



Prevalence of Internal Parasites Associated with Dairy Cattle in Nyala City, South Darfur State, Sudan

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Authors' contributions

This work was carried out in collaboration between both authors. Author EAAA designed the study, performed the statistical analysis and wrote the protocol and wrote the first draft of the manuscript. Author ARYA managed the analyses of the study, managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Helminthosis are one of the worlds most prevalent and economically essential parasitizes of human and domesticated animals. This study was conducted at Nyals city in South Darfur State during the years 2019-2020. The study was aiming at investigating gastrointestinal parasites in cross-breed dairy cattle reared in Nyala city. A questionnaire survey was done before collection of samples. A total of 110 faecal samples were collected from dairy cattle in Nyala city. Faecal samples were subjected for parasitological examination using Floatation and Sedimentation techniques. Faecal slides were examined under low power microscopy. Helminth eggs were detected in 65 (59.1%) faecal samples. 45 percent of the parasitic infestation cases were mixed cases (e.g. mixed Nematodes, and Trematodes and Coccidia spp.). Nematodes eggs were found in 24 (21.8%) samples, Trematodes eggs in 21(19.1%) samples and Coccidia spp. in 20 (18.2%) samples. 10 *Paramphistomum* spp. were detected and the prevalence of *Paramphistomum* spp. was 9.1%. 6 *Schistoma heamtobium* were detected and the prevalence of *Schistoma heamtobium* was 5.4%. 5 *Fasciola gigantica* were detected and the prevalence of *Fasciola gigantica* was 4.5%.

Keywords: Internal parasites; dairy cattle; nyala city; nematodes; trematodes.

1. INTRODUCTION

Throughout the world, internal parasites are considered to be one of the most important causes of infectious diseases in livestock [1]. Independent economic assessments have demonstrated that losses in cattle productivity due to internal parasites infestations can be substantial [2]. The effects of internal parasites can be synergistic, but the damage caused is generally subclinical [3]. The internal parasites emerge as a great problem and a considerable cause of mortality, morbidity and reduced herd efficiency. It is probably true to say that no individual animal does not at some time in its life suffer from endo-parasites infection [4]. It becomes more evident that the most effects on production, either in the form loss of weight, milk, wool quality carcasses quality, are associated with subclinical rather than clinical infections [5]. In Sudan, parasitic diseases were known to exist in the country since 1902. However, most cases reported were based on the tentative diagnosis, rarely supported by laboratory examination. In reviewing the available literature of Sudan veterinary services, no record was encountered while dealing with parasitic infestations or infections in dairy cattle in the different seasons of the year in Khartoum State [6]. Mahgoub [7] reported a high prevalence of Strongylid and Trichostrongylid eggs in Khartoum State. She mentioned that in most cases there was mixed infections with oocysts of *Eimeria* spp. Other eggs encountered were those of *Fasciola gigantica*, *Schistosoma bovis*, *Paramphistomum* spp., *Trichuris* spp. and *Moniezia* spp. *Haemonchus* spp. and *Cooperia* spp. Were the most predominant, followed by *Trichostrongylus* spp., but *Oesophagostomum* spp. *Strongyloides papillosus* was sporadically encountered during the whole study period. Nematodes were the predominant with highest prevalence of *Haemonchus contortus* and *Cooperia pectinata*, followed by *Trichostrongylus axei* and *Oesophagostomum radiatum*. *Trichuris* spp. was the least encountered species. *Cooperia* spp. was detected for the first time in Sudan in the abomasum instead of its previous exclusive presence in the small intestine. Regarding *Oesophagostomum radiatum*, it has been observed that its nodules were apparent in so many animals. Tapeworms were low in their prevalence represented by *Moniezia* spp. and *Avitellina* spp., while light trematodes infection in cattle was due to *Paramphistomum* spp [7].

Yet, internal parasite associated with dairy cattle in Nyala Occurrence is not reported. Therefore, this work aimed at determining the prevalence and identifying different types of internal parasite in dairy cattle in South Darfur State.

2. MATERIALS AND METHODS

2.1 Area of Study

This study was conducted out in Nyala city, South Darfur State (Sudan), during six months of the years 2019-2020.

2.2 Questionnaire Survey

A questionnaire survey was done before collection of samples.

2.3 Source of Samples

In this study a total of 110 faecal samples were collected from dairy cattle of different ages in Nyala city, South Darfour State (Sudan). The climate in the State is dry hot in Summer, wet in Autumn and dry cold in Winter.

