

Leather Processing Level II

Based on June 2021, Curriculum Version 1



Module Title: - Perform Assortment and Grading

Module code: IND LEP2 M02 1221

Nominal duration: 36 Hour

Prepared by: Ministry of Labor and Skill

August, 2022

Addis Ababa, Ethiopia

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Acknowledgment

Ministry of Labor and Skills wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this Teaching, Training and Learning Materials (TTLM).

Introduction to the Module

In Leather processing; assortment and grading helps to document about the size, weight range, quality and selection of raw material from a particular origin in different seasons and the preparation of reliable database. Also, it is important to record the suitability of the raw materials of different origin/country for different finished leathers. Assortment based on the size, weight and substance can ensure better quality consistency in processing. The common problem like poor substance leathers dyed to lighter shades and insufficiently fatliquored can be avoided by separating the poor substance materials and processing them separately with a re-standardized process to get the required quality.

This module is designed to meet the industry requirement under the leather processing occupational standard, particularly for the unit of competency: **Perform Assortment and Grading.**

This module covers the units:

- Determine requirements
- Assort raw hides/ skins
- Assort pickle and wet blue
- Grading raw hides/skins
- Grading pickle and wet blue

Learning Objective of the Module

- Determine requirements for assortment and grading
- Assort raw hides/ skins
- Assort pickle and wet blue
- Grade raw hides/skins
- Grade pickle and wet blue

Module Instruction

For effective use this modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” given at the end of unit and
5. Read the identified reference book for Examples and exercise

Unit one: Determine requirements

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Assorting and grading standard
- Tools/Equipments for assortment and grading

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify assorting and grading standard
- Identify Tools/Equipments for assortment and grading

1.1 Assorting and grading standard

Introduction

Cured hides and skins are the raw material for leather industry which originate from slaughtered or the fallen category. The quality of hides and skins depends upon the health, breed, age, locality, and the manner of death, method of flaying and curing.

Some hides/skins may be very thin and poor in substance while the others may be thicker and stout and it is well known that the substance, thickness and weight of the hides and skins determine its suitability for making various kinds of leathers. These hides and skins after reaching the tannery are processed together in a lot and the uptake of chemicals will be different for different kind of hides/skins resulting in varied quality in the same batch.

The hides/skins contain several defects also which determines their price and suitability for particular end products. These defects may or may not be visible in hides/skins. Some defects are visible only after certain operations of leather processing are conducted.

Due to the above reasons it becomes important for a tanner to assort the raw material and grading in the beginning as well as at intermediate stages to make their enterprise more profitable.

1.1.1 Classification and selection of raw hides and skins

Cattle hides and sheep or goat skins are classified in to various groups according to their quality, weight range, size and color of hairs in order to maintain consistency of quality and determine the commercial value and the type of leather to be produced.

Selection is the operation of classifying /sorting the raw inputs, intermediate or final products based on quality, size, color or weight. It is used in leather industry as a tool for grading at different stages of leather processing and also for local or export trade.

Table 1: Classification of Cattle hides by weight in Green and Cured conditions

<i>Green weight of cattle hides</i>	<i>Class</i>
0-3kg	Calf
3-11kg	Light

11-17kg	Medium
17kg and above	Heavy
Wet Salted weight of cattle hides	Class
6-12kg	Calf, and light
12-22 kg	Medium
22-26kg	Heavy
26kg and above	Extra heavy
Dry salted weight	Class
Below 2.2kg	Calf
2.2-4.4kg	Light
4.4-6.0 kg	Medium
6.0 kg and above	Heavy

Table 2: Classification of skins by size

Size	Class
60-69cm	Kids
70-79cm	Small
80-89cm	Medium
90-99cm	Large
100 cm& above	Extra large

N.B: Measured along the backbone starting from the neck to the end.

Table 3: Classification of skins by weight

Average weight	
15-18kg per 100 skin	Very light
24-28kg per 100skin	Light
35-38kg per 100skin	Medium
48-55 kg per 100skin	Heavy
62-65 kg per 100 skin	Extra heavy

1.1.2 Classification and selection of semi processed hides and skins

At an intermediate stage like pickled or wet blue hides and skins the defects present on the hides and skins become visible and therefore grading is done based on the number & nature of defects and their distribution over the surface.

