
Identifying Helminthes Infection in Dairy Calves Reared by Smallholder Farmers in Central Areas of Ethiopia

Beksisa Urge*, Markos Tadele, Tamirat Siyoum

Ethiopian Institute of Agricultural research, Holeta Agricultural Research center, Ethiopia

Abstract

Subclinical GIT parasites are one of the major health constraints of calf growth and are associated with tremendous economic losses in Ethiopia. A cross-sectional and clinical investigation was carried out in urban and peri-urban dairy farms in different central areas of Oromia to determine GIT helminthes infection rate and its potential risk factors in dairy calves. Accordingly, 157 dairy calves were clinically examined and purposively sampled for the study of GIT helminthes. The results from data analysis indicated that about 38.9 % (N=61) of the dairy calves were found to harbor one or more parasite species. The dominant GIT parasites encountered were mixed infection (19.7%), Ascaris (15.9%) and Coccidia (1.34%) respectively. The highest proportion of parasites was recorded in the calves of welmera district (19.1%) followed by calves of Adea berga district (14%) and the lowest proportion were recorded in the district of Muka Turi calves (3.2%). Furthermore, the risk factor analysis indicated that there was higher occurrence of GIT helminthes in male calves (51.01%) than female calves (42.1%). The result also showed higher occurrence of GIT helminthes during the wet season (41.1%) than dry season (33.02%). The risk of acquiring GIT helminthes in male calves was relatively higher (OR=0.61) than female calves (OR=0.61, 95% CI=0.490-1.020). There was significant difference ($p<0.05$) in harboring either a single or mixed parasites between the sex of calves. Beside this, seasonal variation significantly influenced the occurrence of GIT helminthes in dairy calves. In conclusion, the study showed that various parasites were prevalent in the study districts. Therefore, GIT parasites control and prevention will depend on instituting the availability of potent drugs against the parasites per area.

Key words: Calves, Ethiopia, GIT helminthes, Risk factors, Season.

1. Introduction

Dairy calf helminthes infection is a world-wide problem for small and large-scale farmers. However, their impact is greater 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. Calf gastrointestinal parasites cause economic loss through lowered fertility, reduced work capacity, culling, a reduction in food intake and lower weight gains, lower milk production, treatment costs, and mortality in heavily parasitized animals (Lebbie *et al.*, 1994). Gastrointestinal nematodes are serious problems for young ruminants. Gastrointestinal parasite infection causes digestive disturbances and malnutrition leading to mortality of calf below one year of age. In spite of a huge livestock resources and existing favorable conditions, full

exploitation of cattle potential is constrained by widespread prevalence of parasitic diseases (Johannes *et al.*, 2016). Helminthes, especially subclinical gastrointestinal nematode are known to be a major constraint to ruminant's well-being and productive performance (Holzhauer *et al.*, 2011). Indirect losses associated with GIT helminthes infection of dairy calf involves the stunted growth rate, weight loss, copious diarrhea, reduced feed intake, and anemia in severe cases. In young dairy stock, gastrointestinal parasitism is responsible to reduce growth rate by 30%, even with a minimum level of parasite burden. Helminthes infection in calf is characterized by clinical manifestations such as reduced appetite, frequent scouring and poor condition during the initial grazing in the field when control is inappropriate (Johannes *et al.*, 2016).

Notwithstanding the immense action made to control GIT Parasitosis, farmers in Ethiopia continue to incur significant losses due to insufficient availability of information and best practices on the epidemiology of the GIT parasites. Furthermore, helminthosis is a major obstacle for lowered productivity of Ethiopian livestock sector (Teklye, 1991). The prevalence and distribution of gastrointestinal parasites, the species, and the severity of infection varies considerably depending on local environmental conditions, such as humidity, temperature, rainfall, vegetation, and management practices. In some parts of Ethiopia, limited study has been carried out on the prevalence of helminth parasites and most of the information generated is from abattoir surveillance (Abebe, 2001). Moreover, there is no sufficient information on epidemiology of the gastrointestinal parasites (Fikru *et al.*, 2006). Hence the observational study and frequent assessment on the extent and risk factors of helminthes parasites on dairy calf is also indispensable.

