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A survey on prevalence of helminth infection in desi poultry birds from Darbhanga region of north Bihar India

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Abstract
Poultry has a major role to play in developing countries. Produce is relatively inexpensive and widely available. The commercial poultry industry provides employment and is growing rapidly. To produce 1 kg of meat from a commercial chicken only about 1.7 kg of feed is needed. Poultry production has a less detrimental impact on the environment than other livestock, and uses less water. Semi-scavenging backyard indigenous poultry are extremely important in providing income and high-quality protein in the diets of rural people whose traditional foods are typically rich in carbohydrate but low in protein. The domestic chicken feeds on a wide variety of food substances ranging from grains, fruits to insects which may harbour infective stages of parasites thereby predisposing them to parasitic infection particularly gastro-intestinal parasites. Although, somewhat reduction in bird's parasitic infection has been achieved in commercial production system mostly due to improved housing, hygiene and management practices the prevalence of gastrointestinal parasites is still very rampant.

Keywords: Prevalence, Infection Chicken, Parasitology, Parasites

Introduction
India recorded the fastest growth rate in poultry meat production during 1985-95 with a growth rate about 18% per annum which perhaps, no other country or agro-industry in the world has recorded, during that period. At present more than 400 million broiler chicks are produced annually. Intensive rising of poultry in commercial farms inevitably exposes flock to the various diseases which causes mortality and loss to the farmers. Diseased birds can also be hazardous to the human health, there may be possibilities of damage to the human body due to intake of diseased birds. In India, huge loss of birds due to disease is being faced by farmers due to management related problems. Poultry carry heavy infection of varied types of parasites, i. e. helminths, protozoan's, viruses and arthropods etc. Intestinal helminth infection has a serious impact on poultry health, productivity, quality and quantity of meat. Helminth parasites of poultry birds are commonly divided into three main groups, cestode, nematode and trematode. The cestode of significant importance is of the two genera *Railleitina* and *Hymenolepsis.* Nematode constitute the most important group of helminth parasites of poultry both in number of species and the extent of damage they cause, the main genera include *Ascaridia, Heterakis* and *Capillaria*. The prevalence and intensity of helminth infections may be influenced by several factors, such as climatic conditions (temperature and humidity) may alter the population dynamics of the parasites, resulting in dramatic changes in the prevalence and intensity of helminth infections (Kaingu *et al*, 2010; Rayyan and Al-Hindi, 2010; Shahin and Lebda, 2011) [17, 25, 29]. Many insects that may act as vectors for helminths are also favoured by high temperatures and to some extent humidity. These factors may explain the wide range and distribution of cestode and nematode species in poultry birds, especially during the tropical rainy season (Horning *et al*, 2013; Irungu *et al*, 2004; Hassouni and Belghyti, 2006; Yoriyo *et al*, 2008; Eslami *et al*, 2009;) [14, 15, 12, 34, 7]. Hence considering the economic importance of the diseases caused by helminth infection in desi poultry birds which interns affect on total production causing high economic loss to the farmers as well as Nation too. The necessity for an ecological approach to the study of parasitology has been aptly emphasized by Noble & Noble (1982) [24] as evident in his assertion that "when a parasite is studied by itself, apart from its environment only a part and often a small part of its total biology can be

understood and indeed the modern approach to parasitology envisages an ecological complex formed by the parasite, the vector or intermediate host, the definitive host and other various features of the host's environment." However, this complex is far more than the sum of its parts. It is something new and forever changing. Therefore, it becomes necessary to envisage an ecological approach to the study of parasitological problems which, in turn, involves the study of relationship of the parasite fauna with both the micro-and macro-environment. Such an approach involves indeed the study of all biotic (living) as well as abiotic i.e. non-living factors of the macro-environment of the host. In other words, it examines the influence exerted on the parasite fauna as a unit of the changes in the host's external environment as well as changes in the internal, or says physiologic conditions of the host itself (Dogiel, 1964) [4]. It may be pertinent here to point out that the host as their immediate habitat constitutes what we say, their micro-environment and the host's external environment constituting the macro-environment. This really describes a two-told association between the parasites and their immediate but the prevalence and intensity of parasitic helminths may be influenced by several factors, such as intermediate hosts and climatic conditions (temperature and humidity) etc which may alter the population dynamics of the parasites resulting in dramatic changes in the prevalence and intensity of helminthic infection (Magwisha, Kassuku and Kyusgaard 2002) [18]. Many insects that usually act as vectors for helminths are also favored by high temperature and to some extent humidity. These factors may explain the wide range and distribution of cestode and nematode species in poultry birds, especially during tropical summer season (Dube Zindi, Mbanga and Dube 2010) [5]. As such the studies on the helminth parasites in chickens are needed to design for improvement of poultry eggs and meat production, because the parasitic helminths significantly affect the health of chickens and thereby causing stunted growth and reduced egg as well as meat production. Hence, this becomes of serious concern for poultry farmers or those who opt for poultry farms practice or farming of this study area-that is, rearing of both types of poultry birds Broiler and Desi, to have a substantial knowledge of the helminth parasites and the damages caused by them in order to becoming able to formulate effective measures of prophylactic nature. (Irungu *et al*, 2004 and Hassouni and Belghyti, 2006) [15, 12] Furthermore, it is no less important and essential to have a substantial knowledge of the identity of the helminth parasites and also the period of their occurrence in maximum numbers (worm load) i.e. higher prevalence in terms of incidence as well as intensity. The present investigation forms an attempt in this regard and then only proper preventive measures or say prophylactic measures can be planned out. This will lead to a better understanding of the miseries due to helminthic diseases as well as prophylactic strategies and thus poultry farming economy can be well managed.

