









### Mange mites

Mange mites were wide spread and most important ecto-parasites of animals, mites of animals and birds inhabits the skin where they feed on blood, skin debris or sebaceous secretion, which they ingest by puncturing the skins scavenge from the skin surface or immobile from epidermal lesions and the generalized veterinary term for an infestation by mites In animals is called acariasis and can result in severe dermatitis known as mange or scabies [16].

Mange are mainly transmitted by direct contact between hosts and all three stages: -the larvae, nymph and the adult are capable of migrating and survive on inert materials such as bedding and grooming tools can act as a carrier [21]. High temperature, humidity and sunlight favor mange mite's infestation [36]. Mange affects all age groups and more chronic course in adults than younger and poor body conditions animals are most susceptible to mange [17]. Death occurs due to dehydration, feeding of huge number of mites, inability to move and feed due to severe lesion on the face, muzzle and on the joint due to secondary cause such as pneumonia or bacteremia, septicemia introduced through self-inflicted, bite and scratch wounds [33].

Infestation which does not end fatally a marked regression of lesion with healing of the skin and regrowth of the wool or hair occur during dry season exposure of lesion and mite to direct sun light and desiccation may reduce the survival potential of mite population [37].

### Fleas

Fleas are wingless ecto-parasites of animals. Fleas are unique in being laterally flattened compared with lice which are dorsoventrally flattened and all fleas have basically the same structure and their identification is matter for the specialist the adult female is 1-6mm long. Females are longer than males of the same species and readily recognized by their mahogany brown color and the habit of jumping when disturbed [38]. They are not an important parasite on animals. This may not be the case in the Mediterranean region, particularly where livestock live in close association with farm cats and dogs. For example, cat fleas, *C. tenocephalides felis* may be amongst the most important ecto-parasites of ruminants. Calves, Lambs and Kids are more affected and infested by fleas than adults [34].

### Life cycle

The life cycle of ticks is classified in to three groups according to the number of hosts required. Ticks development has four stages; (egg, larva, nymph and adult). Larva and nymph have to take a blood meal from a host before they are able to molt to the next stage.

Adult ticks require blood for reproduction but they can survive up to two years without feeding. They mate after week when they attach and feed on the host then lays eggs.

Ticks may be:

- **One host tick:** All three instars (stages) engorge on the same animals, such as *B. decoloratus* and *B. annulatus*.
- **Two host ticks:** The larvae engorge and molts on the host and nymph drops of after engorged and it molts in the ground and needs a new host. E.g. *R. evertsi*.
- **Three host ticks:** Require a different host for every instar. They drop of each time after engorged and its molts on the ground. E.g. *R. appendiculatus* [20].

Louse completes its entire life cycle on the body of animals, mature; female louse lays eggs called nits and attaches them to the hair with glue like substance. Single female will lay about 300 eggs in her life time. The nits remain attached to the hair until hatching in 4-7 days [39].

Fleas lay tiny white eggs loosely on the hairs, in the feathers or in the habitat of the host. The eggs readily fall of the host on to the ground, floors, bedding or furniture's. Some fleas can lay 500 eggs over a period of several months by laying batches of 3-8 eggs at a time. The tiny eggs hatch in 1-20 days after being deposited. The white worm like larvae feeds particles of dead animal or vegetable matter. Generally present in cracks and crevices. Within 7-14 days, unless food has been scarce the third larval stage is completed and the larva spins a tiny cocoon and pupates. Usually after a week the adult flea emerges and begins its search for blood [22].

### Clinical findings and pathogenesis

Ticks are vectors and potential reservoir of infectious diseases, tick bite causes directly debilitating to domestic animals, irritation, inflammation and hypersensitivity and when present in large number feeding may cause anemia and loss of production [16,21].

Some species cause tick paralysis and will elaborate toxins other than those causing paralysis. High amount of tick can interfere feeding which may lead to loss of production and weight gain. Tick cause morbidity and mortality during periods of drought and delays in fattening [21].

Ticks cause damage to hide and skin. Damage on sheep skin is primarily found along the belly area or where the flea is thinner. Lamb skins are particularly susceptible to skin damage. Secondary bacterial infection of flea bite increases the severity of the damage. Skin injuries can attract blow flies and screw flies that deposit eggs on the wound and produce fatal cutaneous myositis. Ticks produce marks that look like hole or scars that mostly occur in the belly [20].

### Diagnosis

Many tests are used in the diagnosis of ecto-parasites like skin scraping, hair brushing, biopsy, visual examination and observation whilst feeding are involved [40]. One of the most common diagnostic method in evaluating animal ectoparasites and dermal infections is skin scraping. The blade is dipped in mineral oil in the slide and the skin scraping is done. Tunnels are areas that mite lives in and skin scraped until the capillary oozes occur. Inspection of large ruminants is the major method of detecting lice primarily and collecting them from different body parts of animals which examined under microscope [41].

