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Epidemiology of Helminths in Cattle of Kirinyaga County, Kenya

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Abstract : *The gastrointestinal tract (GIT) of animals harbor a variety of parasites particularly helminths, which causes clinical and sub-clinical parasitism. These parasites adversely affect the health status of animals and cause enormous economic losses to the livestock industry. The aim of this study was to determine the prevalence of helminths in cattle of Kirinyaga County. Epidemiological data was collected using a questionnaire survey administered to 244 respondents while rectal faecal samples from 261 cattle were collected within a period of four months to determine helminths egg counts. Sampling of herbage was carried out from 6 communal grazing sites for analysis of infective nematode larvae levels in the pasture. The cattle were weighed and blood collected by jugular venipuncture to determine the Total Protein (TP). The prevalence of GIN in the study area were species of Haemonchus (59%), Trichostrongylus (26%), Nematodirus (5%) and Oesophagostomum (10%). The most prevalent infective nematode larvae species in herbage was Haemonchus (55%) followed by species of Trichostrongylus (23.8%) and Oesophagostomum (13.4%). Trematodes species of Fasciola, Shistosoma and Paramphistomum were seen to be common in zebu cattle with Schistosoma showing the highest prevalence of 19%. The Total Protein (TP) on 60% of the sampled cattle were within the normal range of between 6 and 8%. However, 5% of the animals had low level of TP. The study shows the epidemiological profile of cattle helminth infections and the results form the basis for recommending the control strategies of helminths in this area.*

Keywords: *Gastrointestinal, helminths, cattle, Kirinyaga, nematodes, prevalence*

I. Introduction

The Kenyan economy is mainly dependent on agriculture as 75% of its population depends on agriculture for food and income. It contributes 26% to the Gross Domestic Product (GDP) and 60% to foreign exchange earnings. However, only about one third of the total land area of Kenya is agriculturally productive, including the Kenyan highlands, coastal plains and the lake region. The other two thirds of the land area is semi-arid to arid, and characterized by low, unreliable and poorly distributed rainfall. These areas are used for pastoral farming [1]. Quite a number of gastro-intestinal parasites have been associated with cattle leading to poor animal health status causing huge losses in this industry [2, 3]. According [4], these parasites that are found in the gastro-intestinal tract of the cattle lead to low production of milk in cattle. For these parasites to cause harm, they have to be in conducive climates for them to multiply. The nutritional deficiency, grazing habits, immunological status, pasture management, presence of intermediate host and vector and the number of infective larvae and eggs in the environment act as predisposing factors [5]. According to [6], loss in body weight, poor reproductive performance, digestive disturbance, and emaciation for longer period result from the gastro-intestinal parasites. They can also lead to anaemia due to the production of toxins. It is important to control internal parasites through better management as in developed countries, and knowledge on prevalence of these parasites is mandatory. This study focused on determining the prevalence of gastro-intestinal parasites in Kirinyaga County, Kenya.

II. Materials And Methods

2.1 Description of study area

The study was conducted in Kirinyaga County, Central Kenya that covers approximately 1,478 Km^2, which is 11.2 percent of old Central Province. It has an estimated population of 455,000 people and a population density of 309 persons per square kilometer. The County is located between latitude 0^o and 0^o40^o south and longitude 37^o and 38^o east. The county consists of 21 locations and 80 sub locations. The sub locations comprises of a number of small holder farms totaling to 114,439 households. The original Kirinyaga County will be referred to in this study as the new counties have not been documented. The county lies between 1,480 m above sea level in the south to over 6,800m above sea level at the mountain peak. Mt. Kenya, which is volcanic mountain and lies to the northern side of the county.

2.2 Collection and analysis of fecal samples

Rectal faecal samples from 261 cattle were collected within a period of four months to determine helminths egg counts. The samples were clearly labeled and placed in a plastic containers. The samples were transported in a cool box to the Parasitology laboratory in the department of Veterinary Pathology, Microbiology and Parasitology Faculty of Veterinary Medicine, University of Nairobi, for parasitological analysis. The faecal analysis for the presence of nematode and trematode eggs was undertaken using McMaster method [7]. The count was expresed as egg per gram of feaces (EPG) and classified as between 0-200 (light), 200-800 (moderate) and 800+ (heavy) as described by [7].

