OCCURRENCE OF SUBCLINICAL *EIMERIA* INFECTION IN COMMERCIAL POULTRY FARMS IN KADUNA, STATE NIGERIA

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ABSTRACT

Subclinical avian coccidiosis can result to significant decrease in production performance in affected flocks, even if the birds do not showing classical symptoms of the disease and it is regarded as one of the major causes of production losses in poultry industry. The present study determined the occurrence of subclinical *Eimeria* infection in commercial poultry farms in Kaduna State, Nigeria. Faecal samples were collected from a total of 123, apparently, healthy commercial poultry farms (consisting of 93 layer and 30 broilers flocks) across eight Local Government Areas of Kaduna State. The samples were tested for the presence of *Eimeria* oocysts using simple floatation test. Of the 123 flocks sampled 30% had subclinical *Eimeria* infection. Although the prevalence rates varied in the different strata of the study area, there was no significant statistical association ($\chi^2 = 7.587$, $P > 0.05$) between locations of the flocks sampled and the occurrence of the subclinical *Eimeria* infection. There was 26.9% and 40.0% occurrence of the infection in layers and broiler flocks, respectively, which was insignificantly associated ($\chi^2 = 1.856$, $P > 0.05$) with the type of flock sampled. It was concluded that subclinical *Eimeria* infection is common and wide spread in commercial poultry farms in the study area, suggesting that the performance of most of the affected flocks might not be optimum induced by poor nutrient utilization due to the possible transient intestinal damage caused by the infection.

Key words: Commercial poultry, *Eimeria*, Production loss, Subclinical infection.

INTRODUCTION

Avian coccidiosis is one of the major diseases of poultry world-wide, which results in great economic losses, amounting to 2.4 billion US dollars annually (Shirley *et al*., 2005). The disease is caused by a multiple species of faeco-orally transmitted protozoan parasite of the genus *Eimeria* (Taylor *et al*., 2007). *Eimeria* parasites invade and multiply in the intestinal epithelial cells of the chicken host with subsequent destruction of the intestinal lining, leading to bloody diarrhoea, dehydration and malnutrition due to digestive disturbances (McDougald, 2003). The severity of coccidiosis is dependent on the number of oocysts ingested by each bird, and morbidity and mortality increase with increase in size of the dose ingested (Taylor *et al*., 2007). Under natural conditions, coccidiosis in poultry occurs in two forms, viz: Clinical coccidiosis in which the affected birds show typical symptoms of the disease; and subclinical coccidiosis because the affected birds do not show visible symptoms of the disease, but when a random sample of birds is examined, the presence of the gross lesions and the coccidia are found (McDougald, 2003). Ingestion of low dose of sporulated oocysts from the environment by birds usually results in low grade infection or subclinical coccidiosis, the main cause of production losses in poultry industry. This is due to poor feed utilization by the affected birds, and most often farmers remain unaware of the infection due to lack of obvious symptoms (Haug *et al*., 2008). Loses due to subclinical coccidiosis manifest as poor performance in the form of decreased weight gain in broilers and/or egg production in layers (Haug *et al*., 2008; Jatau *et al*., 2014). Despite the importance of subclinical coccidiosis in the poultry industry, there appears to be no available information regarding its occurrence in our local poultry establishments. The present study aimed at determining the extent of occurrence of subclinical form of coccidiosis in commercial poultry farms in Kaduna State Nigeria.

MATERIALS AND METHODS

Study area and sample size: A total of 123 commercial poultry farms (consisting of 93 layer and 30 broilers flocks) were sampled across Zaria, Sabon Gari, Igabi, Giwa, Makarfi, Ikara and Soba Local Government Areas of Kaduna State, Nigeria from December, 2012 to April, 2013. The poultry farms were selected and sampled based on availability and

accessibility to the farms, and the willingness of the poultry farmers to participate in the study.

Sample collection: In each poultry house, samples were collected at different spots following a roughly W-shaped path. Along this path, portions of the litter/faecal materials were manually, but aseptically collected and placed in clean plastic bags. Physical health status of the sampled flocks are assessed by observing the flock activity and alertness before and during sampling. Flock record such as bird type and anticoccidial medication used were recorded from each farm visited. Collected samples were transported on ice pack to the Research Laboratory of the Department of Veterinary Parasitology and Entomology, Ahmadu Bello University, Zaria for processing.

