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Prevalence of gastrointestinal parasitism of cattle in Gedebano Gutazer Wolene district, Ethiopia

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This study was carried out to determine the prevalence and monthly distribution of helminth parasites of cattle in Gedebano Gutazer Wolene district, Southern Ethiopia, from November 2008 to May 2009. A total of 406 faecal samples were collected and subjected to qualitative and quantitative coprologic parasitological examination. From the cattle examined an overall prevalence of 39.6% (n=161) was recorded. The study revealed an overall prevalence of 37.9% Strongyle, 22.4% *Toxocara* species, 16.1% *Fasciola* species, 13.7% *Trichuris* species and 9.9% *Paramphistomum* species, Strongyle and *Toxocara* species were the most prevalent parasites encountered in the study area. Statistically significant difference (P < 0.05) in the prevalence of helminthosis between season and different age groups of cattle was noted. The prevalence of helminth parasites during wet season was significantly higher (P < 0.05) than the dry season. Out of 61 Strongyle egg type positive cattle, 14 (22.95%) were massively, 29 (47.55%) moderately and 18 (29.50%) were lightly affected. Intensity of Strongyle infection in terms of egg per gram (EPG) showed no variations when different age group and sex are compared. The current study indicated that season and age of animals are important factors associated with helminth parasites of cattle of the study area. The study identified high prevalence of parasitism demanded due attention to enhance the productivity of cattle. Therefore, strategic control approach by using effective broad spectrum anthelmintics at the beginning of rainy season is recommended and awareness creation to the farmers should be instituted in the study area.

Key words: Ethiopia, cattle, gastrointestinal parasitism, prevalence.

INTRODUCTION

Ethiopian economy is predominantly based on agriculture which is considered as a primary factor in securing food self-sufficiency, generating employment and income for the poor (Coppock, 1994). Livestock sub sector plays a vital role which contributes 33% of agricultural GDP and 19% to the export earnings. In addition, crop production is almost exclusively dependant on livestock especially draft power of cattle. Cattle production, among the sector of livestock production systems, is a critical issue in Ethiopia. In spite of all this, full exploitation of cattle potential is mainly constrained and impeded at a great extent by parasitic diseases (Sintayehu, 1999; Ayele et al., 2003; Zegeye, 2003).

Infectious diseases especially gastrointestinal parasites and exo-parasites are considered as the major diseases of cattle in the district. Helminth parasite infections in cattle are of the major importance in many agro-ecological zones and are a primary factor in the reduction of productivity. This is further aggravated in small holder farmers due to the limited availability of land and feed resources. Year round utilization of communal grazing and watering places shared livestock kept by smallholder are a major source of infection. The prevention and control of helminth parasites is not based on disease epidemiology rather is targeted at sick individual (Alekaw, 2000). According to previous study reports, the

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prevalence of helminth parasites in cattle of many African countries including Ethiopia is found to be high. For instance, Etsehiwot (2004) and Fikru et al. (2006) reported 82.2 and 50.2% in Central Ethiopia and Western Oromia, respectively. In Tanzania, Keyyu et al. (2006) obtained prevalence of 44.4 and 37% for large and small scale dairy cattle, respectively. Similarly, Charlotte and Madsen (1998) reported that gastrointestinal parasites are among the constraints in dairy farms of Zimbabwe.

Though many constraints due to parasitic infections in cattle have been out faced, no any previous study prevalence was conducted and there is scarce information in the district. Therefore, the availability of recent information on helminth parasites of cattle in the district has paramount importance to design appropriate strategies for prevention and control of helminth parasite diseases of cattle in the area. In other words, there seems to be an urgent demand to assess the extent and magnitude of gastrointestinal helminth parasites of cattle in Gedebano Gutazer Wolene district, Southern Ethiopia. Therefore, the objectives of this study were to determine the major helminth parasites and assess seasonal occurrence and distribution of helminth parasites of cattle in the study area.

