The Prevalence of Ecto and Endoparasites in Pigs in Urban and Peri-Urban Areas of Mwanza City, Tanzania

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Abstract: *Parasitism is the most serious constraint causing continuous ill-health and lowered productivity in livestock in Tanzania and sub-Saharan Africa as a whole. This study was carried out in urban and peri-urban areas of Mwanza city and aimed to determine the prevalence of parasitic infections in pigs kept by small holder livestock keepers. A random sample of 14 urban farmers with a total of 213 pigs and 14 peri-urban farmers with a total of 155 pigs were selected. Faecal samples were collected from each pig. Ectoparasites were examined and their morphological characteristics recorded. Direct smear floatation and sedimentation methods were employed to detect endoparasites in the faeces. The prevalence of different types of endoparasites in urban Mwanza city pigs were: Strongylid nematodes (11.7%) Entomoeba ssp (27.2%), Ascaris suum (1.8%) Balntidium coli (3.8%) and Coccidia spp (3.3%) and the only ectoparasites found was sarcoptic mange (1.4%). In the peri -urban area the endoparasites found were Entomoeba spp (51.6%), Strongylid nematodes (9.7%), Coccidia spp (5.8%). Ascaris suum (12.9%) Balantidium coli 20.6%) and Trichurus suis (3.8%) and the ectoparasites was sarcoptic mange (21.9%). Every piggery where samples were taken, the management system was assessed. The difference in the livestock management systems in the two areas clearly explains the observed high prevalence of parasite infection in the peri-uban compared to the urban areas of Mwanza city. The negative impact of these parasites on livestock production and their public health importance -since some of them are zoonotic in nature- cannot be underestimated. The present study validates the need to bring awareness to the farmers and the public at large so that they may embark on cost effective development of parasite control strategies.*

Key words: Mwanza urban, peri-urban, endoparasites, ectoparasites, protozoa, zoonosis, Tanzania, pig.

INTRODUCTION

Pigs were first domesticated in China about 4900 BC (Devendra *et al*.,1979). The modern pig is believed to have descended from two wild stocks, namely: the European and Malayan pigs (Eusebio 1980). They are now found all over the world. In the tropics, pigs are kept for several reasons and they form an integral part of the farming system. They contribute to the household income and employment (Lupala, 2002, Gefu, 1992). They have a relatively high prolificacy and growth rate, thus have a potential to bring quick returns (Lekule *et al.,* 2003). A good sow could produce 600kg of pork per annum. This production is higher than what could be obtained from ruminant livestock. In addition to this; pigs produce manure, which is used to improve soil fertility and thereby produce high agricultural crop yields (Smith *et al.,* 2000).

In Tanzania improved pig breeds were introduced from Europe during the colonial days, they are still few in numbers compared to ruminant livestock and the tradition of keeping pigs is not deep rooted compared to countries in South East Asia, Central and South America, the Caribbean and Pacific Islands where pigs have been kept from ancient times. There were about 450,000 pigs in Tanzania in 2002 (World Hog Population-FAO 2002). Despite low population figures, pigs are important in some areas especially in southwest and northern regions of Tanzania. Presently in Tanzania there is an increase of pig production in urban and peri-urban areas particularly in big cities and towns like Dar-es-Salaam, Mwanza, Arusha and Mbeya. This is in response to the increased flow of people to urban areas and hence increased demand for pork resulting from increased consumers' preference for this product. The most popular pork dish is roasted pork, nicknamed *Kitimoto.*

The majority of the small scale subsistence farmers keep pigs as backyard activity. The productivity of the pigs is generally low and is characterised by small litter size, low birth weights, high mortality rates and low growth rates. (Holness, 1991). Gastrointestinal (GI) nematodes limit pig production; the direct losses caused by these parasites are attributed to acute illness culminating in death, premature slaughter and rejection of carcasses during meat inspection (Pattison *et al*., 1980). Indirect losses include decreased growth rate, weight loss in sows and reduction in litter size (Pattison *et al*., 1980, Ajayi *et a*l., 1988, Taylor, 1999). Nsoso *et al*., (2007) reported that GI nematodes reduced average daily weight gain by up to 30% in indigenous pigs of all ages. The adult nematodes live in the intestines, on the gut lining and ingesting particulate and liquid digesta, thus limiting nutrient uptake by the pigs. The damage caused by adult GI nematodes includes hemorrhagic gastroenteritis and anemia. Larval migration through tissues of the pigs results in spread of infectious organisms to parts of the body thus causing extensive tissue damage and hence compromising organ function (Kahn, 2006).

