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Review article

Major treats of skin and hides in Ethiopian leather industry: A review

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ABSTRACT

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The leather industry sector is one of the fast growing economic sectors in Ethiopia. Hides and skins are the basic raw materials for the leather industry. The major sources for these raw materials are cattle, sheep and goats. The leather industry sub sector is still in its lower level of development. This sub sector is suffering from so many problems including diseases (like parasitic diseases such as mites basically demodex, psoroptes; bacterial diseases as dermatophilosis; fungal diseases like ringworms; and viral diseases like lumpy skin disease). The leather industry sub-sector also faces mechanical problems like flaying and branding, market availability and accessibility, transportation and the quality of raw materials supplied. Poor animal husbandry, bad practices in curing and collection, general handling and the potential of supply are the other factors that affect the leather sub sector. A lower attention is given to the Ethiopian livestock sector from which the raw materials come in relation to disease aspect, management of the mechanical problems, market conditions and others give a negative feedback to the leather industry sector. Due to these factors hindering the development of the leather sub-sector which are in need of greater care and management, the contribution of the sector to the national income is disproportionately small. Higher level of attention is needed to be given from government; stakeholders and professional sectors to improve the current status of skin and hides to that serve as the input for the leather industry that enables us to have a good quality output for foreign currency.

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1. Introduction

Ethiopia is one of the most populous countries in Africa in cattle population, having an estimated population of about 67.2 million in July 2002 with annual growth rate of 2.9% (Mesele et al., 2010; ESGPIP, 2009). The agricultural sector plays a pivotal role in the national economy, livelihood and socio-cultural system. The livestock sub-sector contributes 16% of the total GDP and over 30% of the agricultural GDP. With an estimated 47.57 million cattle, 26.12 million sheep, 21.71 million goats, 1.01 million camels and 7.73 million equines (Mesele et al., 2010).

Archaeological studies have shown that hides and skins have been used since antiquity as clothes, vessels, bedding, and possibly structurally in ancient dwelling places. Hides and skins can be obtained from fish, birds, and reptiles as well as wild and domesticated animals. The most important sources are cattle, sheep and goats (Mahmud, 2000; Arugna, 1995; Aten, 1955). Hides and skins are the basic raw materials for the leather industry and Ethiopia is capable of supplying 16 to 18 million hides and skins per annum (EEA 2007/8). The leather industry processes raw hides and skins and produces semi-processed and finished leather for both export and local consumption (Ayele et al., 2003; Abdi, 2000).

The main sources of hides and skins in rural areas where the major proportion of slaughter is carried out at the household level or in back yards that are not equipped with any amenities for undertaking and following proper slaughtering, ripping and flaying procedures (Mahmud, 2000; Arugna, 1995) and raw materials derived from slaughter slabs constructed by municipal slaughter and abattoir (Mahmud, 2000; ESGPIP, 2009).

Although Ethiopia has a great potential for the tanning, leather manufacturing, industry, it has not benefited much from the sector due to part of the raw hides and skins are illegally sold outside the country. Raw hides and skin does not reach to the market due to lack of transport and modern marketing facilities and due to low awareness of the population which reside in rural areas (ESGPIP, 2009). Therefore, the objective was to overview major Treats of skin and hides in Ethiopian Leather Industry in Ethiopia.

2. Skin and hide diseases

2.1. Parasitic disease

2.1.1. Demodectic mange

Mange is skin disease of which the commonest type is known as follicular or *demodectic mange*, and is caused by parasitic mites visible only under microscope (MoARD, 2008). It spread by contact with infected animals or enclosures, the mite living in the hair follicles and under the surface of the skin. After mating, females move deeper in to the skin to lay hundreds of eggs, which, when mature, spread and do further damage. The mite invades hair follicles and sebaceous glands of all species of domestic animals (Aten, 1955).

The disease causes significant damage to the skin, causing small, pin-holes in the skin which interfere with its industrial processing and limit its use. In most cases, the lesions are difficult to observe externally. The clinical signs most commonly developed due to this disease are small nodules and postules, which may develop in to large abscess (Kassa, 1998).

2.1.2. Sarcoptic mange

Sarcoptic mange is caused by infestation with the *sarcoptes scabiei variety Capri* in goats and *sarcoptes variety ovis* in sheep. *Sarcoptic* mites burrow in to the skin forming galleries where they remain for the rest of their lives. Infestation is spread mainly by direct contact between infected and health animals. *Sarcoptes* are very susceptible to dryness and are unable to live more than a few days away from the host (MoARD, 2008)). The primary constant clinical signs manifested by this disease are pruritis, and much of this is associated with hypersensitivity in relation to mite products (Urquhart, 1996).

