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Prevalence and Associated Risk Factors of Sheep Lice in Tiyo District Highland Area of Arsi Zone in Oromiya Regional State, Ethiopia

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Abstract

This study was done from November 2011 to March 2012.A total of 384 sheep from Tiyo District of Arsi Zone, around High land area of Assela were selected for the present study. Cross sectional study was conducted to determine the prevalence of lice in sheep and to identify major species of lice in the study area. The densities of lice were determined through counting after parting of the fleece/wool at five (5) points on a length of 10 cm in different regions (neck, shoulder, back, rump and flank) on both sides of the body. The overall prevalence of lice infestation was found 53.9% (n=384). From this Bovicola takes the highest prevalence in each variable (sex, age, body condition and month) where as *linognathus ovillus* had lower prevalence in each variable. The prevalence of lice for female and male was 53.26% and 56.4%, respectively. Adult and young infestation rate of lice was 51.52% and 57.5%, respectively. Prevalence of lice Infestation in good, medium and poor body condition was 64 (36.8%), 94 (62.7%) and 49 (81.7%) respectively. The prevalence of lice in November was 94 (74.44%), in January 42 (32.8%) and in February 71(55.5%). There is statistically significant difference in the occurrence of lice infestation between body condition scores and months ($p<0.05$) but there is no statistically significant difference between age and sex ($p>0.05$). These result shows that lice infestation has a great effect on the skin quality and on the production of meat and milk. From this result it can be concluded that occurrence of lice depends on body condition and climatic factor therefore owners should practice good management system by keeping the hygiene of animal and by avoid mixing of healthy animals with diseased once.

Keywords: Assela; Lice; Prevalence; Sheep

Introduction

In Ethiopia small ruminants comprise large proportion of livestock resources, constitute about 30% of the total live stock population of the country and are among important contributors to food production in Ethiopia, providing 35% of meat consumption and 14% of milk consumption [1].The country is an ideal case for studying livestock diversity in the context of developing regions. It is route of sheep migration from Asia into Africa Ethiopia also, has large population [2] and diverse traditional sheep breeds spread across diverse ecology, communities and production system. At the national level, sheep/goat account for about 90% of the live animal/meat and 92% of skin and hide export trade value [3]. At the farm level sheep contribute as much as 22-63% to the net cash income derived from livestock production in the crop-livestock production system [4].

Pediculosis instead of lice are among the major disease of sheep and cause serious economic loss to farmers through mortality, decreased production and reproduction, down grading and rejection of skins which also affect the tanning industries. According to tanneries report, skin diseases [5] due to external parasites cause 35% sheep skin rejection [6] among highly prevalent and pathogenic ectoparasites of sheep [7]. Both biting and sucking lice affect small ruminants. The important species of lice found in sheep and goats are the genus Bovicola and Linognathus and the important species in sheep being Linognathus ovillus (sucking face louse), Linognathus africanus, Linognathus pedalis (sucking

foot louse) and Bovicola ovis (biting louse). In goats Linognathus stenopsis (sucking blue louse), Linognathus africanus, Bovicola caprae (biting louse), Bovicola limbata and Bovicola crassiceps are reported [8].

All species cause irritation of the skin, stimulate scratching, rubbing, and licking leading to restlessness, these have great effect on sheep production and skin quality [6]. Accordingly, the enormous economic losses induced by Lice in sheep necessitate detailed investigation on their incidence in order to organize efforts to at least minimize these losses. This study is therefore aiming to assessing the prevalence of lice and determining the magnitude of lice infestation in relation to sex, age, body condition and month.

Materials and Methods

Study Area

The present study was conducted from November 2011 to March 2012 in Tiyo district of Arsi Zone, around highland area of Assela, capital town of Arsi zone, which is located at 175 km southeast of Addis Ababa [9], and the altitude and annual rainfall of the area ranges from 502-4130 meters above sea level and 200-400 mm with mean annual temperature of 22.5°C, respectively. It is one of the highly populated areas in Ethiopia with estimated human population of 2,521,349 and livestock population of cattle-82,190; sheep-51,292; goat-8, 11,479; poultry- 5, 62,915; equine-22,055.[10,11].

