ANOVA) and means compared using Duncan's multiple range test (Duncan 1955).

## RESULTS AND DISCUSSION

Production and management of livestock varies from free range to year-round confinement based on the available resources and agro-climatic conditions of the area. A comprehensive knowledge of epidemiology for GI parasites and associated agro-climatic conditions are must for better farm management practices. Hence, the prevalence varies according to the host species, physical condition, immune status of the animal and the overall management practices (Urquhart *et al.* 1996).

**Overall prevalence of helminth parasites**

Gastrointestinal parasitism, in large part, is caused by nematode, trematode and cestode infection in domestic animals and found to be reduced in fertility, work capacity, food intake, milk production and higher mortality rate (Raza *et al.* 2014). The fecal analysis of cattle and buffalo undertaken in this study revealed 48.67 per cent cattle and 54.83 percent buffaloes were found positive for the presence of gastrointestinal helminth parasites (Fig. 1). Similarly, higher rate of helminth parasites infection in buffaloes were reported by many workers across India (Wadhwa *et al.* 2011, Kakar and Kakarsulemankhel 2011, Patel *et al.* 2015). Reports are also available upon opposite direction (Swarnakar *et al.* 2014) which could be due to the different agro climatic conditions, variation in food habits and grazing pattern of cattle and buffalo. The buffalo by virtue of nature intends to graze over swampy or water logging pastures which favors the growth and propagation of the developmental stages of the parasites. Besides, the problem of oral anthelmintic application in buffaloes could help the helminth parasites to harbor safely.

**Species-wise incidence of helminth parasites**

In the qualitative fecal analysis, the helminth eggs were screened and based on their morphological features, categorized into Nematode (*Toxocara, Strongyloides, Strongyle* and *Trichuris*), Cestode (*Moniezia*) and Trematode (Paramphistomes and *Fasciola*). In this qualitative study, the incidence of Paramphistomes was found to be highest (32.17%) while a very few samples were positive for *Trichuris* sp (2.42%) (Table 1 and Fig. 3). The marshy and swampy areas prevailing over the district favoured the survival of the intermediate hosts for trematodes, might be the coveted factors for such findings. The species-wise prevalence of nematodes revealed an enriched point for *Toxocara* sp. though they all varied between 2.42 to 18.58%. Evidence of 6.17 percent of *Moniezia* sp., the only cestode was observed which is in agreement with Keyyu *et al.* (2006) who

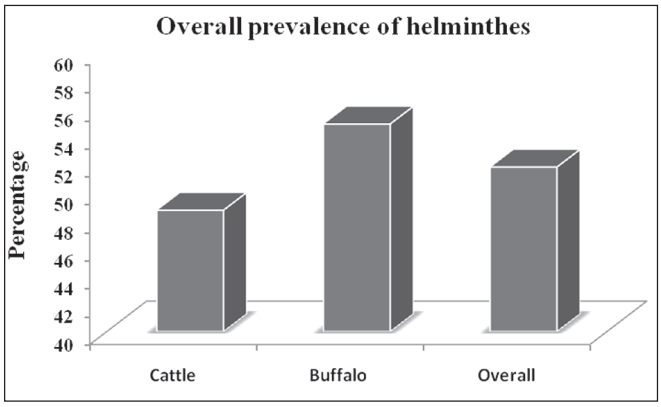


**Fig. 1. Overall incidence of gastrointestinal helminths in cattle and buffaloes in Bankura district, West Bengal, India.**

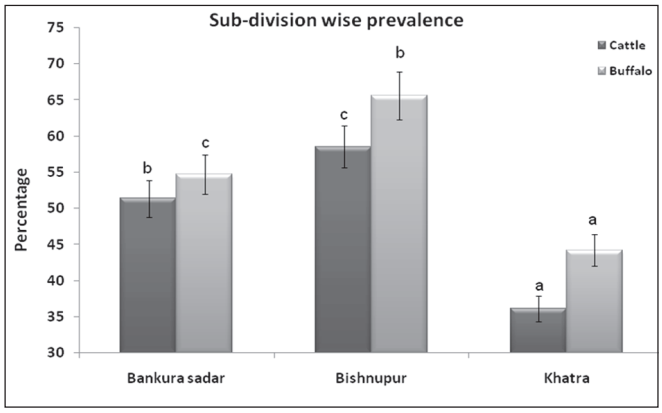


**Fig. 2. Sub-division wise incidence of gastrointestinal helminth parasites in cattle and buffaloes in Bankura district, West Bengal, India.**

concluded that the incidence of cestode species is very few compared to others gastrointestinal parasites. However, it is assumed that the occurrence of *Moniezia* sp. in the tropics is associated with the ingestion of oribatid mites infected with cysts of this parasite. The trend of mixed grazing practices, lack of awareness of the farmers and obviously the indiscriminate use of anthelmintics irrespective of season, age of the animals and physical conditions could be the common predisposing factors of helminthiasis as evident in this study.

