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Prevalence of Poultry Coccidiosis in Addis Ababa Poultry Farms

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Abstract: A cross sectional study was conducted to determines the prevalence of coccidiosis and its associated risk factors in Addis Ababa town from October 2009 to March, 2010. Flotation and McMaster counting techniques were used for qualitative and quantitative studies, respectively. The study involved questionnaire survey, fecal examination. In the present study a total of 384 chickens were examined those reared under intensive management system. Out of the 384 chicken examined, 106 (27.6%) were positive for coccidian parasites. The prevalence increased with the age of the chickens. Chickens with 8-30 days of age showed the highest prevalence of coccidiosis (41%). The prevalence rate of coccidiosis was higher in floor housing system (44.5%) comparing with caged system. Statistical analysis revealed that the distribution of coccidiosis in chickens was highly significant ($P < 0.01$) between the age groups and types of housing system. The mean oocysts count per gram of faeces was significantly ($P< 0.05$) higher in young than adult birds. The findings suggested that coccidiosis was a common health problem in grower layer chickens and in floor housing system. Various managerial problems that are associated with this prevalence of coccidiosis are identified and appropriate control strategies are recommended.

Key words: Addis Ababa · Coccidiosis · Poultry · Prevalence

INTRODUCTION

In developing countries poultry production offers an opportunity to feed the fast growing human population and to provide income for resource poor farmers [1]. Moreover, poultry in many parts of the modern world is considered as the chief source of not only cheaper protein of animal origin but also of high quality human food [2].

Poultry is among the important species of livestock kept in Ethiopia. Three poultry production systems are identified in the country. These are backyard poultry production system, small scale and large scale intensive poultry production systems [3]. Mortality rate in the country due to disease is estimated between 20% to 50% but can go as high as 80% during times of epidemic [3]. Among parasitic diseases, coccidiosis caused by the genus *Eimeria* and nine species are known to occur in chickens, which are widely distributed throughout the world [4, 11].

There are backyard poultry production system, small scale and large-scale intensive poultry production systems. The main objective of rearing chicken in all production systems is concerned with egg and meat production, for income generation and home consumption [5].

There are several disease constraints to poultry production. Among these major or causes of mortality in indigenous as well as exotic chickens kept under traditional and intensive management system in Ethiopia including Newcastle disease, coccidiosis, salmonellosis, chronic respiratory diseases and fowl pox while parasitism, nutritional deficiency and predation are additional sources to loss [6].

The traditional back yard poultry husbandry exposes chickens to many types of parasites of the disease that reduces both the number and productivity of rural poultry [7].

In Ethiopia, coccidiosis is endemic, causing great economic losses particularly in young growing birds in all production systems [8]. In the past years coccidiosis used to be the most important cause of mortalities in all farms. Incidences of the disease were as higher as 80% usually occurring in the form of outbreaks [9].

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Coccidiosis has been reported as one of the major disease problems of poultry production inspites of advances made in prevention and control through chemotherapy. In all parts of the world where confinement rearing is practiced coccidiosis represents major disease problem demanding the attention of poultry producers and poultry exporters [10].

Eimeria tenella (E. tenella) and Eimeria (E.) necatrix are the most pathogenic species. Eimeria (E.) acervulina, Eimeria (E.) maxima and Eimeria (E.) mivati are common and slightly to moderately Eimeria mitis, Eimeria praecox and Eimeria hagani are relatively non-pathogenic species [12].

Coccidiosis remains one of the major disease problems of poultry in spite of advances made in prevention and control through chemotherapy, management and nutrition [13]. The occurrence of clinical coccidiosis is directly related to the number of sporulated oocysts ingested by a bird at one time, the pathogenicity of the Eimeria species, the age of the infected chicken and the management system [11].

