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A Review on Epidemiology of Mange Mites in Small Ruminants

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Abstract: The objective of this paper is to review on the epidemiology, pathogenesis, diagnosis, control and prevention of mange mites of ruminants and to review the economic impact of ruminants' mange mites. There are approximately 53.99 million cattle, 25.5 million sheep, 24.06 million goats, 1.91 million horses, 6.75 million donkeys, 0.35 million mules, 0.92 million camels, and 50.38 million poultry in the Ethiopia; however the economic gain from these animal is insignificant; when it is compared to their huge number, due to the effect of ectoparasites, like, lice, tick, flea and mange. The ectoparasite mange mites severely affect the body condition of animals, production capacity, and health status of animals and also affect the quality of hide and skin. The common mange mites that affect ruminants are: *Demodex, Sarcoptes, Psoroptes* and *Chorioptes*. They are known to affect the health status of animal and quality of processed skin and hides and are responsible for dawn grading and rejection.Generally mites cause simple allergic reaction to sever epidermal and dermal lesions. Mange mite infestation can be diagnosed by using history, clinical sign and laboratory examination of the skin scraping. Therefore, mange mite infestation can be controlled by isolation of affected animals from healthy, quarantine the suspected animal and treat with topical and systemic drug. All infested premises should be cleaned by using appropriate chemicals. Good husbandry system with supply of good nutrition has great importance in the control of the spread of mange mite.

Key words: Epidemiology · Mange Mite · Ruminant

INTRODUCTION

Agriculture is the predominant ministry of the Ethiopian economy and animal production is an integral part of the country Agricultural system [1]. Ethiopia is home to Africa's largest livestock population, and is the continent's top livestock producer, eighth in the world and exporter [2]. There are approximately 53.99 million cattle, 25.5 million sheep, 24.06 million goats, 1.91 million horses, 6.75 million donkeys, 0.35 million mules, 0.92 million camels, and 50.38 million poultry in the country [3].

Livestock in Ethiopia is an essential component of the overall farming system. Various estimate shows that the livestock contributes 12-16% of the total and 30-35% of agricultural GDP, respectively. The sectore's contribution to the national output is underestimated because the traction power and manure for fertilizer are not valued. It contributes 12-16% of the total export of the live animals hides and skins [4]. The sector also employs about one–third of the country's rural population [5]. Therefore, livestock can serve as a vehicle for improving food security and better livelihood, and contribute significantly to agricultural and rural development [6].

In Ethiopia, the exportation of skin and hide is ranked as the third largest foreign exchange earner next to coffee and oil seed. Yet as many as one quarter to one third of all skin and hides processed are unsuitable for export due to various defects [2]. Ectoparasites are organisms, which inhabit the skin of the host for various periods. 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, without being dependent on it Walland Shearer [7].

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Among ectoparasites, mange mites are most common which parasitize different domestic and wild animals. They spent their lives on the animal body by feeding on blood, lymph, skin debris and inject subcutaneous secretion while puncturing the skin, damaging the skin surface [8]. Small numbers of species of mites are parasites living in the lung, nasal passage and other tissues of mammals and birds. Majority of mites are ectoparasites which are living in different parts of the body of domestic and wild animals [9]. The infectious activity of these ectoparasitic mites, which cause purities accompanied by hair loss or alopecia on the subcutaneous tissue and hair loss with associated skin thickening [10]. The feeding habits depends on fluids which are secreted in the body of the host like edematous, fluid, blood and other body fluid [11]. Most ectoparasites mites which spend their entire life on the host by ingesting and puncturing the skin surface and causing epidermis lesion and reduce skin qualities [12].

Mites have different species which causes cattle mange and they are*; Demodex*spps, *Sarcoptes*spps, *Chorioptes* spps and *Psoroptes*spps [13]. They are located on the neck, back of the tail, inner surface of thigh and root of the tail. Generally they causes intense itching and scratching accompanied by exudates which coagulate to from crust on surface of skin characterized by excessive keratinization and proliferation of connective tissue and leading to huge loss of skin and hide and decrease production capacity of animals and in some case leading to death [8].

