

## Prevalence of Poultry Coccidiosis in Gondar Town, North West Ethiopia

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**Abstract:** A cross sectional study was conducted from October 2013 up to April 2014 in Gondar town to determine the prevalence of poultry coccidiosis and to identify the associated risk factors. Fecal sample from a total of 384 chickens were taken from three selected areas and flotation method was employed to harvest coccidial oocysts. The result revealed that out of the 384 chickens, 165 (43%) of the chickens were found positive. the prevalence was higher in Private Farms (43.6%) followed by Markets (43%) and University of Gondar Veterinary Clinic (41%). The prevalence was found highly statistically significant ( $P < 0.05$ ) across age groups, in which 68.1% <3 months old chickens and 37.5% in chickens of greater or equals to three months old. A statistically significant difference ( $P < 0.05$ ) in prevalence of coccidiosis was also noted across breeds of chickens, with the prevalence of 48.7%, 44.2% and 26.8% in local, white leghorn and brown cucar respectively. There was a significant difference ( $P < 0.05$ ) among the different housing types with the prevalence of 49.1% in Floor, 45.7% in Backyard and 25.6% in Cages. There was no statistically significant difference ( $P < 0.05$ ) on the prevalence between male (44.3%) and female (42.4%) chickens. The effect of body condition on the disease prevalence was assessed and relatively high prevalence was recorded in those chickens which have poor body condition (43.8%) than those chicken which have good body condition (42.7%) but not significant ( $P > 0.05$ ). This study showed that coccidiosis was prevalent in the study area and this signifies the need for intervention through awareness creation among farmers and veterinarians.

**Key words:** Coccidiosis • Flotation • 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. Moreover, poultry in many parts of the modern world is considered the chief source of not only cheaper protein of animal origin but also of high quality human food [1]. The total poultry population in Ethiopia is estimated to be 56.5 million [2]. The total national egg and poultry meat production is estimated to be 78000 and 72300 metric tons respectively, of which local birds, kept under the traditional systems of production, contribute 98.5% and 99.2% [1, 3]. Three types of poultry production systems are identified in Ethiopia [4]. These 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].

In the past coccidiosis was one of the diseases most feared by commercial poultry growers in the U.S.A. Death losses of 20% or more were common. "Backyard" growers are usually so small that coccidiosis was not a problem, but as the size of free range flock increases, coccidiosis becomes a threat [6].

Coccidiosis is an economically important disease in chicken caused by the Eimeria species of in the genus Eimeria family Eimeridae order Cucocidioria and phylum Spicomplera [7]. Infection by coccidian is sufficient

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number to produce clinical manifestations of the diseases is called coccidiosis [8]. *E. tenella* and *E. necatrix* are the most pathogenic species. *E. acervulina*, *E. maxima* and *E. mivati* are common and slightly to moderately pathogenic; *E. brunetti* is uncommon but pathogenic when it does occur. *E. mitis*, *E. praecox* and *E. hagani* are relatively non-pathogenic species [9, 10]. The species of *Coccidia* identified in Ethiopia are *E. tenella*, *E. necatrix*, *E. maxima* and *E. acervulina* [11]. *E. mivati* was also reported [12]. The birds become depressed, have ruffled feathers, the wings droop, have diarrhea and tend to huddle. Food and water consumption usually decreases and may become emaciated and dehydrated. Laying hens will experience a reduction in rate of egg production. Cecal coccidiosis may produce bloody droppings and anemia [9, 13].

Coccidiosis is endemic in Ethiopia, causing great economic losses, particularly in young growing birds in all production system [14]. In Ethiopia, *E. necatrix*, *E. maxima* and *E. tenella* are endemic in all parts of the poultry and affect many young growing birds [15]. In the past year coccidiosis used to be the most important cause of mortality in all farms. Incidences of the disease were as higher as 80% usually occurring in the form of outbreaks [16]. The disease contributed to be a problem with prevalence rate of 50.8% and 11% in deep litter intensive system and backyard poultry production systems, respectively [12]. Although in Ethiopia quantitative losses due to coccidiosis are not well documented. Reports indicate that the disease contributes to 8.4% and 11.86% loss in profit in large scale farms and small scale farms respectively [11]. Regarding poultry coccidiosis in Gondar town, no research has been done particularly on local chickens. Therefore the objective of this study was:

- ✓ To estimate the prevalence of poultry coccidiosis in the study area.
- ✓ To identify the associated risk factors of poultry coccidiosis in the study area.

