# Epidemiological Study of Gastro Intestinal Helminthes Parasites of Calves in Urban, Peri Urban and Rural Smallholder Dairy Farms of East Wollega Zone, Western Ethiopia

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## Abstract

A cross sectional study was conducted from September 2012 to February 2014 in selected area of East Wollega Zone of Oromia Regional State, western part of Ehiopia to identify major parasites of calves in the study area and associated risk factors. The study includes all calves under one year age group and has no history of de-worming. Gastro intestinal parasites are one of the most animal diseases which cause livestock production loss in general and calves health problems in particular. Macc master egg counting was done so as to identify the parasitic infestation level of study animal. Sedimentation and floatation techniques were also employed to identify major parasites of calves in the study area and chi-square test was used to compare prevalence difference in line with associated risk factors. As study result shows, out of 250 fecal samples collected, 66.4% were positive for different GIT parasites while 33.6% were free from any parasites. The PCV value of parasitaemic (23.27%) and non-parasitaemic (25.83%) animals showed a slight variation without statistical significance (p>0.05). But there is statistical significance association among risk factors like season, location, age, breed and body condition and GIT prevalence (p<0.05). It can be understood from the present study that GIT parasites are the major problem of calves' health which requires great emphasis to reduce the effect. Awareness creation and proper control measures of GIT parasites should be given for the stake holders.

**Keywords:** GIT parasites, calves, urban, peri-urban, rural, small holder dairy farms, East Wollega, Ethiopia

## 1. Introduction

Gastro intestinal parasites are a world-wide problem in livestock as well as in agricultural sector and responsible for major economic losses. The economic impact of these parasites on animals industry is great. The impact is greater in Africa in general and Ethiopia in particular due to the availability of a wide range of agro-ecological factors suitable for diversified hosts and types of helminthes. The most serious economic consequences of gastrointestinal parasites based on the overall number of worms, number of genera and species present, general levels of pathogenicity and wide spread distribution (Rickard and Zimmerman, 1992). In recent study, Tibbo (2006) found that parasitic infection of cattle is major factors responsible for economic losses through reduction in productivity and increased mortality in heavily parasitized animals. Especially parasitic nematodes (roundworms) are extremely important in both human and animal diseases (Tibbo, 2006).

In the last two decades, anti-helmentic efficacy against nematodes is reducing due to rise of parasitic resistance (Subash, 1990). The anti-helmentic resistance has been seen in almost all countries of the world. The following factors of anti-helmentic resistance are normally associated with parasites such as maturity stage of parasite, sexual phase of parasite, immune response of host which can be age related and history of infected animal and distribution of worms. Despite the immense progress made to control helmethosis, farmers in Ethiopia continue to incur significant losses due to insufficient availability of information on the epidemiology of the parasites as well as presence of different types of helminthes (Subash, 1990).

Furthermore, parasitosis appears to be a major factor for lowered productivity of Ethiopian livestock sector. The prevalence, genera, species, and severity of gastrointestinal helminthes vary considerably depending on different environmental conditions, such as humidity, temperature, rainfall, vegetation, and management practices (Teklye, 1991). Therefore, the distribution and prevalence of the disease should be presented by geographical areas that could roughly correspond to climatic conditions. In some parts of Ethiopia, surveys have been carried out on the prevalence of helminthes parasites of which most of the information obtained is from abattoir survey and animals managed on stations (Fikru et al., 2006).

Gastrointestinal parasitism is one of the first ranked researchable topics on calf health in Western Oromia. Moreover, there is no sufficient information on epidemiology of gastrointestinal parasites of calves in the western part of the country. Therefore, the objective of this study is to provide evidence on the epidemiological distribution of the gastrointestinal parasites of calf in smallholder dairy farm and determine putative risk factors within the study area.

## 2.  Materials and Methods

### 2.1.  Study Area and Duration

The study was conducted from September 2012 to February 2014 in selected area of East Wollega Zone of Oromia Regional State which is found in western part of the country, about 352km distance from Addis Ababa. The average elevation of the area is 2017m above sea level and has maximum and minimum temperature of $22.4^0$C and $10.9^0$C, respectively. The dry season of the study area ranges from April to June while the wet season is from October to December. The mean annual rain fall of the area ranges from 800mm to 2400mm (Moti et.al, 2011). Similar to other rural areas of Ethiopia, the dominant economic activities and the livelihoods of peoples across this study area are mostly depends on mixed farming system.