According to tannery report, hides and skins account for 12-16% of the total value of exports. The current utilization of hides and skins is estimated to be 48% for cattle hide, 75% goat skin and 97% sheep skin with expected off take rate of 33%, 35% and 7% for sheep, goats and cattle respectively. The share of sheep and goat skin from total value of export is about 85% [14]. The Ethiopian tannery industry has long complained about poor quality processed skin and hides because of the effect of insects, arthropods, and other parasites [6]. On the other hands, hide and skin problem due to external parasites cause 35% of sheep and 56% ofgoats skin rejection [15]. Of these parasites mange mites are responsible for significant loss, accounting, 33% in sheep and 21% in goats. Even though deterioration in quality of skin is evident from all parts of the country Wollo was cited as providing the country's worst skin [14]. According to Amsalu *et al*. [16] report mange in sheep and goat killed about 60% of the affected animals in Amhara region.

Generally mange mite is one of the most important diseases that seriously hinder small ruminant skin and hide quality in Ethiopia and other part of the world. Knowledge of the disease in terms of symptoms observed and prevention methods are important in combating the disease and consequently improve the quality of skin and hide of small ruminants.

The objective of this paper is:

- To review on the epidemiology, pathogenesis, diagnosis, control and prevention of common mange mites in small ruminants
- To review the economic impact of mange mites.

Literature Review

Definition: Mange mites belong to Phylum Arthropoda, Class Arachnida, and Order Acarina. The parasitic mites are small, most being less than 0.5mm long, though a few blood-sucking species may attain several mm when fully engorged. With few exceptions, they are in prolonged contact with the skin of the host, causing the condition, generally known as Mange. Mites are obligate parasites that most species spend their life cycles, from egg to adult, on the host so that transmission is mainly by contact. Mites are classified according to their location on the host as burrowing and non-burrowing mite [17].

Common sites of these mites are skin, scales, feathers or fur [18]. They feed on lymph, skin debris or sebaceous secretion. They ingest by puncturing the skin, scavenge from the skin surface [14]. Mange mites are the major causes of skin diseases and that affect ruminant reproduction in many areas of Ethiopia. The infestations by these mites are called acariasis and can result sever dermatitis, Known as mange [7].

Etiology: There are four main genera of mange mites which cause disease in ruminants: *Demodectic* mange (follicular mange), *Sarcoptic* mange (barn itch), *Psoroptic*mange (body mange, ear mange and the sheep scab) and *Choroptic* mange (tail mange, leg mange and the scrotal mange). *D. bovis, D. ovis,* and *D.caprae*is species affecting cattle, sheep and goat, respectively. In cattle and goat, *Demodectic* mange causes significant damage to the hide and skin rarely death that may result from secondary bacterial infection [19]. *Demodex* species usually live as commensals in the skin, and are highly site specific, occupying hair follicles and sebaceous glands. *Demodex* mites present much deeper in the dermis than *Sarcoptes*, Therefore they are less access able surface acting acaricides [20].

Sarcoptes mites (burrowing mites) are economically the most important cause of mange in ruminants. *Sorcoptic*mange is a highly pruritic condition caused by irritation from tunneling of female mites in to the epidermis whereby they deposit their eggs [21]. The causative agent *Sarcoptes scabies* is usually considered to have number of varieties, each generally specific to particular host species. Morphological, immunological and molecular research confirms the close relationship among varieties, but don't explain biological difference particularly with respect to host specificity [2, 19].

Psoroptes mange*:-P. ovis, P. bovis*, and *P .equi* are the scab mites of large animals; which reside. Some feed on skin scales while others suck tissue fluid [7] on the sheep, cattle, and horse, respectively. This mite is host specific and resides within the thick hair, long wool area of the animal [22]. *Psoroptes* mites don't burrow but, live on the surface of the skin under the scabs and scales that they induce [21]. *Psoroptesovis*mite that causes the body mange form of *Psoroptes* mange in sheep and [22]. They don't burrow in to the skin and feed on superficially

*Chorioptes*mange the primary effect on cattle is aesthetic; and causes production effects in dairy animal [19]. These mite feed superficially and have mounth part which do not pierce the skin but, are adapted slowly for chewing, feeding on shed scales and other skin debris [17]. Although specific name have been given to*chorioptes* found in cattle, sheep, goat and equine, they are now all considered to belong to the single specie *Chorioptesbovis* [23]. *Chorioptc* mites are considered as permanent skin inhabitant [24].

Morphologically: *Demodex* species are tiny, worm like cigarette shaped mites with short, stubby legs which live in the hair follicle and sebaceous gland of host [13]. They have elongated tapering body up to 0.1-0.4 mm in the length with short pairs of stumpy legs ending in small blunt claws in the legs. The legs are located in front of the body [20].

