International Journal of Biology Sciences

**ISSN Print:** 2664-9926
**ISSN Online:** 2664-9934
**Impact Factor:** RJIF 5.45
IJBS 2023; 5(1): 06-14
www.biologyjournal.net
Received: 03-10-2022
Accepted: 08-11-2022

**Dessalew Habte**
Department of Veterinary Laboratory Technology, Debre Markos University, Debre Markos, Ethiopia

**Tadesse Tilahun**
Department of Tropical Veterinary Parasitology and Pathology, Addis Ababa University, College of Veterinary Medicine and Agriculture, Bishoftu, Ethiopia

**Corresponding Author:**
**Dessalew Habte**
Department of Veterinary Laboratory Technology, Debre Markos University, Debre Markos, Ethiopia

# Abundances of ectoparasites of sheep in and around Gindeberet district, west Shoa zone, Ethiopia

**Dessalew Habte and Tadesse Tilahun**

**DOI:** https://dx.doi.org/10.33545/26649926.2023.v5.i1a.139

**Abstract**
A cross sectional study was carried out in Gindeberet district in Western Shoa Zone of Oromia regional state from June 2021 to October 2021. Sheep are the most important farm animals in our country, especial dominant livestock, providing skin and wool, and cash income in addition to food subsistence value obtained from livestock production. However, due to the abundances of ectoparasites, there is loss of skin value, income and wool due to poor management problem. The purpose of this study was to identify major ectoparasites of sheep and to determine their prevalence in the study area and to assess the magnitudes of these parasites in relation to sex, age and body condition. Out of 200 sheep examined 133 (66.5%) sheep were infested with the major ectoparasite. The major ectoparasite identified were ticks (31%), followed by lice (15.5%), fleas (12.5%), *Melophagus ovinus* (7%) and Mange mites (0.5%). The overall infestation with ectoparasites, was higher in females (37.5%) than males (29%). The overall prevalence in association with age categories was higher in adult (34%) than in the young (32.5%). The prevalence of major ectoparasite based on the BCS was found to be higher in poor (33.5%) than the medium (21.5%) and the good (11.5%) body condition from the overall occurrence of ectoparasites. The higher prevalence of ticks, lice, fleas, *M. ovinus*, and mange mites were observed in female and males. The highest prevalence of tick infestation (n=62) were observed in the area, among ectoparasite, ticks were the most prevalent parasites (n=62) with the prevalence of 31% in the area, while the prevalence of mange mites was 0.5% (N=1). Based on age classification the prevalence of ticks (17.5%), lice (9%), fleas (7.5%), *Melophagus ovinus* (or sheep ked) (4%), and mange mite (0.5%) were highly prevalent in the adults than young's (13.5%), (6.5%), (5%) and (3%) respectively. From the result of this study, it is possible to conclude that ectoparasite infestation has affected in the production of sheep at the study area.

**Keywords:** Ectoparasites, gindeberet, prevalence, sheep

## 1. Introduction
Ethiopia is believed to have the largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of country, and still promising to rally round the economic development of the country (CSA, 2019). With an estimated population of 7.8 million equines, 1 million camels, 47.5 million cattle, 39.6 million chickens, 26.1 million sheep and 21.7 million goats. Small ruminants plays a significant role in maintaining household stability by providing meat, milk, skin and wool, generate cash income and play traditional social and religious roles (Hiwot *et al*., 2020; Alemayehu and Fletcher, 1995) [17, 2].

Among the small ruminants in Ethiopia, sheep are the dominant livestock, providing up to 63% of cash income and 23% of the food subsistence value obtained from livestock production (Zelalem and Fletcher, 1993) [39]. Regardless the large size of the sheep population in the country and the huge potential there in; the productivity per animal and the contribution of this sub-sector to the national economy is relatively low due to multitude of constraining factors including malnutrition, diseases, improper health care and other management problems.

In the diverse agro-climatic zones of Ethiopia, small ruminants are important source of income for rural communities and are one of the nation's major sources of foreign currency from exports. The country has, however, benefited little from this enormous resource owing to a multitude of problems, disease being the most important Infectious and parasitic diseases are common traits that affect productivity (Haileleul, 2017; Tesfaheywet, 2012) [42, 43].

Parasitic infections pose a serious health threat and limit the productivity of livestock due to the associated morbidity and mortality. Ethiopia is an ideal case for studying livestock diversity in the context of developing regions.

Ethiopia can be considered as a center of livestock diversity, it is a route of sheep migration from Asia in to Africa, has large sheep population (CSA, 2006) [10] and diverse traditional sheep breeds spread across diverse ecology, communities and production systems (Gizaw, 2008) [14]. At the national level, sheep/goat account for about 90% of the live animal/meat and 92% of skin and hide export trade value (Gizaw, 2008) [14]. At the farm level, sheep contribute as much as 22-63% to the net cash income derived from livestock production in the crop-livestock production system and are a main start of the pastoral livelihoods in the lowland pastoral system (Zelalem and Fletcher, 1993) [39].

Globally, sheep are the species with the highest number of recorded breeds, contributing 25% to the total mammalian breeds. Seventy percent of the mammalian breeds for which no risk status data are available are found in the developing world. Lack of such information, including for breeds in Ethiopia, is serious constraint to effective prioritization and planning of breed conservation measures including sustainable breeding strategies (Lyle, 1999) [22].

Production of sheep for milk, wool, hair skin, and manure is an attractive agricultural enterprise for Ethiopian farmers because of relatively low cost of breeding stock, the high reproductive rate of sheep, input and maintenance cost to live in various conditions form desert to humid rain forest. In Ethiopia, sheep are the dominant livestock providing up to 63% of cash income and 23% of food substance value obtained from livestock production.

Despite the large size of the sheep population, the productivity per animal and the contribution of this sub-sector to the nation economy is relatively low. Internal and external parasitic infection and management problems are known to be the main factors that affect productivity (Gizaw, 2008) [34]. Ectoparasites feed on the outside of their host. They affect sheep and can cause severe irritation and hide damage. They are not associated with heavy mortalities in small ruminants but they are important causes of thriftiness and loss of production in affected animals. The common ectoparasites of veterinary importance in sub-Saharan Africa are lice, ticks, mange mites, sheep keds and fleas (Kusiluka, and Kambarage, 1996) [21].

