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Prevalence of Ovine Heamonchosis in and around Nekemte Town, East Wollega Zone of Oromia Regional State, Western Ethiopia

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Abtract: Haemonchosis is common disease and one of the most pathogenic nematodes of sheep caused by *H.contortus*which hinders the production and productivity of sheep in Ethiopia. A cross-sectional study was carried out to determine the prevalence of ovine heamonchosis from November 2015 to April 2016 at selected four urban peasant associations (PAs) and three peasant associations in and around Nekemte town of East Wollega zone of Oromia regional state, western Ethiopia. Fecal samples from 384 sheep were collected and examined by using Baerman technique for parasitological examination. The overall prevalence of haemonchosis in sheep was 121 (31.5%). The prevalence was compared with, age, sex, origin and body condition of the sheep. Body condition score was found to be statistically significant ($P < 0.05$) with highest prevalence in poor (57.4%), followed by medium (31.4%) and good body condition (19.2%). However, there was no statistically significant difference (P>0.05) observed among age, sex and origin. The prevalence of haemonchosis in males and females was 30.67% and 32.1% respectively. With age group highest prevalence showed in sheep above three years (35.2%), followed by age between one to three (33.6%) and bellow one year (28%). Based on origin prevalence was vary with the highest and lowest prevalence of parasite was found Bekenisa Kese (41.5%) and Cheleleki (22.2%) respectively. The current study revealed that ovine Heamonchosis was the constraint for sheep production in the study area. Therefore, effective prevention and control should be designed.

Key words: Haemonchosis · Nekemte · Prevalence · Sheep

INTRODUCTION

Ethiopia has the largest livestock and draft animal population in the African continent which approximately 56, 706, 389 cattle, 29, 332, 382 sheep, 29, 112, 963 goat, 2, 033, 115 horses, 400, 329 mules, 7, 428 donkeys, 1, 164, 106 camels and 56, 866, 719 chickens found in the country [1]. 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 [2].

Sheep is an integral part of the livestock sector of the economy [3]. The special attributes of sheep over the other livestock resources include that they are highly adaptable to broad ranges of environment, have short generation cycles and have high reproductive rates which lead to high production efficiency and poor people can afford few ewes since cost of them is less than a cow [4-5]. With little inputs, sheep play an important role in the rural economy through provision of meat, milk, cash income, accumulating capital, fulfilling cultural obligations, manure and contribute to the national economy which can be incurred due to the export of live animals, meat and skins [6].

Endoparasites are responsible for the death of one-third of sheep and considerable losses of parts of carcasses condemned during meat inspection. It is well recognized that, in resource poor regions of the world, helminthes infections of sheep are major factors responsible for economic losses through reduction in productivity due to mortality, stunted growth, poor weight gain and poor feed utilization [7] sheep production and productivity is still very low in relation to a huge numbers in the country due to inadequate and poor quality of animal feed, limited veterinary services,

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widespread of diseases, lack of proper technology package, infrastructure and marketing problems [8].

Heamonchus controtus (*H. controtus)* is one of the important endoparasites of sheep. The first and second stages of larvae are free-living organisms and the host ingests the third stage larvae starting the infection. Adults of the parasite are found on the surface of the mucosa (the lining of the stomach). Both the larvae (L4) and the adults of Haemonchus species can suck 50 ml of blood/day which cause severe anemia and reduced productivity. A heavy infection of the parasite (20,000-30,000 worms) can kill all ages of sheep mainly during summer months in warm and humid climates [9].

Diagnosis of the disease is made on the basis of clinical signs, grazing history season, demonstrating eggs of fecal examination is confirmative but species identification is difficult and required specialized laboratories and observation of adult parasite during post mortem examination [10].

The livestock population is high in and around Nekemte town which plays a substantial role in the livelihood of the farmers for the agricultural community in both the market and the household level. Despite their population the benefits obtain from livestock is low due to a number of factors like parasite infestation and mismanagement. Among parasite infestation, heamonchosis cause a problem on ovine and no study done on the prevalence of ovine haemonchosis in the study area. Therefore, the objective of this study was to determine the prevalence of Ovine haemonchosis and to assess associated risk factors in the study area.