Sarcoptes is round in outline and up to 0.4 mm in diameter, with short legs scarcely project beyond the body margin. Its most important recognition characters are the numerous transverse ridge and triangular scales on dorsum, afeature possessed by no other manage mites of domestic mammals [17].

Psoroptidae are oval mites; the legs are long. Male have two posterior lobes with setae and two copulatory suckers. The species belonging to this genus are relatively large or 750 um sized adult female and are visible with necked eye [12]. The legs of adult female are approximately the same length where as in male the fourth pair is extremely short [7].

*Chorioptes*spps the mouth parts are distinctly round, the abdominal tubercles of male are notice ably truncate and the pedicles are short unjoined with the cup shaped sucker [19]. Adult female *C. bovis* are about 30 u.m in length and considerably smaller than *psoroptesovis* [20].

Life Cycle: *Sarcoptes*fertilized female creates wounding burrow or tunnel in the upper layer of epidermis, feeding on liquid oozing from the damage tissue. The eggs are laid in this burrow, hatch in 3 to 5 days and six legged larva crawl on to the skin [17]. Two to three days later larval molted to proto nymph which then moult to become a tritonymph and again after few days to adult. Both sexes of adults then start to feed and burrow on the skin and create small pockets in the skin for feeding and reproduction [21]. The normal exfoliation the skin eventually exposes the tunnel exposing the egg as well. The life cycle is completed in 10-13 days [19].

*Demodex*female lays 20 to 24 eggs in the hair follicle, which gives rise to hexapod larvae; each short leg ends in pair of three pronged claws. Usually a second hexapod larvae stage follows, in which the legs end in a pair of three pronged octopod protonymph, tritonymph and adult stage the follows [7]. Immature stages and these migrate more deeply in to dermis. The life cycle is completed in 18-24 days [20].

Chorioptes (Chewing mite). The life cycle is similar to*Psoroptes* except that this mite feed only on the skin surface [17]. Egg, hexapod larvae is followed by octopodoprotonymph, tritonymph and adult (wall and shearer, 2001). The life cycle is completed entirely on the host [25]. Eggs are deposited singly at the rate of one egg for day and are attached with sticky substance to the host skin. Adult female usually lives for two weeks or more. Producing about, 14- 20 eggs during this time [26].

Psoroptes: The female produce relatively large eggs from which a small six legged larvae hatched. The larvae molt to become an eight lagged nymph. There are two nymphal stages called protonymph and deutonymph. The final mouls produces adult stage [12]. Adult male attach to female tritonymph and occasionally protonymphs and remain attach until the female molt for the final time at which point insemination occur. The whole life cycle is completed in 10-11 days [7].

Epidemiology: The distribution of mite on the animal body varies based on season, temperature, sun light and humidity. The infection has been quiescent in locations such as axilla, intra orbital fossa and internal surface of pinna and auditory canal. During summer, spring and early autumn they spread rapidly and distributed over the rest of the body. In the cooler month the fleece and skin become thickened and resist mite infestation [17].

Sarcoptes: Hairless or thin skinned areas of the body are usually affected and show alopecia, thicking of the skin and crust formation [21]. Animals in poor condition appear to be most susceptible, but in conditions especially overcrowding in which *sarcoptic* mange occur often going with poor feeding and poor husbandry. The disease is most active in cold, wet weather and spread slowly during summer season [19]. *Sarcoptic* mange is highly contagious and spread is usually by close physical contact between infested and healthy animal or contamination from the environment as a result single case are rarely seen in groups of animals kept together [7].

Demodex: Geographical distribution is worldwide [20]. Transmission of *demodex* often occur by contact, probably early in the life. Calves can acquire mites from infected dam in half day [19]. Transmission of *D. caprae* to new born goat typically occurs with the first day following birth. Other possible means are parentral licking and intimate contact of mammals during copulation [26].

Chorioptes: It is more prevalent in winter. Different species the genus live on the skin of several species of domestic animals, causing *chorioptic*mange [10]. Their predilection sites are on the lower part of the Leg, but they may spread to flank and shoulder area. This mite doesn't spread rapidly or extensively [22].

