



Prevalence of Major Ectoparasites and Skin Diseases in Cattle at Hosanna Veterinary Clinic, SNNPR, Ethiopia

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Abstract

This study was conducted during the period between November 20017 and April 20018, to identify the major skin diseases of cattle from the Hosanna. A total of 390 cattle of both sexes (153 females and 237 males) divided in young and adult animals (89 and 301 respectively) were examined. The overall prevalence for skin diseases were 16.67% (65 cases) in cattle and 25% (168 cases). In cattle, skin diseases were mainly due to ectoparasites (55/65 cases). The main ectoparasites identified in the Hosanna area were ticks (*Amblyomma*, *Boophilus* and *Hyalomma*) in cattle (prevalence: 7.69%), lice (*Damalina* and *Linognathus*) (respective prevalence: 3.08% in cattle and 1.28% in cattle) and *Demodex* at a lesser extend (1.28% in cattle). Pediculosis highly affected young than adult cattle. Other skin diseases were scarcely observed in cattle (prevalence: 2.56%) in which the infection risk was increased for Female and young animals (particularly young cattle). While lumpy skin disease was rare in cattle. Skin scraping, morphological identification and clinical presentation were the methods employed for identification of mange mites and Dermatophilosis, gross ectoparasites and viral skin disease respectively. This study demonstrates that skin diseases are among the most important health constraints of cattle in the SNNPR region leading to important economic losses and they urgently require some control interventions.

Keywords: Cattle, Skin diseases, Prevalence, Hosanna

Introduction

Ethiopia is generously endowed with livestock resources. Its cattle population is more than 53 million, along with sheep and goat populations of 25.5 and 24.1 million, respectively, put the country first in Africa (CSA, 2013). The agricultural sector in Ethiopia, engaging 85% of the population, contributes 52% to the gross domestic product (GDP) and 90% to the foreign exchange earnings (CSA, 2008). It performs multiple functions in the Ethiopian economy by providing food, input for crop production and soil

fertility management, raw material for industry, cash income as well as in promoting saving, fuel, social functions and employment. The sector's contribution to national output is underestimated, because traction power and manure for fertilizer are not valued. Livestock Contributes 12-15% of total export earnings, the sub-sector is the second major source of foreign currency through export of live animals, meat, hides and skins (Ayele *et al.*, 2003).

Ethiopian hides and skins have good reputations in the international leather market for their unique natural substance of fitness, cleanness, and compactness of texture, thickness, flexibility and strength. The cattle hides, identified as “Zebu type”, are popular for their fine grain pattern and fiber structure that are well suited for the production of quality upper leather (Jabbar *et al.*, 2002). The existence of various skin diseases affecting ruminants is frequently reported from different parts of Ethiopia are accountable for considerable economic losses particularly to the skin and hide export due to various defects, 65% of which occur in the pre slaughter states directly related mostly to skin disease and skin and hides are often rejected because of poor quality. The most common Bovine skin diseases reported in Ethiopia are Dermatophilosis, lumpy skin disease, Demodicosis, sarcoptic and psoroptic manges, pediculosis and ticks infestation (Woldemeskel, 2000; Yacob *et al.*, 2008).

External parasites are the most serious threat since they feed on body tissues such as blood, skin and hair. More significant, however, is that any blood-sucking arthropod may transmit diseases from infected animals to healthy ones. In addition, arthropod pests also may reduce weight gains, produce general weakness, severe dermatitis and create sites for secondary invasion of disease causing organisms. In general, infected livestock cannot be healthy or efficiently managed to realize optimum production levels (Yacob *et al.*, 2008; Kaufman *et al.*, 2011).

Apart from quality degradation of skin and hides, skin diseases induce associated economic losses due to reduction of wool quality, meat and milk yield, losses as a result of culling and occasional mortalities and related with cost of treatment and prevention of the diseases. Some skin problems are easy to cure others more complicated and some like ring worm are even highly contagious to the human handlers. The effect of skin problems on animal productivity also varies from mild irritations to rapid death (Yacob *et al.*, 2008).

Therefore the objectives of this study were to: [1] determine the prevalence of major cattle skin disease at Hosanna veterinary clinic [2] identify the different risk factors associated with occurrence of ectoparasites and skin diseases.

