



## Prevalence and Associated Factors of Bovine *Paramphistomum* in Fedis District Boko Slaughter House, Eastern Hararghe, Ethiopia

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### Abstract

A cross sectional study was carried out from April 2019 to October 2019 in Fedis district Boko slaughter house to determine the prevalence and associated factors of *Paramphistomum* in cattle in the study area. For this study, 384 cattle were selected by systematic random sampling methods and postmortem examination was conducted to check the presence or absence of adult *Paramphistomum* in rumen and reticulum. The parasite was examined macroscopically and microscopically to appreciate the morphology of adult flukes. An overall prevalence of bovine *Paramphistomum* was 40.6% by postmortem examination. Age, gender, body condition and origin of animals were assessed as risk factor for occurrence of paramphistomumiasis. The prevalence was higher in poor body conditioned cattle than in medium and good. However, highest infection rate of paramphistomumiasis was observed in cattle brought from highland than mid highland and lowland areas. Among risk factors, body condition and origin of animals was statistically significant variation ( $p < 0.05$ ) with infection. However, gender and age groups of animals were not statistically significant difference ( $p > 0.05$ ) with infection. The present finding indicates that the of infection rate of *Paramphistomum* were high in the study area. Therefore, it is recommended to livestock owners to improve feeds provision in order to obtain good body condition providing sufficient level of resistance against infections. Integrated control approach using selected anthelmintic therapy for flukes and protecting the animals from contaminated pasture to reduce the magnitude of the problem.

**Keywords:** Slaughter house; Fedis district; Boko; Cattle; Paramphistomosis; Prevalence

### Introduction

Ethiopia is believed to have the largest livestock among many problems, parasitism is the major problems that affect the productivity of livestock worldwide [1]. Paramphistomosis are the most important parasitic diseases in domestic ruminants throughout the world. It is

caused by digenetic flukes belong to the family paramphistomidae. The life cycle of these trematodes involves snail as an intermediate host [2]. The epidemiology of *Paramphistomum* is survival governed by parasite-host-environment interactions. It is also influenced by the climatic requirement for egg hatching, development and of the larvae in pasture [3].

Population in Africa yet produces insufficient animal protein and other livestock products to meet the demand of human population. The livestock sector has been contributing a considerable portion to the economy of the country and still promising to rally around the economic development of the country. However, production and productivity are low in Ethiopia, due to poor nutrition, reproduction insufficiency, poor breed improvement, management constraints, and prevailing of diseases. Adults *Paramphistomum* are found in the rumen and reticulum whilst immature parasites are found in the duodenum. Adult *Paramphistomum* flukes parasitize mainly in the fore stomachs of cattle causing irregular rumination, lower nutrition conversion, loss of body condition, decrease milk production, and reduction of fertility rate [4,5]. The immature flukes occur in the duodenum and ileum causing hemorrhage, which leads to anaemia, weight loss, decreased production death of animals may also occur [6].

Due to above mentioned problems, there is scarcity of well-documented information on the occurrence of *Paramphistomum* in ruminants in Ethiopia and also there is no any conducted research on the occurrence of paramphistomosis infection in Fedis district [7]. Knowledge of the prevalence and risk factors would help in implementing of strategies and policies for control and prevention of bovine paramphistomosis in the study area. Therefore, the objectives of this study was to determine the prevalence and associated factors of paramphistomosis in cattle slaughtered in the study area.

### Materials and Methods

**Study area:** The study was carried out in Fedis district Boko slaughter house. The district is found in Eastern Hararghe, Oromia regional state, Ethiopia. It is located 549 km east of Addis Ababa and 24 km South of Harar at a geographical coordinate of 8°C 49' 43.3"N latitude and 42°C 0' 45.57"E longitude and an elevation of 1285 m above sea level. It is neighboring to the East, South, West and North by Babile, Midega Tola, Gurawa and Harari region respectively. The district consists of 19 rural kebeles (the smallest administrative unit) and 2 urban kebeles. The main occupation of the population in these rural Kebeles are mixed farming system. Livestock species include: Cattle, sheep, goat, donkey and poultry. The livelihood of the population is 93.8% agro-pastoralist while the rest, 6.2% are urban dwellers.

**Study animals and sampling technique:** The study animals were cattle (local breeds) of different gender, age's groups and body conditions brought from highland, mid highland and lowland areas to the slaughter house. Animal ages were categorized in to adult (3 years-7 years) and old (>7 years). Systematic random sampling technique was used to select the study units *i.e.* the first animals were selected randomly and the next animals were selected in third intervals.

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**Study design and sample size determination:** A cross sectional study was conducted in Fedis district from April 2019 to October 2019 in to determine the prevalence and associated factors of *Paramphistomum* in cattle slaughtered at Boko slaughter house using postmortem examination. The number of cattle required for the study was calculated based on the formula given. The sample size was determined based on expected prevalence of 50%, confidence interval of 95% and desired level of precision of 5%.

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

Where;

n=Required sample size,

P<sub>exp</sub>=Expected prevalence,

d=Desired absolute precision.

Therefore, based on the above formula 384 cattle were selected for this study.

**Methodology:** General physical examinations of animals were conducted during ante mortem inspection and details about gender, age, origin and body condition of the animals was recorded. During postmortem rumen and reticulum was systematically inspected to check the presence of adult *Paramphistomum*. If the evidence of *Paramphistomum* were found they are recorded separately. Then

secondary examination was conducted by further incisions of the rumen and reticulum. The parasite was examined macroscopically and microscopically to appreciate the morphology of adult flukes. Final identification of *Paramphistomum* was done based on morphology of flukes shape, posterior sucker (acetabulum), anterior sucker, terminal genitalium and tegumental papillae following the standard guidelines [8].

