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# Prevalence and Associated Risk Factors of Ectoparasite of Sheep and Goat in Yeki district in Southwestern Ethiopia

**Dereje Tulu[1]* and Beksisa Urge[2]**

[1]*Ethiopian Institute of Agricultural Research, Tepi Agricultural Research Center, Ethiopia*
[2]*Ethiopia Institute of Agricultural Research, Holeta Agricultural Research Center, Holeta, Ethiopia*

***Corresponding author**
Dereje Tulu, Ethiopian Institute of Agricultural Research, Tepi Agricultural Research Center, Ethiopia, Email: derejetulu5@gmail.com

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**Abstract**

Ectoparasitesare a serious pathogens sheep and goat industry that cause a significant negative impact in tanning industry and economic growth in Ethiopia. A cross sectional study was conducted in Yeki district, Southwestern Ethiopia to determine the prevalence and associated risk factors of Ectoparasites in sheep and goats from December 2016 to December 2017. A total of 500 small ruminants (321 sheep and 179 goats) were randomly selected and examined for the presence of ectoparasites. The prevalence of Ectoparasites in sheep and goats was (76.6%) and (79.9%) respectively. The overall prevalence of ectoparasites was 77.8% (389/500) in the study areas. The infestation of ectoparasites was highest due to tick (37.8%) followed by fleas (34.4%) and lice (31.2%) with mixed infestation (23.8%) being the least in the area. Multivariable logistic regression analysis identified sex, age groups and body condition of sheep and goats as risk factors ($P<0.05$) for ectoparasites in the study area. However, there were no statistically significant differences observed between species and peasant associations in sheep and goats ($P> 0.05$). The study shows that ectoparasites are one of the constraints to sheep and goats production instudy area. Hence, there is a need to create awareness about impact of parasite on sheep and goats production, and appropriate control methods for ectoparasites should be designed and implemented.

## INTRODUCTION

Ethiopia has a huge number of small ruminants with sheep and goat population of 30.7 million and 30.2 million, respectively [1]. Sheep and goats represent an important segment of the Ethiopian livestock system. They are important sources of income for the agricultural communities and are important sources of animal protein, providing 35%ofmeat and 14% of milk consumption [2]. Skin from goats and sheep are important economic products contributing for the largest share to the total and agricultural exportcommodities [3]. The contribution of sheep and goats to the national economyparticular with regard to foreign currency earnings is through exploration of live animal, meat and skin. Among the export products, skin has the largest share of exports followed by live animal [4]. Owing to their high fertility, short gestation interval and adaptation even in harsh environments, sheep and goats are considered as investments and insurance to provide income to purchase food during seasons of crop failure and to meet seasonal purchase such as improved seed, fertilizer and medicine for rural household [5].

However, the current levels of contributions of sheep and goats in Ethiopia, either the macro or micro level is below the expected potential. Among major constraints hindering the productivity of sheep and goats in the country are diseases; among those ectoparasites are accounts for wide range of health problems that confront the productivity of sheep and goats. Ectoparasites are very common and widely distributed in all agro-ecological zones in Ethiopia [6,7]. Ectoparasites (lice, ked, mange mites and ticks) are cause mortality, decreased production and reproduction of sheep and goat, and also cause serious skin defects that end up with down grading of quality and rejection of skin [8,9].

In Ethiopian tanneries, 35% of sheep and 56% of goat skins have been downgraded and rejected due to defects caused by ectoparasites [8,10]. The Ethiopian tanning industry has long complained about the poor quality of processed skin. This has created a serious problem for competition in international markets through the export of semi-processed and processed skin [11,12]. The study done for assessment of major factors that cause skin rejection at Modjo export tannery in Ethiopia revealed that ectoparasites play key role in the rejection of skin [12]. All ectoparasitescause intense irritation to the skin, the extent depending on the parasite involved. Infested sheep and goatscratch, ruband bite the affected areas and this end up with skin damage [13]. Ectoparasites of sheep and goatscause blood loss and very heavy infestations result with severe anemia. Moreover, they are the most importantvectors of protozoan, bacterial, viral and rickettsial diseases [14,15. All these contributed towards the extreme reduction of sheep and goat productivity. In Ethiopia there is limited information regarding the prevalence, risk factor and distribution of sheep and goat ectoparasites.

