A SURVEY OF DISEASES OF SMALL RUMINANTS IN THE EASTERN ZONE OF TANZANIA

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SUMMARY

Smallholder agro-pastoral livestock farmers from three villages within different agro-ecological zones in Eastern Tanzania were interviewed and their small ruminants subsequently surveyed for various important health problems. Faecal, serum and blood smear samples were collected from small ruminants and analysed in the laboratory. Eggs per gram of faeces (EPG) were detected throughout the year with highest EPGs in May for Mandamazingara and Msingisi and in March for Langali. Faecal culture revealed the following larvae (L_3) in decreasing order of prevalence; *Haemonchus, Trichostrongylus, Oesophagostomum, Bunostomum, Strongyloides* and *Cooperia*. *Haemonchus* being the most predominant contributed to more than 44% of the larvae in all the three villages. Latex agglutination test detected 53% positive cases of CCPP (n = 120) in Msingisi village. *Trypanosoma congolense* and *T. vivax* were detected in goats in Mandamazingara and the parasitaemia was observed in March. Similarly, *Babesia* organisms were detected only in Mandamazingara with the highest counts in March. *Anaplasma* were detected in all the three villages with high counts in March and September. *Theileria ovis* was detected in all three villages during March and July. Anthelmintics and chemoprophylaxis using anti-trypanosomal drugs were administered to bucks and rams, which were introduced to the villages by the project. Animals with EPG≥1000 were treated with anthelmintics. Farmers were advised on the appropriate control measures for diseases found in their animals and when necessary treatments were conducted by trained extension staff.

INTRODUCTION

Tanzania has an estimated 11.5 million goats and 3.5 million sheep of which about 15% are found in the Eastern zone (MAC, 1998). Despite the abundance of goats and sheep in Tanzania, most

farmers have remained poor, largely due the low productivity of the goats and sheep. Therefore, the low productivity of goats and sheep is an important constraint to poverty alleviation and improvement of food security situation. In many parts of Tanzania goats and sheep experience a pre-weaning mortality of 50% and a daily weight gain of less than 30 g/day (Mtenga, 1992). Diseases contribute significantly to the high mortality and reduced weight gains of animals. Viral, bacterial, protozoan, endo- and ectoparasitic agents are known to cause disease in goats and sheep. Earlier studies have shown that respiratory infections like Contagious Caprine Pleuropneumonia (CCPP) and gastroenteritis cause high mortalities in young goats particularly during the cooler months of the year (Minga, 1999). These infections could also account for slow growth rates of goats during the rainy season. Unfortunately, the causes of these diseases are usually not confirmed and therefore treatments are based on clinical signs. Parasitic gastroenteritis has been reported to cause serious effects on the productivity of goats and sheep (McCulloch and Kasimbala, 1968; Ngomuo *et al.*, 1994).

Limited information on animal diseases in the Eastern zone of Tanzania was available prior to this study and this made it difficult to advise farmers on which technologies to adopt in order to improve productivity of their goats and sheep. This study was undertaken to determine the prevalence of diseases in the Eastern agro-ecological zone in order to recommend appropriate technologies for disease control to farmers.

MATERIALS AND METHODS

Study area

This study was conducted in three villages namely, Mandamazingara (Coast region), Msingisi and Langali (Morogoro region), which were selected to represent hot humid, semi arid and highland climatic zones respectively of the Eastern zone of Tanzania. Ten farmers were chosen in each village to participate in the study. The criteria for selection included previous experience in rearing small ruminants, availability of goats and sheep, and willingness to join the study. Farmers were asked to rank the prevalent animal health problems in their herds using a semi-structured interview conducted through methods described by Rietbergen-McCracken and Narayan (1998).

Sampling

Faecal samples for worm egg counts

Faecal samples were collected from 360 animals every other month for determination of worm burdens. Fresh faeces were collected from the rectum of goats and sheep using a finger covered with plastic gloves. The samples were labelled and kept in a cool

box with ice packs until time for laboratory analysis. McMaster technique as modified by Dunn and Keymer (1986) was used for the determination of worm egg counts in faecal samples.

Faecal culture for larval identification

Fresh goat and sheep faeces from each village were pooled, covered with cotton gauze and incubated at room temperature for seven days. The samples were then suspended in a Baermann apparatus for two hours. The larvae were collected at the base of the apparatus for microscopic examination and identification as described by Jozefzoon and Oostburg (1994).