The fecal samples which were positive for strongyle eggs were pooled and cultured to identify the infective larvae. The L_3 were identified to generic level as described by [8,].

2.3 Isolation of infective larvae from herbage

Herbage samples were collected from pastures on six sites randomly identified from each of regions using the W-transect procedure [7]. Isolation and identification of infective larvae from herbage was done using [8]. The infective larvae harvested were differentiated and expressed as number of infective larvae per kilogram of dry herbage (L_3/kg DH) as described by [7] .

2.4 Collection and analysis of blood samples

Ten mL of blood was collected from the animals by jugular venipuncture into heparinized vacutainer. Labeling of tubes was carried out and verified to correspond to the animal details. After collection the blood sample was stored in a cool box and transported to the laboratory. Blood samples were processed Total Protein analysis as previously described by [9].

2.5 Data and statistical analysis

SPSS version 16 was used for ANOVA, Chi-Square test, cross tabulations and descriptive statistics was used to analyze the various helminths present in the study area.

III. Results

3.1 Prevalence of gastrointestinal nematodes

The GIN eggs found in the sampled animals were *Haemonchus Spp*, *Trichostrongylus Spp*, *Oesophagostomum Spp* and Nematodirus spp,. The mean EPG recorded was 88.8 (range = 0-1,800) as shown in Table 1. The intensity of infection of GIN was mainly low (89.6%), with only 2.3% being heavy (Table 1).

Table 1: Prevalence of gastrointestinal nematode eggs in Kirinyaga county

EPG	Percentage	Intensity of infection
0 – 200	89.6	Light
200 – 800	8.1	Moderate
800 +	2.3	Heavy

The strogyle worms were analysed in cattle sampled and 57.9% calves were infected while 26.5% of adults harboured the parasite worm(Table 2). The difference was satistically significant ($P<0.05$).

Table 2: Percentage of strogyle worm infection in calves and adult cattle in Kirinyaga County

Worm	Age	% of positive animals	No. of animals Examined	No. of animals Positive	Chi square	P value
Strogyles	Calves	57.9	38	22	0.000	0.000
	Adults	26.5	223	59		

The results of nematodirus infection in calves and adult cattle in Kirinyaga County are presented in table 3.

Table 3: Percentage of *Nematodirus* infection in calves and adult cattle in Kirinyaga County showing the level of significance

Worm	Age	% of positive animals	No. of animals Examined	No. of animals Positive	Chi square	P value
Nematodirus	Calves	5.3	38	2	0.187	0.170
	Adults	1.8	223	4		

3.2 Prevalence of trematodes

The trematodes found in the study area comprised of species of *Fasciola, Schistosoma* and *Paramphistomum.* The zebu breed of cattle had the highest prevalence of the three species of trematodes with *schistosoma* being the highest at 19% as shown in Figure 1.

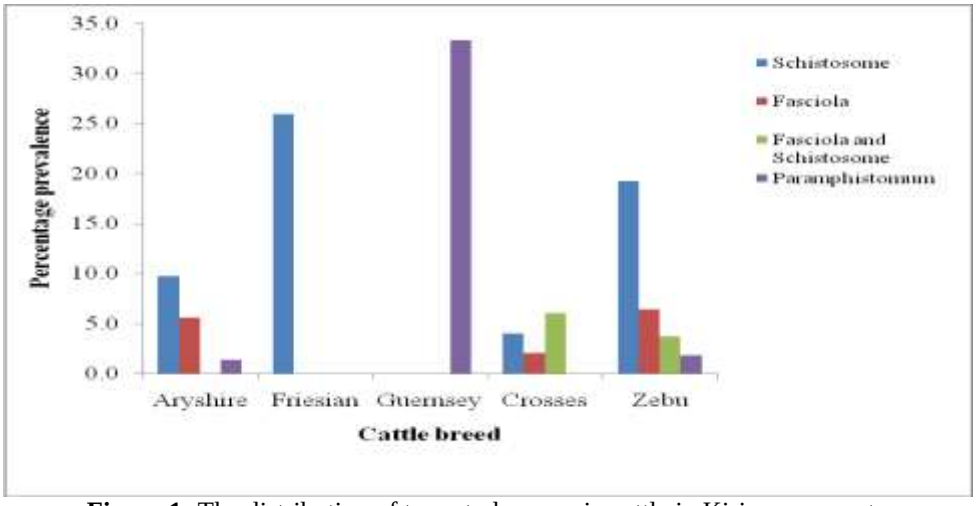

Figure 1: The distribution of trematodes eggs in cattle in Kirinyaga county

Paramphistomum species was highest in the Guernsey and *schistosoma* was more prevalent in the Friesian breed at 33% and 26% respectively). The crosses had a multiple infection of the *schistosoma* and *Fasciola* but no *Paramphistomum.*

