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Prevalence and identification of Ectoparasites on bovine in Hadero and Tunto Zuria Worada, Hadero Veterinary Clinic, Hadero

Eskadmas Assefa Ayele, Tekalign Woldehana Uro
Mekelle University, College of Veterinary Medicine

Abstract

A cross-sectional study was conducted from November, 2015 to February, 2016 on a total of 384 cattle to identify the major ectoparasites and to determine their prevalence in Hadero Tunto Zuria Word, Hadero veterinary clinic, Out of 384 cattle examined for ectoparasites, 333 (86.7%) cattle were found to be infested with one or more ectoparasites. Overall seven genera of ectoparasites belonging to ticks (Amblyomma, Hyalomma, Boophilus and Rhepicephalus), lice (Linognathus and Damalina) and Mange mite (Demodex) were encountered in the study area. Prevalence of tick, lice and mite infestation was 58.9% (226/384), 18.2% (70/384) and 9.6% (37/384) respectively. Among the risk factors assessed, breed of animals ($\chi 2=17.9$; P=0.00), Sex ($\chi 2=7.11$; P=0.008), age ($\chi 2=119.8$; P=0.00), production system ($\chi 2=134.6$; P=0.00) and body condition ($\chi 2=52.9$; P=0.00) were significantly associated with prevalence of ectoparasite infestation. The present study revealed that widespread occurrence of ectoparasites in cattle in the study area, and the major ectoparasites identified were tick, lice and mange mite, thus, improved management practice and well-coordinated control interventions are required.

Keywords: Cattle; Ectoparasite; Prevalence; Mekelle; Significance.

Introduction

More than 80% of the Ethiopian Population is dependent on agriculture which contributes 45 % of the country's Gross Domestic Product (GDP) and more than 90% of the export earnings (MOA, 2010). Livestock contributes 30-35% of the agricultural GDP and more than 85% farm cash income of Smallholders (Tesfaye et al., 2012).

Ethiopia has the largest livestock population in Africa estimated at about 52 million head of cattle, 28.48million sheep,25.91 million goats, 24.56 million donkeys, 11.39 million horses, 8.08 million mules, 8.39 million camels, 42.51 million poultry and 71.62Million beehives (CSA, 2010/2011).

Livestock have diverse functions in the livelihood of Ethiopian farmers in the various farming system and serves as a source of food, traction, manure, row materials, investment, cash income, foreign exchange earnings and social and cultural identity (Belete et al., 2010) and they serve as an important source of income for the agrarian community and are one of the Ethiopia's major sources of foreign currency through exportation of skins and hides (Tadesse, et al., 2011). Despite the large number of livestock, there has been a decline in national and per capita production of livestock and livestock products, export earnings from livestock, and per capita consumption of food from livestock origin since 1974, in comparison to other African countries (Nibret and Basaznew, 2012). Even

though ruminants are important components of the Ethiopian farming system, their contribution to food production, rural income and export income are far below the expected potential. This is because cattle production in Ethiopia is constrained by the compound effects of diseases, poor feeding and poor managements (Aberha et al., 2007).

Among the constraints, different causes of skin disease are accountable for considerable economic loss particularly to the skin and hide export due to various defects, 65% of which occur in the pre slaughter directly related mostly to skin disease causing often rejection because of poor quality (Amare et al., 2013). Among these skin diseases, Ectoparasites are serious problems as they are everywhere, often highly damaging and in most cases cannot be permanently eradicated, as a result ectoparasitism represents a major obstacle to development and utilization of animal resource (Onu and Shiferaw 2013) and causes huge livestock production losses (Rony et al.,2010).Ectoparasites in ruminants cause serious economic loss to small holder farmers and the tanning industry through mortality of animals, decreased production, down grading and rejection of skin and hide (Kumsa etal.,2012). Moreover, they are the most important vectors of protozoan, bacterial, viral and rickettsial diseases (Radostits et al., 2007). Ectoparasitic diseases such as sarcoptic and psoroptic mange, tick and lice infestation have frequently been reported in Ethiopia (Yacob et al.,2008)and these are among the threats that resulting in serious economic loss to the tanning industry and the country as a whole (Yacob, 2014). In Ethiopia, ticks are the most important of all ectoparasites. The economic loss incurred when they infest livestock particularly, cattle are enormous. Major cattle tick-borne diseases in Ethiopia are anaplasmosis, babesiosis, and streptothricosis (Feseha, 2012).