Materials and Methods

Study area

The study was conducted at Hosanna Veterinary clinic Hadiya Zone, Southern Ethiopia. Hadiya Zone is one of the 13 Zones in the southern Nation Nationalities of Ethiopia. The highest altitude in the Zone is 2970 m.a.s.l at the Summit of Sengiya Mountain in the Duna district and the lowest is 800 m.a.s.l in Gibe River valley. The zone is divided into ten districts and one city administration. Hosanna is one of ten administrative towns found in Hadiya zone and located at a distance of 230 km in the North East from Addis Ababa and 187 km from Hawassa, the capital city of the region. According to the information obtained from Hadiya Zone Agricultural Office, mixed farming system (livestock and crop production) is widely practiced. The district consists of 35 Peasant Associations. The study area located approximately at an altitude of 2200 m.a.s.l with the mean annual rainfall of 1172.75 mm and mean annual temperature of 18°C. Geographically, it is located between 70.42 - 7.75° N latitude and 370.80 - 38.07° E longitude (HZSA, 2010).

Study animals

A total of 390 cattle brought to Hosanna veterinary clinic were subjected to clinical detailed examination for the presence of skin lesions and ectoparasites. The age, breed, body condition and sex were recorded whether they are from intensive or extensive farming system. The age of the animals were determined primarily based on the information obtained from the owners and also by looking the dentition pattern of animals. Animals were divided into two groups according to their age, namely young (less than or equal to 2 year old) and adult animals (above 2 year old) (Aiello, 1998).

Study methodology

Clinical examination

In this study, animals were sampled during sample collections and the related risk factors such as sex, age, breed and body conditions were recorded before sampling. The tags of study animals were properly recorded during sampling and then each animal were also carefully inspected for the skin pathogens. The samples were taken to wolaita sodo regional laboratory for identification. Clinical skin disease investigations were conducted by examination of skin of each animal through visual inspection and palpation. For positive cases on clinical examination, detailed husbandry and health history were taken from the owner of the animals. Depending upon the clinical presentation of skin diseases, samples such as, skin-scrapings, hair specimens, pustules, abscesses and externally visible parasites were collected and subjected to a proper laboratory investigation. Viral infections like Lumpy Skin Disease (LSD) was diagnosed based on its occurrence in a herd and observable clinical pictures such as wide spread skin lesions on and around the muzzle, ears, scrotum and udder (Jones *et al.*, 1997).

Laboratory investigation

Deep scrapings of pustules and abscess were collected for demodicosis suspected cases and smears of their content were examined for the presence of demodectic mites at 10x magnification of light microscope. For the mange mite infestations, skins scrapings (till capillary blood oozes) were taken from the periphery of active lesions. The specimens were placed in test tubes and were treated by 10 ml KOH (10%) and examined based on the standard procedures (MAFF, 1977). Exudative crusts were taken by pairs of forceps and were transport to the laboratory in dry Petri dish where they are subjected to Giemsa staining for demonstration of *Dermatophilus congolensis*. Lice and tick were collected in 70% alcohol by parting the hair and were identified using the standard procedures (Cottral, 1978).

Data analysis

The total numbers of cattle that were attended in Hosanna veterinary clinic from November to April were sampled. After Data collection it was recorded in Microsoft excel spread sheet and preliminary analysis were done in it. The laboratory data were coded and the associations of risk factors with the occurrence of the diseases were assessed using Chi-square. The Chi-square (χ^2) test was used to assess differences in the prevalence of skin diseases among breed, sex, body condition and age groups. All statistical analyses were conducted using SPSS (Version 20) statistical software and $p < 0.05$ were taken as significance.

Results

Prevalence of skin disease in cattle

The overall prevalence of skin diseases in cattle was 16.67% (65 cases) from 390 cattle examined; of which 237(60.77%) female and 153(39.23%) male (Table 1). All animals were mono-infected and ectoparasites were responsible for 55 cases (14.10%) while 2.56 % (10 cases) was attributed to other skin diseases. The major skin diseases occurring in cattle were infestation by ticks (7.69%), pediculosis (4.36%), demodicosis (1.28%) and dermatophilosis (1.28%) in order of decreased prevalence (Table I). The major identified species were *Boophilus*, *Amblyomma* and *Hyalomma* species and *Damalina bovis* and *Linognathus* spp for ticks and lice infestations respectively. The common infestation sites of *Damalina bovis* were the shoulder, neck, sides and back while infestation with *Linognathus* Spp was more prominent at shoulder and neck. The prevalence of demodex in male (1.96) was higher than female (0.84). Psoroptic case was not detected in female in study area while in male (1.96) case was found. Psoroptes was statically significant (Chi-square = 4.683, p-value= 0.03) with male. However no case of sarcoptes was diagnosed within both sex. The prevalence of mange between age group was not significantly associated (Chi-square = 5.06, p-value >0.05) (Table 1).

