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TECHNICAL BULLETIN No.19

COMMON DEFECTS OF SHEEP/GOAT SKINS IN ETHIOPIA AND THEIR



ESGPIP

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FOREWORD

This technical bulletin titled “*Common defects of Sheep and goat skins in Ethiopia and their causes*” is the nineteenth in a series of technical bulletins produced by the Ethiopia Sheep and Goat Productivity Improvement Program (ESGPIP) as an extension support tool to improve the productivity of sheep and goats in Ethiopia.

Despite the huge resources and the traditionally good reputation of Ethiopian small ruminant skins, the quality of skins supplied is deteriorating from time to time due to the increase in the supply of defective skins. Defects occur as a result of a variety of causes during the life of the animal, during slaughter and also after slaughter. The most common defects observed in Ethiopian sheep/goat skins are presented in this technical bulletin as a starting point for making improvements.

Kebele Development Agents (KDA's) should use this technical bulletin as an extension aid to advise producers and traders to produce better quality skins.

At this juncture, I would like to thank all those involved in the preparation and review of this technical Bulletin.

Desta Hamito (Prof.), Chief of Party

ESGPIP

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Common defects of Sheep and goat skins in Ethiopia and their causes

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1. Introduction

Ethiopian small ruminant skins, especially sheep skins traditionally have a very good reputation for quality in the world leather market due to their fine grain and compact structure. They are also very important to the country's economy as sheep and goat skins rank among the largest export commodities. Though Ethiopia has very good potential to produce substantial quantities of skins, the quality of skins supplied is deteriorating from time to time. This has resulted in an ever increasing number of complaints about the quality of skins available to local tanners and the export market. The problem has adversely affected all aspects of the industry including the income derived from exports. Improvement of the quality of raw material is vital in expanding trade in the sector. Better-quality skins fetch better prices. Eliminating or at least reducing defects that cause the down-grading and consequent rejection of the raw material will improve price received. Defects occur as a result of a variety of causes during the life of the animal, during slaughter and after slaughter. The most common defects observed in Ethiopian sheep/goat skins are presented below.

2. Common sheep/goat skin defects

Common skin defects can be categorized as: environmental/natural causes; defects due to external parasites and disease; pre-slaughter/ante-mortem defects involving human activities; and post mortem/post slaughter defects such as improper flaying and skin cuts/gouges.

2.1 Environmental/Natural causes

These include breed/type, sex/age, nutrition and climate.

- **Breed/Type:** Sheep skins show more undesirable breed characteristics than goat skins. The best quality skins are plump or stout and have dense uniform structure and usually have surface areas that are small in proportion to their weight. Fine wool sheep breeds, such as Merino, produce skins that are thin, have pin hole grain and are extremely ribby. These skins produce only the cheapest type of leather. The skins of hair sheep have a high proportion of fat in the upper part of the corium and on the flesh side of the skin. In goats, the skin becomes coarser as the animal grows. Skins from goats in the highlands are poor in substance, spready and open grained.
- **Sex/Age:** The skins from male goats and sheep will be heavy with a coarse grain. Female skins will have better tensile strength. The skin structure of young animals tends to be fine, compact and have tight grain patterns. As animals grow older, the grain surface becomes tougher and coarser grained. 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.
- **Nutrition:** Poor nutrition causes an animal to be smaller. It also causes the skin to be thinner and have poorer substance producing leather which lacks elasticity and has a dead feel. These skins have less fat deposition in the corium and have a finer grain.

- **Climate:** 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 coarser grain. These effects are prominent on goat and sheep skins.