Blood sampling

Once in every three months, two blood samples were collected from twelve animals (6 adults and 6 young) on each selected farm. One of the blood samples was collected in vacutainer tubes containing EDTA and the other in plain vacutainer tubes. Blood in EDTA tubes was used for preparation of thin and thick blood smears. The smears were allowed to dry in air. The thin smear was fixed in methanol while the thick smear was lyzed in water. The smears were then stained using 10% Giemsa stain and examined for haemoparasites under light microscope. The numbers of goats and sheep found to be infected with haemoparasites were recorded. Serum was extracted from the blood in the plain vacutainer tubes and then used for serological testing. The serum was subjected to Latex agglutination test for detection of antibodies to *Mycoplasma mycoides mycoides* as described by Rurangirwa *et al.*, (1987). Enzyme linked immunosorbent assay, ELISA kits for detection of antibodies to Rift Valley Fever (RVF) (99-RVFG, IgS ELISA kit) and Blue Tongue (BT) (100-BT1 ELISA kit), obtained from commercial supplier (BDSL, Ayrshire, Scotland, UK), were used. A total of 224 serum samples (186 goats and 38 sheep) were tested by ELISA for antibodies to the Rift Valley fever virus while 200 samples (168 goats and 32 sheep) were tested for antibodies to bluetongue virus.

Nasal and tracheal swabs

Sterile cotton swabs were inserted into the nasal cavities of twelve goats and twelve sheep in order to isolate and identify the bacteria causing respiratory diseases. The swabs were removed from the nasal passages and then dipped into Stuart's transport medium. In the laboratory, the isolates were plated on blood and McConkey agar for detection of *Pasteurella* and *Mycoplasma* species as described by Oros *et al.*, (1997).

Treatment of animals

All study animals with helminth egg burden equal to or above 1000 EPG of faeces were treated by oral drench of albendazole (Univet, Tulyvin, Cavan, Ireland). Those found with trypanosomes were treated with isometamidium chloride at a dose of 0.5 mg/kg by

deep intramuscular injection into the neck muscles. Ectopour pour-on (Norvatis animal health, Bascle, Switzerland) was administered on bucks for ectoparasite control.

Statistical analyses

The experiment was arranged in a randomized complete block design and the data was analyzed by ANOVA.

RESULTS

Helminth egg counts

The data for worm egg counts are shown in Figures 1 to 3. The data indicate that worms were present in goats and sheep in all three villages throughout the year. The worm egg counts increased during the wet season and had a peak in March for Langali and May for Msingisi and Mandamazingara. Lower egg counts were recorded in the dry season starting from July to September. A slight rise in worm egg count was observed in November. A statistical comparison of egg counts showed that animals in Mandamazingara had significantly higher worm burdens than those in Langali in May ($p = 0.004$) and July ($p = 0.014$). It was further observed that from September to January there were no significant differences in worm egg counts between animals sampled in the three villages. However, during March 2003 animals in Msingisi had significantly higher egg counts than those in Mandamazingara ($p = 0.01$).

Table 1: The number of goats /sheep observed to have haemoparasites after examination of Giemsa stained thick and thin blood smears

	Parasite	March 2002	July 2002	Sept 2002	Nov 2002	March 2003
Mandamazingira	*Trypanosoma*	9	0	1	2	4
	Babesia	9	0	0	0	0
	Anaplasma	9	0	2	0	1
	Theileria	4	1	0	1	0
Msingisi	*Trypanosoma*	0	0	0	0	0
	Babesia	0	0	0	0	0
	Anaplasma	4	0	2	0	1
	Theileria	5	4	2	0	8
Langali	*Trypanosoma*	0	0	0	0	0
	Babesia	0	0	0	0	0
	Anaplasma	3	0	1	0	0

Theileria	3	2	0	0	3
Total	**46**	**7**	**8**	**3**	**17**

Identification of larvae in cultured faeces

The results of faecal culture for larval identification are shown in Figure 4. *Haemonchus* was the most predominant worm larvae in all the three villages, which constituted about half of the larvae that were identified, followed by *Trichostrongylus* species, which constituted about a quarter of the larvae that were identified. *Oesophagostomum* species contributed to about one fifth of all the larvae. It was noted that the prevalence of worms as indicated by larval culture did not change between March 2002 and March 2003.