Among the major diseases of cattle causing serious economic loss to the farmer, the tanning industry and the country as a whole as it cause mortality decreased production and reproduction, and downgrading and rejection of skins and hide (Bekele et al., 2011). Hence controlling ectpoarsite is important to improve the contribution of hide and skin to the national economy. In this regard comprehensive documentation of level of occurrence with their associated risk factor is important in animal health intervention targeting in controlling ectroparasite. Although ectoparasites affect the health, productivity of ruminants and the economy of the country, however, currently there is a scarcity of information regarding to ectoparasites of cattle in Hadero Veterinary Clinic.

Therefore, the present study was conducted with objective of:

- ❖ To identify and determine the prevalence of ectoparasites of cattle and
- ❖ To assess associated host- related risk factors in the study area.

Materials and Methods

Study Area Description

The study was conducted in Hadero veterinary clinic, Hadero is a district in the Southern part of Ethiopia, located in SNNP regional state. It is the capital of HTZ Woreda located some 293km South of the capital city Addis Ababa at a latitude of 250 15'S and longitude of 290 16'E with elevation of 1200-1800 metre above sea level, and the average rain fall and temperature ranges from 1200-2200mm and 14-21 0C, respectively. Its rainy season occur mainly between June and September, although a short rainy season do occur on March and April. The city covers an area of about 4square kilometers, with an estimated population of about 152,527 people (SRHDA,2005). The total animals in and around Hadero Tunto zuria woreda is 152,527 heads of cattle,37325 sheep,48161 goat,251324 poultry, 292 mule, 1503 donkeys, 226 horses and 798 bee hives(HTZWAG 2014/2015). Farming system of the study area is mixed crop production. Crops that are produce in the Hadero area include wheat, sorghum, barley, teff and rarely maize. The average vegetation coverage of the area include Acacia Abyssina, Acacia ebieca and *Ecucalyptus camedulensis* are the dominant (SRHDA, 2008).

Study Animals

A total of 384 cattle of the local and cross breed with all age groups, both sex and different body condition was inspected for the presence of ticks, lice and mange mites without discrimination of age, breed, sex and body condition.

Study Design

Cross sectional epidemiological study was conducted from March to August to and identify the major ectoparasites in cattle. All the animals those was

selected as sampling unit was checked for any ectoparasite infestation.

Study Methodology

Physical Observation and Direct Microscopic Examination

The entire body surfaces of the cattle were thoroughly examined for the presence of ectoparasites and the ectoparasite was collected manually. So after collection, the sample was transported with screw cup bottle containing 68% alcohol to college of veterinary medicine parasitological laboratory for identification. Identification of the different ectorparasite was conducted using different morphological parameters such as shape of scutum, body color, coxae and ventral plates particularly for male in ticks.

Sample Collection and Identification

General physical examination was conducted on each cattle after proper restraining of animals. All data regarding the breed, age, sex, body condition and other related information of animals were recorded properly.Then after properly restraining the animal, the ectoparasites were collected manually from different animal body parts, top line (mid- dorsal surface), midway (between the withers and the pelvis), around each eye, sternum, dewlap, udder, neck and under tail and feet of the animals were examined for tick collection. Similarly, all body part surface of examined animals were inspected to look for adult lice glued on the skin. Deep skin scrapings from the margin of the lesion on the animals with clinical signs of mange was collected in universal bottles having 10% formalin, then 10%KOH was added to the sample.Lice and ticks was picked with forceps and placed in screwed bottle containing 68% methanol and then labeled for sex, breed, date of collection, origin and type of animal husbandry. Animals which found positive for at least one parasite was considered positive for ectoparasites' infestation. Identification to species level was done by the aid of stereomicroscope using identification keys set by Wall and Shearer, (1997) and Souls by, (1982) at Hadero Tunto Zuria worda veterinary laboratory.

