

Full Length Research Paper

Prevalence of poultry coccidiosis in and around Yabello, southern Ethiopia

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This study was conducted in and around Yabello, Southern Ethiopia, with the objective of determining the prevalence of poultry coccidiosis and its associated risk factors. Faecal samples were collected from total of 384 chickens. Floatation technique was used to detect coccidian oocyst. The result revealed that out of 384 chickens, 74 were positive to coccidiosis and overall prevalence was 19.3%. The frequency of detection of oocyst in the faecal samples from exotic and local breed chicken were 18 and 20.4%, respectively. The result of the current study disclosed that the prevalence of coccidiosis was almost similar in female (19.6%) and male (18.2 %) chickens. The prevalence rates of 18.4 and 21.9% were recorded in chicken grouped under the age category of 2-8 weeks (young) and greater than 8 weeks (adult), respectively. The prevalence rates of 21.6 and 18% were also recorded in good and poor body condition, respectively. Furthermore, coccidiosis occurrence in intensive and extensive management system were 22.1 and 16.7%, respectively. In conclusion, even though the difference for all risk factors was statistically insignificant ($p>0.05$), the study showed that coccidiosis is important disease of poultry in Yabello district, Southern Ethiopia and this is an indication for intervention to tackle the disease without any priority within the risk factors.

Key words: Coccidiosis, poultry, prevalence, Yabello district.

INTRODUCTION

Poultry coccidian are strictly host-specific and the different species parasitize specific parts of the intestine. The disease is characterized by droopiness, paleness of the comb, diarrhoea and occasional appearance of blood in droppings (Lillehoj and Trout, 1993). The oocysts exist in the litter, premises and are distributed by clothes, shoes, dust and others (Radiostitis et al., 2007; Singla and Gupta, 2012). Several factors influence the severity of infection like age and the number of oocysts eaten (Vegad, 2008). The most common and pathogenic

species that affect the poultry is *Eimeria tenella*, resulting in 100% morbidity and a high mortality due to extensive damage of digestive tract (Singla et al., 2007; Awais et al., 2012)

Poultry coccidiosis is responsible for tremendous worldwide economic losses to the poultry industry with an estimated world annual loss of more than 3 billion USD (Dkhil, 2013). In Ethiopia, some reports indicated coccidiosis loss from 8.4 and 11.86% profit in large and small scale farms, respectively (Kinunghi et al., 2004).

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Losses due to mortality following a severe outbreak may be devastating and incidence rates as high as 80% were sometimes observed in the country (Alamargot, 1987).

Although, there are some previous works done on poultry coccidiosis in different regions of Ethiopia, there is no literature documentation in this study area. Therefore, this study was designed with the objectives of determining the prevalence of poultry coccidiosis and identifying the associated risk factors.

MATERIALS AND METHODS

Study area

The study was conducted in and around Yabello district, Southern Ethiopia (Figure 1) from November 2015 to April 2016. The area is located in Oromia regional state situated at 565 km south of Addis Ababa, geographically located at 50 23'49 N latitude 390 31'52 E longitudes with elevation 1857 of meters. The area have bimodal rainfall with 60% occurring in the long rainy season extending from mid-March to May and erratic short rain season from mid-September through mid-November. Other seasons such as the cool dry season extend from June to August and the major dry season from December to February (BZPADO, 2009/10). The farming system comprise of mainly pastoral and seldom Agro-pastoral areas. The region has predominantly a semiarid climate. The annual temperature varies between 21 and 38°C and the rainfall ranges from 350 to 900 mm, with considerable spatial and temporal variability in quantities and distribution. The area holds 1,496,652 cattle, 452,177 goats, 193,021 sheep, 467,119 camels, 355,700 chickens, 13,945 mules and 61,699 donkeys. Both local and exotic poultry breeds are available in the study area (CARE-Ethiopia, 2007).

Study population

The study was conducted on poultry found in and around Yabello district by dividing them into sex, breeds and ages as young (2 to 8 weeks) and adult above 8 weeks of age (Oljira et al., 2012). This range of age was selected because the disease is more common in young poultry (Pangasa et al., 2007; Taylor et al., 2007). Systematic random sampling was used to select the study population from the study area. Epidemiological information regarding ages, sex, breed, body condition and housing type, date of sample collection and origin or name of the farm were collected.

Study design and sample size determination

Random sampling method was used to select the chickens from the target population. The minimum sample size required for this study was determined by using the following sample determination formula described by Thrusfield (2005):

$$n = 1.96^2 P_{exp} (1 - P_{exp}) / d^2$$

Where: n = sample size; P_{exp} = minimum expected prevalence = 50%; 1.96 = the value of z at 95% confidence interval; d = desired accuracy level at 95% interval.

By rule of thumb where there is no documented information about the prevalence of poultry coccidiosis in the study area, it is possible to take 50% prevalence as minimum expected prevalence. In this study, the sample size was calculated using 50% prevalence with

5% desired level of precision and 95% of confidence interval. By substituting these values in the formula given above, the size was found to be 384.

Data collection

A cross-sectional study was conducted from November 2015 to April 2016 to estimate the prevalence and risk factors of poultry coccidiosis in and around Yabello. Data was gathered from randomly selected chickens. Age, sex, breed, body condition, and housing type were considered as risk factors to test for occurrence of coccidiosis.