### 2.2.  Study Animals

The study animals were 205 calves under one year of age kept under extensive and intensive husbandry management and have no history of de-worming at least for three months.

### 2.3.  Study Design

A cross sectional epidemiological study was carried out on calves of less than one year age groups in the study area. The study sites and farmers were selected purposively whereas the individual sample was selected by simple random sampling method. Sample size for fecal collection was determined using the formula given by Thrusfield, (2007). Accordingly, using expected prevalence of 50% at 95% confidence intervals and 5% desired absolute precision a sample size of 384 calves; however due to logistic problems only 250 calves fecal samples were collected. Sample size determination formula, where;

$$N= \frac{z^2(pq).}{e^2}$$ n= the sample size, p= estimated percent in the population or expected prevalence, z= standard error associated the chosen level of confidence (1.96)
q=100-p  e= acceptable sample error

### 2.4.  Samples Examination Methods

About 3gm of fecal sample was collected from anus of each sampled calf in to a plastic container at dry and wet season, consecutively. After collection of blood samples, immediately centrifuged and the PCV reading was recorded at the study sites where as the fecal samples were preserved with 10% of formalin and taken to Bako Agricultural Research Center (BARC) animal health research laboratory to be examined. Floatation and sedimentation techniques were employed to diagnose eggs of nematodes and trematodes, respectively. Macc master egg counting technique was also done to categorize the severity of the infestation level (Kruse et al., 1982).

### 2.5.  Data Analysis

During the study period the data was collected and stored in the Microsoft Excel spread sheet program and was analyzed using SPSS 16. Version software program. The prevalence was calculated by dividing the number test positive animal by total number of calves examined. Chi-square test was utilized to measure the association between prevalence and risk factors like location, management system, age, sex, season, and body conditions.

## 3.  Result

Out of 250 fecal samples tested 166(66.4%) were positive for eggs of different species of GIT-helminthes parasites and the rest 82(33.6%) samples were negative for parasitic ova. The mean PCV (%) values of parasitaemic (23.27%) and non parasitaemic (25.83%) was compared and found to be statically non-significant (p> 0.05).

### 3.1.  Association of risk factors with parasite prevalence

Different variation was observed on the occurrence of GIT parasite among the risk factors.

**Season:** Comparison was made on the prevalence of GIT parasite in dry and wet season to observe the effect of moisture in the abundance of the parasites. Thus, the result of the study showed that a significantly higher prevalence (p<0.05) was recorded in wet (80%) than dry (53.5%) season.

**Location:** The prevalence of GIT parasites in different location is summarized in (table1). The result of the study indicates that 73.9%, 62.8%, and 61.9% prevalence rate was observed in production system of rural, peri urban and urban, respectively. However, the observed difference was not statically significant (p>0.05).

**Sex:** There was minor prevalence difference observed between sexes. Prevalence of GIT-parasite observed was 68.3% in male calves while 64.6% was recorded in female calves, respectively. However, there was no statically significant sex related difference (p>0.05) (Table 1).

**Age:** Comparison was made on the prevalence of GIT-parasites with in the age groups in order to investigate the presence of any association. Thus, the calves were categorized into two age groups. According to the result of the present study the prevalence of GIT parasite in animals with greater than seven months of age (74.4%) was significantly (p<0.05) higher than those recorded in calves under seven months of age (58.4%)  (Table1).

**Breed:** The present study also tried to identify the presence of any association between prevalence of calf GIT parasites and breed. The study revealed a significant difference in prevalence (p<0.05) of helminthes infection between local (75.6%) and and cross breeds (62.2%) (Table 1).

