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Prevalence of poultry coccidiosis in West Medinipur district of West Bengal State

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Abstract
In this study prevalence of chicken coccidiosis in West Medinipur district of West Bengal. The study was conducted in about 303 houses during April 2019 to March 2020, where backyard and organized farming systems were adopted. Out of 1304 backyard poultry examined, coccidiosis was confirmed in 1016 (77.9% of total birds) birds best on faecal sample examination and necropsy examination. In this study the highest incidence was recorded in rainy (95.2%), followed by summer (83.76%) and lowest in winter (44%). Three *Eimeria* species *viz.*, *E. tenella*, *E. necatrix*, *E. brunetti* were recorded. Out of 1304 birds 56.13% were found positive for *E. tenella*, 12.57% for *E. necatrix* and 9.20% birds were found positive for *E. brunetti.* 200 feacal samples were collected from 4 different organized poultry farms. Out of 200 birds 20.5% birds were positive for *E. tenella*, 5.5% for *E. necatrix* and 3% for *E. brunetti*.

Keywords: Poultry, backyard, coccidiosis, prevalence

Introduction
Poultry industry has developed into one of the economically viable industry during last three decades. Poultry is one of the fastest growing segments of the agricultural sector in India today. In India, 70-80% of people live in villages and most of them are engaged in agriculture and allied works (Dube, 2011) [4]. The agriculture is getting feminized as more numbers of females (83%) are engaged in agricultural work than males (67%) (Mahendra Dev, 2011) [16]. The female farmers prefer to rear the poultry in their backyard due to requirement of less labour and other inputs than the large ruminants. The demand of poultry meat has risen recently due to less production of chevon and mutton and the contraindication of beef or pork in different religions. Thus in this country backyard poultry provides valuable protein through a low input system, representing 30% or more of all protein consumed (FAO, 2000) [5]. In addition, this rural poultry sector contributes 23% of the total national egg production (Ngullie and Sharma, 2012) [18]. As per 19th Livestock census (2012), the state West Bengal stands fifth in relation to poultry population and first considering the density of population in India (livestock census-2012, Government of India). Rearing poultry in the household is a traditional practice in the state where 49% of the rural households belonged to all communities and castes keep poultry (SAPPLPP, 2009) [26]. However, in egg production the state stands fifth due to its large numbers of low yielding fowl population, majority of them are reared in backyard system. About 81% of the eggs are produced in backyard farming system in West Bengal (Annual Administrative Report 2009-2010, ARD Department, Government of West Bengal). There are some constraints in increasing this egg production such as occurrence of infection due to lack of biosecurity knowledge in the farmers, substandard feed, inadequate management practices, poor marketing system, weak extension services (FAO, 2008; Conan *et al*., 2012) [6, 3]. A notable aspect about poultry is that it is an efficient converter of low fiber feed stuffs which is unfit for human consumption, into highly nutritious animal protein food to minimize losses in poultry industry poultry should be maintain in a disease free atmosphere.
Among the many diseases of economic importance to poultry industry, coccidiosis is one of the major problems causing great loss to the poultry industry. Coccidiosis is usually a disease of young birds, but birds can be infected at any time if never exposed before. Coccidiosis is caused in poultry by a one-celled parasite of the genus *Eimeria*. The life cycle of *Eimeria* takes about four to seven days to complete. Coccidia are very prolific parasites. There are seven different *Eimeria* that infect chickens. Chicken coccidia species are *E. acervulina*, *E. maxima*,

E. tenella, *E. necatrix*, *E. mitis*, *E. brunetti* and *E. praecox*. Outward signs of coccidiosis in chicken include droopiness and listlessness, loss of appetite, loss of yellow colour in shanks, pale combs and wattles, ruffled, unthrifty feathers, huddling or acting chilled, blood or mucus in the faeces, diarrhoea, dehydration, and even death. Other signs include poor feed digestion, poor weight gain, and poor feed efficiency. Coccidiosis causes a thickening of the intestines, which make them feel like a sausage. There may be light-coloured spots on the surface of the gut, and inside the gut, haemorrhages and streaks. According to Levine (1963) [12], most of the coccidia found within the intestinal tract, each species is usually found in a specific location. Someare found in the caecum, others in the duodenum, still others in the ileum.

Though, coccidiosis is widely prevalent in West Bengal, but very little published information is available. Threfore, present study was conducted to know the prevalence of coccidiosis in Poultry maintained under different managemental conditions in West Medinipur district of West Bengal State, India.

