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Prevalence of Coccidiosis and Eimeria species in Layers and Broilers at Slaughter Houses in Makurdi, Benue State.

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ABSTRACT

A survey was conducted from July 2013 to October 2013 to determine the prevalence of coccidiosis and Eimeria species in layers and broilers at slaughter in Makurdi metropolis. A total of 384 whole intestines were sampled from the slaughter houses. The contents of each intestinal tract were examined microscopically for the presence of Eimeria oocysts using the simple floatation technique. Eimeria species were identified by the location of intestinal area parasitized and morphology of sporulated oocysts. The overall prevalence rate of coccidial infection was 40.1% (154/384), 41.5% (49/118) for layers and 39.5% (105/266) for broilers. There was no statistical difference ($p>0.05$) between the prevalence rates of coccidial infection in layers and broilers. The prevalence was significantly higher ($p<0.05$) among layers and broilers reared in deep litter than those reared in battery cages. Seven Eimeria species of chickens were identified with the following prevalence rates: E. necatrix (22.6%), E. maxima (20.4%), E. tenella (19.4%), E. mitis (15%), E. acervulina (10.4%), E. praecox (6.9%) and E. brunetti (5.3%). Mixed and single Eimeria species infections accounted for 89.6% (138/154) and 10.4% (16/154) respectively of all infections. In conclusion, the prevalence of coccidiosis in Makurdi is high and the deep litter system of management remains an important risk factor in the occurrence of the disease. Proper sanitation, good bio security measures and the use of the battery cage system of management should be adopted by farmers to reduce the effect of the disease.

Keywords: *Coccidiosis; Prevalence; Eimeria species; Chickens*

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I. INTRODUCTION

The poultry industry in Nigeria has witnessed expansion in recent times (Adewole, 2012). The estimated poultry population in Nigeria rose from 110 million at the beginning of this century, to over 150 million in 2006 (FAO, 2006). In Benue state, North Central Nigeria, the estimated population of poultry stood at 6.7 million (Adene and Oguntade, 2006). In spite of this growth, the industry has suffered several constraints of which poultry disease is a major setback (Etuk *et al*., 2004). Coccidiosis in poultry is caused by different species of the genus *Eimeria* (Taylor *et al.*, 2007). The disease causes reduced growth, emaciation, anaemia and mortality (Hadipour *et al*., 2011). This is responsible for heavy economic losses due to the cost of treatment and prevention (Usman *et al.*, 2011).

The environmental temperature and relative humidity in Makurdi ranges from 27^0C to 38^0C and 43% to 81% respectively (Tyubee, 2009). The warm and humid weather provides favourable conditions for the growth and development of infective ooysts (Etuk *et al*., 2004) which could result in a high prevalence of coccidiosis in Makurdi. The prevalence of coccidiosis Nigeria has been reported for Oyo state (Majaro, 1980), Zaria (Jatau *et al*., 2012), Abak Agricultural Zone in Akwa Ibom State (Etuk *et al*., 2004), Vom (Muazu *et al*., 2008) and Abuja (Olanrenwaju and Agbor, 2014). However, in Makurdi Benue State there is a dearth in data of *Eimeria species* and the prevalence of coccidiosis. Hence this study seeks to investigate the prevalence of coccidiosis and *Eimeria species* in Makurdi.

II. MATERIALS AND METHODS

A sample size of 384 was arrived at using the formula of Thrustfield (1995). The slaughter houses at Makurdi modern market, High-level market and Wurukum market were used for this study between July 2013 and October 2013. Information regarding the management system of birds slaughtered was obtained verbally from the sellers. Fresh gastro-intestinal tracts (GIT) of layers and broilers were cut into four parts namely; the jejunum and

duodenum, the middle on third portion of the intestine, the lower intestinal region (large intestine) and the caeca to aid speciation of *Eimeria* oocysts. The four intestinal regions of each bird were dissected using a pair of scissors and the contents scrapped into different beakers. The intestinal contents were examined microscopically using the salt floatation technique (Zajac and Conboy, 2012) for the presence of *Eimeria* oocysts. Positive samples were sporulated in 2.5% potassium dichromate ($K_2Cr_2O_7$) solution and an average of 10 randomly selected oocysts per sample were determined by morphometry using an ocular micrometer. The measurements were compared with a diagnostic guide for the identification of sporulated *Eimeria* oocysts by Conway and McKenzie (2007).

Data collected from the study were analyzed using Graph Pad Prism® software version 6.07. Values of $p<0.05$ were considered significant. Chi-square test (χ^2) for association in 2x2 tables was used to measure statistical significance.

III. RESULTS

The results of this study shown in Table 1 indicate that of the 384 GITs examined, 154 were infected with *Eimeria species* giving rise to a prevalence rate of 40.1%. Layers had a higher prevalence of 41.5% compared to the broilers with 39.5%, however the difference was not statistically significant ($\chi^2 = 0.3785$, $P = 0.7051$).

Layers reared in deep litter had a prevalence rate of 60% (33/55) which was higher compared to the prevalence rate of 25.04% (16/63) in layers reared in battery cages ($\chi^2 = 3.805$, $P = 0.0001$). Similarly, Broilers reared in deep litter had a higher prevalence rate of 51.02% (75/147) compared to 25.21% (30/119) in broilers reared in battery cages ($\chi^2 = 4.282$, $P = 0.0001$) (Table 2).

