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Prevalencia de haemonchosis en pequeños rumiantes alrrededor de Woreda Alameta - Prevalence of haemonchosis in small ruminants in and around Woreda Alameta

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ABSTRACT

Se realizó un estudio en la región de Woreda Alameta, Al sur de Tigray para estimar la prevalencia de Haemonchosis en pequeños rumiantes en cuatro explotaciones de la ciudad de Alameta, desde noviembre 2011 a marzo de 2012. Durante el período del estudio, se examinaron 613 Abomaso de pequeños rumiantes, 355 ovejas y 258 cabras. El predominio global en este estudio fue 38.6%, con un predominio de 22.8%, y se registró 15.8% respectivamente para las ovejas y cabras. La prevalencia se comparó con la especie, edad, sexo, origen, mes y condición corporal del animal. No se encontró diferencias estadísticamente significativas (P>0.05) entre los factores de riesgo de edad, sexo y especie; hubo sin embargo, diferencia significativa (p <0.05) entre el origen, meses y condición corporal de los animales; los parásito se diagnosticaron en los animales con pobre condición corporal (71.5%), seguido por la condición corporal media (36.7%) y el más bajo se registró en animales con condición del corporal buena (19.5%). La prevalencia más alta se registró durante el mes de noviembre (43.4%) y la prevalencia más baja se registró en el mes de febrero (30.8%). Por consiguiente, la evidencia epidemiológica de la presente investigación mostró que la Haemonchosis es una enfermedad considerablemente prevaleciente pequeños rumiantes en el área de estudio. Se recomiendan métodos estratégicos y buenas prácticas de dirección.

Palabras claves: Prevalencia, Haemuncosis, Pequeños rumiantes

ABSTRACT

A cross sectional study was conducted in Woreda Alameta, southern Tigray to estimate the prevalence of Haemonchosis in small ruminants in four different hotels of Alameta town from November 2011 to march 2012.

During the study period, 613 Abomasum of small ruminants, 355 sheep and 258 goats, were examined. The overall prevalence in this study was 38.6%, with a prevalence of 22.8%, and 15.8% were recorded for sheep and goats respectively. The prevalence was compared with species, age, sex, origin, month and body condition of the animal. There was no statistically significant difference (P>0.05) observed among risk factors of age, sex and species; however, there was statistically significant difference (p<0.05) noticed among origin, months and body condition of the animals in relation to the parasite was recorded in animals with poor body condition (71.5%) , followed by medium body condition (36.7%) and the lowest was recorded in animals having good body condition (19.5%).The highest prevalence was recorded during the month of November (43.4%) and the lowest prevalence was recorded the month of February (30.8%). Therefore, the epidemiological evidence of the present investigation showed that Haemonchosis is considerably prevalent disease of small ruminants in the study area. Hence, strategic control methods and good management practices are recommended.

Keywords*: Alameta, Haemonchus, Prevalence. Small ruminants*

1. INTRODUCTION

Ethiopia has a livestock population estimated to around 30-40 million of cattle, 25 million of sheep, 20 million of goats, 7 million of equines, 759,600 camels and 38 million of chickens (CSA, 2009). Agricultural sector in Ethiopia has the biggest contribution to the national gross domestic population (NGDP) and is the major contributor to the export of livestock production with 32% to agricultural gross domestic production and 18% to the export sector (Tegegn and Gebrewold, 1997).

Small ruminants play a great role in the economy of the world; they are a source of meat, milk, fiber, skin and generate cash income (Fraser, 1991). Sheep and goats assume a great share in the socioeconomic activities of about 85% of the population (Ayele *et al.*, 2003). Small holders in the high land and low land areas where there are mixed crop-livestock population own most sheep and goats in Ethiopia. There are integral parts of livestock sector of the economy (Gryseels *et al*., 1989).
The other important attributes of sheep and goats over the other livestock are they are highly adaptable to broad ranges of environment, have short generation cycles and have high reproductive rates which leads to high production efficiency and is also important to those poor people can afford few ewes since cost of them is less than other large animals. With little

inputs, small ruminant play an important role in the rural economy through provision of meat, milk generation of income by selling them and their products, saving of capital, manure and to the national economy thorough the export of live animals and their products to different regions of the world (Tibbo *et al*., 2003).

Despite the large livestock population of Ethiopia, the economic benefits remain marginal due to prevailing diseases, poor nutrition, poor animal production systems, reproductive inefficiency, management constraints and general lack of veterinary care. These diseases have a major impact on morbidity and mortality rates, with annual losses as high as 30–50% of the total value of livestock products of Ethiopia (Tibbo *et al*., 2003).

