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A six year (2005-2010) retrospective study of avian coccidiosis diagnosed in Gombe veterinary clinic, Nigeria

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Abstract
Chicken Coccidiosis remains one of the major diseases of concern in the poultry production enterprise in Nigeria. A six year retrospective study to establish the prevalence of chicken Coccidiosis (CC) in relation to other poultry diseases diagnosed at the Veterinary Clinic Gombe was conducted. CC occurred year round with high prevalence during the rainy season (July-September). Incidence of CC was 1.7 more likely to occur in November. CC is endemic with higher prevalence during the rainy season in Gombe. Farmers should adhere to routine chemoprophylaxis and avoid factors of predisposition to coccidiosis especially during the rainy season.

Keywords: Avian coccidiosis, Gombe, Northeastern Nigeria, Retrospective prevalence, Seasonality
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Introduction

The commercial poultry in Nigeria has recorded considerable expansion in recent past (FAO, 2000). Unfortunately poultry diseases serve as major threats facing poultry production in the country (Halle *et al*., 1998). Of these diseases coccidiosis is essentially a disease of poultry under intensive management condition caused by a protozoan parasite known as *Eimeria*. A mild coccidian infection due to non pathogenic or low dose of pathogenic *Eimeria* oocyts is not harmful and creates flock immunity against coccidiosis. A severe attack of coccidiosis can however cause weight losses, morbidity and mortality (Sharma *et al*., 2013). Coccidiosis in chickens is one of the most costly diseases affecting the poultry industry worldwide (Nematollahi *et al*., 2009). It is an intestinal parasitic disease caused by intracellular protozoan parasites of the genus *Eimeria* (Nematollahi *et al*., 2009). The infection inflict severe economic loss due to extensive destruction of the enteric epithelium resulting in reduction of feed conversion, body weight gain and egg production (Min *et al*., 2004; Morris & Gasser, 2006; Lillehoj *et al*., 2007). The most common species affecting chickens include *E. tenella, E. brunetti, E. necatrix, E. maxima, E. acervulina*, *E. mivati* and *E. hagani* (Soomro *et al*., 2001). The disease is endemic in most of the tropical and subtropical regions where ecological and management conditions favor an all-year round development and propagation of the causal agent (Obasi *et al*., 2006). Coccidiosis has been reported in most parts of Nigeria (Okoye, 1985; Molta *et al*., 1999; Muazu *et al*., 2008; Jatau *et al*., 2012). Clinical examination, Postmortem examination, histopathology and examination of intestinal mucosal scrapings for oocysts provide the most reliable means of diagnosing the disease since there are no useful serologic methods for the diagnosis of coccidiosis (Idris *et al*., 1997). Immunity develops after infection (Rose & Hesketh, 1979; Sharma *et al*., 2013) and gives protection against future outbreak for about 6 months. Unfortunately, there is no cross immunity between the various species of *Emeria* (Lee *et al., 2010*) and prevention and control of avian coccidiosis is difficult because *Emeria* species are found all over the world and oocyst can occur in flocks where there have been no previous clinical manifestation of coccidiosis (Chapman, 2005).

Therefore, this study was carried out to determine the case prevalence and seasonality of chicken coccidiosis diagnosed in veterinary clinics in Gombe Northeastern Nigeria.

Materials and methods

Study Area

The study was conducted in Gombe metropolis Veterinary Clinic which is the state capital. The state is located in the north-eastern part of Nigeria with mean annual rainfall of 818.5mm, temperature range of 12-37^{o} C and relative humidity of 94% in August and 10% in December. Cold harmattan starts in October while rains begin in April. The climate and adaptive factors such as seasonality, temperature and climate favor crop and livestock production (Anon., 2009). The season in Gombe like in most parts of Northeastern Nigeria were categorized as follows: Dry season (January - March), Pre-rainy season (April - June), Rainy season (July-September) and Pre-Dry season (October –December) (Abdu *et al*., 1992).

Data collection

Data were collected from the state Veterinary Clinics' record in Gombe from Jan. 2005 to Dec. 2010. Information on chicken Coccidiosis only was extracted from the clinic records and the non-Coccidiosis cases were considered together as a group. A case of chicken Coccidiosis was defined as a farm that reported an outbreak of a disease and diagnosed based on history, clinical signs and post mortem findings in the two veterinary clinics in Gombe metropolis.