Psoroptes Mange: The optimum conditions for development include high humidity and cool temperature. The disease is most active in autumn and winter months. This is the result of not only increase activity of the mite but also the more rapid development in housed animals, and the tendencies for disease to be most severe in animals in poor condition [19]. It is worldwide distribution in sheep [12]. Transmission of *Psoroptes* occurs directly through contact between animals [25].

Geographical distribution of different mites responsible for mange in different livestock is fairly variable. Some spices have worldwide distribution; this is the case for *Psoroptic* and *Sarcoptic* mange in sheep and pig respectively. However, other species have more limited distribution, which depend on climatic condition and relative susceptibility of different breeds [12].

The transmission of mange from host to host is primarily by physical contact and all the three stages; infect larvae, nymph and adult are capable of migrating and inert materials such as bedding and grooming tools can act as a carrier. Adult mite do not usually survive more than two weeks away from the host, but, optimum conditions like high temperature, humidity and sun light are favorable, so that they may remain alive for up to three weeks [19].

Risk Factors: Management system: The prevalence of mange mitesindifferent management systems was 10.344%, 2.988% and 0.46% in extensive, semi-intensive and intensive systems respectively.Among the three management systems relatively higher prevalence is observed on cattle from semi intensive (82.14%) while the lowest from intensive (30%) management system [27].

Herd Size: There is difference among difference herd size, herd which have 10-30 were more commonly infested with mange (32.4% [28].

Breed: The prevalence rate of mange in different breed of cattle 14.1375% and 13.38%in local and cross breed respectively. This is due to local breeds are prone to poor managements in rural area than cross breed [28].

Sex: It is more prevalent in females than male due to different factors like pregnancy and lactation reduces immunity [29].

Age: The prevalence is higher in young animals than adult [28].

Body condition: Poor body condition animals have significantly higher mange infestation (6.4%) than those that have moderate (1.8%) body condition [30].

Host Range: There are large of number species of mange mites and among which *Demodex*, *Sarcoptes, Psoroptes*and *Chorioptes* can affect all farm animals namely cattle, sheep, goats, pigs, horses and camel; including cat, dog and human. *Sarcoptes s*pecie*s* in each animal species one or more infections are described depending on the specificity of the causal agent [12].

Epidemiology O F Mange Mites in Ethiopia: Mange mites are common in Ethiopia and therefore are reported from many geographic areas. Based on the reports mange mites are most prevalent in three national regional states of Ethiopia namely, the Tigray, Amhara and Oromia regional states [28]. The overall prevalence of mange mite of small ruminants in different part of Ethiopia is described in Table 3.

*Sarcopticscabiei*var. *caprae*and *Sarcopticscabiei*var. *ovis*have a wide geographic distribution in many goat and sheep rearing in arid and semi-arid areas of Ethiopia, and it is more commonly seen in goats than sheep. In Ethiopia, they are widely distributed in lowland mainly [30], but also found in low and midlands as well as central midland part of the country. According to [30] in different agro climate there was high prevalence of mange mites in the Lowlands compared to the highland and midlands as described in Table 2.

The highest prevalence of sarcoptic mites observed in sheep and goats were 30.32% in Tigray [32] and 57% in southern Ethiopia [32]. Psoroptic mange (sheep Scab), caused by *Psoroptesovis*, which is common in Ethiopia, is reported from different regions. Mites of the genus *Psoroptes* cause psoroptic mange in sheep and goats. In sheep, its prevalence is found greater than in goats. Therefore, it causes greater damage in sheep than in goats have been reported that *Psoroptes*has a prevalence of 42.9 and 32.87% from Cheffe State farm (Wollo). Recent studies indicate that in Ethiopia, Psoroptic mange is most common among small ruminants in lowland areas of north and South [33]. *Demodectic* mange has been reported in sheep (*Demodexovis*) and goats (*Demodexcaprae*). It is one of the major skin diseases of sheep and goats. *Demodectic* mange is distributed in different agro-ecological zones in Ethiopia [30]. In the central lowlands of Oromia[15] and in the midland and highlands of Amhara region [34], the highest prevalence was 6.8% in goats and around Mekele, followed by 2.83% [32].

Economic Significance of Mange Mite Infestation: The economic significance of mite infestation is great in developing countries, like Ethiopia because of traditional husbandry system, poor housing system, poor nutritional supply and insufficient veterinary services. Economic loss of mite infestation was recorded on skin and leather production, reduction in growth rate of animal, and loss of body conditions. These losses are due to skin inflammation, puritis and disturbing of animal from grazing [10]. Mites' damage leads to skin inflammation and is often accompanied by hair and wool loss [13].

