Prevalence of Poultry Coccidiosis and Associated Risk Factors in Haramaya University Poultry farm, Eastern Ethiopia

Nimona Abebe, Wakuma Mitiku and Garoma Desa

1Veterinary expert at Jimma Gannati District Livestock Development Office, Ethiopia
2Shambu Municipal Abattoir, Horro Guduru Wollega Zone Agricultural Office, Ethiopia
3National Institute for Control and Eradication of Tsetse Fly and Trypanosomosis, Kaliti Tsetse fly Mass Rearing and Irradiation Center, P.O. Box 19917, Addis Ababa, Ethiopia

Abstract: A cross sectional study was conducted to determine the prevalence of poultry coccidiosis and associated risk factors in Haramaya University poultry farm, Eastern Ethiopia, from November 2014 to April 2015. The presence of oocysts in the fecal samples was examined by the flotation method using saturated solution of sodium chloride and the modified McMaster counting techniques were used for qualitative and quantitative studies respectively. Out of total 384 fecal samples of chickens examined microscopically, 88(22.9%) were positive for coccidian parasites. The prevalence was significantly (p< 0.05) higher in young (26.9%) than adult (16.4) of chickens. However statistically significant (p>0.05) difference in the prevalence of the coccidiosis were not observed between breeds and sexes. The intensity of oocysts per gram of faeces was significantly higher (p<0.05) in young than adult chickens. However, no significant association (p>0.05) were observed among breeds and sex groups. In conclusion, the present study showed that coccidiosis therefore remains a very important limiting health problem in intensive poultry disease in the study area. Knowledge regarding the farm conditions is necessary for developing the best prevention programs, enabling the recognition of factors that influence the possibility of incidence of the disease.

Key words: Coccidiosis • Emeria Foyamin • Haramaya University • Prevalence • White Leghorn

INTRODUCTION

The Poultry industry occupies an important position in the provision of animal protein (meat and egg) to man and generally plays a vital role in the national economy as a revenue provider [1]. Approximately 20 billion poultry exists worldwide and of this about 75% are found in developing countries [2].

Poultry is one of the most intensively reared of the domesticated species and one of the most developed and profitable animal production enterprises. Its importance in national economies of developing countries and its role in improving the nutritional status and income of many small farmers and those with small land holdings as well as landless has been recognized by various scholars and rural development agencies [1].

The total poultry production of Ethiopia is estimated at 56.5 million, of which about 99% are raised under the traditional backyard system of management, while 1% are exotic breeds maintained under intensive management system. The intensive management system is characterized by high in put, high output and low destruction of the flock due to disease outbreak as compared to the backyard poultry production system [3].

Despite the presence of large number of chicken in Ethiopia, contribution to national economy or benefit from the sector is very limited due to disease, nutritional and management factors. Among those diseases are Newcastle disease, Coccidiosis, Salmonellosis, Chronic respiratory disease and nutritional deficiency [4]. Although the prevalence of parasitic infections has been greatly reduced in the commercial production system,
mostly due to improved housing, hygiene and management operation, a large number of helminthes are still widely distributed throughout the world [5]. Coccidiosis is one of parasitic diseases which occurred wherever chickens are reared and this disease has generated an immense burden on the poultry industry [6].

Coccidiosis is caused by various species of *Emeria*, an Apicomplexa protozoan parasite. It is one the most common diseases in poultry, which is responsible for major economic losses worldwide [7, 8]. The disease is endemic in most of the tropical and subtropical regions where ecological and management conditions favor an all year round development and propagation of the causal agent [9]. The conditions most commonly occur under intensive rearing conditions, where pathogenic population of the causative agents may build up. This is due to high stocking densities and litter housing practices, so its incidence is being increased in commercial poultry farm [1].

The infection occurs through ingestion of feed or water contaminated with sporulated oocysts. After ingestion of sporulated (infective) oocysts, sporozoites are released and enter asexual and sexual cycles of development resulting in the emergence of thousands of new oocysts in the intestines. Oocysts are distributed by faeces. Soon, they sporulated and become infective for chickens [10]. Both clinically infected and recovered birds shed oocysts in their droppings, which contaminate feed, dust, water, litter and soil. Oocysts may be transmitted by mechanical carriers (e.g., equipment, clothing, insects, farm workers and other animals) [11]. The parasite reside and multiples in the intestinal mucosa causing coccidiosis which is characterized by dysentery, enteritis, emaciation, drooping wings, poor growth, low production. Bad management, such as wet litter that encourages oocysts sporulation, contaminated drinkers and feeders, bad ventilation and high stocking density can exacerbate the clinical signs [12].