Blood parasites

The number of haemoparasitic cases detected during the study period is show in Table 1. *Trypanosoma congolense, Trypanosoma vivax, Babesia ovis, Anaplasma marginale* and *Theileria ovis* were detected. High parasite counts were recorded in March and the lowest counts were observed in November.

Bacterial isolation

Attempts to isolate *Pasteurella* or *Mycoplasma* species by using standard bacteriological media were not successful.

Serological studies

Serum from goats was analysed for antibodies to *Mycoplasma* species by using Latex agglutination test. Fifty three percent of the goats tested in Msingisi reacted positive for antibodies against *Mycoplasma capricolum* subspecies *capripneumoniae*, which causes CCPP. The results for both RVF and BT indicate a low prevalence of these diseases in the three villages. For example, antibodies against RVF were detected in only 10 of 224 samples (4.4%), which were mainly from Msingisi and Mandamazingara. Antibodies to RVF were not detected in the samples from Langali village. However, antibodies against BT were detected in all the three villages whereby only 12 samples (6%) reacted positive.

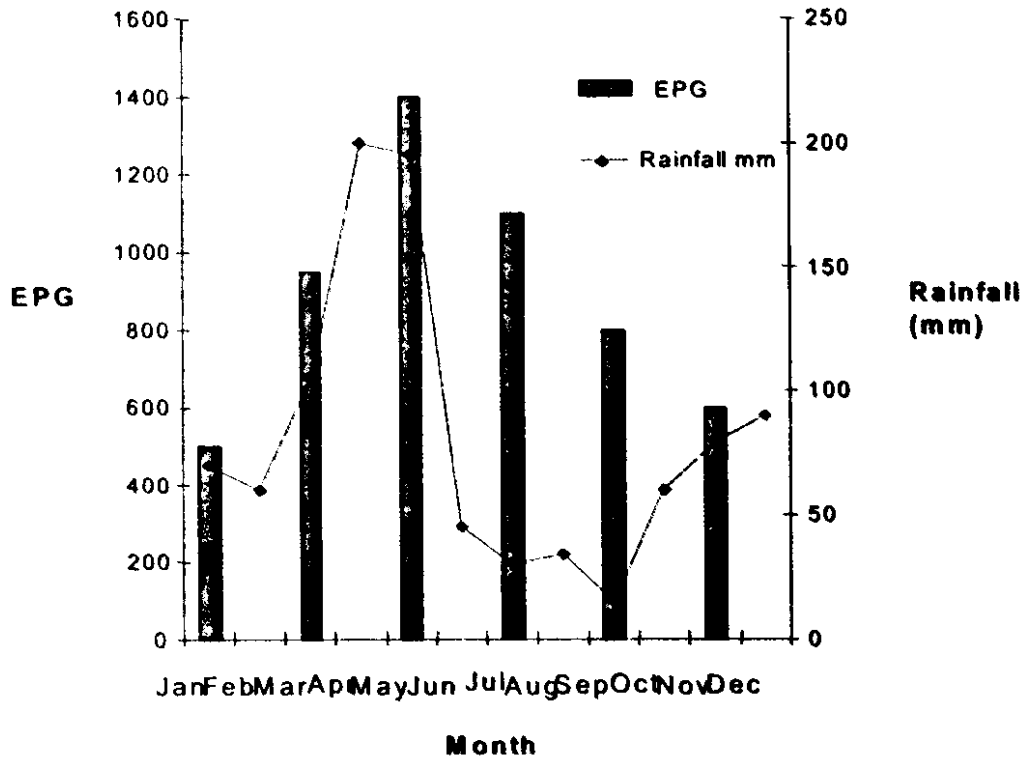

Figure 1. EPG of small ruminants and monthly rainfall in Mandamazingira

DISCUSSION

Results from this study show that helminthosis was the most common disease affecting small ruminants throughout the year. Similar results have been reported in other parts of Tanzania (Keyyu *et al.*, 2002). The clinical symptoms and mortality associated with trypanosomosis, anaplasmosis, heartwater and CCPP could be responsible for their high ranking by farmers. Likewise, the same diseases are known to cause death, which can be easily noted by farmers. The fact that *Haemonchus* species contributed to about half the larval counts could be a result of the high fecundity of the worm itself. However, the high prevalence of *Haemonchus* larvae indicates the potential threat to animal health given the fact that this worm feeds on blood and can actually cause death through anaemia. In addition, farmers could confuse anaemia caused by *Haemonchus* species for other diseases, which they considered prevalent. The helminth parasites were detected in the animals throughout the year but the highest egg counts were observed during May in Mandamazingara and Msingisi and in March at Langali. The persistence of high worm egg counts in Mandamazingara throughout the year could be due to the high humidity and temperature or lack of control programs. Farmers were advised to utilise animal dung as fertiliser to improve crop yields as well as reduce the build up of high numbers of infective larvae near

the homesteads where the dung is commonly stored .