Ectoparasites are one of the major hinder sheep and goat production in many parts of Ethiopia. Several studies from different parts of the Ethiopia showed that skin quality deterioration is very evident mainly due ectoparasites such as Lice, fleas, keds, mange mites and ticks are the major ectoparasites of sheep and goats in the country [5,16]. Ectoparasitesare reported to causea wide range of health problems such as mechanical tissuedamage, irritation, inflammation, hypersensitivity, abscesses,weight loss, lameness, anaemiaand in severe cases death of infested animals with the consequent socioeconomic implications [14]. The occurrence and spread of skin diseases had been shownto correlate with host factors, poor management, climaticfactors, feed scarcity and inadequate veterinary services [17].

Ectoparasite is one of the most important sheep and goats problems in Yeki district of Sheka zone. This districtis potential for sheep and goats production but the districtis infested with ectoparasite. As a result, the people suffer from low level of skin and productivity that compromise the socio-economic and nutritional status of inhabitants. Hence, knowing the current status of ectoparasite and its associated risk factors is important to reducing economic losses by this parasite. To effectively control ectoparasite problems and realize benefit from sheep and goats resource, it is crucially important to know prevalence and associated risk factors of ectoparasite. Furthermore, science-based interventions could be made available for policy makers and animal health extension personnel. There is no any study conducted previously in this area. Therefore, objective of this study was to determining the prevalence of ectoparasite of sheep and goats, and possible risk factors that play a role in precipitating such problems in Yeki district of Sheka Zone in south western part of Ethiopia.

## MATERIALS AND METHODS

### Study area

The study was conducted in Yeki district, Sheka Zone in Southwest Ethiopia which was organized by 23 Kebeles. The area islocated at 611 km southwest of Addis Ababa. Geographically, thedistrict lies between 7°12' to 7°43' W latitude and 35°32' to 35°75' Elongitude. The altitudinal range of the district falls between 1001 to2007 m above sea level, and it receives high amount of rainfall with mean average of 1591 mm annually and an average annual temperature ranging from 21.5 to 27.14°C. The rain fall in the area is abimodal, short rain occurring from March to May followed by long rain from June to September. The number of livestock population of the are acomprises about 3580 cattle, 2330 sheep, 1580 goats, 1685equines and 12685 poultry. The major economic activities of the population were depends on trading, farming crops and fruits and livestock production. The farming system is largely characterized by mixed crop-livestock production.

### Study population

Target population comprises were sheep and goats of Yeki district and study population were sheep and goats in selected peasant association of the district which was kept under different of production systems. The study was included different age group and local indigenous breed of sheep and goats kept by farmers in the area where mixed crop-livestock production system is practiced.

### Study Design

The cross-sectional study was conducted from November 2015 to November 2016 to estimate the prevalence and associated risk factors of ectoparasite in sheep and goats in Yekidistrict.

### Sampling method and sample size determination

The study district was selected purposively based on history of ectoparasite reports. Simple random sampling technique was used to select the peasant associations and animals from district. Five peasant associations were sampled from the district based on number of sheep and goatspopulation. Sampling frame of sheep and goats were taken from respective peasant associations. During sampling peasant associations, age, sex, body condition and species of sheep and goats were recorded. Since there was no previous study done in the area, the sample size was determined based on the expected prevalence of 50% and absolute desired precision of 5% at confidence level of 95%. As a result a total of 384 sheep and goats were needed to be sampled according to formula given by [18]. However, the sample size was raised to 500sheep and goats with the intention to increase the precision of the study.

### Field activity and laboratory diagnostic method

After the animal restrained physically, clinical examination for ectoparasites was performed by visual inspection and palpation of skin for parasites and/or lesions on all parts of animal. The neck, shoulder, breast, ribs, back, flank and rump areas of both sides of the body were examined for presence of ticks and lice by parting the hair/wool. From each site five partings of about 10 cm long was examined. Ectoparasites like tick, fleas and lice was collected from the body surface manually and preserved in proper universal bottle labeled with serial numbers while other data was written on special field register format prepared for this particular purpose (peasant associations, species, age, sex and body condition score of animals). The collected ectoparasites were transported to parasitology laboratory. All collected samples was examined for further identification and confirmed in the laboratory [19,20].Identification of the different ectoparasite species and/or genera was under taken according to [21].