MATERIALS AND METHODS

Study area

The study was conducted in Gedebano Gutazer Wolene district located in Gurage zone at about 120 km from Addis Ababa. The district has a total area of 54,000 ha, and the altitude ranges from 1800 to 3500 m above sea level. The annual rain fall ranges from 780 to 1200 mm and temperature varies between 7 and 25°C. The wet season is from March to August and dry season ranges from September to February. The total livestock population of the district is 56,369 cattle, 39,058 sheep, 12,124 goats and 16,794 equine that are kept in mixed type of agriculture. The study was carried out between November 2008 and May 2009 in four peasant associations, namely Tilamo, Deneb, Enge and Jimma which were accessible for vehicles.

Study design

For this study, indigenous breed (zebu) of all age and sex were selected on the study animals. Simple random sampling method was used to select each study animal. The sample size was determined based on the expected prevalence of 50% and absolute desired precision of 5% at confidence level of 95% according to the methods provided by Thrusfield (2005).

Sample collection

Study animals were categorized into three age groups (<1 year: calf, 1 to 3 years: young and >3 years: adult). A total of 58 cattle were sampled monthly. Fecal samples were collected per rectum using plastic gloves in a sterile bottle. All the specimens were clearly identified, labeled, kept in an ice box and were submitted to the Wolkite veterinary clinic laboratory and stored at 4°C until it was processed.

Sample storage and processing

Specimens were stored in refrigerator at 4°C for some delayed samples. Nematode eggs were identified by floatation technique in saturated NaCl solution and Trematodes were examined by sedimentation methods. *Fasciola* species and *Paramphistomum* species eggs were distinguish by their morphological and colour differences. Strongyle positive fecal samples were subjected to modified McMaster egg counting technique and the degree of infection was identified based on Soulsby (1982), Urquhart et al. (1996) and Maff (1997). The animals were then categorized as lightly, moderately and severely (massively) infected according to their egg per gram (EPG) of faces counts. Egg counts between 100 and 250, >250 and 500, and more than 500 EPG of feces were considered as light, moderate and massive infection, respectively (Soulsby, 1982; Urquhart et al., 1996; Maff, 1997).

Data analysis

Data was entered into Ms Excel sheet 2003 and descriptive statistics was used to determine the prevalence, while Chi-square analysis was employed to test the presence of variation between age, sex, season and peasant association of the district involved in the study. Confidence level was held at 95% and $P < 0.05$ was set for significance. All statistical analysis was performed using Statistical Package for Social Sciences (SPSS) software package version 15.0.

RESULTS

Out of the total 406 cattle examined, 161 (39.6%) were found to be harboring one or more gastrointestinal parasite eggs in their feces. The prevalence of different type of parasites in cattle recorded were 61 (37.9%) Strongyle type eggs, 36 (22.4%) *Toxocara* species, 26 (16.1%) *Fasciola* spp., 22 (13.7%) *Trichuris* species and 16 (9.9%) *Paramphistomum* spp. Different prevalence of gastrointestinal parasites were found for different months with mixed infection: 21 (36.2%) November, 20 (35.1%) December, 17 (29.3%) January, 12 (20.7%) February, 38 (65.5%) March, 29 (50.0%) April and 24 (41.4%) May. Strongyle type eggs were identified as the predominant in almost all months of the study period with the exception of November in which *Fasciola* spp. was higher. *Toxocara* spp. was noted as the second most prevalent helminth parasite encountered in this study (Table 1).

The relative prevalence of helminth parasites in different sex and age groups of cattle is shown in Table 2. The prevalence of helminth parasites in young animals of less than one year age was significantly different ($P < 0.05$) from infections recorded in adult animals of greater than three years age. In wet season infection rate 48 (68.5%) was higher as compared to dry season 113 (33.6%). There was no statistical significance difference prevalence value ($P > 0.05$) detected between sex in a proportions of 40.7 and 39.1% for male and female animals, respectively (Table 2). Among the different peasant associations (PAs), the highest gastrointestinal parasite prevalence of 57 (45.7%) was found to be in Tilamo, whereas the lowest prevalence of 30 (34.5%)

Table 1. Monthly prevalence of gastrointestinal helminthosis and parasite types of cattle in Gedebano Gutazer Wolene district, 2009.