2.2 Defects due to external parasites and disease:

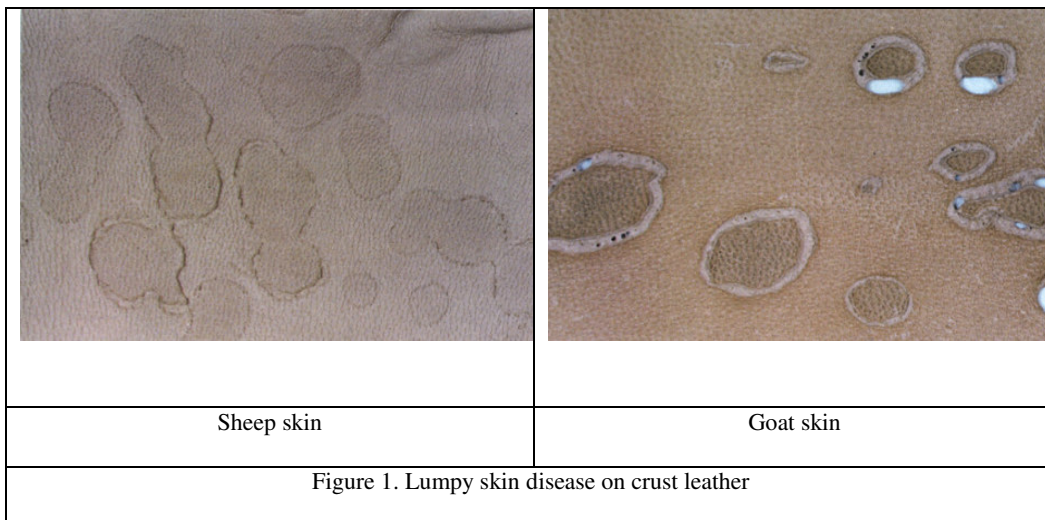
These include parasites and other *d*iseases (Infections) like ring worm, streptothricosis, demodex, dermatophilosis and goat and sheep pox

2.2.1 Fungal Diseases

- **Ringworm:** Ringworm is a fungal infection of the skin that is common in many animal species. It occurs in sheep and goats but not with great frequency. Lesions are most common seen on the head, ears, neck and shoulders. The lesion is often circular with hairless areas and the development of a thickened and crusty skin.



2.2.2 Bacterial Diseases

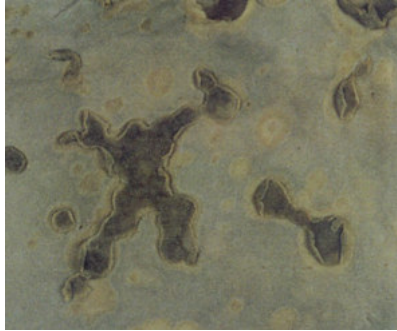

- **Dermatitis:** The disease is characterized as an exudative dermatitis. Lesions usually begin on the animals back. Early signs include matting of the hair or wool into clumps due to sticky secretions exuding from the affected skin. Dermatitis can be very destructive of the skin and lead to extensive rejection of skins for tanning.
- **Streptothricosis:** Is a common disease causing supportive lesions which break out spontaneously or become hardened. These cause blemishes on the superficial grain tissues.
- **Dermatophilosis:** Bacterial disease such as *Dermatophilus congolensis*. The main disease in lambs, lumpy skin disease or lumpy wool disease, affecting the dorsal part of the body is also called ‘strawberry foot rot’.



2.2.3 Viral Diseases

- **Goat and sheep pox:** It is a viral disease of sheep and goats which is highly contagious. Healing of the skin affected by pox is slow and permanent scars can be left. This causes huge economic losses in the tanning sector.

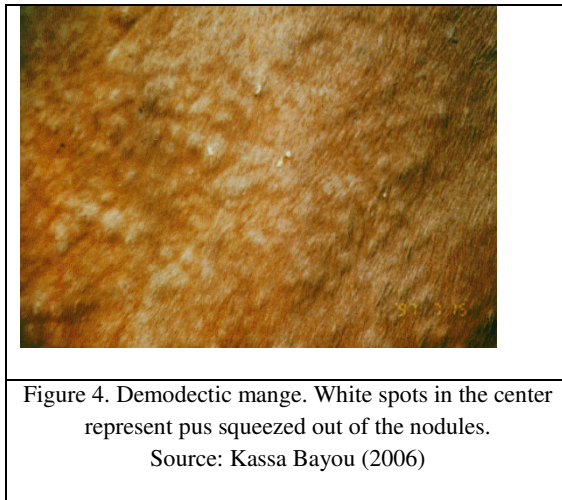
	
<p>Sheep affected by Sheep pox-note swellings on skin</p>	<p>Goat affected by sheep pox -note skin damage</p>
<p>Figure 2. Sheep and Goats affected by sheep pox (Source: Dr. Muhumed – SORPARI)</p>	



