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Prevalence of major ectoparasites of calves and associated risk factors in and around Bishoftu town

Taye Dinku Regasa, Assefa KebedeTsegay* and Hika Waktole

School of Veterinary Medicine, College of Agriculture and Veterinary Medicine, Jimma University, P. O. Box: 307 Jimma, Ethiopia.

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A cross sectional study was carried out from October 2013 to March 2014 in and around Bishoftu town with the objectives of determining the prevalence of major external parasite species of calves, preferred predilection sites and determine the associated risk factors. The calves were selected randomly from small holder farms in and around the town. According to this study; out of 384 calves observationally examined, and identified using stereomicroscope/hand lenses, 126(32.8%) were found infested with one or more ectoparasites species. The major ectoparasites identified were lice 26.8% followed by ticks 13.5% and mites 0.5%. Overall, three genera and one subgenus of tick comprising five species and one species of lice and one species of mite were identified in the study. Among the ticks, *Rhipicephalus* (*Boophilus) decoloratus* (7.6%), *Amblyomma variegatum* (5.2%) and *Rhipicephalus evertsi evertsi* (2.9%) were the most prevalent and the least identified tick species was *Rhipicephalus pulchelus* (0.5%). In this study, *Linognathus vituli* was the solitary species of lice identified and the prevalent (26.8%) among all ectoparasite identified. With regard to mites, *Psoroptus ovis* was the only mite species identified with a prevalence of 0.5%. The difference in the prevalence of ectoparasite species in male and female calves was not statistically significant (p>*0.05*). There was significant (p<0.05) association between *L. vituli* infestation and breed, management system, house cleanness and milk feeding practice. The association between tick prevalence and sex, breed, management system, housing condition, house cleanness, and milk feeding practice of calf was no statistically significant (p>0.05). This study demonstrates that ectoparasites are among the most important health constraints of calves in and around Bishoftu leading to important economic losses and attention should be given to control interventions, developing the knowledge of the farmers and further study on the burden of ectoparasites and their effects on calves was recommended.

Key words: Bishoftu, calf, ectoparasite, prevalence, small holder farms.

INTRODUCTION

Ethiopia is believed to have the largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country, and still promising to play great role in the economic development of the country and in the sampling procedure: Formula: 1.96^2 (square). There are about 53.4 million cattle, 48.28 million small ruminants, 1.1 million camel, 8.58 million equines and 49.3 million

*Corresponding author. E-mail: assefakebede82@yahoo.com, Tel: +251-922462581.

poultry in the country. Out of this total cattle population, the calf under six months constitute about 9.27% (CSA, 2011). Ethiopia's economy is dominated by agriculture and cattle play a vital role in agricultural production. In addition to the products of meat and milk, cattle provide draught power for cultivation of the agricultural lands of many peasants. Skins and hides are also important components of the livestock sector in generating foreign currency (Tessema and Gashaw, 2011). However, the poor health and productivity of animals due to disease remained the major constraint to the significant contribution of livestock industry to the economy (Mokennen et al., 2001). Though, the low productivity of livestock may also be attributed to the low genetic potential of indigenous cattle, poor nutrition and inadequate management, livestock disease have numerous known influences on productivity and fertility of herds including losses due to mortality and morbidity, loss of weight, slow growth rate, poor fertility performance and decrease physical power (Abraha, 2007; Baker, 2007). The productivity of cattle depends largely on their reproductive performance and the survival of calves (Amuamuta et al., 2006). Among other things, the potential of any animal production system depends, on the successful program of raising calves for replacement. Under most conditions, the average length of time a cow stays in a milking herd is about four years and, therefore, 25% of the milking herd must be replaced each year (Bath et al., 1985). But, several infectious and non-infectious disease, environmental and managemental factors affect the health of calves which have a significant effect on replacement of the herd. Some of the main problems affecting cattle production are parasite infestations, particularly ectoparasites, which are responsible for important losses in the productive indices as a result of direct and indirect effect on their hosts (Gallegos and Rodríguez, 2011; Onu and Shiferaw, 2013). In tropical regions, where ambient temperature and solar radiation are high, forage production fluctuates seasonally and parasitic diseases are abundant, parasitism poses a serious threat to the development and utilization of animal resource. Ectoparasites; commonly ticks, mites and lice affect the host by inflammation and through the damage they inflict on the skin and on the host physiology. They are also very important in different disease transmissions such as parasitic, bacterial, rickettsial, and viral diseases to man and animals. They also serve as vectors or intermediate hosts for some parasite species (Baker, 2007; Taylor et al., 2007). The damages inflicted by ectoparasites are annoyance, stress, or blood loss. Lice and tick worry are recognized conditions that reduce feed efficiency and weight gains in livestock (Baker, 2007). In Ethiopia, ectoparasites in ruminant causes a serious economic loss to small holder farmers, the tanning industry and the country as a whole through mortality of the animals, decreased production, down grading and rejection of skin and hide (Tiki and Addis, 2011). Calves have poorly developed defense mechanism and hence they are highly susceptible to diseases (Jemberu, 2004). Ectoparasites affect calves via reducing feed efficiency and weight gain, retarding their growth and causing death. They also predispose the calves to several diseases through skin damaging, immune-suppression and transmission of various diseases. For institution an appropriate intervention, animal production development requires a sound knowledge of the magnitude, the cause and predisposing factors of disease. Any producer should be aware of how parasites grow, reproduce and pass from one animal to other animals. This allows producers to develop management practices that minimize the spread of external parasites and the disease they transmit. Information on the prevalence of ectoparasites of calves facilitates the development of sustainable control strategies that enable farmers to reduce the burden of these parasites on their stock productivity. The existence of various ectoparasites and skin disease affecting cattle are frequently reported from different parts of Ethiopia. Bishoftu town is one of the urban centers where market oriented smallholder farms are flourishing rapidly. A number of dairy farms have been established in the last five years (Kassaye, 2002).

