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ASSESSMENT OF PRE SLAUGHTER HIDE AND SKIN MANAGEMENT IN AND AROUND ASSELA AND SAGURE TOWN, EAST ARSI OROMIA REGIONAL STATE ETHIOPIA

MSc. Thesis

By

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MSc Program in Tropical Animal Production and Health

June, 2014

Bishoftu, Ethiopia

ASSESSMENT OF PRE SLAUGHTER HIDE AND SKIN MANAGEMENT IN AND AROUND ASSELA AND SAGURE TOWN, EAST ARSI OROMIA REGIONAL STATE ETHIOPIA

A Thesis Submitted to the College of Veterinary Medicine and Agriculture of Addis Ababa University in partial fulfillment of the requirements for the degree of Master of Science in Tropical Animal production and Health

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As members of the Examining Board of the final MSc open defense, we certify that we have read and evaluated the Thesis prepared by: Abaineh Jarso, Entitled: Assessment of Pre slaughter Hide and Skin quality Management in and around Asela and Sagure town East Arsi, oromia regional state Ethiopia. And recommend that it be accepted as fulfilling the thesis requirement for the degree of Masters of Science in Tropical Animal Production and Health

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STATEMENT OF AUTHOR

First, I declare that this thesis is my *bonafide* work and that all sources of material used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for an advanced (MSc) degree at Addis Ababa University, College of Veterinary Medicine and Agriculture and is deposited at the University/College library to be made available to borrowers under rules of the Library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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LIST OF ABBREVIATIONS

ESGPIP	Ethiopia Sheep and Goat Productivity Improvement Program
FAO	food and agricultural organization of united nation
FSA	Food Standards Agency
ILRI	International Livestock Research Institute
IPMS	Improving Productivity and Market Success
LSA	Leather and Shoe Research Association
OACC	Organic Agricultural Center of Canada
RFID	Radio Frequency Identification devices

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ABSTRACT

The study was conducted in Arsi Zone Oromia Regional state in Tiyo and Tijo/Digelu which are the woredas of the zone, on pre slaughter hide and skin quality and management. Ten *kebeles* from each woredas were selected purposively and number of farmer in each *kebeles* was taken proportionally. One hundred households from each woredas were interviewed and animals belongs to each house hold were observed for hide and skin defect. In addition to this all butchery and 20 middle men from both woredas were interviewed about handling practice of the animal. Visual observation was also carried out on 2 intensive and 2 semi intensive farms in both woreda of study. Collected data were intered in SPSS version 20 soft ware for analyze. As result of this the major mechanical and pathological factors affecting hide and skin quality in study area were identified. Skin disease like ectoparacite, sheep pox, nodule, alopecia and swelling, were found and they account for about (56%), (13.7 %), (12%), (9.7%) and (8.6%) respectively. from skin disease ectoparacite was a serious problem mentioned by respondents. Of mechanical damage horn rake, whip lash, thorny plant and branding were identified and they account (40.6%), (38.9%), (17.7%) and (2.8%) respectively. Almost all the variables had not significant difference ($P>0.05$) among two woredas except horn rake which was more serious in Tiyo woreda. In addition to these housing and transportation system and feed shortage were also identified as factors reducing hide and skin quality in study site. Farmer use different method to manage pre slaughter factors affecting hide and skin quality. For skin disease and ectoparacite, (47.5%) of them by medicine from the pharmacy and treat their home, while some of them (31.4%) go to veterinary station and use traditional type of treatment to treat tick (21.1%). On the other hand farmer manage horn rake by tethering each animal in pen individually. Of 1677 cattle and 981 sheep under observation, 123(7.33%) cattle and 16(1.63) sheep were affected by mechanical damage, while 64(3.8%) and 15(1.5%) show sign of skin disease. So it is concluded that skin disease is more serious than mechanical factors, so it is recommended for farmer to take their animal to veterinary station for any skin disease.

Key words: hide, pre-slaughter, quality, skin, management, digelu/ tijo, tiyo, oromia

1. NTRODUCTION

Hide and skin are broadly defined as external integument of large animal, while skin is provided by smaller animal. The best source of hide and skin from domestic animal are cattle, sheep and goats. However, hide and skin can also be obtained from other species of domesticated and wild animals, hide from buffalo, horse, camel, and elephant, and skin from pig, ostrich, rabbit, mink, snake, frog and shark. In developing world, they are almost never exploited to anything like their full potential. In majority of developing countries, despite the fact that they have enormous livestock population, their contribution to growing supplies of hide and skin on the world market is very unreasonable. This reason is also true for Ethiopia that possesses huge livestock resources which account 44 million cattle, 6 million equine, 43 million chicken, 23.33 million sheep and 23.62 million goats which could be the basis for development of vibrant leather and leather products industry (Teklay, 2010).

Hides and skins are an end product of animal production. As an end product although more correctly they are a by-product – they are an important and valuable resource. As a resource, hides and skins are the raw materials for various types of businesses – such as collecting, processing and distributing which provide many service jobs in countries where livestock are produced (Ian Leach and R. Trevor Wilson, 2009).

Livestock rearing in Africa is done under very diverse conditions varying from open Savannah grasslands, organized commercial farms, zero and semi-zero grazing. The quality of products obtained from livestock reared in these varying environments is directly influenced by these conditions. In the case of hides & skins the quality and yield of leather obtained from such animals is dependent on these factors. The hides and skins produced in Africa generally carry a poor image in the global markets because of various constraints found throughout the production chain starting with animal husbandry conditions and other factors through production chain (Mohammad *et al,* 2002).

The quality of the hide or skin is to a large extent related to the amount of damage to the grain (or outside) surface. The damage may be due to skin parasites that affect the live animal. Husbandry practices on the farm or in transport of the live animal (scratches, bruising, or dirt contamination, horn rake); it may be due to damage during slaughter or removal of the hide; or it may be caused by inappropriate handling or inadequate preservation techniques (Adugna, 2004).

Hides and skins are important livestock products providing income for the poor people living in the rural areas of the region. They are supplied to domestic and foreign markets. Since they have significant economic importance, much effort is needed to improve the quality and increase the quantity so that there will be effective and efficient utilization. Traditionally farmers treat their animals when they get sick or injured. Of the different traditional methods of treating animal practiced by the farmers branding is the common and this has a significant negative effect on the quality of the hides or skins produced from branded animal. Hides and skins are meat by-products and there is still little consideration given to the care required for the collection and processing of the hides and skins in to high quality leather (Adugna, 2004).

Limited studies were conducted regarding the extension and quality of the byproducts. However, there is no detail study on pre slaughter management raw materials. Of all the constraints (problems) hindering development of the leather sector, the low quality of basic raw materials is the pressing issue in need of an immediate solution.

This study is important to smallholder farmers, animals-herders, veterinarians, transport operators, butchers and live stock trader to enable them reduces damage of hide and skin before the animal is slaughtered. It also contributes to better understanding of the quality of livestock by products (hide and skin) and its effect on the quality of end product.

Hence, the research findings will inform the government to give training for animals-herders, farmers, rancher, veterinarians, butchers and transport operators how to reduce pre-slaughter damage of hide and skin like branding, scratch and tearing,

deferent ectoparacite infestation, several pathological disease, nutrition deficiency that seriously damage hide and skin quality with the following general and objectives.

Objectives

- To identify pre slaughter factors affecting quality of hides and skins in areas of study
- To assess common measures/practices followed to decrease pre-slaughter factors that reduces quality of hide and skin

2. LITERATURE REVIEW

2.1. Pre-slaughter Factors Affecting Hide and Skin Quality

Skin defects are classified into two main groups. First group being those created or acquired during the life of the animal (Pre-mortem defects) and second group being those that occur during and after slaughtering of animals (Post-mortem defects) (yakob,2013).

Pre slaughter period covers the greater part of the animal's life, from its birth to about the time it is collected for delivery to the butchery. Any selection and breeding program that may be operated on the farm or ranch will inevitably affect many features of the offspring of a particular mating including certain characteristics of the hide or skin. Environmental ones often obscure genetic factors, in particular by the consequences of nutrition (Berhe, 2009). Pre slaughters mainly occur during the live stages of an animal and they account for about 30% of the total defects which downgrade the quality of Hides and Skins in Kenya. Pre-slaughter defects contribute to a huge national economic loss (Mwinyihija, 2010).

Determining the extent of losses from hides and skins that are not collected for processing or are processed improperly is difficult to estimate. In Ethiopia many hides and skins are discarded soon after slaughtering, but the major losses occur among materials which have been damaged before, during or after collection. Most hides and skins are affected by pre-slaughter defects accumulated during the life of the animal. Some are damaged during slaughter while relatively few are spoilt during preservation (Ian Leach and R. Trevor Wilson, 2009).

As a result of the by-product status, not enough attention is paid to maintaining the quality of hides and skins. Hides and skins are affected by pre-slaughter defects accumulated during the life of the animal; peri-slaughter defects during slaughter, and post-slaughter defects during handling, preservation and storage (Mwinyihija 2011).

The quality of hides and skins is influenced by factors throughout the production chain including animal husbandry and disease management. Most hide and skin are affected by pre slaughter defects accumulating during the life of the animal. The commonly observed pre slaughter defects can be natural (poor nutrition, age and sex, breed and climate effects), mechanical damage (brand mark, scratches, horn rake, yoke mark etc), or defects due to disease that can be viral, fungal or parasitic etc (teklay, 2010).

2.1.1. Nutrition

There is little documented information on the correlation between qualities of livestock nutrition and the quality of raw hides and skins. However, it must be appreciated that poor animal nutrition affects adversely the production of all animal products, i.e. meat, milk. It is therefore unlikely that hides and skins quality remain unaffected. For example, animals from the commercial sector produce better quality hides because of better breeds as well as better nutrition. And zebu cattle from the communal sector fattened for supplying to the abattoirs also produce better quality hides than those produced by pastoral cattle, indicating that nutrition plays a role in improving both meat and hide quality (Mohammad *et al,* 2002).