Data Analysis

Descriptive analyses were conducted by Microsoft office Excel spread sheet, odds ratio at 95% CI on OR were calculated to determine strength and significance of associations between variables and prevalence of chicken Coccidiosis using Graphad prism® version 5.01 for windows (GraphPad Software, Inc., San Diego, California, USA) computer based program. The seasonal variation in the distribution of chicken Coccidiosis for the period 2005 - 2010 was determined by reducing the 6 year data to one year using the 4 season's ratios to moving average method (Saidu *et al*., 2006).

Results

A total of 5102 cases of poultry diseases were recorded during the six-year study (2005-2010). Of these cases, 581 (11.4%) were diagnosed as chicken Coccidiosis and this was statistically significant ($p<0.05$). The year specific rate (YSR) for chicken Coccidiosis was highest in 2010 (19.0%) and lowest in 2007 (4.5%). However, only the odds ratios for 2006 (0.945) was not significant at 95% C. I (Table 1).

The Month Specific Rate (MSR) for chicken Coccidiosis was highest in November (17%) whereas lowest in January and February (7.2%) but only the odds ratios for January (0.578), February (0.745), March (0.604), August (1.45), September (1.44) and November (1.67) were significant at 95% C. I (Table 2).

The Season Specific Rate of chicken Coccidiosis were 7.3% in Dry season (Jan-Mar) to 15% in Rainy season (Jul-Sep). However, only their odds ratios were significant at 95% C. I (Table 3).

The Isolated Seasonal Indices (ISSI) showed that chicken Coccidiosis peaked in Pre-rainy, Rainy and Pre-dry seasons. The highest peak was observed in Rainy season and lowest peak in Dry season. (Figure 1).

Table 1: Yearly Distribution of Chicken Coccidiosis in Gombe, Nigeria (2005-2010)

Year	Total number of cases	Cases of Coccidiosis	Year Specific Rates (%)	Odd Ratio	95% C.I on OR
2005	826	75	9.1	0.744	0.577-0.960
2006	915	100	10.9	0.945	0.752-1.188
2007	928	41	4.5	0.311	0.225-0.431
2008	810	152	18.8	2.080	1.698-2.547
2009	771	51	6.6	0.508	0.377-0.685
2010	852	162	19.0	2.147	1.760-2.618
Total	5102	581	11.4		

Table 2: Monthly Distribution of Chicken Coccidiosis in Gombe, Nigeria (2005-2010)

Month	Cases of Coccidiosis	Cases of Non-Coccidiosis	Month Specific Rates (%)	Odd Ratio	95% C.I on OR
Jan	35	451	7.2	0.578	0.405-0825
Feb	29	373	7.2	0.754	0.509-0.825
Mar	23	289	7.4	0.604	0.391-0.931
Apr	30	271	10.0	0.854	0.580-1.260
May	55	427	11.4	1.000	0.746-1.350
Jun	61	413	12.9	1.170	0.878-1.550
Jul	43	254	14.5	1.130	0.960-1.880
Aug	84	472	15.1	1.450	1.129-1.862
Sep	55	306	15.2	1.440	1.066-1-946
Oct	38	483	7.3	0.585	0.416-0.824
Nov	64	312	17.0	1.670	1.257-2.219
Dec	64	470	12.0	1.067	0.809-1.407
Total	581	4521	11.4		

Table 3: Seasonal Distribution of Chicken Coccidiosis in Gombe, Nigeria (2005-2010)

Season	Cases of Coccidiosis	Cases of Non-Coccidiosis	Season Specific Rate (%)	Odd Ratio	95% C.I on OR
Dry (Jan-Mar)	87	1113	7.3	0.539	0.425-0.684
Pre-Rainy (Apr-Jun)	146	1111	11.6	1.030	0.844-1.257
Rainy (Jul-Sep)	182	1032	15.0	1.542	1.277-1.862
Pre-Dry (Oct-Dec)	166	1265	11.6	1.030	0.850-1.247
Total	581	4521	11.4		