A total of 384 fecal samples were collected during the entire period of the study directly from the rectum of selected animals using spatula and from freshly dropped feces excluding soil contamination after wearing disposable plastic gloves and placed into air tight sample vials and transported to Yabello Regional Laboratory on the same day of collection and preserved at refrigeration temperature until processing, that is, within 48 h. During sampling date of sample collection, age, sex, breed, body condition and management system were recorded for each sampled animal. Fecal sample was qualitatively examined by centrifugation floatation technique (Ryley et al., 1976).

Data management and analysis

Data collected from the study sites were coded and entered in to a Microsoft excel spread sheet program for analysis. Statistical analysis was done on Statistical package for Social sciences (SPSS) software version 16 (Polar engineering and consulting, <http://www.winwrap.com/>). Descriptive statistics like percentage was used to express prevalence while chi-square (X^2) test was used to compare the association between variables and a statistically significant association between variables was considered at p-value less than 0.05.

RESULTS

Out of 384 fecal samples examined, 74 were found to be positive for *Eimeria* oocysts with the overall prevalence of 19.3 %. The highest prevalence rate (22.1%) was observed in chicken reared in intensive management system and the lowest prevalence rate (16.7%) was observed in extensive management system. The prevalence rates of 18.4 and 21.9% were recorded in chicken grouped under the age category of 2-8 weeks (young) and greater than 8 weeks (adult), respectively. The prevalence rates of 18 and 21.6% were also recorded in good and poor body condition, respectively. As shown in Table 1, the prevalence of coccidiosis was relatively different in different risk factors. However, difference between all risk factors was not statistically significant ($p > 0.05$).

DISCUSSION

Coccidiosis is the most prevalent and important disease of poultry and its prevalence and economic significance has been reviewed by different workers in different



Figure 1. The location of Yabello, Southern Ethiopia. Adapted from <http://fieldguides.com/news/fresh-2011-inieraries-ethiopia-phillipines-more/>.

Table 1. Prevalence of coccidiosis by age, sex, body condition, breed and management type

Risk factors	Category	No. examined	Positive	Prevalence (%)	Chi-square	P-value
Sex	Male	99	18	18.2	0.102	0.750
	Female	285	56	19.6		
Age	Adult	96	21	21.9	0.558	0.455
	Young	288	53	18.4		
Breed	Local	206	42	20.4	0.357	0.550
	Exotic	178	32	18.4		
Management system	Extensive	203	34	16.7	1.761	0.185
	Intensive	181	40	22.1		
Body condition	Good	250	45	18	0.744	0.388
	Poor	134	29	21.6		

production system (Luu et al., 2013). The result of the present study illustrate that poultry coccidiosis is endemic in and around Yabello, Southern Ethiopia, with an overall prevalence of 19.3% (74/384). The present result support the previous finding in central Ethiopia (Ashenafi et al., 2004) and Addis Ababa (Alemayehua et al., 2012) with prevalence rate of 25.8 and 23.1%, respectively. Moreover, this result is in agreement with the finding in Ambo by Oljira et al. (2012) who reported a prevalence of 20.57%. However, this prevalence of coccidiosis result is much lesser than the findings of Dinka and Tolossa (2012) in DebreZeit, Ethiopia (71.1%) and Alemargot in Addis Ababa (80%). This variation in prevalence of the disease may be due to epidemiology of coccidian infection and differences in management systems of the farms.

The result of current study revealed that the prevalence

of coccidiosis was almost alike in both female (19.6%) and male (18.2%) chicken. This may be due to equal chance of exposure for parasitic infection. This result is in agreement with report of previous studies done by Oljira et al. (2012) who reported a higher prevalence of poultry coccidiosis in female chickens than male chickens. This variation in prevalence of the disease may be due to climatic condition of coccidian infection and differences in management systems of the farms. However, the present result disagrees with the finding of Alemayehu et al. (2012) in Addis Ababa and Gebretensae et al. (2014) in Gondar who reported that a higher prevalence of poultry coccidiosis in male chickens than female chickens.

This study also indicated that the prevalence of coccidiosis was relatively higher in adult (greater than 8 weeks) 21.9% than young (2 to 8 weeks) 18.4% chickens. It was observed that there was no statistically

significant difference ($p > 0.05$) in the prevalence of coccidiosis among the two different age groups examined. However, slight variation was observed between the age categories.

The prevalence of coccidiosis was relatively higher in local (20.4%) than exotic 18.4%. This result agrees with the finding of Gebretensae et al. (2014) in Gondar who stated that the prevalence rate of coccidiosis was relatively higher in local than exotic breeds, as locals are allowed to scavenge in villages without any restriction and thus more likely get contact with the sporulated oocysts in faeces.

The effect of body condition on the prevalence of the disease was assessed and relatively high prevalence was recorded in those chickens which have poor body (21.6%) than those chickens which have good body condition (18%). Chickens which are managed in intensive housing system were more affected (22.1%) than extensive (16.7%) housing systems. This result in line with report of previous studies carried out by Taylor et al. (2007) who reported that coccidiosis was the most common problem to chickens kept under intensive management system especially those on deep litter management.

In conclusion, the present study showed that coccidiosis is prevalent in the study area. Even if the association between different risk factors are not statistically significant, still the disease has great socio-economic impact. Therefore, it is recommended that biosecurity practices should be a primary concept in the prevention and control of coccidiosis. Awareness should be created among the local chicken farmers through training on general knowledge of coccidiosis occurrence, medication procedures and prevention and control methods should be undertaken for sustainable control. Moreover, stress conditions such as overcrowding should be minimized by reducing the number of chicken in intensive housing which triggers the disease occurrence.

Conflict of interest

The authors have not declared any conflict of interest

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