Backyard Poultry Coccidiosis and Its Management in Meghalaya's Hilly Region

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Backyard poultry farming is one of the important components of animal husbandry among the tribal farmers of Meghalaya. Backyard poultry farming is increasing rapidly due to low establishment cost, cheap source of proteins and employment (Bachaya *et al*., 2012). The total poultry population of the country is 851.81 million (backyard poultry: 317.07 million; commercial poultry: 317.07 million) (Livestock census, 2019). The poultry population of Meghalaya is 5.38 million i.e. 0.63% of the total poultry population. Coccidiosis is an intracellular intestinal parasitic disease caused by the different species of *Eimeria*. Morbidity of coccidiosis is estimated to be 50-70% and the disease is a major threat to 15-50 day old birds (Wang, 2003). It seriously impairs the growth and feed utilization of the infected birds resulting in the loss of productivity and inflicts tremendous economic losses to the poultry farmers. It causes intestinal tissue damage and interferes with the food digestion and absorption resulting in the weight loss and bloody droppings. Sometime high rate of mortality may be observed in a farm. Secondary bacterial infection with *Clostridium perfringens* may occur which may predispose them to other gut infections such as necrotic enteritis. About nine species of *Eimeria* have been recognized in poultry birds, of which *E. brunetti*, *E. maxima*, *E. necatrix* and *E. tenella* are the most pathogenic; *E. acervulina*, *E. mitis*, *E. mivati* are the less pathogenic while *E. praecox* and *E. hagani* are the lesser pathogenic (Jadhav *et al*., 2011; Nematollahi *et al*., 2008). Both clinical and sub-clinical coccidiosis retards the growth of flocks and cause huge economic loss to the farmers (Naveed and Faryal, 2019). Type of litter materials, time duration, season, humidity, temperature and disposal of dead birds are other critical factors for poultry coccidiosis.

Prevalence of coccidiosis in backyard poultry of Meghalaya

The overall prevalence of coccidiosis in backyard poultry of Meghalaya was 30.12%. Eight species of *Eimeria viz. E. tenella* (24.63%), *E. necatrix* (10.84%), *E. maxima* (0.98%), *E. mitis* (1.48%), *E. brunetti* (1.97%), *E. praecox* (1.48%), *E. mivati* (0.98%) and *E. acervulina* (2.96%) were identified by morphological characterization (Fig.1). Mixed infections were recorded in 54.68% birds. Month wise highest and lowest infection was recorded in the month of May (40.29%) and December (15.15%), respectively (Fig.2).

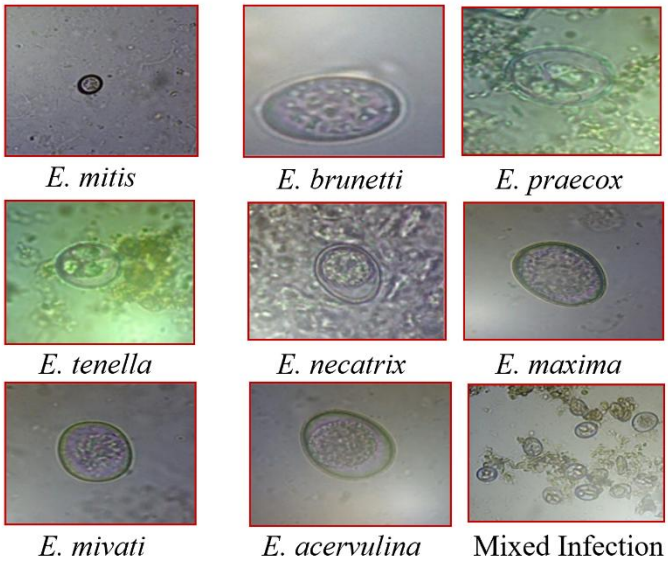

Fig.1 Different species of *Eimeria* in backyard poultry of Meghalaya

Fig.2 Mortality in poultry chicks due to coccidiosis

Month wise highest and lowest infection was recorded in the month of May (40.29%) and December (15.15%), respectively (Fig.3). Intensity of infection i.e. oocyst per gram (OPG) was recorded highest and lowest in the month of August (30000) and February (9500), respectively. Season wise highest infection recorded during monsoon (33.87%) followed by spring (32.77%), winter (27.78%) and autumn (18.37%) (Fig.4). *E. tenella*, *E. necatrix* and mixed infections were observed throughout the year. However, in monsoon season *E. praecox*, *E. maxima*, *E. mitis*, *E. brunetti* and *E. acervulina* are also observed; *E. brunetti* in spring; *E. maxima*, *E. brunetti*, *E. praecox*, *E. mivati* and *E.*

acervulina in winter; *E. mitis*, *E. praecox* and *E. acervulina* in autumn.