Some leathers may be having process defects also that may be visible as the change in color/ grain pattern/ texture. These leathers may be rejected at this stage to save on chemicals and energy.

Leathers made as crust need to be assorted for any process defects so that uniformity in the batch can be achieved. The hides and skins at this stage should be checked for any variation in color so that there is not much problem in finishing.

Table 4: Grading of cattle hides, calf, goat and sheep skins in relation to defects

Origin of hide or skins	Grade by appearance	characteristics
Large cattle	Grade 1	No defects visible in the butt region; Not more than 5 defects in the shoulder or belly in total.
	Grade 2	Total no. of defects in the butt, shoulder and belly assessed at not more than 12, out of which maximum up to 8 could be in the butt area.
	Grade 3	Defects assessed between 12 to 24 defect



		units at the most.
	Grade 4	Defects assessed at more than 24 defect-units but the unusable area of the hide should not exceed more than 50% of the total area.
	Rejects	Hides with more than 50% of the surface being unusable.
Calf	Grade 1	No visible defects, which are likely to depreciate the skin, appearing beyond 5cm from the edges.
	Grade 2	Defects assessed to a total of 1-3 defect units.
	Grade 3	Defects assessed to a total of 4-8 defect units.
	Grade 4	Defects assessed to a total of more than 8 defect units, the unusable area being at the most equal to 50% of the total area.
	Rejects	Skins of which more than 50% of the area is unusable.
Sheep and goat skins	Grade 1	No visible defects, which are likely to depreciate the skin, appearing beyond 5cm from the edges
	Grade 2	Defects assessed to a total of 1-3 defect units
	Grade 3	Defects assessed to a total of 4-8 defect units
	Grade 4	Defects assessed to a total of more than 8 defect units, the unusable area being at the most equal to 50% of the total area.

	Rejects	Skins of which more than 50% of the area is unusable.
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Table 5: Classification and grading of pickled sheep skins in relation to defects and usable areas in %

Grade	Usable area by % of total area	Descriptions
1	85-100	One minor defect in one of quadrants of the pelt which are likely to depreciate the skin appearing beyond 2.5 cm from the edges.
2	70-84	No defects visible in three quadrants, not more than three minor defects in the fourth quadrant appearing beyond 2.5cm from the edges which are likely depreciate the skin.
3	55-69	No defects visible in the two quadrants, not more than three minor defects and one major defect appear in the third and fourth quadrants of the pelt which are likely depreciate the skin
4	40-54	No defects visible in the two quadrants, not more than five minor defects appear in the third and fourth quadrants of the pelt which are likely depreciate the skin
5	25-39	Not more than 10 minor defects in all quadrants and two major defects in two of the quadrant.
Rejects	<25	Major defects visible in all four of the quadrants of the pelt appearing beyond 2.5 cm which are likely to depreciate the skin.

Wet-blue chrome tanned sheep and calfskins, and goatskins shall be graded according to the physical appearance and size specified as follows:

Table 6 : Physical requirements for grading of wet-blue chrome tanned Sheep and calf skins by defects on appearance

Grade	Usable area by % of total area	Descriptions
I	90-100	One minor defect on the skin surface which is likely to depreciate the skin appearing beyond 2.5 cm from the edges.
II	75-89	Not more than three minor defects on the skin surface appearing beyond 2.5 cm from the edges which are likely to depreciate the skin
III	60-74	Not more than three minor defects and one major defect on the skin which is likely to depreciate the skin.
IV	45-59	Not more than five minor defects on the skin which are likely depreciate the skin.
V	25-44	Not more than 10 minor defects and two major defects on the skin which are likely to depreciate the skin.
Rejects	<25	Major defects throughout the skin surface appearing beyond 2.5 cm which are likely to depreciate the skin.

Table 7 : Physical requirements for grading of wet blue chrome tanned goat skins by defect on appearance.