Endoparasites are responsible for the death of one third of calves, lambs and kids, and considerable losses of parts of carcasses condemned during meat inspection (Anon, 2005). It is well recognized that in resource poor regions of the world, helminth infections of sheep and goats are major factors responsible for economic losses through reduction in productivity and increased mortality (Perry *et al*., 2002).

Nematode parasites of small ruminants result in low productivity due to stunted growth, poor weight gain and poor feeding and water intake (Pedreira *et al*., 2006). The principal abomasal worms of small ruminants are *Haemochus contortus*, *Ostertagia circumcincta, Ostertagia trifuricata, and Trichostronglus axei. Homonchus contortus* is one of the most common abomasal worms of small ruminants which are known as “red stomach worm” or” wire worm “. It is the most prevalent and pathogenic parasite and also economically important of small ruminants (Urquhart *et al*., 1996). *Haemonchus contortus* is a species most commonly found in sheep and goats but *Haemonchus placei* is the usual species in cattle and there may be cross infection occur when small ruminants and cattle graze together but its severity is usually less (Radostits *et al*., 2000).

Haemonchus controtus has distributed throughout the world includes in Asia (Indonesia and India), Europe (Russia, Netherland and Italy), South America (Brazil), Africa (Ethiopia, Kenya, Sudan…) and also found in United States of America. These parasites has adapted to condition ranging from tropical to temperate regions (Dorny *et al*., 1996).

Haemonchosis in small ruminants is largely determined by the high fecundity of the female worms, the speed in which the infective larvae can develop in warm and humid conditions. However, the opportunities for transmission are restricted by the susceptibility of the larvae to desiccation and cold. In small ruminants loss occurs mostly in lambs and kids, especially those recently

weaned but yearling and mature sheep and goats also affected. The predisposing factors for prevalence of Haemonchosis in small ruminants include overcrowding, lush pasture, host susceptibility, low plane of nutrition, humid and warm condition (Wallace *et al*., 1995). The major impacts of *Haemonchus contortus* in small ruminants is associated with the blood sucking activity of the parasites which responsible for extensive loss of blood, each worm suck 0.05 milliliter of blood per a day, therefore, an animal having 500 *Haemonchus contortus* may loss about 250 milliliter of blood per day (Urquhart *et al.,* 1996) resulting decrease in erythrocyte, hemoglobin, packed cell volume, body weight and wool growth (Rasool *et al*., 1995). On global basis *Heamonchus contortus* probably causes more losses than other species of nematodes in small ruminants (Marquardt and Demare, 1985), live weight gains are lower and there may be weight loss and even mortality in severe infections especially if the diet is deficient in protein. All ages are susceptible to Haemonchus infection but severe in lambs (Shapiro, 2005).

The primary effect of Haemonchosis is economic losses due to mortality and loss in production (Barger and Cox, 1984). The cardinal sign of Haemonchosis is pallor of the skin and mucous membranes, loss of plasma protein results in anasarca frequently manifested externally as a sub-maxillary edema (bottle jaw). Feces are well formed; diarrhea occurring only in infections complicated by the presence of such species as Trichostrongylus species and Cooperia species. Lambs and kids are the most affected members of the flock and older sheep and goats under stress also may have total anemia (Bowman, 2003). It is characterized by causing retarded growth, loss of productivity, loss of appetite, anemia, edema, weight loss (Iqbal and Jabber, 2005).

Diagnosis is made on the basis of clinical signs, grazing history season, demonstrating eggs of fecal examination is confirmative but specific identification is difficult and required specialized laboratories and observation of adult parasite during post mortem examination (Aiello and Mays, 2000).

Even though in temperate regions, the severity of gastro intestinal (GI) parasitic diseases in most livestock farms is now minimized through the seasonal use of anthelmentics and pasture management, the problem is still persists in the vast majority of tropical and sub tropical regions. Among the gastroinstinal parasites, *Haemonchus controtus* is the species with greatest pathologic and economic importance in small ruminants. Therefore, it is important to asses the type and level of parasitism in ruminant livestock, in order to be able to determine the significance of parasite infections since little known about the prevalence of the parasite in study area and to recommend the most beneficial and economically acceptable control

measures. The determination of the risk factors associated with parasite occurrence can be used to design an effective control strategy (Ng`ang`a *et al*., 2004).

Therefore, the objective of this study was:

To determine the prevalence of ovine and caprine Haemonchosis in and around Alameta Woreda, Ethiopia.