Emaciation is the thinness and friability of hides and skins derived from animals suffering from prolonged and bitter starvation, leathers which are produced from such hides and skins are noted for their dryness and flabbiness. Cockles which are coarse wrinkles on shoulder portions of hides' increase considerably when animals are under fed. Diet plays an important role in the health of the animals and also in the quality of the raw material. Poor nutrition causes an animal to be smaller, the skin thinner and of poorer substance (teklay, 2010).

Sometimes within the same country, some of the animals are usually exposed from young age to seasonal drought conditions, poor pastures and low quality highly lignified forage. Although nutritional deficiencies are usually non-specific and are often the result of low plane nutrition, insufficient intake of feed energy is the main cause of retarded growth. The hides are normally of small size, mainly lights and mediums with thin substance. The grain structure is normally tight but is usually

degraded by the environment, which is normally thorny and bushy. These types of hides and skins originate mainly from marginal areas where animals are not reared in ranches. The post-mortem preparation of hides and skins is generally poor so that these materials result in high lime-loss rejects percentages when processed in the tannery (Mohammad *et al*, 2002).

Cattle that are undernourished produce thin hides. On the other hand, fat animals can cause too much fat content in the hide, which prevents curing agents from penetrating the hide. Intermediate body-conditioned animals produce the best quality hides (Wesley and Wright 2002).

Lack of fodder and other nutritional feeds leads to the poor development of texture of an animal skin (Mwinyihija, 2010). Good animal husbandry practices such as pasture establishment, fodder development and nutritional feeds would ensure a healthy skin (Mwinyihija, 2010).Animals with poor nutrition yield skin of poor substance and lesser area than well fed healthy animals (Yakob, 2013).Lack of fodder and other nutritional feeds leads to the poor development of texture of an animal skin(Mwinyihija, 2010).

In Ethiopia, feed usually is based on fodder and grass, are either not available in sufficient quantities due to fluctuating weather condition or, when available, are of poor nutritional quality (Manaye*et al*, 2009). Under smallholder livestock production system, animals are dependent on a variety of feed resources which vary both in quantity and quality. For optimum livestock productivity, the available feed resource should match with the number of animals in a given area (Dawit et al, 2013).

2.1.2 Housing system and transportation

Hide and skin should have highest value of any product slaughter animal, other than carcass. This is particularly so of cattle, and small ruminant skin. Use full leather can be made only from undamaged properly treated skin. Careless damage to hide and skin will cost industry much loss (FAO, 2001).

Hide and skin of slaughter live stock can be damaged thoughtless handling and treatment of the animal. The risk of injury and stress during handling of live stock can be high causing financial loss to producer, transporter and slaughter house. Properly designed and constructed facility on farm, auction yard and slaughter house will contribute significantly toward safe of handling of live stock, thereby reducing risk of injury and stress to animal (FAO, 2001).

A dirty coat causes discomfort and wounds in the skin. Having a higher proportion of drainage area influences cleanliness positively, which can be a disadvantage with rubber mats, which have less drainage area than slatted concrete floors. The cleanliness of the animals is also influenced by manure consistency (Davies *et al* 2000; Fallon &Lenehan 2002). Some loose housing systems can provide the animals with satisfactory space and a soft lying area (Graunke*et al,* 2011).

New concrete is particularly abrasive because of the sharp edges and protruding aggregate that naturally develop as it is cures. These may be removed by dragging heavy concrete blocks or a steel scraper over the flooring surface. They may also be removed mechanically by grinding or polishing of the surface. New concrete is more abrasive than old and wet concrete is up to 83% more abrasive than dry concrete (Graunke*et al,* 2011).

The space and comfort in confined housing systems are not at all comparable with the situation for animals on pasture. Some loose housing systems can provide the animals with satisfactory space and a soft lying area. Cleanliness is important for both animal welfare and food safety (Mekonnen, 2008).

Pen: live stock on farm, feed lot, and auction yard and slaughter house should have sufficient space for animal to be lying down. In cold climate pen should have walls roof to protect the animal from weather stress. In tropic roof is necessary for holding the pen to protect stock from heat stroke and sun burn. In open pen without roof even free range cattle may suffer (FAO, 2001).

Floor: pen floor should be non sleep and have no gradient, if animal sleep this cause bruising, fracture, dislocation and skin damage. Concrete floor should have pattern

engraved or covered in mush to provide traction at the same time facilitating cleaning (FAO, 2001).

Transportation: majority of live stock in developing countries are moved by trekking on hoof, by road and nail. Historically live stock can be moved on foot but by increasing urbanization of the population and commercialization of animal production live stock transport by road and rail vehicle has surpass this. Poor transportation can have serious deleterious effect on the welfare of live stock and can lead to significant loss of quality production (FAO, 2001).

2.1.3. Scratches and horn rakes

Scratch is caused by sharp objects that tear into the skin superficially causing permanent marks. Common objects that cause the defect include thorns, barbed wire and horn rakes, bush clearing of grazing areas, use of plain wire and trimming of sharp horns reduces the prevalence of these defects. The defects are common in scrublands which constitute a large area of cattle rearing in Kenya (Mwinyihija, 2010).

They can occur at the farm, during transportation of animals, at the abattoir. Usually the grain surface (epidermis is damaged); rarely the scratches are deeper and damage the dermis as well (Zafar *et al,* 2011).

Scratches are amongst the most common mechanical damages found on both hide and skins in Africa. This is because most of the livestock is concentrated in areas of open savannah grasslands or areas with fairly dry environment where thorny bushes are found. Multiple scratches are therefore quite common. Scratches give leather an anesthetic appearance and if deep, cause considerable loss of tear strength especially on skins. The quality is also degraded as tanners try to obscure the faults on the grains by embossing or printing, which also increase processing costs. Consequently, the raw materials fetch lower prices (Mohammad *et al,* 2002).

On cattle hides horn rakes are a general problem as animal husbandry practices in the countries discourage dehorning. Therefore cattle injure the hides mostly in crushes, in fights or during transportation. In some cases the damage is quite serious as the wound is generally deep (Mohammad *et al,* 2002).

Horned cattle: hurt and damage other cattle, either deliberately or accidentally, especially when they are close to each other – at feeders, in yards and during transport, get more injuries, bruising and hide damage than dehorned/polled cattle and are more aggressive towards other cattle, are generally more difficult to handle in yards, and pose a greater risk to themselves and stock-handlers (Newman, 2007).

2.1.4. Branding

Branding is used to identify animals especially cattle due to the prevalence of cattle rustling. Unfortunately most branding is done using hot irons on areas of hides, e.g. on the back and rumps, which have high value. Branding spoils leather like wounds. The widespread and indiscriminate practice of branding cattle with hot irons cause high losses in the hide and leather industry. Anything from 10-40% of the value of the hide is lost by the unsightly and irreparable damage caused by branding. There are also pastoral tribes who use branding as a treatment method for certain diseases especially by application of hot irons on glands. Defects on raw hides and skins are important in the domestic as well as in the export marketing of hides and skins, because they persist throughout the course of tanning and therefore affect the production and quality of marketed semi-processed and finished leather goods (Nyamrund, 2007).

Burning on an animal such as a cow, so that the cow's owner would be known this protects the owner in the event that the animal is stolen. Branding costs the leather industry large amounts of money due to the wasted portions of the hides. The loss of value is dependent on the placement of the brand. Hot iron brands can cause scar tissue to form through the thickness of the hide (Patterson and Loren, 2000).

Traditionally farmers treat their animals when they get sick or injured. Of the different traditional methods of treating animal practiced by the farmers branding is the

common and this has a significant negative effect on the quality of the hides or skins produced from branded animal (Adugna, 2004).

Pastoralists brand their livestock with hot irons for identification (as livestock rustling is a common practice among pastoral communities) and as cure for various diseases. Unfortunately, this is done indiscriminately and branding marks are made on the larger part of the body destroying the hide (Wayua and Kagunyu, 2012). Branding is mostly done by pastoral communities for animal identification, ornamental and/or for curative purposes. In aspects of disease control branding is done after Render pest vaccination for identification (Kagunyu*et al*, 2008 and Mwinyihija, 2010).

2.1.5. Bruises and Wounds

Bruises and Wound commonly referred to as Peri--slaughter defects. However in live animals caused by sharp or blunt objects that destroy or damages the skin. Most bruises and wounds are inflicted on animals due to severe beating especially for draught animals and during transportation on trucks for slaughter (Mwinyihija, 2010).

Damages that have ruptured and penetrated through the skin structure to the flesh of the animal creating an opening in the hide or skin. Wounds are caused by sharp objects that tear through the skin, abscesses and small bruises could develop into wounds if not treated. Although wounds could be healed, they leave a permanent damage on hides and skins which remain visible in the final leather (Mwinyihija, 2010).

2.1.6. Climate

The climate on which an animal is raised has an effect on substance of the skin and on the grain of the leather. Animals raised in warm climate have a short hair and leather produced has superior substance, smoother and finer grain patterns, where as animal raised in cooler climate or higher altitude grow longer wool or hair, and especially on substance is more pronounced on sheep and goat skin than on cattle hide (teklay, 2010).

Animals raised in warmer climates have shorter hair and the leather originating from animals raised in these areas has superior substance and smoother and thinner grain patterns. Animals raised in colder climates or at higher altitudes have longer hair or wool and resulting leather will be of poor substance and have a coarse grain. These effects are prominent on goat and sheep skins (Tekle, 2009).

2.1.7. Breed types

In Ethiopia, 99.4% of the total cattle population is composed of indigenous breeds (Belete*et al,* 2010). (Solomon *et al*, 2010).

