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PREVALENCE OF COCCIDIOSIS IN WEST AFRICAN DWARF (WAD) GOATS AT MGBAKWU, ANAMBRA STATE, SOUTH-EASTERN NIGERIA

***Ikpeze, O.O., Eneanya, C. I. and Ikerionwu, P. N.**

Department of Parasitology and Entomology, Nnamdi Azikiwe University Awka

Abstract

Due to reports emanating from Veterinary Clinic Awka to the Department of Parasitology and Entomology, Nnamdi Azikiwe University concerning the emergence and re-emergence of coccidiosis in small ruminants at Mgbakwu, this study was initiated and carried out between April and July 2007 to ascertain the current status of *Eimeria* infection and clinical coccidiosis in West African Dwarf (WAD) goats at Mgbakwu, Anambra State Nigeria. Faecal samples obtained from one thousand one hundred and twenty (1120) WAD goats were routinely examined for the presence of protozoan cysts that caused coccidiosis. Overall, 816 (72.8%) of the goats were +ve for *Eimeria* cysts. About 25.4% of the population examined or 34.8% of *Eimeria* +ve samples presented with varying degrees of clinical coccidiosis, a positive indication that 65.2% of the *Eimeria* +ve goats may be asymptomatic or immune carriers of the infection. The difference between the overall prevalence of *Eimeria* cysts (81.8% and 64.9%) in WAD goats ≤5 and ≥6 months old, respectively, was highly significant (x^2=20.355, P<0.01). There were also significant differences between the prevalence of *Eimeria* cysts (79.8% and 58.7%) and in clinical coccidiosis (30.3% and 15.2%) in goats reared intensively and extensively. Socio-economic impacts, as well as factors that influence the epidemiology of coccidiosis in WAD goats at Mgbakwu are discussed.

Keywords: *Eimeria* species, coccidiosis, WAD goats, husbandry systems, Nigeria.

Introduction

West African Dwarf goats, which are commonly reared in southern Nigeria, serve as sources of meat, goat-skin, emergency relief-fund and insurance against crop failure. Some socio-cultural and religious ceremonies also demand the use of mature he-goats (Billy goats) and young goats (Kids). The milk from she-goats (Nanny goats) is also relished by the people because of its nutritional and medicinal values. In southern Nigeria WAD goats and sheep are kept in small numbers in village household flocks with usually less than 10 animals of mixed ages (ILCA, 1979). There is no organized grazing in this traditional system. However, animals forage extensively during the day and are housed at night. During the planting season, animals are tied up indoors almost permanently and zero-grazed on a variety of leaves and grasses usually collected from bushes and forests not normally frequented by domestic animals (Chiejina, 1986). In intensive system, therefore, the animals are confined, usually tethered, within the premises of the owner and fed with different kinds of feeds ranging from oil palm leaves (*Elaeis guineensis*), mango leaves (*Mangifera indica*), elephant grass

***Corresponding author:**
E-mail: ikpezevet@yahoo.com

(*Pennisetum purpureum*), guinea grass (*Pannicum maximum*), yam (*Discoriea allata*), banana (M*usa paradisiaca*), plantains (M*usa sapientum*), and pawpaw (*Carica papaya*) peels. Under extensive system, goats are usually left to fend for themselves and are allowed to scavenge. The goats are sometimes tethered in the field by day and brought home at night.

Traditionally managed WAD goats are therefore unlikely to encounter heavy coccidiosis infection. However, severely contaminated environment and stress-related depression associated with weaning and rough handling may contribute to coccidiosis outbreaks. Members of the *Eimeria* species which cause coccidiosis in goats are species-specific one-celled protozoan parasites, which are normal residents of the gastrointestinal tract (GIT) of the animals, and are usually non-pathogenic. The organisms become pathogenic under uncontrolled infection (Cox, 1998) resulting in outbreaks of coccidiosis, leading to rupture of intestinal epithelial cells and blood vessels of the gastro intestinal tract (GIT) leading to primary symptoms of bloody diarrhoea, weight loss and growth retardation. Absorption is compromised because of irreversible damage to intestinal epithelial cells.

Affected animals, especially asymptomatic carriers, continue to seed the environment with coccidian organisms in their faeces. The host becomes infected by ingesting the sporulated oocyst in soil, feed and/or water contaminated with faeces from carrier animals (Urquhart *et al.,* 2003). Management practices may therefore expose the animals to varying levels of coccidian infections. The major aim of this study was to investigate the current status of coccidiosis in WAD goats in Mgbakwu Anambra State, Southern Nigeria, from where frequent complaints about coccidiosis in goats had reached the Department. Findings from this study will make the veterinarian, agricultural extension officer, researcher and the rural farmers more knowledgeable on the role played by the prevailing husbandry practices in the epidemiology of coccidiosis, thereby helping them to control the disease in small ruminants.

