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CASE REPORT

Moniezia expansa in intensively raised Pigs: A Possible First Report in Nigeria

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INTRODUCTION

Pig keeping is a major source of livelihood for farmers in Africa (Mutua *et al*., 2011). Farmers prefer to breed pigs because of their fast growth rate and high fecundity rates which results into quick generation of cash (ILRI, 2011). Pig production has become one of the fastest growing business ventures because of its favourable rate of return on investments, short generation interval and high fecundity (Ikani and Dafwang, 1995). However, the substantial decline in pig production is caused by gastrointestinal tract (GIT) parasites which affect pigs at various ages (Aliaga Leyton *et al*., 2011). Gastrointestinal parasites are known to cause losses and poor performance in the pig industry (Nsoso *et al*., 2000). These conditions can greatly lower their efficiency and profitability (Joachim *et al*., 2001).

Gastrointestinal parasites (GIP) are responsible for economic losses in livestock, this is as a result of their deleterious effect on the production and health of animals infected, and this include decrease in weight gain and poor lactogenesis (Aga *et al*., 2013). Different GIP have been documented in pigs from different part of the world, and the management system practiced has been shown to influence its prevalence (Nansen and Roepstorff, 1999). *Moniezia* spp, is a common cestode of grazing ruminants with global distribution (Leland *et al*., 1973). The prepatent period of *M. expansa* commonly found in sheep and goats averages 25-35 days (Hawkins, 1948). *Moniezia* spp. have an indirect life cycle with forage mite, mainly of the Oribatidae family serving as intermediate hosts (Daubney, 1932) while ruminants such as sheep, goats or cattle serve as the final host.

The adult *Moniezia* live in the small intestine of the final host and eggs or mature proglottids are passed with faeces to the environment (Daubney 1932). The oncosphere adhere to pasture because they are sticky and are ingested by forage mites. The embryo migrates into the body cavity of the mite to develop into cysticercoids. Infection of the final host is by ingestion of infected mite, majorly during grazing. Seven species of *Moniezia* have been described (Spassky,

1951), however, genetic information is only available for three species, namely, *Moniezia expansa*, *Moniezia benedeni* and *Moniezia monardi* (Ohtori *et al*., 2014). *Moniezia* has always being reported in various ruminant GIP survey all over the world and even in Nigeria (Ankers *et al*., 1997; Nwosu *et al*., 2007; Kuchai *et al*., 2013; Adedipe *et al*., 2014; Diop *et al*., 2015). Although it has been reported once in pig from Peru (Go ´mez-Puerta *et al*., 2008) and in human from Egypt (el-Shazly *et al*., 2004), it has never been reported in pigs in Africa.

Various floatation solutions can be used for diagnosis of helminth eggs, each with their strength and weaknesses. Available floatation solutions are sodium chloride, sugar solution, salt and sugar solution, zinc sulphate and magnesium sulphate (Dryden e*t al*., 2005). There are also various faecal analysis techniques employed in the diagnosis of helminths like Mini-FLOTAC (WHO, 1998), Modified Centrifugal Floatation (Christie *et al.,* 2011) Formo Ethyl Acetate (Truant *et al*., 1981), Direct Smear (Gaafar, 2011), Simple Floatation (Cringoli *et al*., 2017) and Sodium Acetate-acetic Acid-formalin solution (Gaafar, 2011) methods. However, modified centrifugal floatation technique was used for faecal analysis in this study because it provides rapid diagnosis with the use of basic laboratory equipment (Cringoli *et al*., 2017). It has equally been reported to enhance separation of parasitic eggs and cysts from excess debris in the diagnosis of pig GIP, through the use of high specific floatation solution (Hersh and Shahnaz, 2015). To the best of our knowledge this article reports the first occurrence of *Moniezia expansa* in pigs from Nigeria and possibly Africa.

MATERIALS AND METHOD

Study location

Ibadan is the largest indigenous city in tropical Nigeria and it lies within longitude 007°2′ and 007°40′E and latitude 03°35′ and 4°10′N. Ibadan is 128km Northeast of Lagos and 345 km Southwest of Abuja, the Federal Capital (Udo, 1994).