Grade	Usable area by % of total area	Descriptions
I	85-100	Materials with good substance. Grain should be free from open defects and heavy pox marks which could show on flesh side. The flesh side should have no prominent veins and flay cuts, which could affect the nap.
II	70-84	Materials with even substance and course and small scratch marks on grain side. On flesh side small or very light vein marks which will not affect the nap. There may be one or two lights flay cuts on the peripheries of the skins.
III	55-69	Materials with even substance. Not too many deep flay cuts or prominent vein marks on flesh side to affect the cutting value. Grain side could have open scratches and pox marks which could show upon suede side.
IV	40-54	Materials with varied substance and similar skin defect as in grade III but the cutting value is less.
V	25-39	Materials will have pronounced pox marks, open defects slash and scratches on grain and flesh sides.
Rejects	<25	Major defects visible all over which are likely to depreciate the skin.

Source: (ES 1181:2008 Leather–Wet-blue chrome tanned sheep and calfskins, and goat skin)

Natural crust






For semi -finished leather (crust), grading and selection by appearance or defect is based on the **amount of usable area or cutting value**. Generally, from literature (not normal standards), we can refer that grading by appearance and cutting value include globally as follow:

Grade	Amount of cutting value
I	Minimum usable area=80%
II	Minimum usable area=65%

- III Minimum usable area=50%
- IV Minimum usable area= 25%
- V Minimum usable area< 25%

1.2 Tool and Equipment's for assortment and grading

Table 8 : Tools/Equipment's for assortment and grading are assortment and grading table, light, PPE (personal protective equipment's), thickness gauge, sizing chart

Tools/Equipment's used for assortment and grading	
a) Thickness gauge	
b) Sizing table with chart	
Personal protective equipment's	
a) Hand Gloves	
b) Safety apron	
c) Boots	

Self-check-1

Directions: Answer all the questions listed below.

Test I: Short answer (7 point)

1. What are the techniques which are used to classify or grade hide or skin? (2 pts)
2. Identify tools /equipment's used during assortment and grading of hide and skin (5 pts)

Test II: Multiple Choices

Directions:

Choose the correct answer for each question and write only the letter that corresponds to your answer. (2 Points each)

1. Based on the classification of hide on weight what is the kg of medium salted cow hide?

A. 3-11kg B. 11-17kg C. 17-24kg D. >24kg

2. Skin which has a defect unit of 1-3 belong to

A. Grade 3 B. Grade 4 C. rejects D. grade 2

3. Skin which has Defects assessed to a total of more than 8 defect units, the unusable area being at the most equal to 50% of the total area is:

A. grade 3 B. grade 1 C. grade 4 D. grade 2

4. For cattle hide when defects assessed; between 12 and 24 defect-units were found. To which grade does it belong?

A. Grade 3 B. Grade 2 C. Grade 4 D. None of the above.

Note: Satisfactory rating – 12 points Unsatisfactory - below 8 points

You can ask your teacher to correct your work.

Lap Test

Name..... ID.....

Date.....

Time started: _____ Time finished: _____

Instructions

1. 30 to 40 cured skins can be given to the students and they should classify them into different categories.
2. 15 hides can be given to the students and they should classify them into different categories.

You can ask your teacher to correct your work.

Unit Two: Assort raw hides/ skins

This unit to provide you the necessary information regarding the following content coverage and topics:

- Preservation methods and requirements
- Assorting Hide/skin by type and size

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Identify Preservation methods and requirements
- Assort Hide/skin by type and size

2.1 Preservation methods and requirements

Fresh hides and skins contain approximately 62% moisture and 38% dry matter and is a favorable medium for bacterial growth. If proper measures are not taken to check the multiplication of bacteria may lead to decay or spoilage. The first sign of spoilage or decay is loosing of hair in patches or all over the skin depending upon the extent of damage done by the decaying process. In addition, dark patches on the flesh side and bad odor is also noticed. The most important method for preventing spoilage is curing. Curing is performed by

- ✓ Wet salting (green salting)
- ✓ Dry salting
- ✓ Brine curing
- ✓ Chilling

I. Wet Salting Preservation

Freshly flayed hides and skins are spread on a sloping concrete platform and cooled to room temperature. Salt is spread sprinkled freely on the flesh side and left over night. Next morning, the first application of salt is removed and a fresh layer of salt is applied in such a way that the thicker portion of the hide receives more salt than the thinner portion or side.