**Season-wise occurrence of helminth parasites**

The coproscopic data generated during the course of seasonal study confirmed highest degree of prevalence was recorded during rainy season 63.5% and 70.50% in cattle and buffaloes respectively (Table 2). However, the incidence was greater in buffaloes compared to cattle irrespective of the seasons undertaken in the current study. These findings are in agreement with Bhattacharya and Ahmed (2005) who recorded higher prevalence of parasitic infection during rainy season. Gibbs (1982) demonstrated that temperature and rainfall are the principal climatic factors influencing the incidence of internal parasites and can be used to predict the outbreaks of endo-parasitism. Higher incidence during rainy season might be due to increase environmental temperature and moisture content which favors propagation of the larvae on pasture and attributes significant contamination with infective development stages of parasites. The occurrence of flooding, water pans and swamps are important habitats for propagation of the intermediate hosts of the trematode i.e. Paramphistomes and *Fasciola* spp.

It is established that above 37°C temperature the eggs or ova of GI helminths generally lost their hatchability (moulting from egg to first larvae or infective stages). Hence, the scorching summer (February to May) endowed with high temperature 39-45°C (http://www.imdagrimet.gov.in) in this district might be the ensuing factor affecting the process of translation of these larval stages and probably the reason of lower rate of GI helminths infection (Table 2) in both cattle and buffaloes. During winter, i.e. October to January months at Bankura, the environmental moisture percentage goes beyond threshold level which may arrest the developmental stages of GI helminths and might be the cause of lower rate of infection as recorded in this study. The seasonal host resistance to such infection has not been considered in this study and needs to be explored for further details.

**Sub-division wise incidence of helminth parasites**

The district is enriched with twenty-two development blocks and demarcated by three sub-divisions *i.e*. Bankura sadar, Bishnupur and Khatra. Among the sub-divisions, the highest incidence of helminth infection was recorded in Bishnupur (62.05%) followed by Bankura sadar (58.47%) and Khatra (40.16 %) sub-division (Fig. 2). Evidently, the Khatra sub-division comprising of eight developmental blocks are ornamented with mid-lands and adjacent to the dry environment of Jharkhand and Purulia district which might be co-related with our present

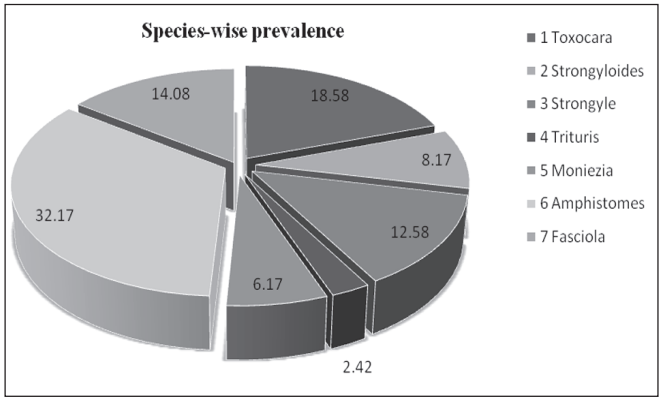


**Fig. 3. Species-wise incidence of gastrointestinal helminths in cattle and buffaloes in Bankura district, West Bengal, India.**

findings. In most cases, the animals are run in herds, concentrated in confined areas or tethered on pegs where they are likely to pick up infective stages from contaminated pastures (Kanyari *et al.* 2009). Higher degree of prevalence may also be associated with the problem in management among rural farmers as well as their lack of expertise in following parasitic control program.

## CONCLUSION

It can be concluded from the present study that the prevalence of gastrointestinal helminth parasites was dominant in buffaloes compared to cattle. The prevalence was highest in rainy season followed by winter and summer. Among the sub-divisions, the magnitude of helminthiasis was drastic in Bishnupur while in Khatra represented the lowest degree of incidence. In the species-wise comparison, Paramphistomes was highly prevalent while occurrence of *Trichuris* sp. was the lowest. However, along with the awareness, every sector associated with the animal husbandry practices needs to understand the epidemiology of GI helminth parasites and vests clear outline for the control and management of the animal resources for optimizing their production potential.

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