

COCCIDIOSIS IN AGRO-PASTORAL GOATS IN MOROGORO DISTRICT, TANZANIA

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SUMMARY

Coprological examination for coccidia oocysts in 349 goats in 11 herds kept under the agro-pastoral management system in Morogoro region, Tanzania revealed an overall prevalence of 84%. The prevalences of coccidia oocysts showed no temporal distribution patterns and were comparable in kids, growers and adults ($P=0.05$). However, median oocyst counts per gram of faeces (OPG) were significantly ($P<0.05$) higher in kids (<6 months) than in growers which also had significantly ($P<0.05$) higher burdens than adult animals. Median OPGs showed temporal patterns with significantly high values ($P<0.05$) being evident during the rainy than in the dry period. Multiple infection involving *Eimeria arloingi* (40.9%), *E. hirci* (33.3%), *E. ninakohlyakimovae* (26.3%) and *E. alijevi* (23.5%) were common.

INTRODUCTION

Small ruminants in Tanzania are kept under various management systems which include the pastoral (extensive), agro-pastoral (semi-intensive) and intensive types (Mtenga *et al.*, 1986). The agro-pastoral management system is the most common system in many parts of Tanzania. In all management systems, the major constraints of animal productivity include poor nutrition, management and breeding policies, and diseases. Inadequate or lack of disease control programmes contribute significantly to the continued loss of animal

productivity. For instance, in Tanzania, diseases are considered to be responsible for 40-60% of the losses in the small ruminant sector (Mtenga *et al.*, 1986).

A number of diseases are known to affect goats resulting in immense loss of productivity. Among them is coccidiosis which is widespread in many parts of sub-Saharan Africa (Vercruyssen, 1982; Chhabra and Pandey, 1991) including Tanzania (Kusiluka *et al.*, 1996) and elsewhere in the world (Foreyt, 1990). The infection is characterised mainly by diarrhoea (Hammond, 1973) and mortalities, especially in

young stock and malnourished animals. The sub-clinical form is the most common and is often associated with poor growth rates and loss of body weights (Githigia *et al.*, 1992).

Although the infection has been observed in goats in pastoral, tethered and stall-fed crossbred animals in Morogoro region (Kusiluka, 1995) and those from central and northern parts of Tanzania destined for slaughter (Kusiluka *et al.*, 1996), no systematic studies have ever been carried out to establish the infection dynamics in agro-pastoral animals which are confined in houses during the rainy period. Therefore, this study was carried out in order to gather information about the infection dynamics in seasonally-housed goats in the agro-pastoral management system in Gairo division in Kilosa district in Morogoro region.

MATERIALS & METHODS

Study area and source of animals:

The study was carried out in the semi-arid area of Gairo division in Kilosa district in Morogoro region. The area has three seasons; the long rainy season (March-May), dry season (June-September) and short rainy season (October-December) followed by a dry spell in January-February.

Animals were herded during the dry period, whereas in the rainy season the goats were normally kept in-doors for a variety of reasons. These included protection from rain which, according to many livestock keepers in the area is thought to cause a variety of ill health problems; avoidance of destruction of crops when grazing land becomes scarce; and labour constraints because most members of families are engaged in crop production activities. During the rainy period animals were kept in door throughout the day, fed with fodder cut from the fields and given water irregularly.

Screening of animals:

The selection of the herds was based on the co-operation of animal owners. A total of 349 goats in 11 herds in Chamtui and Iyongore villages were screened for coccidia oocysts using faecal samples collected per rectum. All animals in the selected herds, categorised as kids (<6 months); growers (6-12 months) and adults (>12 months), were sampled only once. In order to establish temporal dynamics of infection, two herds with a total herd size of 52 animals were screened monthly for one year (June 1995 to May 1996).

Oocyst counts were determined using the McMaster technique (Ministry of Agriculture, Fisheries and Food, 1986). The average

The average oocyst number in the two chambers of the McMaster slide was multiplied by 100 to get the number of coccidia oocysts produced per gram of faeces (OPG). Statistical analysis of data was carried out using Epi Info 6 Version 6 statistical system (Dean *et al.*, 1994). The prevalence data was analysed using Chi square test, whereas median oocyst counts were analysed using Mann-Whitney and Kuskal-Wallis rank sum tests for any two and more than two groups, respectively.