2.1.3. Chorioptic mange

Chorioptes mites are obligate ecto-parasites of mammalian and are the most common causative agents of mange in horses and cattle. It is also named as "Leg mange", "Tail mange", "Foot mange". It is a common condition in cattle, goats, sheep and occasionally horses. Mites are surface inhabiting parasites that feed on epidermal debris. It is generally stated that the mites only live a few days off the host. However, chorioptic bovis has been shown to survive up to 69 days off the host (Tefaye et al., 2015; Shibeshi et al., 2013; Wall and Shearer, 2001). The disease transmission is by direct and indirect contact. The bovine chorioptic mange is caused by *chorioptic bovis*

and the most common signs are papules, crusts, alopecia, erythema, oozing and ulceration. The caprine chorioptic mange is caused by *chorioptic caprae* and the ovine chorioptic mange caused by *chrioptis ovis var ovis*. The clinical signs are similar to bovine chorioptic mange (Kassa, 1998).

2.1.4. Psoroptic mange

Psoroptic mange is devastating pruritic dermatitis of cattle and sheep and a rather frequent cause of otitis externa in goats and horses. The mites are non-burrowing and feed on tissue fluids. The mites can survive off the host for at least 2 weeks (Tesfaye et al., 2015; Jabbar et al., 2000; Tylor et al., 2007). Intensively pruritic dermatitis usually starts at the shoulders, withers and tail-head. Non-follicular papules and pustules, crusts, scales, alopecia are seen. Head shaking, scratching of the pinna with the back foot, crusting of the external pinna, and in server causes otitis media and externa (Mullen and Durden, 2002).

2.2. Flies

Domestic livestock are liable to almost perpetual attack from a variety of flies. An estimated cost to producers to livestock insect control and losses resulting from these ecto-parasites in the U.S exceeds 3 million dollars annually (Drummond et al., 1988).

2.3. Tick infestation

Ticks are blood sucking parasites which are usually found attached to the tender parts of the skin, the thinner portions of the hide such as the dewlap, the inner parts of the thighs and under the elbow, where they feed. They cause direct damage to the hides and skins and transmit bacterial, Viral, protozoal and some of rickettsial diseases. Secondary infections lead to more extensive damage (Aten, 1955; Mesele et al., 2010). In sucking blood, the ticks push their proboscis deeply in to the hides, and an irritating fluid is injected to keep the blood from clotting. Every tick bite leaves a small but distinct blemish on the hide which appears as a small hole in leather, if the bite is recent, or as a small scar, when it is old. Such hides give "ticked" leather, which is of inferior quality (Beaumont, 1951). Ticks are directly or indirectly involved in causing substantial financial losses to the livestock industry of Ethiopia, account 75% of the animal export. A conservative estimate of 1 million birr loss annually was made through reject and down-grading of hides and skins in Ethiopia (Abunna et al., 2008; ESGPIP, 2009).

2.4. Myiasis

Myiasis is the infestation of organism and tissues by fly larvae that feed on necrotic or living tissue of the host. It can be classified as facultative and obligatory. Larval stages move over the wound surface ingesting secretion, exudates, dead cells, and debris but not live tissue. However, they induce irritation, injure cells, and provoke exudation (Tesfaye et al., 2015; Roger and Weaver, 2011; Tylor et al., 2007). Facultative myiasis is caused by *musca* spp; *caliphora* spp; *phaenicia* spp; *Lucilia* spp; *phormia* spp; and *sarcophaga* spp The fly of obligatory myiasis is dependent on fresh wound, as the site for larval development.

The predisposing factors for myiasis are: accidental or surgical wounds, rainy weather and virtually any dermatosis causing exudation and associated with bacterial infection. There fore, common sites for myiasis are wounds, from shearing, dehorning, castration, docking, fighting, wire cuts, ear markings, and branding; the navel of newborn animals, cancer eye in cattle. Sometimes the clinical manifestation can be Severe pinkeye in cattle and confused with tick bite lesions (Tesfaye et al., 2015; Jabbar et al., 2002; Wall and Shearer, 2001).

2.5. Bacterial diseases of hides and skins

2.5.1. Dermatophilosis

Dermatophilosis is a contagious skin condition seen in moist, humid, wet conditions. It has a world wide distribution with severe effects in tropical Africa. It can be severe in cattle, horse and sheep, especially in tropical countries (ESGPIP, 2009). This disease is caused by the bacterium *Dermatophilus congolensis*. The ears, nose, face, and tail may be affected beginning with a low-grade, scaly. Skin infection that spreads along the back and flanks. In severe cases, animals may scratch constantly. The bacteria can survive in soil or dust, on animals skin during dry weather and are transmitted by direct contact, infected equipments, flies, etc (MoARD, 2008). Many African hides are damaged by this disease which commences in flammatory and suppurative lesions which later break

spontaneously or become indurated. The severity of the lesions varies with season and climatic conditions but even in more dormant form they cause blemishes to the superficial leather tissues (Aten, 1955).