### Data management and analysis

Data obtained from this study was recorded, and stored in Microsoft® Excel for Windows 2010 and transferred to Statistical Package for the Social Sciences (SPSS) version 20.0 (IBM SPSS, 2011). Descriptive statistics used to analyze the data and percentages and tables were used to describe the results. The prevalence was calculated by dividing the proportion of animals found infested by the total number of animals examined for ectoparasites multiplied by 100. Associations between outcome (ectoparasites) and explanatory variables (risk factors) for all units of analysis were investigated by using logistic regression model. The strength of the association between outcome and explanatory variables was assessed using the adjusted odds ratios (OR). The explanatory variables (P≤ 0.25) were further checked

for multicollinearity using the variance inflation factor (VIF) and tolerance factor (TF) before multivariable logistic regression analysis. Variance inflation factor values of greater than 3 or tolerance less than 0.1 were considered the cut-off points [22] for the collinearity diagnostics. Variables were also tested for interaction effects using cross-product terms. The backward elimination procedure was used to eliminate the factors that were not significant at P<0.05 in the overall model. Factors that were significant (P≤ 0.05) were retained in the final model and model fit was observed using the Hosmer-Lemeshow test. In the analysis, a covariate was considered confounder and included in the model if its inclusion altered the OR of the estimated risk by more than 20% [23]. For all the analyses, confidence level (CL) is at 95% and P≤ 0.05 were set for significance.

## RESULT

The overall prevalence of Ectoparasite in the study areas was 77.8%. The prevalence in each peasant association was determined to be 77.8% in Zinki, 72.6% in Adisberhan, 74.7% in Selam, 80.0% Adiselam and 82.6% in And inet of Yeki district. The prevalence of Ectoparasite in sheep and goats were 246(76.6%) and 143(79.9%) respectively as shownin Table 1.

The major ectoparasites identified in study are awere ticks (34.4%), lice (31.2%), fleas(37.8%)and mixed infestation (tick, lice and fleas) (23.8%).The highest (83.3%) and lowest (62.5%) prevalence of ectoparasite was recorded in Zinki and Adisberhan peasant associations, respectively. However, there was no statistical significant difference (P>0.05) between prevalence of ectoparasite and peasant associations. The prevalence of ectoparasites was more (86.3%) in adult age category than in young age category (75.0%) of sheep and goats. Statistically significant (p<0.05) difference in ectoparasite infestation was observed among age categories. Relatively older sheep and goats were more likely to beinfested by ectoparasite than their younger counterparts. The prevalence of ectoparasite was higher in male (85.3%) than female (70.6%) sheep and goats. Male sheep and goat were almost two times (OR=2.4) more likely to be infested by Ectoparasite than female sheep and goats. The variation in the prevalence of Ectoparasites between the sex was statistically significant (P<0.05).The highest prevalence of Ectoparasites was recorded in sheep and goats with poor body condition (83.2%). Moreover, variation in prevalence of Ectoparasites among the body condition was statistically significant (P<0.05). Poor body condition sheep and goats being almost four times (OR=3.7) more likely to be infested with Ectoparasites compared to good body condition sheep and goats. Highest prevalence of Ectoparasites was found in goats (79.9%) than sheep (76.6%). However, there was no statistically significant difference (P>0.05) between sheep and goats with prevalence of Ectoparasites (Table 3).

Variables with a p-value less than 0.25 in the univariable analysis with no multicollinearity were entered into multivariable logistic regression model. No significant interactions between variables were detected. A Hosmer-Lemeshow goodness-of–fit value (P=0.76), indicated that the model was fit the data. The final multivariable logistic regression model showed that body condition, sex and age of small ruminants (sheep and goats) were independently associated with (P<0.05) ectoparasite in Yeki district (Table 4).