MATERIALS AND METHODS

Study Area: The study was conducted in and around Nekemte town, East Wollega zone at Oromia regional state, Western Ethiopia. It is located about 328 kilometers from Addis Ababa, capital city of Ethiopia. The average temperature in the area is 21°C. The zone receives the minimum annual rainfall of approximately 1450mm and the maximum annual rainfall of 21500mm with the average rainfall of 1800mm. According to East Wollega Zonal Agricultural Office, the altitude of the study area ranges from 1300-3140mm above sea level and the district has various topographic features. In terms of livestock population of cattle in head 85,584, sheep 14,702, goat 11,861, equine 98,674, chicken 94,276. Mixed crop and livestock production system in which cattle and sheep kept as the major livestock, which are highly important for the livelihood of the local population Crop and livestock sales are important source of income for all wealth groups; the poorer groups also do agricultural labor such as weeding and harvesting and sell firewood [11].

Study Animals: The study was conducted on 384 randomly selected local breed sheep which were selected from four Peasant Association (PA) and three PAs which surrounded Nekemte town. The management system for all sheep was extensive in which animals kept under free grazing. Of these animals, 67 were from Burka Jato, 54 from Cheleleki, 47 from Darge, 53 from Bekanisa Kese, 45 from Gari, 62 from Negasa and 58 from Jiregna. Examination and evaluation of body condition were accomplished during sample collection. They were classified as poor, medium and good by observing the body condition of the animals in the field. The ages of animals were also estimated by the dentition method [12] and from owner information.

Study Design: A cross-sectional study was used to determine the prevalence of ovine heamonchosis in the study area from November 2015 to April 2016. In this study, the Urban Peasant Associations and Rural Peasant Associations were selected based on their accessibility to transport and information from the administrative Peasant Association (PA) and District's manager. Study animals were selected with a simple random sampling.

Sample Size Determination: The number of animals required for the study was determined using the formula given by [13] for simple random sampling, by using 95% level of confidence, 50% expected prevalence and 0.05 desired absolute precision.

$$n = \frac{1.96^2 \ Pexp\ (1\text{-}Pexp)}{d^2}$$

where:

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

Accordingly, 384 sheep were sampled for the study.

Study Methods: Fecal sample, directly from the rectum was collected from randomly selected sheep. The samples were kept separately in plastic bags and transported to the laboratory room. First the feces were examined by flotation techniques (annex 1) to identify the presence of eggs of the parasite. Then, the fecal culture (annex 2) was done for hatching the larvae up to ten days in room temperature Finally Berman techniques were done to identify the larval of parasite.

Data Analysis: The data recorded was entered into Microsoft excel data base system and stastical analysis was done by using SPSS 20 version software. The association between heamonchosis infestation rate and study variables (such as age, sex, BCS and origin) was determined by personal chi- square test. A statistically significant association between variables exists when $p<0.05$ at 95% confidence level.

RESULTS

Out of 384 examined sheep, 121 were positive with *H. controtus* with overall prevalence 31.5%. There were statistically significant variations ($P<0.05$) among sheep having prevalence seen in poor body condition (57.4%) and medium (31.48%) while the lowest prevalence observed in good body condition (19.2%) (Table 1).

There was no statistical significant variation in prevalence of *H.controtus* between sex differences ($P>0.05$) with high infection rate was in female (Table 2).

Prevalence based on age group revealed that high infection rate observed in sheep above three years old but, it was no statistical significant variation ($P> 0.05$) (Table 3).

The prevalence based on origin of the animals indicated that highest prevalence (41.5%) was in Bekanisa Kese while the lowest prevalence from Cheleleki. however there was no statistical significance variation ($P> 0.05$) (Table 4).

DISCUSSION

The result of present study revealed that haemonchosis was one of the diseases of sheep in study area, with overall infestation rate of 31.5%. The overall prevalence of current study was lower than the previous studies conducted in different geographical areas of Ethiopia, which includes 91.2% [14], 81.35% [15], 96.5% [16], 67.57% [17], 67.2% [18], reported in Ogaden, Komolacha, arid and semi arid zone of eastern Ethiopia, in and around Finote Selam, Arsi Negelle district, oromia regional state respectively. This variation may be due to variety of factors such as environmental factors, grazing habits, level of education and different management practices, study season, distribution and survival of parasites.

