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Heterakis spumosa and *Eimeria sp* Infection of Rats in the Hatchery of a Poutry Farm, Jos, Nigeria.

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Abstract
Heterakis spumosa Schneider, 1866 is a typical and widespread parasite of Rattus sp. Zoonotic helminth Hymenolepis diminuta eggs was identified from Rattus rattus found in poultry pen few meters adjacent the hatchery being studied. The study investigated the helminthes profile of Rattus rattus in a poultry hatchery in Jos, Plateau state. Faecal samples were collected by handpicking the faeces on the office table, space on the windows and the floor as they were dispersed. Coprological procedure using floatation method lead to the demonstration of Heterakis spumosa eggs and Eimeria sp oocysts in the faecal samples examined at 10 and 40 magnifications of light microscope. Heterakis spumosa is a parasite of rats. It does not infect chicken and has no known zoonotic importance. Hatchery should be a clean environment similar to a laboratory, where quality control and pathogen control are central to hatchability and chick survival post hatching. The presence of rats in the hatchery indicates increased risk of egg contamination that could pose public health and egg hatchability threat. Control of rats in the hatchery is indicated through prevention of entrance and elimination of the rats.

Keywords: *Rattus rattus, Heterakis spumosa, Eimeria sp,* poultry, hatchery.

Introduction

Rodents, as mice and rats are the most common laboratory animals used in research and testing. They are seldom investigated for autochthonous ecto- and endoparasites prior to their utilization in experiments. It was reported that many laboratory rodent colonies were found to be parasite contaminated, thus a need for eradication; and improvement of the quality of laboratory rodents was suggested. Helminthes infection can alter the interpretation of final laboratory results. (1). The nematode *Heterakis spumosa*, is a typical and widespread parasite of *Rattus* sp (2), that lives and develops in the upper colon of mice (3), in the intestine or caecum and rectum of the 74 % of rats (4). The colon mucosa contains soluble factors that significantly increase release of eggs by female *H spumosa* in vitro (3). The intensity of infection with *H spumosa* significantly increased with rat age (5). In a study conducted in University of Nigeria, Nsuka, Enugu, five mice were found to excrete pinworm eggs (6). *H spumosa* (36.7%) was found to be the most prevalent out of seven helminthes in Belgrade area (7). Parasitological and statistical analysis of *H spumosa* showed a high prevalence of infection (2). In a 3 year study in Malaysian communities, 29.8% prevalence of *H spumosa* as second most prevalent helminth was reported (5). Presence in the host decline during wet season and was more prevalent in *Rattus sp* than *Mus musculus* (Zain et al., 2012). The overall prevalence of helminthic infection was 61.64% in the mice and 92.68% in the rats (3). The presence of *H. spumosa* in *M musculus* with a considerable prevalence (17.81%) and as one of the predominant suggests a greater ecological contact of the parasite with the black rat (prevalence 34.15%) than in rural habitats (3). The prevalence of oxyuroid pinworm *Heterakis* spp. was found to be 14% in England (8).

Coccidiosis caused by *Eimeria sp* is recognized as the parasitic disease that has the greatest economic impact on poultry production. The annual worldwide cost is estimated at about $800 million, and that for the American broiler industry about $450 million. These estimates include the costs of prophylactic in-feed medication for broilers and broiler-breeders, alternative treatments (e.g., with amprolium) if the medications fail, and losses due to mortality, morbidity, and poor feed conversions of birds that survive outbreaks (9).

Over the past decades, various free-living animals (hosts) and their parasites have invaded recipient areas in which they had not previously occurred, thus gaining the status of aliens or exotics. In general this happened to a low extent for hundreds of years. With variable frequency, invasions have been followed by the dispersal and establishment of non-indigenous species, whether host or parasite (10). Scarce published reports exist concerning the distribution of nematodes and *Eimeria* species infecting the poultry hatchery rats and wild rats in Nigeria. This study will represent a pioneer work on the incidence of helminthes in *Rattus rattus* feces in a poultry hatchery.

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Materials and Method

The hatchery is located at the end of the poultry farm about 10 m from the closest grower pen. It has a capacity of 10 thousand hatching eggs with good hygienic practices. The surroundings of the hatchery were well kept with wastes dump site located about 30 m away. Main doors to the hatchery are always kept locked at all times to non operational staff. Rats' presence was detected from dispersed feces on the floor in the offices, destroyed egg trays and eggs collected before setting in incubator and staff food items thrown on the floor by rats.

Fecal collection

With personnel protection (head gear, laboratory coat, rubber hand gloves, and nose mask) worn by the researchers feces were handpicked gently and placed in a plain nylon. The sampled areas included egg collection and sorting room, recording rooms (2) and incubator room. The sample was kept inside refrigerator till processed at the parasitology department, National Veterinary Research Institute, Vom, Nigeria.

