INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN 2278 – 0211 (Online)

Prevalence Study of Bovine Strongylosis in Tullo Woreda, Western Hararghe Zone, Oromia Regional State, Ethiopia

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Abstract:
A study was carried out from November 2015 to April 2016 to determine the prevalence of bovine strongylosis in Tullo woreda, western Hararghe administrative zone based on faecal examination. A total of 384 faecal samples were collected from cattle at different sites of the woreda. Out of 384 the examined animals, 157(40.89%) were positive for strongyle. Prevalence on the basis of localities indicates that a higher in Kira kufis (62.82%) followed by Lubu dekeb (43.04%), Ifa bas (38.75%), Reketa fura (31.43%), Oda balina (27.27%) respectively. Statistical analysis of the result on the basis of sex, age and body conditions were not statistically significant different (P > 0.05), but there was statistically significant difference (P < 0.05) in the prevalence of different study sites. In the study 157 positive cases were examined using the McMaster counting method to determine intensity of the infections. The result showed 21(13.36+%) cattle were severely infected, 51(32.48%) moderately and 85(54.24%) were mildly infected. The mean of EPG of positive animals was 593. The analyzed data indicates a negative correlation between EPG and age of the animal. Most of the animals examined during the present study had low to moderate strongyle eggs counts, suggesting that the infections were sub-clinical. Some recommendations were forwarded for controlling of this parasite in the study area.

Keywords: *Bovine, strongylosis, prevalence, Tullo*

1. Introduction

Ethiopia has the largest livestock production in Africa, estimated at 56.71 million cattle, 29.33 million sheep, and 29.11 million goats respectively (CSA,2015). Inspire of these huge livestock population, productivity is very low compared to other African countries. This uneconomic exploitation of the livestock resource is due to inadequate nutrition, poor productive performance, disease and poor management (Brook, 1983). Animal diseases are widely distributed and are one of the major causes of livestock mortality among the serious constrains of animal production. In Africa, GIT parasitism rank high and aggravate other disease conditions (Teklye, 1991), ill thrift and sub-optimal productivity in all the ecological parts of the country (EARO, 2000). Particularly helminthes infections are common and considered as one of the major problem in cattle production (Gall, 1981).

Cattle constitute the major proportion of the Ethiopian livestock resources. They provide more than 30% of local meat consumption and generate a cash income from export of meat and live animals. They also contribute to the self-sufficiency of resources for poor farmers by providing milk, meat, manure and direct cash income. Cattle production in Ethiopia, however, is constrained by a number of factors including malnutrition disease, improper health care and other management problems. Among the serious constrains to livestock production in Ethiopia is the high prevalence of various disease, mainly of viral, bacterial and parasitic origin. In Ethiopia, where farm animals are kept on pasture throughout the year and clinical conditions are favorable for the development and survival of infective stages, parasites are recognized as major cause of economic loss. Although vaccines are available for most viral and bacterial disease, enabling the under taking of preventive measures, the controls of parasitic disease have made little progress (Mulugeta, *et al.*, 1989).

Animal diseases are widely distributed and are one of major causes of livestock mortality, ill thrift and sub-optimal productivity in all agro ecological zones of the country (EARO, 2000). Parasites infect to animals due to their pathogenecity, sharing nutrients and by predisposing them to other disease (Ageymang, *et al.*, 1995).

Gastrointestinal helminthes cause direct loss through mortality in heavily parasitized animals, especially in young animals as well as the cost incurred in treating and controlling parasitic infection. It is well established that parasitize animals perform less efficiency; feed conversion adversely affected which reface carcasses quality and quantity and growth rates, resulting in farther financial penalties (Symons and Jones, 1978, ILCA, 1993). The direct losses caused by these parasites are attributed to acute illness and death, premature slaughter and rejection of some parts at meat inspection. Indirect losses include the diminution of productive potential such as decreased growth rate, weight loss in young growing calves and late maturity of slaughter stock (Hansen and Perry, 1990). The infections are either clinical or sub-clinical, the latter being the most common of great economic importance (Allonby and Urquhart, 1972).