Table 1: Prevalence of skin disease with based on of cattle (n=390)

Major Skin disease	Total	sex		P- value	chi -square
		Male N=237	Female N= 153		
Ecto parasite	14.10(55)	11.39(27)	18.30(28)	0.109	7.55
Mites	2.05(8)	0.73	3.92(6)	0.060	5.642
Psoroptes	0.78(3)	0.00(0)	1.96(3)	0.030	4.683
Sarcoptes	0.00(0)	0.00(0)	0.00(0)	-	
Demodex	1.28(5)	0.84(2)	1.96(3)	0.972	0.001
Tick	7.69(30)	6.33(15)	9.80(15)	0.498	2.377
Pediculosis	4.36(17)	4.22(10)	4.58(7)	0.875	0.26
Others	2.56(10)	1.69(4)	3.92(6)	0.094	6.383
Dermatophilosis	1.28(5)	0.84(2)	1.96(3)	0.338	0.916
LSD	1.03(4)	0.42(1)	1.96(3)	0.141	2.169
Photosensitization	0.26(1)	0.42(1)	0.00(0)	0.421	0.647
Over all	16.67(65)	13.08(31)	22.22(34)	0.107	11.798

Psoroptes (2.25) and demodex (2.25) mange was higher in young than in adult psoroptes (0.33) and demodex (1.00). No case of sarcoptes was diagnosed within the cattle. However the prevalence of mange between age group was not significantly associated

(Chi-square = 4.18, p-value = 0.12). There was higher prevalence of tick in young age group (11.23) as compared to adults (6.64). However, the tick was not significantly associated with age groups ($p = 0.014$) (Table 2).

Table 2: Prevalence of mange and ticks based on age of cattle (n=390)

Major Skin disease	Total	Age		P- value	chi –square
		Young N=89	Adult N=301		
Ecto parasite	14.10(55)	23.6(21)	11.30(34)	0.033	10.457
Mites	2.05(8)	4.49(4)	1.33(4)	0.124	4.183
Psoroptes	0.78(3)	2.25(2)	0.33(1)	0.069	3.300
Sarcoptes	0.00(0)	0.00(0)	00.0(0)	-	-
Demodex	1.28(5)	2.25(2)	1.00(3)	0.880	0.023

Tick	7.69(30)	11.23(10)	6.64(20)	0.014	10.676
Pediculosis	4.36(17)	7.86(7)	3.32(10)	0.149	3.810
Others	2.56(10)	5.62(5)	1.66(5)	0.233	4.275
Dermatophilosis	1.28(5)	3.37(3)	0.66(2)	0.046	3.975
LSD	1.03(4)	1.12(1)	1.00(3)	0.917	0.011
Photosensitization	0.26(1)	1.12(1)	00.0(0)	0.066	3.391
Over all	16.67(65)	29.21(26)	12.96(39)	0.076	12.836

The prevalence of Lumpy skin disease and dermatophilosis was higher in local breed than cross and high mange was observed in local breed than

cross however these skin disease and mange was not significantly associated with breed (Table 2).

Table 3: Prevalence of skin diseases and ectoparasites based on body condition (n=390)

Major Skin disease	Total	Breed		P- value	chi –square
		Cross	Local		
		N= 330	N=60		
Ecto parasite	14.10(55)	12.73(42)	21.67(13)	0.36	4.357
Mites	2.05	0.60(2)	3.33(2)	0.658	0.836
Psoroptes	0.78(3)	0.60(2)	1.67(1)	0.387	0.748
Sarcoptes	0.00(0)	0.00(0)	0.00(0)	-	-
Demodex	1.28(5)	1.21(4)	1.67(1)	0.773	0.083
Tick	7.69(30)	7.27(24)	10.00(6)	0.312	3.571
Pediculosis	4.36(17)	3.64(12)	8.33(5)	0.247	2.796
Others	2.56(10)	2.12(7)	5.00(3)	0.907	0.552
Dermatophilosis	1.28(5)	0.90(3)	3.33(2)	0.125	2.352
LSD	1.03(4)	0.90(3)	1.67(1)	0.592	0.287
Photosensitization	0.26(1)	0.30(1)	0.00(0)	0.669	0.82
Over all	16.67(65)	14.85(49)	26.67(16)	0.203	0.975

Cows having the body condition poor, medium and good were significantly the most frequently affected by skin diseases ($X^2 = 38.26, 19.44$ and 6.00 respectively, $p < 0.05$) and in the study area poor conditioned animals were more infected with mange