Materials and methods

Faecal samples were systematically collected from April - July 2007 directly from the rectum of 1120 West African Dwarf goats of different ages and gender, raised under the intensive (Fig. 1) and extensive husbandry systems. Routine examination of the faecal samples, for the presence of cysts of *Eimeria* species that caused coccidiosis in goats, was by the concentration (floatation) technique, using the modified Sheaters's solution (Ikeme, 1976). The goats were, at the time of faecal sample collection, examined for the clinical symptoms of coccidiosis.

Field observations and laboratory findings were recorded. Thereafter the sample population of goats was stratified into categories (Kid, Nanny and Billy goats), age-groups (Goats ≤5 and ≥6 months old) and management systems (Intensive and Extensive). Analysis of data was by Chi-square statistics.

Results

Table 1 shows the prevalence of *Eimeria* cysts (in faecal samples) and clinical coccidiosis in the WAD goats examined during the study period. Kids, Nanny, and Billy goats constituted 47.1%, 30.0% and 22.9% of the total sample population, respectively. The prevalence of *Eimeria* cysts was 81.8% for kids, 71.4% for Nanny and 56.3% Billy goats (x^2=7.3075, P<0.01). However, the prevalence of clinical coccidiosis was 30.3%, 21.4% and 20.3% of the total sample; and 37.04%, 30.0% and 31.6% of the *Eimeria*

+ve Kids, Nanny and Billy goats, respectively.

WAD goats that were ≤5 months and older ones ≥6 months of age made up 47.1% and 52.9% of the population examined. The prevalence of *Eimeria* cysts in adults was 64.9%, but cases of clinical coccidiosis in adults were 20.9% and 32.3% respectively for the sample population and *Eimeria* +ve samples.

Fig. 1. A typical layout of the intensive system of management of WAD goats at Mgbakwu

Table 1. Prevalence of *Eimeria* +ve cysts and clinical coccidiosis in WAD goats at Mgbakwu

Stratification	Total sample examined		*Eimeria* +ve Samples*		Total cases of clinical coccidiosis observed in WAD goats examined		
	No.	%	No.	%	No.	% of total sample	% of *Eimeria* +ve samples
Category							
Kids	528	47.1	432	81.8[a]	160	30.3[h]	37.04
Nanny goats	336	30.0	240	71.4[b]	72	21.4[i]	30.0
Billy goats	256	22.9	144	56.3[c]	52	20.3[j]	36.1
Age (months)							
≤ 5	528	47.1	432	81.8[d]	160	30.3[k]	37.04
≥ 6	592	52.9	384	64.9[e]	124	20.9[l]	32.3
Management							
Intensive system	752	67.1	600	79.8[f]	228	30.3[m]	38.0[o]
Extensive system	368	32.9	216	58.7[g]	56	15.2[n]	25.9[p]
Total	**1120**	**100.0**	**816**	**72.8**	**284**	**25.4**	**34.8**

***** Values with different superscripts in the same stratum and column are significantly different (P<0.05)

A total of 752 (67.1%) and 368 (32.9%) of the WAD goats kept under the intensive and extensive management systems had corresponding *Eimeria* cysts prevalence of 79.85% and 58.7% (x^2=27.892, P<0.01) and clinical coccidiosis prevalence of 30.3% and 15.2%.

Overall, stool samples from 816 (72.8%) of the 1120 WAD goats were positive for *Eimeria* cysts. And 284 of the WAD goats (i.e., 25.4% of the sample population and 34.8% of *Eimeria* +ve samples) presented with varying degrees

of clinical coccidiosis. These observations indicated that about 65.2% of all *Eimeria* +ve goats were asymptomatic carriers of coccidian organisms. Eggs and worm segments of *Monieza* and *Strongyloides* species of parasitic helminths were also recovered from the stool samples of the WAD goats examined.

Discussion

Gauly *et al.* (2001) reported that coccidiosis is a wide-spread disease in domesticated sheep and goats worldwide. The overall prevalence (72.8%) of *Eimeria* cysts in WAD goats at Mgbakwu was closely related to 85.0% reported for small ruminants in various regions of Slovakia (Vasilkovia *et al.,* 2004). These authors observed that age-groups 1-3 months old were especially affected. Mykykwycz (1962) also demonstrated a correlation between oocyst counts and age of the animal, with the level of infection gradually decreasing with increase in age. Our findings showed that the prevalence of *Eimeria* cyst in kids less than 3 months, and adults over 6 months old were 81.8% and 64.9% respectively. Clinical coccidiosis was also reported to be more severe in kids than adults (Hassum and Menezes, 2005). This has been attributed to the development of acquired immunity to coccidian organisms in adults. Adults tend to acquire the oocyst from the environment during there normal activities, and may become asymptomatic or immune carriers of the infection in their life time. These asymptomatic carriers become epidemiologically important as the main source of environmental contamination, leading to emergence and re-emergence of coccidiosis in small ruminants in the area. The overall prevalence of clinical coccidiosis in WAD goats studied was 25.4%, but 34.8% in *Eimeria* +ve subjects. The presumption was that about 65.2% of *Eimeria* +ve WAD goats were asymptomatic carriers of coccidian organisms at Mgbakwu, thereby contaminating the environment with oocyst in their faeces.