Study Design and Sampling Strategies

A cross sectional study was conducted to determine the prevalence of lice in indigenous sheep in the study areas. With the assumption of possible prevalence rate of the disease 50%, absolute desired precision of 5% and confidence level of 95% was considered for estimation prevalence in the simple random sampling according to thru field [12]. The total sample size was 384 sheep.

Study Population

The present study involved sheep kept under extensive (mixed-crop livestock production) production system in selected peasant associations of Tiyo district. A total 384 sheep was randomly selected from 19,453 sheep population in the district. The sampling was made by 3 rounds in different months of the study period.

Clinical Examinations

The animals were randomly selected and clinically examined for presence of the ectoparasites. Prior to clinical examination, the sex, ages, body condition scores of the selected animals were recorded. The different age groups such as young and adult have been selected for the present study and the age group was done as per standard method of [13] body condition score of the animals will be considered as poor, medium and good; by modifying the system described by [14] for sheep. The clinical examination was performed by multiple fleeces parting in the direction opposite that in which hair or wool normally rests and visual inspection and palpation of the skin for parasites on neck, shoulder, wither, flank and ramps are sites of concern. In each of the mentioned body parts both on the either sides /left and right/ a place 10 cm long is parted for the presence of lice and if found in all or one of the 10cm long place. Those sheep found infested by parasites was considered positive. The type of parasites was identified on the basis of their morphological structure as described in [15].

Specimen Collection and Examination

Those detected lice that are unidentified during clinical examination was collected by forceps/hand picking, with hairs from their attachment site, put into a clean separate container(universal bottles), labeled and kept preserved with 70% ethyl alcohol before transportation to Asella regional veterinary laboratory for detailed laboratory examination as described by [16].Then the collected ectoparasites was examined by stereomicroscope and identification was performed according to the identification key given by [15].

Data Management and Analysis

The data was subjected for statistical analysis by entry in to Microsoft Excel spread sheet and descriptive statistics like prevalence and analytical statistics such as chi- square ($\chi 2$) was conducted by using SPSS17.0 for determining the significance of association between age groups, sex, body condition scores, and month with lice infestation. For the purpose of this study, 95% confidence level and $P<0.05$ was used for significance.

Results

Overall Prevalence of Lice

Out of the total sheep population examined for lice infestation, 207 (53.9%) sheep were infested with lice. The major species of lice were Bovicola ovis and Linognathus ovillus species, from this the most prevalent species was Bovicola ovis with an overall prevalence of 180(86.9%) while Linognathus ovillus species was only 4(1.9%) and mixed lice infestation was 23(11.6%). The commonest site of lice attachment was the skin of neck, shoulder, flank and rump.

Prevalence of Lice in Sheep by Different Age Groups

Out of the total population of sheep examined for lice infestation 231 (60.2%) sheep was adult and 153 (39.8%) was young. The overall prevalence of lice infestation in adult was 119 (51.52%) where as in young it was 88 (57.5%) of this the most

prevalent lice species were Bovicola ovis with the prevalence of 106 (89.1%), where as Linognathus ovillus species have 0 prevalence and mixed lice infestation was 13 (10.9%) in adult and in case of young (lamb) Bovicola ovis 74 (84.09%), Linognathus ovillus species 4 (4.54%) and mixed lice infestation 10 (11.36%) (Table1). In both age groups there is no statistically significant difference (p= 0.248).

Lice	adult	young
Bovicola ovis	106(89.1%)	74(84.09%)
Linognatus ovillus	0(0%)	4(4.54%)
Mixed lice	13(10.9%)	10(11.36%)
Overall lice	**119(51.52%)**	**88(57.5%)**

Table1: Prevalence of lice in sheep by age wise.