Breed type describes the type and weight of the hide. Bos indicus cattle had the heaviest hides, while Holsteins have the lightest hides and thinner hide. The exotic and English cattle were found to be intermediate. The Bos indicus hides tended to shrink more during curing. Also black-hided cattle account for seventy percent of the feedlot deaths. This happens due to the fact that their hides reach up to twenty degrees hotter than lighter colored cattle (Juan, 2001 and Teklay, 2010).

Hides/ skins from improved dairy or meat type animals have relatively bigger and good quality hides and skins because of their breed type and improved feeding methods, making them ideal (Nyamrunda, 2007).

It is more difficult to remove the hair from dark-haired cattle than from light-skinned cattle. Also, Holsteins have a thinner hide, which is referred to as a spready hide. Brahman cattle contain a shoulder hump, which causes a poor grain pattern in this area. Brahman hides will not cure well because the hump makes a pouch where it is hard to control the curing chemicals. Breed type is an important factor in determining the type of hide that is produced (Juan, 2001, Wesley and Wright, 2002). The highland sheepskins known as “hair sheep/selale type” are considered to be the worlds finest and have a highly compacted texture. They are excellent raw material for high quality leather for dresses, gloves, sports gloves and other garments. This unique

feature of the Ethiopian sheepskins enables them to fetch higher prices in the international leather market (Ahmed, 2000).

Desirable or undesirable characteristics of hide and skin can be attributed to certain breeds. Bovine hide from North America and Europe normally yields flat hides of over 40sqftarea. But the typical bovines hide from South America yield a flat hide only about 25sqftarea and a zebu cross breed from Africa often provides hide below 25sqft. Ovine skin such as that of wool bearing merino sheep Australia can yield larger skin often above 7sqftarea but will not be readily acceptable to the tanner due to ribbing appearance on them (teklay, 2010).

2.1.8. Sex and age

Age affects the hide in two different ways. Younger animals have good tight grain patterns, but they are damaged easier. Older animals have tougher and coarser grain patterns. Also, the older an animal is the more exposed to scars, brands and scratches it tends to accumulate. Younger animals have the better hide quality (Wesley and Wright, 2002). The older the animal, the more the vulnerable to injuries and diseases and other defects from the bad management practices, like shearing and branding could play a role in the occurrence of skin defects. The older the animal, the more the vulnerable to injuries and diseases and other defects from the bad management practices, like shearing and branding could play a role in the occurrence of skin defects (Zenaw and Mekonen, 2012).

Age affects the quality of the hide in several ways. Animals that are intensively grown in a feed yard are slaughtered much earlier than cattle grown on grass. These animals produce a hide that is the same weight, but it consists of 40 percent more soluble collagen and yields less leather. Age affects the hide in two different ways. Younger animals have good tight grain patterns, but they are damaged easier. Older animals have tougher and coarser grain patterns. Also, the older an animal is the more scars, brands and scratches it tends to accumulate. Younger animals have the better hide quality Diseases there are many diseases that damage the hide (Wesley and Wright, 2002).

As animals grow older, the grain surface becomes tougher and coarser. Also with age animals accumulate more scars from brands, diseases, parasites, scratches and other injuries. In case of skins from hair/wool type, sheep, the quality of skin goes down with each shearing (Tekle, 2009).

It is the collagen content that decides the strength of the skin as well as its compactness. This tissue is of paramount importance to the tanner for it is the leather forming protein substance of hides/skin. Collagen content increased with advancing age (Muralidharan and Ramesh, 2005).

Sex affects the weight and strength of the cattle hide. Steer had a heavier green hide weight than heifers across all breed types. Amount of hide was expressed as the percentage of live weight. Also, skins from females have finer grades than those from males. Skins that come from females usually have a greater tensile strength (Wesley and Wright, 2002).

The male cattle or bull, especially older ones have thicker heads and shoulder which might cause trouble in handling. In sheep skin the main difference is that the female skins have finer grains and always lighter but with greater tensile strength than the male one. Age difference also contributes to the inferior quality in leather. The skins of young animal have fine and compact structures and tight grain pattern, while the skins of older animals have tougher and courser gain surface. 'Old grain' is the term used by the tanner to describe the rough and calloused skin of very old animals; in this hide wrinkles are very developed. Age does not only have natural influence on skin but also as the animal gets older the skin also accumulates scars from brand, disease, parasite, scratches etc (teklay, 2010).

2.1.9. Ectopracite and skin diseases

Tick: Ticks are one of the most serious ectoparasites in Ethiopia. They cause the greatest economic losses in livestock production. Their effects are various including reduced growth, milk and meat production, damaged hides and skins, transmission of tick born diseases. Other losses directly attributable to ticks include skin damage that greatly lowers value of the skin (ESGPIP, 2010).

Ticks usually adhere to the inner part of the hide such as the dewlap and inner part of the legs. The defect has the shape of tiny holes or unhealed scar. The hole can be seen on the grain surface of the finished leather resembling tiny spot and hollow. The small hole and the more or less healed scars mark the smoothness of the grain and detract from the appearance of the finished leather (teklay, 2010).

The tick-marks are cause by ticks which are found mainly in tropical and sub-tropical countries. These parasites attach themselves on the hides and skins in order to feed on the blood of the host animal. Heavy infestation of these parasites can cause substantial loss of blood from the host animal making it weaker. More specifically for the hides and skins industry, they damage the skin in areas where they attach themselves which become inflamed (Mohammad et al, 2002). Raw materials affected by tick-infection are therefore down-graded and are of reduced value to the leather industry (Nyamrund, 2007).

The present study revealed that Bahir Dar tannery produces fewer proportions of top graded skins. The reason for the production of low quality pelts may be attributed to the high prevalence of ectoparasitic diseases, This is because, ectoparasites have the tendency to damage skin directly, using their piercing mouth parts mechanically, or indirectly by causing irritations and annoyances as they feed on the skin debris, or crawl over the body surface and make the animal, rub their body against objects and then, by causing hyper sensitivity reactions to the body leaving unnoticeable scars at purchasing and/or curing stages (Zenaw and Mekonen, 2012).

Mites: Cause the skin disease known as mange in sheep and 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 easily detected at the raw material stage. It can be a major cause of downgrading skin quality at the tannery (Tekle, 2009).

Keds: Keds are wingless flies brown in color. They are found on goats but are more commonly seen in sheep. Keds suck blood and can cause anemia as well as skin irritation. Keds can produce an allergic hypersensitivity reaction in the skin of sheep, leading to lesions known as cockle in processed skins. In Ethiopia, keds are

considered a major cause of “Ekek” and are visible on the skin surface of affected animals (Tekle, 2009).

Lice: Two types of lice affect small ruminants, biting (chewing) lice and sucking lice (Lignonathusspp.) Biting lice produce itching, irritation and possible hair loss. An allergic skin hypersensitivity reaction to lice is another cause for “EKEK” in processed sheep skins. Sucking lice suck blood and can contribute to anemia as well as skin irritation. Lice are very small, but are visible to the naked eye. Heavy infestation of lice on sheep can also lead to cockle defects (Zafar *et al*., 2011).

Lice are more common during the winter months with peak populations found in February/March. Dairy cattle in tie stall barns are twice as likely to be infected as those in free stalls. Calves that are housed indoors can be affected throughout the year with peaks in the summer months. Lice are spread in a herd by direct contact and tend to congregate at specific sites on the animals. Heavy infestations are more likely when there is an underlying management problem (OACC, 2009).

Cockle/“*Ekek”*: Ekek is not a disease as such but a generic grading term used by tanners, and Means “itch” in Amharic. Cockle/Ekek is an allergic skin hypersensitivity reaction to Keds that Occurs in local Ethiopian sheep. This is not currently a major problem on goat skin production. It is a defect which appears on the grain side of semi-processed and crust leather after pickling that cannot be detected when the skin is examined raw or unprocessed. It results in huge economic loss to tanneries and the country at large since the damage is recognized after a lot of Cost is incurred on processing after which the damaged skins have to be discarded or downgraded. There are reports of a seasonal pattern to the occurrence of “Ekek”; being higher during or just after the wet or rainy season (Abebayehu*et al*, 2011).

There are many diseases that damage the hide. Lesions show up in the leather produced from infected animals. They appear as smooth, shiny spots. Ringworm's influence on the hide or skin reduces the value of the leather. Warts are growths that emerge as black or brown elevations on the skin. They can cause the tanner problems in several ways. They can drop off, or disrupt the unhairing operation. In the area where warts were on the skin, the leather produced is weak and considered worthless. Ringworms and warts cause problems to the tanneries (Wesley and Wright 2002).

Skin Diseases are diseases that affect the skin and are caused by micro-organisms ranging from viral, fungal and bacterial as well as parasites such as mange, biting flies etc. The National economic loss from skin related diseases (approx. 4.0% National damages) to the sides, skins and leather sub-sector is estimated at **0.18billion.**Vaccination, early treatment and regular dipping of animals are control measures recommended (Mwinyihija, 2010).

2.1. Hides and Skins Quality Management

Hide and skin should have highest value of any product slaughter animal, other than carcass. This is particularly so of cattle, and small ruminant skin. Use full leather can be made only from undamaged properly treated skin. Careless damage to hide and skin will cost industry much loss (FAO, 2001).

Pre-slaughter handling involves all the activities and processes animals undergo prior to sticking. These activities and processes take place on the farm, during transportation, marketing and at the slaughter plant. Although it takes several days and efforts to raise an animal to desirable age, weight and quality, their condition may change appreciably within few days prior to slaughter which will adversely reduce their weight, affect the meat quality and subsequently reduce profit (Adzitey, F, 2011).