## MATERIALS AND METHODS

**Study Area:** The study was conducted in Gondar city, capital of North Gondar zone in Amhara regional state. It is located 750 km North West of the capital city, Addis Ababa. The city has an latitude and longitude of 12°36'N 37°28'E / 12.6°N 37.467°E with an average temperature of 20°C and an average annual rainfall of 1800 mm. Being a highland area, the city is spread on different mountains,

slopes and in valleys and has three small rivers, many streams and a lake. The city has a population of 186,077 [17]. According to Office of Agriculture and Rural Development, the livestock population in the area comprises of cattle (8,202), goat (22,590), sheep (2,695), horse (1,065), donkey (9,001) and unknown number of poultries are found [18]. In this study areas peoples practice poultry production by using different rearing system like cage, floor and backyard production system which is currently become popular and deep litter. Both local and exotic poultry breeds are available in this study area.

**Study Population:** The study was conducted on poultry in selected sites of Gondar town. 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 backyard, floor and cage husbandry system. The study birds were grouped into sex (male and female), breeds (White leghorn, Brown cucar and local) and ages was classified as young (less than three months) and adult (greater or equals to three months) according to Comfort *et al.* [19].

## Study Methodology

**Feecal Sample Examination:** Freshly deposited feecal samples of poultry birds of different ages, breed and sex were collected from the chicken sellers and examined thoroughly. The samples were collected in clean plastic sample bottle, which was pre-labeled indicating the age, breed and sex of the chicken. The presence of feecal oocysts was determined, using the concentration by flotation method [20].

**Study Design:** A cross sectional study design was conducted in poultries to estimate the prevalence and risk factors of poultry coccidiosis in Gondar town. The sample was processed in University of Gondar, Faculty of Veterinary Medicine, Parasitology Laboratory.

**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 desire sample size for the study was calculated using the following formula [21] with 95% confidence interval, 5% absolute precision and 50% expected prevalence as showed below,

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

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 faecal 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, breed type, medication history, management system and the housing type of the farms were registered together.

**Data Management and Analysis:** All raw data generated from this study were coded and entered to Microsoft office excel data base system. The findings were analyzed using SPSS version-17.0 computer program; and data were analyzed to find percentage and Chi-square ( $\chi^2$ ). P-value was determined for determination of the significance. Chi-square test was also used to determine the variation in infections among different risk factors of the disease. Statistical significance was set at  $P < 0.05$  to determine whether there are significant differences between the parameters measured between the studied variables.

## RESULTS

**Over All Prevalence of Poultry Coccidiosis:** Out of a total of 384 chickens examined for poultry coccidiosis, 165 were found positive. And the overall prevalence of poultry coccidiosis in the study area revealed that 43%. (Table 1).

**Prevalence of Coccidiosis in Poultry on Site Basis:** In this study, out of the total of 384 faecal samples examined 165 (43%) were positive for coccidial oocysts. The highest prevalence (43.6%) was observed in chickens from private farms, followed by 43% from market and 41% from University of Gondar (UoG) Veterinary Clinic the difference was not statistically significant ( $P > 0.05$ ) (Table 2).

**Prevalence of Poultry Coccidiosis on Sex Basis:** The effect of sex on the disease prevalence was assessed and relatively high prevalence was recorded in male chickens (44.3%) than that of females (42.4%) as indicated in Table 3. However, the difference between sex groups was not statistically significant ( $P > 0.05$ ).

**Prevalence of Poultry Coccidiosis on Age Basis:** There was a highly significant difference in poultry coccidiosis between different age groups ( $P < 0.05$ ), where chickens with less than three months age (68.1%) were more affected than that of greater than or equal to three months ages(37.5%) (Table 4).