As a result information on the external parasites of calf is required. However, limited efforts have been made so far to investigate the status of ectoparasites of calves in the area. Therefore, the objectives of this study were to determine the prevalence of major ectoparasites of calves, and associated risk factors and identify the composition, and site preference of external parasites in the body of the calves.

MATERIALS AND METHODS

Study area

The study was carried out in and around Bishoftu town. This town is located in Ada'a woreda of East shoa zone of Oromia regional states on southeast of Addis Abeba at distance of 47 km. Bishoftu lies between 9° N latitude and 39° E longitude and an altitude of 1860 m above sea level. It gets an annual rainfall of 871 mm 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 26 and 14°, respectively with a minimum relative humidity of 63.8% (NMSA, 2013).

Study animals

The study animals were calves below six months of age of both local and cross breed kept under different management systems owned by small holder farms in and around Bishoftu town.

Study design

The study was a cross sectional study and extended over six months from October to March. Within this period, the samples

were collected from sampling units that is, all calves designed as a representative of the study population. The calves belonging to a single farm was visited only once during the study period to collect samples and record animal level data.

Sampling procedure and sample size

The numbers of calves owned by small holders were first registered at milk marketing post where the owners submit their milk to create sampling frame and sampling units were selected by lottery system from sampling frame until required number of calves were incorporated. The required sample size were determined by assuming the expected prevalence of 50% external parasites infestation of calves using 95% confidence interval and at 5% absolute precision according to Thrustfield (2007).

$$n = \frac{1.962 pexp\ (1\text{-}pexp)}{d^2}$$

Where, n= required sample size, pexp=expected prevalence, d=desired absolute precision. Because there was no previous study conducted in the area in the same age group in the area, 50% expected prevalence and 95% confidence level and 5% precision was considered. By substituting all the values, a total of 384 calves were considered for this study.

Data collection

Collection of animal level data

Information on host determinants like age, sex, breed and other relevant data such as management system, housing condition and cleanness were collected by interviewing owners and observing the animals and the farms. Breeds of calf were determined by physical characteristics of respective breeds and asking the owners. The management system classified as extensive, semi-intensive or intensive by asking the owners and observing the farms. The housing condition classified as separate or common barns with calves mixed with the dam or other animals. The cleanness of the farm was assessed by interrogating the farmers about the cleaning frequency and personal observation.