In many livestock production systems, disease control is a major aspect of animal's husbandry. Any fatal disease that leads to the condemnation and destruction of the animal, or a serious disease that affects the productivity of the herd will have an

adverse effect on the supply of hides and skins. The final part of the pre-slaughter operations involves the supply and transportation of the animal to the market and ultimately the butchery. Special attention is required at this stage since any damage to the animal will not have time to heal before the animal is slaughtered, so any defect will remain on the hide or skins as an open wound. The range of different problems that can occur at this stage is extensive, and many others associated with improper transportation (Berhe, 2009).

Hide and skin of slaughter live stock can be damaged thoughtless handling and treatment of the animal. The risk of injury and stress during handling of live stock can be high causing financial loss to producer, transporter and slaughter house. Properly designed and constructed facility on farm, auction yard and slaughter house will contribute significantly toward safe of handling of live stock, thereby reducing risk of injury and stress to animal (FAO, 2001).

2.2.1. Treatment and Control of External Parasite

Ticks control: There are several methods being applied for controlling ticks. The main weapon for the control of ticks at present is the use of chemical acaricides. Acaricides used to control ticks on livestock or in the environment are applied in such a manner that the ticks are killed, but will not harm livestock or applicators, the tissues of treated animals will not contain chemical residues, and the environment will not be adversely affected (George *et al*, 2004).

Unfortunately in many African countries animal husbandry measures for controlling ticks are expensive due to the use of chemicals (acaricides) and therefore a lot of farmers leave their animals unprotected from ticks. Compulsory dipping of pastoral animals also protected the commercial sector. However, recent changes due to the land resettlement scheme have apparently led to a disruption in the dipping practices, which may negatively impact on the livestock sector in general and the quality of hides and skins production. Losses from tick damage to hides and skin were claimed to be about one million Ethiopian birr per annum, but are likely to be much higher (Abebayehu*et al,* 2011).

2.2.2. Managing Branding

Branding is the placing of permanent identifying marks on the hide of an animal by destroying the hair follicles and altering hair re growth. From a welfare perspective, fire branding is not the preferred method of identification, but it is permanent and may be the only practical system in some circumstances. Hide damage at the branded area decreases the value of a tanned hide. A poorly administered hot brand can significantly reduce the value of the hide, causing financial loss to the producer and beef industry. Use the correct size brand and position it correctly. Cheek branding is not good welfare practice, being close to sensitive major facial nerves. It should not be performed, and is illegal in most states. Electronic devices, such as ear tags used in the National Livestock Identification System (NLIS), are another method of identification. However, they can be removed, are not easily read electronically further than about 60cm from the animal and are not visible from a distance. Improvements in electronic ID technology may make branding unnecessary in the near future, with benefits for animal welfare (Newman**,** 2007).

Ear-tagging, ear-marking, ear notching, ear-tattooing, udder-tattooing, udder implanting, freeze-branding, photography and radio frequency identification devices (RFID e.g. microchips) are the preferred methods of identifying cattle from a welfare viewpoint. In some situations however, fire branding may be the only practical method of permanently identifying cattle. As States/Territories may have differing regulatory requirements for cattle identification, these should be checked (Newman**,** 2007).

2.2.4 Managing horn rake

Dehorning is removal of the horns after they have formed from the horn bud. Physical methods of dehorning (gouge dehorning) include the use of embryotomy wire, guillotine shears, or dehorning knives, saws, spoons, cups, tubes, or high tension rubber bands. Dehorning is the removal of the horns from cattle. It is a labor-intensive, skilled operation with important animal welfare implications, and is totally avoidable by breeding polled (hornless) cattle. Breeding for polls is relatively simple with British breeds, but a little more complicated with some Bos indicus breeds.

Cattle can have horns of different length, shape and size, but all horns are detrimental to cattle from a welfare and production perspective, and pose a potential safety risk to cattle handlers. Tipping (removal of the insensitive sharp end of the horn) is not dehorning. It does little to reduce the disadvantages of having horned cattle, for example it does not reduce bruising, and tipped cattle can still be a danger to other cattle and handlers (Newman, 2007).

2.2.5. Improving housing and transportation method

Good ventilation, drainage and aspect are important considerations for a good cattle building. Humidity and condensation in poorly ventilated buildings result in dirtier cattle. Uneven floor surfaces, poor drainage and leaking roofs, gutters and water troughs also cause wet, dirty hides. Dung contamination causes irreparable damage to hides, which in 2004 was estimated to cost the British tanning industry £20 million per annum (FSA, 2007).

Small cattle should be kept in a smaller area (tighter) initially, and given more space, according to their size, as they grow. Mixing unfamiliar animals increases cross contamination. Strangers will frequently rub against each other but animals familiar to each other won't. Overstocking, insufficient bedding or infrequent bedding-up are the main reasons for dirtiness in straw-bedded yards. Extra straw provision will not compensate for overstocking. Animals tend to defecate and urinate more in the loafing/feeding area, which often becomes very wet and dirty in completely bedded yards. It is therefore preferable to provide a clear concrete standing that is easily kept clean. Providing adequate bedding improves cattle cleanliness. Check the bedding on the farm, in the lorry during transport and in the lairage at the abattoir (FSA, 2007).

Transport factors can affect cattle cleanliness. We have to think about the length of the journey, the design of the lorry and how many animals are in it. Vehicles should be cleansed and disinfected between loads to prevent survival of bacteria and disease (FSA, 2007).

Pre-slaughter handling involves all the activities and processes animals undergo prior to sticking. These activities and processes take place on the farm, during transportation, marketing and at the slaughter plant. Although it takes several days and efforts to raise an animal to desirable age, weight and quality, their condition may change appreciably within few days prior to slaughter which will adversely reduce their weight, affect the meat quality and subsequently reduce profit (Adzitey, F, 2011).

This will happen if animals are subjected to poor handling conditions before slaughtering. This is so, because animals are exposed to all kinds of stresses ranging from physical such as high ambient temperature, vibration and changes in acceleration, confinement, noise, and crowding during pre slaughter handling (Adzitey, F, 2011).

Transportation: Animals could also suffer from pre-slaughter stresses arising from bruises, injuries, starvation, tiredness, water and food deprivation, and loading and unloading onto vehicles. Animals are reared on farms which may be situated far away from other farms, markets and slaughter plants. Therefore, they have to be transported over some distances to such locations either for better and less expensive feed, sale and slaughter. Transportation begins with loading and ends with unloading. Both ought to be done in a gentle manner and under a quieter environmental condition. Careful loading and unloading conditions has been suggested by Adzitey and Nurul (2011). During transportation, animals are exposed to environmental stress such as heat, cold, humidity, noise and overcrowding (Adzitey, F, 2011).

To avoid or minimize factors that affect quality of animals during transport, animals should be transported in a convenient and safest way. Therefore, the use of dedicated (modified) trucks should be encouraged and legally enforced. On the other hand, the use of ordinary trucks for animal transport should be discouraged and prohibited. Thus, the necessary transport guidelines and regulations on transport and handling of animals should be put in place by the regulatory body of the government and its implementation enforced (Dugasa and Belachew, 2009)

3. MATERIAL AND METHOD

3.1. Study Area

The study was conduct in East Arsi Zone of Oromia Regional state. The Zone is located in South-Eastern Ethiopia at altitude ranging from 1500 to 4245 meters above sea level. The annual mean rainfall ranges from 2000 to 4000 mm and annual ambient temperature varies from 20^{o}c to 30^{o}c. The total numbers of live stock populatio in the area include 3171266 cattle, 1567482 sheep, 707847 goats, 13710 camels, 291908 donkeys and 242357 horses. The great majority of farmers are smallholder livestock keepers in traditional husbandry system (Agricultural office of the zone). Tiyo is one of the administrative woreda found in East Arsi Zone of Oromia Regional state and located at 175 km Southeast of Addis Ababa. The annual rain fall and temperature of the woreda are 1100-1400mm and 10-27c^{o} respectively. The area found at altitudes of 2400 masl. The live stock populations in the woreda include 77246 cattle, 73354 shoat and 27896 equine and 58610 poultry. Digelu/Tijo found at 193 km from Addis Ababa. The annual rain fall and temperature of the area are 900-1400mm and 10-22c^{o} respectively. It found at altitude of 2000-3600masl. The soils of the area have 44% red, 35% loam and 21% brown. Live stock population include; 213167 cattle, 119544 sheep, 8170 goat, 23354 horse, 15560 donkey, 324 mule and 104830 poultry.