Data Management and Analysis

Quantitative data derived from the observation and microscopic examination was coded properly and entered intoMicrosoft excel spread sheet. The data was then exported and analyzed using SPSS version 20. Chi-square test was applied to determine the association of factors at $P \leq 0.05$. In addition, percentage had been used to calculate proportion of animals infested with ectoparasites and number of parasites counted. The animals were divided into different groups: according to their breed namely, local and cross breed; based on sex as female and male; age groups that is, young (cattle of ≤ 4 years), adult (cattle of 4-6 years) and old(cattle of >6 years), body condition score was rated as good, medium and poor (Nicholson and Butterworth, 1996), production system was categorized as extensive, semi intensive and intensive and the herd size was classified as small(<3 cattles), medium (4-7 cattles) and large (>8 cattle). Prevalence was determined based on the formula described by Thrusfield (1995) as the rate of number of infested animals and total number of study animals. Associations between the explanatory variables (breed, sex, age, body condition score, herd size and production system) and the differences were considered significant at value of $P<0.05$.

Results

Overall Prevalence of Ectoprasite Infestation

Overall, seven genera of ectoparasites belonging to ticks, lice and mange mites were found infesting cattle in the study area. The ectoparasites identified were ticks 59.3% (228/384), lice 18.2% (70/384) and mite 9.6% (37/384). In this study mixed infestation (14.3%) of external parasites was recorded.

Table 1. General prevalence of ectoparasites at present study area.

S. no	Ectoparasite	positive	Prevalence (%)
1	Tick	228/384	59.3
2	Lice	70/384	18.2
3	Mite	37/384	9.6
4	Mixed	55/384	14.3

The major identified genera of ticks were Amblyomma, Boophilus, Rhepicephalus and Hyalomma. Damalina and Linognathus were the louse responsible for pediculosis, while the Demodex was the mange mite responsible for mange mite infestation in study area. In the present study, five species of ticks, two species of louse and one species of the mite was collected (table 2). *Amblyomma variegatum* (21.6%) and *H. truncatum* (13.5%), were found to be tick species with a higher proportion in the current study. *Linognathus vituli* (14.0%) and *Damalina bovis* (4.2%) were two species of louse identified in present study area while *Demodex bovis* (9.6%) was only the species of mange mite recorded in the present study area.

Table 2. Prevalence of ectoparasites in cattle brought to Hadero of veterinary clinic based on their species.

S. no	Species of ectoparasite	Total number	Prevalence (%)
1	*Amblyomma variegatum*	83/384	21.6
2	*Boophilus decoloratus*	41/384	10.7
3	*Hyalomma truncatum*	52/384	13.5
4	*Rhipicephalus pulchellus*	28/384	7.3
5	*Rhipicephalus evertsi everetsi*	24/384	6.3
6	*Linognathus vituli*	54/384	14.0
7	*Damalina bovis*	16/384	4.2
8	*Demodex bovis*	37/384	9.6
9	Overall	335/384	87.2

Association of Ectoparasites Positivity with Breed, Sex, Body condition, Herd Size and Management System .The prevalence of ectoparasites was significantly ($\chi2$=17.9; P=0.00) higher in local (72.3%) breed than in cross (42.9%) breeds of cattle. Similarly, the prevalence of ectoparasites was significantly ($\chi2$=7.11; P=0.008) higher in male (73.9%) than female (60.8%) in sex categories. The study also revealed the prevalence was statistically significant (X2=119.8; P=0.00) higher in old (89.4%) cattle than in adult (78.7%) and young (19.0%) cattle.