Collection and preservation of samples

To collect samples, first the calves were properly restrained and examined by close visual inspection, palpation and parting the hairs against their natural direction for easy observation of ticks and lice and any damage on the skin. Tick and lice were collected from different body parts of calf by hand picking. The whole half of the body was examined with special emphasis given to body parts known to be commonly infested such as head including ear, neck, dewlap, posterior back and rump, ventral body part (scrotum, axillae, belly and groins) and under the upper part of the tail and the tip of the tail. Samples from different body parts were collected in different labeled vials containing 70% alcohol and transported to the laboratory for morphological study. Samples for mites were taken by deep skin scrapping from the edge of the active lesion. The skin were scraped until blood oozes using a clean scalpel blade soaked in water putting on a sheet of paper under a site being scraped to avoid the loss of mites. The collected sample was transferred to a vial containing 10% formalin as a preservative and processed according to the method described by Urquhart et al. (1996). The collected samples were examined by stereomicroscope and identification was performed according to the identification key given by Walker et al. (2013) for tick and Urquhart et al. (1996) and Wall and shearer (2001) for lice and mites.

Data analysis

All data were collected and recorded in a sheet of paper and transferred to Microsoft excel spread sheet and encoded in SPSS version 20 statistical software and analyzed. The Chi-square (x^2) test was used to assess the differences in the prevalence of ectoparasites among sex, breed, management system and housing condition. In all cases, 95% of confidence intervals and $p< 0.05$ were set for significance.

RESULTS

Overall prevalence of ectoparasites

Out of the three hundreds and eighty four calves examined in this study, 126(32.8%) were found infested with one or more ectoparasite species. The major ectoparasites identified were lice, 26.8% followed by ticks 13.5% and mites 0.5% (Figure 1).

Overall three genera and one sub-genus of ticks (*Amblyomma, Hyalomma, Rhipicephalus* and *Boophilus*) comprising five species and one genus of louse (*Linognathus*) and one species of mite were identified in this study. Among the ticks, *Rhipicephalus* (*Boophilus) decoloratus* (7.6%), *Amblyoma variegatum* (5.2%) and *Rhipicephalus evertsi evertsi* (2.9%) were the most prevalent and the least identified tick species was *Rhipicephalus pulchelus* (0.5%). In this study, *Linognathus vituli* was the solitary species of lice identified and its prevalent was (26.8%) among all ectoparasite identified. With regard to mites, *Psoroptes ovis* was the only mite species identified with a prevalence of 0.5% (Figure 2).

Prevalence of ectoparasite by sex and milk feeding practice

In present study, the prevalence of ectoparasite species in male and females calves were found to be (33.33%) and (32.40%), however, it was not statistically significant ($p>0.05$). In both sexes; *L. vituli*, *Rhipicephalus (Boophilus) decoloratus* and *A. variegatum* were the dominant ectoparasites. High prevalence of *L. vituli* was recorded in calves kept in farms with suckling feeding practice (33.47%) than bucket feeding practice (14.28%) and it was statistically significant ($p<0.05$) while the other ectoparasite species were found statistically insignificant ($p>0.05$) (Table 1).

Prevalence of ectoparasites in breeds and housing conditions

In this study; in most cases, there was no statistically significant ($p>0.05$) association between breeds and

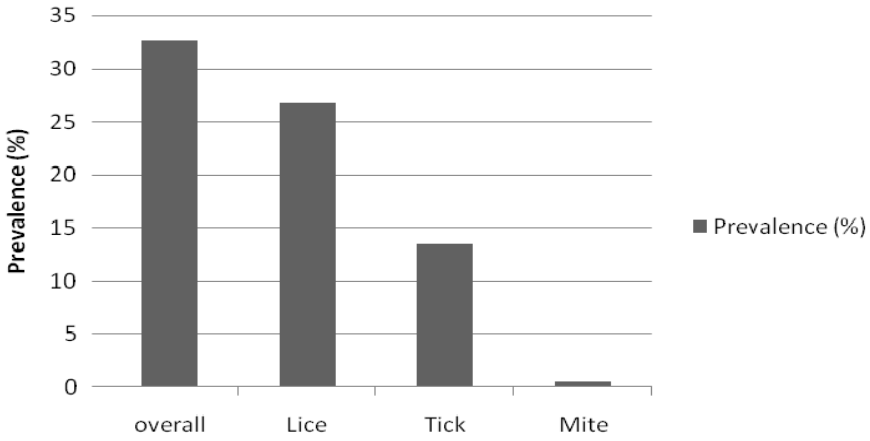

Figure 1. Overall prevalence of ectoparasite.

