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Gastrointestinal Parasites of Wild *Thryonomys swinderianus* (Grass-cutters) Sold at Eateries in Umuawulu Community, Awka South Local Government Area, Anambra State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Parasitic infections have been shown to affect the growth and economic value of animals. The demand for grass-cutter meat is high in most rural and semi-urban communities in Nigeria due to its value as a source of protein. The present study investigated the prevalence of gastrointestinal parasite of wild grass-cutters (*Thryonomys swinderianus)* sold to restaurants within Umuawulu, Anambra State. Three locations were randomly sampled within the study area and the grass-cutters were purchased from three eateries in the sampled locations. The gut and intestinal contents of the animals were collected at the point of slaughter, transferred to a sterilised container and transported to the Zoology Laboratory, Nnamdi Azikiwe University, Awka for further analysis. A total of 45 (25 male and 20 female) grass-cutters were examined out of which 23(51.1%) were infected. The parasites identified were: *Ancylostoma* sp. 20(75.0%), *Ascaris* sp*.* 5(55.56%), *Necator americanus* 2(25.00%) and *Trichuris* sp. 1(12.50%). The highest parasite prevalence in the grass-cutters sampled was found in females 13 (65.0%) while the male had the least 10 (40.0%). Parasite prevalence was not sex-dependent ($\chi 2= 0.95$, $P =0.136$). Also, there was no significant relationship between the parasite distribution and location ($\chi 2= 3.889$, $P>0.05$). It thus highlighted the need for screening of parasites in stock grass cutters brought from the wild for domestication as well as properly cooked before consumption. Further studies are required to generate more data on it.

Keywords: Gastrointestinal parasites; grass-cutters; Umuawulu community; Anambra State; Nigeria.

1. INTRODUCTION

Wildlife has been an important protein source for many West African countries over centuries [1]. The population of these animals (duikers, red Columbus monkeys, chimpanzees and grass-cutters etc.) are now dwindling and is inadequate to provide the protein needs of the people of West Africa due to over-dependence in the past years [2]. The meat is consumed locally and it is also exported for income among countries in West Africa [2,3]. In some developing countries in Africa, bush meat is the main source of animal protein among rural communities and the demand for it is rapidly increasing irrespective of the fact that zoonotic infections such as Ebola and COVID-19 are associated with the consumption of meat from wild animals [4,5].

Nigeria is well-known for its consumption of bush meat [2,4]. More than 80% of Nigerians in both rural and urban areas prefer bush meat and would eat it if it were available [6]. Bush meat is popular and important in most traditional festivities among African communities [7, 8] and among the wild animals it is the grasscutters (*Thryonomys swinderianus*) which has gained wider interest among African countries [9] including Nigeria [10, 11].

Most hunters sell grass-cutter in the raw form in local markets and on highways though the processed form has better prices [12]. Lack of hygiene and handling practices of processed meat can potentially create a negative impression about the grass-cutter industry in Nigeria [13].

Domestication of grass-cutters is a relatively novel practice in Nigeria with its potentialities, challenges and opportunities [14]. Grass-cutter farming has social acceptability, good meat quality with high biological value (high protein and low fat), inexpensive feeds and responds to captive rearing, good litter size and short generation interval. Despite the challenges of the domestication of grass-cutter, non-steady supply of meat, air pollution and ecological devastation as a result of bush burning to hunt grass-cutter and the threat to the extinction of grass-cutter; the domestication and production of grass-cutter is another dimension in the livestock industry that has the potential to ensure regular and sustainable animal production in the nation [12,13].

With the current trend in grass-cutter farming and the intensification of management practices, there is bound to be an increased incidence of infections and other challenges. Some challenges to grass-cutter production include the irregular supply of breeding stock, environmental issues, poor processing and marketing plan, lack of balanced diet, poor producer training and education, inadequate infrastructural development, poor information dissemination, incidences of diseases and mortality [15]. Grass-cutters can transmit parasitic diseases with significant public health and economic

consequences [2]. They are capable of transmitting some of the zoonotic gastrointestinal parasites, especially if the meat is not properly cooked [16]. It has been reported [17] that some parasites responsible for zoonoses and communicable diseases to man and animals such as nematodes (*Ascaris, Bunostomum, Oesophagostomum, Strongyloides, Trichostrongylus Toxocara*); trematodes (*Fasciola, Schistosoma*); Cestodes (*Taenia*) and acanthocephalan (*Moniliformis*) occur in the grass-cutter and their public health significance is worthy of note.