2.4 Collection of Faecal Samples

Faecal samples were collected straight from the rectum of the animal and from the ground only if the animals were seen passing out their faeces. The faeces were then collected in plastic container, labeled, preserved in 10% formal alcohol and immediately transferred to the laboratory in College of Veterinary Medicine University of Bahri for fecal examination [8].

2.5 Parasitological Examination

2.5.1 Flootation method

This technique was described by [9] as follows: One to two grams of faeces were transferred to a mortar and mixed with saturated sodium chloride solution. The mixture were stirred gently until faeces thoroughly suspended in the salt solution. The suspension was then poured through a tea strainer into a container and gently pressed the excess fluid from the debris remaining in the strainer. The mixture was immediately poured into a Bijou bottle until it produced a convex meniscus. A clean glass slide was then placed

over the top of the bottle and left for 10 minutes after which the slide was removed quickly. A cover glass was applied on the slide which then examined microscopically for parasite eggs.

2.5.2 Sedimentation method

This test used for detecting those eggs which did not float well in available flotation solutions. Those are the operculate eggs such as fluke (*Fasciola*, *Paramphistomum* and *Schistsoma*). Two to three grams of faeces were taken in a mortar and emulsified with 5 ml normal saline. They were ground with pestle and mixed well. The suspension was poured through a tea sieve into a beaker to remove the large articles. The sieved suspension will then be poured in a falcon tubes and centrifuged at 1500 rpm for two min (this is the first wash). The supernatant was poured off and re-suspended in normal saline and centrifuged at 1500 rpm for 2 minutes. This will be repeated two times till the supernatant fluid is clear. A drop of the deposit was taken and put on a slide and examined under the microscope [8].

2.6 Type of Data Analysis

Results were recorded and analyzed using Microsoft office Excel windows 10.

3. RESULTS

3.1 Questionnaire Survey of 11 Dairy Farms in Nyala City

Analysis of the questionnaire of 11 dairy farms in Nyala city illustrated that: 100% of the housing

systems were Semi-open rearing and the floor was made of clay. The general evaluation of the housing condition was good for 54.5% of the farms and poor for the rest. The source of water in all farms was tape water and the area of grazing was small (≤ 3 Km²). About 72.7% of the farms were suffering from Tick-borne diseases and other infections and 45.5% were suffering from mastitis. Veterinary services were available in 90.9% of the farms and hygienic level was poor in 72.7% of the farms and good in the rest. Vaccination program were adopted in 3 farms (27.3%). Previous cases of internal parasites were reported in (54.5%) of the farms and all farms used anthelmintics. Summary of the questionnaire was illustrated in Table 1.

3.2 Prevalence of Internal Parasites and Coccidia Spp. in Dairy Farms in Nyala City

Helminth eggs were detected in 65 (59.1%) from 110 faecal samples collected from dairy farms (Fig. 1). According to the results of the questionnaire survey, cases of internal parasites were reported in 54.5% of the dairy farms in Nyala city (Table 1).

3.3 Cases of Mixed Parasitic Infestation in Dairy Farms in Nyalacity

Out of 65 cases of internal parasites infestation reported in Nyala citys dairy farms, 45.0% cases were mixed parasitic infestation (e.g. mixed Nematodes, Trematodes and Coccidias pp. (Figs. 2 and 3).

Table 1. Summary of the questionnaire survey of 11 dairy farms in different areas in Nyala city

Unit	Frequency (%)	Unit	Frequency (%)
Housing / Housing type		Veterinary services	
-Free range	0 (0%)	-Yes	10 (90.9%)
-Semi-free ranging	11 (100%)	-No	1 (9.1%)
Type of floor		Hygiene Level	
-Concrete	0 (0.0%)	-Excellent	0 (0%)
-Clay	11 (100.0%)	-Good	3 (27.3%)
Housing condition		-Poor	8 (72.7%)
-Excellent	0 (0%)	Vaccination system	
-Good	6 (54.5%)	-Yes	3 (27.3%)
-Poor	5 (45.5%)	-No	8 (72.7%)
Source of water		Previous cases of Internal parasites	
- Tape	11 (100.0%)	-Yes	6 (54.5%)
- Rain	0 (0.0%)	-No	5 (45.5%)
Area of grazing		Usage of anthelmintic	
- Small (≤ 3 Km ²)	11 (100.0%)	-Yes	11 (100.0%)
- Large (≥ 4 km ²)	0 (0.0%)	-No	0 (0.0%)
Common diseases			
-Mastitis	5 (45.5%)		
-Tick-borne diseases	8 (72.7%)		
-Other diseases	8 (72.7%)		