The prevalence of *Eimeria* species among chickens surveyed in Makurdi is shown in Table 3. The most prevalent specie was *E. necatrix* (22.6%), *followed by E. maxima* (20.4%), *E. tenella* (19.4%) and the least *was E. brunetti* with 5.3%. 89.6% (138/154) of the infections were mixed while 10.4%, (16/154) were single infections.

The distribution of coccidial infection in Makurdi based on months of survey is shown in Table 4. The prevalence rate for the months of July, August, September and October were 27.8%, 50.6%, 47.6% and 35.0% respectively.

Table 1: Prevalence of coccidial infection in broilers and layers

Type of Bird	Numbers of Birds Sampled	Number of Infected Birds	Prevalence (%)
Broilers	266	105	39.5[a]
Layers	118	49	41.5[a]
Total	384	154	40.1

The same superscripts (a, a) within the last column indicate no significant difference ($p>0.05$) among broilers and layers ($\chi^2 = 0.3785$, $P = 0.7051$)

Table 2: Prevalence of coccidial infection in layers and broilers reared under different management systems

Management System	Layers			Broilers		
	Positive	Negative	Prevalence (%)	Positive	Negative	Prevalence (%)
Battery cages	16	47	25.40 (16/63)[a]	30	89	25.21 (30/119)[a]
Deep litter	33	22	60.00 (33/55)[b]	75	72	51.02 (75/147)[b]

Different superscripts (a, b) indicate significant difference ($p<0.05$) between prevalence rates of birds reared in battery cages and deep litter.

Table 3: Prevalence of *Eimeria species*

***Eimeria* species**	**Number of Oocysts Identified**	**Prevalence (%)**
E. acervulina	118	10.4
E. praecox	78	6.9
E. maxima	231	20.4
E. necatrix	255	22.6
E. brunetti	60	5.3
E. mitis	169	15.0
E. tenella	219	19.4
Total	1,130	100

Table 4: Prevalence of coccidiosis in chickens during months of the survey

Month	**Samples Examined**	**Positive Samples**	**Prevalence (%)**
July	79	22	27.8
August	79	40	50.6
September	103	49	47.6
October	123	43	35.0
Total	**384**	**154**	**40.1**

IV. DISCUSSION

In this study, a relatively high prevalence rate of 40.1% was recorded. The prevalence rate is higher than those reported in Abak Agricultural Zone of Akwa Ibom State (29.3%), Vom, Plateau State (36.6%) and Zaria (33.3%) as reported by Etuk *et al.* (2004), Muazu *et al*. (2008) and Jatau *et al*. (2012) respectively. The higher prevalence rate recorded in this study could be attributed to the high relative humidity in Makurdi metropolis (Tyubee, 2009) as this has been reported to favour the sporulation of *Eimeria* oocysts (Waldenstedt *et al*., 2001 and Etuk *et al*., 2004). The rainy season in which the study was conducted alongside poor management practices such as overstocking and poor sanitary conditions could also be responsible for the high prevalence of coccidiosis in this study (Etuk *et al*., 2004; Bachaya *et al*., 2012).

There was no significant difference ($\chi^2 = 0.3785$, P = 0.7051) between the prevalence rate of coccidiosis in layers and broilers. This is in agreement with the report of Olanrenwaju and Agbor (2014). In layers and broilers, the statistically significant difference ($\chi^2 = 3.805$, P = 0.0001 and $\chi^2 = 4.282$, P = 0.0001 respectively) between the prevalence rate of coccidiosis in birds reared under deep litter system and battery cage system of management shows a strong association between system of management and the occurrence of the disease. The higher prevalence rate in layers and broilers reared under the deep litter system of management is in tandem with the reports of Etuk *et al.* (2004); Hadipour *et al*. (2011) and Jatau *et al*. (2012).

In this survey, seven species of *Eimeria* were detected. This finding is similar to that of Jatau *et al*. (2012) in Zaria and Luu *et al*. (2013) in Ethiopian villages. The three most prevalent species in this study were *Eimeria necatrix* (22.6%), *E. maxima* (20.4%) and *E. tenella* (19.4%). These species are pathogenic and of economic importance in chickens (Taylor *et al*., 2007). These observed frequencies indicate a potential economic impact on poultry production in Makurdi. The observation that mixed infections in this study (89.6%, [138/154]) were more in number than single infections (10.4%, [16/154]) agrees with the reports of Amare *et al*. (2012), Gyorke *et al*. (2013) and Luu *et al*. (2013).

Coccidiosis has been shown to be more prevalent during the rainy season (Etuk *et al*., 2004; Bachaya *et al*., 2012). This survey shows that within the rainy season in Makurdi, the prevalence of coccidiosis infection was highest between the months of August and September which coincides with the peak of the rainy season in Makurdi (Tyubee, 2009). In conclusion, this study revealed that coccidiosis is still an important disease of poultry in Nigeria and Makurdi in particular. The deep litter system of management remains an important factor in the occurrence of the disease. Proper sanitation, good bio security measures and the use of the battery cage system of management should be adopted by farmers to reduce the effect of coccidiosis.

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