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Research Article

A Study on Major Gastro-Intestinal Helminths Parasites of cattle in Tulo District, West Hararghe Zone, South-Eastern Ethiopia

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Abstract

A cross-sectional study was conducted in Tulo district, West Haraghe zone of Oromia Regional State from November 2008 to March 2009 to determine the prevalence of gastro-intestinal helminths parasites in cattle. A total of 657 randomly selected cattle were sampled and examined using standard coprological procedures. Qualitative fecal sample analysis indicated eight (8) species of GI helminths parasites were detected, of which the Strongyle species had higher prevalence 36.23% (95% CI=32.30-40.10 %). In the present study, an overall infection rate of 50.08% (95% CI=46.30-53.90 %) was recorded with one or more species of GI helminths parasites. The prevalence in different age groups was observed to be 42.61% (95% CI=36.20-49.0 %), 65.76% (95% CI=58.90-72.50 %) and 45.27% (95% CI=39.0-51.60 %) in the calf, young and adult age groups respectively with a significantly higher prevalence in the young stock than in the other age categories (P<0.05). The GI helminths infection was recorded to be 58.62% (95% CI=52.92-64.32 %) and 43.32% (95% CI=46.30-53.90 %) in male and female cattle respectively, showing statistically significant difference (P<0.05). McMaster egg counting technique of 307 animals indicated, 86 animals (28.01%) and 26 animals (8.47%) were found with moderate and severe infection level respectively, whilst greater proportion, 195 animals (63.52%) were found with low EPG value suggesting the infection was usually subclinical. The present study revealed that there is high prevalence of GI helminths parasite infection in cattle in Tulo district deserving strategic de-worming with broad-spectrum ant-helminthic.

Keywords: Cattle; Coprology; Gastro-intestinal; Helminths parasites; Prevalence; Tulo

Introduction

Ethiopia posse's about 53.99 million heads of cattle [1]. In spite of the large population of cattle, productivity in Ethiopia is low due to poor nutrition, reproduction insufficiency, management constraints and prevailing animal disease [2]. Gastrointestinal parasites are considered as the major diseases of cattle in the country. Helminths parasite infections in cattle are of the major importance in many agro-ecological zones and are a primary factor in the reduction of production and productivity of livestock. The losses caused by parasites can be distinguished in to direct and indirect losses. Direct losses include those due to acute illness and death and condemnation of organs and carcasses at meat inspection, whilst indirect losses include the diminution of productive potential such as decreased growth rate, weight loss in young growing animals and late maturity of slaughter stock [3].

Severe losses of production can occur in herds suffering from sub-clinical helminths infections even when animals appear to be healthy [4]. Hence, studies comprising the identification of helminths and their epidemiology are essential. The primary factors affecting the development and survival of the eggs and free-living larvae are temperature and moisture and different parasites vary in their ability to survive extremes of temperature and moisture. Thus, *Haemonchus* predominates in hot climate while *Trichostrongylus*, *Ostertagia* and *Oesophagostomum* species predominate in warm climates. There is a marked seasonal fluctuation in number and availability of infective stages on pasture. The causes for this conveniently grouped as factors affecting contamination of the environment and those controlling the survival, development, dissemination and availability of free-living stages and/or intermediate hosts [5].

Translation mainly depends on seasonal climatic changes and certain management practices. The level of environment contamination is influenced by factors including biotic potential of helminths, host immune status and hypobiosis [6]. The most important helminths parasites in cattle include nematodes (round worms), trematodes (flukes), and cestodes (tapeworms). These parasites are a worldwide problem for both small and large-scale farmers, but there is a greater instance in sub-Saharan Africa in general and Ethiopia in particular due to the availability of a wide range of agro-ecological factors suitable for diversified hosts and parasite species [7]. Little is known about the species, distributions and infection rate of GI helminths parasites in Tulo district. Therefore, the objective this study was to determine major gastro-intestinal helminths parasite infection and their distributions in cattle in Tulu district in West Hararghe zone, Eastern Ethiopia.

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Table 1: Species of gastro-intestinal helminths parasites detected in Tulo district.