Pig parasites pose a threat risk, thus, the zoonotic parasite species such as *Cytecercus cellulosae* is said to be prevalent in the southern and northern regions of Tanzania (Nsengwa, 1995; Ngowi *et al.* 2004; Winkler *et al.* 2009). Pigs may also transmit other zoonotic tissue parasites such *Trichnella spiralis* (Vassilev, 1999) and *Cryptosporidia* species which is among the re-emerging zoonoses in the advent of HIV-AIDS (Pasquali, 2004).

Intensive large scale pig production for commercial purposes is limited to very few farmers with regular income from other sources mainly to meet high cost for concentrate feeds among other requirements. Parasite infection particularly intestinal and external parasites seriously limit pig production (Theodoropoulos *et al,* 2001, Beloeli *et al.,* 2003). Epidemiological studies on pig helminthosis in urban and peri-urban areas of Mwanza city are limited and hence comprehensive data are practically non-existent. No attempts have previously been made to determine the epidemiology of porcine helminths and ectoparasites in the city. Knowledge about the prevalence of the parasites is useful when formulating pig development and extension programmes for both urban and peri-urban pig farmers. It enables the authorities and the veterinary services to understand possible health threats and develop cost effective prophylactic measures in order to reduce parasite transmission among pig herds and formulate an appropriate control strategy.

The contribution of the pig industry to the economy of Tanzania although low has become important. Therefore, the objective of the current study was to determine the prevalence of parasites in pigs in the urban and peri-urban areas of Mwanza city, so that the livestock keepers, the veterinary and public health authorities and the public in general are made aware of the extent of parasitic infection and that such information would help them to formulate informed appropriate control strategies.

MATERIALS AND METHODS

Study area

The study was undertaken within urban and peri-urban areas of Mwanza city. Mwanza is the second largest city in Tanzania after Dar- es-Salaam and is among the fastest growing urban settlements in the country. 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 Greenwhich. It comprises of Ilemela and Nyamagana districts (Figure 1). It covers a total area of approximately 1337 square km of which 900 square km is covered by water of Lake Victoria and the remaining portion is land covering approximately 437 square km (32.7%). The city covers only about 3.8% of the total area and has a population of 537,547 (2007 National Bureau of Statistics) and has the biggest port on Tanzania side of Lake Victoria. The urban and peri-urban smallholder piggeries comprising of not less than two fullgrown pigs were randomly selected for sampling. The sites selected are as shown in Figure1 of Mwanza city. The city Veterinary Extension Officers assisted in locating the pig farmers in Ilemela and Nyamagana Districts.

Figure 1: A map of urban and peri-urban areas of Mwanza city

Study design

The studies were undertaken between October 2007 and May 2008. The activities of the study were divided into three groups A, B, C all undertaking the same activities i.e. faecal collection, and clinical mange observation from the pigs. A laboratory technician was assigned to each of the groups. The division of three groups of technicians for sample collection was purposely programmed in order to cover the entire area of the urban and peri-urban of Mwanza city. Fourteen small-holder pig farmers each from urban and peri-urban areas were selected for sampling. From the urban area group 'A' sampled 142 pigs, group 'B' 36 and group 'C' 35; and from peri-urban group 'A' sampled 70, group 'B' 50 and group 'C' 35 pigs.

Animal Management

In each piggery where samples were taken the management system was assessed.

Faecal sampling

Using plastic gloves fresh faecal samples were collected from the rectum of each pig of both sexes and different ages from five months up to twelve months. In few cases freshly defecated faeces were collected. About 20 gm to 30 gm were dropped into a test tube containing 3% formalin and immediately closed with a rubber stopper. The test tubes were labelled, placed into a cool box and transported to Mwanza Veterinary Investigation Centre (MVIC) for storage in the refrigerator ready for examination.