II. Dry Salting Preservation

Dry salting is used with the objective to reduce the weight of hides and skins for transport and to increase the keeping quality. In dry salting, the hides and skins are salted and latter dried. This is a convenient way of preventing putrefaction. This method is recommended for small hide producers or village flayers, carrying off from main hide market or far off from tanneries.

III. brine curing Preservation

Brine curing is also called as wet curing or immersion curing. Wet salting can be carried out by immersing the clean fleshed and trimmed hides in a saturated salt solution for a maximum period of 1-2 weeks. Pots, vats or pits of 4 feet deep can be used for this purpose. To maintain the saturation of the brine, more and more salt is added. Hides and skins are turned from top to bottom after overnight soaking. After curing for 1-2 weeks they are drained and packed in layers.

Hide absorbs salt and loses moisture to the extent that they are unfavorable to the enzymes present in the hides and subsequent bacterial action. These brine cured hides can be stored without addition of salt separately. Under normal conditions they remain in good condition for long time. Experience showed that brine cured hides is superior to hides cured by conventional wet salting or other methods. An important thing in using curing is that the preservative action of salt can be increased by mixing about 2-3% sodium carbonate and 1 % of naphthalene of the salt weight.

IV. Preservation of hide and skins by Chilling

It is one of the controlling factors for curing of hides/skins because it affects the growth of bacteria. The ideal temperature for bacteria to survive is 30-40 °C, out of this range bacteria will be inactive. If hides/skins are exposed to higher temperature, i.e., above 40 °C, the collagen fibers start to shrink. The temperature at which the collagen fibers shrink to one third of its total length is called Shrinkage temperature and it is about 60°C for raw hides/skins.

Freeze drying:-In this way of curing, the activity of bacteria is retarded by reducing the temperature of the media between 0-4°C.

2.2 Assorting Hide/skin by type and size

2.2.1 Identification of hide and skin by Type and size

Hides and skins are segregated mostly based on size, weight and color of hair. It is quite unproductive if each hide or skin is weighed/measured using some machine or device etc. Based on experience, the skill is developed by regular practice so that the segregation can be done manually and making the entire operation faster.

A) Types of Hide and Skin

- ✓ Hides: Skins from large animals
- ✓ Sides: Half hides where the hide is spilt down to the backbone (neck to tail)
- ✓ Skins: from smaller animals
- ✓ Kips: Skins from medium-sized bovine animals

Hides and skins differ in their structure, depending on where and how they were raised/farmed, season of year, age of animal, sex, and breed. Each hide is unique, as the skins of no two animals

are exactly the same. Animals with less hair or wool produce tougher, stronger-grained skins/hides.

Younger animals give thinner, smaller skins and finer, smoother-grained structures. This is because they are less likely to have been exposed to skin damage caused by sore, insect bites, mites and scratches. Every mark made on the skin of an animal from barbed wire, insect bites, ticks, brand marks or diseases leave a trace on the actual leather. This impacts on the quality and type of processing the skin/hid needs and ultimately affects the price.

Leather can be obtained from many sources, which are detailed in this section. Skins and hides of different animals have a variety of characteristics and properties, and their leathers are suitable for many different types of shoe and leather goods and garment.

B) Size of Hide and Skin

- ✓ Extra Large size
- ✓ Large Size
- ✓ Medium Size
- ✓ Small Size
- ✓ Extra Small Size

2.2.2 Method for classification of skins

Skins are classified first based on their size. A sizing table as shown in fig 2.1 below should be used for the purpose. By placing the skins over it the area should be measured and noted. For improved consistency in quality, further segregation may be done based on the weight of the skins for which again a weighing balance can be used.

2.2.3 Procedure for Assortment of Raw Hide/Skin

Steps to be followed for assorting skins:

1. Prepare the received goods in a place which is comfortable for assortment
2. Prepare a table which is used to put the skin/hide (one person can assist by putting the skin/hide on the table)
3. Now the skin/hide is ready to get assorted by applying the parameters like weight, size or color as per the need.

4. Finally, the man who is assisting the assorted can put the goods as a pile in different classes as instructed by the assorted.
5. Indicate respective grades on each pile.



Figure 2.1: Sizing chart



Figure 2.2: Raw Sheep Skin Assortment

Self-check-2

Directions: Answer all the questions listed below.