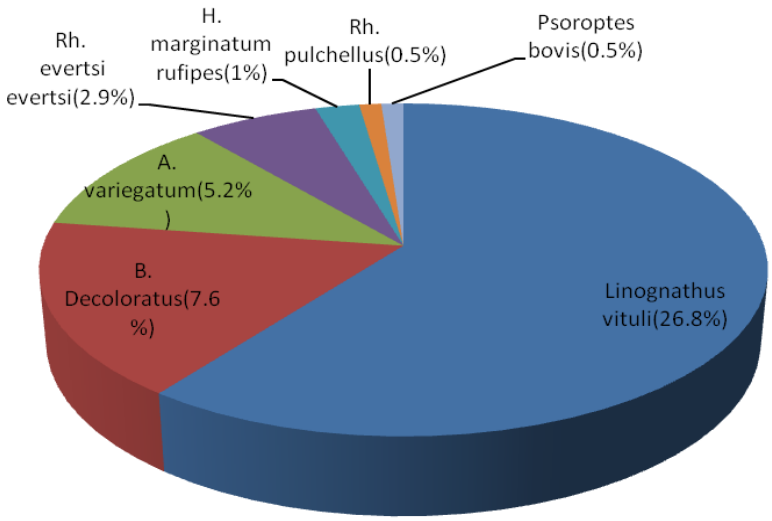

Figure 2. Prevalence of ectoparasite species.

ectoparasite species. However, there was except to *L. vituli*, which was most frequently recorded in local breeds (32.31%) than cross breeds (18.70%) of calves and was statistically significantly ($p<0.05$). The prevalence of ectoparasites was 33.97 and 31.42% in calves share common housing with dam and in calves kept alone but it was not statistically significant ($p>0.05$) (Table 2).

Prevalence of ectoparasites in management system and house cleanness

The prevalence of *L. vituli* higher in calves kept under extensive (37.41%) than those kept in semi intensive (29.41%) and intensive (15.43%) management system. This was statistically significant ($p<0.05$). Similarly, the prevalence was also statistically significant ($p<0.05$) on calves kept in unclean house (52%) than those kept in clean house (15%) while the infestation of other ectoparasite species were not statistically significant ($p>0.05$) in both management and house cleanness (Table 3).

Predilection site of ectoparasite

A total of 211 adult ticks and 986 lice were collected from different body parts of the calves. Ectoparasites tend to prefer specific site of attachment on the animal body. The common infestation sites of Rhipicephalus (*Boophilus)*

Table 1. Prevalence of ectoparasites species in relation to sex and milk feeding practice of calves.

Ectoparasite species	Sex of calf				Milk feeding practice			
	Male (n=168)	Female (n=216)	X^2	p-value	Sucking (n=251)	Bucket (n=133)	X^2	p-value
A.variegatum	10(6.00)	10(4.60)	0.34	0.56	15(6.00)	5(3.76)	0.87	0.47
B.decoloratus	12(7.14)	17(7.87)	0.07	0.79	24(9.56)	5(3.76)	4.19	0.04
H.mrufipes	1(0.6)	3(1.38)	-	0.64	2(0.6)	2(1.5)	0.42	0.52
R.e.evertsi	4(2.38)	7(3.24)	0.25	0.62	9(3.58)	2(1.5)	1.35	1.35
R.pulchelus	0	2(0.92)	-	0.51	0	2(1.5)	3.79	0.05
Tick overall	25(14.88)	27(12.5)	0.46	0.499	40(15.94)	12(9.02)	3.549	0.060
L.vituli	46(27)	57(26)	0.05	0.83	84(33.47	19(14.28)	16.25	0.00
P. bovis	1(0.6)	1(0.46)	-	1.00	1(0.4)	1(0.71)	0.21	0.65
Over all	56(33.33)	70(32.40)	0.04	0.85	101(40.23)	25(19.55)	18.13	0.00

Table 2. Prevalence of ectoparasite species in different breeds and housing condition.

Ectoparasite species	Breed				Housing condition			
	Local (n=229)	Cross (n=155)	X^2	p-value	Alone (n=175)	Mixed (n=209)	X^2	p-value
A. variegatum	13(5.67)	7(4.52)	0.25	0.62	14(8)	6(2.87)	5.07	0.24
B. decoloratus	20(8.73)	9(5.80)	1.13	0.29	7(4)	22(10.53)	5.81	.016
H.mrufipes	2(.87)	2(1.29)	-	1.00	1(.57)	3(1.44)	-	0.63
R. e.evertsi	9(3.93)	2(1.29)	2.32	0.13	1(0.6)	10(4.78)	6.08	0.01
R. pulchelus	0	2(1.29)	-	0.16	2(1.14)	0	-	0.21
Tick overall	36(15.72)	16(10.32)	2.300	0.129	20(11.42)	32(15.31)	1.226	0.268
L. vituli	74(32.31)	29(18.70)	9.62	0.00	47(26.86)	56(26.79)	0.00	0.98
P. bovis	1(0.43)	1(6.67)	-	1.00	1(.57)	1(.48)	-	1.00
Over all	90(39.30)	36(23.22)	10.84	0.001	55(31.42)	71(33.97)	0.28	0.59

Table 3. Prevalence of ectoparasite species in management system and house cleanness.