3.3 Gastrointestinal nematode larvae identified after coproculture

Following coproculture of samples with strongyles eggs the identified species of nematodes were *Haemonchus*(59%), *Trichostrongylus*(26%) *Oesophagostomum*(10%), *Nematodirus*(5%).

Larvae recovered from Pasture

Overall, the majority of the infective larvae recovered from herbage were species of *Haemonchus*(55%) followed by *Trichostrongylus*(23.8%) and *Oesophagostomum*(13.4%).

3.4 Analysis of Total Protein (TP)

It was noted that in 60% of the sampled cattle the Total Protein (TP) were within the normal range of between 6 and 8%. However, 5 % of the animals had low level of TP.

IV. Discussion

This study was able to demonstrate that most prevalent intestinal parasites were of the Genera *Haemonchus*, followed by *Trichostrongylus*, *Oesophagostomum* and *Nematodirus*. The considerably high prevalence of *Haemonchus* in Kirinyaga county was consistent with the report presented by [10], in a study conducted in central highlands of Kenya, where *Haemonchus placei* was recorded to be the most prevalent and pathogenic nematode species of cattle. Earlier studies in Kenya [10, 11] have reported similar findings and were consistent with the current study. Among other gastrointestinal nematodes, *Haemonchus* was also reported to be leading in prevalence in a natural helminth infection [12]. However, there are other reports whose findings differ with what is reported in this study. For instance in India, [13] indicated that the predominant nematode species were *Strongyloides spp, Trichostrongylus spp* and *Haemonchus spp* in that order.

Another study reports that *Haemonchus spp* is not a major problem in adult cattle but it is a significant problem especially in young cattle [14]. However, on a global basis, *Haemonchus spp* is by far the most important parasite of small ruminants [15]. Although *Haemonchus spp* was prevalent and predorminant, there were other nematodes and protozoa infecting cattle in the study area, and they were *Trichostrongylus spp* and *Oesophagostomum spp* . The prevalence of these nematode was in agreement with the studies done in other parts of Kenya [10]. *Nematodirus* was also recorded to be among the nematodes appearing at low levels. Others have also reported low levels of *Nematodirus* infection, with as low as 0.9% prevalence rate [16]. The results reported here were higher than the ones reported in Ethiopia by [16]. However, in a survey carried out in the Kenyan highlands, [10] reported that *Nematodirus* accounted for 19.6% of the total nematodes identified in that survey. Their report was markedly different from what is reported in this study. The difference in various studies could be due to the study design and duration of experimentation [10]. The presence of *Nematodirus* was an

important finding because the farmers may not have been aware that there are other nematodes which need to be controlled and hence the need to include it in their control program.

Based on the feacal examination of samples from cattle, there was presence of *Fasciola, Schistosoma*, a coinfection of *Fasciola* and *Schistosoma* and *Paramphistosome.* On further analysis of the trematodes and their breed prevalence, it was noted that the Gurnseys had more *Paramhistomum* infection , while, the Friesian were harbouring more of the *Schistosomes. Fasciola* menace is not only a problem in developing countries like Kenya, it has also been reported in other countries. For instance, the number of outbreaks of disease caused by the liver fluke *Fasciola hepatica* in cattle and sheep in Great Britain has been reported to increase dramatically in recent years, particularly in 1999 and 2000 [17].

V. Conclusion

The epidemiological survey of infections with helminths in cattle showed that the main species encountered at faecal egg counts and larval counts were species of *Haemonchus, Trichostrongylus, Oesophagostomum* and *Nematodirus. Fasciola* and *Paramphistomum* were also present in the study area, but in low levels. There also was mixed infections of Fasciola and Schistosoma. There is need to make the farmers aware that *Nematodirus, Fasciola* and *Schistosome* are also a threat and when they deworm, some of the dewormers may not be effective against all parasites noted. It is highly recommended to consider the introduction of helminth control programmes in the study area.