2. MATERIALS AND METHODS

2.1. Study Area

The study was conducted from November, 2011 to March, 2012 in Alameta woreda. Alameta is located in the southern part of Tigray near the border of Amhara region. It is 180km far from Mekelle and 600km from the capital city of Ethiopia (Adiss Ababa). It is found at latitude of 12.31^0, longitude of 39.41^0. The area has an altitude of 1580 meters above sea level and experiences a bimodal, rain fall pattern with a long rainy season from June to August and a short rainy season from March to April. Mean annual rainfall and mean temperature is 727mm and 27 ^oC, respectively. (Alamata woreda and rural development office, 2011).

2.2. Study Animals

A total of 613, with 355 sheep and 258 goats of abomasums were examined and used to estimate prevalence of *Haemonchus conturtus*. Both male and female animals were slaughtered and were grouped in to two age groups (<1.6 year, n=151) and (>1.6 year, n=462). Moreover, the study included sheep and goats that have body condition ranging from poor, moderate and good as per Kempster *et al*., 1982). Four days in a week visit was made to the randomly selected four hotels of Alameta town that were supplied by local traders from different areas, Alameta, Korem and Woldya (table 1).

2.3. Study Design

A cross sectional epidemiological study was conducted from November, 2011 to March, 2012 to determine (estimate) the overall prevalence of small ruminants (Ovine and Caprine) Heamonchosis in and around Alameta. The prevalence was determined in respect to the number of risk factors such as host factors (age, sex, species and body condition of the animals), and the environmental factors included (origin of the animal and months).

2.4. Sampling Strategy

A simple random sampling method was conducted (selected) in sheep and goats to study Heamonchus infestation. Whether the presence or absence of the parasite was detected only after slaughtered of the animal.

The sample size for the study animals was determined, on the basis of 50% expected prevalence of Haemonchosis in and around Alameta. The desired sample size for the study was calculated using the formula given by (Thrustfield, 1995) with 95% confidence interval and at 5% absolute precision.

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

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

1.96=Z- value of 95% confidence interval Accordingly 613 total samples were calculated to perform the test by the above formula.

2.5. Methods of Examination

2.5.1. Ante mortem inspection

Ante mortem investigation was performed a few hours before slaughter. The origin, age, sex, body condition, species and general health condition of the animal was properly recorded.

The body condition of the sheep and goats were determined using the body condition scoring method (Gatenby, 1991 and Mike, 1996).

2.5.2. Abomasal worm recovery and identification of the worm

Four days per a week visit was made to the purposively selected hotels and a total of 613 abomasums were removed from their abdominal cavity and legated the end opening (how).Then the abomasums were opened along their greater curvature and their content was washed (where). Then the parasites were identified by close visualization for the presence of adult Haemonchus (Hansen and Perry, 1994). The worms were collected and preserve at 10% formalin and identified based on the characteristics given by (Soulsby, 1982).

2.6. Data Analysis

The data collected from the study area was entered in to Microsoft excel spread sheets and analysis was performed using SPSS statistics (SPSS for windows, version 17) and the chi-square test to compute the association between explanatory variables (species, age, body condition, origin, sex and months) and positivity 95% level of significance (P< 0.05 set for significance) was used to determine significant differences (Thrustfield, 1995).

3. RESULT

A total of 613, with 355 and 258 abomasums of sheep and goats were examined on post mortem for the presence or absence of *Haemonchus contortus*, respectively.

From those examined sheep and goats, 140 and 97 were positive with adult Haemonchus respectively. The overall prevalence of the parasite in this study was therefore 38.5% (Table 1)

Table 1: Prevalence of Haemonchus species based on the animal species

Species of the animal	Number of animal examined	Number of positive	Prevalence	X^2 (P-values)
Sheep	355	140	39.5%	0.871(0.341)
Goat	258	97	37.5%	
Total	613	237	38.5%	

There were statistically significant variation in prevalence of Haemonchus among sheep and goats having different body condition. The highest prevalence seen in poor body condition animals (71.5%) while the lowest prevalence observed in good body condition animals (19.5%) (Table 2).

Table 2: Prevalence of Haemonchus in small ruminants based on body condition

Body condition Score	Number of animal examined	Number of positive	Prevalence	X^2 (P-values)
Poor	95	68	71.5%	18.02(0.000)
Moderate	395	145	6.7%	
Good	123	24	19.5	

The highest prevalence was observed in animals that were brought from Woldya (47.9%) while the lowest was recorded those animals originated from alameta.There was statistical significance variation in prevalence of *Haemonchus contortus* among the origin of the animals (Table 3).

