Prevalence of Eimeria Species among Chickens
In Bahir Dar Town, Ethiopia

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Abstract: Parasitic diseases are among the major constraints of poultry production. The common internal parasitic infections that occur in poultry include cestodes, nematodes and protozoa (Eimeriaspecies). A cross-sectional study was conducted in Bahir Dar town between October 2013 and April 2014 to determine the prevalence of Eimeria species of chickens kept under different management systems and to assess the effect of sex, age and breed on the occurrence of Eimeria species. Three hundred eighty-four faecal and sixty mucosal scraping samples collected from randomly selected chickens were examined using flotation and direct smear techniques respectively. In this study, the overall prevalence of Eimeria species was found to be 40.6%. Out of the total of 195 and 189 village and small scale commercial chickens examined for Eimeria species, 25.6% and 56.1% chickens respectively were found to be positive and the difference in prevalence of Eimeria species between management systems was statistically significant (P<0.05). The overall prevalence of Eimeriaspecies was significantly higher (P<0.05) in young, exotic and small scale commercial chickens than adult, local and village chickens. There was no statistically significant difference (P>0.05) in the overall prevalence of Eimeriaspecies between male and female chickens. The high prevalence of Eimeriaspecies among chickens in the study area may be due to low level of management and health care services. This suggests the need to implement awareness creation among chicken producers on management and health care services of chickens; improvement of management practices and set up of prevention and control strategies so as to harvest the diverse products that may be generated from the poultry production sector.

Key words: Prevalence • Eimeria species • Chickens • Management Systems • Bahir Dar Town • Ethiopia

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. Poultry production in Africa and parts of Asia is still distinctively divided into commercialized and village enterprise subsector [1].

Disease is among the major constraints of poultry production. The common internal parasitic infections in poultry include cestodes, nematodes and Eimeria species that cause considerable damage and great economic losses to the poultry industry due malnutrition, decreased feed conversion ratio, weight loss, lowered egg production and death in young birds [2].

In Ethiopia, many researches had been conducted on coccidian parasites [3], but many of them focused on village chicken production only. Studies on the occurrence of Eimeriaspecies in chickens kept under different management systems are limited and little has been done on the prevalence of Eimeriaspecies of chickens in Bahir Dar town. Therefore, this study was geared with the objectives to determine the prevalence of Eimeriaspecies of chickens that are kept under different
management systems and assess the influence of host related risk factors such as sex, age and breed on the occurrence of Eimerriaspecies in Chickens.

MATERIALS AND METHODS

Study Area: The study was conducted from October 2013 to April 2014 in Bahir Dar town which is located in the North Western part of Ethiopia at a physical distance of 565 kilometers from Addis Ababa, the capital city of Ethiopia. The study area is located at 11°29’-11°41’ N latitude and 37°16’-37°27’E longitude. The average elevation in the town is about 1795 m a.s.l with ‘WeinaDega’ type of agro-ecological zone. The town covers an area of about 16,000 hectares. The mean annual precipitation depth recorded at Bahirdar Station in the 37 years period from 1962 to 1999 is about 1437 mm. The study area experiences average annual rainfall that ranges from 1200-1600 mm and it has mean annual temperature of 26°C [4].

Study Animals: Two groups of chickens based on management practice which included; 195 (50.8%) chickens under village and 189 (49.2%) chickens under small scale commercial, management systems were considered. The chickens’ demographic characteristics (age, sex and breed) were considered important. The ages of chickens were determined using criteria as used by Bachaya et al., [5] and Amare et al., [3]. Those chickens less than 6 months of age were classified as young (n=168) and those of the chickens greater than 6 months of age were categorized as adults (n=216). Chickens of 139 (36.2%) and 245 (63.8%) males and females respectively were sampled. Breed of the chickens was also another important factor considered and thus, about 197 and 187 local and exotic chickens respectively were sampled.