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References

[1] Orodho, A., B., Country Pasture/Forage Resource Profiles, KARI report, 1997.
[2] Waller, P. J., Nematode parasite control of livestock in the tropics/subtropics: the need for novel approaches, *.International Journal for Parasitology*, 27, 1997, 1193-1201.
[3] Waller, P. J., (1999). International approaches to the concept of integrated control of nematode parasites of livestock. *International Journal for Parasitology* 29:155-164 .
[4] Kanyari, P.W. N., Kagira, J. M. and Mhoma, J. R. L., Prevalence of endoparasites in cattle within urban and peri-urban areas of Lake Victoria Basin, Kenya with special reference to zoonotic potential, *Sci Parasitol ,11*, 2010, 171-178.
[5] Blood D. C. and Radostits O.M., Veterinary Medicine, A text book of the diseases of cattle, sheep, pigs and horses, Braillere Tindale, London Philadelphia, 1990, Pp. 1016-1060.
[6] Keyyu, J. D., Monrad, J., Kyvsgaard, N. C. and Kassuku, A., AEpidemiology of *Fasciola gigantica* and Amphistomes in cattle on traditional, small-scale dairy and large-scale dairy farms in the Southern Highlands of Tanzania, *Tropical Animal Health and Production, 37*, 2005,303-314.
[7] Hansen, J. and Perry, B., The Epidemilogy, Diagnosis and Control of Helminth Parasites of Ruminants. A handbook: International Livestock Centre for Africa, Nairobi. Kenya, 1994.
[8] MAFF., Ministry of Agriculture, Fisheries and Food. Manual of Parasitological Laboratory Techniques. Reference Book Number 418, 3rd Edition HMSO, London, *Technical Bulletin, 18*, 1986,131.
[9] Fedde M. and Wood S., Rheological characteristics of horse blood: significance during exercise, *Respir Physiol, 94*, 1993, 323–335.
[10] Waruiru, R. M., Thamsborg, S.M., Nansen, P., Kyvsgaard, N.C., Bogh, H. O., Munyua, W.K. and Gathuma, J. M., The Epidemiology of Gastrointestinal Nematodes of Dairy Cattle in Central Kenya, *Tropical Animal Health and Production*, *33*, 2001, 173-187.
[11] Mango, A.M., Mango, C.K.A., Esamal, D. and Kariuki, D., Prevalence of selected common parasitic helminths of livestock in Kenya, *Veterinary Record, 94*, 1974, 432-435.
[12] Amin, M. R., Mostofa, M., Hoque, M. E. and Sayed, M. A., *In vitro* anthelmintic efficacy of some indigenous medicinal plants against gastrointestinal nematodes of cattle *J. Bangladesh Agril. Univ*, *7*, 2009, 57–61.
[13] Jithendran, K,P., Helminthe Parasites- A constraint in animal management in Himachal Pradesh, Himlayan Ecology, ENVIS Bulletin, 8 (2), 2000.
[14] Winks, R., Bremner, K.C. and Barger, I.A., Epidemiology and control of parasitic gastroenteritis of cattle in the tropical/subtropical zone. In: N. Anderson and P.J. Waller (eds), The Epidemiology and Control of Gastrointestinal Parasites of Cattle in Australia, (CSIRO, Melbourne),1983, 65-72.
[15] Waller, P., J and Chandrawathani, P., *Haemonchus contortus:* Parasite problem No. 1 from Tropics- Polar Circle, Problems and prospects for control based on epidemiology, *Tropical Biomedicine, 22(2)*, 2005, 131–137.
[16] Degefu H., Abera C., Moti Y and Tadele T., Gastrointestinal Helminth Infections in Small-scale dairy cattle farms of Jimma town, Ethiopia, *Ethiop. J. Appl. Sci. Technol*, **2**(1), 2011.
[17] Mitchell, G., Update on fasciolosis in cattle and sheep, in Practice, *British Veterinary Association*, *24*, 2002, 378-385.