The intestinal lesions provoked by coccidian, are due to injury of the epithelial cells of the mucous coat where the parasite are developed and multiplied. The lesions almost entirely in the intestinal tract and often have a distinctive location and appearance that is useful in diagnosis [10]. Mortality and economic losses especially in case outbreaks are frequent and it causes high mortality in young chicks because most of Eimeria species affects birds between age of the 3 and 18 weeks [8]. Losses due to mortality following severe out break may be devastating and incidence rates as high as 80% were observed in our country [13]. Knowledge regarding the farm conditions is necessary for developing the best prevention program, enabling the recognition of factors that influence the possibility of incidence of the disease conditions [14, 15].

**MATERIALS AND METHODS**

**Study Area:** The study was conducted from November 2014 to May 2015 in Haramaya University poultry farm. Haramaya University (HU) was located in eastern Hararghe zone, Oromia region, approximately 509km East of Addis Ababa (capital) at North latitude 41°59.58’ and 09°10.24’ longitudes [16]. The altitude of the areas was 2000m above sea level and the mean annual temperatures and relative humidity were 18 and 65% respectively. The area receives the mean annual rainfall of approximately, 900mm with bimodal distribution pattern, peaking in mid-August and mid-April [17].

**Study Animals:** The study animals were Foyamin and White Leg Horn breeds of chickens in poultry farm of HU and the farm holds about 14884 chickens under intensive deep litter management. The study animals were group into sex (male and female), breeds (Foyamin and white leg horn) and age, young (6 months) and adult (above 6 months).

**Study Design:** A cross sectional study was conducted from November 2014 to April 2015 to determine the prevalence of coccidiosis and its associated risk factors in HU poultry farm.

**Sample Size Determination:** By using simple random sampling methods and 95% confidence interval with required 5% precision, the sample size was determined by the formula of Thrusfield [18].

\[
n = \frac{1.96^2 \text{Pexp} (1- \text{Pexp)}}{d^2}
\]

where;
- \(n\) = Required sample size
- \(\text{Pexp}\) = Expected prevalence
- \(d\) = Absolute precision
The expected prevalence of Coccidiosis was 50\% with the required precision (d) of 5\% (0.05). By substituting the value in the above formula:

\[
n = \frac{1.96^2 \times 0.5(1-0.5)}{(0.05)^2}
\]

\[n = 384\]

Study Methodology

Coprological Examination: Freshly voided feacal samples were collected immediately from floor by using spatula and put into plastic bottles from each chicken and brought to Haramaya University Veterinary parasitology laboratory for examination. During sampling breeds, age and sex were recorded. Both qualitative and quantitative feecal sample examination were conducted. Oocysts in each feecal sample sample of chicken were detected by using floatation technique using saturated sodium chloride solution and counting oocysts were done by Memaster counting technique and expressed as per gram of feces [19].

Data Analysis: The raw data were entered and managed in micro soft Excel worksheet and descriptive statistic was utilized to summarize the data. The point of prevalence was calculated for all data by dividing positive samples by total numbers of examined samples and multiplied by hundred. The association between the prevalence of the disease and risk factors and the intensity of the oocysts per gram were assessed by Ch- square. A statistical significance association between variables was considered to exist if the computed p-value was less than 0.05. All statistical analyses were done using SPSS statistical software version 17.

RESULTS

Prevalence: Out of the total 384 chickens samples examined microscopically, 88(22.9\%) samples were positive for coccidian oocysts. The prevalence was significantly (p<0.05) higher in under age categories 6 months (young) 26.9\% than 6 months (adult)16.4\% chickens. However, the difference in the prevalence of coccidiosis on breeds and sexes were not significant (p>0.05).

Quantitative Study: Oocysts per Gram of Faeces (OPG) were examined using standard Mecmaster technique [19]. Level and severity of infestation were also determined by comparing the calculated values OPG out and standard as light (100-1000 oocytes), moderate (1100-2000 oocytes) and severe (>2000 oocytes). The intensity of oocysts per gram of feaces was significantly (p<0.05) in young than adult chickens. However, no significant association (p>0.05) were observed among breeds and sexes (Table 2).