Table 3: Prevalence Haemonchus in small ruminants based on the origin of the animal

Origin of the animal	Number of animal examined	Number of positive	Prevalence	X^2 (P-values)
Alamata	`179	49	27.4%	21.016(0.000)
Korem	148	51	34.5%	
Woldya	286	137	47.9%	

An attempt was made to relate the influence of age on the prevalence of the parasite. There was no statistical significant variation in prevalence of *Haemonchus contortus* among the studied age group (table 4).

Table 4: Age and status cross tabulations/wise prevalence of Haemonchus in sheep and goats

Age of the animal	Number of animal examined	Number of positive	Prevalence	X^2 (P-values)
>1.6 year	462	175	37.9%	0.86(0.162)
<1.6 year	151	62	41%	
Total	613	237	39.5%	

There was no statistically significant variation in prevalence of Haemonchus among sex differences. The prevalence factor of sex was independence having almost similar prevalence in Male and Female (Table 5).

Table 5: Prevalence of Haemonchus in small ruminants based on sex of animal

Sex of the animal	Number of animal examined	Number of positive	Prevalence	X^2 (P-values)
Male	437	169	38.7%	0.567(0.341)
Female	176	68	38.6%	
Total	613	237	38.65%	

The effect of season (month) was recorded on the prevalence of Haemonchus in small ruminants. The highest prevalence of Haemonchus was observed during the month of November (43.4%) while the lowest prevalence was observed during the month of February (30.8%) (fig).

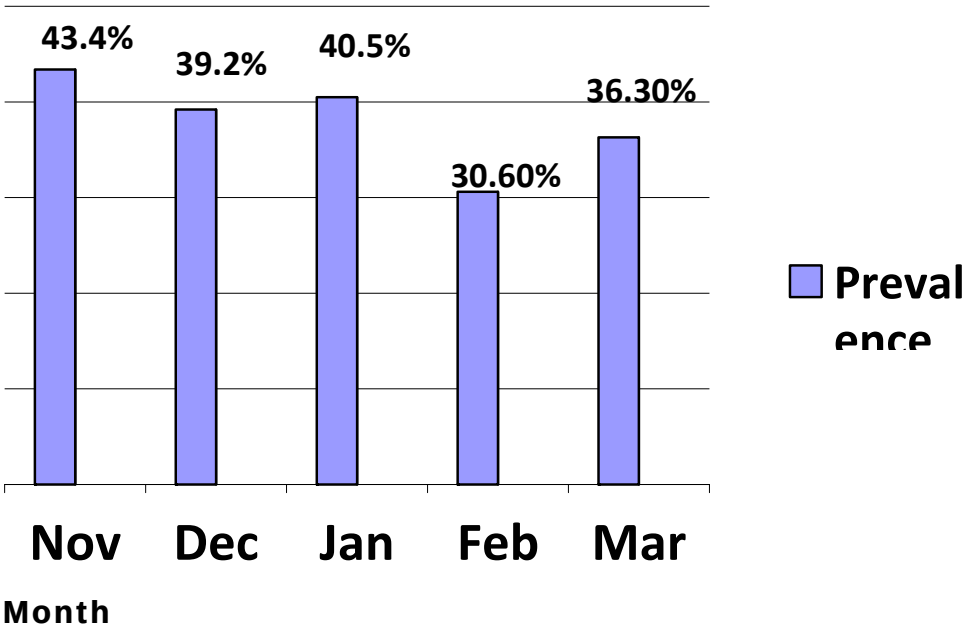

Figure 1: Prevalence of *Haemonchus Contortus* based on Month.

4. DISCUSSION

The present study revealed that the presence of *Haemonchus contortus* parasite with significant prevalence of 38.6% (n=237) in sheep and goats. Generally, the presence of Haemonchus parasite with significant prevalence of 39.5% (n=140) and 37.5% (n=97) in sheep and goats respectively. In this study it indicates that Haemonchosis is one of the prevalent Endoparasites of small ruminants in the study area. In the previous studies, various workers reported variable prevalence rate of Haemonchosis in different geographical areas. However, the prevalence may vary from country to country and even within the country.