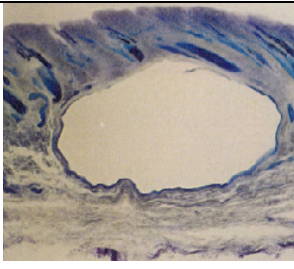
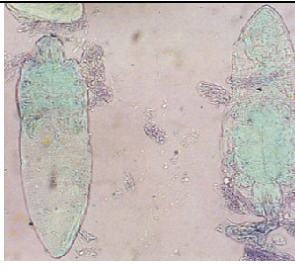
	
<p>Converged lesions and scar areas on pickled skin</p>	<p>Lesions seen on wet blue material</p>
<p>Figure 3. Pox type disease seen on semi-processed sheep skins</p>	

2.2.4 External Parasites

- **Mites:** Cause the skin disease known as mange in sheep and goats. Mites can cause extensive and visible damage but cannot be seen by the naked eye. Mange is a serious cause of skin defects in Ethiopia. *Demodex* is common mange, especially in goats. This mange enters the hair follicles and sebaceous glands producing a chronic inflammation with proliferation and

thickening of the epidermis and loss of hair. It can be easily detected at the raw material stage. It can be a major cause of downgrading skin quality at the tannery.



			
Dark cyst containing mites	Erupted cyst with central pit damage	Cross section of cyst (X47)	Isolated mites (X 475)
Figure 5. Demodex cyst on pickled sheep skins			

- **Sarcoptic mange:** This is chronic mange that may affect large areas of the body. It is the most common cause of mange in goats. The skin lesions are wide spread and can cover the whole body. There is itching and loss of hair. The skin becomes thickened and folded in affected areas. Scales and crust develop on the skin surface. As the skin becomes more damaged it loses its power to protect the animal against secondary bacterial infections.
- **Psoroptic mange:** Mites of the genus *Psoroptes* cause psoroptic mange in sheep and goats. In sheep, the condition is known as sheep scab. As with sarcoptic mange in goats, the skin lesions can be widespread and mange cases are often fatal. There is itching and loss of hair or wool. The skin becomes thickened and folded in affected areas. Scales and crusts developed on the skin surface, as it becomes more damaged it losses its power to protect the animal against secondary bacterial infections. Animals become emaciated, anemic and die.

- **Chorioptic mange:** Caused by *Chorioptic* mange mites. This condition is often referred to as leg mange or foot mange because of the distribution of the lesions, which are usually limited to the lower limbs extending up the limbs to affect the scrotum in males or udder in females. Chorioptic mange is characterized by the production of crusts and flaking especially on the backs of the feet. It causes the downgrading of skins to the tanneries.
- **Ticks:** There are numerous types of ticks that affect sheep and goats in Ethiopia. Ticks attach to the skin of animals and feed on blood of the animal host by the use of piercing mouth parts. Ticks can affect sheep and goat health and affect skin quality in three ways.
 - ✓ The penetration of the skin by the piercing mouth parts makes holes which are defects in processed skins
 - ✓ When feeding, ticks can allow bacteria to pass through the skin leading to the development of local abscesses which damage skin quality more extensively than the holes caused by feeding.
 - ✓ Ticks can transfer infectious disease between animals E.g. Heartwater