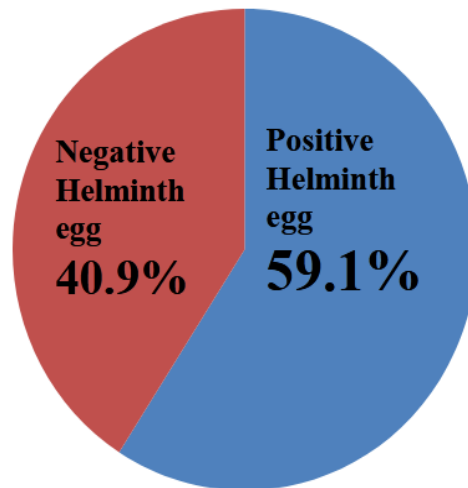


Fig. 1. Prevalence of internal parasites in dairy farms in Nyala city

3.4 Internal Parasites Detected in Faecal Samples Collected from Nyala City

Out of 65 faecal samples positive for parasitic infestation, Nematodes eggs were found in 24 (36.9%) samples, Trematodes eggs in 21 (32.3%) samples and Coccidias pp. in 20 (30.8%) samples (Table 1 and Fig. 4).

3.5 Prevalence of Trematodes

Out of 110 faecal samples collected from Nyala city, 10 Paramphistomum spp. were detected with the prevalence of 9.1% (Fig. 5). The eggs of Paramphistomum spp. are operculated similar in shape to those of *Fasciola hepatica* but slightly larger and more transparent (Fig. 6). Six *Schistoma heamtobium* were detected with the

prevalence of 5.4% (Fig. 5). The egg of *Schistoma heamtobium* is more circular and has no spine (Fig. 7). Five *Fasciola gigantica* were detected with the prevalence of 4.5% (Fig. 5). The eggs of *Fasciola gigantica* are light yellow in colour, large, oval, operculated, and measure about 140 by 80 IL. They contain a large ovum, which is embedded in a mass of yolk cells (Fig. 8).

3.6 Prevalence of Coccidia spp

Out of 110 faecal samples collected from Nyala city, the prevalence of Coccidia spp. was 18.2% (Table 1). Coccidia egg is spherical and ovoid (15 to 50um) with two layers (lipids and protein plates) and pointed anteriorly and rounded posteriorly (Fig. 9).

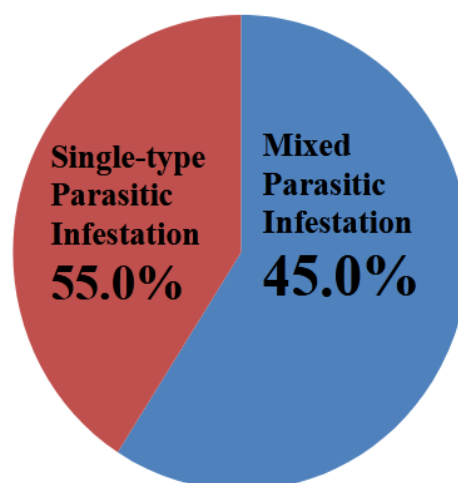


Fig. 2. Cases of mixed parasitic infestation in dairy farms in Nyala city

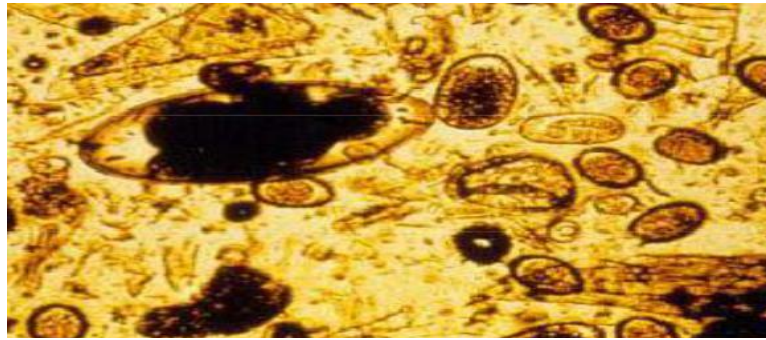


Fig. 3. Mixed parasitic infestation (Nematodes, Trematodes and Coccidia) in dairy farms in Nyala city