For Total infestation Chi square (df=1) =1.334, P = 0.248

Prevalence of Lice in Sheep by Different Sex Group

Out of the total population of sheep examined for lice infestation 306 (79.7%) sheep were female and 78 (20.3%) are male. The overall prevalence of lice in female is 163 (53.26%) and in male are 44 (56.4%). The most prevalent species is Bovicola ovis with the prevalence of 142 (87.12%), whereas Linognathus ovillus2 (1.23%) and mixed 19 (11.66%) in female sheep. In male sheep the prevalence of Bovicola ovis was 44(100%), Linognathus ovillus 4 (9.1%) and mixed infection is 4 (9.1%) (Table2). In both sex groups there is no statistically significant difference (p= 0.619).

Lice	Female	Male
Bovicola ovis	142 (87.12%)	44(100%)
Linognatus ovillus	2(1.23%)	4(9.1%)
Mixed lice	19(11.66%)	4(9.1%)
Overall lice	**163 (53.26%)**	**44(56.4%).**

Table 2: Prevalence of lice in sheep by sex wise.

For Total infestation Chi square (df=1) =0.247, P= 0.619

Prevalence of Lice Infestation in Sheep by Different Body Condition

From the total population of sheep examined for lice infestation 174 (45.3%) sheep have good body condition, 150 (39.1%) sheep have medium body condition and 60 (15.6%) sheep have poor body condition. The overall prevalence lice infestation of good, medium and poor body conditions was 64 (36.8%), 94 (62.7%) and 49 (81.7%) respectively. The most prevalent species was Bovicola ovis with the prevalence of 58(90.6%), Linognathus ovillus 2 (3.13%) and mixed lice infestation 4 (6.25%) in good body conditioned animal. In medium body condition animal the prevalence of Bovicola ovis was 79 (84.04%), Linognathus ovillus 1 (1.064%) and mixed lice infestation 14 (14.89%). In poor body condition prevalence of Bovicola ovis was 43 (87.76%), Linognathus ovillus 1 (2.04%) and mixed lice infestation 5 (10.2%) (Table3). There is statistically significant difference in the occurrence of lice infestation between body condition sores (p=0.000).

Bovicola ovis	**43(87.76%)**	**79(84.04%)**
Linognatus ovillus	142 (87.12%)	44(100%)
Mixed lice	2(1.23%)	4(9.1%)
Overall lice	19(11.66%)	4(9.1%)
Bovicola ovis	**163 (53.26%)**	**44(56.4%).**

Table 3: Prevalence of lice in body condition.

For Total infestation Chi square (df=6) =43.778, P= 0.000

Prevalence of Lice Infestation in Sheep by Month Wise

Out of the total population of sheep examined for lice infestation equal number of sheep were taken in each month (i.e. 128 (33.3%), in November, 128 (33.3%) in January and 128 (33.3%) in February). Out of this the overall prevalence of lice in November was 94 (73.44%), in January 42 (32.8%) and in February 71 (55.5%). Out of this prevalence of Bovicola ovis was found 85 (90.42%), Linognathus ovillus 0 prevalence and mixed lice infestation 9 (9.6%) in November. In January the prevalence of Bovicola ovis was 35 (83.33%), Linognathus ovillus 0 prevalence and mixed lice infestation 7 (16.66%). In February prevalence of Bovicola ovis was 60 (84.5%), Linognathus ovillus 3 (4.22%) and 11 (15.5%) and mixed lice infestation 7 (9.86%) (Table 4). There is statistically significant difference in between the three months (p= 0.000).

Lice	November	January	February
Bovicola ovis	85(90.42%)	35 (83.33%)	60(84.5%)
Linognatus ovillus	0%	0%	3(4.22%)
Mixed lice	9(9.6%)	7(16.66%)	11(15.5%)
Overall lice	**94(73.44%)**	**42(32.8%)**	**71(55.5%)**

Table 4: Prevalence of lice by month wise.

For Total infestation Chi square (df=2)42.698, P= 0.000

Prevalence of Lice in Sheep by Severity

Out of the total population of sheep infected with lice 85(41.06%) sheep were severely infected, 101 (48.79%) sheep with moderate infection and 21 (10.14%) were with slight infestation. The most prevalent species was Bovicola ovis with the prevalence of 83 (97.65%), 80 (79.2%) and 18 (85.71%) in severe, moderate and slight infestation respectively. While for Linognathus ovillus 1 (1%) was slight infestation and 3 (14.29%) was moderate infesta-

tion. In mixed lice infestation 2 (2.35%) was for severe infestation and 21 (20.79%) for moderate infestation (Table5).