Table 1: Overall prevalence of mange mites in different agro climate.

Agro climate	Prevalence (%)
Lowland	2.9%
Midland	1.4%
Highland	1.2%

(*source:)[30]*

Table 2: The overall prevalence of mange in different part of Ethiopia

		Prevalence (%)	
Location		Sheep	Goats
1.	Hararghe	7.85	11.8
2.	Bale Robe	67.7	ND
3.	Addis Ababa	32.7	ND
4	DirieDawa	0.73	6.8
5	Mekele	1.5	ND
6	Wolayta	0	6.87
7	Centeral Ethiopia	2.69	3.96
8	Sidamo zone	2.07	4.27
9	Selected Zone of Tigray	30.2	31.8

(Source: [15]) ND=No data

Demodex is acommon mange, especially in goats. This mange enters the hair follicles and sebaceous glands producing a chronic inflammation with proliferation and thickening of the epidermis and loss of hair. It can be a major cause of downgrading skin quality at the tannery. *Demodexcaprae* causes decrease in milk production and it has chief economic effect on caprine. *Demodexovis* in sheep has little economic importance [20]. During the early tannery process the cheesy mass is washed out thus producing pitted and scar grain surface that reduce the value the leather [36]. The economic importance of *sarcoptic*mange in food producing animal is due to retarded growth rate and decreased rate of feed conversion [14]. Mites multiply profitably under the skin and damage the hide [35].

*Chorioptic*mange result in matting of the hair and result in rubbing and scratching with damage to the hide [19, 20]. Sheep scab caused by *psoroptic* mange is particularly devastating in sheep; especially those maintained for production of high quality wool [13]. Ethiopia used to get the second largest foreign currency earnings from the export of skins and hides. This has been deteriorating due to 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 [8].

Table 3: Mite species found in livestock; zoonotic importance and sensitivity to commonly applied systemic and topically

Genus	Transmission to man	Sensitivity to topically applied drug	Sensitivity to systemic drugs Inject able	Pour on
Sarcoptes	+	+++	+++	+/+++
Psoroptes	-	+++	+++	+/+++
Chorioptes	-	++/+++	+	+++
Demodex	-	?	?	?

SOURCE: [12]

Key: +/++, variable efficacy,? Not known

Fig. 1: Sheep scab infestations are rampant causing serious welfare problem (source[40]).

According to tannery report, hide and skin problem due to external parasite causes 35% of sheep and 56% of goats'skinrejection [15]. Of these external parasites mange mites are responsible for loss in 33% of sheep and 21% of goats. Even though deterioration in quality of skin is evident from all parts of the country; Wollo was cited as providing the country's worst skin [14].

Public Health Importance: Mites can diversely affects human health in many ways they can infest homes including carpets, mattresses and bedding, close stored feed and other material. They have also occupational hazard for farmer and filled land mill worker [36]. The activity of scabies mite on human population increase through autumn to winter and decline to spring. The transmission between the populations is depending up on the prolonged personnel contact [36]. Source of zoonotic scabiei include dogs, foxes, cats, horses, and pigs. Feline scabiei caused by *Notoederscati* is zoonetic [37].

Zoonotic scabies is also highly pruritic but the lesions usually occur on the arms, chest, abdomen and thighs. In humans, the zoonotic varieties of *Sarcoptesscabiei* are generally believed to cause vesicles, papules and other symptoms of dermatitis, but not classic burrows. However, in one case, burrows caused by *S. scabieivarcanis* were found in the skin by histopathology. Zoonotic scabies is almost always self-limiting; the mites usually disappear within a few days, and the clinical signs resolve in 1 to 3 weeks unless the person becomes reinfested [38].

Pathogenesis: Young animals infected in the first few weeks of life develop hypersensitivity within 8-10 days which lasts for 8-9 months and during this time affected animals exhibit constantly itching [19]. *Sarcoptic* mange in ruminants has variable predilection sites. However, ear, neck, face and occasion ally the limbs are most commonly affected [25]. In some cases there may be spread from the limb to face and other regions and in occasional sever cases, pustular dermatitis occurs. In goats the condition is often chronic and may have been presented simply as "skin disease" for many months before definitive diagnosis has been made *Sorcoptic* infection the main signs are irritation with encrustation, loss of hair and excoriation from rubbing and scratching [20]. Most *Sarcoptes* related diseases in ruminants are caused by allergic reaction and then lesions will be exaggerated by sever pruritis and itching [39].

