

Determination of prevalence external parasite on different species

Abstract

A cross sectional study was conducted from September 2016 to February 2017 at kutaber words different veterinary clinics to determine the prevalence of major skin diseases caused by ectoparasites (ticks, lice, fleas and mange), bacterial (dermatophillosis) and viral skin diseases (Lumpy skin diseases, Pox, and Contagious ecthyma). A total of 1662 ruminants (909 cattle, 447 sheep, and 306 goats) were examined through clinical examination and laboratory confirmation (if possible) were the method employed. The overall prevalence of skin diseases registered was 39.38%, 45.09% and 43.40% for cattle, goats and sheep respectively. The prevalence of skin diseases in cattle was ticks (25.41%), lice (5.28%), and mange (5.28%), dermatophillosis (0.88%) lumpy skin diseases (0.56%). Male animals and cross breeds were more susceptible. There was statistical significant difference between risk factors (age, sex and breed) in cattle ($p < 0.05$). In sheep the prevalence of skin diseases was ticks (29.08%), lice (6.9%), flea (4.3%), mange (2.01%) and pox (1.12%). The prevalence of skin diseases in goats ticks (19.29%), lice (3.92%), flea (2.94%), mange (3.26%), pox (8.49%), Orf (6.86%) and there was only statistical significance difference in age category ($p < 0.05$). The main identified tick genus were *Ambylomma*, *Hayalomma*, *Boophilus* and *Rhipicephalus* species and *demalina* and *linogathus* species lice were identified. This study demonstrates skin diseases among the most important health constraints of ruminants in Kutabre words leading to important economic losses and they urgently require control and prevention methods.

Keywords: cattle, goats, diseases, prevalence, skin, sheep, veterinary clinic

Volume 7 Issue 5- 2018

Kindu Wondmnew, Mohamed Hussien, Wosen Temesgen, Dagnachew Endalamaw

¹Department of virology, DVM Wollo University, Ethiopia

²Wollo University, Amhara, South wollo Kutaber, Ethiopia

³Wollo University, Amhara, South wollo Kutaber, Ethiopia

⁴Wollo University, Amhara, South wollo Kutaber, Ethiopia

Correspondence: Kindu Wondmnew, Department of virology, DVM Wollo University, Ethiopia, Tel +251-910-749-377, Email onbehaveofus@gmail.com, dagnachewkey@gmail.com

Received: September 12 2018 | **Published:** September 18 2018

Introduction

Ethiopia has the largest livestock inventories in Africa including about 40.7 millions cattle, 25.5 millions sheep and 23.4 million goats (CSA, 2004). Its resource of cattle, sheep, and goats ranks 1st, 3rd and 2nd respectively in Africa.¹ The development of leather industry requires great quality of raw materials of various origins, the principal source of which is livestock industry. Although the livestock production and tanning industry of the world are increasing in number, the source of the material for the tanning industry is limited both in quantity and quality.² Ethiopia produce about 2.7 millions of hides, 8.1 millions of sheep skin and 7.5 millions of goats skin per annum and is the leading export time of the country next to coffee with its finished and semi finished leather products.³ Although the number of tannery involved in production of this products increasing from time to time, the sectors and the country are losing revenue due to decline in leather quality and fall in export price.⁴ Of the total skin processed of tanneries, one fourth to one third of it is unsuitable to export due to various defects, 65%, which occur in pre-slaughter, stage.⁵ The existence of various skin diseases (Dermatophillosis, Demodicosis, Sarcoptes and psoroptes manges, ticks and lice infestations affecting cattle, sheep and goats are frequently reported from different parts of Ethiopia.⁶ These different diseases in Ethiopia are documentable for considerable economic losses culling and occasional mortalities and related with cost of treatment and prevention disease.⁷ The potential economic losses necessitate the nationwide investigation on the distribution of skin disease and organize efforts between farmers, trader, tanners and government to at least minimize these enormous losses. Hence in socio-economically important city like Kutaber words so far limited studies has been made to investigate the overall prevalence of the skin diseases in domestic

ruminants. Therefore, the objectives of these studies are:

To identify the major skin diseases of cattle, sheep and brought to kutaber Veterinary clinic.

To assess and qualify associated risk factors (breed, Age and Sex) of the study animals.

To recommend possible control measures.