2.6. Fungal diseases of hides and skins

2.6.1. Dermatophytosis (Ringworm)

Dermatophytes are molds capable of parasitizing only keratinized epidermal structures: superficial skin, hair, horn, hooves, claws, and nails. Dermatophyte infections are called ringworm or tinea. Ringworm infection is caused by *trichophyton* and *microsporium* species of fungi occurring in all animal species in all over the country but more commonly where animals are accommodated in dense groups, especially in doors. Direct and indirect contact with infected animals are the routes of transmission of ringworm (Hendrix, 1998; Hirsh et al., 1999).

2.7. Viral diseases of skins and hides

2.7.1. Sheeppox and goatpox

Sheeppox and *goatpox* are the most important *poxvirus* disease affecting domestic animals. All ages are susceptible but younger animals, especially in endemic areas, are most severely affected. The disease is caused by *capripox virus* strains vary in virulence and host specificity (Hirsh et al., 1999). Both sheeppox and goatpox affect sheep and goats of all ages, breeds, and sex but young and old animals and lactating females are more severely affected. In areas where sheeppox is enzootic, imported breeds such as Merinos or some European breeds may show greater susceptibility than the native stock (Radostits et al., 2007).

2.7.2. Lumpy skin disease (LSD)

LSD of cattle and buffalo caused by a virus of the genus *capripox virus* (Neethling Virus) which is closely related immunologically to *sheeppox* and *goatpox* viruses. Mostly this disease is confined to sub-Saharan Africa. Morbidity rates reaches 80% during epizootics, but are near to 20% in enzootic areas. Case fatality rates average 2%, but vary with disease outbreak. Cattle can acquire infections by drinking water but ingestion and direct contact transmission are not common routes (Radostits et al., 2007; Hirsh et al., 1998).

2.8. Mechanical problems of hides and skins damage while the animal is living

2.8.1. Branding

The most damaging type of hot iron branding is the ornamental branding carried out by some tribes which some times covers the whole hides in continuous pattern. The only parts of the animal which should be branded are those which are of secondary importance to the leather industry, namely; the cheeks, the limbs below the elbow on fore leg, the ears, the top of the hump (Aten, 1955).

2.8.2. Scratches

Scratches may be caused by wire, horns, or thorns, and are avoidable only to certain degree maintenance of fences in good repair and the use of plain fencing wire minimize damage by wire scratches (Beaumont, 1951).

2.9. Damage during flaying, drying and killing

2.9.1. Bruising

Occurs when small blood vessels are damaged mechanically, either by blows received during driving to the place or by forceful throwing on the ground before slaughter (Aten, 1955).

2.9.2. Strain marks

Sheep skins have a loose structure and are liable to damage through strain when being pulled off the carcass. This kind of damage is chiefly visible on the flanks where the skin is thinner. Leather made from such skins shows broken grain and reduced tensile strength (Beaumont, 1951).

2.9.3. Bad Shape and cuts

Good shape is basic quality required by the tanner. The tanner, therefore, pays less for badly shaped hides (Aten, 1955). When the hide is completely pierced, the damage done is called a "Cut." Damage to hides due to cuts

and gouges second only to that done by ground drying. The most common causes of cuts are: delays in flaying, use of pointed knives, unnecessary use of the knife, insecure position of carcass, bad lighting, lack of skills and carelessness (Aten, 1955).

2.10. Damage after flaying and drying Hair-slip

Damage caused to epidermis by bacterial action, which causes loosening of the hair and superficial putrefaction, is called “hair-slip.” This is an extremely common type of damage to hides and skins (Aten, 1955).

2.10.1. Putrefaction

If hair-slip is not checked in time, the process of decay will spread in to the deeper layers of the skin, namely in to the corium. Putrefaction may also occur or start from the flesh side, due to lack of air circulation, excess moisture in the air or contact with any solid object, earth, poles of frames (Beaumoount, 1951). Putrefaction usually causes the separation of the corium from the epidermis and decomposition of the superficial layers of the dermis, resulting in grain less areas on the finished leather.

2.11. Damage during storage and transport

2.11.1. Rubbing

Care should be taken to prevent bales from coming in to contact with hard objects, especially iron-ware, while in transit on Lorries or buses. In sub-tropical and tropical countries many forms of transport are used to convey hides and skins from out stations to the more important market. The motor lorry, bullock cart, and even animal transport, bulls, camels and donkeys are used (Aten, 1955; Beaumont, 1951). Rubbing damage, caused during normal transportation by road, rail and steamer is more or less negligible, but a certain amount of care is required to ensure protection of bales against rubbing and tearing on the outside surfaces, by adequate covering with the hessian or gunny, especially in the case of skins (Aten, 1955).