Faecal examination

(*a) Examination of direct smears*

A small amount of faeces was placed on a glass slide, mixed with a drop of water spread out and covered with a cover slip and examined directly. The smears were examined under the microscope using the 10 X objective for parasite eggs and larvae and 40X for motile protozoa organisms.

(b) Concentration methods

In order detect the presence of stomach liver flukes (trematodes) and Strongyle eggs (nematodes) in the samples, two procedures were used; the test tube floatation and the sedimentation methods as described by (MAFF 1986). The presence of coccidian *oocysts* was also recorded using the same methods.

Mange observation

Individual pigs were clinically examined. Clinical classification was on the basis of evidence of signs either, the hypersensitive form characterised by localised or generalised erythmatous skin papules and alopecia or the chronic form with encrustation in ears or other parts of the body.

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 species was determined in the two areas. Further more, a proportion test procedure was used to perform a two sample hypothesis tests and confidence intervals for the prevalence rates of each parasite species was computed using the normal approximation with the correction for continuity.

RESULTS

Animal management

All the pigs kept in the urban Mwanza city were exotic breeds. These animals were zero grazed and seen scavenging around homesteads and mostly fed with commercial formulated feeds and hotel leftovers. On the other hand most of peri-uban pigs were also exotic mixed with few indigenous pigs and they were left to scavenge around the villages, fed with vegetable wastes, kitchen leftovers. The de-worming and the frequency of application of acaricides varied from one farmer to the other. Some of the peri-urban farmers reported that they had not dewormed or applied acaricides for periods ranging from three months to a year, due to shortage of cash to buy antihelminthics and the acaricides and to pay for veterinary services. The urban smallholders had easy access to veterinary services and hence their pigs received regular animal health services.

Housing varied from farmer to farmer, the common houses in the urban areas had walls made of timber off cuts with concrete floors and a grass thatched roofs or roofed with corrugated iron sheets. In peri-urban areas some were made with mud walls with hard wooden poles to prevent the pigs from digging into the earthen wall and were grass thatched and few used corrugated iron sheets.

Prevalence of gastrointestinal (GI) parasites and ectoparasites

A total of 213 and 155 pigs from the urban and peri-urban areas respectively were sampled. The prevalence of different types of protozoa, helminths and ectoparasites in urban Mwanza city – pigs were *Entomoeba* ssp 58(27.2 *%,*), *Strongylid* nematodes 25(11.7%) *Balantidium coli* 8(3.8%) *Coccidia oocyst* 7(3.3%) and *Ascaris suum* 4(1.9 %). Ectoparasites found were sarcoptic mange 3(1.4 %). In the peri -urban area, the parasites that were found were *Entomoeba* spp 81(51.6%), *Balantidium coli* 32(20.6 %), *Ascaris suum* 20(12.9%), *Strongylid* nematodes 15(9.7%), *Coccidia oocyst* 9(5.8 %.) and *Trichurus trichuria* 6(3.8%). Ectoparasites found were sarcoptic mange 34(21.9%) (Table 1).

Table 1: Prevalence of endo and ectoparasites infection in pigs in urban and peri-urban areas of Mwanza City

Parasites identified	Urban areas		Peri-urban areas		SE (DIFF)	P-values
	No. animals examined	No. Positive (%)	No. animals examined	No.Positive (%)		
Trichuris spp	213	0(0%)	155	6(3.9%)	-	P≤ 0.01
Balantidium coli	213	8 (3.8%)	155	32(20.6%)	0.03286	P≤ 0.001
Sarcoptic mange	213	3(1.4%)	155	34(21.9%)	0.03175	P≤ 0.001
Ascaris suum	213	4(1.9%)	155	20(12.9%)	0.02607	P≤ 0.001
Strongyle type of eggs	213	25(11.7%)	155	15(9.7%)	0.03286	P≤ 0.001
Coccidia oocyst	213	7(3.3%)	155	9(5.8%)	0.02153	
Entomoeba spp	213	58(27.2%)	155	80(51.6%)	0.05111	P≤ 0.001

