

Prevalence and Identification of Lice Genera Infesting Cattle in Lume Woreda, East Shoa Zone, Oromia, Ethiopia

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Abstract: Background: Lice are one of the common ectoparasites of domestic cattle. Lice can be an important cause of economic loss when cattle are in poor condition or if infestations are heavy. Louse infestation is more common in cattle than other domestic animals. **Objectives:** To determine the prevalence of cattle lice and assess associated risk factors and Identify the lice genera of cattle in Lume district. **Methods:** The study was cross sectional method and it was extended over four months from the beginning of June to the beginning of September of 2022. And it was carried out in Lume woreda which locate East shoa zone of Oromia regional state. he study animals were cattle of different age, sex, breed and body condition score kept under different management system. 384 samples were collected and analyzed by SPSS software. **Results:** out of the 384 cattle examined for lice infestation, 170 were infested for one or more genera of lice and the overall prevalence was 44.3%. The major lice genera identified were *Linognathus* (35.7%) followed by *Damalinia* 10% and *Solenopotes* 1.3. The prevalence of males and females cattle were found to be (38.7%) and (52.6%) ($p>0.05$). In both sexes; *Linognathus* were the dominant lice. The prevalence of lice in young, and adult was (53.6%) and (38.2%) respectively. Based on their body condition score variation, Poor body conditioned, Moderate and good body condition animals were; (67.8%), (41.9%) and (5.4%) respectively. **Conclusion and Recommendations:** Lice (*Linognathus*, *Damalinia* and *solenopotes*) were widely distributed in relation to age and body condition and cause economic lose in cattle. Therefore, owners should manage their cattle especially in the beginning and in the time of rainy season and provide treatment; and also pasture management and proper application of acaricides, were good intervention methods so as to prevent and control the heavy infestation of lice in area and production and productivity will be increased.

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1. Introduction

Ethiopia has the largest livestock population in African country. There are about 53.4 million cattle, 48.28 million small ruminants, 1.1 million camel, 8.58 million equines and 49.3 million poultry in the country(CSA, 2011). The livestock sector represents a significant part of the global economy, particularly in the developing countries. Thus, livestock provides energy, food, raw material, and manure for crops. It is therefore not surprising that the livestock sector has emerged as an important economic source for a vast majority of the rural population and a target for agrobusiness in the dairy, meat, and various other products in the processed foods sector (Kabir *et al.*, 2011). However, poor health, management and productivity of animals due to disease have considerably become major obstacle to the potential of livestock industry (Mokonen *et al.*, 2001)).

Now days, parasitism represents a major problem to development and utilization of animal resource. In Ethiopia ectoparasites in ruminant causes serious economic loss to small holding farming system, the tanning industry and the country as a whole through mortality of animals, decreased production, performance and down grading quality of skin and hide. Ectoparasites, such as ticks, mites and lice have veterinary importances which affect economics of cattle production (Regassa, 2011).

The exportation of hide and skin is important income source and a good root of foreign exchange in the country. Yet as much one quarter to one third of all skin processed at tanneries are unsuitable for export due to various defects. Up to 65% of these defects occur in pre-slaughter stage of production while the animal is still alive. A considerable

portion of these pre-slaughter defects are directly related to skin disease caused by parasites or to secondary damage that occur when the animal scratch itself to relieve the itching associated with some of these disease (Kassa *et al.*, 1998).

Lice are one of the common ectoparasites of domestic cattle. A louse is a small, flat, wingless insect that infests the hair, skin and feathers of various species of domestic pets, livestock and birds. The lice belong to the order *Phthiraptera* which is divided into two: Anoplura: the sucking lice and Mallophaga: the biting lice (Baker, 2007). Sucking lice are an obligate blood feeders, taking small meal from capillaries in the upper skin with their piercing mouth parts while the chewing lice feed on dead skin cells, hair and oil secretion which they abrade from the surface using their chewing mouth part (Radostits *et al.*, 2006).

Lice can be an important cause of economic loss when cattle are in poor condition or if infestations are heavy. Diseased or nutritionally stressed animals will develop more severe lice infestations than healthy animals (Walker, 2007). Louse infestation is more common in cattle than other domestic animals. Heavy infestations are usually associated with young animals or older animals with poor health or those kept in unhygienic conditions (Wall and Shearer, 2001).