## DISCUSSION

The present study showed 77.8% sheep and goats were infested with ectoparasites. This finding is most probably attributable to several important factors including management problems, favorable environment, malnutrition and poor husbandry systems, poor awareness of farmers and inadequate veterinary services in the study area [24]. Prevalence of 81.5% in selected districts of Amhara Region, 73.3% in Kombolcha and 71.4% in Bahirdar, Ethiopia was reported by other workers [4,25,26]. On the other hand, the prevalence ofectoparasitereported in the current study is lower than the values reported [3] 99.4% in Wolmera district; [27] 93.1% in pastoral districts of Afar. However, the prevalence ofectoparasitereported in the current study is higher than the values reported by [10] 54.8% in selected districts of Tigray Region; [28] 48.9% in Bahirdar, Northwest Ethiopia and [29] 45.5% in Sekela Northwest Ethiopia. This variation in prevalence of ectoparasites might be due to differences in environmental factors, management system and level of veterinary servicein study areas.

The major ectoparasites identified wereticks (37.8%), fleas (34.4%), lice (31.2%) and mixed infestation (23.8%) of sheep and goats in the study area. Other studies have also demonstrated the widespread nature of these ectoparasites in sheep and goats in Ethiopia [10,30,31,32]. Ticks were the major ectoparasites in the current study insheep and goats. This may be attributed to the fact that ticks are easier to detect compared to fleas which jump frequently all over the host body. This finding was alsoinagreement with reports of predominance of ticks in Bahir Dar and East Wollega areas of the country [33,34].

Statistically significant variation has been observed in prevalence of ectoparasite between different age groups; adult and young age group were almost four (OR=3.9) and three times (OR=2.8) respectively more likely to acquire ectoparasite infestation compared to their older counterparts. This might be attributed to their poor grooming behavior. Moreover, acquired immunity added to the relative thicker skin of older animals may also contribute to greater resistance against ectoparasites in older age category. This finding is consistent with previousreports that age is one of the important risk factors influencing ectoparasites in sheep and goats [4,25,36].

Current study indicated that sheep and goats with poor body condition are almost two times more likely to be infested by ectoparasites (OR= 2.2) than good body condition. This may be due to sheep and goats under good body condition have well developed immune status that can respond to any foreign protein better than those of sheep and goats with poor body condition [19]. This finding is consistent with some previous studies in Ethiopia [10,37,38], who stated that prevalence of ectoparasites was statistically significantly associated with body condition in sheep and goats.

In the present study, sex was statistically significantly associated with occurrence of ectoparasite(p<0.05) with male sheep and goatstwo times more likely to be infested by ectoparasite (OR= 2.3) than female sheep and goats. This may be due to restrictedaccess ofpregnant and lactating females to pastures. This study was inagreement with the reports of [39] and

**Table 1:** Prevalence of Ectoparasite in different peasant associations of Yeki district.

| | Sheep | | Goats | | | |
|---|---|---|---|---|---|---|
| **Kebele** | **Number of examined** | **Prevalence (%)** | **Number of examined** | **Prevalence (%)** | **Totalof examined sheep and goats** | **Overall prevalence (%)** |
| Zinki | 66 | 55 (83.3) | 33 | 22 (66.7) | 99 | 77 (77.8) |
| Adisberhan | 56 | 35 (62.5) | 39 | 34 (87.2) | 95 | 69 (72.6) |
| Selam | 75 | 59 (78.7) | 16 | 9 (56.3) | 91 | 68 (74.7) |
| Adiselem | 73 | 57 (78.1) | 27 | 23 (85.2) | 100 | 80 (80.0) |
| Andinet | 51 | 40 (78.4) | 64 | 55 (85.9) | 115 | 95 (82.6) |
| Total | 321 | 246 (76.6) | 179 | 143 (79.9) | 500 | 389 (77.8) |