Test I: Multiple choose

Directions:

Choose the correct answer for each question and write only the letter that corresponds to your answer. (2 point each)

1. The amount of water present in fresh hides and skins are,
 - a) 50%
 - b) 62%
 - c) 38%
 - d) 45%
2. The most important method of preventing raw hide and skin from spoilage is _____
 - a) Tanning
 - b) curing
 - c) Soaking
 - d) None
3. Inhibition of bacteria by reducing the temperature of media of raw hide and skin in between 0 – 4°C is called _____
 - a) Brine curing
 - b) dry freezing
 - c) wet salting
 - d) sun drying

Test II: Short answer (10 point)

1. Mention the types of preservation of hides and skins? (5 points)
2. Write the procedure for Assortment of Raw Hide/Skin. (5 points)

Lap Test

Name..... ID.....

Date.....

Time started: _____ Time finished: _____

Instructions

1. 30 raw skins can be given to the students and they should classify them into different categories as per tannery procedure and Ethiopian Standard.
2. 10 full hides can be given to the students and they should classify them into different categories as per tannery procedure and Ethiopian Standard.

You can ask you teacher to correct your work

Unit Three: Assort pickle and wet blue

This unit to provide you the necessary information regarding the following content coverage and topics:

- Requirements of pickle and wet blue assortment
- Assorting pickle and wet blue by size and type

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify the requirements of pickle and wet blue assortment
- Assort pickle and wet blue by size and type

3.1 Requirements of pickle and wet blue assortment

Pickle and wet blue are assorted based on their size, colour, weight and defects. Weighing balance can be used to take weight of different pickled pelt and wet blue leather. Practically it may not be possible to weigh all the pickle and wet blue so a relation between the weight and the size of the leather can be achieved by performing this exercise on 50 – 100 pieces. Creating such data and using it as reference, the weight of pickle and wet blue can be adjudged comfortably by its size. Limitation for this method will be the region or origin of the hides. If the hides are being procured from a different region, then the exercise of building data should be performed again and used as reference.



Figure 3.1: Heavy load weighing balance

The required tools/equipment's for the assortment of pickle and wet blue are sizing table (chart)fig. 2.1 in unit two, fluorescent lamp, trimming knife etc.



(a)



(b)

Figure 3.2: (a) Fluorescent lamp (b) Trimming Knife

3.2 Assorting pickle and wet blue by size and type

In area measuring leathers the usable area related to the whole area determines the assortment and thus the market price. Measuring of size is done by pinned roller measuring machines or electronic measuring machines. The official unit measure square feet (sqf), square meters (m²) and square decimeters (dm²).

A) Classification of pickle by size

Table 9: pickle pelt size category

Origin of the skin	Classification	Category by size (square feet)
Sheep, lamb, kid and goat	Extra small	Bellow 2.5
	Small	2.6-3.5
	Medium	3.6-4.5
	Large	4.6-5.5
	Extra large	5.6 above

ES: 1201:2055

B) Classification of wet – blue skins by size

Table 10: Wet blue Leather size category

Origin of skins	Category by size	Skin dm ² per skin	Size in ft ² per skin
Sheep, lamb, kid and goat	Extra small	Less than 23	Less than 2.5
	Small	23 – 32	2.5 – 3.5
	Medium	33 – 42	3.6 – 4.5

	Large	43 – 51	4.6- 5.5
	Extra large	above 51	above 5.5

Packing: Wet-blue chrome tanned leather shall be packed in polyethylene plastic bags or wrapped inside and outside with polypropylene bags or wrapped as a bundle or palletize as agreed to between the purchaser and producer as ES 1181:2008.

Procedure for Assortment of pickle and wet blue by size and type

For assortment of pickled pelt and wet blue leather the materials are kept in a pile below the level of elbow and the defects are identified on the surface of the leather and finally assorted to be used for the production of suitable end products. Later sorted for different thickness range specially in case of skins. Thickness of the hides and skins are assessed by pressing it between thumb and fingers after folding and the materials of varying thickness are thus segregated.

Steps to be followed for assorting skins:

1. Prepare the received goods in a place which is comfortable for assortment
2. Prepare a table which is used to put pickle/wet blue skin (one person can assist by putting the pickle/wet blue on the table)
3. Now the skin is ready to get assorted by applying the parameters like size and type as per the need.
4. Finally, the man who is assisting the assorted can put the goods as a pile in different classes as instructed by the assorted.
5. Indicate respective size on each pile.