Materials and methods

Study area

The study was conducted from September 2016 to January 2017 at kutaber veterinary clinic in kutabre city which is the capital city of Kutaber words, which is 20 kms far in West of Dessie. It is located at 11°15' (11 degree 15 minute) North latitude and 39°32' (39 degree 32 minute) East longitude and situated on the elevation of 2768 meters above sea level. It receives the annual average rainfall of 1000 mm and average temperature of 23°C (BOANR, 2001; CSA, 2005). It is estimated that in Kutaber, the farmers had total of 69,720 cattle (representing 0.01 % of Ethiopia total cattle), 65,729 sheep (0.026%), 53,302 goat (0.023%), 2,142 horses, 3,049 Mules, 12,814 asse, 104,737 poultry of all species and 5,457 bee hives of the total of Ethiopian bee hives. In and around Kutaber estimated number of cattle (69,720), sheep (65,729), Mule (3,049), Donkey (12,814), goats (53,302), hens (104,737) and horse (2,142) reported by KLRDO (2016_2017).⁹

Study animals

From September 2016 to March 2017, a total of 909 cattle, 447

sheep and 306 goats brought to Kutaber veterinary clinic were subjected to detailed clinical examination for the presence of skin diseases ticks, lice fleas, mange, dermatophillosis, pox, contagious ecthymia and the history, breed, sex and ages were recorded. The age of the animals is determined primarily based on history we get from the owner and estimating using the destination formulate described.⁹ The animals were divided in to three groups according to their age (less than 1 year), (1 year to 5 year), (more than 5 years).

Study designs and methodology

A cross sectional was conducted to determine the prevalence of major skin diseases of ruminants. The examination of each animal was conducted by detailed clinical examination for the presence of skin diseases and when skin lesion are evidenced the case history was taken from owner and subsequently skin samples were taken from at a least two sites covering the adequate depth peripheral edges. Each animal species was examined singly for one type of skin diseases infection encountered in the study system. In addition samples such as skin scraping hair specimens, pustules and externally visible parasites are collected and subjected to appear laboratory imposition for confirmation. Viral infection like lumpy skin diseases, pox and contagious ecthyma diseases were diagnosed based on their occurrence in stock and then observable clinical picture such as wide spread skin lesions on and around the muzzle, ears, scrotum and udder.¹⁰

Laboratory confirmation

Skin scraping from suspected cases of mange are collected and preserved in 10% formalin after addition of 10% KOH to the specimen; mites may be released from scabs and crusts before examination following procedures indicated.¹¹ The identification of the mange mites species are based on the morphological characteristics described.¹¹ The diagnosis of parafillariasis was based on the clinical signs and direct microscopic examination of the oozing blood or exudates from the bleeding points described. Lice and fleas are collected by coat brushing of the affected animals and

identification of lice by their characteristics lice described.¹² Ticks were collected from infestation sites by ethyl alcohol (70%) then preserved in 10% formalin and dispatched to laboratory identified in genus level using their characteristics and stereo microscope or light microscope described.¹³ For suspected case of dermatopillosis scabs, pus and exudates was collected giemsa and gram's stained smears are directly microscopically examined according to the procedure described.¹⁴ The diagnosis of pox diseases was based on observation of pox lesions around the oral cavity and tail region.¹⁵

Data entry and analysis

The data was entered in Microsoft excel sheet and the data was analyzed using Epi. Info version 3.5.1. The Pearson's chi-square (χ^2) test was used to assess difference in the prevalence of skin diseases among breed, sex, and age groups. In all cases 95% confidence intervals and $P < 0.05$ as consider as statistical significance value.

Result

The prevalence of skin diseases in cattle

The overall prevalence of skin diseases in cattle was 39.38% (358 cases). The major identified skin diseases were ticks (25.41%), pediculosis (5.28%), mange (5.28%) flea (1.76%), dermatophillosis (0.88%) and lumpy skin diseases (0.56%). The susceptibility of different age group of cattle to skin diseases is presented in Table1. Young animal were more susceptible to skin diseases than the older once. Statistically significant different was observed between the different age group ($P < 0.05$). Animal less than 1year age were more susceptible to skin diseases than greater than 5year Table 2 The major identified tick species were, *Boophilus* (17.75%), *Amblyomma* (7.48%), *Rhipicephalus* (7.92), *Hayalomma* (7.26%) and lice identified was *Demalina* and *linogathus* species was 2.2% and 3.08% respectively and demodex 3.85%, *Sarcoptes* 0.88%, *Psoroptes* 0.55% in cattle. The prevalence of skin diseases was high in cross breed than local breed and male animals were more susceptible.