**Body condition:** In this study comparison has also been done on the prevalence of calf GIT parasites among the calves body condition scores. There was statistically significant variation (p<0.05) observed among the different body condition categories. The highest prevalence was observed in poor (79.1%), followed by medium (65%) and good (52.1%) body conditions of calves (Table 1).

| Parameter | No.      Examined (N=250) | No. positive (%) | $x^2$ (p-value) |
|---|---|---|---|
| **Season** | | | |
| Dry season | 129 | 69(53.3) | 19.547(0.000) |
| Wet season | 121 | 96(80.0) | |
| **Location** | | | |
| Rural | 88 | 65(73.9) | 3.406(0.096) |
| Per urban | 78 | 49(62.8) | |
| Urban | 84 | 52(61.9) | |
| **Age** | | | |
| <7month | 125 | 73(58.4) | 7.172(0.007) |
| 7-12 month | 125 | 93(74.4) | |
| **Sex** | | | |
| Male | 123 | 84(68.3) | 0.389(0.593) |
| Female | 127 | 82(64.6) | |
| **Breed** | | | |
| Cross breed | 172 | 107(62.2) | 4.339(0.043) |
| Local | 78 | 59(75.6) | |
| **Body condition** | | | |
| Poor | 67 | 53(79.1) | 9.147(0.009) |
| Medium | 137 | 89(65) | |
| Good | 46 | 24(52.2) | |
| **Overall prevalence** | 250 | 250(66.4%) | |

*Table 1 shows the association of risk factors (season, location, age, sex, breed, body condition) with prevalence*

### 3.2.    Fecal egg count or intensity of infection (EPG)

The present study tried to categorize positive calves in their degree of infestation. According to the result it was found that out of 166 infected calves 23.49% were infested severely whereas 31.93% and 44.58% were infested at moderate and low rates, respectively (figure 1).
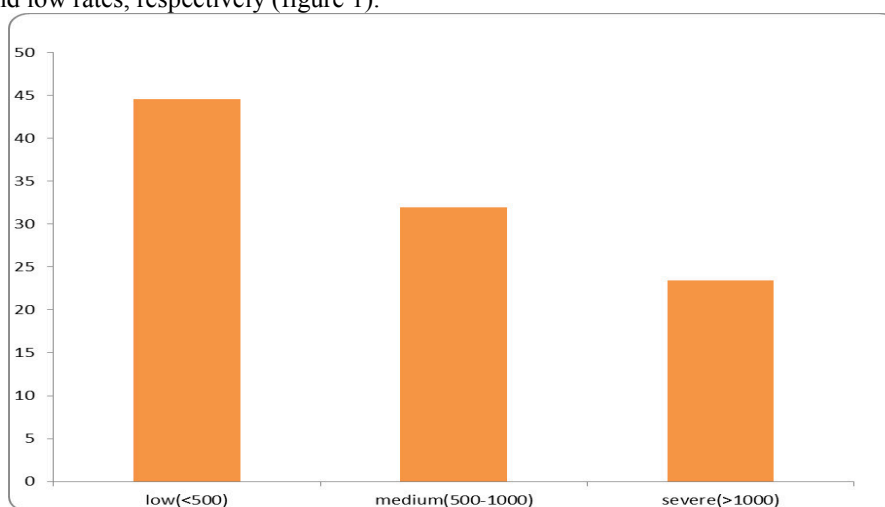


Figure 1:  *Shows fecal egg count or intensity of infection* (EPG)