Figure 3.3: Pickle and wet blue Assortment

Self-check-3

Directions: Answer all the questions listed below.

Test I: Multiple choose

Directions:

Choose the correct answer for each question and write only the letter that corresponds to your answer. (2 point each)

1. When the size category of Sheep, lamb, kid and goat pickle pelt in the range of 3.6 – 4.5 square feet it classifies as _____
 a) Medium b) Small c) Large d) None
2. When the size category of Sheep, lamb, kid and goat wet blue leather is Large it's size in dm^2 ranges in between
 a) 33 – 42 b) 43 – 51 c) 23 – 32 d) above 51

Test II: Short answer (10 point)

1. Write the procedures for pickle and wet blue assortment? (5 points)
2. Write the requirements of pickle and wet blue leather assortment. (5 points)

Lap Test

Name..... ID.....

Date.....

Time started: _____ Time finished: _____

Instructions

1. 25 pickled pelt can be given to the students and they should assort into different size categories as per the Standard.
2. 25 wet blue leather can be given to the students and they should assort into different size categories as per the Standard.

You can ask you teacher to correct your work.

Unit Four: Grade raw hide/skin

This unit to provide you the necessary information regarding the following content coverage and topics:

- Hide/Skin defects
- Grading and labeling hide/skin
- Records and documentation

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify Hide/Skin defects
- Grade and labeling hide/skin
- Record and document

4.1 Hide/Skin defects

The defects resulting in hides or skins being downgraded or rejected at the study site were classified as **pre-slaughter, slaughter, post-slaughter defects and preservation defects.**

4.1.1 Pre-slaughter /Ante Mortem Defects

Pre-slaughter/ante-mortem defects involving human activities and environmental/natural causes; defects due to external parasites and disease like brand mark, Ekek, ticks, mites, awns, lice, dung and urine, radiation

- **Brand marks:** - Produced by branding letters, numbers or figures by means of a red-hot stamping iron mainly in the butt, seldom in the forehead, neck or jaw.



(a)



(b)

Figure 4.1: (a) Brand mark on life animal (b) Brand mark on leather

- **Ekek:** It is the most common defect in sheep skins in Ethiopia caused by Keds and Lice. It becomes visible on the grain side of the skin only after pickling and it is difficult to detect it at raw stage.



Keds



Lice



Ekek on the pickled pelt

Figure 4.2: Ekek causing insects its defect on pickle

- **Defects caused by ticks:** Many kinds of ticks affect the quality of skins in Ethiopia. They puncture the skin by piercing mouth parts in order to suck blood and thus damage the skin. It may

cause bacteria to pass through the skin leading to even more serious damage to the affected region.

- **Defects caused by mites:** -Mange is a serious skin disease in Ethiopia caused by mites. It enters the hair follicle and results in thickening of the epidermis and loss of hair.
- **Defects caused by awns:-**Defects of varying depth in the grain caused by sharp awns of plants, fruits or hard grasses.
- **Defects caused by lice:** Injuries caused by infestation with blood - sucking lice, with partial distraction of the grain layer.
- **Defects caused by dung and urine:** -Resulting from unclean indoor livestock husbandry, etching of the grain occurs in soiled sections, in particular near the claws and on the belly, producing matt sections and blind or rough grain.
- **Damage caused by radiation:** X-rays or gamma rays used in veterinary medicine or ultraviolet rays of sunlight can cause defects of the skin.

4.1.2 Slaughtering defects

In most developed and many developing countries animal needs to be rendered unconscious before it is slaughtered. Stunning is done to render the animal unconscious for long enough so that bleeding results in enough loss of blood to cause death from lack of oxygen to the brain. However, exceptions are made for the Jewish (Kosher) and Muslim (Halal) slaughter of livestock. In these cases, the animal is bled directly using a sharp knife to cut the throat and sever the main blood vessels.

If the neck and head are not securely restrained, the movement results in a poor cut and bad bleeding.

