



Prevalence and Associated Risk Factors of lice in Small Ruminants in and around Ambo District

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ABSTRACT

This study was conducted from November 2015 to April 2016 with the aim of studying the prevalence of lice of economic importance in small ruminants in and around Ambo Woreda. A total of 384 (156 sheep and 228 goats) were included in this study. Out of these animals 143 (37.2%) animals were found being infested with one or more species of lice. Of a total of examined animals; 75 (48.1%) of sheep and 68 (29.8%) of goats were positive for lice. The lice recorded 34.0% Damalinia species, 5.1% Linognathus species and 9.0% mixed species in sheep and 29.8% Linognathus species in goats. This study has revealed that lice were the predominant ectoparasites in goats; The Damalinia species was higher significant prevalent in female than male animals however linognathus was higher significant prevalent in young than adult animals ($p < 0.05$). the poor body condition score animals were higher infested with both species of lice ($p < 0.05$). The present study has shown that lice are among important causes of skin damage

which is likely to cause significant economic loss. To reduce this loss management practices should be put in the place to control infestations of valuable animals.

Key words: *Ambo, Lice, Prevalence, small Ruminant*

1. INTRODUCTION

Ethiopia's economy is based mainly on agriculture, including crop and livestock production, which contributes 45% of the national Gross Domestic Product (GDP), more than 80% of employment opportunities and over 90% of the foreign exchange earnings of the country. The livestock sub-sector contributes an estimated 12% to total GDP and over 45% to agricultural GDP [8]. In Ethiopia, small ruminants comprise large proportion of livestock resources, constitute about 30% of the total livestock 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]. At the national level, sheep and goat account for about 90% of the live animal/meat and 92% of skin and hide export trade value [4]. However, the Ethiopian economy, particularly agricultural development, is extremely vulnerable to external shocks like climate change, global price fluctuations of

exports and imports and other external factors [8].

Ethiopia is believed to have the largest livestock population in Africa. The total sheep and goats population for the country is estimated to be 25 and 23 million respectively, as a result of this, leather has been at the core of Ethiopia's economy since many centuries [8]. And also, in various areas of Ethiopia, sheep and goats play significant social and cultural functions including food security, poverty alleviation, ensuring gender equity, weed control and income generation [5]. They also play an important role by providing export commodities such as live animals, meat and skins to earn foreign exchange to the country. The sheep and goat skins rank among the largest export of commodities [18]. However, poor health and productivity of animal due to disease has considerably become the major stumbling block to the potential of livestock industry [7].

Lice are among the major disease of small ruminants 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. Tanneries reported that 35% of sheep skin and 56% of goats' skin are rejected due to external parasites, and out of the reject groups of the processed skin, about 80 to 90% defects were believed to be due to external parasites. The estimated economic loss due to drop in quality of sheep and goat skin is around USD 25.8 million per year [17]. Both biting and sucking lice affect small ruminants. The important species of lice found in sheep and goats are the genus *Damalina* and *Linognathus* and the important species in sheep being *L. ovillus*(sucking face louse), *L. africanus*, *L. spedalis*(sucking foot louse) and *Bovicolaovis*(biting louse). In goats *L. stenopsis*(sucking blue louse), *L. africanus*, *B. caprae*(biting louse), *B. alimbata* and *B. crassiceps* are reported [9].

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 [2], currently there is a paucity of information regarding to lice infestation of

small ruminants in Ambo district west shoa zone. The present study was carried out to determine the prevalence lice of economic importance in small ruminants and assesses host-related risk factors in the study area.

2. MATERIALS AND METHODS

2.1. Study Area

The present study was conducted in Ambo district from November 2015 to April 2016. Ambo is a town in central Ethiopia, located in the West Shoa Zone of the Oromia Regional State, West of Addis Ababa. This town is located at 114Km from Addis Ababa and it has a latitude and longitude of 8°59'N 37°51'E and an elevation of 1380 to 3300 m.a.s.l. This area receives 800mm to 1000mm of annual rainfall, which is 70% (long term) rainfall from June to September and 30% (short term) rainfall from February to April. The monthly minimum and maximum temperature are 15 degree Celsius and 29 degree Celsius respectively. The Ambo area constitutes 35.3% highland, 14.7% lowland and 50% midland from the total coverage. The agricultural scenario is mixed crop-livestock farming system, which is dominated by crop production system. The livestock populations of the area are estimated as 144243 cattle, 65652 sheep, 30009 goats, 10130 horses, 13130 donkeys,

282 mules, and 92030 poultry. The livestock production of the area is an extensive type where animals are kept on grazing pasture but there are also some intensive and semi intensive animal production system. The land usage of area is 83598.69 hectares, which includes cultivated land, grazing land, forest land, home land and others. The soil types of this area are 34% black, 36% red, and 30% mixed type [19].

2.2. Study Animals

The study animals were sheep and goats of both sexes and different age groups (young and adult) in and around Ambo district.

2.3. Sample Collection

The survey of lice was conducted on small ruminants of both sexes and different age groups. Collection of lice was conducted after proper restraining of the animals. The adult lice were manually collected from the body surface by hand and brush. Hair coat was parted and examined for lice on five regions of the body surface namely; head, neck, thoracic, abdominal and tail region, both on the right and left sides of these areas and the collected parasites were preserved in properly labeled plastic containers containing 70% ethanol. The collection bottles were labeled with serial numbers while other data was written on specified register format prepared for this particular

purpose (date, address, sex, age and species). Sample was then transported to veterinary laboratory for further identification of the lice species. Identification of the collected lice was carried out at veterinary laboratory by the aid of stereo- and compound microscope by appreciation of its mouth part according to the procedure described by Wall and Shearer [16] and [11].