Also, the devastating effect of parasites on grass-cutters has been brought to notice [18], the post-mortem results revealed heavy infection and the prevalence of intestinal helminths in grass-cutters from Omagwa district in River State, Nigeria. In this study, the result revealed the presence of seven different species of intestinal helminths (*Ascaris* sp., *Strongyloides* sp., *Trichuris* sp., *Fasciola* sp., *Taenia* sp., *Moniliformis* sp. and Hookworm). These pieces of evidence show that the health of captive grass-cutters can thus no longer be taken for granted. Several parasites in wild grass-cutters were reported in Oyo State, south-western Nigeria [19].

In Umuahia, Imo State, Nigeria, there was a 37.2% prevalence of gastrointestinal parasites in grass-cutters. Male and female grass-cutters had 30.7% and 52.9% parasite infections respectively [20].

There is increased demand for quality grass-cutter meat in Nigeria [21] and the patronage for grass-cutter meat consumption in sub-Saharan Africa [22]. The African population growth rate with the lowest protein supply in the world [2] also, calls for more attention to the regular supply of grass-cutter meat as a possible alternative to pork, chevon, beef and chicken since there are no religious prohibitions for the consumption of grass-cutter meat [23,24]. However, research and literature have shown that the availability of this valued product is affected by many factors such as parasitic diseases (protozoa and helminths) [25, 26]. The frequent dependence of humans on bush meat as a vital resources poses increased risks of zoonotic pathogens and disease transmission [27] through its handling and consumption [28, 29].

As promising as micro-livestock integration sounds, parasites in grass-cutters will threaten the practicability of production and availability of meat to the general public. It is against this background that this study is designed to find out the intestinal parasites of grass-cutters sold at eateries in Umuawulu, Anambra State. The objectives of the study are to identify and determine the prevalence of intestinal parasites of grass-cutters sold at popular eatery joints in the Umuawulu community in Anambra State, Nigeria.

2. MATERIALS AND METHODS

2.1 Area of Study

The study was carried out in Umuawulu, Awka South local government area, Anambra State, Nigeria. The town is located at Latitude: 6° 08' 60.00" N and Longitude: 7° 05' 60.00" E. The estimated population by 2005 is 20,150 people living in three villages: Enugwu, Umuenu and Agbana. The study was carried out in three eateries popularly known for the selling of grass-cutter meat.

2.2 Study Design

The study is a survey aimed at identifying and determining the prevalence of the gastrointestinal parasites of grass-cutters.

2.3 Sample Collection and Analysis

The study was carried out from October to December 2021. The study site was visited two times a month; 4 grams of faecal matter were collected from the rectum of the animals before they were sliced by the local chefs. Samples were kept in coolers containing ice packs and taken to the Zoology Laboratory of Nnamdi Azikiwe University, Awka, Anambra State, Nigeria where they were analysed. A total of forty-five (45) faecal samples were collected from the three different eateries in three locations and given a unique code number (UET1 – Umuawulu eatery number 1, UET2 - Umuawulu eatery number 2 and UET3 - Umuawulu eatery number 3) for easy identification.

The qualitative faecal examination was done using the Cornell-McMaster dilution egg counting technique [30]. Two grams of faecal samples were measured into a cup and mixed with 28 ml flotation solution and allowed to soak for 5 minutes. After 5 minutes the solution is steered and strained into a second cup. With the use of a syringe, McMaster slide chambers were filled with the mixture and set aside for at least 5 minutes to allow parasite eggs to float to the surface. In less than an hour, all eggs inside the

grid areas were counted using the 10X objective lens of the Microscope.

The prevalence of intestinal parasites was determined using the Chi-square ($\chi 2$) test from the contingency tables while Fisher's exact test was used to calculate the significant difference in prevalence for gender, location and parasite species. Analysis was done using SPSS (version 20.0) statistical software. The significant difference was set at P = 0.05 and all tests were performed with a 95 % confidence level.

3. RESULTS

The result shows the prevalence of gastrointestinal parasites of grass-cutters in relation to parasite species, gender and location in the study area.

The overall prevalence of gastrointestinal parasites in the animals was 51.11%. Table 1 revealed that the grass-cutters sold at eateries in Umuawulu had the highest number of *Ancylostoma* sp, 15(75.00%) followed by *Ascaris* sp, 5(55.56%), *Necator americanus* 2(25%) and *Trichuris* sp. 1(12.50%) recorded the lowest. The prevalence rate was significantly different (P<0.05) by species of parasite.