External parasites limit production in sheep in many ways the major ones are: attachment to the host causes irritation of the skin with subsequent ulceration and secondary infections, feeding in body tissue such as blood, skin, and hair, causes discomfort, weight loss and diseases transmission. In addition to this they cause huge economic losses through skin damage rendering it unsuitable for the leather industry (Lyle, 1999) [22]. Ethiopia used to get the second largest foreign currency earnings from the export of skins and hides. This has been deteriorating due to the decrease in skin quality. Thirty years ago tanneries in Ethiopia used to produce 70% of processed skins with grades 1-3. About 10-20% of the skins were graded as poor quality.

Currently, only 10-15% is in the good category while the rest are downgraded or rejected due to the increase in external parasite infestations (Hamto, 2010) [15]. This study aims to fill such gap and hence been carried out in sheep in and around West Shoa Zone Gindeberet Woreda. Therefore the objectives of this study were: to identify major eco parasites of sheep and to determine their prevalence in the study area and to assess the magnitudes of these parasites in relation to sex, age and body condition.

## 2. Literature review

### 2.1 Ectoparasites Host Relationship

Ectoparasites are organisms, which inhabit the skin or outgrowth of the skin of the host for various periods (Hopla *et al*., 1994) [18]. The presence of external parasites on the host is termed as infestation. The association between arthropod ectoparasite and vertebrate hosts may take on variety of forms. In some cases the parasite may be totally dependent on the host, alternatively, the parasite may feed, or live only occasionally on the host, alternatively, the parasite may feed, or live only occasionally on the host, without being dependent on it (Wall and Shearer, 1997) [34].

The host provides a number of important resources for the parasite, most vitally the host supplies a source of food, which may be blood, lymph, tear or sweat or the debris of the skin, hair or feather. The host's body also provides the environment on which ectoparasites live, generating warmth, moisture and within the skin or hair' a degree of protection from the external environment. The host may also provide transportation from place to place for the parasite, a site at which to mate and, in many cases, the means of transmission from host to host (Wall and Shearer, 1997) [34].

Despite a benefit of a close association with the host, there is a considerable variation in the amount of time spend on the host by various types of ectoparasites. Some ectoparasites such as many species of lice live in continuous association with their host throughout their life cycle and are therefore, highly dependent on the host. The majority of ectoparasites, however, has only intermittent contact with their hosts, and is free- living for the major portion of their life cycles. In some cases, ectoparasites, such as many species of mite, are highly host specific; only one host species is exploited and, in some instances, the parasite can exist only on one defined area of the host. Other species are able to exploit a wider range of hosts (Wall and Shearer, 1997) [34].

### 2.2 Major Ectoparasites of sheep

Wide range of skin parasites can affect sheep, with resultant loss or damage to fleece and economic loss associated with impaired production. Some parasites are important in their own right and some are more important as vectors of other infections. Ecto- parasites that can potentially infest skin of sheep include lice, mites, sheep ked, ticks and blowfly larva (FAO, 2001) [12].

The general clinical signs, which are irritation, fleece loss and dermatitis, are common to many infestations and laboratory examinations may be required to establish an accurate diagnosis. Some non-parasitic diseases, such as Dermatophilosis or Scrapie have behavioral signs and skin lesions which resemble parasitic infestation. Fleece loss, especially during winter months, has a severe effect on affected sheep and their resistance to cold stress (Appleyard and Bailie, 1984) [4].

#### 2.2.1 Lice

Lice are obligates of the class insect, the species are host – specific. Two suborders of lice are recognized; Mallophaga

and Anoplura. The Mallophaga are biting lice which have mouth parts adapted specially for chewing the epithelial debris of the skin. The Anoplura are sucking lice that have pointed heads and mouthparts. These lice are adapted for sucking tissue fluids and blood from the host (Radostits *et al*., 1994., Jubb *et al*., 1993) [26, 19]. The Anoplura are also vectors of Rickettsia, (Typhus) and Borrelia (Relapsing fever) in human beings (Cox, 1986) [8].

There are approximately 540 valid species of sucking lice recognized, all of which are obligate haematophagous ectoparasite of mammals. By virtue of blood feeding, sucking lice are generally more at transmitting pathogens to animals than are chewing lice. Different species of chewing lice parasitize both mammals and birds but sucking lice parasitize only mammals (Hopla *et al*., 1994) [18]. The general clinical signs, which are irritation, fleece loss and dermatitis, are common to many infestations and laboratory examinations may be required to establish an accurate diagnosis. Some non-parasitic diseases, such as Dermatophilosis or Scrapie have behavioral signs and skin lesions which resemble parasitic infestation. Fleece loss, especially during winter months, has a severe effect on affected sheep and their resistance to cold stress (Appleyard and Bailie, 1984) [4].

Lice usually are unable to survive for more than 1-2 days off their host and tend to remain with a single host animal throughout their lives. Most species of louse are highly host specific but there are reports of naturally occurring transmission of the goat louse *Damalinia caprea* to sheep and experimental transmission of *Damalina ovis* to goats (Jubb *et al*., 1993) [19]. Many species specialize in infesting only one part of their host body (Wall and Shearer, 1997) [34] and transfer to new hosts is by body contact, particularly under condition of close confinement (Sewell and Brockes by, 1990; Peter, 1995) [48, 25]. To allow them survive as permanent ecto- parasites, lice show a number of adaptations which enable them to maintain a life of intimate contact with their hosts.

### 2.2.2 Life cycle of lice

Lice of the two span of about a month the female lays 200-300 operculate eggs (‘nits’). These are whitish and are glued to the hair where they may be seen with the naked eye. There is no true metamorphosis and from the egg hatches a nymph, similar to, though much smaller than, the adult. After three mounts, the fully grown adult is present. The whole cycle from egg to adult is present. The whole cycle from egg to adult takes two to three weeks (Radostits *et al*., 1994) [26].