Table 1 Prevalence in % and (number of cases) of skin diseases observed in cattle (n=909) at Kutaber veterinary clinic, South wollo, Amhara region

Type of skin diseases	Positive case	< 1 year n = 251	Age 1 – 5 year n = 351	>5 year n = 307	Total n = 909	Percentage %
Ticks	231	71(28.28)	140(39.9)	20(6.5)	909	25.41
Lice	48	29(11.6)	18(5.12)	1(0.32)	909	5.28
Fleas	16	11(4.38)	5(1.42)	0	909	1.76
Manage Dermato	48	6(2.36)	39(11.1)	3(0.97)	909	5.28
Phillosis Lumpy skin	8	0	8(2.27)	0	909	0.88
Diseases	5	0	5(1.42)	0	909	0.56
Parafillaria	2	0	2(0.56)	0	909	0.22
Total	358	117(46.61)	217(61.82)	24(7.81)	909	39.38

Table 2 The overall prevalence of skin in cattle among factor

Risk factors	Groups of animals	Result Positive	Negative	Total	Percentage %	P value
Age	< 1 year	117	134	251	46.61	Significance P < 0.00
	1-5 year	217	134	351	61.82	
	>5 year	24	283	307	7.81	
	Total	358	551	909	32.19	

Table Continued

Risk factors	Groups of animals		Result Positive	Negative	Total	Percentage %	P value
Breed	Local	229	432	661		32.19	Significance P < 0.00
	Cross	129	119	248		45.29	
	Total	358	551	909		39.38	
Sex	Female	132	278	499		34.64	Significance P < 0.00
	Male	226	273	410		52.02	
	Total	358	551	909		39.38	

Prevalence of skin diseases in small ruminant (sheep and goats)

Prevalence of skin diseases in sheep

Out of 447 sheep which brought to Kutaber veterinary clinic, 194 sheep were suffered to one and more type of skin diseases. The overall prevalence of sheep skin diseases was 43.40%. The major skin diseases examined were tick (29.08%), lice (6.94%), Fleas (4.25%), Demodex (1.12%), mange (2.01) sarcoptes (0.88%) and pox (1.12%) in Table 3,4. This result was lower than the previous study in kombolcha veterinary clinic the prevalence of lice (25.8%), flea (7.9%), Pox (1.6%), Orf (3.2%), Boophilus (3.2%) and Amblyomma (11.6%).¹⁶ The difference was arising from the distribution of disease in relation to agro climate: season of study conducted and the clients develops awareness about skin diseases and treated their animals by brought to near veterinary clinic and the recent drugs which available also effective for most ectoparasites. There was no significance association between age, sex in sheep. Male animals (47.27%), and

animals under less than one year (47.5%), were more susceptible to animals when compare to the rest groups of animals. These reports were similar to the previous study.¹⁶ In this study the prevalence of skin diseases was higher in sheep under 1 year and male animals with the prevalence of 47.5% and 47.27% respectively and there were no statistical significance difference among sex and age in sheep.

Prevalence of skin diseases in goats

A total of 306 goats were examined, the overall prevalence of skin diseases was 45.09% in goats individually the prevalence of skin diseases was tick infestation 19.28%, mange 3.26%, lice 3.91%, Pox virus 8.49%, and contagious echthymia 7.18% in the study area Table 5. In this study the prevalence of overall skin diseases in age categories of goats were 62.28%, 45.78% and 26.26% in 1–5 year and less than 1 year and greater than 5 year respectively. Animals which are greater than 5 year were not affected by lice and flea. In goats generally the skin diseases not significance between sex. Male animals and animals between the group of 1–5 year were showed high prevalence 48.96% and (62.28%) respectively Table 6.

