The prevalence of gastro-intestinal parasites in goats in urban and peri-urban areas of Mwanza City, Tanzania

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Abstract. Gastrointestinal parasites are among the major causes of severe losses to livestock industry worldwide, especially in small ruminants. This study was conducted to determine the prevalence of gastrointestinal parasites in goats kept by small holders in the urban and peri-urban areas of Mwanza City in Tanzania. Randomly, 36 farmers from urban areas, with a total of 280 goats and 22 farmers from peri-urban areas with a total of 205 goats were identified for sampling. Faecal samples were collected from each goat and direct smears, floatation and sedimentation techniques were employed to identify parasite types. The prevalence of different endoparasites among urban Mwanza City goats was: Fasciola gigantica (4.2%); Strongyles (68%) and Entamoebae (3.2%). In peri-urban Mwanza City the prevalence of parasite infections was: Entamoebae (6.3%); Paramphistomum (7.3%), Strongyle eggs (47.3%) coccidia oocysts (2.4%), F. gigantica (8.2%), and Balantidium coli (4.8%). The present study showed that the prevalences of coccidia and strongyle parasites were significantly (p<0.05) higher in urban compared to peri-urban areas. However, there was no significant (p>0.05) difference in the prevalence of other parasites between two areas. The differences observed in the prevalence of aforementioned parasites are partly related to the variance in the animal management systems in the two areas, these being extensive and intensive in the peri-urban and urban areas, respectively. The challenges brought about by the prevalence of these parasites, some being zoonotic in nature validate the need to bring awareness to the farmers and the public in both areas and develop control strategies.

Keywords: Mwanza urban; Peri-urban; Endoparasites; Parasites; Protozoa; Zoonosis.

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Introduction

Mwanza City, in Tanzania, is the regional commercial and service hub. Its strategic location at the shores of Lake Victoria attracts industries and commercial enterprises. Like many other cities in the world and Africa in particular, Mwanza is fast attracting rural/urban migration due to the availability of amenities and modern social service facilities.
such as hospitals, schools, running water, electricity and recreation. Many others come in search of jobs and creation of social economic opportunities such as business. It is estimated that Mwanza is experiencing an average of immigration growth of 8% per annum (Mwanza City Master Plan 2008/2028). This rapid rise of population in the city poses a great challenge on sustainability of necessary resources. Therefore there is a great demand of food especially protein from milk and meat. It is this demand of meat and milk in the city which has forced the creation of urban and peri-urban goat farming among other activities. Besides production of meat, urban and peri-urban goat keeping creates employment opportunities at household level and increases income. This is especially true for the vulnerable groups such as women, retired people, and those without formal education who rely more on livestock keeping due to their limited alternative choices of livelihoods. Of equal importance are the benefits accrued from manure when the livestock keeping is linked with household gardening and manure is used as fertilizer. Sometimes production of bio-gas is practised from the manure to help cut down on electricity energy bills.

Urban and peri-urban livestock farming especially goat farming has historic links to the micro-economic developments in these areas around Lake Victoria. In some cases it is influenced by cultural background with the majority of people in the case of Mwanza City coming from a livestock keeping background in the rural areas. It is estimated that more than 15% of the households in Mwanza City are involved in livestock keeping (Mwanza City Master Plan 2008/2028). In other countries like Ghana it has been shown that 25% of the 4.5 million small ruminants are raised by people living in and around cities (Baah, 1994).

Although goat farming is lucrative among production activities carried out by urban and peri-urban Mwanza City residents, there are various constraints that are related to goat industry. Animal diseases such as viral, bacterial and parasitism are implicated among the major causes of poor goat health and productivity (Nansen, 1991; Kusiluka et al., 1998). Among the aforementioned diseases, gastro-intestinal parasites are considered to be the major cause of severe losses in goats from Africa. Although they can cause diseases and deaths, the main economic losses result from chronic infections due to concurrent infections with several parasites can cause unthriftness, poor feed utilization, poor growth, low resistance to some other infections, decreased meat and milk quality and infertility (Nansen, 1991; Ngomuo and Gyrd-Hansen, 1986; Kusiluka et al., 1994).

In order to develop a relevant parasite control programme for urban and peri-urban goat keepers, a thorough knowledge of the epidemiology of the present parasites is imperative. However, epidemiological studies on parasites, in this fast growing urban and peri-urban area of Mwanza City has not yet been documented, except for a report by Msanga and Tangaraza (1985) which mentions external and internal parasites of indigenous poultry in Mwanza municipality. This article reports results of a survey of various endoparasites in small scale goat keeping farms in the urban and peri-urban areas of Mwanza City.