Table 1: Overall Prevalence of Poultry Coccidiosis

Total N <sup>o</sup> of Sample Examined	N <sup>o</sup> of Positive	N <sup>o</sup> of negative
384	165	219
Overall	43%	57%

Table 2: Prevalence of Coccidiosis in Poultry on site Basis

Site	Total N <sup>o</sup> examined	N <sup>o</sup> of positive	Prevalence %	X <sup>2</sup>	P-value
UOG vet-clinic	61	25	41%	0.75	0.945
Private farms	241	105	43.6%		
Markets	82	35	43%		
Total	384	165	43%		

Table 3: Prevalence of Poultry Coccidiosis on Sex Basis

Sex	Total N <sup>o</sup> examined	N <sup>o</sup> of positive	Prevalence %	X <sup>2</sup>	P-value
Male	106	47	44.3%	1.133	0.889
Female	278	118	42.4%		
Total	384	165	43%		

Table 4: Prevalence of Poultry Coccidiosis on Age Basis

Age	Total N <sup>o</sup> examined	N <sup>o</sup> of positive	Prevalence %	X <sup>2</sup>	P-value
<3 month	69	47	68.1%	21.775	0.000
≥3 month	315	118	37.5%		
Total	384	165	43%		

Table 5: Prevalence of Poultry Coccidiosis Breed Basis

Breeds	Total N <sup>o</sup> examined	N <sup>o</sup> of positive	Prevalence %	X <sup>2</sup>	P-value
White leghorn	215	95	44.2%		
Brown cucar	56	15	26.8%		
Local	113	55	48.7%	12.944	0.012
Total	384	165	43%		

Table 6: Prevalence of Poultry Coccidiosis on Body Condition Basis

Body condition	Total N <sup>o</sup> examined	N <sup>o</sup> of positive	Prevalence %	X <sup>2</sup>	P-value
Good	279	119	42.7%		
Poor	105	46	43.8%	0.409	0.75
Total	384	165	43%		

Table 7: Prevalence of Poultry Coccidiosis on Housing Type Basis

Housing type	Total N <sup>o</sup> examined	N <sup>o</sup> of positive	Prevalence %	X <sup>2</sup>	P-value
Cage	82	21	25.6%		
Floor	173	85	49.1%		
Backyard	129	59	45.7%	14.64	0.006
Total	384	165	43%		

Table 8: Prevalence of Poultry Coccidiosis on Management System Basis

Management System	Total N <sup>o</sup> examined	N <sup>o</sup> of positive	Prevalence %	X <sup>2</sup>	P-value
Good	191	67	35.1%		0.005
Poor	193	98	50.8%	10.410	
Total	384	165	43%		

Table 9: Prevalence of Poultry Coccidiosis on Vaccination History Basis

History	Total N <sup>o</sup> examined	N <sup>o</sup> of positive	Prevalence %	X <sup>2</sup>	P-value
Yes	290	133	40.3%		
No	94	32	51.1%	0.939	0.168
Total	384	165	43%		

**Prevalence of Poultry Coccidiosis Breed Basis:**

There was a significant difference in poultry coccidiosis between the different breeds of chicken ( $P < 0.05$ ), where those local breeds (48.7%) are more affected than white leghorn (44.2%) and brown cucar (26.8%) chickens (Table 5).

**Prevalence of Poultry Coccidiosis on Body Condition Basis:**

The effect of body condition on the disease prevalence was assessed and relatively high prevalence was recorded in those chickens which have poor body condition (43.8%) than those chickens which have good body condition (42.7%). However, the difference in prevalence of poultry coccidiosis between body conditions were not statistically significant ( $P > 0.05$ ) (Table 6).

**Prevalence of Poultry Coccidiosis on Housing Type Basis:**

There was high significant difference in poultry coccidiosis between different housing types (Cage, Floor and Backyard) ( $P < 0.05$ ). Those chickens found in Floor were more affected (49.6%) than Backyard (45.7%) and Floor (25.6%) (Table 7).

**Prevalence of Poultry Coccidiosis on Management System Basis:**

There was a significant difference in the prevalence of poultry coccidiosis among management systems ( $P < 0.05$ ), those chickens which are managed poorly were more affected (50.8%) than that of properly managed (35.1%) chickens (Table 8).

**Prevalence of Poultry Coccidiosis on Vaccination History Basis:**

Even though there was a variation in the prevalence of poultry coccidiosis vaccinated chickens (40.3%) and not vaccinated ones (51.1%), the degree of statistical association revealed that there was no any significant difference among both variables ( $P > 0.05$ ) (Table 9).