However, there is a paucity of detailed information on the occurrence, species composition and seasonal pattern of helminths of dairy calves in the central areas of oromiya region. Therefore, this study was conducted to generate recent information on the occurrence and species diversity of dairy calves, to develop an appropriate control and prevention options that could be adopted under livestock rearing farmers. Therefore, the objectives of the present study were

- ☞ To investigate the different types of GIT helminthes of dairy calves and associated risk factors
- ☞ To determine the distribution of GIT helminthes in calves at the study areas

2. Materials and Methods

Study Areas

The study was carried out in Muka turi, Gar Jarso and Degem in North West shewa zones of the oromiya region situated in the central high lands of Ethiopia. The area is located between 78 and 150 km northwest of the capital, Addis Ababa and lies on an elevated plateau that ranges from 2400 to 3500m above sea level and receives the mean annual rainfall with the mean annual maximum and minimum temperature of 1000-1500mm and with the mean minimum and maximum temperature of 15- 18 c⁰ respectively. The study area also included Adea berga and welmera districts of west shewa zone which are located in the central highlands of Ethiopia. Ada'a berga is one of the districts in west shewa zone and situated in central highlands of Ethiopia 30 km away from Holeta and the rainfall pattern of the district is bimodal and the long rainy season extends from June to September. The farming system of the area is mixed type where crop production and livestock rearing are done side by side. Welmera district is 40 km away from the capital city, Addis Ababa and area is situated at 9⁰04'- 9⁰13' N latitude and 38⁰29'-

38°39' E longitude. The average altitude of the area ranges from 2200-2500 m above sea level. It receives an average annual rainfall of 1060mm. The mean maximum and minimum temperatures are 23.30C and 4.6°C respectively

Study calves and design

The study was conducted on dairy calves kept under the different management systems. All local and cross breed calves were sampled in each farms in respective of sex, body condition and other relevant parameters. A cross sectional study design and clinical examinations were applied to study GIT helminthes of calves during the wet and dry seasons of the year.

Sampling Techniques and Sample Size Determination

Purposive sampling method was used to select infested dairy calves from each district. Study calves with no history of anthelmintic treatment were included in the study. Accordingly, 157 dairy calves were sampled for the investigation of GIT helminthes in dairy calves.

Fecal sample collection, processing and identification of parasites from dairy calves

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 submitted to veterinary parasitology laboratory and stored at 4°C until processed. Fecal samples were processed and examined in laboratory using both qualitative and quantitative techniques. Nematode eggs were identified by Standard Flotation technique and trematodes eggs were examined by sedimentation methods. The above procedure was conducted according to (Soulsby, 1982) and (Urquhart *et al.*, 1996).

Data Analysis

All data collected from the study area were coded and entered into Microsoft Excel spreadsheet 2007 computer program and analyzed using Statistical Package for Social Science (SPSS)-Version 19 or 20 and SAS 2004. Descriptive statistics and percentage was calculated to display the status of GIT parasite in relation to considered variables. The association between the effects of variables such as breed, sex, age and Helminthes infection was analyzed using the Pearson chi-square (χ^2) test. The odds ratio (OR) was used to determine the strength of association between variables with the helminthes infection and prevalence of parasites. In all cases, p-value less than 0.05 held at 95% confidence intervals was considered for significance level.

Results from GIT helminthes infection in dairy calves

Out of the total calves (n=157) examined for GIT helminthes in central areas of Oromiya region, 38.9% (n=61) were found to harbor one or more parasite species. The result revealed that there was higher occurrence of GIT helminthes in male calves (51.01%) than female calves (42.1%). The result also indicated that there was higher occurrence of GIT helminthes during wet season (41.1%) than during dry season (33.02%). Analysis of the putative risk factors revealed that the occurrence of GIT parasites (P=0.013) was varied with the season of the year indicating that relatively higher occurrence (OR=0.35, 95% CI (0.22-0.53) in wet season than in the dry season. Similarly, the risk of acquiring GIT helminthes in male calves was relatively higher (OR=0.61) than female calves (OR=0.61, 95% CI=0.490-1.020) (Table5).