The species of coccodian identified in Ethiopia are E. tenella, E. necatrix, E. maxima and E. Acervulina [14]. Laying hens will experience a reduction in rate of egg production. Cecal coccidiosis may produce bloody droppings and anemia [15]. Losses due to sub clinical forms of the disease are heavy and can't be estimated [16]. In large population of chicken kept confined together, the risk of acquiring sufficient dose of oocysts is more likely to occur and the risk factor is very high for young chicken than old age groups, which develop immunity from pre-exposures [17]. Losses due to mortality following a severe outbreak may be devastating and incidence rates as high as 80% were observed to occur in the form of an outbreak in Ethiopia [11]. However, losses due to morbidity may be even more costly without the producers being aware that their flocks having any disease problem. In general, the losses caused by coccidiosis without including the sub clinical coccidiosis are estimated to be 2 billion USD throughout the world [18].

The disease contributed to be a problem as reported by Guale [19] who recorded prevalence rates of 50.8% and 11% in deep litter intensive system and backyard poultry production systems, respectively. However, there is lack of recent studies showing the status of the disease in the new economic era of the country where poultry is becoming a major sub-sector of wealth accumulation beyond other important roles. Coccidossis is a problem which needs a deep and thorough investigation and subsequent monitoring so as to boost production and productivity [11].

Therefore the objectives of this study were

- To determine the prevalence of coccidiosis in chickens in the study area.
- To study the impact of the risk factors of age and housing system on prevalence of coccidiosis.

MATERIAL AND METHODS

Study Area Description: The study was carried out from October 2009 to April 2010 in Addis Ababa, the capital city of Ethiopia. The area of the city covers about 540 km². The estimated human population is about 3.2 million. The lowest and highest annual average temperature is between 9.89 °c and 24.64 °c, while the average annual rainfall is 750 mm. Addis Ababa lies between 2200 and 2500 meters above sea level. The city lies at the fact of 300 meters high Entoto Mountain.

Study Animals: The study was conducted on poultry in selected sites of Addis Ababa city for the investigation of the prevalence, the study was including 384 chickens from large and small-scale commercial poultry farms. The information regards to age, breed, body condition and short interview of owners about the management and housing type of their chicken was made. Chickens were kept under floor and cage husbandry system.

Study Design: A cross sectional study design was conducted in poultries to estimate the prevalence and risk factors of poultry coccidiosis in Addis Ababa from November 2009 to April 2010. The sample was processed in Addis Ababa city Gurdishola Regional Veterinary Laboratory. The study also involved questionnaire survey and fecal examination in both in large and small scale commercial poultry farms.

Sample Collection and Parasitological Examination: The sample was collected from each sub-city farm which selected randomly. During the study, a history about the management of the flock, previous occurrences of any disease condition was asked. The faecal samples were collected in clean plastic sample bottle, which was pre-labeled indicating the age and sex of the chicken. The presence of feacal oocysts was determined, using the concentration by flotation method.

Sampling Method: Simple random sampling method was employed to determine prevalence and associated risk factors of poultry coccidiosis in the study area.

Sample Size Determination: The sample size required for this study is determined depending on the expected 50% prevalence of Coccidiosis and the desired absolute precision according to Thrusfield [20] by the following formula.

$$n = \frac{1.96 \times P\,exp\,(1-\_P\,exp)}{d^2}$$

Where,
n= the required sample size,
P exp= expected Prevalence,
d= absolute precession

As a result, 384 study populations were selected.

Data Collection: While collecting feacal samples from study birds, all data was recorded with pre-designed format and enter in to computer using Microsoft excel spread sheet. The individual bird details such as bird identification, sex, age, medication history, management system and the housing type of the farms were registered together.

Data Management and Analysis: The data was entered and managed in MS Excel, MS Access or software was applied for the data analysis. Prevalence estimation of Coccidiosis in poultry was determined using standard formulae (i.e. the number of positive animals/samples divided by the total number of animals/samples examined).

RESULTS

From a total of 384 birds examined, 106 (27.6%) were infected with coccidiosis. The highest prevalence of 41.0% was observed in chickens examined with age 8-30 days. The other age group 41-60, 61-120 and above 121 were recorded 25.7%, 118.3% and 21.2% respectively. There was a statically significant difference in the prevalence of coccidiosis at different ages and housing system of birds ($p<0.01$).