The adverse effect of helminthes on production is well documented. Anorexia and reduced feed intake, loss of blood and plasma proteins in to gastrointestinal tract, alterations in proteins metabolism, depressed levels of minerals, depressed activity of some intestinal enzymes and diarrhea. These all contributes to a reduction in feed intake, live weight gains and growth in all ages of animals (Soulsby, 1982).

The loss caused by parasitic disease is often under estimated, primarily because of the absence of distinct clinical signs in comparison with most viral and bacterial disease. The most serious production impact of helminthes parasites is loss of both live and carcass weight. It has been shown that parasitized animals can loss between 30% and 50% or more of endo parasitism in Ethiopia, according to yearly loss of 700 million ETB (Mulugeta, *et al*., 1989). The effects of infestation by gastro intestinal parasites vary according to the parasite concerned, the degree of infestation and other factors (ILCA, 1993). It is, therefore, important parasitism prevailing in a given agro-ecological zone to recommend the most cost effective control measures.

Gastro intestinal infections are the most serious problem affecting animal production worldwide (Pugh, *et al.*, 1998). In dairy cow, they are strongly associated to grazing management, and the intensity of fecal egg excretion is negatively correlated to milk production and general farm productivity (Chartier, *et al*., 2000). In addition, the negative influence of gastro-intestinal strongyle on the live weight gain of animal has been observed in different zones of the world (Faizal, *et al*., 2002). The strongyles are parasitic in large intestine and the important genera are *strongylus*, *Triodontophorus*, *Trichonema (Cyathostomes)*, *Chabertia* and *oesophagostomum* (Urquhart, *et al*., 1996). The life cycle is direct, no requiring intermediate host. In the cycles, adult female parasites in the gastro intestinal tract produce eggs that are passed out with the faeces of the animal. Development occurs within faecal mass. The egg embryonate and hatch in to first stage larvae, which moult in to second stage larvae, shedding their protective cuticle in the process. Larvae two moult in to larvae three. The larvae three or infective stage migrate to the surrounding vegetation where they become available for ingestion by grazing animal. The L_3 enter the mucosa of any part of the small or large intestine and become enclosed in obvious nodules in which the L_3 moult to L_4 takes place. These L_4 then emerge on to the mucosal surface, migrate to the colon, and develop to the adult stage. The prepatent period is about 45 days. This is common in the genera of oesophagostomum which is common in ruminants, especially oesophagostomum radiatum in cattle (Urquhart, *et al*., 1996).

The pathogenic effect is attributed to the nodules (up to 5mm in diameter) in the intestine and it appears that as few as 500 larvae are sufficient to produce clinical signs. Necropsy reveals a severely inflamed mucosa studded with yellowish-green purulent nodules. In the later stages of the disease, anaemia and hypoalbuminaemia develop due to the combined effects of protein loss and leakage of blood through the damaged mucosa. Strongyle clinically in acute infections of ruminants, sever dark green diarrhea is the main clinical sign and there is usually a rapid loss of weight and sometimes sub mandibular oedema. In chronic infections inappetence and emaciation with intermittent diarrhea and anaemia are the main signs of strongyle. Diagnosis is based on clinical signs and post-mortem examination. Since the acute disease occurs within the prepatent period, eggs of strongyle are not usually present in the faeces. But in the chronic disease eggs are present in the faeces (Urquhart, *et al*., 1996).

Strongylosis responds well to treatment at the standard dosage rates with any of the modern Benzimidazoles (Albendazole, Fenbendazole or oxfenbendazole) (Urquhart, *et al*., 1996). The effect of infestation by strongyle parasite in cattle cause diarrhea and rapid loss of weight. It is important to study the prevalence of parasite to recommend the most effective control measures.