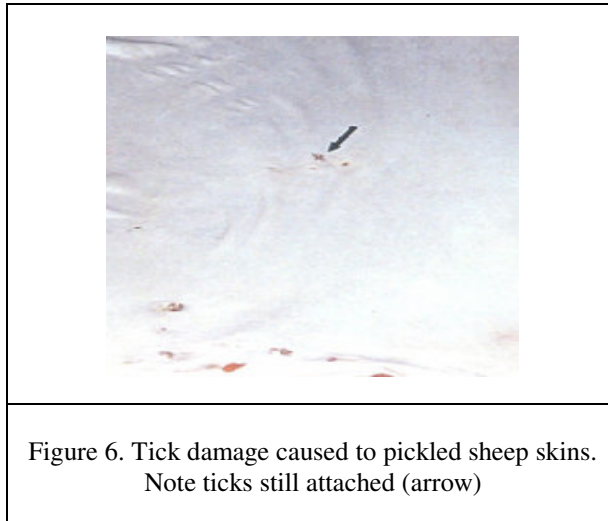








Figure 6. Tick damage caused to pickled sheep skins.
Note ticks still attached (arrow)

- **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.

	
<p>Close up to the skin surface, on wet salted sheep skin</p>	<p>Ked recovered from a wet salted sheep skin (enlarged)</p>
<p>Figure 7. Sheep Ked (<i>Melophagus ovinus</i>)</p>	




- 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 down graded. There are reports of a seasonal pattern to the occurrence of “Ekek”; being higher during or just after the wet or rainy season.

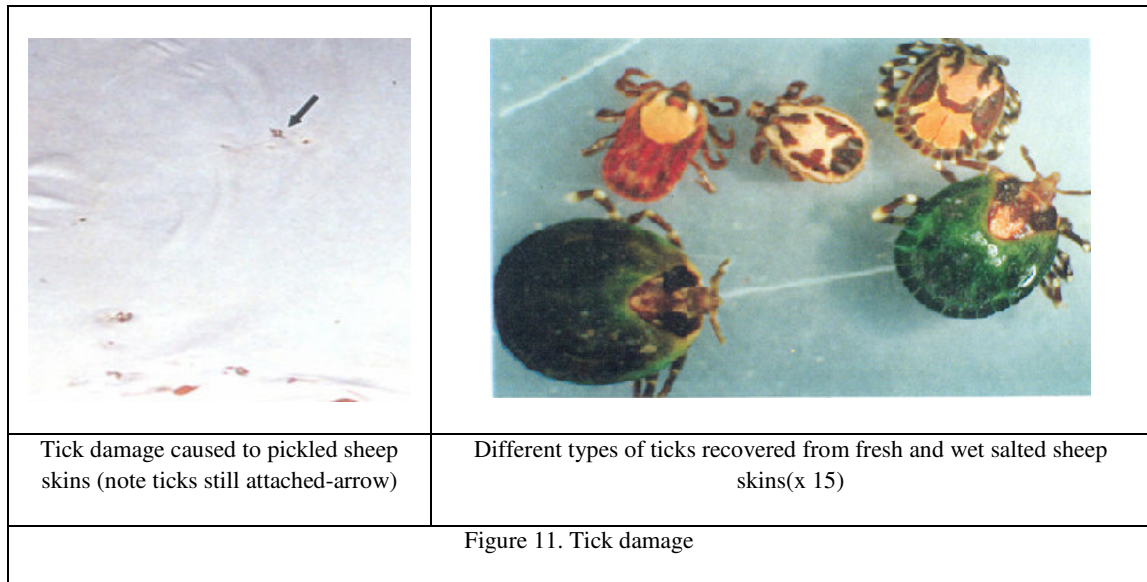
	
<p>Scattered cockle nodules seen over the main body of the skin</p>	<p>Raised nodules seen in the neck and shoulder regions of the skin</p>
<p>Figure 8. Cockle damage seen on pickled sheep skins</p>	

	
Grain damage (x2)	Damage predominantly around neck and shoulder region (arrows.)
Figure 9. Sample “EKEK” damage on crust leather	

• **Lice:** Two types of lice affect small ruminants, biting (chewing) lice (*Bovicola ovis*, formerly *Damlinia ovis*) and sucking lice (*Lignonathus spp.*). Biting lice are brown in color and mobile. They feed by chewing on the skin surface and surface debris.

- ✓ 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.