Early infection with *Demodex species causes* aslight loss of hair on the face and fore limbs, followed by thickening of the skin; lesion may spread over the entire of the body [17]. Invasion of hair follicle and sebaceous gland leads to chronic inflammation, loss of hair fibers, and the development of secondary staphylococcal pustules or small abscess. It is these foci of infection which causes small pin hole in the hides which interfere with its industry processing as well reduce value dramatically. The disease is especially severe in goats, spreading extensively before it is suspected and in some instance causing death [19].

Chorioptic mite punctures the skin, causing serum to exude. Thin crusts of coagulated, serum are formed on the skin surface. The skin wrinkle and thicken, although purities is not severe [22]. *Chorioptes.bovis* causes exudative dermatitis on the lower leg and scrotal of rams. In extreme case the crust may be 5 cm thick. Detoriation of semen quality was associated with chorioptic mange lesion covering more than one third of scrotum and was apparently related to elevation of testicular temperature [13].

The mites cluster around accessory digits and along coronary border of the outer claws and causing crusts below the accessory digits and in the inter-digital space.

Lambs are thought to become infected by contact with the legs of the ewe in some cases; they may spread from the limb to face and other regions [20].

Posroptesovis doesn't burrow in to the epidermis, but remain at the base of hair and pierces the skin with styletic chelicerae. This manner of feeding results in exudation of serum which leads to form scabs. *Psorptesovis*is particularly devastating in sheep especially those maintained principally for production of high quality wool [13]. The lesion that develop consists of papule, pustule, with yellowish crust, the wool often become matted with crust and large area of wool may be shaded [25]. Heavy crusting and scab formation with associated inflammation, hair damage and depletion of wool are typically in animal that are antigenic ally sensitive to this mite. Heavily infested lambs have been found to have crust and scab formation with associated inflammation, hair damage and depletion [26].

Clinical Sign: Mange mite spent their entire life in intimate contact with their host. It affects the sebaceous tissue, epidermal cells and causes various form of clinical feature [41]. *Sarcoptic* mange is common in some countries. It commences on the head and lateral aspect of the neck. The marked edema and inflammation causes the formation of vertical skin fold which are quite characteristic. Usually it extends rapidly to the entire body; scratching is continuous and responsible for extensive mechanical lesion [12].

Demodex mange also called as follicular mange which affects all domestic animals hair follicle. It causes significant damage in cattle and goat [42]. *D.bovis* is common species which affects cattle and causes clinical feature on different body condition. These are pea sized nodule containing caseous material and mite particularly on the wither, lateral neck, back and flank region [20]. Concurrent pyoderma may occur leading to furunclosis with ulceration and crust formation [19].

Chorioptic mange is common mange of cattle which have the production effect on dairy cattle. Scabs or scales develop on the skin of lower part of the body. There is some exudation and crust formation on the legs and lower body [20]. The main lesion in the sheep is seen on the scrotum of rams where allergic dermatitis results in the production of yellowish serous exudates over the area from few millimeters to several centimeters [19]. Both in sheep and cattle infected individual can be seen to stamp and scratch at their legs to relieve irritation. In rams it can lead to temporary infertility [7].

Psoroptes mange is most common in sheep but in cattle has a little effect [13]. *Psoroptesovis* affects both cattle and sheep which cause some typical lesion on cattle. These lesions are appearing first on the wither, neck and around root of tail. In several cases it may spread to the rest of body [19]. The large area of the skin may covered after involvment of severe infestation with the consequent hair loss and skin become thickened, wrinkled and covered with scab [7].

Pathological Lesion: In mange typical gross lesions are multiple cutaneous papule or nodule usually between 2-4mm diameter and occasionally reaching 1cm or more [10].Nodules are visible in smooth coated animal, often indicated by over lying tuft of erect hair. The content of thick, waxy, or caseous material are sometimes stained blood [19].The content may liquiefy and discharge to the surface forming a thick crust or rupture f nodule in the dermis may generate abscess or granulomatous reaction [21]. In case of psoroptic mange the lesion are characterized by alopecia, marked lichnification, accumulation of thick gray, scale crust and fissure. The infection appears dry encrusted scale lesion on the edge of ears and face[17].