Speciation of oocysts

Faecal samples with more than 1000 OPG values were mixed with 2.5% potassium dichromate and incubated for 5-7 days at room temperature to allow for sporulation. Speciation was based on morphological features of sporocysts, with special reference to the shape, wall thickness, colour and size of sporocysts and, presence of micropyle and polar cap (Ministry of Agriculture, Fisheries and Food, 1986).

RESULTS

The prevalence of oocysts in the screened animals was found to be 84%. High and statistically comparable prevalences ($p=0.43764$) of infection were observed in all age groups (Table 1). The highest median OPG was recorded in kids, followed by growers and the least was in

adult animals (Table 1). Kids had a significantly higher median OPG compared to both growers and adults ($p=0.00725$), and growers had a significantly higher median OPG than adults ($p=0.0164$). The difference in median OPG values of the various ages is further supported by the observation that, whereas 32.6% of kids; 47.0% of growers and 72.9% of adults were excreting less than 3000 OPG, the percentages of animals with more than 3000 OPG values were 67.2%, 52.9% and 26.9% respectively (Table 2).

A year long coprological evaluation revealed seasonal variations of OPGs'. Significantly higher median OPGs ($p=0.0235$) were observed during the long rainy period compared to other seasons (Fig. 1). A slight elevation of median OPG levels was observed in October coincident with the short rains.

Multiple *Eimeria* infections involving *Eimeria arloingi* (40.9%), *E. hirci* (33.3%), *E. ninakohlyakimovae* (26.3%) and *E. alijeivi* (23.5%) were common.

DISCUSSION

Eimeria spp. infection in agro-pastoral goats of all age groups was evident throughout the year as also observed in pastoral, tethered and stall-fed goats in other parts of Morogoro (Kusiluka,

Table 1: Prevalence, medians and ranges of coccidia oocyst counts in goats in Morogoro district, Tanzania (June 1995).

| Age group | No. of animals screened | No. of infected animals | Prevalence (%) | Median OPG | OPG range |
|-----------|-------------------------|-------------------------|----------------|------------|-----------|
| Kids | 74 | 65 | 87.8 | 4800 | 100-18000 |
| Grower | 119 | 101 | 84.9 | 2700 | 100-8900 |
| Adults | 156 | 127 | 81.4 | 700 | 100-2500 |
| Total | 349 | 293 | 84.0 | - | - |

OPG - Oocysts per gram of faeces.

Table 2: Variation of OPG in various age group of goats in Morogoro District, Tanzania (June 1995).

| Range of OPG | Kids | | Growers | | Adults | |
|--------------|------|------|---------|------|--------|------|
| | No. | % | No. | % | No. | % |
| 100-1000 | 22 | 30.0 | 26 | 21.8 | 90 | 57.5 |
| 1001-3000 | 2 | 12.6 | 30 | 25.2 | 24 | 15.4 |
| 3001-5000 | 18 | 24.3 | 28 | 23.5 | 18 | 11.5 |
| >5000 | 32 | 42.9 | 35 | 29.4 | 24 | 15.4 |

OPG - Oocysts per gram of faeces.

1995) and those from other parts of the country destined for slaughter (Kusiluka *et al.*, 1996). The species of *Eimeria* infecting goats in the study area have also been encountered in animals in other parts of Morogoro (Kusiluka, 1995). The observation of higher median oocyst counts during the rainy period than in the dry season conforms with those in cattle in Kenya (Omara-Opyene, 1985) but is in contrast with the

disease dynamics observed in small ruminants in Kenya (Waruiru *et al.*, 1991) and in Senegal (Vercruyssen, 1982). The high median OPG counts during the long rains may be attributed to favourable climatic factors which ensure survival of oocysts in the environment, whereas during the dry season desiccation is lethal to oocysts and reduces environmental contamination leading to low burdens. However, the seasonal influence on median oocyst