Therefore, the objectives of this study were

- To study the prevalence of bovine Strongyle in Tullo woreda.
- Risk factors difference infection rates between localities
- Asses infection intensity

2. Materials and Methods

2.1. Study Area

The study was conducted from November 2015 to April 2016 in Tullo woreda, western Hararghe zonal administration in the Oromia regional state. The woreda is located 371km east of Addis Ababa. Altitude ranges from 1,600 to 2,700 m.a.s.l. and total coverage of the Tullo woreda is 45,760 hectares out of these 18,692 hectares or 40.93% has been estimated as cultivated area.

Tullo woreda has a mid-sub tropical weather "weynadega" and high land temperature climate "Dega" accounting 68% and 32% of the climate respectively. The mean annual temperature and rain fall ranges between 7 to 27^{o}c and 831 to 850 ml respectively (Tullo woreda agricultural office information).

The relative humidity of the area varied from 21.9% to 65%. The woreda characterized by four seasons in a year: a short rainy season (from mid March to mid May) a long-wet season (from beginning of July to end of October), a long dry season (from last October to beginning of March) and a short dry season (from end of May to end of Jun). Agriculture is the main occupation of the population of

the area. The agricultural activities are mainly mixed type with cattle rearing and crop production under taken side by side. The soil is fertile which is deep and clay. The main crop cultivated in the area include: Teff, Maize, Sorghum and Wheat.
According to the information obtained from the veterinary clinic, livestock and fisheries resource development office in 2014/15 the total livestock population of this woreda was estimated to be cattle 107,588, goat 51,021, sheep 36,765, poultry 840,100, donkey 6,777, horse 374, and mule 322.

2.2. Study Animals
A total of 384 fecal samples were taken from cattle from 5 kebeles (Kira kufis, Lubu dekeb, Oda balina, Reketa fura and Ifa bas) were subjected to determine the overall prevalence of bovine strongyle infection in the study area. All animals that examined were local (indigenous) of mixed age and sex group.

2.3. Study Design
A cross-sectional study method was conducted by selecting animals randomly to estimate the prevalence rate and intensity of strongyle infection in study area.
2.3.1. Sample Size Determination
Since there was no previous study on prevalence of bovine strongyle in Tullo woreda to establish the prevalence of the disease, the sample size was calculated based on the formula given below as described by Thrusfied, 1995.

$$n = \frac{(1.96)^2 \times P_{exp}(1-P_{exp})}{d^2}$$

Where n= required sample size
P_{exp} = expected prevalence
d= absolute precision

Accordingly, the minimum sample size needed is 384.
2.3.2. Sampling Method
Out of 30 kebeles found in Tullo woreda 5 kebeles were selected randomly and from each of the 5 kebeles 77 animals were selected and sampled.

2.4. Study Methodology

2.4.1. Fecal material Collection
During the study period a total of 384 cattle were sampled and fecal materials were collected per rectum with gloves from each animal and the collected samples were put in to faecal sample bottles and labeled (age, sex and origin) and kept cool prior to transportation to Hirna regional veterinary laboratory where the samples were immediately examined or stored at refrigerated temperature (4^0c) for a maximum of one day before processing.

Larvae identification through culturing faecal samples could not be carried out due to the local laboratory capacity reasons.

2.4.2. Laboratory Diagnosis
Laboratory technique used includes: Flotation, Sedimentation, Fecal egg count (using McMaster counting chamber). Details of materials required, preparation and technique is provided under annex part.

- Saturated Saline Flotation Technique

The logic behind is to concentrate the parasitic eggs (nematode, cestodes and coccidian oocysts) in a given portion of samples or processed faecal material (Hindrix, 1998, and Bowman, 1999). A general purpose of saturated sodium chloride solution with specific gravity of 1.204 was used to float the above mentioned parasitic eggs (annex-1).

- Quantitative Method

McMaster technique counting method is commonly employed method that requires a special counting chamber called McMaster. The method enables to determine the number of eggs per gram of feces (epg) and to indicate the level of infestation and degree of worm burden per animal (Hindrix, 1998) (annex-2).