(3.22%) than other categories of body conditions (Table 3). Meanwhile, animals with poor body condition were found to be highly infected by skin diseases such as pediculosis and dermatophilosis (Table 4)

Table 4: Prevalence of mange mites based on body condition (n=390)

Major Skin disease	Total	Bcs			P- value	chi-square
		Poor	Medium	Good		
		N= 31	N=202	N=157		
Ectoparasites	14.10(55)	25.80(8)	14.85(30)	10.83(17)	0.000	36.702
Mites	2.05(8)	3.22(1)	2.97(6)	0.00(0)	0.363	4.334
Psoroptes	0.78(3)	0.00(0)	1.49(3)	0.00(0)	0.245	2.814
Sarcoptes	0.00(0)	0.00(0)	0.00(0)	0.00(0)	-	-
Demodex	1.28(5)	3.22(1)	1.49(3)	0.00(0)	0.471	1.508
Tick	7.69(30)	0.00(0)	7.42(15)	9.55(15)	0.84	11.161
Pediculosis	4.36(17)	22.58(7)	4.45(9)	0.64(1)	0.000	38.259
Others	2.56(10)	12.90(4)	0.99(2)	2.55(4)	0.000	37.038
Dermatophilosis	1.28(5)	9.68(3)	0.99(2)	0.00(0)	0.000	19.439
LSD	1.03(4)	0.00(0)	0.00(0)	2.55(4)	0.050	3.998
Photosensitization	0.26(1)	3.22(1)	0.00(0)	0.00(0)	0.003	11.610
Over all	16.67(65)	38.70(12)	15.84(32)	13.37(21)	0.000	65.295

Discussion

This study indicates that skin diseases caused by parasites, bacteria and viruses were common in and around Hosanna town in cattle: the overall prevalence was 16.67% in cattle. These relative high frequencies would be associated with nutritional factor, climatic stress, fly season and favorable condition for diseases agent multiplication. As different herd of animals came in close contact at available communal watering and grazing sites (contact points) because of the feed scarcity, the establishment and spread of skin diseases

infections were encouraged. The prevailing poor veterinary services, improper application of acaricides by non-professionals could also amplified this endemic situation.

In the current study high mange prevalence was found in local breeds (3.33%) and lower prevalence was observed in cross breeds (0.6%). This finding was in agreement with the report of Yacob et al (2008) who indicated higher prevalence of mange in local breed (8.8%) and lower in cross breeds (2.2%) in and around Mekelle (Tewodros *et al.*, 2012) who reported

higher prevalence in local breeds (9.425%) and lower prevalence in cross breeds (4.367%) in Gondar town. This might be, because of cross breeds usually kept in and around urban areas with good management while local breeds of cattle are reared mostly in rural areas where farmers do not afford them with good management and most of them were kept under free range communal grazing system which lets them to contact with those cattle having mange and this facilitates transmission of mange from infested to healthier cattle. In addition Yacob et al (2008) reported a lower prevalence of mange (0.00%) on cross breeds in Adama. The current slightly higher prevalence (0.6%) on cross breed of cattle might be due to difference in agro - ecology of study areas and time of study.

Mange infestation was also found varied according to sex of animals. Prevalence of mange was high in females (3.92%) than males (0.73%) in the study area. This result agrees with the study of Matthes and Bukva (Matthes *et al.*, 1993) who reported 32% in females and 1.22% in male animals. But this report disagrees with the previous work of Yacob et al (2008) who reported 2.22% in male and 1.67% in female animals, respectively in Adama and the report of Bogale (1991) who indicated 4.57 and 3.17% in male and female animals in DebreZeit, respectively. This might be associated with physiological stress conditions during pregnancy and lactation, the lesser emphasis given on feeding of female animal with regard to better feeding habit to male animals by owners since they used for ploughing, fattening and higher financial gain at the market level.

Age of animals was also another point which appears as a risk factor for the occurrence and different prevalent rates recorded on animals. Based on the present finding, the prevalence of mange was 4.49% and 1.33% for less than two years and two and above years of age respectively. This was in agreement with the work of Bogale (Bogale, 1991) who reported 7.95% in young 2.40% adult in Bishoftu. This indicated that mange was occurred in all age groups with various degrees.

There was higher prevalence of tick in young age group as compared to adults. The infestation tick was significantly associated with age groups ($p = 0.014$). The main tick species were (*Abylomma*, *Hyalomma* and *Boophilus*) and their attachment sites were ventral abdomen, sternum, under the tail, scrotum in males and udder in females and the tick

infestation prevalence was not significantly influenced by sex and breed. The same tick species have been identified in the previous study conducted in the Wolaita Soddo region Yacob et al (2008) except that *Rhipicephalus* genus was more abundant and the *Hyalomma* genus was scarcely observed. The relatively low prevalence rate of tick infestation in my study as compared to the above finding might be due to the dry season period during which the study was conducted whereas humidity and prolonged sunlight promote the survival and reproduction of ticks in low land areas (Radostits, 2007).