Table 3 Prevalence in % and (number of cases) of skin diseases observed in sheep (n=447) at Kutaber veterinary clinic, South wollo, Amhara region

Type of skin	Positive	Age			Sex		Total	Percentage %
Diseases		<1 year n = 120	1-5 year n=196	>5 year n=131	Male n=165	Female n=28		
Ticks	130	23(19.16)	52(26.53)	55(41.98)	47(28.48)	83(29.43)	447	29.08
Lice	31	19(15.8)	11(5.6)	1(0.8)	18(10.9)	13(4.6)	447	6.9
Flea	19	14(11.7)	5(2.6)	0(0)	7(4.3)	12(4.3)	447	4.3
Mange	9	1(0.8)	6(3.1)	2(1.5)	4(2.4)	5(1.8)	447	2
Pox	5	0	4(2.1)	1(0.7)	2(1.2)	3(1.1)	447	1.12
Total	194(45.1)	57(29.1)	78(39.8)	59(45.1)	116(41.1)	78(47.3)	447	

Table 4 The overall prevalence of skin diseases in according age, sex in sheep

Risk factors	Age group	Total	Positive	Negative	Percentage	P value
Age	<1 year	120	57	63	47.50%	
	1-5 year	196	78	118	39.79%	
	>5 years	131	59	72	45.04%	
	Total	447	194	253	43.08%	
Sex	Male	165	78	87	47.27%	
	Female	282	116	166	41.13%	
	Total	447	194	253	43.08%	

N.S=No significance

Table 5 Prevalence in % and (number of cases) of diseases observed in goats (n=306) at Kutaber veterinary clinic, South wollo, Amhara region

Type of skin diseases	Age				Total	Sex		Percentage %
Srl. no.	Positive case	< 1 year n = 109	Age 1 – 5 year n = 83	>5 year n = 114	n = 306	Male n=96	Female n=210	
Ticks	59	9(8.25)	27(32.5)	23(20.2)	306	-	-	19.3
Lice	12	4(3.66)	8(9.63)	0	306	-	-	3.92
Flea	9	7(6.42)	2(2.4)	0	306	-	-	2.94
Manage	10	1(0.91)	8(9.63)	2(1.76)	306	-	-	3.26
Pox	26	10(9.17)	15(18.07)	1(0.8)	303	-	-	8.46
Orf	22	7(6.43)	14(14.45)	3(2.63)	306	-	-	7.18
Total	138(45.09)	38(45.78)	71(62.28)	29(26.26)	306	47(48.96)	91(43.33)	

N. B. Orf means contagious ecthymia

Table 6 The prevalence of skin disease in relation of risk factors (Sex and Age) in goats

Risk factors	Animals group	Positive	Negative	Total	Percentage %	P value
Age	<1 year	38	45	83	45.78	Significance
	1-5 year	71	43	114	62.28	
	>5 year	29	80	109	26.6	
	Total	138	168	306	45.09	
Sex	Male	47	49	96	48.96	No Significance
	Female	91	119	210	43.33	
	Total	138	168	306	45.09	

Discussion

This study revealed that the diseases caused by parasites, bacteria, viruses and others were common in and around Kutaber Town in Kutaber veterinary clinic. The overall prevalence was 39.38%, 43.40% and 45.09% in cattle, sheep and goats respectively. The high prevalence of skin diseases in animals may be associated with nutritional and climatic stress following repeated drought. Different origin species and species and health status animals were come to in close contact at available communal watering and grazing sites (contact at point) because of feed scarcity, the establishment and spread of ectoparasites and bacterial or viral infections were favored. Furthermore, young animals were significantly more affected than adults $P < 0.05$ has strong association between age, sex and breed and there was significant association $P < 0.05$ between age in goats and no significant association the skin diseases and risk factors in sheep. Among skin diseases, the prevalence of ectoparasites was 37.73%, 42.28% and 26.47% for cattle, sheep and goats respectively. This obtained overall prevalence was relatively higher than the previously study in Adam veterinary clinic.¹⁷ This difference may be due to agro climatic condition and health care of the animals or the drug which used to treatment of skin diseases efficacy decrease due to drug resistance development of ectoparasites or skin diseases or used withdrawal drugs. The major identified tick species were *Boophilus* (17.16%), *Amblyomma* (7.48%), *Rhipicephalus* (7.92%) and *Haemaphysalis* (7.26%) in cattle. When compare to the previous study this prevalence was higher than reported 6.34% but there was variation in previous prevalence of rick species reported in North Eastern Ethiopia, Kombolcha,¹⁸ *Amblyomma* (27.9%) and *Boophilus*