Ectoparasite species	Management system					House cleanness			
	Intensive (n=175)	semi intensive (n=34)	Extensive (n=175)	X^2	p-value	Clean (n=257)	Not clean (n=127)	X^2	p-value
A.variegatum	8(4.6)	2(5.88)	10(9.71)	0.27	0.86	13(5.06)	7(5.51)	0.04	0.85
B.decoloratus	8(4.6)	4(11.76)	17(9.71)	4.26	0.12	15(5.84)	14(11)	3.28	0.07
H.marginatum rufipes	3(1.71)	0	1(.57)	1.50	0.47	2(.8)	2(2)	0.52	0.47
R.e.evertsi	5(2.86)	1(2.94)	5(2.86)	0.001	1.00	9(3.50)	2(1.58)	1.13	0.29
R.pulchelus	1(0.6)	0	1(0.6)	0.19	0.91	1(.4)	1(.8)	0.26	0.61
Tick overall	18(10.29)	5(14.70)	29(16.57)	2.99	0.224	28(10.89)	24(18.89)	4.649	0.031
L.vituli	27(15.43)	10(29.41)	66(37.41)	22.27	0.00	37(14)	66(52)	61.13	0.00
P.bovis	1(0.6)	0	1(0.6)	0.19	0.91	2(0.78)	0	0.99	0.32
Over all	36(20.57)	11(32.35)	79(45.14)	23.97	0.00	57(22.18)	69(54.33)	39.86	0.00

decoloratus were dewlap and neck. *A. variegatum* and *Hyalomma marginatum rufipes* were most frequently observed on ventral body parts of the animals. The favorable predilection sites for *R. evertsi evertsi* were under tail and ventral body parts. Even though it was observed in head, ear, back, rump and base tail in heavy

Table 4. Distribution tick species in different body region of calves.

Attachment site	A. *variegatum* (%)	*B. decoloratus* (%)	*Rh. evertsi evertsi* (%)	*Rh. Pulchellus* (%)	*H. marginatum rufipes* (%)
Head and hear	-	6(6.59)	1(3.13)	-	-
Dewlap	12(24)	57(62.64)	1(3.13)	4(100)	-
Neck	-	26(28.57)	2(6.25)	-	-
Back and rump	-	-	-	-	-
Ventral body parts	36(72)	2(2.2)	18(56.25)	-	24(70.58)
Base and tip of tail	2(4)	-	10(31.25)	-	10(29.41)
Total count	50	91	32	4	34

infestation, the common infestation site for *L. vituli* were dewlap, neck and ventral body parts (Table 4).