### 2.2.3 Pediculosis in sheep

The suckling lice in sheep are essentially parasites of the haired regions of the body, invading the wooly areas only when the population is expanding rapidly. They are not very active and have a gregarious habit, feeding in swarms. The biting louse of sheep is active and usually found in wooly areas (Urquhart *et al*., 1996) [32]. Though *Linognatus spp*. can cause anemia, it is Damalina usually considered to by the more pathogenic. Reduction in the value of the wool clip is economically the most important consequence of ovine pediculosis (Georgi, 1985) [13].

There are a number of morphologically similar host specific species, the species that commonly affect *Damalina ovis* on sheep; *Damalina caprea, Damalinia limbata and Damalina crassiceps* on goats. The sheep chewing lice, *Damalina ovis*, is one of the most common lice found on sheep, is *D. ovis* has typical life cycle. The female deposits about two eggs, attached to the wool or hair next to the skin by a viscid substance, every three days. The egg hatch in 9-10 days, and the nymph matures in about 21 days (Bay and Harris, 1988) [5]. Infestations with *Damalina ovis* occur over all areas of the body but the upper sides of the animal are favored. This species move rapidly over the wool fiber but is usually found near the skin (Bay and Harris, 1988) [5]. Being highly active, *Damalina ovis* is usually considered to be most pathogenic in sheep and it can cause great irritation so that the sheep are restless and have their grazing interrupted. Exuded serum from the bite wounds cause wool matting. Rubbing leads to wool loss. Wound may attract blowflies (Wall and Shearer, 1997) [34].

Like sheep keds, *D.ovis* is also associated with the development of cockle (Health *et al*., 1996) [16]. Out of more than 50 species of *Linognathus* described, the species that parasitize sheep includes; the face louse *Linognathus ovilus, Linognathus africanus* and the foot louse *Linognathus pedalis* (Wall and Shearer, 2001) [35]. Adult female lays a single egg per day. Eggs hatch in 10-15 days; giving rise to nymph which requires about 2 weeks to pass through three nymphal stages. The egg to adult life cycle requires about 20-40 days. The face louse, *L. ovillus*, usually occurs in colonies on the ear and face of sheep. The preferred sites for *L. pedalis* are the feet, legs and scrotum. At high densities however, both species may spread over the entire body. *L. pedalis* can survive for several days off the host. So the infestation may be picked up of contaminated pasture (Wall and Shearer, 1997) [34]. The damage causes is due to irritation which interferes with feeding causing decreased weight gain, scratching result in wool loss, cuts and bruises. Excretion of the lice soils the wool (Bay and Harris, 1988) [5].

### 2.2.4 Epidemiology of Pediculosis

Lice cannot live away from their hosts for more than a few days. Consequently spread of infestation occurs mainly by direct contact among hosts and generally close bodily contact is necessary for the transfer of louse infestation (Urquhart *et al.* 1996; Jubb, *et al*., 1993) [32, 19].

Pediculosis shows a seasonal periodicity with very low numbers in the summer when conditions are hot and becoming worse in winter. This is probably because the lice, which are sensitive to heat and low humidity cannot survive in the body fleece where temperature could be very high (Radostits *et al*., 1994; Jubb *et al*., 1993) [26, 19].

### 2.2.5 Pathogenesis of Pediculosis

Though *Linognatus* spp. Can cause anemia, it is Damalina which is considered to be the more pathogenic. Being very active it can cause great irritation (Urquhart, *et al*., 1996) [32]. All species cause irritation of the skin and stimulate scratching, rubbing and licking leading to restlessness, damage to fleece and skins and loss of milk production (Souls by, 1982; Radostits *et al*., 1994) [30, 26].

### 2.2.6 Melophagus ovinus

Commonly called the sheep ‘ked’, *M. ovinus* is a hairy, wingless insect approximately 5-7 mm long with a short head and broad, flattened, brownish thorax and abdomen. It has strong eggs provided with claws and is a permanent

ecto- parasite (Urquhart, *et al*., 1996) [32]. Keds spread by contact and long – wooled breeds appear to be particularly susceptible. The irritation caused by these parasites also results in animals biting and rubbing with resultant damage to the fleece (Charles, 1991) [7].

**2.2.7 Life cycle of Melophagus**

Adults live for several months and the larvae produced by the females adhere to the wool. These are immobile and pupate immediately, the 3-4mm long brown pupae being easily visible on the fleece. Adult keds emerge in approximately three weeks in summer, but this period may be extended considerably during winter. Ked population build up slowly since only one larva is produced by each female every 10-12 days, up to a total of 15.

Adult and pupae can only live for short periods of their hosts. *M. ovinus* is the vector of the non-pathogenic *Trypanosoma melophagium.* Heavy infestations of keds are most commonly seen in autumn and winter, which might lead to loss of condition and anemia. Keds spread by contact and long-wooled breeds appear to be particularly susceptible. The irritation caused by these parasites also results in animals biting and rubbing with resultant damage to the fleece (Urquhart, *et al*., 1996) [32].

**2.2.8 Mites**

Mites are tiny arthropods, usually less than 1 mm in size, and can be difficult to see and identify without the aid of a microscope or at least a hand lens. There are more than 200 families of mites and many thousands of species. Most mites are free living and feed on plant juices or prey up on other arthropods. Some mites have evolved to become important ectoparasite pet of animals. Some species of mites have even become ectoparasites, pet of animals. Some species of mites have even become ectoparasites, invading the ears, bronchi and lungs, nose and other tissues of animals. More than 50 species of mites live on or in the bodies of domestic animals. In general, mites can affect the health of animals in four ways: they damage tissues and cause dermatitis, cause blood or body fluid loss, cause allergic reactions and create conditions for secondary bacterial infection (Lyle, 1999) [22].

Scabies, a chronic contagious dermatitis of sheep and other domestic animals, is characterized by encrustation, denudation and itching of the skin and is caused by five species of mites. Although most species of domestic animals are susceptible to scabies, a high degree of host specificity prevents transfer of parasites transfer between host species. This fact validates the separate control and eradication programs for scabies of sheep and scabies of cattle (Lyle, 1999) [22].