The current finding also revealed that the overall prevalence of ectoparasites infestation was significantly ($\chi2$=52.9; P=0.00) higher in poor (84.5%) conditioned cattle than in medium (64.7%) and good (21.2%) body condition score category. Moreover, the occurrence of ectoparisitism was found to significantly influenced by the type management system ($p<0.05$). However, herd size of the cattle have no effect on the prevalence of ectoparasites (P>0.05).

Table 3. Prevalence of ectoparasites by breed, sex, age, body condition and production system

no			Breed		sex		age			Body condition			Management system			Herd size		
			local	cross	male	female	young	adult	old	Good	Medium	poor	Extensive	Semi-intensive	intensive	<4	4-6	>6
1	Variables	335	49		241	143	79	211	94	33	203	148	280	47	57	127	133	124
2	positive	244	21		178	87	15	166	84	7	133	125	238	20	7	88	86	90
3	Prevalence (%)	72.8	42.8		73.9	60.8	19	78.7	89.4	21.2	65.5	84.5	85	42.5	12	69.3	64.7	73.2

Discussion

The result of the present study showed that the overall prevalence of ectoparasites infestation was high(87.2%) in two cattle breeds kept under different production systems. The findings of this study agree with report by Tadesse et al. (2011), who reports high ectoparasite prevalence (73.3%), but differ with the previous findings of Yacob et al. (2008) and Dinka et al. (2010), those reported the overall prevalence of ectoparasites as 28.1% and 40.2% respectively. The variation in ectoparasites infestation on cattle of different breeds and production systems might be attributed to differences in animal husbandry and control measures against ectoparasites on local cattle breeds, which are usually kept under an extensive production system unlike cross breeds. The poor husbandry practices of small holder dairy farmers might be a cause making the animals more prone to tick infestation (Sajid et al., 2008). More ectoparasite prevalence was recorded in local breed (72.3%) compared to cross breed (42.9%) of cattle. This finding is similar to the finding of Belew and Mekonnen (2011); Meseret et al. (2014) those revealed that the prevalence of ectoparasite infestation in local breeds were very high with the prevalence of (44.96%), while in cross breeds (15.83%) prevalence. In contrast to this, Eshetu et al. (2015), revealed that the prevalence of the ectoparasites was higher in exotic (83%) breed as compared to local (55.5%) and cross (41%) breeds of cattle. The significant variation in ectoparasite infestation of animals of different breeds in the research might be attributed to different management system, or lack of control measures against external parasites on local breeds. Furthermore, it can be assumed that it might be due to lack of interest of farmers for local breeds as well as taking more care to cross and exotic breeds than local breeds. The present study showed that, ectoparasite prevalence was higher.