**Data management and analysis:** All of the data collected from each of slaughtered animals were entered into microsoft excels spread sheet and analyzed with SPSS version 20. *Chi-square* test ( $X^2$ ) was used to show the variation between different risk factors such as gender, age, body condition and origin of animals. ( $P<0.05$ ) was considered to be statistically significant.

## Results

Out of the total of 384 examined animals, 156 (40.6%) of animals were infected with *Paramphistomum*. The current finding showed that the infection was almost similar in females and males. However it shows slightly higher in old than adult but there was no statistical significant difference ( $p>0.05$ ) in relation to gender and age groups of animals (Table 1). This finding showed that, statistically significant variation ( $p<0.05$ ) with respect to origin the animals with highest prevalence of *Paramphistomum* was recorded in cattle brought from highland than mid highland and lowland areas (Table 2). This finding showed that, statistically significant variation ( $p<0.05$ ) with respect to body condition of the animals with highest infection was recorded in poor body conditioned animals followed by medium and good body conditions (Table 3).

| Risk factors | Variables | No. of examined | No. of positive | Prevalence | $X^2$ |
|--------------|-----------|-----------------|-----------------|------------|-------|
| Sexes        | Male      | 291             | 117             | 40.20%     | 0.06  |
|              | Female    | 93              | 39              | 42.10%     |       |
| Age groups   | Adult     | 284             | 109             | 38.40%     | 2.014 |
|              | Old       | 100             | 47              | 47.20%     |       |
| Total        |           | 384             | 156             | 40.60%     |       |

**Table 1:** Prevalence of bovine paramphistomosis based on gender and age groups of animals.

| Origin of animals | No. of examined | No. of positive | Prevalence | $X^2$  | P-value |
|-------------------|-----------------|-----------------|------------|--------|---------|
| Highland          | 140             | 71              | 50.70%     | 12.853 | 0.005   |
| Mid high land     | 140             | 56              | 40%        |        |         |
| Lowland           | 104             | 29              | 28%        |        |         |
| Total             | 384             | 156             | 40.60%     |        |         |

**Table 2:** Prevalence of bovine paramphistomosis based on body conditions of animals.

| Body conditions | No. of examined | No. of positive | Prevalence | $X^2$  | P-value |
|-----------------|-----------------|-----------------|------------|--------|---------|
| Good            | 90              | 30              | 33.30%     | 11.923 | 0.01    |
| Medium          | 200             | 74              | 37.20%     |        |         |
| Poor            | 94              | 52              | 55.30%     |        |         |
| Total           | 384             | 156             | 40.60%     |        |         |

**Table 3:** Prevalence of bovine paramphistomosis based on origin of animals.

## Discussion

Out of 384 selected animals, the overall prevalence of *Paramphistomum* was 40.6% that was in line with the study conducted in Ethiopia and Egypt [9,10] they reported 41.5%, 40.1% and 38.92% prevalence of *Paramphistomum* respectively. However, the current study found a higher rate of infection than studies conducted in Turkey and Ethiopia [11] they reported 8.95% and 6.7% respectively. On the other hand, this finding was slightly lower than the finding in Ethiopia who reported 65.7% [12]. This difference might be due to difference in sample size, season of the study, management system and environmental conditions.

Gender and age groups was not significant variation ( $p > 0.05$ ) in relation to infection rate. This is also in agreement with other study conducted Ethiopia and Iran [13] they reported insignificant difference between gender and age groups. This is due to the fact that all ages and both gender have the same chance to ingest the infective stage during grazing and equally susceptible to infection. This finding reported that the highest infection rate was recorded in poor body conditioned animals than medium and good.

There was significant difference ( $p < 0.05$ ) in relation to body conditions. This finding was in agrees with the findings in Ethiopia they reported significant variation. The difference of result may be due to the difference in immunity of the host and the fact that cattle with good body condition expected to be de-wormed and are more able to resist infection from others. To the fact that the flukes cause high protein loss in ruminants due to blood loss arising from their pluck feeding habits. It was similarly observed among the few cases which we encountered with heavy fluke infestation that the animals appeared markedly emaciated with poor body conditions [14].

The current study finding showed that, the highest prevalence of paramphistomosis was recorded in cattle brought from highland than mid highland and lowland areas of origin. There was statistically significant variation ( $p < 0.05$ ) was observed between origin of animals. This finding was agrees with from Ethiopia who reported significant difference in relation to origin of animals. But it was disagree with from Ethiopia who reported insignificant variation between origin of animals. These differences might be due to the differences in sample size, diagnostic technique, climate, ecology, and livestock management system. In general, this study revealed the importance of paramphistomosis infection in the study area in the short period of time which is six months of the years and only based on slaughtered animals may have some limitation on results.

## Conclusions

In this study, *Paramphistomum* was found to be prevalent in cattle. This will be a hindrance to the livestock production by causing remarkable direct or indirect losses of livestock productions and productivity in the study area. In the present study an overall

prevalence of 40.6% were infected by adult *Paramphistomum*. Age, gender, body condition scores and origin of animals were assessed as risk factors for occurrence of bovine *Paramphistomum*. Among the risk factors, body conditions and origin of animals was statistically significant variation ( $p < 0.05$ ) with infection rate of *Paramphistomum*, but gender and age groups was not significant difference. Therefore, based on the above conclusions the following recommendations were forwarded.

- Awareness creation for owners to improve feeds provision in order to obtain good body condition to provide sufficient level of resistance against infections.
- Integrated strategies should be implemented for control and prevention of infection using mass de worming animals by selected anthelmintic.
- Further detail epidemiological and seasonal study should be carried out, so as to design appropriate control strategies on the area.

## Conflict of Interest

I have not declared any conflict of interest.

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