2.4. Study Design

The study was conducted using cross-sectional study design to determine the prevalence of small ruminants' lice. The sample was collected from small ruminants kept under extensive production system. The lice were randomly collected from sheep and goat of different sex, body condition score and age group (young under one year of age and adult above one year of age for both sheep and goats [3] and [12].

Since no studies have been done on the lice of small ruminants in and around Ambo district in particular, 50% was taken as approximate expected prevalence. So the sample size was calculated according to Thrusfield [15] sample size calculation, ninety five percent confidence levels, 5% precision and 50% expected prevalence used for the computation. Though, the required

sample size was computed to be 384, a total of 384 (156 sheep and 228 goats) of different species, age and sex group were examined to increase the precision of investigation.

$$N = \frac{1.96^2 pex (1-pex)}{D^2}$$

where, N= required

sample size

pex= expected prevalence, D= precision

2.5. Data Analysis

The collected data was first entered and managed into Microsoft Excel worksheet and analyzed by a statistical software namely, SPSS version 20. Prevalence was determined by the formula described by Thrusfield[15] as the rate of number of infested animals and total number of animals in population. Associations between explanatory variables (species of animals, age and sex) and prevalence were done by chi-square test and $P < 0.05$ were set to indicate significance.

3. RESULTS

The overall prevalence of lice was 48.1% and 29.8% in sheep and goats respectively. Overall 34.0%, 5.1% and 9.0% of examined sheep were infested with *Damalinea*, *Linognathus* and mixed species of lice respectively and 29.8% of examined goats were infested with *Linognathus* (Table 1).

High prevalence of lice infestation in sheep than in goats ($P < 0.05$) was recorded. Relative to sex of animals *Damalinea* species was higher significant ($p = 0.005$) prevalence in female animals (16.3%) than male once (3.9%). regarding to age of animals *Linognathus* species of lice was higher significant ($p = 0.009$) prevalence in young (28.9%) than adults (16.7%) and poor body condition score small ruminants were higher significant infested by both species of lice ($p < 0.05$) (Table 2).

Table 1: Prevalence of different genera/ species of ectoparasites infestation in sheep and goats.

Genera of Lice	Sheep (n=156)	Goats (n=228)	Total (n=384)
	No positive (Prevalence in %)	No positive (Prevalence in %)	No positive (Prevalence in %)
<i>Damalinea</i> species	53(34.0)	0(0.0)	53(13.8)
<i>Linognathus</i> species	8(5.1)	68(29.8)	76(19.8)

Mixed lice	14(9.0)	0(0.0)	14(3.7)
Total	75(48.10)	68(29.8)	143(37.2)

Table 2: Prevalence of Lice infestation in small ruminants among risk factors.

Risk factors	Categories	Prevalence <i>Damalinia</i> species (%)	χ^2/p -value	Prevalence <i>Linognathus</i> species (%)	χ^2/p -value	Prevalence <i>Mixed</i> species (%)	χ^2/p -value
Species	Sheep (n=156)	34.0	89.9(.000)	5.1	35.6(.000)	48.1	4.1(.043)
	Goats (n=228)	0.0		29.8		37.7	
Sex	Male (n=77)	3.9	7.9(.005)	16.9	0.5(.474)	29.9	5.8(.016)
	Female (n=304)	16.3		20.5		45.0	
Age	Young (n=97)	13.4	0.2(.895)	28.9	6.7(.009)	50.5	3.9(.047)
	Adult (n=287)	13.9		16.7		39.0	
BCS	Poor (n=77)	22.1	7.0(.031)	41.6	37.5(.000)	75.3	47.4(.000)
	Medium (n=106)	8.5		23.6		40.6	
	Good (n=201)	13.4		9.5		29.9	

4. DISCUSSION

The overall prevalence of lice infestation was 48.1% in sheep and 29.8% in goats. The result is lower than 57% and 47% in sheep

and goats respectively in Gondar [14]. But this result is higher than the prevalence recorded in Tigray 1.3% and 6.1% in sheep and goats respectively [10]; 25.8% and

14.9% in sheep and goats respectively. Lice infestation was observed to significantly affect most animals in the flocks of sheep than goats ($p < 0.05$). This is probably related to rubbing is a powerful indicator of infestation and choosing a sheep with rubbed fleece greatly increases the likelihood of detection and close contact between animals is important in the transmission of the parasites[6].

The overall prevalence of lice in the present study was 37.2% (Table 1). According to present study, two species of louse was identified in sheep. The prevalence of *Damalinia* and *Linognathus* species in sheep in present study was 34.0% and 5.1%, this result is similar with prevalence of 33.69% of *Damalinia* (Tewdroset *et al.*, 2012) and higher than 3.2% *Damalinia* and 2.2% *linognathus* reported by Tesfaye *et al.* [13].

Present study showed high prevalence of lice infestation in sheep than in goats ($P < 0.05$) it was similar to the report of Tesfaye *et al.* [13]. Relative to sex of animals *Damalinia* species was higher significant ($p = 0.005$) prevalence in female animals (16.3%) than male once (3.9%) and poor body condition score small ruminants were higher significant infested by both

species of lice ($p < 0.05$) (Table 2) the same trend reported by Tesfaye *et al.* [13].

Present study showed that lice are infesting significant proportions of small ruminants in the study area. It was shown that two species of lice were the major small ruminants pests. Sheep were highly infested than goats and goats were infested only by *linognathus* species of lice. All age groups and both sex of livestock were found infested with various type of lice. Pediculosis remain to cause skin damage in the area. Based on the findings of the current study, Good veterinary services and management practices put in the place to control infestations of these valuable animals and Awareness created among the farmers and animal health assistances to indicate the extent of the problem. Should be recommended

Conflict of interests

The authors have no conflict of interest regarding the publication of this paper

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