**Table 2:** Univariable logistic regression analysis of ectoparasite associated risk factors in Yeki district.

| **Variables** | **Category** | **Total animals examined** | **Total animals positive (%)** | **OR (CI; 95%)** | **P-value** |
|---|---|---|---|---|---|
| PA | | | | | 0.44 |
| | Andinet (Ref) | 51 | 40 (78.4) | - | - |
| | Zinki | 66 | 55 (83.3) | 1.4 (0.69-2.67) | 0.38 |
| | Adisberhan | 56 | 35 (62.5) | 1.8 (0.93-3.46) | 0.08 |
| | Selam | 75 | 59 (78.7) | 1.6(0.82-3.20) | 0.29 |
| | Adiselem | 73 | 57 (78.1) | 1.2 (0.60-2.36) | 0.62 |
| Sex | Female (Ref) | 255 | 180 (70.6) | - | - |
| | Male | 245 | 209 (85.3) | 2.4 (1.55-3.77) | 0.001 |
| BCS | | | | | 0.001 |
| | Good (Ref) | 108 | 93 (86.1) | - | - |
| | Medium | 148 | 93 (62.8) | 1.3 (0.66-2.38) | 0.49 |
| | Poor | 244 | 203(83.2) | 3.7 (1.94-6.95) | 0.001 |
| Age | | | | | 0.001 |
| | Old (Ref) | 285 | 246 (61.9) | - | - |
| | Adult | 139 | 86 (86.3) | 3.9 (2.40-6.39) | 0.001 |
| | Young | 76 | 57(75.0) | 2.1 (1.13-3.91) | 0.019 |
| Species | Goats (Ref) | 179 | 143 (79.9) | - | - |
| | Sheep | 321 | 246 (76.6) | 1.2 (0.77-1.90) | 0.40 |

OR: Odds Ratio; CI: Confidence Interval, Ref: Reference

**Table 3:** Multivariable logistic regression analysis of potential risk factors of ectoparasite in Yeki district .

| **Factors** | **Number of animals examined** | **Total animals positive (%)** | **Adjusted OR (95% CI)** | **P-value** |
|---|---|---|---|---|
| Sex | | | | |
| Female (Ref) | 255 | 180 (70.6) | - | - |
| Male | 245 | 209 (85.3) | 2.3 (1.44-3.81) | 0.001 |
| Age | | | | 0.001 |
| Old (Ref) | 285 | 246 (61.9) | - | - |
| Adult | 139 | 86 (86.3) | 3.9 (2.28-6.58) | 0.001 |
| Young | 76 | 57(75.0) | 2.8 (1.33-5.86) | 0.007 |
| Body condition | | | | 0.030 |
| Good (Ref) | 108 | 93 (86.1) | - | - |
| Medium | 148 | 93 (62.8) | 0.7 (0.35-1.54) | 0.42 |
| Poor | 244 | 203(83.2) | 2.2 (1.13-4.44) | 0.021 |

OR: Odds Ratio; CI: Confidence Interval, Ref: Reference

[29], who reported significant association between prevalence of ectoparasite and sex of sheep and goats.

The prevalence of ectoparasite was higherin goats (79.9%) than sheep (76.6%). However, no statistically significant variation was observed in prevalence of ectoparasite between sheep and goats.Nostatistical significant difference (P>0.05) was found betweenpeasant associations and prevalence. The reasons are anequal exposure of sheep and goats to the ectoparasite and even distribution of the parasite in the district. This result is in line with study done inselected pastoral districts of Afar, Northeastern Ethiopia [27].

## CONCLUSION AND RECOMMENDATIONS

Ectoparasites are the most important constraint for sheep and goats production in study area. Tick was the most abundant ectoparasites in the study area followed by fleas and lice in sheep and goats. This has great impact on the economy through downgrading of skin for the leather industry, the loss of condition and carcass quality, and possible transmission of many diseases. Body condition, age groups and sex of sheep and goats were major risk factorsin the study area. To reduce the impact of ectoparasites in sheep and goats appropriate control methods should be designed and implemented in the study area. Moreover, awareness creation about the importance and prevention of ectoparasites among smallholder animal producing farmers is recommended.