a) Helminth fauna and their seasonal dynamics

Altogether 4 types of helminth parasites -2 cestodes and 2 nematodes have been recorded from the poultry birds (host) i.e. broiler and desi types: *Raillietina* (Cestode); *Davainea* (Cestode); *Ascaridia* (Nematode); *Heterakis* (Nematode). During investigation it was found that single infection with cestode or nematode did occur but mixed infections show no less prevalence. Perhaps, this may be attributable to non-preferential food habit of desi chickens particularly on the insects than in the broiler chickens. Since the nature of food and feeding habits could not have been investigated in detail exact reason for higher prevalence of the mixed infection needs further explanation. However, it may not be none-the-less important to be pointed out here in that insects serve as intermediate host for nematodes and some cases of cestodes. Since the poultry birds do not feed up on Molluscs or crustaceans no infection of trematode could be obtained. Another interesting finding in the present study is that no helminth species did occur in greater number, rather maximally 4 to 6 or really 10 to 20. Such tendency may be explained as a sort of special distribution in the body of the single host especially in cases of mixed infection. Apparently enough, such distribution pattern may be considered to be an adaptation first to avoid any sort of crowding, or say competition for food, space and other factors essential for their survival within the limited space of the host's body. These perhaps overcome the accommodation of the parasites. It may be pertinent to quote Noble & Noble (1982) [24] "if the demands of life are met one fact seems clear an increase in population size does not necessarily mean that the individual or the species is 'fit'; rather it usually means that pressure of environmental resistance has decreased or just that a normal cycle of overpopulation has occurred. And the numbers of individuals in a given area are subject to the processes that control the population density. This is one of the illustrations when the principle of population ecology is focused. Whenever we think of parasite-host populations and the environment, it is important to remember that in the 'individual' host, its populations and communities of parasites are ever- changing in numbers and/or kinds during seasonal changes and age of the host. 2013 That is, it provides an answer to the mechanisms influencing the population size (density) and its growth. Perhaps the majority of the parasites are influenced by both the density-dependent factors i.e. primarily climatic, and the density-independent factors i.e. intrinsic ones.

b) Seasonal changes & helminth fauna

Seasonal changes are very sharply reflected in organic life. To quote Chubb (1982) has "all seasonal phenomena result from the annul changes of photoperiod and temperature which in combination with the features of geo-morphology at any particular point on the earth in climate. And the climate changes with latitude and altitude but remain consistent in a given area for long periods of time, whereas the weather conditions vary from year to year. It is, therefore, quite natural to expect that the endoparasites, although they do not have any direct ties with the external environment in which the host lives, may not remain indifferent to the annual cycle of climatic change to which their hosts are exposed. Most of the works on the prevalence and burden of helminth infection in chickens have been reported from outside of the country-that is, Sayyed *et al*, 2000; [28] Matur and Dawam, 2010; [19] Permin *et al*, 2010;[41] Dube *et al*, 2010; [5] Heyradin *et al*, 2012; [13] Baboolal *et al*, 2012; [2] Tesfaheywet *et al*, 2012 [31]. All these works reported higher prevalence of cestode parasites (*Raillietin*a) in comparison to trematodes and nematodes. Further the percentage of prevalence of parasitic helminths related to season was found relatively higher during summer season followed by rainy and lowest during winter season. In India studies on the seasonal prevalence of

helminthic infection in chickens are very few such as only those of Naphade and Choudhari (2013) [21, 22, 23]. This work too has revealed the most common helminth parasites include cestode *(Raillietina)*, nematode (*Ascaridia*) and their prevalence in relation to season was found highest during summer, followed by rainy and lowest during winter season, thus conforming to the findings of African workers and the present study also. Therefore, so far the author is aware; the paper an attempt to conduct a survey to find out the prevalence or incidence and intensity of helminth parasites, either singly or mixed, from poultry birds as host from this part of North Bihar. Conclusively it may be asserted that though the helminth parasite whether cestodes or nematodes potentially could occur and reproduce all times the year but their marked prevalence during the summer months can be attributable to the plentiful availability of the insects which serve as the intermediate host of the parasites and which are often feed up on by the bird hosts which become infected. Similarly, their higher prevalence during the rainy months can also be attributable to the plentiful availability of insects but on the other hand lower prevalence during the winter months may be accounted for fall in temperature during these months which result in the poor availability of the insects. In the present survey, though four helminth parasites were found throughout the year but *A. galli*. And *R. echinobothrida* were found most important and very common parasitichelminth in the intestine of the birds. Their prevalence as well as worm burden must be said to have relationship with the food or feeding habit of these birds. However, the host birds, whether desi or broiler types, showed almost similar trends in relation to seasonal difference in the helminthic infection as well as the helminth species also when compared.

Conclusion

The present survey revealed that helminth infection is commonly found in all the poultry birds in maximum region. The most common cestode and nematode species in desi poultry birds are *Raillietina* spp. and *Ascaridia* spp. respectively. The prevalence of helminth infection in relation to season was found highest during summer than the rainy and lowest during winter season. Among the species *Ascaridia galli* is most prevalent parasite affecting the health of desi poultry birds. This survey study indicated that helminth infection particularly cestode and nematode is highly prevalent in this region. Therefore improved poultry management practices for controlling the helminth infection and further studies on the appropriate control measures of helminth parasite in desi poultry birds need to be advised for improvement of poultry egg and meat production.

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