This result was contrary to the previous studies reported by researchers from Ethiopia and different parts of the world. Kumsa (2007) and Wossene (2007) reported 91.1% and 80% prevalence on Ogaden sheep and goats respectively. This may be due to different in natural resistance of the host and management practices of the animal owners. Thomas (2007) reported 81.1% in Awasa, Ethiopia. Naseem *et al*. (1987) reported 72% from central Punjab, Pakistan, Fakae (1993) 90-98% from eastern Nigeria and El-azazy (1995) 47.9% from Jaddah and Saudi Arabia. The present finding was lower than the previous findings. This may be due to different management practices, natural resistance of the host, during treatment schemes season and environment factors.
There was statistical significant difference (P<0.05) among origin of the animals, month's and body condition in the prevalence of Haemonchosis.

The disease Haemonchosis causes poor body condition in small ruminants (Pedreira *et al*., 2006). Sheep and goats with good body condition are in high plane of nutrition and they are resistant to the disease and animals with poor body condition are in low plane nutrition and are more susceptible to parasitic infection due to decreased resistance or immunity (Radostits *et al*., 2000).

During the study period, the highest prevalence of Haemonchosis was recorded the animals that brought from Woldya (47.9%, n=137). This may be due to the environmental factors (warm and humidity) those facilitates the distribution of the parasite to the grazing pasture because of the geographical area which is easy predisposing with flood especially during the rain season.

There was no significant difference (P>0.05) in the prevalence of Haemonchus in releation to the risk factors (age, species, sex). Even though the variation was insignificant, the study revealed that prevalence was higher in below 1.6 year (41%, n =62) than above 1.6 year (37.9%,n=175). This result is closely related to the findings of Assoku (1981), Gibbs (1936), Maqsood *et al*. (1996). It was recognized that animals below 1.6 year of age are more susceptible to parasitic infection than the adults (Gamble and Zajac, 1992). This may be due to the fact that with advancement of age, vigor the animal becomes better and they develop resistant against the parasitic disease (Silverman and Patterson, 1960).

There was no significant difference in the prevalence of Haemocnhus in sheep and goats though there was high prevalence rate in sheep (39.5%, n=14) than in goats (37.5%, n=97). This may be due to sheep are more grazing in pasture than these of goats (Urquhart, *et al*., 1996).

The insignificance of sex factor indicating that prevalence of Heamonchus is sex independent; both sexes are almost equally susceptible to Haemonchus, due to equal chance of the sheep and goats (both males and females) to be infected with the parasite.

In seasonal wise, it was observed the highest prevalence of Haemonchus during the month of November 43.4%, n=63), and the lowest prevalence was recorded during the month of February (30.6%, n=32). There was statistically significant difference (p<0.05) in the prevalence of Haemonchus among the studied months. These finding are consistent with those of Maingi *et al.* (1993), Lateef *et al*. (2005). This may be due to the high biotic potential of Haemonchus result in rapidly assuming dominance at times when environmental conditions in pasture are favorable for the development and survival of free living stages.

The prevalence rate of Haemonchus started to decrease steadily from November to February and increase at the month of March (36.3%,n=29). This may be due to the prolific character of Haemonchus in warm and wet season and decreases it prolific character in dry season. The present finding showed that the infection was higher during the wet months than the dry months and this was similar to the findings of Keyyu *et al*. (2005) and Vlasoff *et al*. (2001) .The rain fall pattern revealed that favorable environmental conditions for the development and completion of the life cycle of Haemonchus.

5. CONCLUSION AND RECOMMENDATION

Small ruminants are an integral part of the livestock sector of the economy and the mainstay of livelihood of the majority population especially in developing countries like Ethiopia. However, the economic benefits remain marginal chiefly due to prevailing disease. Among the diseases of sheep and goats that restraint the survival and productivity of small ruminants is Haemonchus contortus being of over wheeling significance. Haemonchosis is a common disease in all but greater in the coldest regions. High economic impact is seen in sheep and goats in tropical and warmer temperate countries especially where there is good summer rainfall. It is blood sucking parasite of the ovines and caprines and causes loss of production, weight loss and death. The prevalence of Haemonchus species in this study area this prevalence is mostly associated with the epidemiological factors such as body condition, months and origin of the animals. The epidemiological evidence of the present investigation showed that Haemonchsis is considerably prevalent diseases in the study area. Generally, the presence of risk factors like warm and humidity, poor animal management, and seasonal scarcity of feed and other concurrent diseases in the study area favors the disease of distribution.

From the above conclusion, the following recommendations are for warded:

- There should be strategic and regular anthelminitic treatment and pasture management that enable to control of the disease.
- Animals should be kept in high plane of nutrition in order to develop disease resistance.
- Farmers should be educated regularly and should be prepared to enhance and update the awareness of the professionals and stalk holders to the status of the disease and its control strategies.
- There should be further study on epidemiology on identification of Haemonchus species in the study area.

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