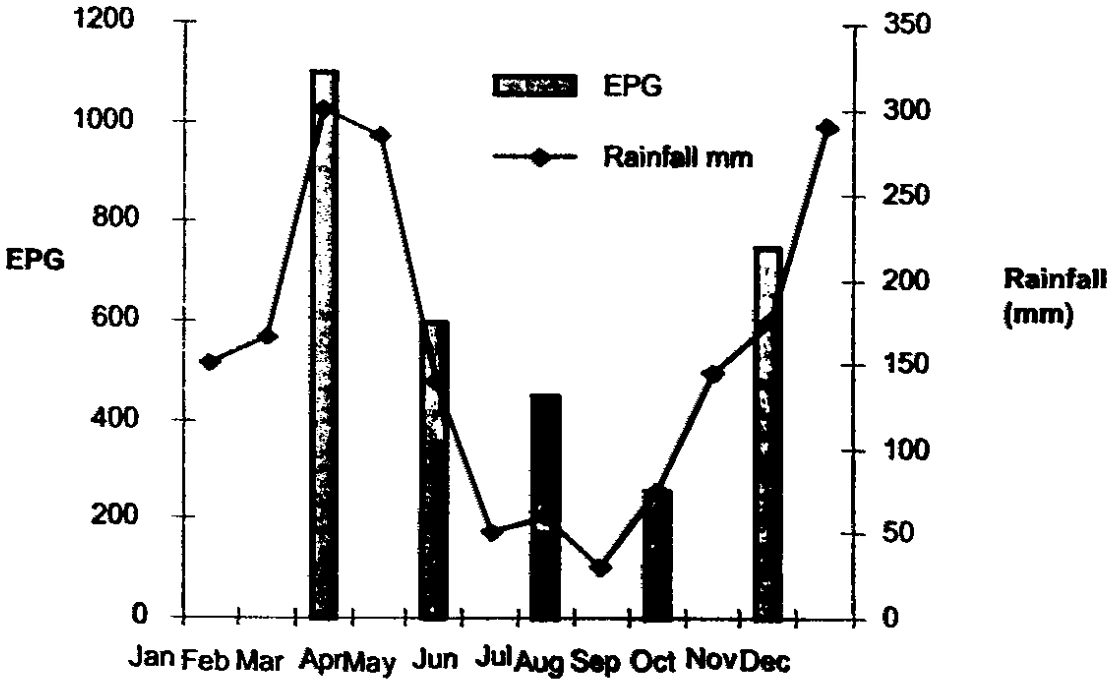

Figure 2. EPG and mean monthly rainfall in Langali for the year 2002

Most cases of trypanosomosis, babesiosis, anaplasmosis and theileriosis were detected in March. Trypanosomosis and babesiosis were only observed in hot humid areas of Mandamazingara but not in the highlands of Langali. On the other hand anaplasmosis was detected in all the three agro-ecological zones. There was a decline in the monthly number of cases of haemoparasitic diseases detected from 46 in March 2002 to 13 in March 2003. This could be a result of intervention measures that were introduced during this study.

The finding that 53% of the goats in Msingisi had antibodies to CCPP indicates a real problem facing farmers, which needed attention. It is understood that CCPP is a serious disease, which causes reduction in growth rate and high mortality in goats (Kusiluka *et al.*, 2001). The 53% of goats with antibodies form a potential source of infection for the remaining animals in the flock. In order to improve productivity, there was a need to design appropriate control strategy, which could ensure that the goats are free from this disease including the search for a reliable vaccine.