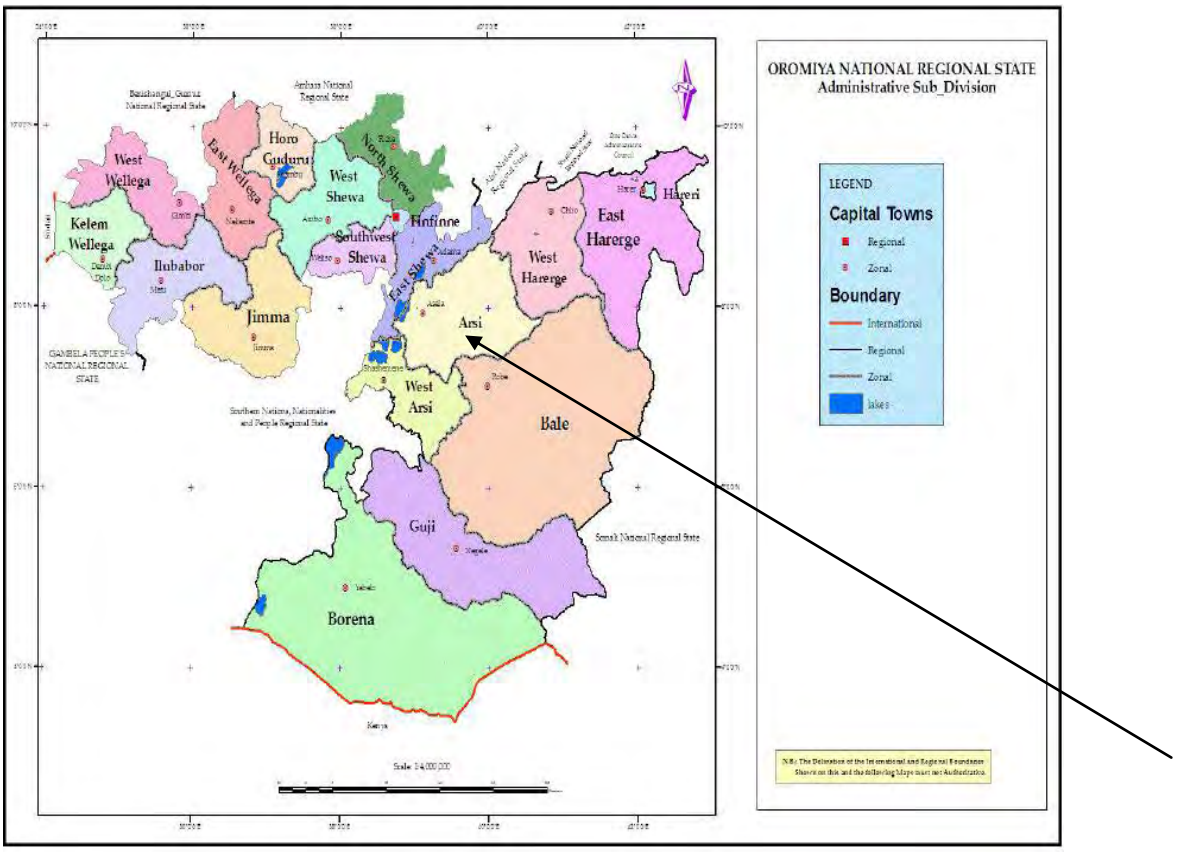

Figure 1: Map of study area

Sources: (BFED, 2008)

3.2. Study Design and Study Population

A cross sectional study design was employed to assess pre-slaughter factors affecting quality of hides and skins and ante-mortem hides and skin management methods in the study area. The study populations were smallholder farmers and farm holders found in and around Asela and Sagure town, middle men and butchery and key informant in both wereda of the study. Study units were randomly selected households, farm holders, local livestock traders, butcher men and key informants.

3.3 Study Procedures and sample size

Data collection sites were households, middle men, butchers and intensive and semi-intensive farms. Key informants such as development agents and experts in the agricultural office of the Woredas were also interviewed. Two Woredas (Tiyo and Digelu/Tijo) were purposively selected based on potential of live stock population. For the households, five Peasant *kebeles* (Bilalo ,Burka Chilalo, Dosha Gora selengo and Kombolcha) from Tiyo Woreda and (Ashebeka welkitie, Burkitu Alkessa, Gusha Tiemiela, Sagurie Molie and Sagurie 01) from Digelu/Tijo woreda (one from urban and four from rural) were purposively selected from the list provided by Woreda Offices of Agriculture. The number of household in each *kebeles* was taken by proportion depending on number of house hold in each *kebele* and households to be interviewed were taken randomly. A total of 100 respondents were selected from each Woreda.

The sample size was determined by using the formula recommended by Ashram (2007) for formal survey studies.

$$N = \frac{0.25}{SE^2} = 0.25/0.05^2 = 100$$

Where

N=sample size

SE= standard error Assuming the standard error of 5% at a precision level of .0.05 and the confidence interval of 95%.

3.4. Method of Data Collection and Sources of Data

Questionnaires and personal observation were used to collect primary data. The questionnaire generally includes data on animal feeding, housing, management, identification, transportation, perception of respondents on the value and quality of hide and skin (appendix I). Observations were made on any pre-slaughter factor affecting hide and skin quality.

On the other hand, two intensive and two semi intensive farm in both woredas were visited for any pre slaughter factors affecting hide and skin quality. Moreover, cattle corresponding to each farmer and farm holder were observed for any skin/hide defects. 48 butchers found in each woreda and 40 live stock trades were also interviewed.

3.5. Data Analysis

Appropriate data were collected from each respondent and stored in Microsoft Excel spread sheet. Data analysis was carried out by using SPSS 20 software. Descriptive statistics such as mean and percentage and standard deviation were used to present the results.

4. RESULTS

4.1 General Household and Livestock Information

4.1.1. House hold characteristic

Out of the total interviewed households (N =200), (54%) were females and (46%) were males. The same pattern of gender distribution was observed in the specific study sites. In terms of education, significant number of households interviewed did complete primary school (38%) which was followed by those able to read and write only (30%). The proportion of illiterate respondents was higher in rural than in urban areas (Table 1). Those who attended secondary school and above accounted for about (8.5%).All respondents had age above 18 years.

Table 1: Educational level of respondents in rural and town

Education	Rural	Town	Overall
	N= 151	N= 49	200
Illiterate	43(28.5%)	4(8.1%)	47(23.5%)
Primary school	56(37.1%)	20(40.8%)	76(38 %)
Reading and writing	44(29.1%)	16(32.7%)	60 (30%)
Secondary school	7(4.6%)	9(18.4%)	16 (8%)
Diploma	1 (.7%)	0	1(0.5%)

4.1.2. Ruminant livestock Population

The livestock herd in the studied households was composed of local cattle (53.8%), cross breed (9.36%) and sheep (36.9%) (Table2). Cattle holding was significantly higher in Tiyo woreda in which Assela town is located than in Digelu/Tijo Woreda which is 18km away from Assela town ($P<0.05$).

Table 2: Mean ruminant livestock holding/100 sampled households in each Woreda

Livestock species	Study location			
	Tiyo	Digelu/Tijo	Over all	(%)
Local breed cattle*				
N	597	831	1428	53.8
Mean ±SD	6.38±4.822	8.31±4.817	7.345±4.8195	
Sheep				
N	405	576	981	36.9
Mean ±SD	4.05±5.372	6.26±5.808	5.155±5.59	
Crossbreed cattle				
N	104	145	249	9.36
Mean ±SD	1.04±1.556	1.45±1.648	1.245±1.602	

*= Means show significant difference in the two woredas, n= total livestock (for each species) SD= standard deviation

4.1.3 *Purpose of Keeping live stock and importance of side and Skin in study area*

According to the respondents, cattle were kept to fulfill multipurpose functions. These include milk, drought power and cash income and also as sign of wealth. The majority of the households in both woreda kept ruminant for milk production and drought power, while some of them kept for cash income, only few of responded kept livestock as sign of wealth. There is no significant difference ($P>0.05$) in the purpose of keeping ruminant livestock between the two woredas. Moreover, the importance of hide and skin is appreciated almost similarly by respondents from both sites. (73.3%)

and (80.8%) of both cattle and sheep owners rank hide as more important than sheep skin in Tiyo and Digelu/Tijo woredas respectively. Most (72.5%) farmers interviewed used hide and skin to make utensils while (66%) of them used them for cash income (Table 3). On the other hand, most respondents used cattle hide at home for different purpose such as for making utensils like 'kurbet', 'wenber' and also to cover different hand tools than sheep skin. In addition to these, culturally people who have many locally modified sheepskins at their home are seen as rich.

Table 3: Relative use of hide and skin in the study areas

Use of hide and skin	Tiyo N=100	Digelu/Tijo N=100	Over all N=200
Make utensil	67	78	145
Cash income	59	73	132
Not so important	8	5	13

4.2. Pre slaughter Factors Affecting Hide and Skin Quality

4.2.1. Households/farmer responses

Disease and physical damages

Hide and skin of the animal can be affected by different pathological and non pathological factors before the animal is slaughtered. 91% and 84% of respondents in Tiyo and Digelu/Tijo respectively ascertained the presence of factors affecting hide and skin quality on their animals in the area. Among those that have indicated the presence of risk factors, all mentioned skin disease as a primary problem followed by horn rake in both woredas (table 4, Figure 2). Similarly, among those who mentioned skin diseases as a problem, significant number of them complained of ectoparasites (Table 5). For all the factors except horn rake, there was no significant difference in the frequency of respondents between the two woredas. In both woredas of the study, ticks were the major problem of cattle mentioned by the farmers. Mite and lice was also seen rarely. Most farmers said that a plant called 'sindedo' was major source of tick and it was seasonal because it was seen during rainy season than dry season.

According to the respondents, horn rakes as a result of fighting between animas occur commonly during grazing as in most instances large animals are tethered individually at night. In the rural part of study site, oxen and bull were used for drought power like ploughing. At this time, most farmers beat oxen on their shoulder and cause rope marks or whip lash called 'sember' by Amharic, which ultimately changes to permanent wound gradually.