In extensive (85.0%) than in semi- intensive (42.6%) and with the intensive (12.3%) having low prevalence in management system. This finding is similar to the findings of Rony et al. (2010), who reported the highest ectoparasitic infestation in extensive farming system. Similarly, significantly higher prevalence of ectoparasites infestation ($\chi2=52.9$; $P=0.00$) was observed in poor (84.5%) and medium (64.7%) compared to cattle of good body condition group (21.2%). However, contrasting findings has been reported by Nigatu and Teshome (2012); Onu and Shiferaw (2013) where there was no significant variation in the prevalence among body condition scores. The difference among infestation in the study could be due to lowered immune response as a predisposing factor and/or the poor body condition could be the result of chronic ectoparasite infestation (Urquhart et al., 1996) or it could be due to husbandry practices. In the present study, the prevalence was statistically significant ($X2=119.8$; $P=0.000$) in age of studied cattle, and it was higher in old (89.4%) cattle than in adult (78.7%) and young (19.0%) cattle. This finding highly agrees with the finding of Eshetu et al. (2015), who recorded varied differences in the prevalence of the ectoparasites between old, adult and young cattle. The higher proportion may be due to outside management and long distant movement of old and adult animals to search for food and water compared to younger animals, so the chance of exposure is higher in adult and old cattle. The prevalence of ectoparasites was significantly ($\chi2=7.11$; $P=0.008$) higher in male (73.9%) than female (60.8%) in sex categories of present study and this finding disagrees with the study done by Onu and Shiferaw (2013) who recorded statistically insignificant prevalence in male (39.1% and female (25.0%) cattle with ($P>0.05$). This difference might be due to the anagement practices in the study area and/or male cattle used to different field activities from where it can be infested ectoparasites. Herd size of the animals did not affect the prevalence of ectoparasite ($\chi2=2.62$; $P=0.453$) and it is statistically not significant ($P>0.05$). The distribution and abundance of tick species infesting domestic cattle in Ethiopia vary greatly from one area to another area. In this study, ticks (59.3 %) were the most prevalent followed by lice (18.2%) and mites (9.6%) which agrees with the previous reports on cattle (Ohaeri and Ugwu (2013); Onu and Shiferaw (2013). Out of the five species of ticks recorded, the most prevalent was *Amblyoma variegatum* (21.6%), followed by *Hyalomma truncatum* (13.5%). Similar to this finding, Belew and Mekonnen (2011); Nibret et al. (2012); Tadesse and Sultan (2014); Tegegn et al. (2016) reported the predominance of cattle infested with *Amblyoma variegatum* from different regions of Ethiopia. *Hyalomma truncatum* (13.5%), was the second abundant tick recorded in this study area. This finding is higher than the finding previously reported by Nigatu and Teshome (2012), who reported it as (6.2%). *Boophilus decoloratus* (10.7%) was the third abundant tick species, In contrast to this finding, Desalegn et al. (2015), recorded the prevalence of *Boophilus decoloratus*(47.8%) which is higher than the present result. This might be due to Variation in geographical locations, climatic conditions and management practices in the different study areas might have contributed for the disparity in prevalence.,

Rhipicephalus species were the least dominant tick species of cattle. This observation is in agreement with the previous findings by Shiferaw and Abebe, (2006); Solomon et al. (2007); Nigatu and Teshome (2012) in different parts of Ethiopia. The major lice species in the study area were *Linognathus vitulii* and *Damalina bovis*, with a prevalence of 13.3% and 4.2% respectively. The finding is similar to the finding recorded by Kumsa and Bekele (2008); Nigatu and Teshome (2012) both the biting and sucking lice were identified from animals in different husbandry system. In this study, *Demodex bovis* (9.6%) was only the species of the mite recorded at the study area. This finding is slightly in line with finding of Meseret et al. (2014), who reported the prevalence of *D. bovis* (6.6%) in and around Bishoftu area. However, Nigatu and Teshome, (2012), found the highest prevalence of *D.bovis* (95.9%) from Omo valley area PA in cattle.

Conclusion and Recommendations

The present study revealed that widespread prevalence of ectoparasites in cattle in the study area, and the major ectoparasites identified were tick, lice and mange mite, thus, it cause severe damage to the hides and skins of domestic ruminants and thereby reduce the foreign exchange of the country. They also (tick), transmit tick borne disease which can cause severe loss to the productivity of these animals.

Based on the above conclusion, the following recommendations are recommended:

- Strategic ectoparasite control based on dynamic population should be design with cooperation with animal owners
- Regular and effective application of recommended acaricides should be exercised
- The owners should be oriented on the use of chemical control of external parasites.

References

Abreha, T., Zekarias, A. and Mekonnen, S. (2007). Survey of major external parasites of veterinary importance in. Ethiopian. Veterinary. Journal. 11: 137-15.

Amare, S., Asfaw, Y. and Yacob, H. (2013). Ectoparasites of Sheep and Goats in North-West Amhara Regional State,Ethiopia. Ethiopian Veterinary Journal, 17:55-67.

Bekele, J., Tariku, M. and Abebe, R. (2011). External parasite infestations in sheep and goats in Wolmera district of Oromia region, central Ethiopia. Journal of Animal Veterinary Advance, 10: 518-523.