DISCUSSION

The results from the survey have shown a high prevalence of various endo and ectoparasites species infestations in pigs kept in urban and peri-urban areas of Mwanza city. The current study is the first to be carried out on GI nematodes infesting free-range pigs under smallholder peri-urban village management practices and urban intensive management practices in Mwanza city. Results show that there were differences in the prevalence of parasites between the urban and peri-urban pigs (Table 1). The prevalence was generally higher among the peri-urban pigs than the urban pigs except for Strongyle eggs which were prevalent among the urban than the peri-urban pigs. The differences in the prevalence of

parasitic infestation between urban pigs and peri-urban pigs may be attributed to differences in management practices like feeding, housing, provision and application of acaricides and de-worming programmes. The observed higher prevalence of *Ascaris suum*, Sarcoptic mange and *Balantidium* species in the peri-urban pigs as compared to urban area pigs could be due to good management practices such as treatment of diseases and improved feeding and housing. However, the prevalence of *Strongylid* species in the urban areas was vice-versa. The probable explanation could be due to intensive use of zero grazing that favours high transmission potential in such areas. The infection of pigs with protozoa parasites (*Coccidia* spp) was not significantly different in both urban and peri-urban areas this could probably be due to not using anti-protozoan treatment in both areas. Therefore, there was the continued of transmission of protozoans in pigs in both areas, the majority of the protozoans are known to be zoonotic including *Cryptosporidia* and *Giardia* which are a threat to vulnerable humans with HIV-AIDS (Morgan *et al* 2008). However, in the present study due to limitation of equipment some of the important zoonotic parasites such as Cryptosporidium were not diagnosed.

Strongyloid infection was (11.7%) in the urban areas, and this finding is relatively similar to that reported by Esrony *et al.,* (1997) who sampled 424 faecal samples from local and crossbred pigs kept under different management systems in Morogoro region and found that (9%) were positive for *S.ransomi.* The prevalence of *Balantidium coli* was (8.4%) and (20%) for the urban and peri-urban areas respectively. The pig appears to be the primary host and it is generally regarded as a commensal under normal conditions though for undetermined reasons it may invade the mucosa and cause dysentery, haemorrhages and severe enteritis (Moncol *et al,* (1966). *B.coli* is a zoonosis in humans, and produces superficial to deep ulcers with dysentery (Soulsby, 1982). The prevalence of *Coccidia oocyst* was 3.3% in urban and peri-urban was (5.8%). The scavenging nature of the pigs exposes them to the *Coccidia* spp infection. The prevalence of *Ascaris suum* was 1.9% and 12.9% in urban and peri-urban areas respectively, these findings are similar to those reported from Ghana (Salifu *et al.,* 1990; Ajayi *et al*., 1988), Zimbabwe (Marufu *et al.,* 2008) and Tanzania (Ngowi *et al.,* 2004). Eggs of *Trichuris suis* were detected in the peri-urban pigs only (3.8%). The ectoparasite which was clinically detected was the sarcoptic mange with a low prevalence of 1.4% in the urban and a high prevalence 21.9% in the peri-urban areas this might also be due to good management practised in the urban areas. Study by Kambarage *et al.,* (1989) on epidemiological studies of sarcoptic mange in Tanzania pig herds which was conducted in three climatic zones, showed that the overall prevalence was 52% and 21% when determined on the basis of clinical examination and mite isolation respectively and 91% of the herds were shown to be harbouring the disease. Knowledge of the prevalence and significance of parasites in pigs in Lake Victoria Basin is rather limited, but our findings with regard to GI nematodes, are in agreement with reports from other parts of Africa (Ajayi *et al*., 1988; Salifu *et al.,* 1990; Esrony *et a*l., 1997; Permin *et al*., 1999; Nsoso *et al*., 2000).

CONCLUSION

Urban and peri- urban pig farming has become popular in Mwanza city and in Tanzania generally. The occurrence of these parasites which are of economic importance and public health significance poses a great challenge to both urban and peri-urban farmers and consumers. The present study calls for a need to create awareness among the pig farmers and the general public so that relevant veterinary extension officers may embark on the development of appropriate control measures.

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