- Sedimentation Technique

This method was used to identify Fasciola and any other trematode parasitic eggs which do not float well in common salt solution following procedures described by Soulsby (1982) (annex-3).

2.4. Data Management and Analysis

Study animals were sampled and samples labeled on basis of age, sex and origin and transported to laboratory for processing. The result obtained were recorded and these data were entered in to Microsoft excel spread sheet. The data fed in to the excel sheet were analyzed by STATA 7.0 version. Descriptive statistics like percentages, standard deviation and chi square (x^2) test and correlation coefficient were used.

3. Results

The results obtained from the study indicate that 157 of 384 (40.89%) total cattle examined were positive for Strongylosis.

Site	No of animals sampled	No of +ve sample	Prevalence (%)
Kira kufis	78	49	62.82
Lubu dekeb	79	34	43.04
Oda balina	77	21	27.27
Ifa bas	80	31	38.75
Reketa fura	70	22	31.43
Total	**384**	**157**	**40.88**

Table 1: Prevalence of bovine strongylosis on the basis of sites
Pearson chi^2 = 24.3240, P= 0.000

The prevalence of bovine strongyle between the study areas showed significant difference ($p < 0.05$).

Sex	No of animals Sampled	No of +ve sample	Prevalence (%)
Male	165	71	43.03
Female	219	86	39.27
Total	**384**	**157**	**40.89**

Table 2: Prevalence of bovine strongylosis on the basis of sexes
Pearson chi^2 = 0.5507, P = 0.458

Age	No of animals Sampled	No of +ve sample	Prevalence (%)
Young	204	86	42.16
Adult	180	71	39.44
Total	**384**	**157**	**40.89**

Table 3: Prevalence of bovine strongylosis on the basis of ages
Pearson chi^2 = 0.2911, P = 0.590

Body Condition	No of animals Sampled	No of +ve sample	Prevalence (%)
Poor	48	19	39.58
Good	336	138	41
Total	**384**	**157**	**40.89**

Table 4: Prevalence of bovine strongylosis on the basis of body condition.
Pearson chi^2 = 0.0385, P = 0.844

Total No of animal sampled	No of +ve sample	EPG minimum No	EPG maximum No	EPG mean	Total prevalence (%)
384	157	50	1,600	593	40.89

Table 5: the intensity of strongyle infection, egg per gram of faeces (EPG).

The data analysis of **epg** indicated that as the age of animals increase the egg per gram of faeces (EPG) decreases.

4. Discussion

The present study indicated that strongylosis is quite important health problem in cattle in high lands of Tullo woreda with an overall prevalence of 40.89%. The higher prevalence observed in the study area could be due to different in management system of the animal and ecology. In western Hararghe, animals are managed under traditional extensive and depend mostly on grazing lands receive minimum health care and no extra supplement (there is shortage of feed). This might reduce the animal's immunity or resistance and cause higher prevalence of strogyle infection.

The prevalence in this study (40.89%) is lower when compared with that of Vanaken *et al.,* (2000) study on strogyle infections of cattle in Mindanae, Philippines who reported 53% of the overall prevalence in bovine. This difference may be due to increase of awareness of people for their animals, by improving management system of animals or by regular deworming. According to the report by (Aumont, *et al*., 1997) strongylosis are the more frequent disease in ruminant found to be one of the main constraints in animal production. In Tullo woreda there are two different areas, marsh and dry areas, even though there is no such difference. In the dry area shortages of fodder might have also influenced the severity of strongyle infection. In the current study area, there was mixed farming systems in which animals kept (no overcrowding) during pasture grazing. This might reduce pasture contamination and reduces the severity or intensity of infection in this area.