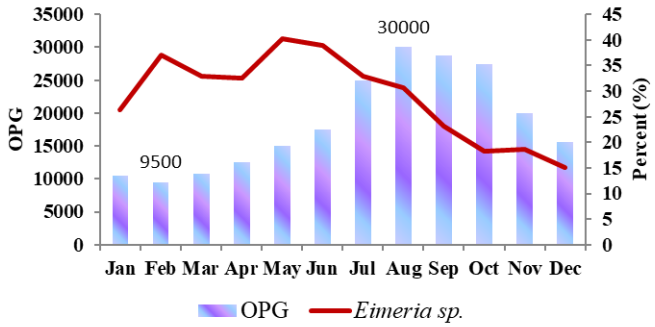

Fig. 3. Month wise intensity of infection in poultry

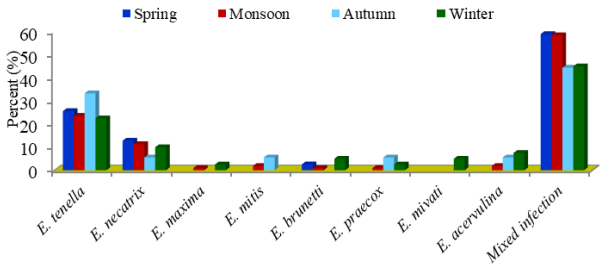

Fig. 4. Season wise prevalence of Eimeria infection in poultry

High rate of infection in the monsoon season may be due to wet floor and litter of poultry farm which is very conducive for the growth and development of the *Eimeria* oocysts. *E. tenella*, *E. brunetti* and *E. necatrix* are associated with haemorrhagic coccidiosis and can be highly pathogenic, with high mortality and morbidity (Long *et al*., 1976). However, *E. acervulina*, *E. maxima*, *E. mitis* and *E. praecox* are less pathogenic, incurring malabsorptive pathologies, although morbidity and mortality can occur depending on dose ingested, parasite strain-specific variation in virulence and host factors such as age, breed and immune status (Williams *et al*., 2009). According to the Williams *et al*. (1996), co-infection with multiple species is common and can complicate diagnosis. *E. necatrix* has been recognized as the most pathogenic *Eimeria* sp. but *E. tenella* is more common and exerts a greater impact on poultry production (Blake *et al*., 2015). The occurrence of coccidiosis can also vary due to climatic conditions, with evidence of elevated parasite levels and disease during wetter and warmer seasons (Luu *et al*., 2013).

According to Omer *et al*. (2011), all ages of birds are susceptible to coccidiosis, but younger birds are more susceptible to infection than older birds which might be associated with the immature immune system in young birds leaving them susceptible to infection even with the lower or less pathogenic strain of *Eimeria* species. Das *et al*. (2020) also observed high rate of infection in young birds which may be due to decreased immunity as well as continuous exposure to infections from the contaminated litter. According to Morris and Gasser (2006), *Eimeria* sp. multiply in the intestinal tract, causing tissue damage, interruption in feeding and digestive processes as well as nutrient absorption, blood loss and increased susceptibility to other disease agents.

Treatment and prevention of coccidiosis in backyard poultry

Poultry coccidiosis can be prevented by using coccidicides, coccidiostats and vaccines as mentioned below:

1) **Coccidicides:** Coccidiosis prevention program used usually aims for eliminating *Eimeria* completely from the gut by using coccidicides that kill the parasites.
2) **Coccidiostats:** In breeders and layers, development of protective immunity is desired. It is achieved by minimal degree of exposure to *Eimeria* species. Coccidiostats are generally used to arrest the development of the parasites at different stages of development allowing for a good balance between intestinal damage and appropriate exposure for immunity development.
3) **Vaccines:** Passive or active immune responses induce immunity in animals. This immunity can reduce the pathogenic effects of coccidiosis such as less macroscopically visible lesions, decreasing of oocyst production and increasing performance of birds. Currently two types of vaccines are used with the aim of controlling coccidiosis in a chemical free way:
    - Live non-attenuated.
    - Live attenuated vaccine.