Belete, A., Azage, T., Fekadu, B. and Berhanu, G. (2010). Cattle and Meat Production and marketing systems and opportunities for market orientation in Fogera Woreda, Amhara region, Ethiopia. IPMA (Improving Productivity and Market Success) of Ethiopian

Farmers Project Working Paper 19. ILRI (International Livestock Research Institute), Nairobi, Kenya, Pp. 65. Belew, T. and Mekonnen, A. (2011). Distribution of Ixodidae ticks on cattle in and around Holeta Town, Ethiopia. Global veterinaria, 7: 527-531. BOARD (2008/2009). Bureau of

Agriculture and rural development of south region CSA (Central Statistical Agency) (2010/2011). Livestock Sample Survey. Central Statistical Agency of Ethiopia, Statistical report on livestock and farm implements. Central Statistics Authority, Addis Ababa, Ethiopia. Pp. 1-205.

Desalegn, T., Fikru, A. and Kasaye, S. (2015). Survey of Tick Infestation in Domestic Ruminants of Haramaya District, Eastern Hararghe, Ethiopia. Journal of Bacteriology and Parasitology, 6: 246. Dinka, A., Bedada, B. and Yacob, H.T. (2010). Study on major parasitic problems of rural cattle in and around Ambo, Western Oromia,Ethiopia. Nigerian Veterinary Journal, 31(3): 208-213. Eshetu, E., Tamiru, T. and Hika, W. (2015). Major ectoparasites of cattle in Ada'a district, East Showa Zone,Ethiopia. Website: www/http Livestock Research for Rural Development 27 (10) 2015

Feseha, G. (2012). Notes on tick species and tick born disease of domestic animals in Ethiopia. AAU, Debre Zeit, Ethiopia, Pp. 12-16.

Kumsa, B. and Bekele, M. (2008).Lice infestation on cattle in Endegagn district (southern Ethiopia):

prevalence, species composition and distribution. Revue de Médecine Vétérinaire Accueil Tropica, 28:126-131.

Kumsa, B., Beyecha, K. and Geloye, M. (2012).'Ectoparasites of sheep in three agroecological zones in central Oromia, Ethiopia', Onderstepoort, Journal of veterinary science, 46:23-57.

Meseret, G., Zeru, F. and Romha, G. (2014). Identification and Prevalence of Ectoparasites in Cattle and Sheep in and Around Bishoftu Town, Central Ethiopia. Animal and Veterinary Sciences. 2(4): 124-129.

MoA (Ministry of Agriculture) (2010).Ethiopia Animal Health Year Book (2009/10). Federal Ministry of

Agriculture Animal and Plant Health Regulatory Directorate (APHRD), Ministry of Agriculture (MoA). Addis Ababa, Ethiopia.

Nibret, M. and Basaznew, B. (2012). Assessment of Major Animal Production and Health Problems of Livestock Development in Lay-Armacheho District, Northwestern Ethiopia. American-Eurasian Journal of Scientific Research, 7:136-141.

Nibret, M., Basaznew, B. and Tewodros, F. (2012). Hard ticks (Ixodidae) species composition, seasonal

dynamics and body site distribution on cattle in Chilga District, Northwest Ethiopia. Asian Journal of Agricultural Sciences, 4(5): 341-345.

Nicholson, M. and Butterworth, T. (1996).A guide to body condition score in zebu cattle international livestock center for Africa, Addis Ababa, Ethiopia.

Nigatu, K. and Teshome, F. (2012). Population dynamics of cattle ectoparasite in Western Amhara National Regional State, Ethiopia. Journal of Veterinary Medicine and Animal Health, 4(1): 22-26. Ohaeri, C. C. and Ugwu, A. U. (2013). Survey of ectoparasites of farm animals. Journal of Agriculture and Veterinary Sciences, 5(2): 163 - 172. Onu, S. and Shiferaw, T. (2013).