Study Design: A cross-sectional study was conducted from October 2013 to April 2014 in Bahir Dar town. Sampling was carried out repeatedly from apparently healthy chickens under different management systems (with their varying sex, age and breed) on local markets, sites of merchants, households and farms. Faecal samples from chickens were collected directly from the vent of the chickens, by usingswab and from top layers of fresh voided litter whereasscrapings from intestinal mucousa were collected, from the intact gastrointestinal tracts of sacrificed chickens, by using scissors and scalpel blades. All samples were placed in air and water tight sample vials (universal bottle containing 10% formaldehyde solution), labeled accordingly and then transported to Bahir Dar Animal Health Investigation and Diagnostic Laboratory where they were analyzed for Helminthes’ ova and Eimeria oocysts. The presences of Eimeria infections were confirmed by floatation and direct smear techniques for faecal samples and intestinal mucosa scrapings respectively. The results obtained in either of the techniques were considered as positive when at least one oocyst was observed in one of the techniques employed. Common salt (NaCl) floatation solution was prepared in the laboratory and used as afloatation solution. Mucousal scrapings from sixty (60) sacrificed chickens were examined by mucosal scraping.

Sample Collection and Study Methodology: Chickens were grouped in to two groups based on management systems, and repeated random samplings by lottery system were carried out to select local markets, sites of merchants, households and farms. Faecal samples from chickens were collected directly from the vent of the chickens, by using swab and from top layers of fresh voided litter whereas scrapings from intestinal mucosa were collected, from the intact gastrointestinal tracts of sacrificed chickens, by using scissors and scalpel blades. All samples were placed in air and water tight sample vials (universal bottle containing 10% formaldehyde solution), labeled accordingly and then transported to Bahir Dar Animal Health Investigation and Diagnostic Laboratory where they were analyzed for Helminthes’ ova and Eimeria oocysts. The presences of Eimeria infections were confirmed by floatation and direct smear techniques for faecal samples and intestinal mucosal scrapings respectively. The results obtained in either of the techniques were considered as positive when at least one oocyst was observed in one of the techniques employed. Common salt (NaCl) floatation solution was prepared in the laboratory and used as a floatation solution. Mucosal scrapings from sixty (60) sacrificed chickens were examined by mucosal scraping.
examination procedures as described by Lobago et al. [7]. Identification of *Eimeria* oocysts were carried out using a light microscope with x10 and x40 objectives. Identification of characteristic *Eimeria* oocysts were one by using identification keys mentioned in Jordan and Pattison [8].

**Age Estimation:** Ages of the chickens examined were classified into two categories as young (0-6 months) and adult (>6 months) as used by Bachaya et al., [5] and Amare, et al., [3].

**Statistical Analysis:** Computation of descriptive statistics was conducted using SPSS version 16.0. Descriptive statistics such as percentages, proportions and frequency distributions were applied to compute some of the data. The prevalence of the *Eimeria* species was calculated by dividing the number of chickens harboring a given parasite by the number of chickens examined (i.e. the proportion of positive results among tested chickens). Pearson’s chi-square ($\chi^2$) to measure association between prevalence of the *Eimeria* species with the age, sex, breed and management systems of chickens was used as the statistical tool. Confidence level was held at 95% and statistical analysis for the difference in prevalence of *Eimeria* species among risk factors were considered significant when the P-value was less than 0.05 (P<0.05).

**RESULTS**

**Overall Prevalence of *Eimeria* Species among Chickens:** A total of three hundred eighty four (384) chickens, i.e. 195 from village and 189 from small-scale commercial management systems, were examined out of which 139 (36.2%) and 245 (63.8%) were males and females respectively. One hundred fifty six (40.6%) of the chickens were positive for one or another of the *Eimeria* oocysts that may imply to the different *Eimeria* species.

**Prevalence of *Eimeria* species among Chickens Between Management Systems:** Of the 195 and 189 chickens examined from village and small scale commercial management systems respectively, overall prevalence of 25.6% in village and 56.1% in small scale commercial chickens were recorded and the difference in prevalence of *Eimeria* species was statistically significant (P<0.05) between the management systems (Table).