Species of GI helminths parasites detected	No. of Animals Infected (N)	Prevalence (%)
Strongyle	238	36.23%
Strongyle + Strongyloide mixed	1	0.15%
Strongyloide	43	6.54%
Ascaris	1	0.15%
Trichuris	24	3.65%
Paramphistomum	14	2.13%
Fasciola	6	0.91%
Dicrocolium	1	0.15%
Monezia	1	0.15%
Total	329	50.08%

Materials and Methods

Description of the study area

The study was conducted from November 2008 to March 2009 to determine the prevalence of gastro-intestinal helminths parasite in cattle and their distribution in Tulo district, western Hararghe zone. Tulo district has 45,670 hectares of land area and located 370km southeast of Addis Ababa. The altitude of the district is 1750 meters above sea level with mean annual rainfall of 1850ml and mean annual temperature of 23°C. Haraghe region, including Tulo district has very little forest and woodlands amounting to less than 0.3% of the national total coverage. It has the largest area of grass covering 38% of the region. However, the largest part of the region (54%) consists of bush, shrub and Afro-alpine. The production system is mixed type in which extensive husbandry management of livestock have been practiced. There are 71232, 8969, 22822, 4092 and 98468 bovine, ovine, caprine, equine and poultry respectively, in this district in 2008.

Study population, sample size and sampling method

A study was conducted on 657 local cattle randomly selected from six (6) sites of mid-highland (Hirna town, Lubudekeb, Reketafura, Kirakufi, Odanagaya, Ifabas, and four (4) sites from highland area (Regasis, Garakufa, kufakas and Tarkanfata). A cross-sectional survey was carried out by employing a simple random sampling method to select the sample animals. The sample size was determined using the simple random sampling formula given by Thrusfield [8].

$$N= (1.96)^2 P_{exp} (1-P_{exp})/ d^2$$

Where, N = required sample size Pexp = Expected prevalence (50%), d = desired absolute precision (0.05). Accordingly, 384 samples were needed, even though, 657 cattle were sampled and examined.

Parasitological survey

Fecal samples were collected directly from the rectum of cattle with strict sanitation. Collected fecal samples were preserved in 10% formalin and subjected to qualitative and quantitative coprological examinations to investigate the major gastro-intestinal helminths parasites involved and to determine the prevalence of gastro-intestinal helminths parasites in the area. Flotation, sedimentation and Modified McMaster methods were used to identify and count parasitic helminths. Those fecal samples that were positive for nematodes were subjected to egg output (egg per gram; EPG) of egg count using McMaster egg counting technique, and degree of infestation was categorized based on MAFF [9]. Age of study animals was determined by dentition according to De Lahunta and Habel [10] as well as information from the owners. Levels of worm infection were extrapolated from infection severity index defined by Smith [11] where cattle are said to have low, moderate, and sever nematode infections if their fecal egg counts are 100-250, >250-500 and more than 500 respectively.

Data management and analysis

The data collected were entered in to Microsoft Excel Data base system. The entered data were analyzed using STATA version 10.0 statistical software program. The prevalence of gastrointestinal helminths parasites was calculated by dividing the proportion of cattle infected with one and/or more parasites species by the total number of cattle examined multiplied by 100. The association between the prevalence of GI parasite infection and associated risk factors were assessed by logistic regression. A statistically significant association between variables was said to exist if the calculated $P<0.05$ at 95% confidence level.

Results

A total of 657 cattle were sampled and examined for GI helminths parasites and 329 (50.08%, 95% CI = 46.30 - 53.90 %) were found to infected with one and/or more parasites. The present study indicated that a higher prevalence of strongly type of helminths parasite (36.23%) and other helminths parasites like cestodes and ascarids were found to be the least prevalent as summarized in Table 1.

The prevalence of GIT helminths infection in different age groups was detected to be 42.61 65.765 and 45.27% in calves, young and adults age groups respectively ($x^2= 25.4842$, P =0.00).

The prevalence of gastro-intestinal helminths infection in sex group was observed to be 58.62% (95% CI = 52.92-64.32 %) and 43.32% (95% CI = 46.30-53.90 %) in the male and female animals respectively ($x^2 = 15.16$, P= 0.00). The GI helminths infection rate in the two different agro-ecological zones studied was detected to be 54.92% (95% CI = 48.92-60.92 %) and 46.82% (95% CI = 41.92-51.72 %) in the mid-highland and highland areas in the given order. There is statistically significant difference between both zones ($x^2 = 4.15$, p=0.04). Three hundred seven (307) fecal samples that were positive for gastro-intestinal nematodes were subjected to McMaster egg counting technique. Accordingly, 86 animals (28.01%) were infected moderately and 26 animals (8.47%) showed a severe infection whilst greater proportion, 195 animals (63.52%) were found with low EPG value (Table 2).