Lice	Severe	Moderate	Slight
Bovicola ovis	83(97.65%)	80(79.2%)	18(85.71%)
Linognatus ovillus	0%	3(14.29%)	1(1%)
Mixed lice	2(2.35%)	21(20.79%)	0%
Overall lice	**85(41.06%)**	**101(48.79%)**	**21(10.14%)**

Table 5: Prevalence of Lice by Severity.

Discussion

The high prevalence of lice was 53.9%, recorded in the study, which is suggestive of the importance of the parasite in sheep population of the study area. Poor management and poor level of awareness of sheep owners on the effect of ectoparasites particularly lice infestation are believed to have contributed to wide spread occurrence of the parasites. Bovicola ovis is the most prevalent lice species recorded with a prevalence of 86.9%, from the 207 sheep infected with lice infestation Linognathus ovillus species and mixed lice infestation were 1.9% and 11.6% respectively.

The overall prevalence obtained in this study is higher than observations made by [17] in North western Amhara Region which is 30.9% for Bovicola ovis, by [18] 22.28%for Bovicola ovis in around Kombolcha and by Sertse 25.7% in Amhara region. But the present findings indicates lower prevalence than that of 63.5% as reported by [19] in Amhara National Regional State and by [20] in Southern Ethiopia, Sodo, and in the Zone of this study area, Arsi [21], which was 75.5%. Such difference in prevalence with the above observations may arise from differences in agro climate, management, health care of animal and the sensitivity of the diagnostic method used to reveal ectoparasites. Similarly, lice infestation was greater in winter and spring similar to the findings of [22].

In addition to skin damage, lice infestation also has a significant effect on production and productivity of animals because the presence of lice interferes with nutrition of animal. Due to itching and scratching the animal spend more time by grooming on fixed objects rather than taking feed which result in decreased body condition. Body condition has also contribution for the occurrence of lice infestation because there is also evidence that immune response may be involved in regulating louse numbers and may underlie differences amongst sheep in susceptibility to lice [23, 24]. Impaired immune response may explain the greater susceptibility to lice of animals in poor condition or under stress.

In the present study sex and age are not statistically significant in the occurrence of lice infestation but in male animal the prevalence of lice is slightly higher than female animal and in young the prevalence of lice infestation is higher than in adults this is because the lambs doesn't mixed with ewes therefore transmission from ewe to lamb doesn't occur.

The other factor for the occurrence of lice is climatic condition. In this study the occurrence of lice is higher in November than February and January, which shows infestation of lice, is high in cooler time. According to [25, 26] lice infestation is very high in spring time in European countries where the temperature is low during that time.

Considering the importance of skin and hides as a main source of foreign currency to the country, the prevailing ectoparasites mainly in different sheep reared in Arsi zone [27] requires attention in order to minimize the spread of infestation and increase income earnings of farmers and small scale holders whose livelihood is dependent on their animals.

Conclusion and Recommendation

Lice infestation is among the major causes of sheep production constraints and quality deteriorations of exported skin in Ethiopia. Lice are easily overlooked because of their small size but they have the capacity to multiply very fast before being discovered. In the present study the overall prevalence of lice infestation was high (86.9%) this can be resulting in high economic losses through decreased production of meat and milk due to interference with nutrition and skin damages. Lice have a significant effect on body condition. Whereas sex and age of the host animals were not determinant factors for the prevalence variation.

Therefore based on the above points, the following recommendations are forwarded:

- The effect of lice on production, productivity and skin quality is not appreciated by farmers. Therefore farmers should have enough awareness and effective extension programs that raise public awareness on effect of Lice.
- Reducing the prevalence of Lice mainly relies on treatment of affected animals with appropriate acaroids and improving the management system [28].
- Detailed study on economic losses associated with lice infestation and investigation of other causes of skin downgrading and rejection should be conducted [29].

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