The main risk of using live non-attenuated vaccines (Coccivac, Advent, Immucox, Inovocox) is the live parasites that can develop a severe reaction in

birds. Many times their use is accompanied by chemical treatments to control the inherent pathogenicity of the parasites. On the contrary, the success of live attenuated vaccines (Paracox and Hatch Pak Coccill) relies on the low risk of disease occurring because of the reduction in the proliferation of parasites and consequently a less damage in bird's tissue.

Today chemoprophylaxis in continuous medication programs appears to be the only effective tool for controlling coccidiosis in floor reared poultry although drug resistance in *Eimeria* sp. populations is a widespread problem in the broiler industry today. Strategic use of anticoccidials may thwart the development of resistance processes. The prophylactic use of anticoccidials is based on the application of additives in feed i.e. drugs are added directly to bird feed in small quantities, usually in concentrations of a few ppm (parts per million) in the morning. Additives in-feed used worldwide for the prevention of poultry coccidiosis and therapeutic anticoccidials are:

1) **Synthetic compounds:** Amprolium, clopidol, decoquinate, diclazuril, halofuginone, nicarbazin, robenidine).
2) **Polyether antibiotics or ionophores:** Lasalocid, maduramicin, monensisn, narasin, salinomycin, semduramicin).

Withdrawal times for most prophylactically used anticoccidials may last 0-5 days and longer (toltrazuril, 14 days). In case of outbreaks of coccidiosis therapeutic drugs (e.g. amprolium, sulfonamides, toltrazuril) are preferably administered via drinking water for 3- or 5-days treatment course and withdrawal periods may exceed 14 days (Heinz Mehlhorn, 2007).

Salient points for treatment of poultry coccidiosis

1) Sulfonamides are widely used.
2) Sulfadimethoxine, sulfaquinoxaline, sulfamethazine, but they shouldnot be used in layer hens.
3) Ionophones, which have an effect on membrane function of the parasite and act as both coccidiocides and coccidiostats (monensin).
4) Quinolones, which have an effect on energy metabolism of the parasite and act as both coccidiocides and coccidiostats (buquinolate).
5) Coccidiostatic thiamine analogs, which have an effect on co-factor synthesis for the parasite.
6) The supplementation of vitamins A and K promotes the fast recovery.
7) Dose of drugs administration.
   - Sodium-sulphadimidine (0.2%) in drinking water for 3 days, orally.
   - Sodium-sulphaquinoxaline (0.5%) in feed for 7 days, repeat after 5 days interval, orally.
   - Sulphaquinoxeline: Add 50 ml of solution to 10 lit. of water and give in the following schedule (3-2-3 basis). 3 days medicated water, 2 days plain water, 3 days medicated water.
   - Amprolium hydrochloride @ 30 gm in 25 litre of water for 5-7 days.
8) To avoid development of drug resistance include switching of drugs and the 'shuttle programme', which is a planned switch of drug in the middle of the growing period of birds is necessary. Most suitable drug is used for starter, while another drug is used for grower and finisher.

Prevention of coccidiosis in backyard poultry

- Maintain vigilance and treat as soon as the first symptoms are seen.
- Coccidiosis in poultry birds are prevented by maintaining hygiene and sanitation in the poultry farm. When young birds are placed on heavily contaminated litter, deaths may occur within a few days.
- For sporulation, oocysts require moisture and warmth and survive best in shade and moist conditions. So, always try to keep poultry sheds and litter dry.
- To avoid the intake of large numbers of oocysts by susceptible poultry, litters from poultry shed should be regularly removed if possible every two days.

- Periodical turning of poultry litter is also essential to keep it dry.
- Litters may be redistributed frequently to avoid concentrations of oocysts at places such as feeding or watering troughs etc.
- When poultry houses are emptied for a new batch of birds, the litter should be stacked so that the heat evolved is sufficient to kill oocysts. Heaped litter, left for 12 hours or more, will normally generate a temperature of about 51°C, which is sufficient to destroy the oocysts.
- Footbaths should be provided at the entrance of poultry farm.
- Proper steps must be taken to remove the poultry droppings at frequent intervals and to dispose them away from poultry shed.
- Poultry birds can be prevented from coccidiosis by giving prophylactic medication with anticoccidials in feed/water.
- Coccidiosis in birds may be prevented by giving anticoccidials in feeds/drinking water of birds (Amprolium @ 0.0125% in feed, Nicarbazine @ 0.0125% in feed, Nitrofurazone @ 0.005%-0.01% in feed upto 10 weeks of age).
- Treatment of infected birds immediately to prevent spread of infections.
- Droppings of birds should be regularly screened for parasitic infections.

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