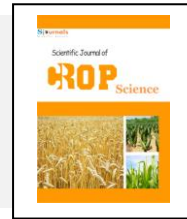


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Journal homepage: www.Sjournals.com**Original article****Prevalence study of poultry coccidiosis in small and large scale farms in Addis Ababa, Ethiopia****T. Alemayehu^a, A. Tekeselassie^b, S.A. Kassa^{c,*}**^aMekelle University College of Veterinary Medicine^bUniversity of Gondar Faculty of Veterinary Medicine^cHaramaya University College of Veterinary Medicine

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ABSTRACT

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We conducted a cross sectional study from October 2009 to March 2010 in Addis Ababa, Ethiopia with the objective of identifying prevalence of poultry coccidiosis in small and large scale production systems. A total of 384 fecal samples from female Rod Island Red chickens were taken and a flotation technique was employed to harvest coccidian oocysts. The result revealed that 89 (23.1%) are positive for coccidia oocysts. Unlike Yeka and Akaki kality sub cities, Kolfe sub city showed significantly higher ($P < 0.05$) prevalence of coccidiosis in both small and large scale production systems ($\chi^2 = 45.887$ and 62.28) respectively. Moreover, result of coccidiosis by age group indicated that significantly higher ($P < 0.05$) prevalence of coccidiosis ($\chi^2 = 9.255$) was registered in chicken above 8 weeks of age in large scale production system (LSP). However, significant variation was not noticed by age group in small scale production system (SSPS). Significant variation in terms of clinical coccidiosis were not observed ($p > 0.05$) between age groups in both SSPS and LSPS. Variation in management system and objective of the farms might be accounted for the observed variation in the prevalence's mentioned above.

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1. Introduction

In developing countries poultry production offers an opportunity to feed the fast growing human population and to provide income for resource poor farmers (CSA, 2004). 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 (Jordal *et al.*, 2002).

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 (Yami and Tadella, 1997). 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 (Almargot, 1987; Yami, 1995). 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 (Jones, 1996).

In Ethiopia, coccidiosis is endemic, causing great economic losses particularly in young growing birds in all production systems (FAO/ILRI, 1995). 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 (Almargot, 1987). The disease contributed to be a problem as reported by Guale (1990) 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. We believe coccidiosis is a problem which needs a deep and thorough investigation and subsequent monitoring so as to boost production and productivity. There for we initiated this investigation to determine the status of the disease in both small scale and large scale poultry farms.

2. Materials and methods

2.1. Study area

The area is characterized by bimodal rainfall with an average of 1100mm. The average annual daily temperature ranges from 10.7°C -23.6°C minimum and maximum, respectively and relative humidity varying from 70% to 80% during rainy season and from 40% to 50% during the dry season (A.A.C.A, 2004).

2.2. Study population

The study population consisted of Rode Island Red female chicken those are found in small and large scale poultry farms that are found in Yeka, Kolfe and Akaki kality sub cities of Addis Ababa. Small scale farms had flock size ranged from 50 to 500 birds per farm. Large scale farms had flock sizes that ranged above 500 birds per farm. Factors such as age (less than and greater than or equal to 8 weeks), case type (clinical or sub clinical) and production system were considered to determine their association with the disease pictures. Chicken that showed sign of illness in the flock, abnormal feces, birds that have a moribund appearance with lethargy, ruffled feathers and loss of skin pigmentation was considered as clinically ill.

2.3. Study design

Multi-stage random sampling method was employed in the selection of representative small and large scale poultry farms and sample chickens in the study area. Initially from the 10 sub cities of Addis Ababa administration, three sub cities namely Yeka, Kolfe and Akaki kality sub cities were selected randomly. In the three sub cities all the small scale and large scale poultry production system were registered and six farms from each of small and large scale production system were again selected. From the selected sample farms chickens were selected randomly.

2.4. Sample size determination

Sample size determination was based the possible prevalence rate (p) of the disease recorded in other places 50.8% (Gual, 1997) expected prevalence rate was considered from previous researchers and the desired absolute precision (d) according to Thrusfield (2005) was used to calculate sample size using 95% confidence level.

$$n = \frac{Z^2 p_{exp} (1-p_{exp})}{d^2}$$

Where Z (a multiplier for 95% confidence interval based on the normal distribution) =1.96, p=50% and d=5% the required sample size was estimated to be 384.

2.5. Fecal sample examination

This study methodology involved qualitative fecal examination to investigate oocyst discharge. The samples were collected in plastic bottles and brought to parasitological laboratory where they were examined. When the samples were not immediately examined they were stored at refrigeration temperature (about 4 °c) until examination. Oocysts in feces of infected birds were detected by using flotation methods with sugar solution (Annex 1).

2.6. Statistical analysis

Data generated from fecal examination was recorded in Microsoft Excel program and analysis was done by comparing proportions using Fisher’s exact for data with a frequency of less than five in cells and Pearson’s chi-square test for data that had greater than five in cells using SPSS Version 15, Chicago, USA. Since the number frequency per cell is less than five for some of the farms and numbers of farms are more than two, data set was merged and prevalence of coccidiosis was determined using Pearson chi square at sub city level. Significance was considered at P value < 0.05.

3. Results

Out of 384 faecal samples examined 89 (23.1%) were positive for coccidia oocysts. The variation in sub cities of Addis Ababa prevalence of coccidiosis was assessed and found to be significant (p< 0.05). Prevalence of coccidiosis in selected sub cities of the study area are shown in Fig. 1. Kolfe sub city showed significantly higher (P<0.05) prevalence of coccidiosis in both small and large scale production system ($\chi^2 = 45.887$ and 62.28) respectively.