2.12. Market availability and quality raw material supply

2.12.1. Production and trade of hides and skins

Leather and leather products including hides and skins are the most widely traded and universally used commodities in the world. Various studies indicate that the global leather trade is estimated at over US \$ 51 billion and the informal businesses amount to almost equivalent values (Tadesse and Mebrahitu, 2010). Africa occupies a relatively low position in production and trade in hide and skins with in the global industry in spite of its significant livestock population and low labor cost. Perhaps the most significant factor influencing production of hides and skins is the “Cultural factor” in livestock rearing which discourage commercial farming, slaughtering and lay emphases on numbers of animals maintained by a farmer as a sign of wealth (UNIDO, 1994; FAO, 2001).

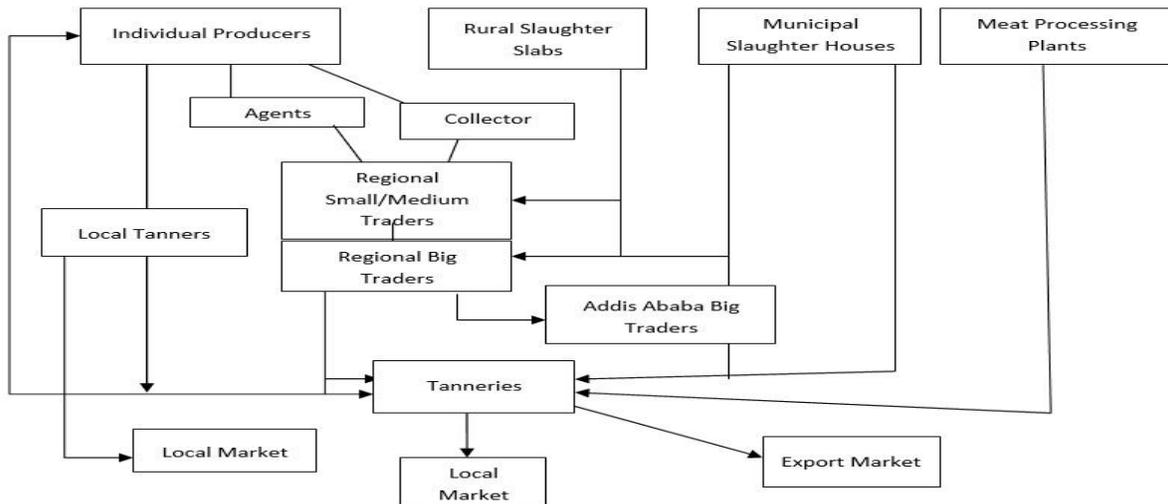


Fig. 1. Market structure for hides and skins.

The market chain for raw hides and skin consists of the primary producers /consumers, who are the initial sources individual meat consumers, rural slaughter slabs, municipal slaughter houses, abattoirs, meat processing plants/ agents of traders, collectors, local tanners, regional medium /small traders, regional /Addis Ababa big traders and tanneries (Alemnesh et al., 2018). After preservation by air-drying or wet salting, the HS are passed on to big traders and then to the tanneries (Mahamud, 2000).

3. Conclusion and recommendations

The livestock sub-sector contributes 16% of the total GDP and 30% of the agricultural GDP. Ethiopia has Africa's largest livestock population. However, the contribution from this huge livestock resources to the national income is disproportionately small due to several factors. Some of the factors includes diseases, management, feeding, parasites and others. The leather industry sector is one of the fast growing economic sectors in Ethiopia. The hides and skins are the basic raw materials for the leather industry. The major problems affecting hides and skins sector and the leather industry in Ethiopia include lack of skills towards hides and skins, lack of technology, processing facilities, poor animal husbandry, diseases, parasites, bad sloughtering and flaying techniques, and bad practices in curing, collection, transportation, stroage, and general handling. The marketing systems, the vehicles used for transportation, the traditions and cultures of the country, the position of tanning industry and the source and place from which the raw materials come are also the other factors contributing to the lower development of the leather sector and give negative feed back to the leather and leather products and raw materials of the county.

The following recommendations are forwarded to improve the existing conditions of Ethiopian skins and hides and Ethiopian leather industry as a whole:

- ✓ Special attention has to be given with regard to the management, treatment and control of major diseases of skins and hides.
- ✓ Study must be done to improve the mechanical and managemental problems of the raw materials of leather industry.
- ✓ Government and professional sectors have to pay special attention to follow non-registered traders to improve the quality of hides and skins.
- ✓ Care should also be forwarded on transportations and market conditions of raw materials, semi-processed leather and leather products.

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