Histopathology: The nodules are follicular cyst lined by flattened squamous epithelium and filled with keratinized squamous and large number of demodectic mite. Rapture of follicular cyst induce marked nodular granulomatous reaction in which degenerating and keratinized debris are surrounded by epitheliod macrophage, multinucleated giant cells, Lymphocytes, plasma cells and eosinophil [43].

Eosinophils are most numerous of the infiltrated leukocyte followed by lymphocyte, other mononuclear cells and mast cells. Dermal edema is usually marked. Sebaceous gland hyperplasia has been described in lesion in sheep and cattle [21].

Morbidity and Mortality: Morbidity rate is higher in both young and adult animals. However, mortality rate is significant in younger animals and animals in poor body condition. Animal death is due to dehydration, with direct result of feeding of huge number of mites [17]. Inability to move and feed due to severe lesion in muzzle, face and on the joint or secondary cases such as pneumonia, and septicemia introduced through scratching wound [44].

Diagnosis: Clinical diagnosis of these diseases relies on the existence of pruritic skin condition in suspect able species, but also, on herd history and record of

purchase, sales and animal movement [17]. Location, extent and appearance of lesion may determine final diagnosis

Psoroptes initial diagnosis is based on the season of the occurrence and the sign of the wet, discolored wool, debility and intense puritis with easily elicited nibbling reflex. Confirmatory diagnosis is made by identification of the mite [45].

Confirmation is essential by demonstration of live mites by a veterinary surgeon. Skin scrapings taken using a scalpel drawn at right angles over the skin surface at the periphery of active lesions demonstrate large numbers of mites under X100 magnification**.** [40]. Identifying characters are; body is oval, the pedicles are joined which are present at tarsal sucker for female and at first, and pair legs and in male, legs are long, are host specific, are non-burrowing mites, mites mostly occur in the skin with dense hairs [46].

Demodex; can be found in deep scraping and contents of pustules and abscess. Scraping must be deep enough to assure sampling of the hair follicle and hence should cause capillary oozing. The skin must be softened with weak solution of KOH to assisting scraping. Uncomplicated case of demodicosis is associated with large number of mites in all stages of development [12].

Sarcoptes; clipping the area with a no 40 blade before scraping enables better visualization of the lesion and removes excess hair that impend pro per scraping and that interfere with collecting of epidermal debris then the skin should be scraping until capillary blood oozes out [21].

Histological examination: skin biopsy specimen reveals varying degree superficial perivascular dermatitis with aggregate of numerous eosinophils and eosinophilic micro abscess, leucosytic exocytose ulceration for *Demodecos*ishistopathological examination the skin biopsy specimen reveals hair follicle with numerous *Demodex* mites, in many instances to the point of formation of follicular cyst [25].

ELISA for detection of antibody to scabies has been developed the test has high specificity and moderate sensitively, being more sensitive in young animals undergoing their first infestation [19].

Laboratory Diagnosis: The scraping must be collected from the most affected parts of the skin as more parasites are fuondon this part than any other. The affected part should be moistened with mineral oil or 10% KOH. The skin scrapings are collected with the help of scalpel. Press the lesion on the skin with thumb and index finger of the left hand and scrap the skin. The scraping should be collected so deep that some blood oozes out. The skin scraping is collected in 10%KOH, and then transported to laboratory [12].

Diagnostic Technique: Direct smear method: collected skin scraping in 10% KOH is placed on adry and clean slide with one drop of 10% KOH. The scraping is macerated with scalpel or spatula covered with cover slip, examine under microscope [22].

Sedimentation method: skin scrapin g is kept in 10% KOH or NaOH to digest the debris; the digestion process may be expedited by providing gentle heat to the sample. The scraping should be transferred to the centrifuge tube and centrifuge at 3000 rmp for 5 minutes. The supernatant is discarded and one drop of sediment is placed on dry and clean slide then covered with cover slip then examined under microscope [47].

Differential Diagnosis: Sheep and goat pox: it is caused by sheep and goat pox virus, the lesion, erosion, and ulcers commonly occur in mouth, trachea, pharynx and doesnot form hole in the skin [48].

*Dermathohilos*is; it is caused by *Dermathophilescongolonsis,* it doesn't break normal barrier of the skin. It may be transmitted mechanically by feeding flies. Prolonged wetting of the fleece or sheaving cut are the environmental factors, the primary lesion is pain less and non pruritic [19].