Lice infestations in cattle with different lice genus were reported from different parts of the country including *Linognathus*, *Heamatopinus* and *Damalina*. However, limited efforts have been made so far to investigate the status of lice infestation of cattle in Lume Woreda. Therefore the objectives of this study are to:

- Determine the prevalence of cattle lice and assess associated risk factors
- Identify the lice genera of cattle in Lume district

2. MATERIAL AND METHODS

2.1. Study Area

The study was carried out in Lume woreda which locate East shoa zone of Oromia regional states on southeast of Addis Abeba at distance of 73km. The district lies between 8°39' N latitude and 39°5' E longitude and an altitude of 1788 meter above sea level. It gets an annual rainfall of 500-1200mm of which 80% is received during long rainy season starting from June to September and the remaining in short rainy season extending from March to May, and the dry season from October to February. The mean annual maximum and minimum temperature are 28°C and 18°C, respectively with a minimum relative humidity of 46% (WIKIPEDIA, 2018). Livestock population of the area comprises 76610 cattle, 34060 sheep, 43543 Goats, 377 Horses, 315 Mules, 22178 Donkeys, 87322 Poultry and 195 Camels (LWLFDO, 2019).

2.2. Study Animals

The study animals were cattle of different age, sex, breed and body condition score kept under different management systems present in the study area.

2.3. Study design

The study was a cross sectional study. To sample all the sample size, the study was extended over four months from the beginning of June to the beginning of September of 2022. Within this period, the samples were collected from cattle selected using random sampling. Information on host determinants like age, sex, breed, body condition and other data such as management system, were collected by interviewing owners and observing the animals. Breeds of cattle were determined by physical characteristics of respective breeds and asking the owners. The management system was classified as extensive or intensive by asking the owners and observing the farms.

2.4. Sample size determination

The required sample size was determined by assuming the expected prevalence of 50% Lice infestation of Cattle using 95% confidence interval and at 5% absolute precision according to Thrustfield (2007).

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

Where n= required sample size

p_{exp} =expected prevalence

d=desired absolute precision

$$n = \frac{1.96^2 \times 0.50 (1 - 0.50)}{0.05^2}$$

$$n = \frac{3.8416 \times 0.25}{0.0025}$$

$$n = 384$$

2.5. Collection and Identification of Lice

To collect samples, first the cattle were properly restrained and examined by close visual inspection, palpation and parting the hairs against their natural direction for easy observation of lice. Lice will be collected from different body parts of cattle manually by hand picking and by using tools like forceps and combs. The Chewing lice can be collected by combing the body parts of cattle on sheet of paper and transferred to vial containing preservatives. Samples from different animals were collected in different labeled vials containing 70% alcohol and transported to Modjo Veterinary clinic laboratory for identification. The collected samples were examined by stereomicroscope and identification of genera were performed according to the identification key given by Wall and Shearer 2001.

2.6. Data Analysis

All data collected were recorded in format prepared on a sheet of paper and transferred to Microsoft excel spread sheet and encoded in SPSS statistical software and analyzed. The Chi-square (χ^2) test was used to assess differences in the prevalence of Lice among age, sex and body condition score. In all cases, 95% of confidence intervals and $P < 0.05$ was set for significance.

3. RESULTS

3.1 Prevalence of Lice

In the present study a total of 384 cattle were examined for lice infestation. Out of the total, 170 were infested for one or more genera of lice and the overall prevalence was 44.3%. The overall prevalence was calculated by dividing the number of positive samples by the total sample size and multiplied by 100. The major lice genera identified were Linognathus, 35.7% followed by Damalinia 10% and Solenopotes 1.3% (Figure 1).

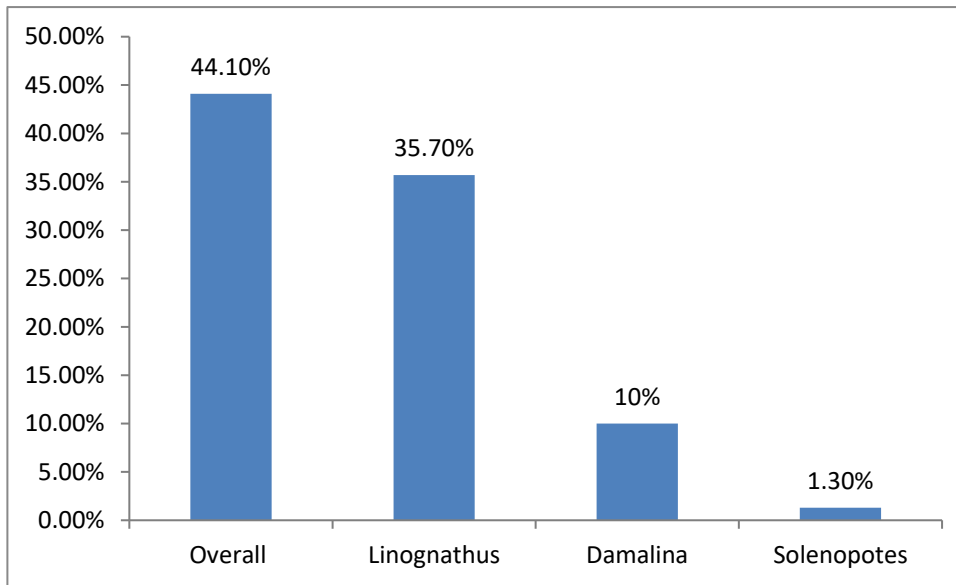


Figure 1: Overall prevalence lice

Overall three genera Lice were identified in this study. Among the lice *Linognathus* (35.7%) was the most prevalent followed by *Damalina* 10% and *Solenopotes* 1.3% was the least prevalent.