Prevalence of ectoparasite infestations of cattle in Bench Maji zone, southwest Ethiopia, Veterinary World, 6(6): 291-294.

Radostits, O. M., Gay, C., Hinchcliff,K. W. and Constable, P. D. (2007). A textbook of the diseases of cattle, sheep, goats, pigs and horses (10^{th} edition), Suanders publishing company, Edinburgh, London, UK. Pp. 1585-1612.

Rony, S. A., Mondal, M. M., Begum, N., Islam, M. A. and Affroze, S. (2010). Epidemiology of ectoparasitic infestations in cattle at bhawal Forest area, gazipur. Bangladish Journal ofVeterinary Medecine, 8: 27-33.

Sajid, S. M., Iqbal, Z., Khan, N. M. and Muhammad, G. (2008). Point Prevalence of Hard Ticks (Ixodids) Infesting Domestic Ruminants of LowerPunjab, Pakistan. International Journal of Agriculture and Biology, 10: 349-51.

Shiferaw, D. and Abebe, G. (2006). Cattle tick dynamics in different agro-ecological zones of Wolayta, southern Ethiopia. Ethiopian Veterinary Journal, 10: 85-99.

Solomon, G., Sileshi, M., Nigist, M., Thomas, C., Getachew, T. and Abebe, M. (2007). Distribution and seasonal variation of ticks on cattle at Ghibe Tolly in central Ethiopia. Ethiopian Veteterinary Journal, 11: 121-139.

Soulsby, E. J. (1982). Helminths, Arthropod and Protozoa of Domesticated Animals, 7th edition. Bailliere, Tindall and Cassell Ltd. 136-346, 365-491 and 763-778.

Tadesse, A., Fentaw, E., Mekbib, B., Abebe, R., Mekuria, S. and Zewdu, E. (2011). 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 Kombolch Tannary, Northeastern Ethiopia. Ethiopian Veterinary Journal, 15(2): 87-101.

Tadesse, B. and Sultan, A. (2014). Prevalence and distribution of tick infestation on cattle at Fitche Selale, North Shewa, Ethiopia, School of Veterinary Medicine, Collage of Medical and Health Science, Wollega University, Nekemte, Ethiopia, DVM thesis, Pp. 12.

Tegegn, T., Yosef, D. and Nuraddis, I. (2016). Prevalence and Species Composition of Ticks Infesting Cattle In and Around Bishoftu Town, Oromia Region, Ethiopia. Global Veterinaria, 16 (3): 238-246.

Tesfaye, D., Assefa, M., Demissie, T. and Taye, M. (2012). Ectoparasites of small ruminants presented at BahirDar Veterinary Clinic, Northwest Ethiopia. African Journal of Agricultural Research, 7: 4669-4674.

Thrusfield, M. (1995). Veterinary Epidemiology, (3rd edition), Blackwell Science Ltd. Edinburgh, UK, Pp. 228-247.

TRHDA, (2008). Tigray Regional housing developement Agency Report. Tigray,

Ethiopia. Urquhart, G. M., Armour, J., Duncan, J. L., Dunn, A. M. and Jennings, F. W. (1996). Veterinary Parasitology, (2^{nd} edition), Blackwell Science Ltd. London, UK, Pp. 229-301. Wall, R. and Shearer, D. (1997). Veterinary Entomology, 1st edition, Chapman and Hall. London, UK. 265 - 290.

Yacob, H. T. (2014). Ectoparasitism: Threat to Ethiopian small ruminant population and tanning industry. Journal of Veterinary Medicine and Animal Health, 6: 25-33.

Yacob, H., Nesanet, B. and Dinka, A. (2008). Prevalence of major skin diseases in cattle, sheep and goats at Adama Veterinary Clinic, Oromia regional state, Ethiopia. Revue de Médecine Vétérinaire, 159: 455-461.

Zeryehun, T. and Atomsa, M. (2012). Ectoparasite infestations of sheep and goats. Eurasian Journal of Veterinary Science, 28: 185-189.

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