The present study also assessed prevalence of coccidiosis by age groups (Table 1, 2). As it is indicated in the table significantly (P<0.05) higher number of adult chickens are affected by the disease in large scale production system ($\chi^2= 9.255$). However, variation in prevalence of coccidiosis were not observed between young (<8 week) and adult (≥8 week) groups of chickens in small scale production system.

The result of clinical and sub clinical infection are shown in Table 3. The result revealed absence of significant difference (P<0.05) in clinical coccidiosis between young and adult chickens in both small and large scale production system.

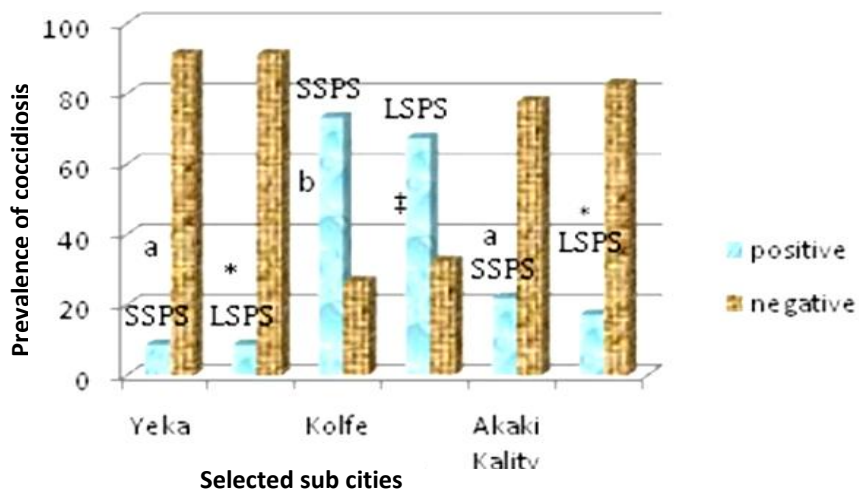


Fig. 1. Prevalence of coccidiosis in selected sub cities of Addis Ababa. N.B. values with different letters and symbols are significantly different P<0.05. SSPS: Small scale production system; LSPS: Large scale production system

Table 1

Prevalence of coccidiosis in small scale and large scale production system by age.

Production system	Age groups in weeks	Number of farms	Sample examined	Positive cases	(%)of positive cases
Large scale	< 8	3	125	18	14.4 ^a
	≥8	3	110	34	30.9 ^b
Small Scale	< 8	1	10	2	20 ^a
	≥ 8	5	139	35	25.2 ^a

N.B Percentage values with different superscripts (a and b) with in column are significantly different (P<0.05).

Table 2

Prevalence of clinical coccidiosis by age group.

Production system	Age group in week	Number of farms	Sample examined	Positive	Clinical case	Sub clinical
Large scale	<8	3	125	18	0 ^a	18(14.4%)
	≥8	3	110	34	4(3.6%) ^a	30(88.2%)
Small scale	<8	1	10	2	2(10%) ^a	0
	≥8	5	139	35	2 (1.4%) ^a	33(23.74%)
Total		12	384	89	8(2.08%) ^a	81(21.02%)

N.B Percentage values with different superscripts (a and b) with in column are significantly different (P<0.05).

4. Discussion

The result of the present study showed that out of 384 chicken tested for coccidiosis under small and large scale production system, 89 (23.1%) of them were found positive for coccidial oocysts. From coccidia positive chickens' higher percentage of subclinical cases of coccidiosis (21.02%) was recorded compared to clinical cases of coccidiosis (2.08%). This is in agreement with the previous finding by Gual (1990) in Debre Zeit 11% and 0% Ashenafi (2000) in central Ethiopia 15.79% and 4.21%; Getachew (2004) in Arsi zone 85.86% and 14.14% of sub clinical and clinical cases, respectively.

The result of the current study also showed prevalence of coccidiosis by sub city where by that Kolfe sub city registered significantly higher (P<0.05) prevalence of coccidiosis in both small and large scale production system compared to the prevalence recorded in the rest of sub cities. The observed higher prevalence of coccidiosis in Kolfe sub city may be explained in terms of the rearing systems where all of the poultry farms in the sub city included in the study practiced deep litter rearing system. In deep litter poultry houses which offer optimal condition of temperature and humidity for oocyst sporulation, the risk of heavy infection is further, increased (Urquhart *et al.*, 1987).

The current study showed absence of significant difference between clinical and subclinical coccidiosis in both small and large scale production system. Even though there is no significant variation higher prevalence of clinical coccidiosis recorded in SSPS as compared to LSPS (10.8% and 7.7% respectively). This finding is in agreement with the finding of Methusela (2004) where he reported higher prevalence of clinical coccidiosis in SSPS than LSPS with prevalence of 24.5% and 17.4% respectively. Unlike clinical coccidiosis, higher prevalence of

subclinical coccidiosis was registered in LSPS than SSPS. The higher prevalence of clinical coccidiosis in SSPS might be due to lack of utilization of coccidiostat in SSPS than that of LSPS in the study area.

The result indicated that significantly higher number of chickens ($P<0.05$) above and equal to 8 weeks of age affected by the disease (30.9%) than their younger counterparts (14.4%). Higher prevalence of coccidiosis in adult birds in LSPS might be due to the species of *Eimeria* that affect chicken because older chickens are affected by the species found in the small intestine and coccidiosis due to *E. tenella* (caecal coccidiosis) occurs principally in chickens of 3-7 weeks of age (Urquhart *et al.*, 1987). Even though this study not focuses on species identification the previous study conducted by Methusela (2002) found higher prevalence rate of coccidiosis of the small intestine than *E. tenella* in different poultry farms around Debre Zeit and Addis Ababa.

5. 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 large scale and small scale production system in Kolfe sub city. Awareness should be created among poultry producers regarding poultry coccidiosis and its preventive and control options.

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