Although the results indicate low prevalence of RVF and BT they however, indicate the presence of natural exposure of animals to these viral infections. Both diseases are arthropod-borne i.e RVF is transmitted by *Aedes*

mosquito while BT is transmitted by *Culicoides* spp. In Eastern Africa, epidemics of these diseases occur in 5-20 year cycles following prolonged heavy rains. A surveillance program for these diseases would assist in early warning to the communities when potential outbreaks are anticipated. Early warning is particularly important in the case of RVF, which is zoonotic.

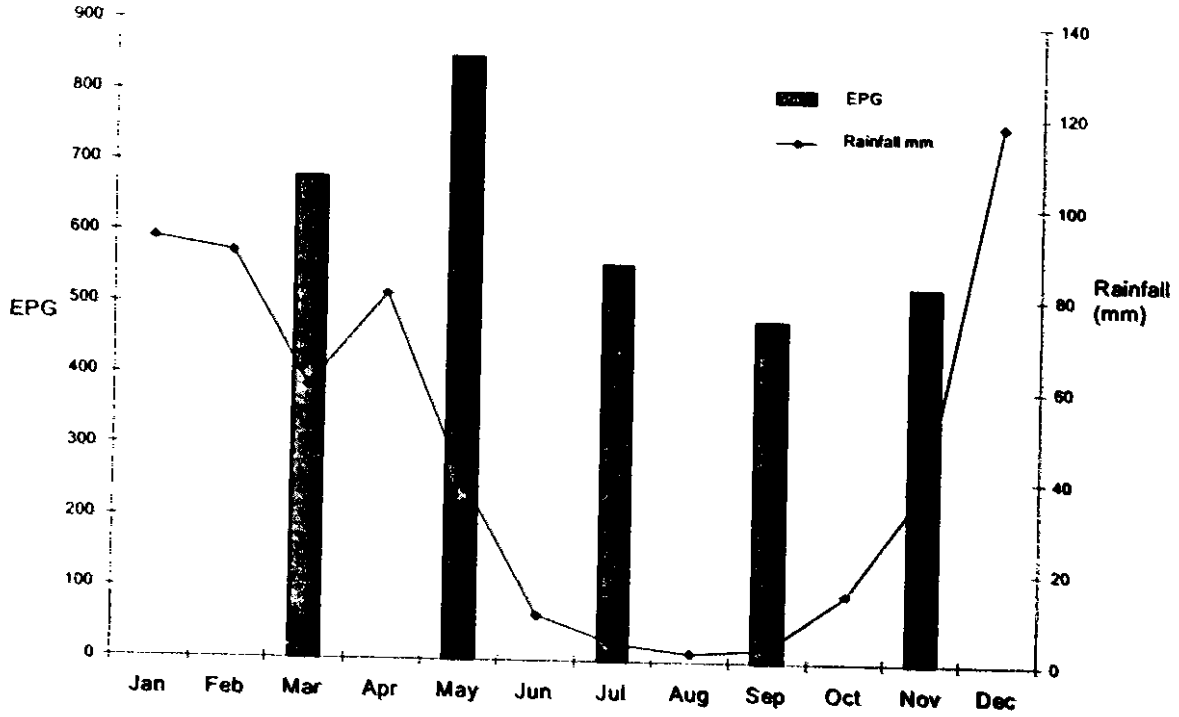

Figure 3. EPG and mean monthly rainfall in Msingisi for the year

The control measures for the diseases mentioned above were availed to the farmers through training and advice during farm visits. Farmers were advised to consult the veterinary extension staff in case the animals became sick. Likewise farmers were advised to sell some healthy animals in order to pay for costs of treating the sick animals.

In conclusion, this study has shown that helminthosis was the most prevalent health problem in small ruminants in the study villages. It is recommended that the animals should be grazed away from the homesteads in order to avoid picking large numbers of infective larvae from dung stored near the homesteads. Further studies are required to determine appropriate control strategies. And therefore small ruminants should be de-wormed at the beginning of the rainy season and also at the beginning of the dry season. CCPP was a problem in the semi-arid village of Msingisi for which a vaccine was desirable. Trypanosomosis was prevalent in

the hot humid village of Mandamazingira and measures should be taken to control the vector tsetse flies

ACKNOWLEDGEMENTS

We thank Messers K. Lekaki, L. Msalilwa, M. Mugusi, and J. Fitwangile for their excellent technical assistance. This work was supported by a grant from the Norwegian Agency for Development Cooperation (NORAD) through the SUA –TARPII project.

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