## REFERENCES

1. CSA. Livestock and Livestock Characteristics, Agricultural sample Survey. Addis Ababa, Ethiopia. Statistical Bulletin. 2017; 2: 9-13.
2. MOA (Ministry of Agriculture).Annual Report on Livestock Production, MOA, Addis Ababa, Ethiopia, 2010.
3. Jemere B, MarthaT, Rahmeto A. External Parasite Infestations in Small Ruminants in Wolmera District of Oromiya Region, Central Ethiopia. Journal of Animal and Veterinary Advances. 2011; 10: 518-523.
4. Amuamuta A, Kassahun A, Fentahun T. Occurrence of Small Ruminant Ectoparasites in and Around Bahir Dar, Northwest EthiopiaAdvances in Biological Research. 2012; 6: 170-176.
5. Tefera S. Investigation on ectoparasites of small ruminants inselected sites of Amhara regional state and their impact on the tannin Industry, MSc thesis, Addis Ababa University, Ethiopia. 2004.
6. Kumsa B, BeyechaK, Geloye M. Ectoparasites of sheep in three agro-ecological zones in central Oromia, Ethiopia. J.Vet. Res. 2012; 79: 442-447.
7. Yacob HT. ECTOPARASITISM:Threat to Ethiopian Small Ruminant Population and Tanning Industry. J. Vet. Med. Anim. Health, 2014; 6: 25-33.
8. Yebegashet M, Hailu Y, Ashenafi H. Ectoparasites of small ruminants in three selected agro-ecological sites of Tigray Region, Ethiopia. Trop. Anim. Health Prod. 2010; 42: 1219-1224.
9. AmareS, Asfaw Y, Hailu Y. Ectoparasites of Sheep and Goats in North-West Amhara Regional State, Ethiopia,Ethiop. Vet.J. 2013; 17. 55-67.
10. Rahmeto A, Makelesh T, Bekele M, Desie S. Prevalence of Small Ruminant Ectoparasites and Associated Risk Factors in Selected Districts of Tigray Region, Ethiopia, Global Veterinaria. 2011; 7: 433-437.
11. MoARD (Ministry of Agriculture and Rural Development). The effect of Hide and skin quality on Domestic and export markets and evaluation of the campaign against Ectoparasites of sheep and goats in Amhara, Tigray and Afar Regions, official report to Regions and other sectors, Addis Ababa, Ethiopia, 2008.
12. Berhanu W, Negussie H, Alemu S, Mazengia H. Assessment on major factors that cause skin rejection at Modjo export tannery, Ethiopia. Tropical Animal Health and Production. 2011; 43: 989-993.
13. USAID. USAID (FAO), success story, Ethiopians learning to fight ectoparasites, 2008.
14. Radostits OM, Gay C, Hinchcliff KW, Constable PD. A textbook of the diseases of cattle, sheep, goats, pigs and horses, 10th edition, Saunders, Edinburgh, London, 2007; 1585: 1612.
15. Rhabari S, Nabian S, Bahonar AR. Some observations on sheep sarcoptic mange in Tehran province, Iraq, Tropical animal health production. 2009; 41: 397-401.
16. Tadesse H. Pre-slaughter Defects of Hides/Skin and Intervention Options in East Africa, Harnessing the Leather Industry to Benefit the Poor. In: Regional Workshop Proceedings, April 18 - 20, Addis Ababa, Ethiopia. 2005; 19-30.
17. Ayele S, Assegid W, Jabbar MA, Ahmed MM, Belachew H. Livestock Marketing in Ethiopia. A Review of Structure, Performance and Development Initiatives. Socioeconomic and Policy Research Working Paper, ILRI, Nairobi, Kenya. 2003; 35-52.
18. Thrusfield M. Veterinary Epidemiology, 3rd Edn., Blackwell Publishing, England, 2005; 345-543.
19. Taylor MA, Coop RL, Wall RL.VetParasitol, 3rd edn.Blackwell, Oxford, 2007; 586-593.
20. Urquhart G, Armour J, Duncan JL, Dunn AM, Jennings FW. Veterinary Parasitology, 2nd edition. Singapore; Longmann. 2007.
21. Wall R, Shearer D. Veterinary ectoparasite; Biology, pathology andcontrol. 2 ed. UK. Black Welsceince, 2001; 23-54.
22. Apeanti WO. Contributing factors to pre-service mathematics teachers' e-readiness for ICT integration. International Journal of Research in Education and Science. 2016; 2: 223-238.
23. Dohoo I, Martin W, Stryhn H. Veterinary epidemiologic research, 2nd ed. AVC, Charlottetown, Prince Edward Island. 2009; 239-249.
24. Bedada H, Gizaw F, Fekadu G, Negash W. Identification of Major Ectoparasites Infesting Sheep in Aba Jima District, Oromia Region, Ethiopia. Int. J. Curr. Res. Biol. Med. 2017; 2: 42-29.
25. Chanie M, Negash T, Sirak A. Ectoparasites are the major causes of various types of skin lesionos in small ruminants in Ethiopia, Tropical Animal Health and Production. 2010; 42; 1103-1109.
26. Tadesse A, Fentaw E, Mekbib B, Abebe R, Mekuria S, Zewdu E. Study on the prevalence of ectoparasite infestation of ruminants in and around Kombolcha and damage to fresh goat pelts and wet blue (pickled) skin at KombolchTannary, Northeaster Ethiopia. Ethiop. Vet. J., 2011; 15: 87-101.
27. Zeru F, Bedada H, Gebru M, Seid A, Gebregergious A. Epidemiology of Major Small Ruminant Ectoparasites and Effectiveness of the Control Approaches Employed in Selected Pastoral Districts of Afar, Northeastern Ethiopia.Journal of Biology. Agriculture and Healthcare. 2015; 5: 63-72.
28. Tesfaye D, Assefa M, Demissie T, Taye M. Ectoparasites of small ruminants presented at Bahir Dar Veterinary Clinic, Northwest Ethiopia. African Journal of Agricultural Research. 2012; 7: 4669-4674.
29. Seyoum Z, Tadesse T, Addisu A. Prevalence in Small Ruminants in and