Laboratory Processing of the Samples: In the laboratory, about 200 g of each sample was transferred into a plastic beaker and soaked in about 500 ml of distilled water overnight. The soaked samples were then homogenized and, subsequently, filtered through a metal sieve. The filtrate was allowed to sediment for about an hour on the laboratory bench, after which the supernatant fluid was discarded. The sediment was then tested for the presence of coccidia oocysts using the simple floatation technique (Soulsby, 1986).

Data analysis: The chi-squared and Odds ratio tests were used to determine the association between the occurrences of *Eimeria* oocysts in a farm with the farm location and flock type. Values of $P<0.05$ were considered statistically significant.

RESULTS AND DISCUSSION

The physical examinations of the 123 flocks sampled indicated that all the sampled flocks were, apparently, healthy as they were alert and active before and during the sampling process. Also, examination of the flock record and or the flock history showed that all the sampled flocks had history of anticoccidia medication. Table 1 shows the prevalence of the subclinical *Eimeria* infection in flocks of commercial poultry in the study area. Of the 123 flocks sampled in the study area, 30% had subclinical *Eimeria* infection. Prevalence rates of 20%, 46.7%, 25%, 16.7%, 20.7%, 20% and 33.3% were observed in Giwa, Igabi, Ikara, Makarfi, Sabon Gari, Soba and Zaria Local Government Areas respectively. Although the prevalence rates varied in the different strata of the study area, there was no significant association ($\chi^2 = 7.587$, $P > 0.05$) between locations of the flocks sampled and the occurrence of the subclinical *Eimeria* infection (Table 1). The occurrence of the subclinical *Eimeria* infection in the sampled flocks, based on flock type is shown in Table 2. Of the 93 layer flocks sampled, 26.9% had subclinical *Eimeria* infection, while 40.0% of the apparently healthy 30 broiler flocks sampled were also infected with *Eimeria* parasite. There was no statistically significant association ($\chi^2 = 1.856$, $P > 0.05$) between the prevalence of subclinical *Eimeria* infection observed, and the type of flock sampled (Table 2). All the coccidia positive sampled flocks were apparently normal, based on the physical assessment of the flocks despite the detection of *Eimeria* oocysts in their faeces, indicating the birds might have developed immunity to the trickle infections acquired from the environment. The developed immunity enabled them to maintain the state of balance to the infection in the form of sub-clinical disease (Blake and Tomley, 2004). The implication of this finding is that birds' performance in the infected flocks may be affected negatively while the farmers not be aware of the flocks' problem. Haug *et al.* (2008) and Jatau *et al.* (2014) reported significant decrease in commercial performance in the form of reduced egg production and weight gain respectively, in birds with

Table 1: Prevalence of *Eimeria* infection among the sampled flocks based on locations.

Flocks location	Number sampled	Number (%) positive	OR	95% CI for OR
Giwa	10	2 (20)	2.00	0.36 to 11.23
Igabi	30	14 (46.7)	0.57	0.20 to 1.62
Ikara	8	2 (25)	1.50	0.26 to 8.82
Makarfi	6	1(16.7)	1.83	0.19 to 17.86
Sabon Gari	29	6 (20.7)	1.92	0.59 to 6.22
Soba	10	2 (20)	2.00	0.36 to 11.23
Zaria	30	10 (33.3)	Reference	-
Total	123	37 (30.1)		
$\chi^2 = 7.587$,		df = 6,	P = 0.2699	

Table 2: Prevalence of *Eimeria* infection in the study area according to flock type.