(11.3%) may be due agro climate variation and season of the study. The prevalence of demodicosis was 3.85%, 1.96%, 1.12%, in cattle, in goats and in sheep. The manage mite infestation (Demodicosis) prevalence registered in the previous study in different parts of the country in ruminants cattle, sheep and goats were 1.88% in cattle, 1.33% in sheep and 1.02% in goats and the prevalence of demodicosis was reported in cattle range from 0.42% in Nekemte region (Regessa, 2003) to 1.63% in Wolaita Soddo region.¹⁹ The frequencies of *Demodex* in sheep and goats were 0.80% and 1.37% respectively in central Ethiopia, 0.84% and 0.99% in eastern Ethiopia.²⁰ Few number of *Sarcoptes* cases are observed in all ruminants in the study period in the study area with a prevalence of 0.88% (8cases) in cattle, 0.88 (4cases) in sheep and 1.30% (4cases) in goats. In the previous report,²¹ in kombolcha veterinary clinic the prevalence of *Sarcoptes scabiei* was 22.9%, 13.2% and 26.5% in cattle, sheep and goat respectively. Such difference probably agro climate condition, health care awareness of develops in the livestock producers brought to the clinic when health problems occurs and treated early. The prevalence of dermatophillosis in cattle was 0.88% in Kutaber veterinary clinic. The dermatophillosis in three species studied,²² 1.20%, 0.53% and 0.68% in cattle, sheep and goats respectively and 5.2% in cattle in Northern Ethiopia.²³ The low prevalence dermatophillosis may be attributed due to agro-climate changes, season of the study conducted and the management system of animal, but in small ruminants' null prevalence registered in the study period. Lice infestation was an important skin diseases recorded in both ruminants (cattle, sheep and goats) with a prevalence of 6.94%, 5.28%, 3.92%, in cattle, sheep and goats respectively. The overall prevalence of lice infestation obtained in the study area was relatively higher than in the previous study in central Ethiopia 2%

in sheep and 1.5% in goats,²⁴ in southern rangeland 0.5% in goats (Molu, 2001) and on the other hand the present study prevalence of lice infestation was relatively lower than (39.8%) in sheep and 29.2% in goats in Amhara regional state,²⁵ and around kombolcha 14.2% in goats.²⁶ Such difference in prevalence may arise from different in agro-climate, in season during the study was conducted. Management and health care of sheep and goats in the study area.

Flea infestation was one of skin diseases in countered in the study area in all ruminants with a prevalence of 1.76%, 4.4% and 2.94% in cattle, sheep and goats respectively. In the previous study the prevalence of fleas' infestation were registered 7.9% in sheep and 1.5% in goats in kombolcha.²⁷ This obtained prevalence was low in sheep and high in goats. Such difference of prevalence may be the health care of animals or agro climate. In the present study the prevalence of lumpy skin diseases in Kutaber veterinary clinic was 0.55%, this prevalence was low compared to the previous report. Whereas lumpy skin diseases was rarely observed in cattle (0.68% 4cases), no documented report of lumpy skins is except the only report of (27.91%) in and around wolliso South west Oromia. This may be agro climate changes, season of study or etiological agent access to enter to the host. The prevalence of contagious ecthyma in small ruminants was 2.79% in comparison with the previous study conducted,²⁸ 27.91% and (Regassa, 2003) 7.02%, low, probably because of the vaccination program against to this diseases give first before the beginning of this study. On the other band, the prevalence of pox viruses disease observed in this study was 8.49% in goats and 1.12% in sheep, relatively more elevated compared to other studies, who reported 1.53% in sheep and 1.62% in goats, but far lower than that reported,²⁸ (22% in sheep and 18.5% in goats and 1.6% in sheep and 4.5% in goats reported by (Berehutesfa, 2008). The variation of prevalence may be epidemiological factors or agro climate changes, season of study conducted and the animal health management. Other skin diseases which cause skin damaged or reduction or skin and hide quality (such as wart, ironing or branding) were observed and branding of animals for different purpose traditional treatment, identification cause high damage of skin and hide or reduction of skin or hide quality. Even though the study was limited to group of animals brought to the mentioned veterinary clinic, the prevalence of different skin diseases in these domestic ruminants suggest the importance of these diseases in reducing the production and productively of domestic animals. Kutaber is one of the biggest animal marketing site and route of export of animal meat supply and skin and hide processing industry

established in Kombolcha city. The potent risk of this particular study site in dissemination of skin diseases should be underlined. Considering the importance of skin and hide as main source of foreign currency to the country, the prevailing skin diseases and ectoparasites mainly in different age groups of these domestic ruminants reared in and around Kutaber town requires attention in order to minimize the spread of infestation and increase income earnings of farmers and small scale holders whose livelihood is dependent on their animals Annexes 1–5.