around Sekela, Amhara Regional State, Northwest Ethiopia. Hindawi Publishing Corporation Journal of Veterinary Medicine. 2015; 6.

30. Misgie A, Baye D, Belete A, Ge G. Prevalence of ectoparasites among small ruminants in and around Bahir Dar town, Ethiopia.World Journal of Pharmaceutical and Medical Research. 2016; 2: 24-32.

31. Sertse T, Wossene A. A study on ectoparasites of sheep and goats in eastern part Amhara region, northeast Ethiopia. Small Rumin Res. 2007; 69: 62-67.

32. Woldemeskel M, Ashenafi H. Study on skin diseases insheep from northern Ethiopia. DtschTierarztl Wochenschr, 2000; 110: 20-22.

33. Dawit T, Mulugeta A, Tilaye D,Mengistie T. Ectoparasites of small ruminants presented at Bahir- dar Veterinary Clinic, Northwest Ethiopia. African Agricultural Journal Research. 2012; **7**: 4669-4674.

34. Mersha C, Solomon,Basaznew B. Prevalence of bovine demodicosis in Gondar Zuria District, Amhara Region, Northwest Ethiopia. Global Veterinarian. 2013; 11: 30-35.

35. Fentahun T, Woldemariam F, Chanie M, Berhan M. Prevalence of Ectoparasites on small ruminants in and around Gondar town. American-Eurasian Journal of Science Research. 2012; **7**: 106-111.

36. Sertse T, Wossene A. A study on ectoparasites of sheep and goats in eastern part Amhara region, northeast Ethiopia. Small Rumin Res. 2007; 69: 62-67.

37. Mulugeta Y, Yacob TH, Ashenafi H. Ectoparasites of small ruminants in three selectedagro-ecological sites of Tigray Region, Ethiopia Tropical Animal Health and Production. 2010; 42: 1219-1224.

38. Teshome D, Derso S. Prevalence of major skin diseases in ruminants and its associated risk factors at university of Gondar Veterinary Clinic, North West Ethiopia. J.Vet. Sci. Technol. S. 2015; 13-002.

39. Johnson NN. Integrated control programsfor tick on cattle. An examination of some possible components of FAO animal production and health. 2004; 402-432.

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