Flock type	Number sampled	Number positive (%)	OR	95% CI for OR
Layers	93	25 (26.9)	1.813	0.77 to 4.30
Broilers	30	12 (40.0)	Reference	-
Total	123	37 (30.1)		
$\chi^2 = 1.856$,		df =1,	P = 0.1731	

subclinical coccidiosis. Moreso, with the known high fecundity rate and pathogenicity of the chicken *Eimeria* species, the mere presence of the parasite in a flock indicates an immediate risk of outbreak of clinical coccidiosis. The fact that all the sampled flocks had history of anticoccidia prophylactic treatment suggests that the isolated *Eimeria* species may have some degree of tolerance or resistance to the drugs. Capacity for the development of resistance by *Eimeria* to all available anticoccidial drugs have been established (Abbas *et al*., 2011). According to Chapman (1999), most anticoccidial drugs used in the field today only partially suppress parasite development, thereby ameliorating the clinical manifestation of the disease. This may contribute to the observed widespread subclinical coccidiosis in the sampled flocks. The detection of *Eimeria* oocysts in 30% of the farms sampled is an indication that coccidiosis is a widely occurring infection in the study area. This agrees with the report of Adene and Oluleye (2004) that coccidiosis is the major parasitic disease of poultry in Nigeria. Although different prevalence rates of *Eimeria* infection were observed at the different strata of the study area, the difference in the rates , not significant. This observation concurred with report of Luu *et al.* (2013) also observed no difference in the prevalence of *Eimeria* oocysts in faecal worms obtained in different regions of Ethiopia. This could be due to the cosmopolitan nature of chicken *Eimeria* species (Taylor *et al*., 2007; Blake and Tomley, 2014).

Conclusion

In conclusion, subclinical *Eimeria* infection is common and widespread in commercial poultry farms in the study area, apparentlydue to the widespread presence of drug tolerant strains of the parasite. Consequently, the affected flocks may not perform optimally as a result of poor nutrient utilization due to the transient intestinal damage, caused by the subclinical *Eimeria* infection.

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REFERENCES

Abbas, R.Z., Iqbal, Z., Blake, D., Khan, M.N. and Saleemi, M.K. (2011). Anticoccidial drug resistance in fowl coccidian: the state of play revisited. *World's Poult. Sci. J.*, 67: 337349.

Adene, D.F. and Oluleye, O.B. (2004). Coccidiosis of poultry: The biology diagnosis, treatment and control. In: D.F. Adene. *Poultry Health and Production Principles and Practices*. Stirling-Horden Publishers (Nig.) Ltd. Ibadan, Nigeria, pp. 129-164.

Blake, D.P. and Tomley, F.M. (2014). Securing poultry production from the ever-present*Eimeria* challenge. *Trends Parasitol.*, 30(1): 12-19.

Chapman, H.D. (1999). Anticoccidial drugs and their effects upon the development of immunity to *Eimeria* infections in poultry. *Avian Pathol.*, 28: 521–535.

Haug, A., Gjevre, A.G. Skjerve, E. and Kaldhusdal, M. (2008). A survey of the economic impact of subclinical *Eimeria* infections in broiler chickens in Norway. *Avian Pathol.*, 37: 333-341.

Jatau, I.D., Odika, A.U., Thlama, M., Talba, A.M., Bisalla, M. and Musa, I.W. (2014). Response of two breeds of broiler chicks to experimental infection with low dose of *Eimeria tenella* sporulated oocysts. *Turkish J. Vet. Anml. Sci.*, 38: 398-404.

Luu, L., Bettridge, J., Christley, R.M., Melese, K., Blake, D., Dessie, T., Wigley, P., Desta, T.T.,Hanotte, O., Kaiser, P., Terfa, Z.G., Collins, M. and Lynch, S.E. (2013).Prevalence and molecular characterisation of *Eimeria* species in Ethiopian village chickens. *BMC Vet. Res.*, 9:208.

McDougald, L.R. (2003). Protozoal infections. In: Saif, Y.M., Barnes, H.J., Glisson, J.R., Fadly, A.M., McDougald, L.R. and Swayne, D.E. editors. *Diseases of Poultry*. 11th edition. Iowa StateUniversity Press, Pp. 973-1023.

Shirley, M.W., Smith, A.L. and Tomley, F.M. (2005). The biology of avian *Eimeria* with an emphasis on their control by vaccination. *Adv Parasitol.*, 60:285–330.

Soulsby, E.J.L. (1986). *Helminths, Arthropods and Protozoa of Domestic Animals* (7th Edition). Beilliere Tindalll, London, Philadelphia and Toronto, Pp. 231.

Taylor, M.A., Coop, R.L., and Wall, R.L. (2007). Parasites of poultry and game birds. In: *Veterinary Parasitology*, 3rd edition. Iowa State, Blackwell Publishing, USA. Pp 459-557.