### Treatment, prevention and control

Insecticidal compounds are important in control of ectoparasites. Ivermectin and synthetic pyrethroids are a routine parasite control programs. Several studies suggest that insecticides controls are less effective in autumn [42].

Very few insecticides are registered for control of ecto-parasites of large ruminants with precautions carefully to ensure proper usage such as permethrin [23]. Until the end of 19<sup>th</sup> century where it was attempted pests and parasites control depend almost entirely on relatively inefficient but low-cost management practice such as pasture rotation and the use of natural plant derived insecticides, sulfur, dusts oils and highly toxic heavy metals [43].

The treatments applied to control or prevent infestation are being targeted by the animal right and environmental lobbies. No more chemicals or insecticides are available to control and remove ectoparasite due the impact on the environment. There are also

increasing restriction on timing treatment available. Dipping, setting, dusting, spray race back line application and localized dressing have all been used to control or eradicate ecto-parasites. Treatment may be failed due to insecticide resistance of ectoparasites but most common reason has been poor application of insecticides. Systemic insecticides such as macro cyclic lactones are effective against scab, ked and itching mites. The longer acting macro cyclic and macro cyclic lactones capsules will control for longer than 15-21 days [44].

## Materials and Methods

### Study area

The study was conducted from October, 2019 to June, 2020 in jabitehinan district which is located in west Gojjam zone of Amhara region northwestern Ethiopia on the paved highway 376km from Addis Abeba. This woreda has a longitude of 37°14'60" E and latitude of 11°09'60" N with an elevation of 1917m above sea level (m.a.s.l). The area is known by having three agro-climatic zones, Woyina Dega, Dega and kola. The annual rainfall ranges in 1453mm.

### Study animals

The study animals that were used for this study were 384 large ruminants (cattle) that were found in jabitehinan woreda as well as cattle brought to jabitehinan veterinary clinic. Among the study population there were 165 males and 219 females. Animal of all age, sex groups and animals with different body condition were included. The age determination is made according to [45]. Large ruminants are divided in to three groups according to their age, namely calve (less than or equal to one year old), young between one and three years old and adult animals (above three-year-old).

### Study type

A cross-sectional study was conducted on local and cross breed cattle found in jabitehinan woreda from October, 2019 to June, 2020 to know the prevalence of ecto-parasites in different age groups, body condition, sex and breeds.

### Sample size determination

The sample size for study was determined using the formula that is stated by (46) by taking the expected prevalence of 50% in the study area, absolute desired precision of 5% at confidence level of 95%.

$$n = \frac{1.96^2 \times p_{exp} (1-p_{exp})}{d^2}$$

Where

n = required sample size

P<sub>exp</sub> = expected prevalence

d= desired absolute precision.

Therefore, using the above formula, the sample size was calculated to be 384.

### Study methodology

#### Live animal examination

Examination of animals that were found in jabitehinan woreda was made animals with the case of skin lesions, history of itching and in contact animals was examined closely by visual inspection, palpation of skin for parasites and/or gross skin lesion across all parts of animals including ears, digits and each side as described by [47].

#### Laboratory examination

Ecto-parasites such as lice, ticks and fleas were collected from the attachment sites manually and kept in 70% alcohol until subsequent examination. Identification of the parasite was carried out according to [16]. Samples were collected from suspected cases using scalpel blade by deep skin scrapping until capillary oozing was examined under light microscope. Ecto-parasitic species are identified based on morphological characteristics described by [20]. Mites can be examined from crusts and scabs of skin on the host by adding 10% KOH on the specimens

#### Data analysis

The data was entered in to Microsoft excel data base system and analyzed using STATA (version 9) statistical software. The interac-

tion between different risk factors were assessed by Chi-square (x<sup>2</sup>) test. Descriptive statistics such as percentage is used to summarize the prevalence of different kinds of ecto-parasite from animals. Level of rejection was set at p > 0.05.

## Results

### Prevalence of ecto-parasites in cattle

The study shows that that out of 384 examined for external parasites 208 (54.2%) were infested with at least one or more parasites. Overall, ten genera of external parasites which belong to ticks, lice, fleas and mites were found infesting in the study area (Table 1). The most abundant parasites identified were ticks of genus *Amblyomma*, *Boophilus*, *Rhipicephalus* and lice of genus *Linognathus*, *Haematopinus*, *Damalinea* and fleas of genus *Tenocephalides*, *Pulex*, *Tunga* and mites of *Demodex* in decreasing order except *Tunga* which is less than *Demodex*.