Demathophytosis: It is caused by genera of, *Trichophyton* and Microsporum, it can only parasitize keratinized epidermal structures like hair, nail, feather, claws [19].

Treatment: For treatment of mite infestation, acaricides are most widely used. Pay particular attention to underside of acaricide for scaly skin and leg. The scaly skin or legs should be dipped into the acaricide solution [17]. According to the characters tics of mites, treatment is recommended for each species by considering their activity [19].

Demodex mange; Because it is aburrowing mite, not easily attach with acaricides, but the application of systemic and topical clinical compound has been given to relieve to infestation [21]. Topically applications of Benzyl Benzoate, ivermectin inject able form or oral formulation. *Chorioptesbovis* is found superficially on the skin and not sensitive to ivermectin because it is found superficially so it should be treated with topical acaricides by dipping or spraying [49].

For *Sarcoptic* manage ivermectin 200 microgram per kg/Subcutaneous is more sensitive because mites are found burrowing under epidermal scales of the skin. After one treatment given live mites are not found in the skin. Dipping & spraying may also used to reduce clinical effects of sarcoptic mange [46]. For *psoropte*s mites also applied topical treatment compound which effective to these because they are found topically on the skin, chloruloted, Rychocalion and profilons (0.5-0.6%), comphos (0.3%), Plosment/ 0.2-0.25% diazinon/ 0.0204 %) [41] synthetic pyrethroids; like, Allethrin, phenothrine, permethrin and cyfluthrin and organophosphate drugs like,Amitrazine,Doramectine and Avermectine are available for treatment of arthropods [51].

All treatment should be administered strictly according to the manufacturer instruction [20]. Treat all incoming animals with inject able products effectively against ectoparasites or dip in an organophosphate whether or not they show sign. Quarantine treatment of incoming groups of animals saves the cost and labor of treating the entire flock be introduced and check regularly for other diseases [7].

Prevention and Control

Psoroptesovis: Because of its short population turn over period there is very rapid spread, and it is this character which has led to legislative control in many countries since the economic consequence of uncontrolled sheep scab are serous. Legislation in support of control is based on inspection of flocks, limitation of movement of sheep in and from area in which the infection has been diag nosed and compulsory treatment of all sheep at prescribed times [20]. If treatments are used they must be thoroughly applied so that all parts of the skin especially under the skin in the ears, between legs are wetted by acaricide. Although building, bedding and other inert materials do not support the mite for more than a few days they should also be treated unless they can be left in dry state for 3 weeks [19].

The affected animal should be quarantined and infested house cleaned to minimize the spread of infection to healthy animals; all infected premises should be cleaned out, and disinfected by spraying with lindane solution and other prophylaxis methodes [22]. Good nutrition with high mineral and vitamin content will help to control the disease [13]. As soon as the animals go back to pasture in spring symptoms recede quickly. Exposure to sun reduces the humidity in the hair coat, which slows down mite development, and without crowding mite transmission is significantly reduced. For reasons yet unknown, a few mites often survive such unfavorable summer conditions in a few animals within a herd, without showing any clinical signs. Once the herd goes back to the winter quarters in fall, these animals will transmit the mites measures are not taken. Therefore it is highly recommended for preventive treatment of the herds in late autumn. All animals in a herd must be treated, because it is impossible to know which are carrier animals [19].

CONCLUSION

Despite the large livestock population in Ethiopia their contribution in economy is less than expected. This is due to the presence of many diseases and skin diseases of ruminants have impact on their health, performance and product. There are number of ectoparasites which affect ruminants. Among mange mites Demodex, *Sarcoptes*, *Psoroptes* and *Choriopes* are common. There are various risk factors affecting the prevalence of mange mites such as, body condition and management system and different agroecologicalzone causing diseases on the individual animal mange mite infestation impairs the quality of hide and skin. It leads to loss huge amount of income to the country due to down grading and rejection of skin and hides in terms of foreign exchange earnings. Furthermore the seasonal dynamic of mite infestation causes considerable economic loss on the livestock production. In addition to this mange mites have segnificant public health importance, because they are contagious from infected animal. Unless control measures are taken the loss is going to be huge. Based on the above conclusion the following points are recommended;

- Awareness must be created about favorable seasons of mange mites and their effect on animal health and production.
- Aware the owner about management system since it is one of the factor for mange occurrence**.**
- Educate society about zoonotic importance of mites

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