A blunt knife can damage the cut ends of the blood vessels. This may cause premature clotting and blockage of the vessels. Delayed bleeding may rupture the blood vessels and the extra blood can make the hides and skins more susceptible to microbial damage. Poor bleeding can also lead to the vein marks in the hides and skins.

Thus the major defects on slaughtering are:

- Poor cut
- Poor bleeding
- Blood stains

4.1.3 post-slaughter defects

Post slaughtering defect is the defect happened after the animal's hide/skin flayed in the absence of taking care. Those defects are:

- **Flay cuts:** These cuts are caused by butchers at the time of flaying which damage the hides and skins considerably depreciating the value.
- **Gouges:** Unintentional cutting of flat pieces of skin out of the reticular layer when the skin is flayed. These sections result in a thinner quality of the finished leather.
- **Putrefaction:** Delay in preservation causes putrefaction and the entire hide or skin can be damaged.
- **Rub marks:** Dragging of carcasses along hard ground causes rub marks in hides mostly near the top of the hind legs.
- **Blood stains:** If soiled and blood-stained skins are not washed adequately these incrustations may produce brownish stains on the raw hide/skin.

4.1.4 Preservation Defects

Drying and salting are the two techniques followed in Ethiopia for preservation of hides and skins.

- **Sun blister:** When the hides and skins are dried in hot sun, the surface dries faster and the inner layers of hides and skins still contains sufficient amount of moisture to result in putrefaction. It is visible during pre-tanning operations as blisters.
- **Salt stains:** Mineral granular deposits in all skin layers, analyzed mainly as insoluble calcium compounds. Caused by increased contamination of calcium and magnesium salts in the curing salts.
- **Iron stains:** Brownish stains because of contact of the hides/skins with iron parts or rusty iron compounds which are further intensified by liming chemicals or tanning agents containing polyphenols
- **Lead stains:** Lead compounds are contained as denaturing agents in curing salts, used mostly in overseas countries; they produce similar stains as iron.

- **Rottenness:** If curing is inadequate or is performed too late and if the hides/skin is stored too long at excessive temperature in the salt, an increased development of microorganisms occurs on the skin /hides. It starts with slimy smears on the surface, followed by hair-slip at an advanced stage. It may also cause loosening of the grain layer in some sections and destruction of the skin by the formation of holes.
- **Flesh side discoloration:** Noticeable through red, blue or violet discoloration on the flesh side. These stains are caused by color-forming bacteria which result in matt to rough grains and hair-slip, and also attack the hide substance. Can be avoided by increased addition of soda and addition of naphthalene to the curing salt.
- **Mould stains:** Stains of different colors may appear as patches or over large areas depending upon the type of mould spore infestation.

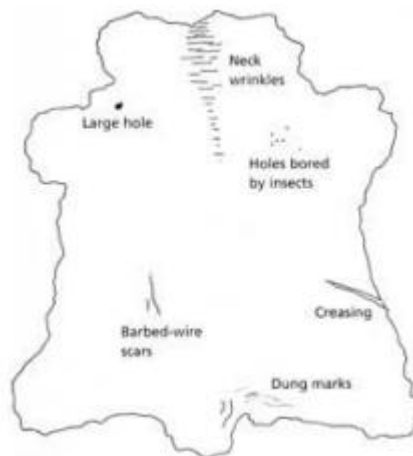


Figure 4.3: Defect assessment areas

4.2 Grading and labeling hide/skin

Grading is often associated with quality designations. After assortment, the materials based on their quality are segregated and kept as separate bulk indicated as different grades. It usually follows the Arabic/Roman numeric 1,2,3,4,.../I,II,III,IV,... or the Roman Alphabets A,B,C,D...

Improvement of hides and skins quality can be achieved only if quality grading norms are applied. The primary producer, as well as the whole chain of related services, including flaying, curing, handling and storing, should be rewarded by better prices for improved

quality. Hides/skins are classified into first, second, third, and reject grades according to the degree of defects and the area of the skin covered.

