



Major Skin Diseases of Cattle: Prevalence and Risk Factors in and around Hawassa, Southern Ethiopia

Addise Ambilo, Achenef Melaku*

Veterinary Pharmacy and Biomedical Sciences Department, Faculty of Veterinary Medicine, University of Gondar

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Abstract

A cross-sectional study was conducted to determine the prevalence of major skin diseases of cattle in and around Hawassa from November 2011 to April 2012. Both clinical and laboratory examinations of samples from skin were carried out. Of the total 384 cattle examined, 66 (17.19%) were clinically infected with different skin diseases of various etiologic origin. The most commonly encountered skin diseases were dermatophytosis (8.32%), acariasis (3.13%), pediculosis (2.60%), lumpy skin disease (1.62%) and dermatophilosis (1.56%). No significant differences ($P>0.05$) were observed among age, breed and managemental groups in relation to the prevalence of dermatophilosis and lumpy skin disease whereas significantly ($P<0.05$) higher cases of dermatophytosis and pediculosis were recorded in animals less than two years of age. In dermatophytosis and pediculosis cases, no significant difference ($P>0.05$) was seen between sex and breed groups. In pediculosis cases, the major lice encountered were *Bovicola*, *Haematopinus* and *Linognathus species*. Statistically significant ($p<0.05$) difference was observed in two sex groups regarding to acariasis infestations. The frequent sites of ringworm lesions were on the hump, sacral areas, face and base of the horn, ears and sides of the body. Acariasis, dermatophilosis, dermatophytosis, lumpy skin disease and pediculosis were the major skin problems in the study area. Therefore, strategies have to design by professionals, regional governments and tanneries to fight these skin diseases of cattle.

Keywords: Skin diseases; Cattle; Prevalence; Hawassa

Introduction

Ethiopia has huge livestock population which provide draught power, milk, meat, fiber, fuel and fertilizer and they also provide hide and skin which partially processed for export or tanned and finished in the country's tanning for shoe making and leather goods (Zelege, 2009). The development of leather industry requires great quantity of raw materials of various origins, the principal source of which is livestock industry. During past decades leather and semi-processed hides and skins have constituted the second major export product of country with 10 to 20% of total of foreign earnings (Theo, 2003).

Although the number of tanneries involved in production of finished and semi-finished leather products are increasing from time to time, the sector and the country are losing revenue due to a decline in leather quality. A considerable portion of these pre-slaughter defects are directly related to skin diseases or secondary damage that occurs when the animal scratches itself to relieve the itching associated with some of these diseases (Kassa *et al.*, 1998). The most common cattle skin diseases reported in Ethiopia are dermatophytosis, lumpy skin disease, dermatophytosis, pediculosis, acariasis, photosensitivity and warts (Assegid, 1991; Chalachew, 2001).

Besides their impact on leather quality, skin diseases impose economic losses as result of reduction in body weight gain and milk yield, occasional mortality, reduction of performance in draft ani-

*Corresponding author: Achenef Melaku

E-mail address: achenefmela@yahoo.com

mals and losses associated with treatment and prevention of diseases (Gray, 1995). In addition, some skin diseases such as ringworm has zoonotic significance (Aiello and Mays, 1998). The potential economic loss the country is experiencing necessitates the nation-wide detailed investigation on the distribution of important skin diseases and their determinants. Therefore, the objectives of this study were to determine the prevalence of major skin diseases of cattle in and around Hawassa, Southern Ethiopia and to assess the relation among different risk factors with the occurrence of major skin diseases of cattle in the area.

Materials and methods

Study area

The study was conducted in and around Hawassa town, the capital city of southern Nations Nationalities and People Regional state from November 2011 to April 2012. Hawassa is located in Rift valley at about 275km South of Addis Ababa. Geographically, it lies between 4° 27' and 8° 30' North latitude and 34° 21' and 39° 1' East longitude. The town has an estimated human population of 150,000 with an area of 50km and altitude range from 1,500-2,000 metre above sea level. The area has an average annual rainfall of 997.6 mm and the maximum and minimum annual temperature is 17 and 24°C, respectively. In addition, in the town and its surrounding there are about 1,573,318 cattle, 183,464 goats, 221,505 sheep, 49,150 horses, 48,653 asses and 1,196,504 poultry (CSA, 2004).

Study animals

The study animals were cattle in and surrounding Hawassa and it includes sex, breeds and all age groups 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 (Aiello and Mays, 1998).