Table 4: Pre slaughter factors affecting hide and skin quality (manmade or associated factors)

Factors	Tiyo N=91	Digelu/Tijo N=84	Over all N=175
Skin disease	91(100%)	84(100%)	175 (100%)
Horn rake	42(46.1%)	29(34.5%)	71(40.6%)
Thorny plant	18(19.8%)	13(15.5%)	31(17.7%)
Branding	2(2.2%)	3(3.6%)	5(2.8%)
whip lash	29(31.9%)	39(46.4%)	68(38.9%)

Table 5: Pre slaughter factors affecting hide and skin quality (skin diseases or associated lesions)

Skin diseases	Tiyo N=91	Digelu/Tijo N=84	Over all N=175
Ectoparacite	48(52.7%)	50(59.5%)	98(56%)
Swelling	8(8.8%)	7(8.4%)	15(8.6%)
Nodule	12(13.2%)	9(10.7%)	21(12%)
Sheep pox	12(13.2%)	12(14.3%)	24(13.7%)
Alopecia	11(12.1%)	6(7.1%)	17(9.7%)

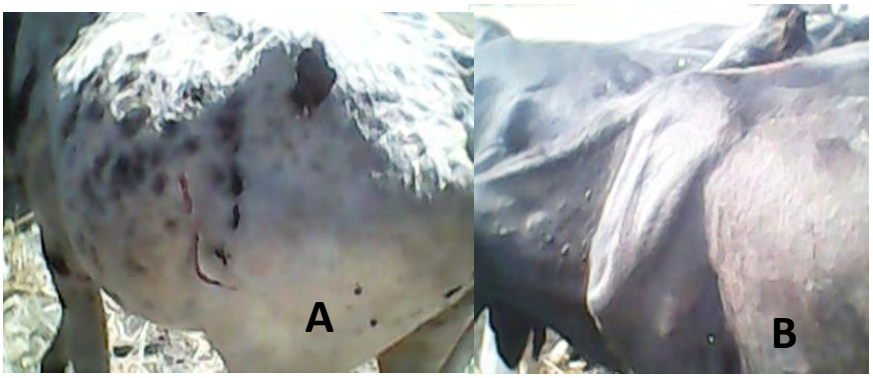

Figure 2 Skin problems on live cattle: A) horn rakes B) nodular swellings

Moreover, thorny plants such as (Echinocactus plantycanthus) “kulkal” (Figure 2) are responsible for causing damage to skin and hides. The plant has two species, the first one has no thorn, but it produces white latex that can affect animal hide and skin by gluing the hairs to the skin and hardening. The second one has thorn which causes scratches and wounds. Most of the farmers use this plant as a fence around their homes and farm yards.

Figure 3: The plant species identified as source of damage to skin and hide

In the study area, branding was rarely practiced on cattle for purpose like disease treatment, herd identification and to check whether the animal is properly castrated or not and for each purpose they brand on different part of body. The Zonal Agricultural Office reported that branding on the neck region has been allowed by animal heath extension workers and veterinarians to treat some diseases that cause swelling on that part of the body.

Figure 4: Branding on the different parts of the animal practiced in the study area

Housing and floor type

Most farmers (43%) confined their animals in the house during night time with smooth earth floor (figure 4B, Table 5) while 24% keep them in the house with earth floor done made with stones (Figure 4A). In contrast to this, some farmer leave their animals outside in a simple fenced pen (Figure 4C). Most of farmer 74% confined large ruminant and small ruminant independently, while 26% of them keep the two species together in one pen.

Table 6: Animal housing practice during night time

Housing during the night	Tiyo N=100	Digelu/Tijo N=100	Over all N=200	%
In house with stony floor	20	28	48	24
In house with smooth earth floor	48	38	86	43
In house with rough earth floor	11	7	18	9
In fenced pen with rough earth floor	15	18	33	16.5
Fenced pen with smooth earth floor	0	2	2	1
Unfenced plot with rough earth floor	6	7	13	6.5

Figure 5: Different type of housing system

Production system and type of feed

Of the ten *kebeles* included in the study, eight of them were from rural areas; in General extensive production system was the common production system found (88%) and the rest reported a semi-intensive system especially in towns. Crop residue (87%) and free grazing (79%) were the dominant feed sources in the study sites. Barley straw, wheat straw and grass forage were provided for animals. In addition to this few of them (20.5%) fed homemade alcohol distillation byproduct called 'atela' and concentrate. Concentrate supplementation was limited in the town sites only.

Most (63%) farmers in Digelu/Tijo woreda and (36%) of interviewed farmers from Tiyo woreda reported feed and water shortages during dry season. At this time, most of animals show signs of emaciation and are more exposed to different diseases such as ectoparacitism. In areas where water is available during the dry season, the quality of the water become poor and farmers believed that this predisposes them to diseases although the impact of water shortage on hide and skin quality is not known by the farmers.

4. 2.2. Livestock traders' responses

Source of animals

In Tiyo woreda, the source of animal for majority of trader (75%) was local market and some of them (50%) buy from farmer by directly going their home. In Tijo/Digelu no trader bought animal from farmer, all of them bought from other middle men. Of 40 middle men interviewed, (70%) trade cattle and (45%) of them trade sheep (appendix table1). Most of traders (82.5%) see quality of the skin or look of the animal in addition to body condition and general health before buying the animal, but (17.5%) of them did not consider hide and skin quality. All traders believe that qualities of hide and skin have great effect on price because any mechanical damage and skin disease can decrease animal price.

Damage frequently seen on animal

Of all traders interviewed, (100%) in Tiyo and (75%) in Digelu/Tijo reject buying the animal due to different defect. Branding defect was one of the major reasons for rejecting to buy an animal for (66.7%) of respondents in Digelu/Tijo (Table 6).

Table 7: Damage observed by traders on animals at livestock markets

Factors	Tiyo		Digelu/Tijo		Over all	
	N=20	%	N=15	%	N=35	%
horn rake	9	45	9	60	18	51.4
rope mark	2	10	6	40	8	22.9
Branding	3	15	10	66.7	13	37
dirt & contamination	1	5	1	6.7	2	5.7
Ectoparacite	3	15	2	13.3	5	14.3
Wound	6	30	4	26.7	10	28.6
Sheep pox	4	20	4	26.7	8	22.9

Transportation and housing system

Most traders (90%) transport animals they bought from market to markets on foot while 10% of them use tracks especially to big cities (table7). In most cases, animals stay for some days with the traders until they are transported to the next destination. During this time they use different sheltering systems like housing pen and fenced pens with smooth or rough earth floors (appendix table2).

Table 8: Means of transporting livestock from market to market or final destination

	Tiyo		Digelu/Tijo		Over all	
	N=20	%	N=20	%	N=40	%
Transport						
On foot	18	90	18	90	36	90
By track	2	10	2	10	4	10

When animals are transported on foot, they were beaten mainly on their legs (62.5%) to avoid damage to the essential part of the flesh, and shoulders 28% or not beaten at all (19.5%). Most traders said that hide and skin have no significant advantage for them.

4.2.3. Butchers 'response

Selection of Animals for slaughter

Of the 48 butchers interviewed, (79.2%) slaughter cattle and 18.8% slaughter sheep. The sources of animal for most of butcheries were local market (93.8%). They buy either from market of the same woreda or any market of the zone. Where ever the source of animal, they transport them up to slaughter house on foot. So, it may take days to arrive from their source to slaughter house. Most butchers (60.4%) select animals with good look and smooth skin for slaughter. One of their reasons was to sell the hide and skin to hide and skin collectors/traders at good price. On the contrary (39.6%) of them do not consider quality of the skin because their main purpose is meat and income they earn by selling hide and skin is very little. Hence, they reject to buy the animal only if it is deeply wounded and when they think that this affects the quality of meat.

Factors affecting hide and skin quality along transportation rout

Of 48 butcher interviewed (47.9%) ascertained that there are factor damaging hide and skin quality along transportation route. From these horns rake (95.7%) and rope mark (73.9%) were factors mentioned by butchers, because number animals are transported and stay in one pen during night, this increase the risk of the horn rake (table9). They beat animals frequently on their leg (85.4%), shoulder (54.2%) and rarely horn (14.6%) and cause severe damage to the animal occasionally (Table10).

Table 9: Factors affecting hide and skin quality during transportation on foot by butchers

Variables	Tiyo		Digelu/Tijo		Over all	
	N=9	%	N=14	%	N=23	%
Factors						
Horn rake	9	100	13	92.9	22	95.7
Rope mark	6	66.7	11	78.6	17	73.9

Table 10: part of body beaten frequently

Part of body	Tiyo N=19	%	Digelu/Tijo N=29	%	Over all N=48	%
Leg	15	78.9	26	89.7	41	85.4
Shoulder	10	52.6	16	55	26	54.2
Horn	2	10.5	5	17	7	14.6

Animal sheltering before slaughter

Most butchers (62.5%) do not take animal to their home; animals go directly from market to abattoirs. If they have to stay, there is a place prepared for this service only, so, they pay some money per animal and the animal stays there during night time. It is a fenced pen which have smooth earth floor done from soil (appendix figure1), but here a lot of animals are expected to be confined together in one pen which may predispose them to horn rakes. Only some butchers take the animals to their home when they want to keep and fed them for some time (Table11).

Table 11: Animal sheltering until slaughtering

where animal stay during night	Frequency	Percent
In house with concrete floor	3	6.3
In house with smooth earth floor	7	14.6
In fenced pen with rough earth floor	8	16.7
In fenced pen with smooth earth floor	30	62.5
Total	48	100.0

4.3. Pre-slaughter hide and skin problem management practices

4.3.1 Veterinary and livestock extension services

Majority of farmers (82%) interviewed have ascertained that they get veterinary services in their closest proximity. Moreover, 47.45% of the farmers practice treating their animals by buying medicines from pharmacy (Table10). Despite the presence of veterinary services, no extension agent working on pre-slaughter hides and skin quality management as a focus area exists. So, farmers do not get any advice about feeding, housing system and general management system rather than their own indigenous knowledge. Contrary to this opinion of farmers, key informants interviewed in the Woreda Agricultural offices argue that farmers are getting advices or consultations on Pre-slaughter hide and skin quality management.

Table 12: place where farmer treat their animal

	Woreda					
where do treat diseased animal	Tiyo		Tijo/digelu		Total	
	N=60	%	N=58	%	N=118	%
Vet clinic	24	40	13	22.4	37	31.4
Buy medicine and treat my self	27	45	29	50	56	47.5
Use traditional treatment	9	15	16	27.6		21.1

4.3.2. Other management practices

In the study area, farmer treat animals affected by tick by buying medicine from pharmacy and spray on their body and some of them treat traditionally in their home by adding 'kerosene' on affected part. Farmer thought that though the effect of ectoparacite is low, it reduces animal productivity if it is around teat and reduce animal work power if it attaches on their legs. No one took animal to veterinary station for ectoparacites except for other skin problems. Dehorning is not a practice in the study areas. So, most farmer manage horn rake by tethering each animal individually and by culling aggressive animal from the herd.