**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 [11, 22]. It is a problem of significant order meriting attention and implementation of control program..

In the present study, the overall prevalence was 43%. The result of this research was very close to the finding of Mwale and Masika [23] (41.43%) and Netsanet [24] (38.5%) reported a prevalence of coccidiosis in Centane district (South Africa) and Kombolcha (Ethiopia) respectively. However, the present result is not consistent with the finding of Alemayehu [25] (20.57%) and Gari *et al.* [22] (22.58%) of prevalence's in deep litter system of exotic breed (Rhode Island Red) of chickens in Tiyo districts and Arsi Zone, Ethiopia respectively. This variation in prevalence of the disease may be due to climatic condition of coccidian infection and differences in management systems of the farms.

The prevalence of coccidiosis was relatively higher in male (44.3%) than female (42.4%) chicken. But, it was not statistically significant ( $P > 0.05$ ). This result is not consistent with the previous studies [25] who reported a higher prevalence of poultry coccidiosis in female chickens than male chickens.

This study also indicated that the prevalence of coccidiosis was relatively higher in grower (<3months) (68.1%) than adults ( $\geq 3$ months) (37.5%). There was a highly significant difference in poultry coccidiosis between different age groups ( $p < 0.05$ ).

As indicated in most published literatures, significantly higher prevalence of coccidiosis is observed in young than adult birds as former immunity is not well developed [26]. The disease appears to reach climax at 5-7 weeks of age and as age exceeded 7 weeks, most birds will develop immunity and increase resistance to the disease [20]. However, this study is not consistent with the report of [14] who stated that all ages of poultry are susceptible to infection.

The prevalence rate of coccidiosis was relatively higher in those local breeds (48.7%) than that of white leghorn (44.2%) and brown cucar (26.8%) chickens. There was a significant difference in poultry coccidiosis between the different breeds of chickens ( $P < 0.05$ ). The occurrence of coccidial infection in local chicken might be due to local birds are allowed to scavenge in villages without any restriction and thus more likely get contact with sporulated oocysts in faeces, which are the main source of infection and the present finding agreed with work of Guale [12] and additionally there might be due to concurrent parasitosis which are common in local chickens kept under traditional management system. However, this study disagree with the previous report in Ethiopia by Garie *et al.* [22] who reported a higher prevalence was found in exotic (25.10%) breeds than local (12.41%) breed chickens.

In this study, there was high significant difference in poultry coccidiosis between different housing types (Cage, Floor and Backyard) ( $P < 0.05$ ). Chickens which are managed in backyard production system were more affected (45.7%) than Floor (49.1%) and Cage (25.6%) production systems. This may be due to poor management practices, malnutrition and non-use of coccidiostats as preventive measures. Poor poultry management where there is overcrowding, leaking water troughs and accumulation of faeces are factors that contributed to the high prevalence rate. Bird's feed and water are contaminated by oocysts because the environment is damp especially that of the market place where nobody cares about cleaning the chicken cages.

## CONCLUSION

The result of the current study showed that different putative risk factors have contributed for the occurrence of poultry coccidiosis infection in the study sites. Among these age, breed, management system, housing system, sex, body conditions and vaccination history are the most common factors. Lack of effective biosecurity practices and inappropriate usage of coccidiostat as treatment modalities has also contributed for the higher infection rate of the disease. The deep litter system was also the main reasons and predisposing factors for the higher prevalence of coccidiosis in growers stocks than adult ones in these study areas. These means that coccidiosis is still an important health problem of poultry production in the study areas.

Based on the above findings the following recommendations are forwarded:

- ▶ Bio security practices should be a primary concept in the prevention and control of coccidiosis,
- ▶ Maintaining recommended stocking density and avoiding raising of multiple age flocks in the same house should be practice,
- ▶ Awareness should be created among the society regarding the importance of the disease,
- ▶ Further longitudinal and advanced studies should be conducted in the study area in order to know the clear status of the disease.

## ACKNOELEDGEMENT

The authors would like to thank the University of Gondar for funding this research work. We also extend our sincere thanks to all the laboratory technicians for assisting the laboratory work.

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