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Lice Infestation in Sheep and Goats in and around Dembi dolo Town: Associated Risk Factors

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ABSTRACT

A cross-sectional study on ectoparasites of sheep (n=134) and goats (n=250) was conducted in Dembi dolo west Ethiopia from November 2018 to April 2019 to determine the prevalence of major lice infestation of sheep and goats and the associated risk factors. Out of the examined animals, 56(41.8%) sheep and 88 (22.9%) goats were infested with Damalinia and Linognathus species of lice. one or more ectoparasites. Small ruminants female in sex were 3.6 times more at risk for Damalinia ovis than male small ruminants and young 2.1 time than adult and poor in body condition small ruminants were 6.9 times more at risk for Linognathus species than adult and good body condition small ruminants (P< 0.05). The observed overall prevalence is generally high which may result in enormous economic losses through decreased production and productivity, damages to the skin and deaths of the animal which requires an immediate professional and governmental attention.

Key words: Dembi dolo, Lice, Prevalence, Risk factor, small Ruminants

1. INTRODUCTION

Ethiopia has a population of about 59.5 million cattle, 30.7 million sheep and 30.2 million goats however, the economic gains from these animals remain insignificant. when it is compared to their huge number (CSA, 2017). 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 (Asfaw, 1998). 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 (Gizaw, 2008). However, poor health and productivity of animal due to disease has considerably become the major stumbling block to the potential of livestock industry (Mekonen *et al*., 2001).

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 (Yacob, 2014).

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 (Bayou, 1998), currently there is a paucity of information regarding to lice infestation of small ruminants in Dembi dolo town. Therefore, the main objectives of this study were to determine the prevalence of lice on small ruminants in and around Dembi dolo town and identify lice and the associated risk factors involved in small ruminants in the study area.

2. MATERIALS AND METHODS

2.1. Study Area

Dembi Dolo is capital of Kelem Welega zone of Oromia region. This town has a latitude and longitude of 8°32'N 34°48'E / 8.533°N 34.800°E with an elevation between 1701 and 1827

meters above sea level. Dembi Dolo is located about 652 km from Addis Abeba, capital of Ethiopia. The annual mean temperature ranges between 15.1-27 °c and the annual mean rainfall ranges 400-2000mm (CSA, 2007).

2.2. Study Animals

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

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 or comb. 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 (1997) and Soulsby (1982).

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 (Gatenby, 1991; Steele, 1996).

Since no studies have been done on the lice of small ruminants in and around Dembi dolo town in particular, 50% was taken as approximate expected prevalence. So, the sample size was calculated according to Thrusfield (2018) 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 (134 sheep and 250 goats) of different species, age and sex group were examined to increase the precision of investigation.

$$N = \frac{1.96^2 \, pex \, (1-pex)}{D2}$$, 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 22. Prevalence was determined by the formula described by Thrusfield (2018) 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 in present study was 37.5%. Among 384 examined small ruminants 56/134 (41.8%) of sheep and 88/250 (35.2%) of goats was infested with *Damalinia* and *Linognathus* species of lice respectively (Table 1).

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

Genera of Lice	**Sheep (n=134)**	**Goats (n=250)**	**Total (n=384)**
	No positive (Prevalence in %)	**No positive (Prevalence in %)**	**No positive (Prevalence in %)**
Damalina species	56(41.8)	0(0.0)	56(14.6)
Linognatus species	0(0.0)	88(35.2)	88(22.9)
Total	**56(41.8)**	**88(22.9)**	**144(37.5)**

High prevalence of *Damalinia* lice infestation in female about 3.6 times than in male small ruminants ($P<0.05$) was recorded (Table 2).

Table 2: Logistic regression of Associated risk factors with prevalence of *Damalinia* species of lice in small ruminants.

Variables in the Equation

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% CI.for EXP(B)	
								Lower	Upper
Step 1[a]	Sex (1)	1.279	.537	5.662	1	.017	3.592	1.253	10.299
	Age (1)	.158	.328	.233	1	.630	1.171	.616	2.226
	BCS			3.388	2	.184			
	BCS (1)	.521	.345	2.273	1	.132	1.683	.855	3.313
	BCS (2)	-.187	.374	.251	1	.616	.829	.399	1.725
	Constant	-2.973	.541	30.171	1	.000	.051		

*Reference Sex (Male), Age (Adult), BCS (Good)

High prevalence of *Linognathus* lice infestation in young about 2.1 times than in Adults and in higher in poor body condition 6.9 times than in good body condition score small ruminants (P<0.05) was recorded (Table 3).

Table 3: Logistic regression of Associated risk factors with prevalence of *Linognathus* species of lice in small ruminants.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% CI.for EXP(B)	
								Lower	Upper
Step 1[a]	Sex (1)	.141	.338	.173	1	.677	1.151	.593	2.234
	Age (1)	.745	.282	7.008	1	.008	2.107	1.213	3.658
	BCS			36.468	2	.000			
	BCS (1)	1.928	.319	36.421	1	.000	6.873	3.675	12.854
	BCS (2)	.835	.318	6.898	1	.009	2.304	1.236	4.295
	Constant	-2.319	.363	40.722	1	.000	.098		

*Reference Sex (Male), Age (Adult), BCS (Good)

High prevalence of overall lice infestation in female about 1.96 times than in male, 2.0 times in young than adults and higher in poor body condition 7.0 times than in good body condition score small ruminants (P<0.05) was recorded (Table 4).

Table 4: Logistic regression of Associated risk factors with prevalence of overall Lice infestation in small ruminants.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% CI.for EXP(B)	
								Lower	Upper
Step 1[a]	Species of animals	-.353	.241	2.150	1	.143	.703	.438	1.126
	Sex (1)	.672	.309	4.718	1	.030	1.957	1.068	3.588
	Age (1)	.697	.258	7.316	1	.007	2.007	1.211	3.325
	BCS			41.022	2	.000			
	BCS (1)	1.948	.304	40.928	1	.000	7.013	3.862	12.738
	BCS (2)	.491	.267	3.393	1	.065	1.635	.969	2.758
	Constant	-1.574	.356	19.594	1	.000	.207		

*Reference Species of animals (Goats), Sex (Male), Age (Adult), BCS (Good)

4. DISCUSSION

The overall prevalence of lice infestation was 37.5% and 41.8% in sheep and 22.9% in goats infestation of *Damalinia* and *Linognathus* species of lice was recorded. The result is lower than 51.4% and 42.2 % in sheep and goats respectively eastern Ethiopia (Natenael and Tesfahewet 2015). But this result is higher than the prevalence recorded in Tigray 1.3% and 6.1% in sheep and goats respectively (Rahmeto *et al*., 2011); 25.8% and 14.9% in sheep and goats respectively.

Present study showed high overall prevalence of lice infestation in female, young and poor body condition score of sheep and goats ($P<0.05$) was recorded than male, adult and good body condition score it was similar to the report of Sisay *et al* (2013) that reported Sheep poor in body condition were 1.9 times more at risk for *Damalinia ovis* than good body condition sheep and goats poor in body condition were 3.5 times more at risk for *Linognathus* species than good body condition goats ($P< 0.05$).

5. CONCLUSION AND RECOMMENDATION

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. The study revealed that lice of small ruminants were widely distributed and prevalent in all sex, body condition score and in all age groups of small ruminants in the study area. The observed overall

prevalence is generally high which will result in high economic losses through decreased production and productivity, deaths of the animal and damages of the skin demanding an immediate attention and professional intervention.

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