Animal sampling

An intensively raised pig farm in Ibadan, Oyo State Nigeria was visited in the month of July 2018 in order to screen their pigs for GIPs as part of an on-going research on the prevalence of porcine gastrointestinal parasites in the State (Adelakun *et al*., 2020). Interview with the workers and from their report, revealed that the pigs were dewormed a month earlier, however, 13 faecal samples were randomly collected. Faecal samples were collected directly from the rectum of the pigs except for those that defecated freshly at the point of collection. The faecal samples were labelled properly noting the age, sex, breed, body condition score of sampled animals along with the farm location were also documented. Collected faecal samples were kept in cool box with ice packs after collection and during transportation to the laboratory. The faecal samples were processed at the Department of Veterinary Medicine, University of Ibadan, Nigeria.

Laboratory technique

Faecal samples were prepared for microscopy using a modified centrifugal floatation technique (Christie *et al.,* 2011) and saturated sugar solution was used as floatation solution. Specific faecal sample to be examined was diluted with tap water (dilution ratio 1:10), homogenized and suspension was filtered through a tea strainer. 10 ml of the diluted faecal sample was poured into a 15 ml test tube and centrifuged for 5 minutes and decanted, leaving the sediment. 8 ml of saturated sugar

solution was added to the sediment and centrifuged the second time, after which the tube was filled to the brim with saturated sugar solution the second time and covered with a cover slip for 20 minutes. Ova of GIP was identified on the basis of various morphological and morphometric characters (Soulsby, 1982).

RESULT AND DISCUSSION

The *Moniezia expansa* identified in domesticated pigs raised intensively in this study is the first observation in Africa, although it has also been reported in Peru (Go ´mez-Puerta *et al*., 2008). Pigs can be regarded as accidental hosts of *Moniezia* spp because they are majorly helminths of grazing ruminants like cattle, sheep and goat (Leland *et al*., 1973), who come in contact with the intermediate host (Oribatid mite) during grazing.

Findings from this farm reveal that, out of the 13 faecal samples examined (Table I), seven (53.8%) were positive for GIP and all of them had *Monienzia* spp (Fig 1), which was the only helminth ova observed and identified on the farm. The prevalence of 53.8% (7/13) reported on this farm is an indication that eggs can develop to maturity in the accidental host, there is also possibility of establishment of intermediate host in the farm area given the normal behavior of pigs to forage even in confinement (Gonyou *et al*., 1992). The possibility of anti-helminthic resistance also comes to mind; this is based on the history that the pigs were dewormed a month earlier and it was only *Moniezia* ova that was observed in the coprological study that was carried out. The pathogenicity of *Moniezia* infection in adult livestock has been reported to be mild, because they rarely show any clinical signs, however, it could be devastating in young livestock, especially economically; in terms of weight gain (Nishizaki, 2000).

Fig. 1. *Monieza expansa* Mag X40

TABLE I. Overall percentage distribution of Moniezia in the pig farm

Variables	Categories	No. sampled	No. positive	Percentage
Age	Adult	10	4	40
	Grower	1	1	100
	Weaner	2	2	100
Sex	Female	7	5	71
	Male	6	2	33.3
Breed	Large White	7	5	71
	Duroc	3	2	67
	Hamshire	3	0	0
Body condition Score	Fat	5	3	60
	Moderate	5	1	20
	Lean	3	3	100

Table 1 shows the percentage distribution of *Monienzia* spp across various variables

recorded in the pig farm. The age groups examined were adult (10), grower (1) and weaner (2). Seven were female while the remaining 6 were male, three breeds were examined: Large white (7), Duroc (3) and Hamshire (3). The body condition score was classified into three: Fat (5), moderate (5) and lean (3) as previously described by Adedipe *et al*. (2014). Further investigation revealed that the pigs are housed in the same compound as some goats that are semi-intensively raised and that the same farm attendant is responsible for the care of both pig and goat. Also, the same farm equipment like wheelbarrow and personal protective kits are used in both pig and goat pens. It is therefore possible that infected Oribatid mites were transported into the pig house via fomites, considering the fact that animal-environmental interface is important in disease epidemiology, also diseases and their aetiologies have no respect for borders either local or at the national level.

The impact of *Moniezia* in pigs is yet to be well known because it is believed to be an accidental host, it is however necessary to carry out further study for better insight into its infection in such hosts. *Moniezia*, a common cestode of ruminants, acquired the ability to mature into the adult inside a pig host and shed eggs possibly due to high contact between the parasite and the accidental host, the viability of the eggs shed in the faeces of infected pigs and their ability to develop to cysticercoids inside the Oribatid mite is yet to be validated. The zoonotic implication cannot be ruled out because it has been reported in humans, hence the need to carry out more studies focusing on the genus *Moniezia*, most importantly its characterization in pig

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