Fecal flotation method was performed as described by (11). Briefly stated, Flotation solution (saturated sodium salt), a flat-bottomed vial, petri dish, cover slip, microscope slide, and applicator/stirring sticks were assembled. 2-5 fecal pellets were placed into the flotation chamber. Feces were moistened with 500 µl of 0.9% saline. Then the vial was placed in the petri dish to protect the working surface from overflow of dissolved feces. Small volume of saturated sodium salt was added, mashed and stirred thoroughly until no large pieces of faecal material remained. The flotation medium was continuously added until a meniscus formed above the edge of the vial. Cover slip was then placed on the meniscus and incubated at room temperature for 15 minutes. Helminth eggs and some protozoan oocysts if present, will rise to the top and adhere to the cover slip. After incubation, the cover slip was lifted and inverted, then placed on a glass microscope slide. The slide was then examined using the 10x and 40x objectives under a light microscope.

Result and Discussion

Ascarid like egg of *H spumosa* and *Eimeria sp* oocyst were recovered from the fecal sample.

Despite their importance as reservoirs of zoonotic infections, wild rats have seldom been studied thoroughly with respect to the epidemiology of their helminths (5) and protozoan in Nigeria. In this study, *Heterakis spumosa* (rat nematode) and *Eimeria sp* was identified in the rat faeces found in the hatchery as the only parasites (Fig. 1). This is corroborated by (1,2) findings of *H spumosa* as the most prevalent helminth in rats studied from ecologic sites different from poultry sites. *H spumosa* being the only helminth found implied perhaps the rats lived mostly in the hatchery. *Eimeria sp* as found in this faeces is of significant health importance to the rat population as it can cause severe coccidiosis in the rat was corroborated by a reported severe coccidiosis in laboratory rats and mice; and in poultry (9,12) with devastation to research and poultry production in farms. Persistent severe coccidiosis in a broiler pen opposite the studied hatchery was observed by the author (personal communication). Based on the findings and the ecology of the rats habitat the parasitosis discovered could be justified by 1. that undisturbed the rats will continuously ambulate the hatchery for nutritious feed such as eggs and food remnants (granulated sugar and bread) left by the staff in a clean house. 2. Coprophagy was unlikely as there were nutritious feed enough to sustain life.

Feral birds and rodents has been reported to play important roles in interspecific dissemination of infection of Salmonella typhimurium, S onatum and S newport (13). Persistent infection of rats in the hatchery could bring about contamination of the hatchery incubator and the eggs with other pathogens thereby causing interspecific dissemination and persistence.Little knowledge is known of the rat Heterakosis and Coccidiosis living extensively in poultry settings and the public health significance. We recorded the first finding of *Heterakis spumosa* and *Eimeria sp* in feces of rats inhabiting a hatchery in an institutionalized poultry farm in Jos, Nigeria. No published work in Nigeria has documented this finding.

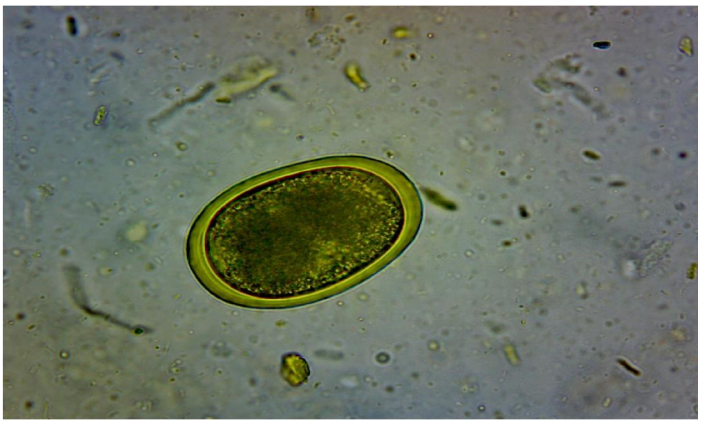

Fig.1 Ova of *Heterakis spumosa*

Conclusion

This study emphasized a need for rat breeders and researchers to prevent infections due to *Heterakis sp* and *Eimeria sp* on the colonies of rats. The presence of rats in the hatchery increases zoonotic risks to workers via contamination of eggs, foods and contact surfaces. The wild rats may play a role in transmission of *Eimeria spp* in the poultry. Improved hygienic practices that promotes prompt hatchery waste disposal, fecal disposal could ease control of rats in hatchery. This study has contributed a significant knowledge for poultry hatchery workers and owners on the health of rats in farms; and also laboratories for laboratory animal researchers and commercial rodent producers. Further studies are required to fully understand the epidemiology of helminthic and protozoan diseases of rats in contact with chickens and poultry farm workers. Conflict of interest

The authors declare that there was no conflict of interest.

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