The current study also demonstrated an association between the body condition of sheep and the occurrence of heamonchus infections, the association has statistical

Table 1: Prevalence of *H. controtus* based on the body conditions

Body condition score	Nº examined	Nº of positive	Prevalence (%)	χ^2 (p-value)
Poor	54	31	57.4	24.659 (0.000)
Medium	216	68	31.48	
Good	114	22	19.2	
Total	384	121	31.5	

Table 2: Prevalence of *H.controtus* in sheep based sex

Sex of animal	Nº of examined	Nº of positive	Prevalence (%)	χ^2 (P-value)
Female	221	71	32.1	0.092(0.85%)
Male	163	49	30.67	
Total	384	121	31.5	

Table 3: Prevalence of *H. controtus* based on Age

Age of animal	Nº examined	Nº of positive	Prevalence (%)	χ^2(P-value)
<1	150	42	28	1.426(0.490)
1-3	217	73	33.6	
>3	17	6	35.2	
Total	384	121	31.5	

Table 4: Prevalence of *H. controtus* based on origin

Origin of animal	Nº of examined	Nº of positive	Prevalence (%)	χ^2 (P-value)
Burka Jato	67	25	37.3	7.967(0.241)
Chalalaki	54	12	22.2	
Darge	47	15	31.9	
Bekanisakase	53	22	41.5	
Gari	45	16	35.5	
Negasa	62	18	29	
Jiregna	56	13	23.2	
Total	384	121	31.5	

significance (P<0.05). This could be explained by the occurrence of infections in 57.4%, 31.48% and 19.2% of sheep with poor, medium, good body condition respectively. This might be due to that animals with poor body condition are high susceptible for haemonchosis than those medium and good body condition score which agrees with previously reported by [17-19].

The study also demonstrated no significant variations in prevalence among different age groups, between both sexes and origin (p> 0.05). This is explained as prevalence with age <1, 1-3 and >3 years was 28%, 33.6% and 35.2% respectively. All age groups of sheep are susceptible to *H. controtus* infestation and most of the previous studies have observed higher rate of haemonchosis in young [20] which is disagree with the current study. The current study agrees with the study conducted in Finote Selam which was higher in adult [17]. This is probably due to the facts that adults might be stressed on seasonal change and developed resistance against the frequently used anthelminthic while the young ones might be respond to anthelminthic that minimizes their infection rate.

Similarly, Female animals were affected (32.1%) than male (30.6%). The current study is disagree with reportes by [21] as 80.9% and 77.1%, in males and females respectively, in Gonder town and [17] who reported 73.22% and 64.71% in male and females respectively in and around Finote Selam in Amhara region, [18] in male 60% and female 59.7% respectively. Arsi Negelle destrict oromia regional state. It is assumed that sex is a determinant factor influencing prevalence of haemonchosis and this might be due to that female are more susceptible to parasitism due to physiological factors that cause stress and decreased immune status.

Prevalence among the origin was explained as 37.3%, 22.2%, 31.9 %, 41.5%, 35.5%, 29%, 23.2% in Burka Jato, Cheleleki, Derge, Bekenisa Kese, Gari, Negasa, Jiregna, respectively, which were not statistically significant (P>0.05) due to their similar agro-ecological habitat and the environment (humidity) those facilitate the distribution of the parasite.

The results of the current study indicated that *H. controtus* is the main cause of low productivity of sheep in the study areas. Therefore, progressive control methods aimed at reducing infection burden would be necessary to minimize the impact of heamonchosis. Since success of control options depends on active community participation, mobilizing the community and increasing their participation in control activity could play a key role in reducing the impact of the disease and increasing animal productivity.

CONCLUSION

The result of this study showed that an overall prevalence 31.5%. It is the problem in the area that could cause major economic loss in sheep production due to; mortality, losses for treatment and control measures. The distribution of the parasites is more common in poor body condition animal due to low immune status which needs great attention when designing the control programs of the parasite. In addition, the production level of the animals might contribute to the occurrence of the parasite as most of the sheep were using extensive grazing system in the study area.

Based on the above conclusion some recommendations were forwarded: There should be strategic deworming and pasture management that enable to control the disease; animals should be kept in high plane of nutrition in order to develop disease resistance and the community should be aware about the importance of the disease.

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