### 3.3.     Type of parasites investigated

In the study there were different types of GIT parasites observed. Out of 250 examined calves, 66.4% were positive with one or more types GIT parasite. The proportion of single parasitic infection (74.1%) was higher than that of mixed (25.9%) parasitic infection. Out of 166 calves infected with single type of gastrointestinal parasites namely strongly (35.54%), coccidia (22.89%), ascaris (6.63%), monesia (5.42%) and fasciola (3.61%) whereas the rest of 25.9% were infected with more than one types of the above indicated species.
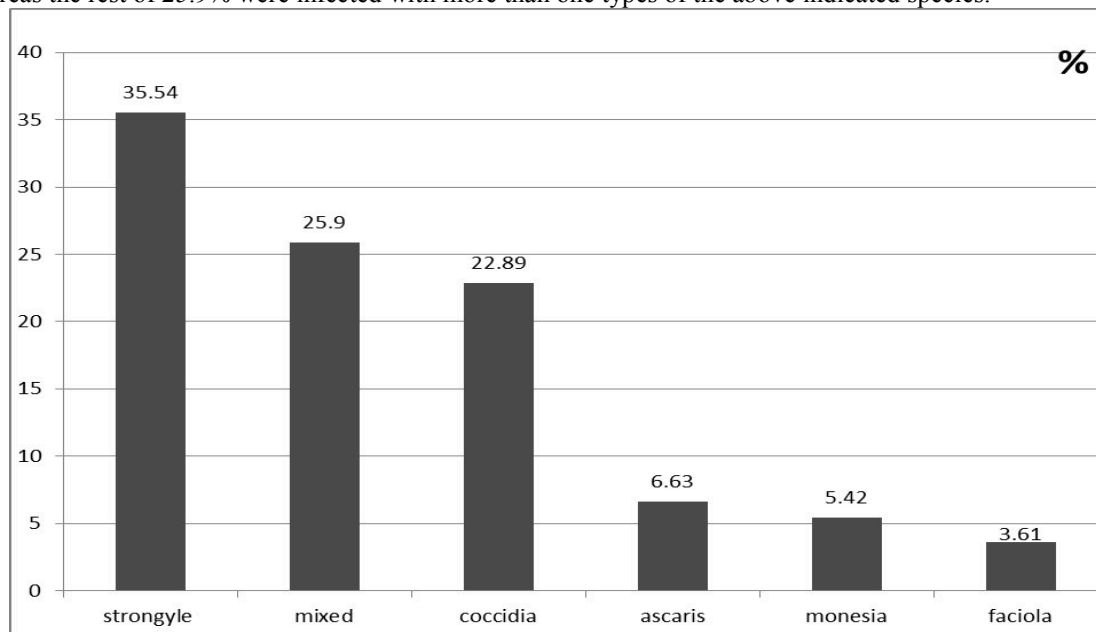


Figure 2: *Types of parasites investigated with their percentage*

## 4.  Discussion

The current study showed that calves from study area were infected with wide variety of gastrointestinal parasites including nematodes, cestodes, trematodes and protozoa. The overall prevalence of GIT-parasites in calves was 66.4% in urban, peri-urban and rural areas of small holder dairy farms. Different prevalence rate of GIT parasites was reported from different corner of Ethiopia as well as other countries due to the difference in management, husbandry, climate, topography, and other factors. The prevalence in the current study is higher than the findings of Tigist et al. (2012) which was reported to be 41.30% in Amhara regional state and Adam and Anteneh (2011) reported 18% in Haramaya district of Oromia Regional State  and Bilal et al. (2009) reported 55.56% prevalence outside of the country in Pakistan. On the contrary it is lower than the previous 79.1% reports of Hailu et al. (2011) within the country in Jimma town and 97% reports of SA square et al. (2013) outside the country in southern Ghana.

The result of the current study showed significantly higher prevalence of gastrointestinal parasite (p<0.05) in wet season (80%) than dry season (53.5%). This finding is in agreement with many reports of the world such as Fikru et al., (2006) and Deressa et al., (1998) in Ethiopia; Alim et al.,(2012), Jeyathilakan et al.,(2008), and Aktaruzzaman et al., (2013) in Bangladesh; Moyo et al.,(1996) in Zimbabuwe, SA square et al. (2013) in Ghana and Nginyi et al., (2001) in Kenya that reported the period of wet or rainy season is when the parasitic infections are relatively high as compared to dry season. This is due to the existence of adequate moisture and optimum temperature favoring the growth and survival of infective stage of parasite in the pasture that leading to the high probability of exposure of animals to the parasites which results in higher prevalence of GIT parasite in wet season.

In this study the prevalence of gastrointestinal parasite across rural, per urban and urban dairy farmers were identified. Thus, higher prevalence was recorded in rural than per urban and urban dairy farms. The reason for higher prevalence in rural area than that of per urban and urban dairy farms may be due to difference in management system and awareness of the farmers about disease. Almost all farmers found in urban area implement intensive management system whereas those farmers found in rural area are apply extensive management system. Moreover, urban dairy farmers have access to anti-helmentic drugs and better awareness than rural farmers about the importance of de-worming.