Materials and Methods

Poultry birds maintained under two managemental conditions *viz*. organized and unorganized (backyard poultry birds) were used in this study. The study was conducted in about 303 houses, where backyard farming system adopted. There was no history of vaccination against coccidiosis. In cross sectional study during April 2019 to March 2020, each house was visited once during the rearing period and faecal samples were collected from suspected and non- suspected birds for laboratory examination. Infected birds were collected and for necropsy respectively. A total of 1304 faecal samples were collected from organized farms and backyard poultry (unorganized) of West Medinipur district of West Bengal. The faecal samples were collected directly from floors of backyard poultry and organized farms and stored in plastic containers. The particulars like age, farm management practices were recorded. The samples were kept at 4^0C till examination. The oocysts were concentrated for examination by centrifugation with saturated sugar solution and were identified on the basis of morphological characters. The oocysts recovered were kept in two lots of 2.5% potassium dichromate solution (K2Cr2O7). The material of one lot was poured in petri dishes to a depth of 3–4 mm and kept in biological oxygen demand (BOD) incubator at a temperature of 30 ± 2 ^{0}C for sporulation. The other lot of culture was kept at 4 ^{0}C C. The culture of both the lots was examined and morphological characters were studied before and after sporulation (Lima 1979; Levine 1985; Pelle´rdy 1974; Soulsby 1982) [14, 13, 20].

After faecal sample examination the sporulation time were recorded at every 12 hours interval. The parameters included morphological characters, biometry and sporulation time as described by (Levine 1985) [13]. Unsporulated and sporulated were speciated on the basis of their morphological features and sporulation time.

Results and Discussions

Out of 1304 backyard poultry examined, coccidiosis was confirmed in 1016 (77.9% of total birds) birds best on faecal sample examination. In this study the highest incidence was recorded in rainy season (95.2%), followed by summer (83.76%) and winterseason (44%) (Table-1& Fig-1). Results on seasonal variation were conformity with the reports of (Mathur, 2000 and Jithendran (2001) [17, 9]. The disease generally reached its pick level during rainy season when the environmental condition *viz*., moisture and humidity favour for the sporulation of oocysts which are the metacyclic stage of the protozoa. This might be the account for the higher incidence of the coccidia infection during the wet months as compared to other season.

Table 1: Incidence of Coccidiosis in Birds in Relation to Season.

Season	Totalm number of birds examined	Total number birds positive	Percentage of infection
Summer (March to June)	468	392	83.76%
Rainy (July to October)	500	476	95.2%
Winter (November to February)	336	148	44.0%
Total	1304	1016	77.9%

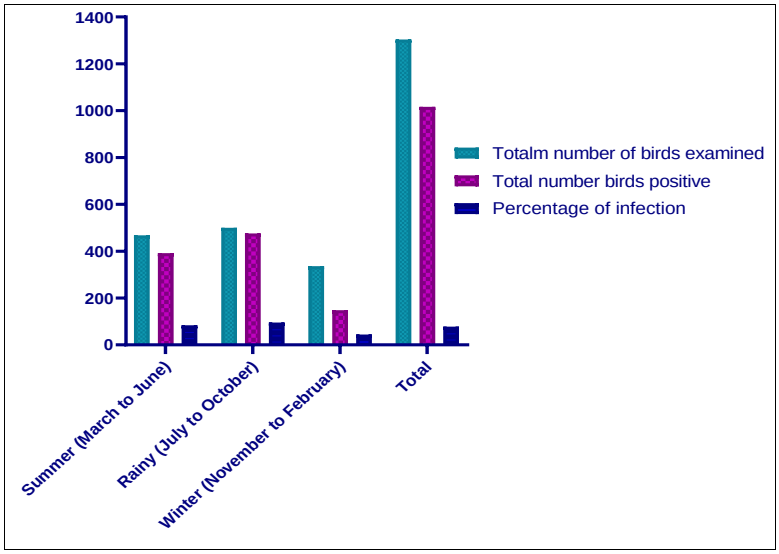

Fig 1: Incidence of coccidiosis in birds in relation to season.

During this study three *Eimeria* species *viz*., *Eimeria tenella*, *Eimeria necatrix*, *Eimeria brunetti* were recorded (Fig. 3, 4 & 5). Out of 1304 birds 732 birds were found positive for *E. tenella*, 164 birds were found positive for *E. necatrix*, and 120 birds were found positive for *E. brunetti. E. tenella*(56.13%), *E. necatrix*(12.57%), *E. brunetti*(9.20%) were most frequently encountered species (Table-2& Fig-2). The various species of *Eimeria* in poultry were reported by (Jadhav *et al.* 2012, Sharma *et al.* 2013, Amare *et al.* 2012 and Kumar *et al.* 2015) [8, 23, 1, 11].

Table 2: Identified species of *Eimeria* and percentage of their infection in birds.

Species of Eimeria	Number of positive samples	Percentage of infection (%)
Eimeria tenella	732	56.13
Eimeria necatrix	164	12.57
Eimeria brunetti	120	9.20

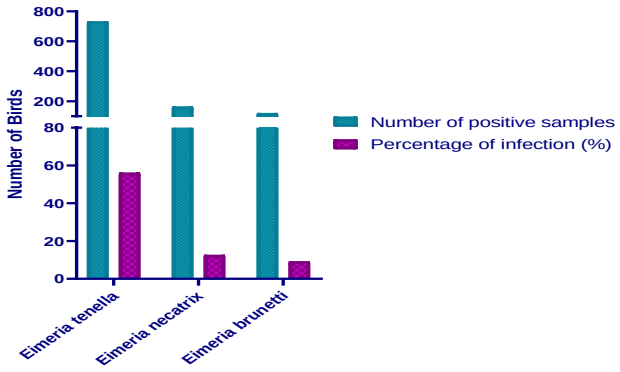

Fig 2: Identified species of Eimeria and percentage of their infection in birds

Fig 3: Unsporulated oocyst of *Eimeria tenella* (Photomicrograph, X100).