The parasitic mites are small, most being less than 0.5mm long, though a few blood- sucking species may attain several millimeters when fully engorged. With few exceptions they are in prolonged contact with the skin of the host, causing various forms of the condition generally known as manage. Although, like the ticks, mites are obligate parasites, they differ from them in important respect that most species spend the entire life cycles, from egg to adult, on the host so that transmission is mainly by contact. Unlike the ticks, once infection is established, pathogenic populations can build up on an animal without further acquisitions (Lyle, 1999) [22].

**2.2.9 Life Cycle of Mites**

The generalized life cycle of mites can be described as follows. Mites' female lays eggs. The eggs hatch and six-legged larvae emerge. These larvae feed and molt to the eight legged nymph stage. Later, after feeding the nymphs molt and become adult male or female mites. This entire life cycle can take as little as eight days to as long as four weeks, depending on the species of mite, and temperature and humidity (Yakhchali and Robert, 1999) [38].

**2.2.10 Epidemiology of Mites**

Clinically affected and carrier animals are source of infection. Transmission occurs by direct contact and contaminated fomites can be source of infection. Overcrowding of animals in houses, markets, dips and communal grazing land facilitates rapid spread of the parasites. Kids and lambs are more severely affected than adult animals. Moist condition and undercurrent infections increase the susceptibility of animals to manage mites (Kusiluka and Kambarage, 1996) [21]. The major species that cause manage in sheep belongs to the four genera of mite, namely Sarcoptes, Psoroptes, Chorioptes and Demodex from which Sarcoptes and Demodex are burrowing while Psoroptes and Chorioptes are non-burrowing in their nature (Charles, 1991) [7].

**2.2.11 Ticks**

Ticks are obligate, blood feeding ectoparasites of vertebrates, particularly mammals and birds and the most important group of ectoparasites, primarily because they feed on blood and tissue fluids in order to develop and because of the wide range of pathogenic agents that they transmit. In addition, they cause local irritation at the site of feeding, blood loss from severe infestations, wounds as sites for secondary infection, and tick paralysis (Wall and Shearer, 2001) [35].

Ticks are divided into two families: Argasidae (soft bodied ticks), a relatively small group comprising 170 species, and Ixodidae (hard ticks); a larger group comprising over 650 species. Hard ticks are more common ectoparasites of mammals, in part because of their widespread distribution and prolonged association with the host while blood-feeding.

Ticks are primarily parasites of wild animals and only about 10% of species feed on domestic animals, primarily sheep and cattle (Wall and Shearer, 2001) [35]. Ixodid ticks are one of the most economically important ectoparasite of livestock in tropical and sub-tropical part of the world. Because of the direct and indirect effect on their host, ticks are considered to be not only a significant threat to successful livestock production, but also serious interfere with economy of the country (Zenebe, 2005) [41].

More than 60 species of ticks infesting both domestic and wild domestic animals have been recorded in Ethiopia (Feseha, 1983) [44]. Among these about 37 species and sub-species are very wide spread and important parasites of livestock (Dalgliesh *et al*., 1990) [45]. In Ethiopia, tick and tick borne diseases cause considerable losses to the livestock economy, ranking third among the prevalent parasitic diseases, after trypanosomes and endo-parasitism (Pegram *et al*., 1981; Zeleke and Bekele, 2004) [24, 40].

Ticks undergo four life stages: egg, larva (3 pairs of legs), nymph (4 pairs of legs and no genital pore), and adult (4 pairs of legs and a genital pore). The life cycle of ticks vary

widely. Some species pass their entire life on the host, others pass different stages of the life cycle on successive hosts, and others are parasitic only at the certain stages (William *et al*., 2001) [46].

Hard ticks require three blood meals for development and to complete the life cycle. Each stage blood feeds once, detaches from the host, and molts to the subsequent life stage on the ground. Often the larva, nymph, and adult feed on different hosts (i.e. three host ticks). Some species of hard ticks are one-host ticks (all stages feed on the same individual host). Most of the life cycle of one-host ticks occurs on the host with only gravid females, egg masses, and host-seeking larvae present on the ground. Females and immature hard ticks become greatly distended when blood-fed; females, for instance, often ingest more than 100 times their body weight. Blood meals are used for molting to the next stage or production of eggs. Eggs are laid in a mass of 100–10,000 in 3–30 days (depending on species and temperature); they are deposited on the soil, in a crevice, or beneath leaves. Males generally obtain small blood meals and expand little in size. Hard ticks feed relatively slowly and remain on the host 3–14 days before detaching. After feeding as immature, molting occurs after an interval that varies between species and with temperature (Wall and Shearer, 2001) [35].

**2.2.12 Life cycle of ticks**

In the hard ticks mating takes place on the host, except with Ixodes where may also occur when the ticks are still on the vegetation. Male ticks remain on the host and will attempt to mate with many females whilst they are feeding. They transfer a sac of sperm (= sperm theca) to the females. The females mate only once, before they are ready to engorge fully with blood. When they finally engorge they detach from the host and have enough sperm stored to fertilize all their eggs. Females' hard ticks lay many eggs (2000 to 20000) in a single batch. Female argasid ticks lay repeated small batches of eggs. Eggs of all ticks are laid in the physical environment, never on the host (Walker *et al*., 2003) [33].

**2.2.13 Three- host tick life cycle**

This is the commonest type of life cycle. Larvae develop in the eggs until ready to hatch, usually in several weeks. Larvae feed once on a host, then detach from the host and hide in sites such as soil or vegetation. They moult to nymphs. Nymphs feed once and moult in the same way as larvae. From the nymphal moult either a female or male hatches. The female feeds once and lays one huge batch of eggs. The depleted female then dies. The male may take several small feeds, mate and then die. Ticks that have recently hatched from eggs or from moulting have soft bodies and are inactive for one to two weeks until the external body wall hardens. The life cycle of three- host ticks is slow, from six months to several years (Walker *et al*., 2003) [33].