Among the caged and floor system high prevalence was observed in flooring system about (44.5%) due to contact between litter and birds, but in caged system less prevalence (16.2%) was observed.

DISCUSSION

Coccidiosis is known to be the most prevalent and most important disease of poultry production worldwide and its prevalence and economic significance has been reviewed by different workers in different production system. In present study, the overall prevalence was (27.6%). The result of this research was very close to the finding of the previous reports 28 % by [14] and 25% [21] around Debre-zeit town. The present finding was smaller as compared to 38.34% [22] at Kombolcha farm and 48.2% [23] at Debre-ziet. This might be due to the difference in the study season [24, 25]. [24] reported the prevalence of coccidiosis 28.9% during the rainy season and [25] also reported 12.2% during dry season. The other possible factors for fluctuating in prevalence can also be development of immunity against coccidiosis as there are anticoccidian drug applications are commonly practiced in the farm.

This study was designed to determine the prevalence of coccidiosis in different age groups and housing system. The present study revealed the prevalence rate increased with the age of the chickens. Chickens with 8-30 days of age showed the highest prevalence of coccidiosis (41%). This result is agreement to the finding of [26] and is not in agreement with Chapman and Johnson and Stayer, *et al*., [26, 27]. The prevalence rate of coccidiosis was higher in floor housing system (44.5%) than in caged

Table 1: Prevalence of coccidiosis between different age groups

Age group	N	Prevalence%(n)	X^2	df	P value
8-30 days	100	41.0%(41)	13.439	3	=0.004
41-60 days	144	25.7% (37)			
61-120 days	60	18.3 %(11)			
212 and < days	80	21.2%(17)			
Total	384	27.6% (106)			

N= number of birds observed n= number of birds positive

Table 2: Prevalence of coccidiosis between cage and floor systems

Housing	No	Prevalence% (n)	X^2	df	P value
Caged	229	16.2%(37)	37.199	1	0.000
Floor system	155	44.5%(69)			
Total	384	27.6 (106)			

N= number of birds observed n= number of birds positive

system. The relatively high prevalence of coccidiosis in the floor housing system was attributed to management factor. Management is concerned as the primary importance together with sanitation, environmental condition and the hygienic status of the poultry house [28]. Statistical analysis revealed that the distribution of coccidiosis in chickens was highly significant ($P<0.01$) between the age groups and types of housing system. Overcrowding of chicken could increase the risk of coccidiosis, as there is competition for feeding and watering. Wet and moist environment in poultry house are suitable to develop ooysts in to sporulation. Then the rate of coccidiosis is high in floor housing system.

CONCLUSION

The current study demonstrates high prevalence of coccidiosis in Addis Ababa. The high prevalence reported in these finding clearly indicated lack of appropriate control measures against the disease. In addition to the overall prevalence of coccidiosis, significantly higher prevalence of coccidiosis registered in both floor housing system and 8-30 days old chickens in Addis Ababa city. Generally the present study indicates that coccidiosis is one of the important diseases in both cage system and floor system. The finding also implied that, moreover, coccidiosis is one of the most important diseases under the intensive management and also display it is an economically important disease under poor and low-input based husbandry practices. Based on the above conclusion, the following recommended forwarded:

- The house should be cleaned thoroughly before each new flock comes in. Clean out old litter, wash the walls, floor and disinfect the room using appropriate disinfectant that can kill coccidial oocysts.
- The birds should not be overcrowded. The feeding and watering troughs should be placed in a way that chicken can easily reach and adequate spaces are available for feeding and watering.
- Avoiding damp areas in house should be the practical emphasis of poultry producers. Leaking roofs or watering troughs should be adjusted; redistribute litters frequently to avoid concentration of the oocysts at places such as feeding and watering troughs.
- Biosecurity practices should be the primary concept in the prevention and control of coccidiosis.

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