Materials and methods

Study area

The study was undertaken within the urban and peri-urban Mwanza City (figure 1). Mwanza is the second largest urban settlement in Tanzania after Dar-es-Salaam and among the fastest growing settlements in Tanzania. It is located on the southern shores of Lake Victoria in north western Tanzania between latitudes 2.15 and 2.45 south of the Equator and longitudes 32.45 and 33 east of Greenwich. It comprises of Nyamagana and Ilemela districts. It covers a total area of approximately 13,337 km² of which 900 Km² is covered by Lake Victoria and the remaining portion is land covering approximately 437 Km² (32.7%). The city covers only about 3.8% of the total area and has a population of 537,547 (National Bureau of Statistic, 2007) it is the biggest port to Lake Victoria in Tanzania. The urban and peri-urban small holder goat farms comprising not less than two full grown goats were randomly identified for sampling with the help of City Veterinary Extension Officers. In Ilemela District, samples were collected from Balewa,
Bugando, Buswelu, Kitangiri, Mihama, Bwiru, Kirumba, Nyamanoro, Nyamhongoro, Sangabuye, Bugongwa, Kiseke, Mirongo, Mtakuja, Mkuyuni, Nyangwi, Nyakato and Pasiansi. In Nyamagana District, samples were collected from Buhongwa, Mkolani, Butimba, Bulale, Bugarika, Capripoint, Isamilo, Igogo, Igoma, Mbugani, Mahina, Mihama, Luchelele, Lwahnima, Mkuyuni and Pamba. Most of the goats in urban areas were usually seen roaming randomly in playgrounds, open spaces, garbage dumps and few tethered. In the peri-urban areas, goats were communally grazed in the grassland and bushes.

**Figure 1.** A sketch map of urban and peri-urban Mwanza City

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**Study design**

A random selection of thirty six small holder goat farmers from urban and twenty two from peri-urban areas were identified for sampling. In all areas where samples were taken the management system was assessed.

**Faecal sampling**

Using plastic gloves fresh faecal samples were collected from the rectum of each goat. In a few incidences freshly defecated faeces on the ground were collected. About 20gm to 30gm were placed into a test tube containing 3% formalin and immediately closed with a rubber stopper. The test tubes were labelled and placed into an ice box and transported to Mwanza Veterinary Investigation Centre (MVIC) for storage in the refrigerator and subsequent examination.

**Faecal Examination**

**(a) Examination of direct smears**

A small quantity of faeces was placed on a slide, mixed with a drop of water, spread out and then covered with a glass cover slip and examined directly. The smears were examined using X10 objective for parasite eggs and larvae and X40 for motile protozoa organisms.

**(b) Concentration methods**

Two qualitative procedures were alternatively used for concentration, the test tube flotation and sedimentation methods as described by
MAFF (1986) were used to detect the presence of stomach and liver flukes (trematodes) and *Strongyle* eggs (nematodes) in the samples. The presence of coccidian oocysts was also recorded.

Data analysis

The data was entered in a computer and Statistix© 2000 Analytical software was employed to carry out descriptive statistics where the prevalence rate of each parasite type was determined in the two areas. Furthermore, a proportion test procedure was used to perform a two sample hypothesis tests and confidence intervals for the prevalence rates of each parasite then computed using the normal approximation with correction for continuity.

Results

Goat management

All the goats kept in the urban and peri-urban Mwanza city were local breeds. In the urban areas, a few of these animals were tethered while others roamed randomly grazing in open spaces, garbage dumps and sports fields. In the peri-urban areas, they freely grazed in village natural pastures. The de-worming and the application of acaricides periods varied from one farmer to the other. Some of the peri-urban farmers reported that they had no opportunity of de-worming or apply acaricides on their goats due to shortage of money to buy the acaricides and dewormers. Some of the urban smallholders reported that they accessed veterinary services and their animals received regular animal health services but others never bothered about the veterinary services. A total of 280 goats from urban and 205 from peri-urban Mwanza city were sampled.

Parasite Prevalence

The prevalence of parasitic infestation in goats from urban and peri urban Mwanza City is presented in Table 1. Parasite eggs identified from urban goats were of *Fasciola gigantica* [4.2%], *Strongyle* [68.9%] and *Paramphistomum* [6%]. From the same goats, protozoan parasites encountered were *Entamoeba* spp and coccidian oocysts at the prevalence rate of 3.2% and 10% respectively. The prevalence of parasites from peri-urban Mwanza goats was: *Paramphistomum* spp 7.3%, *Fasciola gigantica* 8.2% and *Strongyle* 47.3%. Protozoan infections were *Entamoeba* spp [6.3%], coccidia [2.4%] and *Balantidium coli* [4.8%].