**Prevalence of *Eimeria* Species Among Chickens Between Sexes:** Out of 139 male and 245 female chickens examined for the presence of *Eimeria* oocysts, 54 (38.8%) and 102 (41.6%) males and females respectively were found infected by one or another of the *Eimeria* species. Statistical analysis of data showed the presence of a statistically insignificant (P>0.05) difference in prevalence of *Eimeria* species between the sexes (Table).

**Prevalence of *Eimeria* species among Chickens Between Ages:** In the study, the prevalence of *Eimeria* species was found higher in young (60.1%) than in adult (25.5%) with a statistically significant (P<0.05) difference of the prevalence between age groups (Table).

**Prevalence of *Eimeria* Species among Chickens Between Breeds:** A total of 197 local and 187 exotic breeds of chickens were examined for the presence of *Eimeria* species; out of which 49 (24.9%) and 107 (57.2%) respectively were found infected and the

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statistical data analysis showed that the difference in prevalence was statistically significant (P<0.05) between the breeds (Table).

Based on personal observations, it was identified that most of the people producing chickens were not having animal production or veterinary basis of education but carry out production based on their traditional knowledge, experiences and because they are beneficiaries with the income generated from poultry production. Most of the local chickens are fed grain and spend most of the times by scavenging. In addition to this, chicken owners do not seek treatments for chickens and taking sick chickens to Veterinary Clinics is not a common practice in Bahir Dar town. But in the small scale commercial production systems, even though feeding of some rations (to which coccidiostats are included) was found common, but the housing, drinking and biosecurity practices were identified not to be set as recommended. Small scale commercial farms were found to have private Veterinarians who attend the health of the chickens. However, symptomatic and prophylactic treatments without laboratory diagnoses were found common practices.

DISCUSSION

The prevalence of *Eimeria* species among chickens in Bahir Dar town (40.6%) confirmed in this study was lower than the findings of Comfort and Rita [9] who reported 69% in Nigeria. But the present finding was comparable to the reports by Nnadi and George [1] and Mwale and Masika [10] who reported prevalence of 35.5% and 41.43% in chickens from Nigeria and South Africa respectively. In contrary to these, the present finding had shown higher prevalence than the findings of Amare et al., [3] and Ohaeri and Okwum [11] who reported overall prevalence of 25.24% and 8.9% in central Ethiopia and Abia state Nigeria respectively. The differences in prevalence of *Eimeria* species among the findings from different countries and different places of Ethiopia could be attributed to differences in agro-ecology, management systems, the breeds and age groups of chickens, diagnostic methods used, public awareness about gastrointestinal helminthes of chickens, health care management and prevention and control strategies set among chicken producing countries and/or communities.

In this study, there was a significant difference (P<0.05) in the prevalence of *Eimeria* species between the different age, breed and management system groups. The higher infection prevalence of *Eimeria* species was observed in the young, exotic and small scale commercial than in adult, local and village chickens. This can be supported by the justifications of different findings that discuss *Eimeria* species to be more common in young and that reared under intensive management systems [3] and Bachaya et al., [5]. The prevailing study revealed a higher prevalence of *Eimeria* species in chickens under small scale commercial management system than that of village chickens and the difference in prevalence was statistically significant (P<0.05). This was in agreement with [12] and [3] who showed that coccidiosis was not common among village chickens and suggested that it is a problem more related to intensive rather than extensive management.

CONCLUSION

In this study, *Eimeria* species were proofed to occur frequently in small scale commercial than village chickens which may be an implication to wet litter and other suitable conditions for sporulation of oocysts in the confined systems of management. The study revealed that *Eimeria* species were more common in young and exotic chickens with the prevalence differences between age and breed groups having statistical significance (P<0.05). The high prevalence of *Eimeria* species in the study area together with the low awareness of chicken producers about the health care of chickens may pose devastating health problems to the chickens and economic losses to poultry production sector.

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REFERENCES