Ecto-parasites	No. infested	Prevalence %
Ticks	135	35.2
Lice	63	16.4
Fleas	8	2.08
Mange	2	.52
Total	208	54.2

**Table 1:** Overall prevalence of ecto-parasites in cattle (n = 384).

### Prevalence of ecto-parasites in cattle by sex

Overall prevalence of ecto-parasite infestation in male and female animals is 48.49% and 58.90% respectively (Table 2). This result revealed that the infestation was more prevalent in females than males. No statistical difference or association with sex groups.

Ecto-parasite	Male (n = 165)	Prevalence (%)	Female (n = 219)	Prevalence (%)	X <sup>2</sup>	P value
Ticks	53	32.12	82	37.44	1.1690	0.280
Lice	26	15.76	37	16.89	0.0888	0.766
Fleas	1	0.61	8	3.65	3.8168	0.051
Mange	0	0.00	2	0.91	1.5147	0.218
Total	80	48.49	129	58.90	6.5893	1.315

**Table 2:** Prevalence of ecto-parasites in cattle by sex.

**Prevalence of ecto-parasites in cattle by breed**

Overall prevalence of external parasite infestation in local and cross breed is 57.89% and 33.33% respectively (Table 3). This result revealed that the infestation is more prevalent in local breed than in cross breed. There was statistical association of lice infestation with breed difference ( $p \leq 0.05$ ).

**Prevalence of ecto-parasites in cattle by age**

The overall prevalence of external parasite infestations in animals of different age groups such as calves, young, and adults had 5.8%, 45.67% and 78.20 respectively (Table 4). There were significant differences observed in prevalence of ticks and lice in all age groups ( $p \leq 0.05$ ).

Ectoparasites	Local (n = 330)	%	Cross (n = 54)	%	X <sup>2</sup>	P value
Ticks	121	36.67	14	25.93	2.3484	0.125
Lice	60	18.18	3	5.56	5.3944	0.020
Fleas	9	2.73	0	0.00	1.5081	0.219
Mange	1	0.30	1	1.85	2.1486	0.143
Total	191	57.89	18	33.33	11.3995	0.507

**Table 3:** Prevalence of ecto-parasites in cattle by breed.

Ecto-parasite	Calve n = 69	(%)	Young n = 127	(%)	Adult n = 188	(%)	X <sup>2</sup>	P value
Ticks	1	1.45	29	22.83	105	55.85	78.1660	0.000
Lice	2	2.90	23	18.11	38	20.21	11.4348	0.003
Fleas	1	1.45	5	3.94	3	1.6	2.1093	0.348
Mange	0	0.00	1	0.79	1	0.53	0.5359	0.765
Total	4	5.80	58	45.67	147	78.20	92.246	1.116

**Table 4:** Prevalence of ecto-parasite in cattle by age.

The overall prevalence of external parasites in animals having poor, medium and good condition was 95.68%, 41.00% and 11.90% respectively (Table 5). There were significant association

tick and lice infestation with body condition ( $p \leq 0.05$ ). But there were no association with other ecto-parasites.

Ecto-parasites	Poor n = 139	%	Medium n = 161	%	Good n = 84	%	X <sup>2</sup>	P value
Ticks	80	57.55	48	29.81	7	8.33	59.1145	0.000
Lice	51	36.69	12	7.45	0	0.00	67.5973	0.000
Fleas	1	0.72	5	3.11	3	3.57	2.5637	0.278
Mange	1	0.72	1	0.62	0	0.00	0.5768	0.749
Total	133	95.68	66	41.00	10	11.90	129.5423	1.027

**Table 5:** Prevalence of body condition.



Ecto-parasite group	Frequencies	Prevalence (%)
<i>Amblyomma</i>	61	15.9
<i>Boophilus</i>	46	12.0
<i>Rhipicephalus</i>	28	7.3
<i>Linognathus</i>	27	7.0
<i>Haematopinus</i>	22	5.7
<i>Damalinia</i>	14	3.6
<i>Demodex</i>	2	0.5
<i>Tunga</i>	1	0.3
<i>Pulex</i>	2	0.5
<i>Ctenocephalides</i>	6	1.6

**Table 6:** Frequencies and percentages of ecto-parasites in cattle (n = 384) identified.

### Discussion

The main objective of present study was to determine the prevalence of ecto-parasites affecting large ruminants and to compare the magnitude of ecto-parasites infestation between different risk factors. The effects and problems of ecto-parasites in large ruminants of the study areas are highly found in all agro-ecological zones affecting all age groups. From the total 384 large ruminants examined 54.2% of them were infected by ectoparasites. Multiple infestations were common among the examined positive animals. The relatively high prevalence of ecto-parasites may be associated to nutritional and climatic as a result of repeated drought. In addition different herd of animals at study area come in close contact at available communal watering and grazing sites because of feed scarcity. Due to this condition the prevalence of ecto-parasites infestations was favored.