### Table 1. Prevalence of parasite infection in goats in peri-urban and urban areas of Mwanza City

<table>
<thead>
<tr>
<th>Parasites identified</th>
<th>No. Examined</th>
<th>No Positive (%)</th>
<th>No. Examined</th>
<th>No Positive (%)</th>
<th>SE (DIFF)</th>
<th>P-values</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Strongyles</em></td>
<td>280</td>
<td>179 (68.9%)</td>
<td>205</td>
<td>99 (47.3%)</td>
<td>0.05</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td><em>Coccidia oocyst</em></td>
<td>280</td>
<td>28 (10%)</td>
<td>205</td>
<td>5 (2.4%)</td>
<td>0.02</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td><em>Fasciola gigantica</em></td>
<td>280</td>
<td>12 (4.2%)</td>
<td>205</td>
<td>17 (8.2%)</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td><em>Paramphistomum</em></td>
<td>280</td>
<td>12 (4.2%)</td>
<td>205</td>
<td>15 (7.3%)</td>
<td>0.02</td>
<td>0.13</td>
</tr>
<tr>
<td><em>Entamoeba spp</em></td>
<td>280</td>
<td>9 (3.2%)</td>
<td>205</td>
<td>12 (6.3%)</td>
<td>0.02</td>
<td>0.57</td>
</tr>
<tr>
<td><em>Balantidium coli</em></td>
<td>0</td>
<td>0</td>
<td>205</td>
<td>10 (4.8%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

The results presented in this survey reveal the prevalence of various gastrointestinal parasites in goats kept in urban and peri-urban Mwanza City. This is the first community based survey to be undertaken in this urban setting of Mwanza City. The prevalence of *Strongyle* parasites was higher in urban than in peri-urban Mwanza. The explanation to this might be that goats in the city mostly roam and feed at the city garbage dumps where they are
concentrated is smaller spaces and hence come into contact with more infective nematode larval stages. On the other hand, goats in the peri-urban areas feed from the upper parts of shrubs and trees where there are less chances of encountering infective nematode larvae. Some species of Strongyles such as Haemonchus spp have been reported to cause serious pathogenic effects including gastroenteritis poor growth rates and even heavy mortalities (Kagira and Kanyari, 2001). The prevalence of coccidia oocysts was higher in urban city than in peri-urban city. The same explanation as for Strongyles may apply here as well. It is known that some genera of coccidia such Eimeria have species that are pathogenic causing diarrhoea, abdominal pain, anaemia, inappetance, weakness and loss of weight in goats and sheep (Soulsby, 1982; Kanyari, 1988). Other gastrointestinal protozoans found in this study were Entamoebae and Balantidium coli species in urban and peri-urban areas respectively. Some species of Entamoeba namely E. polecki and E. histolytica have been proved to be pathogenic to both humans and animals (Schuster and Visvesvara, 2004).

Although the prevalence of Fasciola gigantica infestation was higher in the peri-urban area with infection rate of 8.2% compared to 4.2% in urban area such difference was not statistically significant (P>0.05). However, the observed slightly higher prevalence of this infection in the peri-urban areas can be due to poor water drainage experienced in the rural areas where there are plenty of low-lying swampy areas, water pools and wetlands which are very important habitats for the reproduction of the water snails, the intermediate hosts for the trematodes. Equally, in the urban areas, the chances of finding water logging in the drainage systems in the streets and elsewhere is not uncommon, thus creating suitable environment for the survival of the snails in which the intermediate hosts propagate. In addition, goat migration between the two areas does often occur. Fasciolosis in small ruminants in Tanzania causes great economic losses through condemnation of livers at slaughter (Hammond, 1965; Msanga, 1985, Mellau et al., 2010). The trematode Fasciola has been reported to cause sporadic infections to humans, with a variety of symptoms such as intermittent malaise, weight loss, pain under the right costal margin and often pruritis with eosinophilia (Mas-Coma, 2005). In some parts of the peri-urban city, the hygiene of drinking water sources is substandard; there is a possibility of contamination with encysted metacercariae which could possibly be transmitted to human populations. Also other parasite species like B. coli and Entamoebae that were recovered in the goats are important zoonotic parasites (Theresa et al., 2000; Kanyari et al., 2009). The aforementioned parasites are even more dangerous to immune incompetent HIV-AIDS patients where they cause life threatening infections.

The prevalence of Paramphistomum in goats was 6% in the urban Mwanza city. These trematodes sometimes cause profuse foetid diarrhoea, marked weakness and frequently death (Soulsby, 1982). However, there is no documented report of its economic importance in ruminants especially goats in Tanzania. A well planned control programme is necessary to avoid infection to both urban and peri-urban Mwanza city population and livestock.

In conclusion, goat keeping has become part and parcel of urban and peri-urban life which is also rapidly featuring in Mwanza City. The occurrence of parasites which are of economic importance and public health significance poses a great challenge to both urban and peri-urban city dwellers. Chemotherapeutic treatment of animals has been very costly to small holder farmers. The present study validates the need to create awareness to develop appropriate education to the farmers and the public in general of the infection potential, the danger these parasites pose and the ways to combat them. The farmers can be sensitised to good management practices, such as rotational grazing, and regular preventive treatment of the goats against worms.

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References