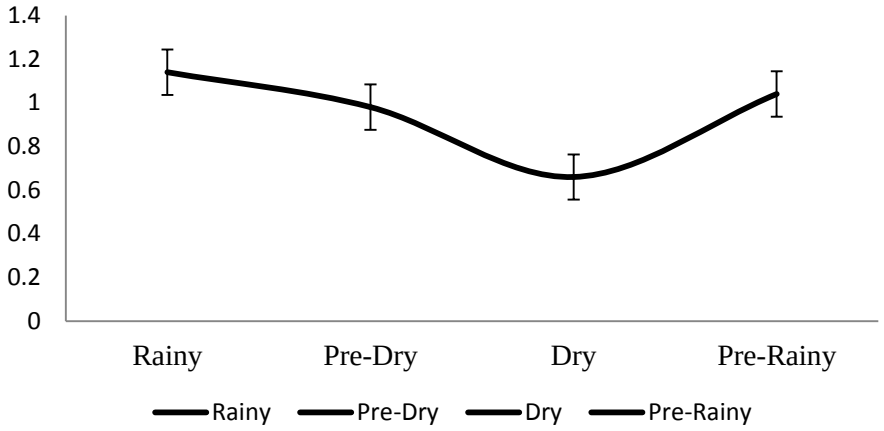

Figure 1: Seasonal Variation of Chicken Coccidiosis in Gombe, Nigeria. (2005-2010)

Discussion

The prevalence of coccidiosis in chicken reported in this study (11.4%) showed an increase from what was reported (10.8%) by Bukar *et al*., (2006) in Gombe with 2007 and 2010 having the highest and lowest YSR respectively. The higher prevalence rate reported may be attributed to the preference of deep litter system of management by farmers (Geidam *et al*., 2011). This finding agrees with the results of similar studies in Northeastern Nigeria (Amin *et al*., 1999; Ibrahim & Tanya, 2001) in which difficulties associated with vaccination of chickens led to higher prevalence of infectious diseases. The low prevalence of coccidiosis observed in 2007 might have been due to the outbreak of Highly Pathogenic

Avian Influenza (HPAI) in 2006 which might have discouraged farmers from rearing birds (Adene *et al*., 2006). The higher prevalence recorded in 2010 may be attributed to the fact that farmers were encouraged to report any case of bird mortality especially that associated with hemorrhages (which is one of the clinical signs of coccidiosis), as a result of HPAI outbreaks in most parts of the country thus, more cases of coccidiosis might have been diagnosed (Ameji *et al*., 2012).

Avian Coccidiosis occurred every year throughout the study period and was 1.7 more likely to occur in November than in other months, suggesting that the disease is endemic in Gombe (Bukar-Kolo *et al*., 2006). The disease mostly occurs from April to December with 1.5 more likelihood of occurrence in rainy than dry season. The weather favors the growth and multiplication of the organism (Jatau *et al*., 2012).

Similarly, the ISSI indicated that chicken coccidiosis has 3 peaks; April-June, July-September and October-December. This seasonal variation may be because farmers in the study area raise chickens when the weather condition is favorable. According to a report by the Food and Agriculture Organization (FAO, 2008), the number of poultry farms in the study area showed high number of exotic and rural poultry. Farms with high chicken populations had higher prevalence rates than those with low population densities. This implies that the higher the chicken population densities, the higher the rate of infection and transmission of parasites in flocks from one household to another (Geidam *et al*., 2011). Seasonal differences in prevalence have previously been described in other countries (Awais *et al*., 2012). In addition, most poultry farmers in the Northern Nigeria have preference for brooding chicks during pre-rainy and rainy (warm, wet) seasons because of lower chick mortality than in pre-dry and dry (harmattan) seasons (Tong *et al*., 1993). This higher prevalence observed in the wet seasons is also in agreement with the findings of Etuk *et al.*, (2004) in Southeastern Nigeria on the influence of climatic conditions on incidence and severity of chicken Coccidiosis and that of Larry & Malcolm (1997), where coccidian oocysts were shown to require moist environment to survive, sporulate and become infective.

The overall prevalence of 11.4% recorded in the study might have been underestimated because early and complicated cases may not be diagnosed (De Gussem, 2007) and some cases of chicken coccidiosis might not have been reported.

In conclusion, chicken coccidiosis is an endemic disease in Gombe which occurs mostly in the rainy season as reported worldwide. It is therefore recommended that farmers should use the battery cage system of management especially in wet season. Farmers should vaccinate and or treat their birds prophylactically against coccidiosis to reduce the likelihood of its occurrence.

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