DISCUSSION

Ectoparasites are the prevalent diseases of calves in study area and it may causes high economic losses in the area. Several factors such as absences of improved husbandry practices, inadequate utilization of veterinary services and poor awareness of the owners on the effects of ectoparasites on calves have high contribution for wide occurrence of infestation ectoparasites of calves. In the present study, an overall ectoparasites prevalence of 32.8% was found in the study area. This result was higher than Yacob et al. *(*2008) who reported to be 21.28% in young cattle (calf less or equal to one year) in Adama. In contrast, it was lower than the report of Bilkis et al. (2011) from Bangladesh who was reported to be 46.15% in calves less or equal to one year. This difference in prevalence of ectoparasites might be due to the presence of different factors like animal husbandry practice like feeding and management, utilization of veterinary service and it might be due to the difference in sample size of different researchers. Furthermore, it may be also associated with the agro-ecological difference where the researches were conducted their research which could favors or limits the distribution of ectoparasites in the area as well as in the animal. In the current study, overall prevalence of lice was found to be 26.8% and it was the most prevalent ectoparasite recorded in calves in this study. The higher prevalence of lice infestation among the ectoparasites of calves might be due to the indoor keeping nature of calves, poor grooming behavior of calves, keeping of calves in dirty and unhygienic conditions, lack of awareness about the effect of lice on calves, other health problems, and nutritional stressors. This might also be aggravated due to underlying problems such as malnutrition and disease stressors (Radostits et al., 2006). This result was higher when compared to the reports of Yacob (2008) (9.57%) on calves less than or equal to one year and Gharbi et al. (2013) who reported 21.6% prevalence of lice infestation on calves less than eight months in region of Nabeul in Northeast Tunisia. 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 calves in two successive winters, a research conducted in Southern Alberta in Canada. This variation in prevalence lice were might be related to climatic variation, managemental 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). *L. vituli* was the only lice species identified in the current study. This was in close agreement with a research conducted in Hungary by Hornok et al. (2010) that reported only *L. vituli* on calves and its heavy infestation than other adult animals. This was also supported by the finding of Townsend (2006) who had observed heavy infestation of calves with *L. vituli*. The overall prevalence of tick in current study was 13.5%. This was relatively higher than that was reported by Yacob et al. (2008) who reported to be 7.45% in Adama and Fantahun and Mohamed (2012) reported 2.6% on calves less than one year in Assosa. However, this finding was lower than the reports of Wirz (2005) and Singh and Rath (2013) who were reported 24 and 72.59% prevalence of tick on calves between 0 to 6 months of age in Mali and India respectively. These differences may be due to differences in agro-ecology, husbandry practice, the season and length of study period and the sample size might be contributed to this variation in the prevalence of tick. The low prevalence of tick in this study when compared to lice might be due to absence of factors that worsen the occurrence of ticks such as calves maintained apart from adult animals at low population densities and calves graze around home on the pasture with no more animal graze and most of the times they are managed in zero grazing were thus possibly exposed rarely to tick and reduced its transmission between the calf and other animal. The prolonged dry season in the study period might be contributed for this low prevalence of tick. The current study identified five species of ticks belonging to three genera and one sub genus; *Ambylomma, Rhipicephalus, Hyalomma* and *Rhipicephalus (sub genus Boophilus)*. Out of the five species of ticks recorded, the most