Discussion

The overall prevalence of gastro-intestinal helminths parasite of 50.08% (95% CI=46.30-53.90 %) was recorded in this study. This result agrees with the result of previous works by Regasa et al. [12], Derib [13], Nwigwe et al. [14] were they reported prevalence of gastro-intestinal parasite of 50.2% from western Ethiopia, 50.0% from northwest Ethiopia and 50.8% from south eastern Nigeria, respectively. This result is also similar with that of Ntonifor et al. [15] in which they reported the prevalence of 56.7% GI parasites of cattle in western Cameroon. Bacha and Haftu [16] also reported of

Table 2: Gastro-intestinal helminths infection in different age groups.

Age groups	No of animals examined	Prevalence (%)	95% CI
Calf (<l year old)	230	98(42.61)	36.20-49.0%
Young (1-4year old)	184	121(65.76)	58.90-72.50%
Adult(>4year old)	243	110(45.27)	39.0-51.60%
Total	**657**	**329(50.08)**	**46.30-53.90%**

gastro-intestinal prevalence of 49.0% in cattle, west Arsi, Ethiopia; Keyyu et al. [17] reported a prevalence of 44.4% in large dairy cattle in Tanzania and Epherem [18] reported 41.2% in western Amhara region, Ethiopia.

The result of the present study is lower than the report by Etsehiwot [19] who reported a prevalence of GI parasites of 82.8% in Holleta, Ethiopia. The difference of prevalence in different study could be due to difference in management system, de-worming practices using broad-spectrum anthelmintics, topography, reason and climate that could favor the survival of parasitic stage and its intermediate hosts.

The present study showed that the prevalence of gastro-intestinal helminths parasites infection is greater in younger age groups (65.76%, 95% CI=58.90-72.50 %) than in other age groups. Moreover, the prevalence was observed to be 42.61% (95% CI=36.20-49.0 %) and 45.27% (95% CI=39.0-51.60 %) calves and adults, respectively. The present finding is similar with previous results reported by Pfukenyi et al. [20] in communal grazing areas of Zimbabwe and Kemal and Terefe [21] in Gedebario Gutazer Wolane district, Ethiopia. The significant difference in the infection rate of gastro-intestinal helminths parasite among different age groups in the present study is most probably due to susceptibility and resistance of different age groups. Adult animals may acquire immunity to the parasites through frequent challenge and expel the ingested parasites before they establish infection [22], keeping adult cattle for a longer period in breeding and milk production purposes [23] or supply inadequate feed against their high demand [24].

The result of the present study showed eight (8) Spps of gastro-intestinal helminths parasites namely: *Strongyle*, *Strongyloide*, *Ascaris*, *Trichuris*, *Paramphistomum*, *Fasciola*, *Dicrocolium* and Monezia species were recorded in the study. Higher prevalence of *Strongyle* type of helminths parasite (36.23%, 95% CI=32.30-40.10 %) infection in cattle while other helminths parasites like cestodes and ascarids were found to be the least prevalent gastrointestinal helminths parasite. The result of the present study agrees with finding reported by Telila et al. [25] who reported 41% of Strongyle type in East Showa zone, Central Ethiopia.

The result of the current study indicated statistically significant difference in the infection rate of gastro-intestinal helminths parasite in among sexes in which higher prevalence rate was recorded in the male 58.62% (95% CI=52.92-64.32 %) than female 43.32% (95% CI=38.22-48.42 %). This finding is in consistent with the work of Hillgarth and Wingfield [26] who reported prevalence rate of 56.5% in male and 52.9% in female respectively. The difference in the infection rate of gastro-intestinal helminths parasite in between male and female cattle is most likely due to hard working.

The GIT helminths infection rate in two different agro-ecological zones (mid-highland and highland) areas in the current study indicated statistically significant variation and higher prevalence was observed in mid-highland areas 54.92% (95% CI=48.92-60.92 %) than highland areas 46.82% (95% CI=41.92-51.72 %). This is most likely due to the climate of mid-highland area of this study, which is characterized by hot humid. The optimum temperature and relative humidity for survival and development larval stages of most GI helminths parasites is 24°C and 80-100 %, respectively [27]. The egg count per gram of feces for nematode infection in the current study indicated most of the animals were with low to moderate intensity of infection indicating the sub-clinical cases of GI helminths parasites with subsequent subsistent low pasture contamination [28].

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