Study design and sample size determination

A cross-sectional study was conducted to determine the current prevalence of major skin diseases in the study area. The total numbers of animals re-

quired for the study was calculated based on the formula given by Thrusfield (2005). Since there was no previous study in the prevalence of skin diseases in the area, 50% prevalence was taken to calculate the sample size and it was calculated at 95% confidence interval and a desired accuracy level of 5%. Therefore, the calculated sample size was 384 and these animals were selected randomly.

Study methodology

A. Clinical examination

In this study, animals were selected during sample collections and the related risk factors such as sex, age, breed and managemental conditions were recorded before sampling. The tags of study animals were properly recoded during sampling and then each animal was also carefully inspected for the skin pathogens. All the encountered cases were taken to Hawassa University laboratory for identification.

Clinical skin disease investigation was conducted by examination of skin of each animal through visual inspection and palpation. For positive cases on clinical examination, detailed husbandry and health history was 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.

B. Laboratory investigation

Specimen of hair plus skin were plucked from lesions suspected of dermatophytosis using forceps, put in dry Petri dish and transported to the laboratory to demonstrate characteristic fungal elements in a wet mount of lesion scraping. Deep scrapings of pustules and abscess were collected from demodicosis suspected cases and smears of their content were examined for the presence of demodectic mites at 10x magnification of light microscope (Cottral, 1978). For the mange infestations, skin scrapings (till capillary blood oozes) were taken from the periphery of active lesions. The specimen were placed in test tubes and treated by 10ml KOH (10%) and examined based on the standard procedures (MAFF, 1977). Exudative crusts were taken by pairs of forceps and transported to the laboratory

in dry Petri dish where they are subjected to Giemsa staining for demonstration of *Dermatophilus congolensis*. Lice were collected in 70% alcohol by parting the hair and were identified using the standard procedures (Cottral, 1978).

Data management and analysis

Data were collected and recorded in Microsoft excel spread sheet and preliminary analysis was done in it. The laboratory data were coded and the association of risk factors with the occurrence of the diseases were assessed using Chi-square and Fisher's Exact Test. All statistical analyses were conducted using SPSS statistical software and $P < 0.05$ was taken as statistically significant in all cases.

Results

Overall prevalence

Of the total of 384 cattle examined, 66 (17.19%) were affected by skin diseases of various etiologi-

cal agent. Although relatively higher percentages of the skin diseases were observed in cross breed cattle (23.68%) and male animals (21.14%) the difference was not statistically significant. On the other hand, the overall prevalence of major skin diseases was significantly ($P < 0.05$) higher in animals less than two years of age and in poor husbandry system (Table 1).

Dermatophytosis

Out of the 384 examined cattle 32 (8.32%) of the animals were positive for dermatophytosis. Significantly higher ($P < 0.05$) prevalence rate was encountered on animals less than two (25.81%) than those greater or equal to two years of age. Statistically significant associations ($P > 0.05$) were not observed with other risk factors (Table 2). The frequently affected areas of the body were hump, sides of body, sacrum, face, neck and shoulder.

Lumpy skin disease

Of the total of 384 cattle examined, 6 (1.56%) an-

Table 1. Association of risk factors with major skin diseases

Factors	Categories	No. examined	No. Positive	Prevalence (%)	Chi-square	P-value
Breed	Cross	38	9	23.68	1.25	0.26
	Local	346	57	16.47		
	Total	384	66	17.19		
Sex	Male	123	26	21.14	1.98	0.15
	Female	261	40	15.33		
	Total	384	66	17.19		
Age	< 2 years	93	32	34.41	25.57	0.00
	≥ 2 years	291	34	11.68		
	Total	384	66	17.19		
Husbandry	Poor	247	52	21.05	7.26	0.007
	Good	137	14	10.22		
	Total	384	66	17.19		

Table 2. Prevalence of dermatophytosis in cattle in relation to different risk factors

Factors	Categories	No. examined	No. Positive	Prevalence (%)	P value
Breed	Local	346	28	8.09	0.54
	Cross	38	4	10.53	
	Total	384	32	8.33	
Sex	Male	123	12	9.76	0.48
	Female	261	20	7.66	
	Total	384	32	8.33	
Age	< 2 Yrs	93	24	25.81	0.00
	≥ 2 Yrs	291	8	2.75	
	Total	384	32	8.33	
Management	Poor	247	25	10.12	0.08
	Good	137	7	5.11	
	Total	384	32	8.33	

imals were clinically positive for lumpy skin disease. The prevalence was 1.73% in local breeds, but it was not observed in cross breed animals. There was no significant difference ($p>0.05$) in prevalence rate of lumpy skin disease among the age, sex, breed groups and husbandry systems (Table 3). Affected animals had painful nodular skin lesions diffused all over the body including the conjunctiva and rectum, swollen leg, and dewlap areas, enlarged superficial lymph nodes and their body temperature varied from 39.5 to 41°C.