Annex 1 Determining the age of the goats

Age group	Teeth condition
Kid under 1 year	eight sharp teeth
Year ling (1–2 year)	Central pair of body teeth replaced by permanent ones
Young adult 3–4 year	Four permanent teeth
Adult 4–5 year	Eight permanent teeth
Older adult > 5 year	Worn teeth and some missing

Annex 2 Estimation of the age of sheep

Permanent incisor	Age of sheep
None	< 1 year and 3 month
1 pair	1 year and 3 month up to < 2 year and 10 months
2 pair	1 year and 10 month up to < 2 year and 4 months
3 pair	2 year and 4 month up to 3 year
4 pair	more than 3 year

Annex 3 Age estimation of the cattle

Teeth	Eruption	Neck visible and emerged from the gum
I1	1½ 2 years	6th year
I2	2 year – 2½	7th year
I3	3 year	8th year
I4	3½ year – 4 year	9th year

All incisors erupt > 5

Annex 4 Methods of data collection recorded in prevalence of major skin disease of cattle in Mekelle veterinary clinic

S. No	Age			Sex		Breed		Type of skin diseases examined					
	<1 year	1–5 year	>5 year	F	M	Cross	Local	Tick	Flea	Manage	Dermatophilosis	Parafilariosis	Lice
1													
2													
3													

Annex 5 Methods of data collection recorded in prevalence of major skin disease of small ruminant in Mekelle veterinary clinic

Sr. no	Species	Sex	Types of skin diseases									
	Sheep	Goats	Female	Male	Tick	Lice	Flea	Manage	Pox	Orf	Other	

Conclusion and recommendations

Tick infestation, mange, lice, flea dermatophilosis and viral diseases like lumpy skin diseases, pox virus and contagious ecthyma has been found the major skin diseases in the study area, suggesting that importance of these diseases in the words, but most of ectoparasite and others skin diseases are can be easily controlled by proper management. In Ethiopia skin and hide production is one of the main sources of foreign currency, yet the amount of hide and skin rejected is increase and their quality also reduce due to these skin diseases control failures or poor management and health care of these animals or ruminants. Based on the above point in consideration the following points are forwarded. Detailed epidemiological study of the skin diseases should be conducted to identify the major skin diseases and their predisposing factors at words level to implement efficient control program. To combat the skin diseases problem and reduce skin damage appropriate control program should be implemented in near future. This control program should be based on food epidemiological knowledge of the disease in the area. The control program should involve farmers, Tanneries, Government, veterinarian and other control bodies. The government should have extended extension education program for livestock producers' in the region to improve animal management program and control of skin diseases.^{29,30}

Acknowledgments

First of all, my deepest gratitude goes to the Almighty God with out whose help I would not take a simple step for forwards the completion of year.

I would like express my deepest heartfelt application and thanks to Kutaber woreda livestock development office workers especialy to Tesfaneish Haile, Alebachew Fentaw, Bizuhan Abera.

Lastly, but not the least I want to thank all my class friends which help me in different ways specially, Seid A, Ali A, Ahmed H, Mohamed A, Girma B, Bogal E, Hassen A.

Conflict of interest

This thesis presents works carried out by myself and doesn't incorporate without acknowledgement any material previously for a degree or diploma in any university. To the best of my knowledge it doesn't contain any material previously published or written by another person except where due reference is made in the text and all substantive contributions by others to the work presented, including jointly authored publication is clearly in the acknowledgement.