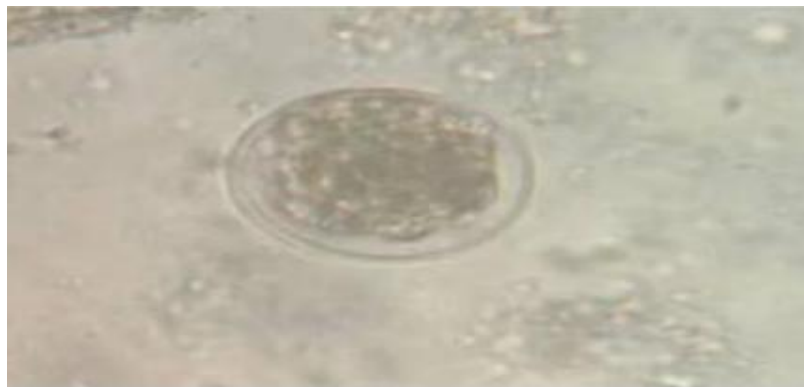


Fig. 4. Nematodes egg

Table 2. Internal parasites detected in faecal samples collected from Nyala city

Internal parasite	Number	Percentage
Nematodes	24	21.8%
Trematodes	21	19.1%
Coccidia spp.	20	18.2%
Negative samples	45	40.9%
Total	110	100%