4.4. Observations on Skin lesions and Wounds affecting Hide and Skin Quality

All ruminant livestock owned by the 200 interviewed study participants were examined for the presence of skin problems. Of the total 1677 cattle and 981 sheep under observation, 123 (7.3%) cattle and 16 sheep (1.6%) were found to have been affected by mechanical factors on their skins (Table11). Among the animals with mechanical damages on their skin, contamination with dirt and horn rake is the major problems. The major problems identified on skin of sheep were dirty hair coat (81.25%) and wounds of unidentified causes (18.75%) among sheep identified with skin problems. In addition to these, gross lesions as sign of skin diseases were observed on 64 cattle (3.8%) and 15 sheep (1.5%). Among animals identified with skin disease problems, scab, nodule and ulcers were the dominant problems in cattle whereas scab, ulcer and sheep pox were common in sheep.

Table 13: maltreatment and skin disease indicators observed on animals

Skin problem indicators	Animal species			
	Cattle		Sheep	
	N	%	N	%
Mal treatment indicator				
Horn rake	30	24.4	_	_
Rope mark	15	12.19	_	_
Yoke mark	10	8.13	_	_
Branding	3	2.4	_	_
Wound	17	13.8	3	18.75
Dirt and contamination	48	39	13	81.25
Disease indicators				
Scab	24	37.5	6	40
Ulcer	15	23.4	4	26.7
Nodule	17	26.6	2	13.3
Sheep pox	_	_	3	20
Alopecia	8	12.5	_	_

4.5 Farm Observation

In both woredas of study, some intensive and semi intensive farms were exist. Of existing farms, two intensive and two semi-intensive farms were observed for pre-slaughter factors affecting hide and skin quality. In Tiyo woreda, the intensive farm had conversional housing system with proper drainage. However, the body of all animals in the farm was soiled by feces and urine. Wound and skin disease indicators like scab and scar were also observed on animal body (appendix fugure2).

In the semi intensive farm of Tiyo woreda, proper house was prepared only for milking cows (figure5 C). Heifer and calf confined in house with concrete earth floor prepared from stone (figure A and B). The body of all animals in the farm was soiled by feces and urine and also mechanical damage like wound was observed.

Figure 6: housing for different group of animal in the semi-intensive farm

In the second wereda, Digelu/Tijo one intensive farm (sheep fattening) and one semi-intensive farm (cattle fattening) were observed. In the intensive one has 180 male sheep; they have different house for day and night. During night they confined in house which have smooth earth floor while during day time they stay in fenced pen. No skin defect was seen on the sheep skin. The semi intensive one has cross breed bulls. Majority of the animals have pure clean skin but horn rakes were seen on few of them. They are confined in house which have rough earth floor.

Figure 7: Housing system for sheep fattening

5. DISCUSSION

5.1 Pre slaughter Factors Affecting Hide and Skin Quality

Ectoparasite was the major pre slaughter factor causes hide and skin defect in study area. From ectoparasite, tick was a serious problem mentioned by farmer. Tick can cause a great damaged to hides and skins and predispose animals to secondary attacks from other parasites and infection by pathogens and it was seasonal because it was seen commonly during rainy season. Zenaw and Mekonen (2012) reported that Ectoparasites have the tendency to damage skin directly, using their piercing mouth parts mechanically or indirectly by causing irritations and annoyances as they feed on the skin debris or crawl over the body surface causing hyper sensitivity reactions to the body leaving unnoticeable scars at purchasing and/or curing stages. Tick infestations tend to decrease during the dry season compared to the wet seasons (Simeon and Tesfaheywet, 2013). According to Teklay (2010), badly tick infested animals have poor health and provide hide with lack of subsistence. Mohammad *et al* (2002) reported that, tick damages the skin in areas where they attach themselves which become inflamed. Raw materials affected by tick-infection are down-graded and are of reduce value to the leather industry (Nyamrund, 2007). Ticks penetrate the hide when feeding; leaving a very small hole in the hide that is still visible after tanning. The irritation caused by the ticks may cause the animal to rub itself against objects, resulting in scratches on the hide. Tick bites may become infected, which makes the hide damage worse (LSA, 2005). In study site lice and mites were seen rarely, but they reduce quality of hide and skin by causing irritation to the animal skin. According to LSA (2005), Irritation caused by lice causes cattle to rub themselves against fences, posts, trees etc. This results in scratches on the hide. There is also some evidence that lice may cause a fault known as hide spot

On the other hand, horn rake was a major of mechanical factors affecting hide and skin quality which was followed by whip lash, effect thorny plant and branding in study area. Horn rake can be occurred at field during grazing when animal fight each other and cause scratch and tearing to hide. Newman (2007) pointed out that, horned cattle hurt and damage other cattle, either deliberately or accidentally, especially

when they are close to each other at feeders, in yards and during transport, get more injuries, bruising and hide damage. On cattle hides horn rakes are a general problem as animal husbandry practices in these countries discourage dehorning. Cattle injure the hides mostly in crushes, in fights or during transportation (Mohammad et al, 2002). Horn rakes cause the formation of open wounds or scars that reduce the useable area of the hide (LSA, 2005). Whip lash were commonly seen on the shoulder of ploughing oxen and bull. It can be covered by hair after some time so, wound is not visible. Thorny plant was also other factors causes and skin damage. In study area plant called "kulkal" was kwon by causing skin defect. Especially large animal are prone to this factors because, they rub their body against the plant stem and make it to produce latex like solution which can damage their skin. Mohammad *et al.* (2002) reported that thorn plant cause scratch to hide and skin, scratches give leather an anaesthetic appearance and if deep, cause considerable loss of tear strength especially on skins

In study area, branding was used for different purpose like to identify animals, as disease treatment and to check whether the animal is properly castrated or not. For each purpose farmer brand their animal on different part of body. Nyamrund (2007) reported that branding spoils leather like wounds. The wide spread and indiscriminate practices of branding cause high losses in the hide and leather industry. Branding cause permanent damage to the hide, and branding is usually on the rump the most valuable part of the hide (LSA, 2005). Pastoralists brand their livestock for identification as livestock rustling is a common practice among pastoral communities) and as cure for various diseases, and branding marks are made on the larger part of the body destroying the hide (Wayua and Kagunyu, 2007). Patterson and Loren (2000) also said that branding costs the leather industry large amounts of money due to the wasted portions of the hides. The loss of value is dependent on the placement of the brand.

Majority of farmer confine their animal in the house but few of them confine in fenced pen without shade, this type confinement expose the animal to many harsh environment like sun and rain. Similarly Sintayehu *et al* (2008) in Shashemen -Dilla reported that most households kept their cattle in the house, while considerable proportions used open barn/shed. Sheltering cattle, not only protects animals from

extreme environmental hazards, but also ease some other husbandry practices. In addition to this some farmers in study area confine their animal in house which have concrete earth floor. Stony type of floor can rub animal and cause damage to hide and skin. Graunke *et al.* (2011) reported concrete floor is particularly abrasive because of the sharp edges and protruding aggregate that naturally develop as it is cures. In area of study all farmer confine different group of animal in one pen, these increase risks of cross contamination. Contamination can affect hide and skin quality. Mekonnen, (2008) said that, dirty coat causes discomfort and wound on the skin and hide. Humidity and condensation in poorly ventilated buildings result in dirtier cattle. Uneven floor surfaces and poor drainage cause wet, dirty hides. Dung contamination causes irreparable damage to hides (FSA, 2007).

The most common production system found in the area was extensive production system. In extensive production system, animal expend most of their time at field, during these time they are exposed to many mechanical damage like horn rake, thorn plant that can damage hide and skin quality. In addition to this animal are affected by tick as they contact with animals come from other area. Crop residue and free grazing were common feed in the area. This result was agree with the report of Tolera *et al* (2012) in highlands of Ethiopia and Zemenu *et al* (2014) in Debre markos Amhara region which say crop residue and natural pasture to be the major feed resources. Nutrition has an effect on hide and skin quality, in that undernourished animal can produce low quality hide and skin. Mohammad *et al.* (2002) reported that Zebu cattle from the communal sector fattened for supplying to the abattoirs produce better quality hides than those produced by pastoral cattle, indicating that nutrition plays a role in improving hide and skin quality. Poor nutrition causes an animal to be smaller, the skin thinner and of poorer substance (teklay, 2010). Wesley and Wright (2002) also pointed out that animals with poor nutrition yield skin of poor substance and lesser area than well fed healthy animals

In areas of study some farmers face feed and water shortage problem during dry season. At this time the animals become emaciate and exposed to different disease and ectoparacite. Emaciation causes shrinkage to hide and skin. This was similar to result of Katiku *et al* (2012) in Kenya, Zemenu *et al* (2014) in Debre markos and Belay *et al* (2013) in Ginchi watershed, (Dhaba *et al,* 2012) in Illu Abba Bora and

Belete *et al* (2010) in Fogera which indicated that, feed and water shortage is the most important constraints to livestock rearing in all those areas of study. Animals with poor nutrition yield skin of poor substance and lesser area than well fed healthy animals (Yakob, 2013). Lack of fodder and other nutritional feeds leads to the poor development of texture of an animal skin (Mwinyihija, 2010).

The sources of animal for most of butchers and trader were local market, and they transport the animal from market to market on foot, in contrast to this Solomon *et al* (2010) in Mieso and Alaba reported that animal are often trekked or transported on carts to market places. Berhanu *et al* (2007) in Alamata and Mekelle also said that livestock are transported mainly from market to market by truck. During foot transportation, animals can exposed many mechanical factors like horn rake, rope mark and scratch and tearing due to different thorny plant along transportation rout. The opportunity to be affecting by horn rake was high when group of animal are confined together during night until they slaughtered. Most transporters beat the animal during transporting them to slaughter house or from market to market and this can cause damage to hide and skin. According to Adzitey, F (2011), various degrees of bruising can occur on animals hide and skin at the market depending on the way they are handled. Poor transportation can have serious deleterious effect on the welfare of live stock and can lead to significant loss of quality production (FAO, 2001).