*One and two- host tick life cycles*: This is a less common type of life cycle but it occurs in the entire *Boophilus* sub-genus of the *Rhipicephalus* genus and in other genera. Eggs are laid on soil. Larvae hatch after several weeks of development and crawl on to vegetation to quest for a host. When they have completed feeding they remain attached to the host and moulting occurs there. The nymphs then feed on the same host and also remain attached. After another moult the adults hatch and then feed on the same host. The adults will change position on the same host for mating. Thus all three feedings of any individual tick occur on the same individual host. The life cycle of one-host life cycle is similar but only the larvae and nymphs feed on the same individual host, and the adults will feed on another host. *Hyalomma detritus detritum* and *Rhipicephalus evertsi evertsi* have two – host life cycles (Walker *et al*., 2003) [33].

## 3. Materials and Methods

### 3.1 Study area

The study was conducted from June 20, 2017 to January 2018 in and around West Shoa Gindeberet Woreda which is located in Oromia Regional Administration at 192km West of Addis Ababa. The town has altitude of about 8°28'-10°65'W and longitude of about 26°42'-33°37'W and an elevation ranging from 1300-4500m.a.s.l. The study area receives a mean annual rain fall of about 1800 mm which comes from long and short rainy seasons. The average minimum and maximum annual temperature ranges between 12.5 and 25.7 °C, respectively. The climatic condition of the area is weyenadega. Agriculture is the livelihood for more than 90% of the population in rural community of the zone. The main agricultural system is mixed crop livestock production and animals are mainly produced in an extensive system. Gindeberet district has livestock population of 35545 bovine, 6300 goat, and 12400 sheep and 12540 horse, 6785donkey and 4378 mule. The livestock production is characterized by extensive production system in which indigenous cattle are kept under traditional management (CSA, 2015).

### 3.2 Study Population

The study animals were sheep kept under traditional extensive management system of indigenous breed with different ages, sex, body conditions found in and around Gindeberet district, Western Shoa zone.

A cross sectional study was employed to assess the ectoparasites of sheep in the area, their prevalence and the magnitude of these parasites in relation to age, sex, and body condition. A total of 200 sheep were selected randomly. The animal sex groups (male, female), age groups (adult and young), and body condition (good, medium and poor) were recorded.

### 3.3 Sampling and Sample Size Determination

The total sample size required for the study was calculated according to formula given by Thursfield (2005) [31]. Therefore, a total sample size of 200 sheep was surveyed. Sampling technique were used to determined based on the expected prevalence (50%) of sheep and the 5% desired absolute precision or level of precision and 95% confidence level value. Accordingly, 384 animals were supposed to be done; however, we were able to manage examining 200 sheep.

### 3.4 Method of data collection\

Questionnaire survey was carried out to estimate the prevalence of the major ectoparasites of sheep in and around West Shoa Zone Gindeberet Woreda. Cross-sectional and retrospective studies were conducted from June 20, 2017 up to October 2017 to determine the prevalence of the major ectoparasites of sheep in Gindeberet Woreda western, Ethiopia i.e. for the year 2010 Ethiopian Calendar). For the

purpose of the prevalence major ectoparasites to identifying by visual observation sheep in Gindeberet Woreda. The total sample size of sheep in observation N= 200 and n=133 were included in the study. The sheep level characteristics incorporated in the questionnaire were ticks, lice, M. ovinus, fleas and mange mites.

### 3.5 data analysis method

All data was entered in to Microsoft Excel 2003 and analyzed with SPSS version 20 for Windows program. For the analysis of different attributable factors and problems, recorded data were entered into spread sheet of Microsoft Excel. The appropriate statistical analysis was used to analyze were the tests used to analyze the data pertaining to the sex, age, and body condition and over all prevalence of ecto-parasites. Significance difference was considered when p- value is less than 0.05.

## 4. Results

### 4.1 Overall prevalence of ectoparasites survey finding and major ectoparasite

Out 200 sheep examined for ectoparasites 133(66.5%) sheep were infested with major ectoparasites (Table1). The major ectoparasite identified were ticks 31%, followed by lice 15.5%, fleas 12.5%, *Melophagus ovinus* 7% and Mange mites 0.5% (Table1).

The commonest sites of ticks' attachment sites were the feet, especially the area just below the fetlock joint, head/ ear, belly and tail, while for lice attachment was the skin of neck, shoulder, flank and rump. For *M. ovinus* infested sheep the sites commonly parasitized were the neck shoulder, rump and belly.

**Table 1:** Overall prevalence of ectoparasites

| Ectoparasites | Number of major ectoparasites positive (N=200) | Prevalence% |
|---|---|---|
| Ticks | 62 | 31 |
| Lice | 31 | 15.5 |
| *Fleas* | 25 | 12.5 |
| *M. Ovinus* | 14 | 7 |
| Mange mites | 1 | 0.5 |
| Total | 133 | 66.5 |

### 4.2 Prevalence of ectoparasites in different age groups

The prevalence of major ectoparasites regarding to the two age groups of study sheep was higher in adult sheep 34%) and in young sheep (32.5%), while lower prevalence both age groups was observed (Table 2). Of these the most prevalent ectoparasites were ticks with prevalence of 13.5% in young (lamb) and (17.5%) in adult followed by lice with prevalence of (6.5%) in young and 9% in adults. The least prevalent ectoparasite was mange mites with prevalence of (0.5%) in adult but no prevalence in young (Table 2).

**Table 1:** Major ecto-parasites by ages of different groups

| Major ectoparasites | Young (n=80) | | | Adults (n=120) |
|---|---|---|---|---|
| | frequency | Prevalence | Frequency | prevalence |
| Ticks | **27** | **13.5** | **35** | **17.5** |
| Lice | 13 | 6.5 | 18 | 9 |
| *Fleas* | 10 | 5 | 15 | 7.5 |
| *M. ovinus* | 6 | 3 | 8 | 4 |
| Mange mites | - | - | 1 | 0.5 |
| Total Ecto parasite | 63 | 32.5 | 70 | 34 |

### 4.3 Prevalence of Ectoparasites by Sex Groups

The overall prevalence of ectoparasites of sheep based on sex was 29% in male and 37.5% in females respectively. Of these the most prevalent ectoparasite was tick with prevalence of 19% in females and 12% in males. The second most prevalent ectoparasite was lice7.5% in females while in males 8%. The least prevalent ectoparasite was mange mites with prevalence of 0.5% in male and without observed prevalence in female (Table 3).