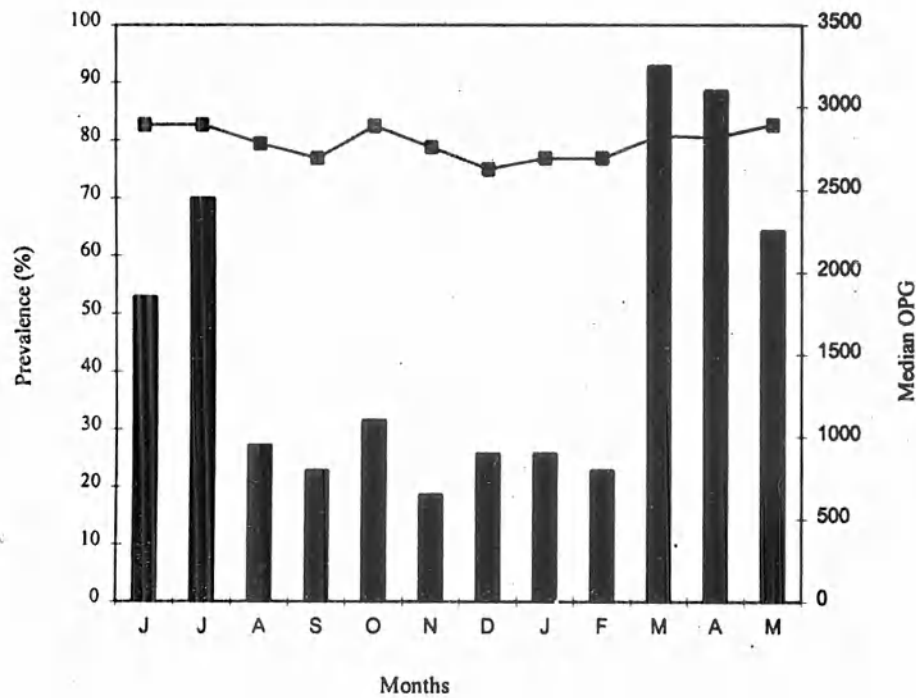


Figure 1. Seasonal variation in prevalence (line graph) and median coccidia oocyst counts (histogram) in goats in Gairo Division, Morogoro District, Tanzania. The long rainy and dry seasons were in March-May and June-September periods respectively, whereas the short rainy and dry seasons were in the October-December and January-February periods, respectively.

Seasonal prevalence and median coccidia oocyst counts in goats in Gairo Division, Morogoro District, Tanzania in long rains (March-May), dry season (June-September), short rainy season (October-December) and short dry spell (January-February).

counts may also be partly attributed to the confinement of animals during the rainy period when grazing land becomes scarce because most areas are turned into crop fields. Confinement of animals during the crop

planting period favours high contamination of houses, thus increasing the chances of infection (Blood, 1994). The continued high burden of infection in June to July period may be a spill over effect of the favourable climatic factors of

the rain period and the cold temperatures during that period which also favours the survival of oocysts in the environment (Foreyt, 1990).

The age-related coccidia oocyst burden in domestic animals is well documented (Mason, 1977; Gregory *et al.*, 1980; Amarante and Barbosa, 1992). This phenomenon is due to the development of resistance following continuous exposure to natural infection.

Despite the year round high prevalence of infection and the seasonal variation on median OPG levels, only few diarrhoeic animals (7) were observed. This suggests that coccidia infections in the study animals are mainly sub-clinical; possibly causing production losses in the form of reduced growth rates and loss of body weights which are not very apparent to many of the livestock keepers in rural communities. The preponderance of the sub-clinical form of infection is probably related to the relatively low stocking rates.

Livestock keepers in this area, as it also applies elsewhere in Tanzania, do not bother about controlling gastrointestinal infections caused by helminths and/or coccidia; both of which cause sub-clinical disease associated with variable losses of production. Because most of the keepers sell their animals on the basis of appearance of body condition

and size, which are a reflection of body weight, it is likely that animal owners may accrue more incomes from sale of animals with minimal or no endoparasite burdens. This can be achieved through implementation of cost-effective disease control strategies which may involve strategic treatments and/or change of management and animal husbandry practices. Thus, more studies are required to determine cost effective control regimes that may be adopted in this type of management system.

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