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Categories</th>
<th>N(^e) examined</th>
<th>Prevalence (%)</th>
<th>Chi square</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Female</td>
<td>253</td>
<td>60 (23.70)</td>
<td>0.268</td>
<td>0.605</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>131</td>
<td>28 (2.140)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>384</td>
<td>88 (22.90)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Young</td>
<td>238</td>
<td>64 (26.90)</td>
<td>5.597</td>
<td>0.018</td>
</tr>
<tr>
<td></td>
<td>Adult</td>
<td>146</td>
<td>24 (16.40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>384</td>
<td>88 (22.90)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breed</td>
<td>Foyamin</td>
<td>178</td>
<td>42 (26.30)</td>
<td>0.087</td>
<td>0.769</td>
</tr>
<tr>
<td></td>
<td>WLH</td>
<td>206</td>
<td>46 (22.30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>384</td>
<td>88 (22.90)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Categories</th>
<th>N(^e) examined</th>
<th>100-1000</th>
<th>1100-2000</th>
<th>&gt;2000</th>
<th>X(^2)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Female</td>
<td>253</td>
<td>27(10.7%)</td>
<td>27(10.7%)</td>
<td>6(2.37%)</td>
<td>0.958</td>
<td>0.811</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>131</td>
<td>15(11.5%)</td>
<td>10(7.6%)</td>
<td>3(2.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Young</td>
<td>238</td>
<td>23(9.7%)</td>
<td>32(13.4%)</td>
<td>9(3.78%)</td>
<td>16.44</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Adult</td>
<td>146</td>
<td>19(13%)</td>
<td>5(3.4%)</td>
<td>0(0.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breed</td>
<td>Foyamin</td>
<td>178</td>
<td>22(12.4%)</td>
<td>17(9.6%)</td>
<td>3(1.7%)</td>
<td>0.906</td>
<td>0.824</td>
</tr>
<tr>
<td></td>
<td>WLH</td>
<td>206</td>
<td>20(9.7%)</td>
<td>20(9.7%)</td>
<td>6(2.9%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DISCUSSION

Coccidiosis is one of the most important poultry diseases, caused by protozoal parasite that live in the lining of intestine.

The results of the present study was agreed with the findings of Gari et al. and Tehetena [13, 20] who assessed prevalence rates of 23.1% and 22.58% in small and large scale production systems and in deep litter system of exotic breed (Rhode Island Red) of chickens in Tiyo districts, Arsi Zone, Ethiopia respectively. Moreover, the result also in line with findings of Abadi, et al. [21] who reported prevalence rates of 22.3% in white leghorn grower chickens in Kombolcha poultry farm.

However, the present result disagrees with the findings of Netsanet and Mwale and Masika [22, 23] who reported the prevalence of coccidiosis 38.5% and 41.43% in Kombolcha (Ethiopia) and Centane district (South Africa) respectively. The higher reduction of prevalence of coccidiosis observed in the current study may be ascribed mainly to the application of preventive measures which basically rely on the use of anti-coccidial drugs that were given at early ages, slight improvement of management system and biosecurity measures when compared to the set up in the previous study by Lobago, et al., [24].

The prevalence rates of disease was significantly (p<0.05) higher in young (26.9%) than adult (16.4%) of chickens. This may be due to under development of immunity and absence of previous exposure to disease. As the increases most birds will develop immunity and increase resistance to the disease.

There was no observed significance difference in the occurrence of coccidiosis between the two breeds (p>0.05), although a slight higher prevalence rate of (23.6%) was noted in Foyamin breed than the white leghorn (22.3%) breeds. However, this insignificant difference observed between these two breeds may be due to the effect of environmental factors inspite of the genotypic factors in which both genotypes were exotic breeds. This finding was reported by Saif [25] who stated that chicken selected for their zoo-technical performance are particularly sensitive to coccidia infection.

The study also indicates that the prevalence of coccidiosis was relatively higher in female (23.7%) than in male (21.4%) of chickens. This was due to stress occasioned by egg production. But it was statistically not significant (p>0.05). This agrees with Gari et al, previous studies [13] who reported that there was not significant natural resistance variation in relation to sex.

CONCLUSION

Coccidiosis is one of the common and important diseases that have negative impact on the growth of poultry industry.

The results of this study indicates that coccidiosis is still the most important parasitic disease of poultry on the conditions of intensive management system due to high stocking densities of poultry, litter housing practices that promote oocysts sporulation, poor ventilation facilities and improper of anti-coccidial drugs for prevention the disease. Both clinically infected and recovered birds shed oocysts in their drooping, which contaminate feed, water and litter. Oocysts also transmitted by mechanical carriers. So ingestion of contaminated feeds and water causes coccidiosis. The disease causes high mortality and morbidity in young chickens and decrease production and productivity of chickens. Knowledge regarding the farm conditions is necessary for developing the best prevention programs, enabling the recognition of factors that influence the possibility of incidence of the disease.

Based on above conclusion the following recommendations were forwarded:

- Good management practices should be provided for prevention of the disease and economic losses.
- Strict biosecurity measures have to be practiced to reduce the transmission of the disease.
- Strategic use of prophylactic and chemoprophylaxis drugs should be practiced for prevention of the disease.

REFERENCES

5. Roy, D.K., 2002. Helminthosis of Free-Range Chickens in Bangladesh with emphasis on prevalence and effect on productivity. The Royal Veterinary and Agricultural University, Department of Livestock Services, Farmgate, Dhaka, Bangladesh.


20. Tehetena, A., 2010. Study on prevalence of poultry coccidiosis in small and large scale productions in Addis Ababa. DVM thesis, Faculty of Veterinary Medicine, University of Gondar, Ethiopia.