Pediculosis

Of the total of 384 cattle examined, 10(2.60%) were positive for different species of lice. The major lice species observed were *Bovicola*, *Linognathus* species and *Haematopinus* species. The prevalence was higher in cross breed animals (7.89%) than local breed animals (2.02%), but not statistically significant difference. It was significantly ($P<0.05$) higher in animals with age less than two years (32.60%) than greater than or equal

to two. Significant variation was not observed in sex groups and husbandry systems (Table 4).

Acariasis

Of the total of 384 cattle examined, 3.13% were positive for acariasis. The prevalence was 3.47% in local, but the disease was not observed in cross breed animals. Male animals (7.31%) were more significantly ($P<0.05$) affected than females (1.15%). No significant difference ($P>0.05$) was observed in two age groups (Table 5). The major mites encountered were *Demodex* (2.08%) and *Sarcoptes* (1.04%). Gross lesions of demodectic cases were pustular nodules distributed over the neck, shoulder and dewlap areas and deep scrapings of the lesion prevailed grayish pus deep scrapings for *Sarcoptes*.

Dermatophilosis

Of the total of 384 cattle examined, 1.56% was positive for dermatophilosis. Although the higher

Table 3. Prevalence of lumpy skin disease in cattle in relation to different risk factors

Factors	Categories	No. examined	No. positive	Prevalence (%)	<i>P</i> -value
Breed	Local	346	6	1.73	-
	Cross	38	0	0	
	Total	384	6	1.56	
Sex	Male	123	1	0.81	0.66
	Female	261	5	1.92	
	Total	384	6	1.56	
Age	<2 Yrs	93	1	1.07	1.00
	≥2 Yrs	291	5	1.72	
	Total	384	6	1.56	
Husbandry	Poor	247	5	2.02	0.42
	Good	137	1	0.73	
	Total	384	6	1.56	

Table 4. Prevalence of pediculosis in cattle in relation to different risk factors

Factors	Categories	No. examined	No. Positive	Prevalence (%)	<i>P</i> -value
Breed	Local	346	7	2.02	0.06
	Cross	38	3	7.89	
	Total	384	10	2.60	
Sex	Male	123	3	2.44	1.00
	Female	261	7	2.68	
	Total	384	10	2.60	
Age	<2 Yrs	93	3	3.23	0.007
	≥2 Yrs	291	7	2.41	
	Total	384	10	2.60	
Husbandry	Poor	247	7	2.83	1.00
	Good	137	3	2.19	
	Total	384	10	2.60	

Table 5. Prevalence of acariasis in cattle in relation to different risk factors

Factors	Categories	No. examined	No. Positive	Prevalence (%)	P-value
Breed	Local	346	12	3.47	
	Cross	38	0	0.00	
	Total	384	12	3.13	
Sex	Male	123	9	7.32	0.00
	Female	261	3	1.15	
	Total	384	12	3.13	
Age	<2 Yrs	93	3	3.23	0.58
	≥2 Yrs	291	9	3.09	
	Total	384	12	3.13	
Husbandry	Poor	247	11	4.45	0.03
	Good	137	1	0.72	
	Total	384	12	3.13	

Table 6. Prevalence of dermatophilosis in cattle in relation to different risk factors

Factors	Categories	No. examined	No. positive	Prevalence (%)	P-value
Breed	Local	346	4	1.16	0.11
	Cross	38	2	5.26	
	Total	384	6	1.56	
Sex	Male	123	1	0.81	0.66
	Female	261	5	1.91	
	Total	384	6	1.56	
Age	<2 Yrs	123	2	1.63	1.00
	≥2 Yrs	261	4	1.53	
	Total	384	6	1.56	
Husbandry	Poor	247	4	1.62	1.00
	Good	137	2	1.46	
	Total	384	6	1.56	

prevalence of dermatophilosis was observed in cross breed cattle (5.26%), the difference was not statistically significant ($P>0.05$). Statistically significant ($P>0.05$) associations were also not observed with other risk factors (Table 6).