5.2. Hide and Skin Quality Management Method

Majority of farmers interviewed have ascertained that they get veterinary services in their closest proximity. So, some of them take animal to veterinary station for skin disease, but majority of farmers in study area treat their animal in their home by buying medicine from pharmacy, while some of them use traditional type of medicine like kerosene to treat ectoparacite.

On the other hand farmer in study area did not apply dehorning, so, they manage horn rake by tethering each animal individually in pen, so horn rake can be occurred during grazing only.

6. CONCLUSION AND RECOMMENDATION

From results of this study, it is concluded that, prevalent factors that can be affect hide and skin quality are skin disease and mechanical damage. From skin disease, ectoparacite was a serious problem mentioned by respondent. Among mechanical damage; horn rake, and whip lash, thorny plant and branding were common factors hide and skin defect in study area. In addition to this housing and transportation system and feed shortage in terms of quality and quantity were also other factor causes hide and skin damage. There is veterinary service in study area. Farmer treats animals affected by tick by buying medicine from pharmacy and spray on their body and some of them treat traditionally in their home by adding 'kerosene' on affected part. While some of them take to veterinary station for skin disease. In addition to this farmer manage horn rake by tethering each animal individually in pen during night.

It was observed that several mechanical and pathological factors can affect hide and skin quality before the animal is slaughtered. As pre slaughter period cover greater part of animal life, exposing animal to those factors lead to poor quality of hides and skins after the animal is slaughtered. Therefore from this study, the following recommendations should be undertaken to improve hide and skin quality in the study area:

- There should be extension service in for farmer in the rural area
- Training should be given for traders, butcher and rancher on housing, feeding, transporting method that can be damage hide and skin of the animal.
- Communal grazing land both in urban and rural areas should be utilized through cut and carries system to reduce damage occurred during grazing.
- To reduce the impact of ectoparasites the appropriate and strategic control measure should be applied by animal health service.

- One way of overcoming dry season feed problem is to conserve the excess forage during the rainy season. The excess forage could be conserved in the form of hay at the end of the main rainy season. Thus training of the interested farmer in hay making techniques and providing them with appropriate tools or any logistic support would contribute to alleviation of the problem of feed shortage during the dry season.

- Different water source should be prepared for animal to reduce problem of water shortage during dry season.

- Transportation method have to be improved for middle men and butchers, this can reduce damage occurred during transporting the animal on foot.

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8. APPENDIXES

Appendix I. Questioner format

I. Households/farms

General information

1. Respondent ID____ Woreda _____Kebele _____Date _____
2. age _____
3. sex _____
4. Respondent Education: 1) Illiterate___ 2) Primary school__ 3) Reading and writing __4) secondary school___ 5) Diploma ____ 6) Degree___
5. Number of animals by species: 1) cattle_____ 2) Sheep____
6. Breed of animals if different from local: 1) cattle____ 2) Sheep___
7. Purpose of keeping ruminants; 1) For cash 2) For draught power 3) For milk 4) wealth

Respondent perception on hides and skin

1. Do you get veterinary service when they get sick? 1) yes 2) no
2. Use of hide and skin 1) cash income 2) make utensils 3) not so important
3. Do you care for your animals so that their skin will not be damaged? 1) yes 2) no
4. How? 1) treating wounded animals 2) avoiding damage to skin at work, during grazing, transport
5. Do you know any factor affecting hide and skin quality before the animal is slaughtered? 1) yes 2) no
6. If yes for question 5 what are there? 1) ectoparacite 2) Horn rake 3) rope mark 4) thorny plant 5) small pox 6) branding 7) swelling 8) nodule
7. Which one is most important for you? 1) hide 2) Sheep skin

Management practices

8. Management system? 1) extensive 2) intensive 3) semi-intensive
9. Which type of Feed is available in the area?: 1) forage 2) crop residue 3) concentrate 4 atela
10. Do you have feed and water Shortage problem? 1) yes 2) no
11. At what time of the year? 1) summer 2) winter
12. How the Condition of your animals during is feed and water shortage?

1) They emaciate 2) exposed to ectoparacite

13. Do you think feed and water shortages reduce the quality of the skin? 1) yes 2) no

14. Where do your animals stay during the night? 1) In house with concrete floor 2) In house with concrete floor and bedding 3) in house with smooth earth floor 4) in house with smooth earth floor and bedding 5) in house with rough earth floor 6) in house with rough earth floor and bedding 7) in fenced pen with rough earth floor 8) outside with rough earth floor 9) in fenced pen with smooth earth floor
15. Are all group of animals confined together? 1) yes 2) no
16. Do you think the quality of the skin can be affected by the floor quality? 1) yes 2) no
17. Do you use any branding method for identification? 1) yes 2) no
18. If yes to the above question, on which part of the body? 1) on neck 2) on shoulder 3) leg 4) other
19. If yes to Q17, do you think it affects the quality of the skin? 1) yes 2) no
20. Where do you treat your animal? 1) Vet clinic 2) buy medicine and treat myself 3) use traditional method of treatment 4) get support from friends 5) do nothing
21. Do extension agents advise you on hide and skin quality management? 1) yes 2) no

Observation

Species	Mal treatment indicator					
	1.wounds	2.branding scars	3.whip lash	4.Horn rake	5 yoke mark	6 dirt and contamination
Cattle						
Sheep						

Species	Skin disease indicators				
	1.Nodules	2.alopecia	3.scabs	4.Ulcers	5. small pox
Cattle					
Sheep					

II. Butchers/restaurants

1. Butchery/restaurant ID_____ Woreda _____ Kebele_____
2. What kinds of animals do you slaughter? 1) cattle 2) sheep 3) Goat
3. Where do you buy the animals? 1) Local market 2) from another market
4. How do you transport your animals from the market to the slaughter house/restaurant? 1) on foot 2) by track
5. Have you noticed any condition that could damage the skin/body of the animal along transportation route? 1) yes 2) no
6. horn rake 1) yes 2) no
7. rope mark 1) yes 2) no
8. What criteria do you use to buy your animals for slaughter? 1). Animal with good body condition 2) Animal with good body condition and pure skin
9. Do you consider the look or quality of the skin when you buy? 1) yes 2) no
10. Do your personnel bit animals when transporting to the abattoir? 1) yes 2) no
11. On which part of the body do they frequently bit them? 1) on leg 2) on shoulder 3) on horn
12. Where do you keep the animals until they are slaughtered? 1) In house with concrete floor 2) In house with concrete floor and bedding 3) in house with smooth earth floor 4) in house with smooth earth floor and bedding 5) in house with rough earth floor 6) in house with rough earth floor and bedding 7) in fenced pen with rough earth floor 8) outside with rough earth floor 9) in fenced pen with smooth earth floor
13. Do you care for the skin before slaughter? 1) yes 2) no
14. How important is the skin/hide for you? 1) cash income 2) make utensil 3) not so important

II. Key informants

1. Is there any extension work on hide and skin quality management? 1) yes 2) no
2. Is there any training given to improve the knowledge of all actors including trader and butchers? 1) yes 2) no

IV. What are the gaps in the pre-slaughter hide/skin quality management?_____

For middle men/traders (Market)

1. Trader ID_____ Woreda _____
2. Where are you common sources of livestock? 1) households 2) local markets
3. markets from other areas 1) yes 2) no
4. Which one is the most common species you buy? 1) Sheep 2) Goat 3) Cattle
5. What criteria do you use to buy your animals for slaughter? 1). Animal with good body condition2). Animal with good body condition and pure skin 3) fat pure skin and selected color
6. Do you consider the look or quality of the skin when you buy? 1) yes 2) no
7. Does the look of the skin have impact on the price? 1) yes 2) no
8. Where do you sale the animals? 1) in the same market 2) to other market
9. Have you ever rejected buying an animal because of its bad look on the skin? 1) yes 2) no
10. What defects do you observe 1) horn rake 2) rope mark 3) branding 4) ectoparacite 5) small pox 6) wound
11. How do you transport the animas? 1) on foot 2) by track
12. Do you sale them immediately or keep them for a while? 1) immediate 2) keep
13. If you keep them for a while, where do you keep them? 1) In house with concrete floor 2) in house with smooth earth floor 3) in house with rough earth floor 4) in fenced pen with rough earth floor 5) outside with rough earth floor 6) in fenced pen with smooth earth floor
14. How important is the skin/hide for you? 1)cash income 2) make utensil 3)not so important
15. Do you bit animals when transporting? 1) yes 2) no
16. On which part of the body do you frequently bit them? 1) on leg 2) on shoulder

Appendix II Tables and Figures

Appendix figure 1. Fenced pens which have smooth earth floor

Appendix figure 2. Contaminated calf and wounded cow

Appendix table 1. Source of animal, their species and criteria to buy animal

Source	Tiyo		Tijo/digelu		Over all	
	N=20	%	N=20	%	N=40	%
House hold	10	50	0	0	10	25
Local market	15	75	20	100	35	87.5
Market from other area	1	5	0	0	1	2.5
Species						
Cattle	15	75	13		28	70
Sheep	9	45	10		19	47.5

Appendix table 2. Housing system

	Tiyo		Tijo/digelu		Over all	
	N=20	%	N=20	%	N=40	%
Housing						
In house with concrete floor	2	10	0	0	2	5
In house with smooth earth floor	8	40	3	15	11	27.5
In house with rough earth floor	4	20	2	10	6	15
In fenced pen with rough earth floor	2	10	8	40	10	25
In fenced pen with smooth earth floor	4	20	7	35		27.5