Month	Cattle examined	Types of parasite detected					No. positive	Prevalence (%)
		Strongyle	*Toxocara* spp.	*Fasciola* spp.	*Trichuris* spp.	*Paramphistomum* spp.		
November	58	6	5	8	1	1	21	36.2
December	58	5	5	1	6	3	20	35.1
January	58	4	5	3	3	2	17	29.3
February	58	4	3	0	3	2	12	20.7
March	58	20	6	5	4	3	38	65.5
April	58	12	7	6	2	2	29	50.0
May	58	10	5	3	3	3	24	41.4
Total (%)	406	61 (37.9)	36 (22.4)	26 (16.1)	22 (13.7)	16 (9.9)	161	39.6

Table 2. The prevalence of helminth parasites of cattle in different age group, sex and season, 2009.

Parameter observed	No. of cattle examined	Parasite detected					Total	Prevalence (%)	χ^2	P-value
		Strongyle	*Toxocara* spp.	*Fasciola* spp.	*Trichuris* spp.	*Paramphistomum* spp.				
Age										
< 1 year	108	30	18	3	6	3	60	55.5		
1-3 year	152	26	15	9	10	3	63	41.4	59.32	0.000
> 3 year	146	5	3	14	6	10	38	26.0		
Total	406	61	36	26	22	16	161	39.6		
Season										
Dry season	336	36	26	21	17	13	113	33.6		
Wet season	70	25	10	5	5	3	48	68.5	39.18	0.000
Total	406	61	36	26	22	16	161	39.6		
Sex										
Male	140	13	15	12	8	9	57	40.7		
Female	266	48	21	14	14	7	104	39.1	10.50	0.062
Total	406	61	36	26	22	16	161	39.6		

was revealed from Enge with a significance difference ($P < 0.05$) (Table 3). The degree of Strongyle infection was determined from the total fecal egg count. From a total of 61 Strongyle positive fecal samples subjected to EPG count, 29.50% (EPG < 250) were lightly, 47.55% (EPG > 250 to 500) were moderately affected and 22.95% (EPG > 500) showed massive intensity of infection (Table 4).

DISCUSSION

The result of the current study demonstrates that helminth infections were highly prevalent in cattle of the study area. The higher prevalence of gastrointestinal poly parasites of this present study (39.6%) could be due to the fact that cattle could have frequent exposure to the same communal grazing land that causes contamination of pasture. The findings of this study agree with the results of other researchers who have

Table 3. Prevalence of gastrointestinal parasites of cattle by peasant association (PA's), 2009.

PAs*	Cattle examined	No. Positive	Types of parasite detected					Total	Prevalence	χ^2	P-value
			Strongyle	*Toxocara* spp.	*Fasciola* spp.	*Trichuris* spp.	*Paramphistomum* spp.				
Tilamo	124	57	22	12	9	9	5	57	46.0		
Enge	87	30	10	6	2	7	5	30	34.5		
Deneb	83	35	12	10	7	6	0	35	42.2	450.97	0.000
Jimma	112	39	17	8	8	0	6	39	34.8		
Total	406	161	61	36	26	22	16	161	39.6		

reported a prevalence rate of 41.2% (Epherem, 2007) and 26.3% (Darsema, 2009) in Western Amhara region, Ethiopia. In addition, Keyyu et al. (2006) reported an overall prevalence of 44.4 and 37.0% for large and small scale dairy cattle, respectively in Tanzania. In contrast, a very high prevalence rate of 82.8% was reported by Etsehiwott (2004) in Holeta which could probably be due to the most favourable environmental condition for the development of larvae. Strongyles were the predominant (37.9%) helminthes followed by *Toxocara* (22.4%) and *Fasciola* (16.1%). The high level of multiple infections could be due to the inefficient methods of control including low attention given to the sub clinical forms, coupled with the prevailing chronic nutritional stress and suitability of the climate for survival and proliferation of the parasites (Biffa et al., 2007).