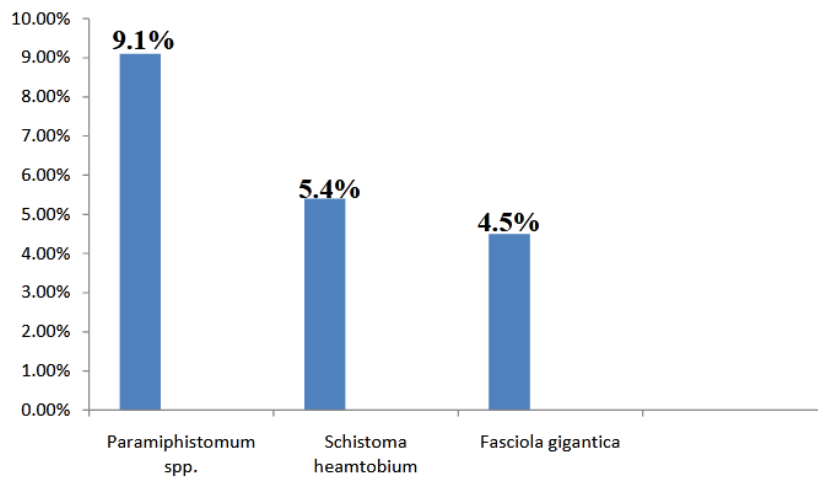


Fig. 5. Prevalence of trematodes



Fig. 6. Paramphistomum spp. egg

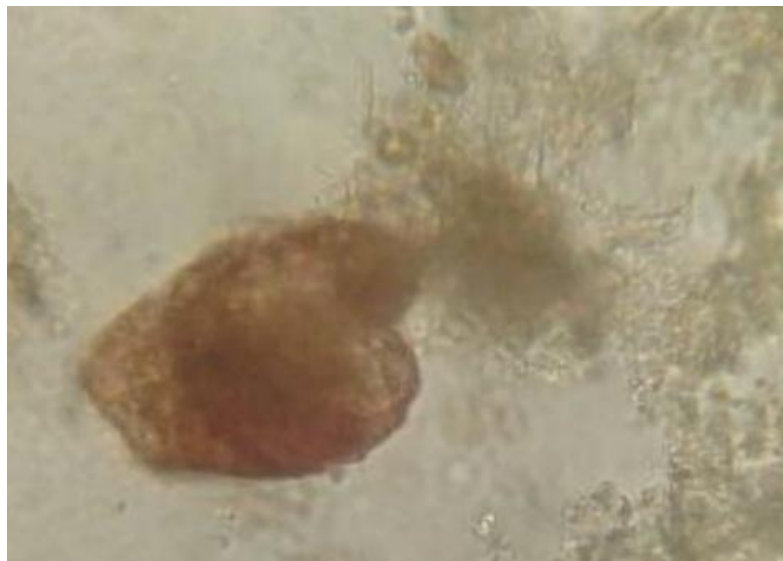


Fig. 7. Schistosoma haematobium egg

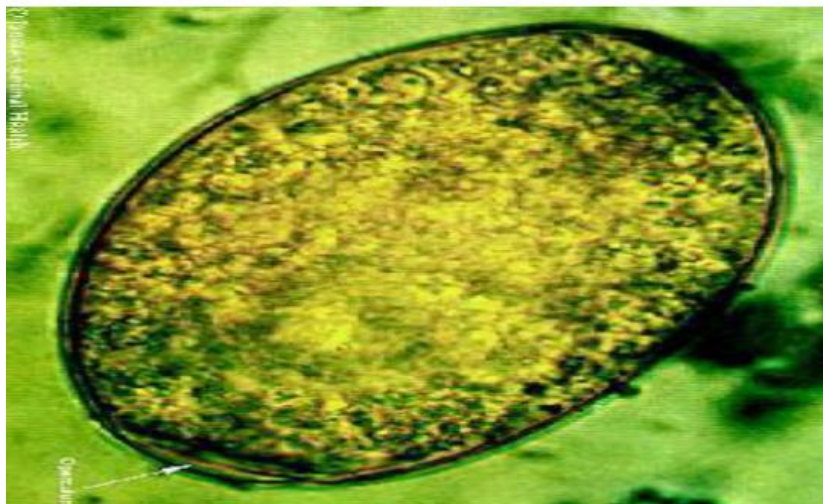


Fig. 8. Fasciola gigantica egg



Fig. 9. Coccidia spp. egg

4. DISCUSSION

Gastrointestinal parasite infection is one of the major causes of wastage and decreased productivity exerting their effect through mortality, morbidity, decreased growth rate, weight loss in young growing calves and late maturity of slaughter stock, reduced milk and meat production and working capacity of the animal mainly in developing countries [10]. According to the analysis of the questionnaire for the 11 dairy farms in Nyala city in this study, the general evaluation of the housing condition was good for 54.5% of the farms and poor for the rest. Previous cases of internal parasites were reported in 54.5% of the farms and all farms used anthelmintics. [11] reported that the presence of internal parasites of cattle in Kuku area is mostly due to the poor hygiene in the farms resulting from infrequent removal of animal dung noting that the animals were crowded in the center of pens where there was a partial shade. Furthermore, the animals were fed fodder contained with internal parasites from endemic area which increases the risk of infection with internal parasites as contamination with infective stages can happen at any point. In this study the prevalence of internal parasites in dairy farms in Nyala city was 59.1%. According to the results of the questionnaire survey, prevalence of internal parasites was 54.5%. [12] reported that there are many associated risk factors influencing the prevalence and severity of GI helminths. These include age, sex, weather condition and husbandry or management practices. [13] reported that distinct seasonality in parasite prevalence was evident, peaking during the wet season coinciding with the maximum rainfall. She

also stated that the prevalence of internal parasites was higher in Western Sudan cattle. In this study cases of mixed parasitic infestation in dairy farms in Nyala city were found in 45.0% of the total cases. [13] reported that mixed infections were more common than single infection. In this study Nematodes eggs were found in 24 (36.9%) samples, Trematodes eggs in 21 (32.3%) samples and Coccidia spp. in 20 (30.8%) samples. These results were in agreement with Yasmin (2005) who reported that Nematodes represented the predominant internal parasite in South Darfur State (22.5%) followed by Trematodes and then Coccidiaspp. The identified Trematodes in this study were, Paramphistomum spp. (9.1%) *Schistoma heamtobium* (5.4%) and *Fasciola gigantica* (4.5%). [13] detected Paramphistomum spp. (12.5%), Schistosoma spp.(2.5%), Fasciola spp. (5%) in faecal samples collected from South Darfur State. [14] recorded high infection of *Fasciola* (36.5%), *Paramphistomum* (18.4%), in Oromia Regional State in Ethiopia. [11] stated that the Prevalence of *Schistosoma* spp. and *Fasciola* spp. infection was high in the dry hot season (5.26%) in Khartoum State. In the present results the prevalence rate of coccidian spp. was 30.8% and this is higher than prevalence rate that reported by [13] and [11] reported the prevalence of 7% for *Coccidia* spp. detected in Khartoum State.

5. CONCLUSION AND RECOMMENDATIONS

The present study showed that infection with Nematodes, *Paramphistomum* spp.; *Schistoma heamtobium*, *Fasciola gigantica* and *Coccidia* is

of high prevalence among cattle reared in Nyala city, Western Sudan South Darfur State. These gastrointestinal and tissue parasites of cattle are known to constitute a major cause of production losses in livestock. Further studies should include a survey of more animals in different farms and an extensive study of the significance of other parasites in dairy cattle. A comprehensive study of effectiveness of anthelmintics used for treatment of cases of internal parasites infestation in South Darfur State should be done. Implementation of internal parasites control program in Nyala city.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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