There was significant difference ($p < 0.05$) in the prevalence of bovine strongyle infection in different study site (kebeles). This may be due to variation in deworming practice and wetness of the area which is more suitable for larval development. Accordingly, the prevalence is high (62.82%) in Kira kufis which has marsh area and low practice of deworming (history from people of the area) and low prevalence is observed in Reketa fura (31.43%) which has dry area and high practice of deworming. These findings are agreed with Dhoot *et al.,* (2002) and Bhattacharya and Ahmed (2005) who recorded higher incidence of parasitic infection in wet areas. Higher incidence of helminthes parasitic infection during rainy season may be due to high moisture content temperature which favors the growth and development of larvae on pasture resulting in increased contact between the host and parasites.

There was no statistically significant difference ($p > 0.05$) in the infection rate between sexes, with the prevalence rates of 43.03% and 39.27% in males and females respectively. It has been reported by Asefa and Sisay, 1998 that gastro-intestinal helminthes affect both sexes equally.

There was no statistically significant difference ($p > 0.05$) in the infection rate between age groups (adult and young). In the present study, all age groups of animals were managed in extensive management system with free grazing in the pasture. This indicated they have equal chance to get or infected by strongyle parasite. The epg analysis indicated that negative correlation between age and EPG.

There was no statistically significant difference ($p > 0.05$) in infection levels in basis of body condition. The prevalence rates indicated 39.58% and 41% in poor and good body condition. This may be due to the animal is not infected only by strongyle or it may be the effect of poly parasitism. This is in agreement with that of Gebreyesus (1996), Yosef (1993), and Getachew (1998) who observed the higher existence of poly parasitism in ruminants, in different area of the country.

The intensity level obtained in this current work indicated that mean epg was 593 having interpretation of light infection. An attempt was also made to assess the degree of parasitic intensity level (infestation burden) and observed that 21(13.36%), 51(32.48%), 85(54.14%) were infected heavily, moderately and mildly respectively. This indicates the numbers of heavily infected cattle were low, and the data analysis of epg indicates that as the age of animals increases the egg per gram of faeces (EPG) decreases. This result agrees with that of Vanaken *et al.,* (2000) study on strongyle infections of cattle in Mindanae, Philippines who reported that adult animals had lower egg counts than calves. The result was also in comply with that of Urquhart *et al.,* (1996) which said cattle develop a good immunity to strongyle, partly due to age and partly due to previous exposure so that it is primarily a problem in weaned calves.

Strongyle parasites in bovine are found widely spread in the study area. The disease moderately severe in villages found in the woreda where rainy or flowing reveres area abundant. This situation exists in some areas of the woreda which are included in this study. In grazing of this area during dry season, animal searching good herbage (grasses) acquiring high infection of strongyle. These situations increase the prevalence of strongyle infection in the study area.

The worm burden recorded in this study may be regarded as low to moderate that mainly manifests as sub-clinical infections. The effects of this infection can be aggravated by the frequent drought that occurs in some areas accordingly anonymous, 2005. This is described as the most economically important form of infection since it occurs in most of the cases leading to unthriftiness and animals are more susceptible to other infections and are continuously contaminating pastures (Ocaido *et al.,* 1996). Treatment of such animals is therefore indicated to improve productivity and reduce the chances of infecting the more susceptible young animals.

This study was cross-sectional in nature. Therefore, it could not capture the patterns of this parasite burden over seasons. A better and a long-term monitoring study is proposed or recommended to address the health and economic impact of this parasite in cattle found in the study area.

5. Conclusion and Recommendations

The present study conducted on prevalence of bovine strongyle for about 6 months in Tullo woreda of western Hararghe administrative zone indicated that strongylosis is prevalent disease affecting the health and productivity of cattle in the study area. In the area, there is sufficient rain fall and the climate is not as cool, because of such good environment and minimum health care the prevalence of bovine strogylosis were moderately high. From the results obtained, bovine strongyle were found to be one of the problems that hampered efficient utilization of production potential of animal in the study area and thus requiring attention by all concerned bodies to minimize the problem and design effective control measure.

Based on the above conclusion, the following recommendations are forwarded:

- Use strategic deworming; deworming before and after rainy season
- Educating of the communities regarding the impact of helminthes parasites on the productivity of livestock.
- Minimizing pasture contamination through management of grazing pasture.

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