**Table 3:** Prevalence of major ectoparasites by sex groups

| Major ectoparasites | Male (N =90) | | Female (N= 110) | |
|---|---|---|---|---|
| | Frequency | prevalence | Frequency | prevalence |
| Ticks | 24 | 12 | 38 | 19 |
| *Lice* | 15 | 7.5 | 16 | 8 |
| Fleas | 11 | 5.5 | 14 | 7 |
| M.ovis | 8 | 4 | 6 | 3 |
| Manage mites | - | - | 1 | 0.5 |
| Overall ectoparasites | 58 | 29 | 75 | 37.5 |

### 4.4 Prevalence of Ecto-parasites by Body Condition

Based on body condition score of the study animals the overall prevalence of sheep ectoparasites was 11.5% in good, 21.5% in medium and 33.5% in those with poor body condition. Of these the most prevalent ectoparasite was ticks with prevalence of 5% in good body conditioned, 11% in medium body conditioned and 15% in poor body conditioned sheep. The second most prevalent ectoparasites of sheep was lice with 3%, 5%, and 7.5% prevalence in good, medium and poor body conditioned sheep respectively the study animals for the occurrence of ectoparasites in sheep (Table 4).

**Table 4:** Prevalence of major ectoparasites by body Condition

| Major Ectoparasites | | Good | | Medium | | Poor |
|---|---|---|---|---|---|---|
| | Freq | % | Freq | % | Freq | % |
| Tick | 10 | 5 | 22 | 11 | 30 | 15 |
| Lice | 6 | 3 | 10 | 5 | 15 | 7.5 |
| Fleas | 4 | 2 | 7 | 3.5 | 14 | 7 |
| M.ovis | 3 | 1.5 | 4 | 2 | 7 | 3.5 |
| Mange mites | - | - | - | - | 1 | 0.5 |
| Total | 23 | 11.5 | 43 | 21.5 | 67 | 33.5 |

**Table 5:** Prevalence of major ectoparasites by peasant association

| Major ectoparasites | Gemada | | Berbabo | | H/gubba | | B/bal'a | |
|---|---|---|---|---|---|---|---|---|
| | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| Tick | 16 | **8** | **12** | **6** | **25** | **12.5** | **9** | **4.5** |
| *Lice* | 10 | 5 | 8 | 4 | 7 | 3.5 | 6 | 3 |
| Fleas | 5 | 2.5 | 4 | 2 | 6 | 3 | 10 | 5 |
| M.ovis | 2 | 1 | 5 | 2.5 | 4 | 2 | 3 | 1.5 |
| Mange mites | - | | - | | 1 | 0.5 | - | |
| Total | 33 | 16.5 | 29 | 14.5 | 43 | 21.5 | 28 | 14 |

## 5. Discussion

The high prevalence of ectoparasites was recorded in this study (66.5%), which is suggestive of the importance of these health problems in sheep population of the study area, poor management and low level of awareness of sheep owners on the effect of ectoparasites are believed to have contributed to widespread occurrence of the parasites. Tick infestations were the most prevalent ectoparasites recorded with a prevalence of 31% from the 62 sheep positive for tick.

Ticks were observed significantly affecting poor body condition (15%) sheep more than medium (11%) and good (5%) body condition sheep. Of these was observed among body condition of the study animals for the occurrence of ectoparasites in sheep (Table 4). This might have resulted from the nature of the ticks, which can infect different types of animals of all age and sex groups. When compared to observations by Sertse, (2004) [27] (3.8%) in Amhara region and Ali (2009) (6.6%) in eastern Ethiopia the prevalence of ticks in the study area was higher but when compared with observations by Yakob *et al*., (2008) [37] in southern Ethiopia (31.78%) and Abunna *et al*., (2000) [1] in Mieso (89.7%) it shows decreased figures. Differences in the environmental conditions (study season and design) could have contributed for this variation. Indeed, low tick prevalence may be related to unfavorable climatic conditions (intermittent and weak rainfall in the Jimma area during the study period coupled to relative moderate temperatures).

The overall lice prevalence obtained in this study is lower than findings of Sertse, (2004) [27] 39.8% in Amhara region prevalent ectoparasites recorded with a prevalence of 15.5% from the 31 sheep positive Yacob *et al*., (2008) [37] 25.7% in southern Ethiopia, Sodo, and Wondimu, (2010) [36] 75.5% in Arsi zone. Such differences in prevalence with the above observations may arise from differences in agro climate, management and health care of animals, know-how farmers' about ectoparasites in the study sites and the sensitivity of the diagnostic method used to reveal ectoparasites. Louse infestations may indicate some other underlying problem such as malnutrition and chronic diseases (Wall and Shearer, 1997) [34]. The possible reasons for such low prevalence of lice in the study area includes; medium sanitation, medium feeding and management, and imporper utilization of veterinary services.

Flea infestation important ectoparasite problems encountered, in the study area with an overall prevalence of 12.5% from the 25 sheep positive for flea. The prevalence of fleas in this study was found to be lower than the observations made by Bekele *et al*., (2011) [6] in Wolmera, (32.31%), Yakob *et al*., (2008) [37] and the greater than in Wolayita Sodo (11.21%), Sertse, 2004 [27] in Amhara Region (0.2%) and Ali, 2009 in Eastern Ethiopia (0.4%) compared the result of observation.

*M. ovinus* was one the ectoparasite observed on sheep accounting for (7%) from the 14 sheep positive for M. ovinus overall prevalence. Although infestation with *M. ovinus* does produces any marked changes in health of sheep, their presence leads to irritation and staining of the wool by the feces of the ked. The irritation results in animal biting and rubbing with resultant damage to the fleece and development of a vertical ridging of the skin called 'cockle' (Urquhart *et al*., 1996; Wall and Shearer, 1997) [32, 34].