In the current study comparison was made on the prevalence of GIT-parasites in male (68.3%) and female (64.6%) calves to assess the existence of any association between the prevalence and sex. Thus, there was no sex related deference (P>0.05) observed in the prevalence of GIT-parasite. The absence of association between

sex agreed with the findings of Tigist et al., (2012) in Gonder; Fikru et al., (2006) in western Oromia and Hailu et al. (2011) in Jimma town. However, in contrast to the finding of the present study, there is association between the sex and prevalence of parasites were reported (Yeshiwas, 2013; Maqsood et al., 1996; Valcarce and Garcia, 1999) that female animals showed higher parasitic infection than males despite similar management practice due to the fact that female animals are more susceptible than male and hence sex is determinant factor in influencing prevalence of parasites.

Age is supposed to have some association with occurrence of internal parasite because age has an effect on responsiveness or to the development of immunity causing lower worm fecundity in adult animals' (Klooser man et al., 1991) as well as adult animal may acquire immunity to the parasites through frequent challenges and expel the ingested parasite before they establish infection (Dunn, 1987 and Fishes et al., 1989). Bilal et al., 2005 also reported that calves up to six months of age were more affected by gastrointestinal parasite (86.67%) as compared to calves of 7-12 age (66%). However, in contrast to the reports of above authors, the present study revealed that calves under 7 month of age were less infected with parasite (58.4%) than calves 7-12 month of age (74.4%). The reason is that in the study area most of the newly born calves are managed in the house so that they are stall fed where as those calves above seven months of age are managed in free gazing system, due to this most of the time calves between 7-12 of ages have greater exposure to parasites than calves under 7 months of age. This finding is in agreement with the work done by Adam and Anteneh, (2011) in Haramaya district which reported the concomitant increase in the prevalence with age of animals could be due to increase in frequency of contact with age and management factors.

There is still controversy among different authors on the issue of breed susceptibility to internal parasite. In this study, the prevalence of gastrointestinal parasite was found significant (p<0.05) higher in local breed calves (75.6%) than cross-breed calves (62.2%) which is in agreement with the report of Tigist et al., (2012) in and around Gonder town. This may be due to the fact that farmers owned cross-breed or farmers that found in urban area are tend to follow intensive management system where as those farmers that haves our indigenous breed were tend to follow free grazing system mean extensive management system. Thus, the chance of exposure to infective parasitic egg or larvae of local-breed calf is higher than that cross-breed calf.

The present study further described the body condition of calves were significantly associated (p<0.05) with prevalence of GIT-parasite. Calves with poor body condition scores (79.1%) were infected at higher rate than calves with medium (65%) and good (52.2%) body conditions indicating that loss of body condition of calves in study area were due to GIT-parasitic infection. This finding is in agreement with the work done by Keyyu et al., (2003) in Tanzania and Tigist et al., (2012) in Ethiopia. However, the report disagrees with the work of Fikiru et al., (2006) and Hailu et al., (2011).

In this study most prevalent parasite of calves was the strongyle (35.54%) whereas the least prevalent parasites were monesia (5.42%) and fasciola (3.61%) which is inagreement with the report of Hailu et al., (2011) in small holder dairy farms of Jimma town.  Similarly, Yeshiwas, 2013 also reported that higher prevalence rate of strongyle species (21.4%) and least prevalence rate of monesia (5.8%) parasite was recorded in selected site of Bahidar area.

## 5. Conclusion and Recommendation

The prevalence calf GIT-helminthes in study area is 66.4% indicating that parasites can be considered as one of the production constraints of cattle in the study area. The prevalence of the helminthes found to be higher in rural and per urban area than in urban dairy farms. The study also revealed that the calves GIT-parasites were higher in local breed and poor body condition calves than cross-breed and good body condition calves. It also recorded that higher prevalence of GIT parasites in wet season than dry season. In the present study all risk factors were found to be associated with the prevalence of GIT parasites with exception of sex. In conclusion, GIT-parasites cannot be ignored as a non important disease in current study area where it may continue to become a hazard to livestock industry of the country in general and inhibit the productivity of small holder dairy farmers of the area in particular.

Based above conclusion the following recommendations are forwarded;

➢ All responsible body in general and small holder dairy farmers in particular should be made aware of the impacts of the GIT-helminthes through veterinary extension likes training, booklets, media etc.

➢ To minimize parasitic infestation and the existed associated risk factors regular de-worming activity with appropriate anti-helmentic drugs for each type of parasites should be given and

➢ Appropriate management practices such as housing management, feeding management/rotational/zero/grazing and health aspect/acaricide spray/ should be delivered.

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