A high prevalence of pediculosis was noticed in cattle 4.36% with different lice species at various infestation levels. Usually mild cases are not considered as being having any pathogenic effect, but heavy infestations are associated with extensive hide damage. The common lice species identified were *Linognatus* and *Dammalina bovis*. All age groups of cattle can be infested with lice, but the heaviest infestation was usually seen on calves, yearlings or in older unthrifty animals and those animals living in poor husbandry conditions (Urquhar *et al.*, 1996). In line with this the current study revealed higher proportion of lice infestation in younger animals (7.86%) than other age group. The risk for this skin disease was not statically significantly with breed and in age but it was significant with relation to body condition in cattle ($p < 0.001$). In support of other observation (Urquhar *et al.*, 1996) young animals were severely affected than adult animals, this is perhaps because they possesses a higher ratio of accessible surface to body volume, inefficient grooming behavior and other defense capabilities (Melauncon, 2007).

Demodicosis was registered at prevalence rates of 1.28% in cattle. The demodicosis prevalence previously reported in cattle ranged from 0.42% in the Nekemte region (REGASA, 2003) to 1.63% in the Wolaita Soddo region (CHALACHEW 2001). No significant effect of sex, body condition, breed and age on the demodicosis prevalence in cattle was observed in the present study in accordance with the works of Chalachew (2001) and of Haffize (2001). Young animals are very susceptible to skin diseases probably because of their young, scarcely wool covered skin and relatively undeveloped immunity as well As their frequent exposure to pasture together with adults.

Dermatophilosis in cattle is recorded from many countries of the world including Ethiopia (Geremew, 1998). In this study, an overall prevalence of 1.28% of dermatophilosis was recorded. The diseases prevalence is less than the prevalence of dermatophilosis in Ambo town with the total prevalence of 5.21% by Dejene *et al.* (2012), but it is higher than the report of (Meseret and Safinew, 2011) which was 1.04%. In this study, the proportion of bovine dermatophilosis was significant ($p < 0.05$) between age and body condition, however it was not statically significant with sex and breed ($p > 0.05$) in which female cattle were more susceptible than male one. This is accordance with the previous study by Dejene et al (2012) in Ambo town; in which dermatophilosis occurs in rainy season and affect female than male. This is suggested as females are always in contact with water for udder washing and they are stressed during milking.

Lumpy skin disease found in cattle, which accounts 1.01% prevalence at Hosanna veterinary clinic; which is lower than the previous study 0.68% conducted by Yacob et al (2008) at Adama veterinary clinic and the study conducted at Wolliso (South west Oromia) which shows a prevalence rate of 27.91% by Bishawired (1991). This is assumed to be as a result of study period, in which multiplication of flies which act as mechanical vector for the virus is common during spring in Ethiopian context and availability of flies for mechanical vector aggravates the infection rate of lumpy skin disease. There was no significant association ($P > 0.05$) between risk factors and prevalence of Lumpy skin disease.

The photo sensitization only needs presence of photodynamic agents to cause skin problem, its occurrence as skin disease does not related with age, sex, breed, but in rare case, congenital photosensitization may occur in domestic animal. In this research, only one (0.26) animals were encountered with skin damage suspected to be due to photo sensitization (Table 1). The suspected case of photosensitization was proportionally higher in cross breed animals.

In conclusion, the most common cattle skin problems encountered in and around the study area were ectoparasite (like acariasis and pediculosis), bacterial like dermatophilosis, and viral such as lumpy skin disease and some cases of photosensitization.

Ectoparasites were the most serious cases of skin problems of cattle. Considerable financial losses associated with skin problems were found to be due to pesticide prices, extensive skin damage, morbidity and mortality of the affected animals.

Based on the above conclusion the following recommendations were forwarded:

- ❖ Strategic treatment of cattle with insecticides and acaricides should be practiced in the study area to minimize the impact of ectoparasites
- ❖ Educating of local farmers about the control of skin diseases is essential
- ❖ Vaccination should be applied for viral disease before its occurrence season
- ❖ Newly introduced animals should be clinically examined and treated before they are introduced in the herd or in to the farm
- ❖ Animal management practices should be improved implemented to minimize transmission of ectoparasites and skin disease

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