The prevalence of *M. ovis* in this study was lower than the observations made by Amin Ali, (2009) [3] (11.25%) in eastern Ethiopia, in Amhara region by Sertse, (2004) [27] (12.1%), in Tigray by Kassaye and Kebede (12.5%) in 2010 and in wolmera by Bekele *et al*., (11.67%) in 2010. According to Radostitis *et al*., (1994) [26] in the hot, humid tropics the parasite is restricted to cooler highlands and infestations may be lost when sheep are moved to hot dry areas. Kettle, (1984) [47] suggested as an account for this fact; temperature may play an important role in the dynamics of the keds. In addition to environmental temperature differences, the variation in prevalence of sheep ked might have resulted from differences in the breeds of sheep which might contribute to different to difference in woolliness of coat, since heavily wool led sheep are more suitable for ked colonization.

In the current study the overall prevalence of mange mite was 0.5% from the 1 sheep positive for mange mite overall prevalence. The prevalence was less than observations made in southern Ethiopia (1.99%) by Sheferaw *et al*., (2010) [29], in northern Ethiopia (11.8%) by Demissie *et al*., (1999) [11] and in Tigray (0.95%) by Kassaye and Kebede, (2010) [20]. According to Pangui (1994) [23] high temperature, humidity and sunlight favor mange mite infestation. The higher temperature, humidity and sunlight which prevail in lowland and midland may have accounted for the differences in prevalence.

## 6. Conclusion and Recommendations

Ectoparasites are among the major causes of sheep production constraints and quality deteriorations of exported skin in Ethiopia. The prevalence of ectoparasites in sheep in the present study is high and can potentially result in high economic loses through decreased production and skin damages. Ticks were the most prevalent ectoparasites followed by lice; whereas mange was the least prevalent parasite species. The rate of ectoparasitic infestation is high in adults and poor body conditioned animals as compared to the young age and sheep in good body conditions respectively. Therefore, based on the above conclusion the following recommendations are forwarded:

- The ectoparasitic infestation in the sheep population of the study area should be reduced by using appropriate ectoparasite control methods and improving the management system.

- Strategic prevention and control of ectoparasites should be established through regular and scheduled uses of acaricide sprays and dipping techniques.
- The farming community should be aware about the effects of these parasites and the possible control and prevention methods.
- Further study should be done to have full picture of the distribution and seasonal occurrences of these ectoparasites and the associated economic losses.

## 7. Acknowledgments

Above all, we would like to praise the Almighty God who helped me in every aspect of our life and conditions for our success.

Secondly, our great pleasure goes to express our sincere gratitude and appreciation to the Veterinary Teaching Hospital of Addis Ababa University and Modjo Veterinary Clinic staff members, SPANA, Biomedical, Microbiology, Parasitology, Clinical pathology and VTH multipurpose laboratory workers who are involved directly or indirectly in this research work.

## 8. Statement of the authors

First, we declare that this senior research paper work is in alone and that all sources of materials used for this work have been fully acknowledged. This senior paper work has been submitted in the partial fulfillment of the requirements for a bachelor of veterinary science degree at Wollega University, College of health Science and School of Veterinary Medicine and is deposited at the University/College library to be made available to borrowers under rules of the library. I solemnly declare that this senior paper work is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

Brief quotations from this senior research paper work are allowable without special permission provided that accurate acknowledgement of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the school or the Dean of the College when in his or her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however permission must be obtained from the author.

## 9. References

1. Abunna F, Kasasa D, Shelima F, Megersa F. Survey of tick infestation in small ruminants of Miesso district, West Harergie, Oromia Region, Ethiopia. Trop Animal Health Prod. 2000;41:6-72.
2. Alemayehu Z, Fletcher I. Small ruminant productivity in the central Ethiopian mixed farming system. Institution of Agriculture proceeding. 1995;4:1941-1947.
3. Ali A. Major ectoparasites of sheep and goats in Haromaya Woreda, eastern Ethiopia. DVM Thesis, Jimma University, School of Veterinary Medicine, Jimma Ethiopia; c2009. p. 21-24.
4. Appleyard B, Bailie H. Parasitic skin diseases of sheep. BMJ, London; c1984. p. 5.
5. Bay DE, Harris RL. Introduction to Veterinary Entomology (A Guide to Livestock Insects), Stonefly Publishing, Texas; c1988. p. 111.
6. Bekele J, Tariku M, Abebe R. External parasite Infestations in small ruminants in Wolmera district of Oromia Region, Central Ethiopia. J Anim. Vet. Adv. 2011;10(4):518-523.
7. Charles MH. Diagnostic Veterinary Parasitology. 2nd ed, Elsvier Science, London; c1991. p. 199-221.
8. Cox FE. Modern Parasitology, 2nd ed., Blackwell; c1986. 66
9. CSA. Ethiopian Agricultural Sample Enumeration, Statistical report on Livestock and Farm Implements, Addis Ababa, Ethiopia; c2013.
10. CSA. Ethiopian Agricultural Sample Enumeration, Statistical report on Livestock and Farm Implements, Addis Ababa, Ethiopia; c2006.
11. Demissie A, Siraw B, Teferi K, Tsertse T, Mammo G, Mekonnen D, *et al*. Mange: A Disease of Growing Threat for the production of small ruminants in the Amhara National Regional State. J Anim. Vet. Adv. 1999;18(5):6-49.
12. FAO. Ectoparasites Factsheet. Rome, Pp 1-6. Farming System Processing of the Fourth National Livestock Improvement Conference 13-15 Nov, IAR and Addis Ababa Ethiopia; c2001.
13. Georgi JR. Parasitology for veterinarians 4thed, W.B. Sounders Company; c1985. p. 38-61.
14. Gizaw G. Sheep Resources of Ethiopia: Genetic Diversity and Breeding Strategy; c2008.
15. Hamto D. Estimation of Weight and Age of Sheep and Goats. ESGPIP Technical Bulletin No. 2010;23:8-10.
16. Health AC, Bishop DM, Cole DJWP, feffer AT. The development of cockle, a sheep pelts defect, in relation to Bovicola ovis, the sheep biting louse. Veterinary Parasitology. 1996;67:259-267.
17. Hiwot Desta Wodajo, Biruk Alemu Gemeda, Wole Kinati, Annet Abenakyo Mulem, Anouka van Eerdewijk, Barbara Wieland. Contribution of small ruminants to food security for Ethiopian smallholder farmers, Small Ruminant Research. 2020;184:106064, ISSN 0921-4488, https://doi.org/10.1016/j.smallrumres.2020.106064.
18. Hopla CE, Dureden LA, Keirans JK. Ectoparasites and Classification Rev. Sci. Tech. off. Int. Epiz. 1994;13(4):985-1012.
19. Jubb KY, Kennedy PC, Plamer N. pathology of Domestic animals, 4th ed. Academic press inc, Philadelphia; c1993. p. 342-343.
20. Kassaye E, Kebede E. Epidemiological study on manage mite, lice and sheep keds of small ruminants in Tigray region, northern Ethiopia. Ethio. Vet. J. 2010;14(2):51-65.
21. Kusiluka L, Kambarage D. Diseases of small ruminans A Handbook: Common disease of sheep and goats in sub- Saharan Africa. VETAID, Roslin. Scotland; 1996. p. 102-106.
22. Lyle G. Sheep Scabies. Navajo sheep project. 1999;5(3):43-45
23. Panqui L. mange in domestic animals and methods of control. OIF – Review. 1994;13:1227-1247.
24. Pegram R, Hoogstral H, Wassef Y. 'Ticks (Ixodidae) of Ethiopia: Distribution, ecology and host relationship of tick species affecting livestock', Bulletin of Entomological Research. 1981;71:339-359.