		
Biting louse recovered from a wet salted sheep skin (enlarged)	Sucking lice (<i>Lignonathus spp.</i>)Seen close to the skin surface, on wet salted sheep skin	Sucking lice recovered from a wet salted sheep skin (enlarged)
Figure 10. Biting and sucking lice		



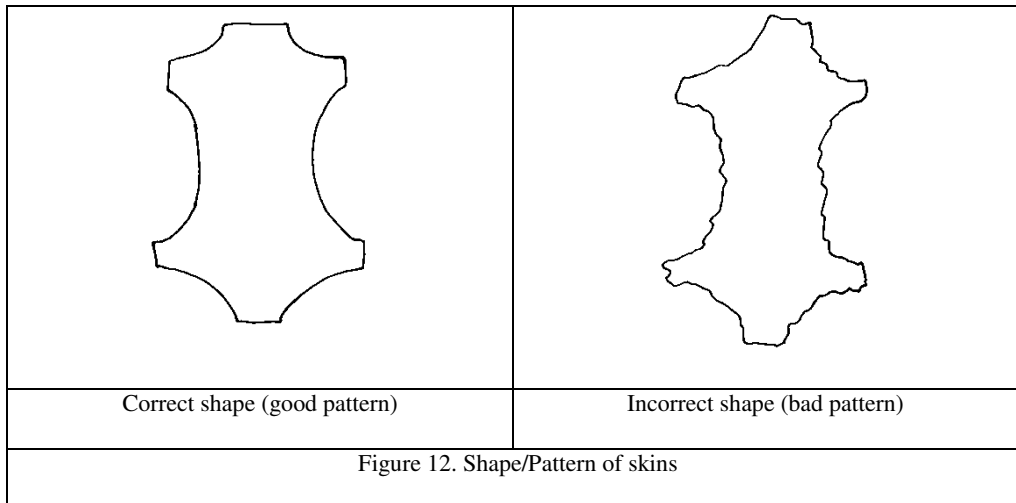
2.3 Pre slaughter/Ante-mortem causes involving human activities:

These include mechanical action and mechanical damages like abrasions, bruises and brands.

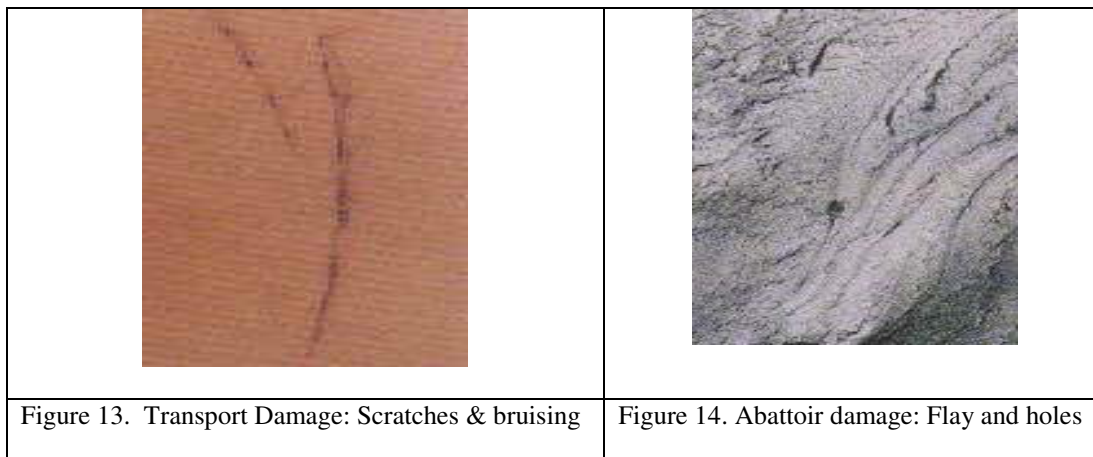
- **Abrasions:** Abrasions damage skins by rubbing, scrapping, etc.
- **Bruises:** Bruising is damage caused by an injury or blow to the body.