Table 5. Multivariate logistic regression analysis of different risk factors for the occurrence of gastrointestinal parasites in examined calves

Variables	No examined	No infected (%)	Odd ratios for 95% CI	p-value
Season				
Wet	55	41.01	0.35 (0.22-0.53)	0.013
Dry	102	33.02		
Total	157	38.9		
Sex				0.023
Male	55	51.01	0.61 (0.49-1.02)	
Female	102	42.1		
Overall	157	61 (38.9)		

The distribution of GIT helminthes in different districts

The distribution of different GIT parasites in calves varies from one study area to another. The highest proportion of parasites was recorded in the calves of welmera district (19.1%) followed by calves of Adea berga district (14%) and the lowest proportion were recorded in the district of Muka Turi calves (3.2%). The dominant GIT parasite species found during the study period was mixed (19.7%), ascaris (15.9%) and coccidia (1.34%), in different study districts as shown in table 6.

Table 6. Distribution of different GIT parasites in different areas.

Distric ts	Types of GIT parasites encountered											
	N	Ascari s	Bunostom um	Coccid ia	Fascil oa spp	Mones ia	Oesophagostom um	Paraphistom um	Strongy le spp	Trichur is	Multip : p arasite	Positiv e (%)
A/berg	37	4	0	4	0	0	1	0	1	0	22	22(14)
a	57	9	4	6	0	0	1	0	1	0	9	30(19.
welmer												1)
a												
G/jarso	21	4	0	1	0	0	0	0	1	0	0	6(3.8)
Muka	21	4	0	1	0	0	0	0	0	0	0	5(3.2)
turi	21	4	0	2	0	0	0	0	2	0	0	8(5.1)
Degem												
Overall	15	25(15.	4(8.92)	14(1.3	0	0	2(3.2)	0	5(1.97)	0	31(19.	61
l (%)	7	9)		4)							7)	(38.9)

3. Discussions

Subclinical gastrointestinal parasites are known to be a major constraint to ruminant's well-being and productive performance. The findings of the current investigation revealed that the overall prevalence of gastrointestinal parasites of dairy calf was 38.9%. This result was lower than the reports of Hailu *et al* (2011) and Ahmed *et al* (2009) who reported that it was 79.1% and 56.25% in Jimma town and Pakistan respectively. The finding was also in a close agreement with the reports of slam *et al* (2014) in vangura upazila in Pubna districts of Bangladesh which indicated the prevalence of 50% in young calves. The variation in prevalence could be attributed to differences in agro-ecology, sampling season and animal management system. The current study also showed mixed parasites (19.7%), *Ascaris* (15.9%) and *Oesophagostomum* (3.2%) where the predominant parasites encountered in dairy calves while strongyle species (1.97%) and others were the least encountered. This study is relatively similar with the findings in other parts of Ethiopia by Hailu *et al* (2011) who recorded strongyle species (40.3%) and ascaris (7%), as the prevalent GIT helminthes among dairy calves. Akataruzzaman *et al* (2013) in Bangladesh also reported that the proportion of strongyle parasite was relatively higher in young calves below one year of age than older groups.

Furthermore, the prevalence of GIT helminthes in male and female calves was (51.01%) and (42.1%) respectively and there was significant variation ($p < 0.05$) between both sexes of calves. This finding was in contrast to the earlier works conducted in Pakistan by Ahmed *et al* (2009) who reported that female calves have a higher risk of suffering from GIT parasites (60%) than male calves (51.43%). The result also indicated that there was higher occurrence of GIT helminthes during wet season (41.01%) than during dry season (33.02%). This is supported by the reports of Pandey *et al* (1993) in Zimbabwe showed that wet months were the highest risk for occurrence of gastrointestinal parasites than the dry months and young animals had the highest risk of infection. This is mainly attributed to the management system and the hygienic circumstances and feeding availability, climatic condition as well as lack of regular deworming strategies tend that might have attributed to the incidence of parasites. The presence of sufficient moisture during the rainy season favored the survival of infective larvae in the pasture and higher probability of uptake of the infective.

4. Conclusion and Recommendations

The present study revealed that the prevalence of GIT helminthes parasite of dairy calf at the study area is mainly due to non-adoption of suggested prophylactic options and related best practices. It is highly recommended that appropriate prophylactic measures such as dehelmentizing methods and pasture management should be used and awareness creation should be delivered to farmers. Future studies should focus on anthelmintic efficacy and its resistance patterns to formulate better therapeutic options that can be applied in the study districts

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