Management practices in Mgbakwu encouraged environmental contamination with oocyst in faecal droppings of affected animals, and may be a factor in the epizootiology of Caprine coccidiosis in the study area. Prevalence of *Eimeria* cysts in intensively managed goats was 79.8% against 58.7% in extensively managed goats, an indication that oocyst are more readily acquired under the intensive system of management. An infected goat could shed up to 2000 oocyst per day; pH 7-8, warmth (30°C) and high oxygen tension being favourable for sporulation of the cysts in 2-3 days (Cox, 1998).These conditions were observed under the intensive system at Mgbakwu, where up to 10 goats of mixed ages may be kept in an overcrowded condition by the farmer.

Taylor and Catchpole (1994) elucidated the life cycle of coccidian to highlight the pathogenesis of coccidiosis in small ruminants. Oocyst shed in faeces of infected goats when ingested, are acted upon by digestive enzymes to release the sporozoites which invade the intestinal epithelial cells to undergo merogony. The resultant trophozoites grow and transform into merozoites which rupture the infected cells and re-infect other cells before they mature into sexual forms, which transform into the zygotes (oocyst) passed in the faeces to contaminate the environment. The rupture of the intestinal cells is the cause of irreversible damage to the gut mucosa leading to necrotic areas. Absorption of nutrients across the GIT is therefore compromised. The condition may be exacerbated under co-infection with parasitic helminths that cause parasitic gastro enteritis (PGE). In both situations (clinical coccidiosis and PGE) infected or recovered animals were

stunted and never developed their full potential (Chiejina, 1986).

Active immunization (Edcar and Sieboold, 1964), preventive medication in feed and water, and proper management rank high among all possible control measures against coccidiosis outbreak in WAD goats. Control of coccidiosis in WAD goats at Mgbakwu had tremendous impact on poverty. The peasant farmer could neither afford the cost of preventive medication nor provide separate pens for separate rearing of the kids before weaning. Land tenure system made it difficult for the farmer to practice extensive system of management to an advantage. Majority of farmers in Mgbakwu had to contend with intensive system of management, especially during the farming season when livestock were not to be left loose or allowed to wander into farmlands. The farmer and his family usually bore the loss associated with the premature slaughter or sale at give away prizes of clinically affected goats. Such animals sometimes died before any of these measures were contemplated.

To boost production of WAD goats, government should therefore initiate a strategic preventive treatment regimen for goats by supplying the farmers with highly subsidized feed or water additives containing proven coccidiostats such as Amprolium and Sulphonamide compounds. The farmers themselves should provide separate rearing pens for kids and ensure prompt removal and replacement of soiled and wet litter in goat houses so as to prevent accumulation of coccidian cyst in the environment. These measures will help to maintain low level of coccidian organisms in the GIT of the animals and bring about rapid development of acquired immunity to coccidiosis in WAD goats.

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References

Chiejina, S. N. (1986). The epizootiology and control of parasitic gastroenteritis of domesticated ruminants in Nigeria, *Helminthol. Abstr. (Series A*), 55 (11):413-429.

Cox, F. E. (1998). Control of coccidiosis: lesions from other sporozoa. *Intern. J. Parasitol.,* 28(1): 65-176.

Edcar, S. A and Sieboold, C. T. (1964). A new coccidium in chickens. *Eimeria miuoli* (Protozoa: Eimeridae). *J. Parasitol.* 50:193-204.

Gauly, M., Krauthahn, C., Baver, C and Erhardt, G. (2001). Patterns of Eimeria oocyst output and repeatability in naturally infected suckling Rhon lambs. *J. Vet. Med. Series B,* 48(96): 665 -673.

Hassum, L.C. and Menezes, R.C. (2005). Natural infection with species of the genus *Eimeria* in small ruminant raised in two municipalities of the state Rio-de-Janeiro. *Rev. Braz. Vet. Parasitol.,* 3:95-100.

Ikeme, M.M. (1976). Laboratory Techniques in use in Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine and Surgery, University of Nigeria, Nsukka, pp. 4-5; 40-43.

ILCA. (1979). International Livestock Centre for Africa. Small ruminant production in the humid tropics. Addis Ababa, Ethiopia: ILCA. v + 122pp.

Mykykwycz, R. (1962). Epidemiology of coccidiosis (*Eimeria* spp) in an experimental population of the Australian wild rabbit (*Oryctolagus cuniculus*). *Parasitol. J.,* 52:374-395.

Taylor, M.A. and Catchpole, J. (1994). Coccidiosis and Cryptosporidiosis in sheep and goat. *Vet. J.,* 35(2): 73-86.

Urquhart, G. M., Armour, J., Duncan, J. L., Dunn, A. M and Jennings, F.W. (2003). *Coccidiosis of sheep and goats. In: Veterinary Parasitology* (2nd edition). Book Power (formerly ELST) with Blackwell Science in co-operation with the British Council.

Vaslkovia, Z., Krupicer, I., Legath, J., Kova-Ikovicova, N and Pet'kol, B. (2004). Coccidiosis of small ruminants in various regions of Slovakia. *Acta Parasitol.,* 49(4):272-275.