2.4 Post mortem/post slaughter defects:

- **Veininess:** Veiny leather is the result of blood vessels in the skin where the blood is not completely drained through proper bleeding. This is an unwanted effect which shows very clearly in suede leather. Veininess is a prominent defect in goat skins and very prominent in glazed kid leather
- **Improper ripping:** Results in small-sized and incorrectly shaped skins
 - ✓ **Small size:** The small size of skins yielded by the hair sheep of tropical and mountain area origin is not considered a drawback because of the skin's superior quality of high tensile strength, compact fiber structure and excellent grain. But small size skins that are downgraded due to poor quality are unwanted by tanneries. To the tanneries, processing these skins represents loss of profit due to the chemicals and labor involved in tanning a skin with a small, poor quality surface unsuited for finishing.
 - ✓ **Incorrect shape:** This is the shape of a skin formed by not following an accepted pattern of ripping before flaying. A bad pattern obviously affects the utilization of the leather produced and reduces the marketability of the finished product.



- **Cuts/holes:** These are damages caused by careless use of an axe and knife during flaying/skinning by penetrating through the skin.
- **Gauge marks:** Knife damages to skin during flaying taking out scooped portions of corium.



- **Putrefaction:** The main constituent of skin is protein. After an animal's death, skin proteins are exposed to bacterial attack that leads to decomposition. Hair slippage is a sign of putrefaction, usually occurring due to delays in preservation, improper curing, or when dried skins are exposed to rain during transport or storage. If hair slippage is not checked in time, putrefaction starts which can be from both the grain and flesh sides. This leads to decomposition of the grain layer. Lack of air circulation, excess atmospheric humidity, skins contacting frames, ground/soil, poles, or ropes etc. during drying/curing will all lead to putrefaction. High temperatures can exacerbate the problem. Blood is difficult to remove from wool or hair and it aids in bacterial attack along with dung.

3. Glossary

Corium: One of three parts of the dermis.

Correct pattern: A standard pattern for a flayed skin when laid out flat, which is adopted by the trade, and which enables the tanner to cut maximum area of good leather from a hide/skin.

Curing: The treatment of skins with common salt or by air drying to prevent putrefaction.

Defatting: The removal of unwanted fatty (adipose) tissue from the flesh side of a fresh skin during fleshing.

Dermis: The layer of skin under the epidermis consisting of the grain, corium, and junction.

Epidermis: The superficial, cellular structure covering the grain layer of a skin.

Flay cuts: Damage caused by careless use of a knife during flaying, sometimes cutting through the skin.

Flaying (skinning): The removal of a skin from a carcass.

Flaying knife: The knife used to sever the subcutaneous tissues when removing the skin from the carcass.

Flesh side: The inner side of a skin next to the body of an animal in life.

Fleshing: The removal of the residual connective and adipose tissues from the flesh side of a skin after flaying.

Fresh (grain, raw) skin: A skin which has received no treatment.

Gouges: Knife damage to the skin during flaying, taking out scooped portions of the corium.

Grain layer: The top portion of the dermis.

Hair slip: Loosening of the hair within the follicles of the skin, an indicator of putrefaction.

Off-take: The proportion of a herd killed, on average, during a given period, e.g., off-take in developed countries may be up to 35% but is frequently not higher than 10–15% in many developing countries.

Pattern: The pattern of skin when laid out flat.

Pickling: Process involving the saturation of dehaired skins with a dilute acid solution and a strong solution of common salt, either as an end itself or as a preliminary stage before chrome tanning.

Poor pattern: The pattern of a skin, on being laid out, does not conform to the standard or correct pattern adopted by the trade, more simply, it is asymmetric and parts of it are displaced from the accepted position. The fiber structure is abnormal in the part transposed by the asymmetric cutting.

Putrefaction: Bacterial and enzymatic breakdown, rotting.

Ripping: Opening of a skin on a carcass, following an accepted pattern of cutting, before flaying.

Ripping knife: Knife designed to make the opening cuts on a skin before flaying. It can also be used for slaughtering, bleeding and other operations. N.B: Is similar to a flaying knife but has a straighter cutting edge.

Salt stains: Permanent stains on the grain surface or deeper, caused by negligent curing.

Scores: Knife damage to skins during flaying by cuts that do not fully penetrate through the skin.

Shank: The portion of a skin which covers the leg of an animal.

Trimming: Removal of unwanted portion of a skin.

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