A significant variation was observed between different age groups in which young animals were higher number of eggs than adults particularly for Strongyle and *Toxocara*. This might be due to a limited previous exposure and immaturity of the immune system that resulted in higher development of the parasite. There are previous reports that concur with this result (Kloosterman et al., 1991; Ploeger et al., 1994; Nganga et al., 2004; Nigatu, 2008), whereas a higher proportion of *Fasciola* and *Paramphistomum* were obtained in adults than young ones in this study. The lower number of calves infected with *Fasciola* and *Paramphistomum* could probably be due to the opportunity of exposure to the intermediate hosts (Vassilev, 1994, 1999; Pfukenyi et al., 2005). It may also be due to the management system, whereby calves grazed around farms, whereas adults trekked long distances to valleys, flood plains or swampy areas during the dry season, so exposing adults to contaminated pastures. This higher proportion of flukes in adults than young animals confirms earlier observations of other workers (Maingi et al., 1993; Mbae et al., 2004; Pfukenyi et al., 2005).

The present study revealed that sex of the studied animal did not show significant association with the prevalence of the parasite burden. This is more probably due to an equal opportunity for infection when they are exposed to the parasites in the communal grazing pasture. The absence of association between sex and prevalence agrees with that of Nigatu (2008). However, the findings showed that females were more infected than their counterparts. Analysis of monthly parasite prevalence and levels of infestation confirmed that the wet season (March, April and May) when the rain begins presented more nematode parasite record than the dry season (November to February), whereas flukes were predominant at the end of rainy season which could be due to the more availability of the intermediate host. This result is in line with reports of Adrien et al. (2001).

The present study also compared and contrasted the status of gastrointestinal infestation of cattle against different PAs that a significant difference in prevalence rate was obtained. The prevalence value of parasite in Tilamo was higher than others. This is because of almost all small-scale farmers practiced a habit of keeping their animals for pasture grazing in groups for long period of time compared to the rest. This creates suitable environment for worm free animals in order to acquire high level of infective larvae from the infected pasture. Furthermore, according to Preston and Leng (1987) one would expect to find high worm burdens in cattle on overgrazed communal pastures.

Majority of infected animals (47.55%) had fecal egg count in the range of > 250 to 500 EPG and few proportions of animals (22.95%) had fecal egg count over 500. Statistically, no significant variation was observed in EPG among different age group and sex of animals though a higher EPG count was found in animals less than one year old. This is in line with the previous works done in Ethiopia (Fikru et al., 2006) and Kenya (Maichomo et al., 2004) that reported no association between

Table 4. Degree of infestation of Strongyle egg type positive animals among different age group and sex.

Season	No. of cattle examined	No. positive subjected to EPG	Degree of infection		
			Light	Moderate	Massive
< 1 year	108	30	10 (33.33%)	14 (46.67)	6 (20.00)
1-3 year	152	26	5 (19.23)	14 (53.85)	7 (26.92)
> 3 year	146	5	3 (60.00)	1 (20.00)	1 (20.00)
Total	406	61	18 (29.50)	29 (47.55)	14 (22.95)
Male	336	13	4 (30.77)	6 (46.15)	3 (23.08)
Female	70	48	14 (29.17)	23 (47.92)	11 (22.91)
Total	406	61	18 (29.50)	29 (47.55)	14 (22.95)

EPG degree and age group.

CONCLUSION AND RECOMMENDATIONS

This study revealed a high prevalence of gastrointestinal parasitism. The study identified Strongyle, *Toxocara*, *Trichuris*, *Fasciola* and *Paramphistomum*. Under favorable climate and environmental factors, the potential of larval development, availability of infective larvae on grazing lands and the risk of acquiring the infective larvae especially that of Strongyle could be high. The overall prevalence and the prevalence of the different types of parasites of cattle recorded in the current study are high enough to limit and constraint cattle production of the district. Hence, to reduce the negative impacts of helminthosis on cattle production of the area and minimize pasture contamination and infection of susceptible hosts, cattle should be treated with effective broad spectrum anthelmintics at the beginning of rainy season. In addition, young cattle should receive great attention as they are most susceptible categories to helmithosis.

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