In present study, the prevalence of in male and females cattle were found to be (38.7%) and (52.6%), however, it was not statistically significant ($p>0.05$). In both sexes; *Linognathus* were the dominant lice. The prevalence of lice in young, and adult was found to be (53.6%) and (38.2%) respectively. Based on their body condition score variation, Poor body conditioned, Moderate and good body condition animals were; (67.8%), (41.9%) and (5.4%) respectively.

Table 1: Prevalence of lice with relation to different risk factors

Risk factors	No examined	No positive	Prevalence(%)	P-value	X ²
Age					
Adult	233	89	38.2	0.045	9.742
Young	151	81	53.6		
Sex					
Male	230	89	38.7	.674	2.339
Female	154	81	52.6		
Body conditions					
Poor	112	76	67.8	0.000	29.387
Moderate	217	91	41.9		
Good	55	3	5.4		

4. DISCUSSIONS

In the current study, overall prevalence of lice was found to be 44.30%. This finding disagrees with previous study of Simeon (2012) who has reported the prevalence of 10.4% in Bench Maji zone. This result was higher in compared to the reports of Yacob *et al.* (2008) (9.57%). On the other hand, the prevalence reported in this study was lower than that reported by Colwel *et al.*, (2001) who reported 69.2% and 71.1% prevalence of lice on cattle in two successive winters, a research conducted in Southern Alberta in Canada. The major lice genera in the study area were *Linognathus* and *Damalinia* which relates with the finding of the previous study in Southern Ethiopia by Bekele and Kumsa (2008). This variation in prevalence lice were might be related to climatic variation, management practice and sample size used. The seasonal variation of the study period may also contribute to this difference as the lice populations on animals vary seasonally, depending on the condition of the host. Lice populations on animals are greater during the rainy months (Walker, 2007).

There was an association of the prevalence of lice with different risk factors in this study. Female animals 52.6% were found more affected than male 38.7% animals with no statistical significance ($P > 0.05$) which might be due to the fact that both male and female animals were exposed to the same management system. This finding is in line with Bilkis *et al.* (2011) had been reported significantly higher prevalence in females (64.63%) than in males (41.86%) and he hypothesized that higher level of prolactin and progesterone hormones makes the female individual more susceptible to any infection and stresses of production such as pregnancy and lactation make the females more susceptible to such infestation. The grazing area and the resting places were very conducive for the lice population to multiply. Crowding increases the chance of contact between animals and results in the transmission of lice between infested and susceptible animals.

Age also affected the prevalence of lice in cattle in the study area. The prevalence of lice were (53.6%) in young and (38.2%) was found on adult cattle. It appears with statistical significance association where the $p < 0.05$. This is in line with Dinku and Aseffa (2014) that report high prevalence of *Linognathus* genus on the young cattle in and around Bishoftu town. Heavy infestations are usually associated with young animals or older animals with poor health or those kept in unhygienic conditions (Wall and Shearer, 2001).

Based on body condition of cattle, lice infestation was high in poor body condition cattle followed by moderate body condition. The raise of lice infestation on poor body condition animals may be due to the less ability of resistant to lice infestation and lack enough body potential to build resistance in addition to management system (poor housing, lack of supplement feeding and lack of control measures against lice). This finding in agreement with previous study finding in Adama by Anullo *et al.*, (2018) who reported the probable reason for this may be debilitated animals cannot groom themselves, so lice remain undisturbed for long time and also the poor body conditioned animals may have under compromised immune system.

5. CONCLUSION AND RECOMMENDATIONS

Lice can be an important cause of economic loss when cattle are in poor condition or if infestations are heavy. Diseased or nutritionally stressed animals will develop more severe lice infestations than healthy animals. Louse infestation is more common in cattle than other domestic animals. A louse is a small, flat, wingless insect that infests the hair, skin and feathers of various species of domestic pets, livestock and birds. The present study showed high prevalence of lice of cattle in the study area. The problem of lice seems to be essential as they are widely distributed in relation to age and body conditions. The important and prevalent lice genera investigated in this study were *Linognathus*, *Damalinia* and *Solenopotes*. However, the attentions given to the infestation of lice was not sufficient and the lack of available information on lice and the consequence behind its infestation; aggravates the infestation of the cattle by lice in the area. Based on this the following recommendations were forwarded:

- The owners should be manage their cattle especially in the beginning and in the time of rainy season and provide appropriate treatment.
- To overcome the problems owner should be using pasture management, the right dosage and application of acaricides.

- Government should provide intervention and research to develop long lasting prevention and control strategies to get rid of the lice

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