Table 2 revealed that the female grass-cutters had a higher number of infections, 13(65.00%) than the males 10(40.00%). The prevalence rate of infection was not significantly different (P>0.05) with gender.

In Table 3, it can be seen that the grass-cutters sold at UET1 and UET3 had a higher number of infections, 9(60.00%) than those of UET2 5(33.33%), however, there was none significant difference (P>0.05) with location.

4. DISCUSSION

The results revealed that grass-cutters from the wild are heavily infected with intestinal parasites that can be transmitted to their offspring and other mammals, including humans that may come into contact with them if eaten poorly prepared or domesticated. Two types of hookworm were isolated from the grass-cutter and *Ancylostoma* sp. has the highest prevalence. This is similar to the results in previous studies [31,32,33] that reported a high prevalence of *Ancylostoma* sp. in grass-cutter which may have high medical significance. *Ancylostoma* sp causes chronic loss of blood in animals including humans. Hookworm diseases such as Ancylostomiasis and Necatoriasis are widely endemic in tropical and subtropical countries where sanitary disposal of human faces is low and the soil moisture and temperature conditions favour the development of infective larvae [34]. At least 68 hookworm species have been described in 9 orders, 24 families, and 111 species of wild mammals. Black bears, red foxes, and bobcats harboured the highest diversity of hookworm species. *A. pluridentatum*, *A. tubaeforme*, *Uncinaria stenocephala* and *Necator americanus* were the hookworm species with the

Table 1. Prevalence of gastrointestinal parasites of grass-cutters in relation to parasite species

Name of parasite	No. of grass-cutters examined	Infected	Prevalence (%)	P value
Ancylostoma sp.	20	15	75.00	
Ascaris sp.	9	5	55.56	
Necatora mericanus	8	2	25.00	
Trichuris sp.	8	1	12.50	
Total	**45**	**23**	**51.11**	**0.01**

Table 2. Prevalence of gastrointestinal parasites of grass-cutters in relation to gender

Gender	No. examined	Infected	Prevalence (%)	P value
Male	25	10	40.00	
Female	20	13	65.00	
Total	**45**	**23**	**51.11**	**0.09**

Table 3. Prevalence of gastrointestinal parasites of grass-cutters in relation to location

Location	No. of grass-cutters Examined	No Infected	Prevalence (%)	P value
UET1	15	9	60.00	
UET2	15	5	33.33	
UET3	15	9	60.00	
Total	**45**	**23**	**51.11**	**0.241**

highest host diversity index. Hookworm infections cause anaemia, retarded growth, tissue damage, inflammation and significant mortality in several wildlife species [35]. Wildlife infections with *Necator americanus* are common in many regions of the world [36].

Another parasite in the study with a relatively high prevalence is *Ascaris* sp. In another study [37], 14 species of nematodes including *Ascaris* sp. were reported in Imo State, Nigeria. *Trichuris* sp. prevalence in the grass-cutters was also moderately high, as it is in this study in Anambra State. Gastrointestinal poly-parasitism in bush meat has being reported in wild animals [38,39]. Poly-parasitism (*Ascaris* sp*., Strongyloides* sp., *Trichuris* sp., *Fasciola* sp., *Taenia* sp., *Moniliformis* sp., *and Hookworm*) have also, being reported in both male and female grass-cutters in Omagwa Rivers State, Nigeria [40]. An improvement in sanitation in the study area is very important because of the relatively high number of hookworm parasites identified in this region.

5. CONCLUSION AND RECOMMENDA-TIONS

The results from the study revealed poly-parasitism in the grass-cutters (*Thryonomys swinderianus*) sold to eateries in Umuawulu community, Anambra state. *Ancylostoma* sp. was the most prevalent species followed by *Ascaris* sp*., Necator americanus* and *Trichuris* sp. It is recommended that stock grass-cutters brought from the wild for domestication be screened for parasites before they are prepared for consumption. Furthermore, the meat should be properly cooked to avoid ingestion of helminth eggs.

ETHICAL APPROVAL

Permission and ethical clearance certificate were obtained from Nnamdi Azikiwe University Animal Research Ethical Committee with reference number NAU/AREC/2021/00057.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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