References

1. Aiello S, Mays A. *The Merck veterinary manual*. 8th ed. Merck NJ, editor. USA. 1998;620–670.
2. Mulat A. *Quality control and certification in tanning sector; Presented on the occasions of Ethio-Italian industrial partnership meeting in the leather Sector*. Ethiopia; 1999.
3. Molu N. *Epidemiological study on skin diseases of small ruminants in the Southern range land of Oromia*. Ethiopia; 2001.
4. Kassa B, Bistrat M, Asegedech S. *Control of "EKEK" skin defects in sheep by insecticides and sharing, EVA processing 12th annual conference*. Ethiopia. 1998;104–109.
5. Wall R, Shearer D. *Veterinary ectoparasites Biology, pathology and control*. 2nd ed. Blackwell science. 2001: 304 p.
6. CSA Central Statistical Authority. *The 2001/2002 Ethiopia Agriculture sample Enumeration (EASE), executive summary*. Addis Ababa, Ethiopia; 2005.
7. Yacob HT, Yalew TA, Dinka A. Ectoparasites prevalence of in sheep and goats in and around Wolaita Sodd. *Rev Med Vet*. 2008;450–454.
8. KLDO (2017): Amhara regional states: Kutaber Woreda Livestock Development Office, Amhara, Ethiopia.
9. Leach I. *Economic importance of hiders, skins and leather in Ethiopia control of sheep and goats skin disease for improved quality of hides and skins MOA/FAO*. Ethiopia; 1998.
10. Jobnes TC, Hunt RD, Kink NW. *Prevalence of Major Skin Diseases in Ruminants and its Associated Risk Factors at University of Gondar Veterinary Clinic, North West Ethiopia*. veterinary pathology. 6th ed. Williams & Wilkins, editors. Baltimore, USA. 1997;817–872.
11. Kassaye E, Moser I, Woldemeskel M. *Epidemiological study on Clinical bovine dermatophilosis in North Ethiopia*. Ethiopia. 2003;110(10):422–425.
12. Ahmed M. *Raw hide and skin improvements in Ethiopia. A paper presented on a technical work shop on good practices for the Ethiopian hides and skin industry*. Ethiopia; 2001.
13. Regassa C. *Preliminary study on major skin diseases of cattle coming to Nekemte Veterinary clinic*. Ethiopia; 2003.
14. Carter GR. *Diagnostic procedures in veterinary bacteriology and mycology*. 4th ed. Thomas CC, editor. Illinois's, USA. 1984; 431–436.
15. Sheba Tannery. *A report on Tigray state government regarding quality deterioration of hides and skins in the region due to external parasites*. Ethiopia; 2005.
16. EPI, info version 3.5.1 for windows. *A word-processing, data base and statistics program for public health on IBM-compatible microcomputers*. World Health organization (WHO), Geneva, Switzerland; 2008.
17. Yacob HT, Netsanet B, Dinka A. Prevalence of skin disease in clinic, sheep and goats at Adama veterinary clinic major Oromia regional state. *Rev vet*. 2008;455–461.
18. Radostits OM, Blood DC, Gray CC. *Veterinary medicine, A textbook of the diseases of cattle, sheep, pigs, goats and horses*. 8th ed. Bailliere, Tidall and Cassel, editors. Ltd 24–28 oval road, London NW 17DX, England. 2002;534–560.
19. Soulsby EJ. *Helminthes Arthropods and protozoa of domestic animals*. 7th ed. Baillier and Tindall, editors. England. 1982;375–504.
20. Urquhart G, Armour M, Duancan J, et al. *Veterinary parasitology*. 3rd ed. Blackwell science. 2003;180–201.
21. Tefera S. *Investigation of ectoparasites of small ruminants in selected sites of Amhara regional states and their impact on tanning industry*. Ethiopia. 2004.
22. Chalachew N. *Study on skin diseases in Cattle, Sheep and Goats in and around Wolaita Sodo*. Ethiopia; 2001.
23. CSA Central Statistical Authority: Federal democratic republic of Ethiopia, central statistical investigatory. Ethiopia; 2004.
24. Numeria A. A study on the prevalence of ectoparasite on the on live goat, fresh goats pelts and assesses the skin defects on processed wet blue (pickled) goats skin at kombolcha tannery, south wollo zone north, eastern Ethiopia. Ethiopia; 2001.

25. ENDSN Ethiopian Business Development Service Net work: The Ethiopia leather and footwear sector. Ethiopia; 2004.
26. Haffize M. Study on skin disease of small ruminants in central Ethiopia. Ethiopia; 2001.
27. Berchutessfa M. *Study on the prevalence of skin diseases in Ruminants at kombolcha veterinary clinic and Major Cause of Fresh goats pelts and pickled skin downgrades at Kombolcha Tannery*. Ethiopia. 2009;10–18.
28. Carton WW, MC–Gavin. *Special veterinary pathology*. 2nd ed. Duncan LL, editor. Mosby, USA. 1995;89–101.
29. Boanr. *Tigray regional states: Bureau of Agriculture and Rural Development*. Ethiopia; 2009.
30. Gashaw J. *Preliminary survey of mange mites in black head Ogaden Sheep, goats and pigs in the administrative region of Hararge*. Ethiopia; 1992.