prevalent was *Rhipicephalus* (*Boophilus) decoloratus* (7.6%) followed by *Ambylomma variegatum* (5.2%) and *R. evertsi evertsi* (2.9%). This was in line with the reports of Onu and Shiferaw (2013) and Mokennen et al. (2001) who were reported *Rhipicephalus* (*Boophilus) decoloratus* followed by *Ambylomma variegatum* to be the dominant tick species in cattle in Bench Maji zone, southwest Ethiopia and central Ethiopia respectively. There was no statistically significant association were found between tick prevalence and the risk factors assessed. This was in agreement with report of Yacob et al. (2008) who report statistically insignificant association between tick prevalence and sex and breed of cattle. Moreover, the overall prevalence of mite on calves was 0.5% and genus *Psoroptes* was the only genus of mange mites that was identified in calves in the study area. The current finding on prevalence of *P. bovis* was in agreement with the reports of Tadesse et al. (2011), Onu and Shiferaw (2013) and Yacob et al. (2008) who were reported 0.4, 0.9 and 0.68% prevalence of *P. bovis* on cattle respectively. The low prevalence of mite infestation in this study could be due to the fact that the length of time mites can survive off its host is strongly affected by ambient temperature and humidity. Time of the year may have an impact on off host survival of mites. This has important implication for the potential for the transmission from the environment to the host, transmission being greater considerably in the winter (Wall and Shearer, 2001). The number of cases was too small for analyzing the effects of sex, breed, management system, housing condition, house cleanness, and milk feeding practice of calf. There was an association of the prevalence of lice with different risk factors in this study; except, the prevalence of lice in male and female calves was found to be almost the same; 27% in males and 26% in females. This is in agreement with report by Onu and Shiferaw (2013) on cattle. Furthermore, the comparable prevalence of lice in both sexes could be related to the absence of the stresses such as using male for draught purpose and production stresses in female that disrupt the immunity of the animal against ectoparasite and lead to the difference in the infestation of lice on sex group in adult animals. By contrast, 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 prevalence of lice on suckling and bucket feeding calves were 33.47 and 14.28% respectively. In this study, it was found a strong association between milk feeding practice and prevalence of *L. vituli*. This might be due to the increased contact rate of calf with dam which favors the transmission of lice. Lice are spread from animal to animal when animals are in close contact with one another such as during feeding, breeding, or shipping (Radostits et al., 2006). This study revealed that the prevalence of *L. vituli* was higher in local breed calves (32.31%) than in cross breed calves (18.70%). This was in line with the findings of Yacob et al. (2008) and Bilkis et al. (2011) who were reported a positive correlation between prevalence of lice and breed of cattle. This could be associated with taking more care to crossbreeds due to their high productivity nature than local breeds. So, heavy infestation of local breed calves may be associated with the unhygienic handling condition of their housings. On the other hand, the milking procedure in local breeds is done in the presence of calf as a stimulant for milking throughout the lactation period which contributes for the transmission of lice through prolonged contact with infested dam. However, there was no association between the prevalence of other ectoparasite species and breeds of calves. The prevalence of *L. vituli* was almost similar 26.86 and 26.79% in calf's share common housing with dam and in calves kept alone respectively. This comparable prevalence was might be related to the tie of calves in specific place in the house to prevent from suckling the milk. It was also found that the prevalence of *L. vituli* was higher in calves kept in unclean house (52%) than those kept in clean house (15%). This may be due to lice and louse eggs drop off onto bedding or are rubbed off, along with hair, onto fences and feed bunks; as a result, other calf may then become infested from contaminated bedding, bunks, sheds, or trucks (Radostits et al., 2006). Even though, the probability of animals to pick up infestations from dirty house from lice drop off their host is limited; it could not be ignored. Unhygienic house might predispose calf to other health problems that makes calves more susceptible to lice infestation. There might be underlying factors such as malnutrition and chronic disease in calves kept under unclean house (Wall and Shearer, 2001). *L. vituli* infestation in different management systems was found to be higher in calves kept under extensive (37.71%) than those kept in semi intensive (29.41%) and intensive (15.43%) management system. This agreed with the reports of Nigatu and Teshome (2012) that were reported lice infestation to be significantly higher in the extensive production system than in the intensive production system. This could be due to the poor management systems applied, prolonged contact with dam during suckling and milking time. The dam might have been in contact with animals from other herds at communal grazing and serve as source of infestation to the calf. More or less, early release of calves to pasture and inadequate utilization of veterinary service in extensive management system might exacerbate the condition. Ectoparasites tend to prefer specific site of attachment on the animal body. The common infestation sites of *Rhipicephalus* (*Boophilus) decoloratus* were dewlap and neck. *A. variegatum* most frequently observed on ventral body parts of the animals. The favorable predilection sites for *R. evertsi evertsi* were under tail and ventral body parts. This corroborated with

those reported by other authors like Tessema and Gashaw (2010) and Tiki and Addis (2011). Furthermore, a verity of factors such as host density, interaction between tick species, time and season, and inaccessibility for grooming, determine the attachment site of ticks (Gebre et al., 2001). Lastly, in the present study, *L. vituli* was confirmed commonly to infest dewlap, neck and ventral body parts of the calf. This was similar to the reports by Urquhart et al. (1996) who were indicated that *L. vituli* prefer the head, neck and dewlap but also may be found anywhere in the hair coat.

CONCLUSION AND RECOMMENDATIONS

Ectoparasite infestation in calves has significant economic importance due to direct and indirect loss of production, reduce weight gain, retard growth, skin damage, immunosuppression, nuisance and biological vectors of different bacteria, viruses and protozoa. The present study showed high prevalence of ectoparsites on calves in the study area. The problem of external parasite seems to be crucial as they are widely distributed in relation to breed and management system. The important and prevalent ectoparasite species investigated in this study were *L. vituli, Rhipicephalus (Boophilus) decoloratus, A. variegatum, R. evertsi evertsi, H. marginatum rufipes, Rhipicephalus pulchellus* and *P. bovis.* However, the attentions given to the infestation ectoparasites was not sufficient and the lack of available information on ectoparasite species and the consequence behind its infestation; aggravates the infestation of the calves by ectoparasites in the area. Based on this the following recommendations were forwarded: There should be a close attention by all stakeholders; farmers, veterinarians and government on control and prevention measures to lessen losses caused by ectoparasites infestation and transmission of pathogens to domestic animals. Awareness should be created in small holder farmer concerning the cause, transmission, and effect and control methods of ectoparasites in order to minimize the loss incurred due to ectoparasites in the study area. Further detailed study should be conducted to have appropriate information on the seasonal occurrence, burden and the effect of these ectoparasites on calves and economic losses caused by them in the study area.

Conflict of Interest

The authors have not declared any conflict of interest.

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