25. Peter G. Parasites and skin diseases. J.A. Allen & Company limited, london. PhD Thesis, Wageningen University, Netherlands; c1995. p. 2.
26. Radostits O, Blood D, Gay C. Veterinary Medicine, Texbook of cattle, sheep, pigs, goats and horses, 8th edition, bailliere Tindall, UK; c1994. p. 1280-1308.
27. Sertse D. Investigation on Ectoparasites of small ruminants in selected sites of Amhara regional state and their impact on the tanning industry. MSc Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debrezeit, Ethiopia; c2004. p. 40-47.
28. Chandran D. Bovine babesiosis: A general review. Int. J. Vet. Sci. Ani. Husb. 2021;6(3):40-4.
29. Sheferaw D, Degefu H, Banteyirgu D. Epidemiological study of small ruminant mange mites in three agro ecological zones of Wolaita, Southern Ethiopia. Ethiopia. Vet. J. 2010;14(1):31-38.
30. Soulsby E. Helminthes, Arthropods and Protozoa of Domestic Animals, 7th edition, Lea and Faebiger, Philadelphia; c1982. p. 375-502.
31. Thrusfield M. Veterinary Epidemiology, 2nd ed. Black well science Ltd; c2005. p.178-198.
32. Urquhart G, Armour J, Duncan J, Dunn A, Jennings FW. Veterinary Parasitology, 2n ed., Black well Science Ltd, UK Pp141-205. Veterinary Journal. 1996;9(1):9-16
33. Walkers A, Bouattour A, Camicas J, Estrada-Pena A, Horak I, Latif A, Pegram R. Ticks of Domestic Animals in Africa: A Guide to Identification of Species. Bioscince Reports. Houten, the Netherlands; c2003 p. 28-30.
34. Wall R, Shearer D. Veterinary Entomology, 1st ed., Chapman and Hall, UK; c1997. p. 439-450.
35. Wall R, Shearer D. Veterinary ectoparasite biology, pathology and control 2nd Ed; c2001.
36. Wondimu H. Major Ectoparasites of small ruminats in Arsi Zone of Oromia Region: Prevalence, species composition and Acaricidal efficacy of medicinal plants against lice of sheep. MSc Thesis, faculty of Veterinary Medicine, Addis Ababa University, Debrezeit, Ethiopia; c2010. p. 37-40.
37. Yacob T, Yalew A, Dinka A. Ectoparasite prevalence in sheep and in goats in and around Wolaita Soddo, Souther Ethiopia. Review Med. Vet. 2008;159(8-9):450-454.
38. Yakhchali M, Robert M. Factors affecting the occurrence of mites and ticks. Veterinarski Archv. 1999;76(5):431-442.
39. Zelalem A, Fletcher I. Small Ruminant Productivity in the Central Ethiopian Mixed; c1993.
40. Zeleke M, Bekele T. Species of ticks on camels and their seasonal dynamics in Eastern Ethiopia. Tropical Animal Health and Production. 2004;36:225-231.
41. Zenebe S. Ethiopia veterinary association (EVA) Addis Ababa, Ethiopia; c2005.
42. Negussie H, Gizaw D, Tessema TS, Nauwynck HJ. Equine herpesvirus-1 myeloencephalopathy, an emerging threat of working equids in ethiopia. Transboundary and Emerging Diseases. 2017 Apr;64(2):389-97.
43. Tesfaheywet Z. Helminthosis of sheep and goats in and around Haramaya, Southeastern Ethiopia. Journal of Veterinary Medicine and Animal Health. 2012 Apr 30;4(3):48-55.
44. Feseha G. Notes on tick species and tick borne diseases of domestic animals in Ethiopia. FVM, AAU, Ethiopia; c1983. p. 1-64.
45. Dalgliesh RJ, Jorgensen WK, De Vos AJ. Australian frozen vaccines for the control of babesiosis and anaplasmosis in cattle-a review. Tropical Animal Health and Production. 1990;22(1):44-52.
46. Srinivas S, Watanabe T, Lin CS, William CM, Tanabe Y, Jessell TM, *et al*. Cre reporter strains produced by targeted insertion of EYFP and ECFP into the ROSA26 locus. BMC developmental biology. 2001 Dec;1(1):1-8.
47. Kettle DS. Medical and veterinary entomology. Croom Helm Ltd; c1984.
48. Sewell M, Brockes D. Hand Book on Animal Disease in the tropics, 4th edition, bailliere Tindall; c1990. p. 2-28.