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Cryptosporidium Infection in Pre-Weaned Ruminants and Pigs in Southwestern Nigeria

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Abstract

The study was carried out to detect Cryptosporidium coproantigens in pre-weaned ruminants and pigs in Ogun State, southwestern Nigeria. Faecal samples of 186 preweaned animals comprising calves (n=32), lambs (n=47), goat kids (n=36) and piglets (n=71) were collected and examined for Cryptosporidium antigens by the use of an enzyme-linked immunosorbent assay (ELISA). 60.2

Index terms— cryptosporidium, ELISA, nigeria, pre-weaned animals.

1 Introduction

ryptosporidium is a protozoan parasite that causes enteric infection in several animal species and humans **??**Quilez et al., 2008). Various species of Cryptosporidium infect mammals and humans with C. parvum being the most common zoonotic species **??**Quilez et al., 2008;Chako et al., 2010;Xiao, 2010). While several studies have revealed that cattle are important reservoirs of C. parvum (Xiao and Fayer, 2008; Xiao, 2010), sheep have been reported to be more frequently infected by other host-adapted Cryptosporidium genotypes, mostly C. bovis and the Cryptosporidium Cervine genotype and rarely habours the zoonotic C. parvum **??** The parasite is considered as a major enteric pathogen associated with neonatal diarrhoea in calves (Xiao, 2010;Bhat et al., 2013), lambs and goat kids (Wang et al., 2010;Giadinis et al., 2012;Maurya et al., 2013) and piglets (Maikai et al., 2009;Zhang et al., 2013;Yui et al., 2014). The severity of the diarrhoea seen in cryptosporidiosis in pre-weaned animals is usually high and may ultimately lead to severe loss of condition and death .

The results obtained from several prevalence studies have been largely dependent on the sensitivity and specificity of the screening methods used and the age categories of the animals studied **??**Brook et

2 G

samples were collected from 186 randomly selected pre-weaned animals comprising calves (n=32), lambs (n=47), goat kids (n=36) and piglets (n=71). Each animal species were categorized into neonates (1 day to 1 month) and other pre-weaned age group (>1 month to 3 months).

3 C

farms for each animal species considered. Faecal Stool samples were collected directly from the rectum of each animal. For animals in which rectal sampling was not possible, such as neonates, freshly voided faeces were collected by the use of wooden tongue depressors which were used to scoop up the superficial layer of faeces without contacting the floor. The faeces were then dropped into individual universal sample bottles and labeled appropriately. The stool samples were conducted to the laboratory in cold packs, where they were catalogued, processed and analyzed. The stool samples were stored under a temperature of 4 o C until they were processed. coproantigens in the samples was done using a commercially available ELISA kit for faecal samples(RIDASCREEN ® Cryptosporidium; R-Biopharm AG,

Germany). The procedure was carried out according to manufacturer's instructions. The optical densities (OD) of the samples were read at 450nm using an ELISA reader (BIOTEX; Model: ELx800, Biotex Instruments,

USA). Samples were analyzed using the manufacturer's cut-off calculations in the instruction manual. The cut-off was calculated as shown below:

Cut-off = Extinction of the negative control + 0.15 Samples were considered positive if their extinction is more than 10% above the calculated cut off but considered negative if their extinction was more than 10% below the calculated cut-off. Samples were however considered as equivocal and repeated if their extinction was within the range 10% above to 10% below the cut-off.

4 III.

5 Statistical Analysis

Data was collated and analyzed with Statistical Package for Social Sciences (SPSS) on Windows 7. Chisquare test was used to compare the differences in occurrence of Cryptosporidium spp. coproantigens between the categories, sexes and stool consistencies of all animal species at 5% level of significance.

6 IV.

7 Results

Cryptosporidium spp. antigens were detected in all species of animals studied. 60.2% (112/186) of all pre-weaned animals examined were positive for Cryptosporidium coproantigens. The rates of infection were 78.1%, 51.1%, 83.3% and 46.5% for calves, lambs, goat kids and piglets respectively.

The infection rate observed in neonates of all animal species, 73.5% (72/98), was significantly higher ($p<0.05$) than the rate recorded in the other pre-weaned age group (>1 month to 3 months).

The rates of infection in females were higher in lambs, goat kids and piglets while the males recorded higher infection rate in calves. The overall infection rate in females, 67.3%, was significantly higher ($p<0.05$) than the rate observed in the males, 51.8%.

In all the animal species considered, the infection rates were higher in diarrhoeic animals than those without diarrhoea. The occurrence rate of Cryptosporidium infection was significantly higher ($p<0.05$) in pre-weaned animals with diarrhoea (68.6%) than the rate observed in those with formed stools (44.6%) (Table 1). Bhat et al., 2013). Furthermore, the ELISA used in the study may also contribute to the higher rate of detection of the parasite as this method has been reported to possess higher sensitivity than the acid-fast staining method utilized in majority of previous investigations in Nigeria (Yilmaz et al., 2008) .

8 Volume XIV Issue II Version

The specie-specific occurrence rates observed in this study were higher than previous reports of 27 (Kwaga et al., 1988;Maikai et al., 2009) and 24.5% among lambs in Australia (Yang et al., 2009). This observation may therefore imply that Cryptosporidium oocysts survive for longer periods in the study area, possibly due to the high relative humidity and rainfall, thereby leading to higher risks of transmission to animals (Yu and Seo, 2004).

The Zhang et al., 2013). This therefore suggests that neonates of ruminants and pigs are important reservoirs of infection and are mainly responsible for contamination of water with oocysts of Cryptosporidium.

Our observation of higher infection in diarrhoeic animals is in tandem with reports of Maurya et al. (2013) and Caccio et al. (2013). The diarrhoea observed in cryptosporidiosis may be associated with the pathogenesis of the parasite and concurrent infection with other enteric pathogens such as Salmonella, Escherichia coli, Eimeria, Rotavirus and Giardia (Thompson et al., 2007;. This observation therefore suggests that pre-weaned animals having diarrhoea should be routinely screened for Cryptosporidium.

9 The results of this study indicates that

Cryptosporidium infection is highly prevalent in preweaned ruminants and pigs with neonates and diarrhoeic animals being at higher risk of infection and may also serve as important sources of infection to other animals and humans in the study area. The ELISA employed in this study, though rapid, easy to perform and interpret, is less sensitive in detecting the species of Cryptosporidium infecting the animals in the study. This has been associated with the cross-reactivity of ELISApositive C. parvum with other species identified by PCRbased molecular techniques (Ayinmode and Fagbemi, 2011). The need to know the species of Cryptosporidium affecting pre-weaned ruminants and pigs and their zoonotic potential therefore necessitates the use of molecular techniques in the detection and genotyping of [1]

Figure 1:

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Figure 2: Table 1 :

Figure 3:

Cryptosporidium species found in these animals (Amer et al., 2013).

.1 Ethical consideration

The manuscript does not contain clinical studies or patient data.

.2 Conflict of interest

The authors declare that they have no conflict of interest.

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