Discussion

The overall prevalence of major skin diseases was 17.19%. Specifically, the prevalence of dermatophytosis, lumpy skin disease, pediculosis, acariasis and dermatophilosis were 8.32, 1.56, 2.60 and 1.56%, respectively. Among different skin diseases, dermatophytosis ranked first in and around Hawassa. Dermatophytosis in domestic animals is an infection of keratinized tissues by one of the two genera of fungi, *Microsporium* and *Trichophyton* (Aiello and Mays, 1998). In developed countries, it has the greatest economic and human health consequence (Bradford, 1996). Most of the animal owners mentioned ringworm as the major skin disease of cattle in the area. However, this clinical manifestation and the naming of the disease might

not be as such specific to fungal infection. Young animals are more susceptible to dermatophytosis than adults (Cottral, 1978). In the present study too, the prevalence of disease was significantly ($p<0.05$) higher in animals less than two year of age than the adult age group. Of all dermatophytic cases, 32 (8.32%) of them have generalized and widespread lesions, 24 (25.81%) of which were seen on younger animals. This is because, dermatophytosis in adult and health animal is self-limiting but in young and debilitated animals the infection is wide spread and persistent (Radostits *et al.*, 2007). The most usual route of infections of dermatophytosis is by penetration of intact skin or more commonly of skin subjected to minor trauma by rubbing, scratching or prolonged moistening (Carton and Mc Gavin, 1995). In this study also the frequently affected area were found to the hump and sacrum, but in generalized cases, especially in younger animals, the dorsum and sides of the body were the usual sites of the diffused lesions. This could be due to the nursing behaviour of the dam, which could distribute the infection of over the

body while nursing.

Because of the endemicity of the disease in the area, most of the animal owners were familiar with dermatophytosis growth, gross pathological lesion and the age group affected. The majority of complaints did not practice isolation of the sick animals from the healthy once in their normal husbandry practice. This practice will undoubtedly contribute to easy transmission of the disease within herd because of the highly contagious nature of the disease (Carton and Mc Gavin, 1995).

In Ethiopia, outbreaks of lumpy skin disease have been reported at different times in western part of the country since 1981 (Tadese, 1997) similar studies conducted in Woliso (Bishawired, 1991) and southern rangeland (Assegid, 1991) revealed 27.9% and 11.6% prevalence, respectively, indicating the widespread importance the disease since its recognition in 1957 in East Africa (Radostits *et al.*, 2007). In agreement with previous report of Aiello and Mays (1998), two age groups, breed and both sexes in this study area were found to be equally susceptible to LSD infection. The maximum morbidity rate was found to be in the month of December followed by November similar peak of outbreaks was obtained during the months of November and December in central part of the country (Bishawired, 1991). This might be associated with higher activity of insect vectors (Aiello and Mays, 1998). Most of clinical presentations like cutaneous lesions, lacrimations, swelling of the leg and dewlap areas, swelling of the peripheral lymph nodes, decreased milk yield and occasional mortalities symptoms were also regularly observed by many authors (Aiello and Mays, 1998; Radostits *et al.*, 2007).

Despite no complaints made by the animal owners, 2.60% of the animals were infested 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 (Urquhart *et al.*, 1996). The common lice species identified were *Bovicola*, *Linognatus* and *Haematopinus species*. 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. In support of other observation (Melauncon, 1993; Urquhart *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 behaviour and other defence capabilities (Melauncon, 1993).

Demodex is the normal flora of bovine skin and is the most prevalent of all mange infestation (Radostits *et al.*, 2007). In line with this; the present study has shown prevalence rate of 3.13% for Demodex and sarcoptes. Demodexosis will not draw attention unless closely inspected and palpated (Radostits *et al.*, 2007). In support of this statement, almost all the cases were not recognized by the owners of the animals. The prevalence rate of mange mite obtained in this study was (3.13%) which by far lower than other works done in different parts of the country such as Assegid (1991) (7.4%) in southern rangelands and Geremew (1998) (28%) in Bale zone. This might be due to the differences in management, climatic condition, and time factor.

Dermatophilosis was the least prevalent skin disease in the study area, 1.56% which is lower than the previous report, 16.3% (Assegid, 1991) in southern rangelands and 15.04% (Habte, 1994) in Mekele. This might be due to low level of rainfall in the study period, which could prohibit clinical streptotrichosis from coming to picture. Prolonged wetting, high humidity and various ectoparasites which reduce or permeate the natural barriers of the integument influence the development, prevalence, seasonal incidence and transmission of dermatophilosis (Radostits *et al.*, 2007).

In the conclusion, the most common cattle skin diseases encountered in Hawassa were: dermatophytosis, dermatophilosis, lumpy skin disease, acariasis and pediculosis. The most common affected cattle group were young animals and those animals living in poor husbandry conditions for dermatophytosis and pediculosis. Veterinarians and animal health assistants should give more focus to skin diseases at clinical investigation and regional governments and tanneries should support activities in fight of skin diseases. Further investigation should be under taken to identify the deramato-phytic species-affecting cattle to assess its zoonotic importance.

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