Tick infestations were the most prevalent parasites recorded with a prevalence of 35.2% in cattle in the study area and lice was the second prevalent. From the three genus of ticks recorded, the percentage was *Amblyomma* (15.9%) followed by *Boophilus* (12.0%) and *Rhipicephalus* (7.3%) in prevalence respectively. In the present study cattle were highly infested by ticks when compared to 14.5% in cattle at Bench Maji Zone southern regional state (48). This variation was resulted due to environmental factors, management and agro-ecological difference. Unfavorable climatic condition, good access to veterinary service, long dry season impaired tick development leads low prevalence. However, the tick prevalence observed in the present study was in agreement with

report of [49] from North West shewa zone of Oromia region. The major ticks identified in the study areas were *Amblyomma*, *Boophilus*, and *Rhipicephalus*. There was statistically significant difference ( $p < 0.05$ ) in the prevalence of ticks between different age groups and body condition score categories but was no existed statistical significance ( $p > 0.05$ ) in the prevalence of ticks between different breed and sex groups. It may be the management and farming system of animals.

From the total prevalence of lice recorded was 16.4%. My finding disagrees with the result of [50] who reported a prevalence of 9.5% and also disparities with the finding of [51] with the prevalence of 63.5%. The variations could be due to differences in risk factors of for the prevalence of ectoparasites. Out of the three lice recorded in cattle *Linognathus* (7.0%), *Haematopinus* (5.7%), and *Damalinia* (3.6%) were the major lice parasites identified in the study area. In the present study there was statically significant difference ( $p < 0.05$ ) in the prevalence of cattle lice infestation between different age groups and body condition score categories but no significant difference ( $p > 0.05$ ) in breed and sex groups.

From the total prevalence of mite in large ruminants was 0.52% and demodex was the only mite identified in the area. My study agreed with the result of [50] (0.4%) [52] (0.43%) in Nekemte.

On the contrary prevalence of mites was high 5.5% [51] was reported from Western Ethiopia. The macro and micro environment (high temperature, humidity and sun light) favors the breeding and multiplication of mites [53]. My findings indicates lower in prevalence than the result of [54] (1.63%) in wolaytasodo and report from [29] with the prevalence of 2.93% and also lower than with the report of [55] 9.58%. There was no significant dispersion ( $p > 0.05$ ) in the infestation of animals by mites with regard to sex, breed, age and body condition categories.

The total infestation of fleas in cattle was 2.08% and the major fleas identified in the study areas were *Ctenocephalides* (1.6%), *Pulex* (0.5%) and *Tunga* (0.3%) but no infestation of fleas was observed in cattle in the report of [42] (0%) and [46] (0%). There was no significant variation ( $p > 0.05$ ) in the sex, breed, age and body condition of cattle.

### Conclusion and Recommendation

The current study showed very prevalence of ecto-parasites in cattle of all age, breed, sex and body condition scores in the study

areas. Ecto-parasites were observed to be major problems of large ruminants in all agro-ecologies of the study areas. The presence of these external parasites leads to down grading of skin and decrease the quality of wool and skin, thereby decreasing the supply of skin for leather industry for export as well as for domestic consumption.

The overall finding regarding ecto-parasitism suggests the importance of the diseases in the study area in reducing the production and productivity of large ruminants. Considering the skin and hides as a means source of foreign currency to Ethiopia, the high prevalence of ecto-parasites recorded in cattle of the study districts in west gojjam zone north western of Ethiopia needs much more emphasis of all measurements in order to reduce the dissemination of infestation and enhancing the way of life of small holder farmers since they are dependent on their livestock. There are many types of ectoparasites that infest large ruminants in jabitehinan district in north western Ethiopia and they have a negative impact on productivity, reproduction of animal's. Strict management system and by providing veterinary services reduces the epidemiology and control of ectoparasites. Management systems such as feeding, grazing and different agro ecological zones have a significant role in epidemiology and control of external parasites.

Generally, the listed below should be understood and recommended:

- Integrated control of external parasites needs to be launched.
- Awareness creation has to be done in farmers about economic impact on their animals.
- The animal health services delivery systems should be strengthened in this district to control losses due to diseases.
- Further investigations on economic impacts of ecto-parasites on large ruminants should be conducted
- Coordinated research should be conducted on ecto-parasites and associated skin lesions in large ruminants to generate base line data that can be used to control the ecto-parasitic diseases all over the country.

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