Fig 4: Unsporulated oocyst of *Eimeria necatrix* (Photomicrograph, X100).

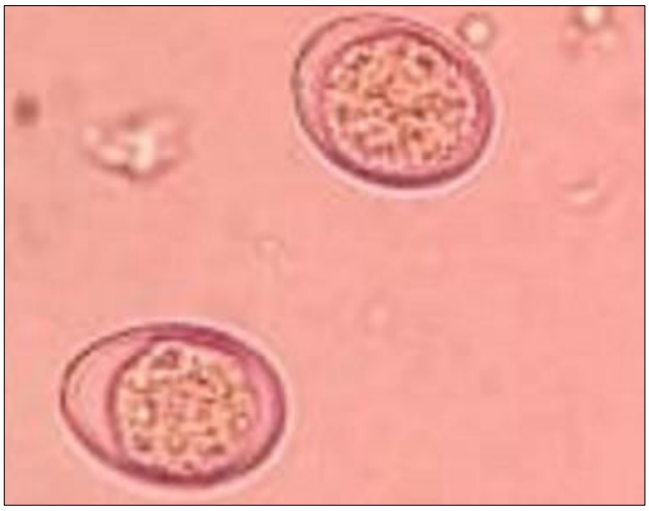

Fig 5: Unsporulated oocyst of *Eimeria brunette* (Photomicrograph, X100).

Out of 468 birds examined in summer 270 birds were positive for *E. tenella*, 76 birds were positive for *E. necatrix* and 46 birds were positive for *E. brunetti.* In rainy season out of 500 birds examined, 360 birds were positive for *E. tenella*, 56 birds were positive for *E. necatrix* and 60 birds were positive for *E. brunetti*. In winter season out of 336 birds were examined, out of which 102 birds were positive for *E. tenella*, 32 birds were positive for *E. necatrix* and 14 birds were positive for *E. brunetti* (Table-3). The similar results were observed by (Kala *et al.* 2013, Mathur, 2000 and Jithendran 2001) [10, 17, 9].

Table 3: Percentage of Different *Eimeria* Species in Relation to Season

Season	Total number of bird examined	*Eimeria tenella*	*Eimeria necatrix*	*Eimeria brunetti*
Summer	468	270	76	46
Rainy	500	360	56	60
Winter	336	102	32	14

200 feacal samples were collected from 4 different organized poultry farms. Out of 200 birds 41 birds were positive for *E. tenella*, 11 birds were positive for *E. necatrix* and 6 birds were positive for *E. brunetti*. 20.5% birds were infected with *E. tenella*, 5.5% birds were infected with *E. nacatrix* and 3% birds were infected with *E. brunetti.* Total 29% birds were positive for coccidial parasite (Table- 4). The level of coccidiosis infection is much lower in organized poultry farming in comparison to back yard poultry farming. The similar results were observed by (Sharma *et al.* 2013; Wondium *et al.* 2019) [23, 27]. Because different coccidiostatic (Agents that prevent the replication and growth of coccidial population) and coccidiocidal (Agents that destroy coccidial population) agents like monencin, lasalocid, salinomycin, maduramicin, amproliumetc are used in organized poultry farming and also good hygiene maintained in commercial poultry farm.

Table 4: Incidence of Coccidiosis in Backyard Poultry in Comparison with organized Poultry Farming.

Total birds examined	Backyard poultry farming (1304)	Percentage of species positive	Commercial poultry farming (200)	Percentage of species positive
Eimeria tenella	732	56.13%	41	20.5%
Eimeria necatrix	164	12.57%	11	5.5%
Eimeria brunetti	120	9.20%	6	3.0%
Total positive birds & Percentage of positive birds	1016	77.9%	58	29%

Results on age susceptibility were presented in this study. The higher incidence of the disease was recorded in 9 to 20 weeks of age (37.7%), followed by 0 to 8 weeks and above 20 weeks age (Table-5 & Fig-6). Which supported the findings of (Gardiner, 1995; Ranby, 1960; Rose, 1967; Pannerselvam andSingh *et al.* 1987) [7, 21, 22, 24].

Table 5: Age Susceptibility in Coccidiosis.

Age susceptibility	Positive for Coccidiosis	Percentage of positivity
0 to 8 weeks	357	27.3%
9 to 20 weeks	492	37.7%
Above 20 weeks	167	12.8%

Conclusion

The present study of prevalence, isolation and identification of backyard and organized farm poultry coccidiosis were undertaken in West Medinipur district of West Bengal. The overall prevalence of coccidia was found to be 77.9% among 1304 backyard poultry birds. The most of the coccidia infected back yard poultry birds, these three coccidia species were *Eimeria tenella, Eimeria necatrix and Eimeria brunetti* identified. Therefore, it can be concluded that the back yard poultry birds were more susceptible from these three most prevalent species of Eimeria.

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