Table 11 : Grade description of hide/skin

Grade	Usable area by % of total area	Descriptions
1	90-100	No visible defects in the butt area, when assessed, which are likely to depreciate the hides and calf skins appearing beyond 2.5 cm from the edges. No more than three defect units in shoulder or belly area, when assessed.
2	75-89	One defect unit in the butt area and not more than four defect units in shoulder or belly area, when assessed which are likely to depreciate the hide and calf skins appear beyond 2.5 cm from the edges.
3	50-74	Defects, when assessed, shall not be more than three defect units in the butt, shoulder or belly area which are likely to depreciate the hides and calf skins appear beyond 2.5 cm from the edge.
Reject	< 50	Defect when assessed, covering less than 50% useable area.

4.3 Records and documentation

Records consist of information created, received and maintained as evidence of business activities. The International Council on Archives (ICA) defines a record as “recorded information produced or received in the initiation, conduct or completion of an institutional or individual activity and that comprises content, context and structure sufficient to provide evidence of the activity”. It can be either a tangible object or digital information which has value to an organization.

Table 12 : Records to be managed for grading of raw hides/skins

S.No	Origin/source of raw material	Quantity in number	Weight (Kg)	colour	Grade	Remark
1	Eg. Jimma, Gojam					
2						
3						
4						
5						

Benefits of Record Management

- Enables more informed decision making, by making information readily available.
- Helps deliver services in a consistent and equitable manner.
- Facilitates effective performance of activities throughout an organization.
- Protects the rights of the organization, its employees and its customers.
- Provides continuity in the event of a disaster.
- Protects records from inappropriate and unauthorized access.
- Meets statutory and regulatory requirements including archival, audit and oversight activities.
- Provides protection and support in litigation.
- Allows quicker retrieval of documents and information from files.
- Improves office efficiency and productivity.
- Provides better documentation more efficiently.

Self-check-4

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short answer (10 point)

1. What are pre-slaughtering defects? (3 points)
2. Identify slaughtering defects? (3 points)
3. Explain briefly post-slaughtering defects? (4 points)

Test II: Multiple choice

Directions:

Choose the correct answer for each question and write only the letter that corresponds to your answer. (2 points each)

1. Which one of the following is pre- slaughtering defect?
 - a) Iron stain
 - b) Fly cut
 - c) Ekek
 - d) none
2. The defect caused by means of a red-hot stamping iron mainly in the butt, seldom in the forehead, neck or jaw is called _____
 - a) Mites
 - b) Awns
 - c) Brand mark
 - d) Ticks
3. Defects, when assessed, shall not be more than three defect units in the butt, shoulder or belly area which are likely to depreciate the hides and calf skins appear beyond 2.5 cm from the edge is belongs to grade _____
 - a) I
 - b) II
 - c) III
 - d) IV
4. Which of the following is not the part of raw hides/skins grading record management?
 - a) Origin
 - b) Grade
 - c) Quantity
 - d) Colour
5. _____ is defect caused by butchers at the time of flaying which damage the hides and skins considerably depreciating the value.
 - a) Rub mark
 - b) Gouge mark
 - c) flay cut
 - d) Putrefaction

Unit Five: Grade pickle and wet blue

This unit to provide you the necessary information regarding the following content coverage and topics:

- Pickle and wet blue defects
- Grading and labeling pickle and wet blue
- Records and documentation

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify Pickle and wet blue defects
- Grad and label pickle and wet blue
- Record and document

5.1 Pickle and wet blue defects

5.1.1 Defects occurring in the Beam House

- 1) **Under soaking:** When under soaked skins/hides are placed in lime liquor, there shall be uneven stress or swelling.
 - ❖ The outer surface plumps up while the center layer is restrained.
 - ❖ The grain swollen in this manner draws during bating and Deliming.
- 2) **Over soaking:** Causes degradation of fibers and loss of hide substance. Any inadequacy of curing also can bring damaging results during soaking as bacteria can re-activate themselves in the soaking medium.
- 3) **Alkali Burn:** Na₂S can cause the burn of grain if not used in a controlled manner. If it is added in stationary condition the grain may become case hardened. The damage will be clear after bating as the bate digests away the chemically attacked protein. is not taken in handling of material, machine is not adjusted according to the material or the mechanical operation is not done properly.
- 4) **Dulling of the grain:** It is called low grain caused by chemical attack/mechanical abrasion on grain which result in the loss of papillary layer of the grain (the outer layer of corium). Generally, this dulling can be caused by poor curing/heating and bacterial damage, high alkalinity by conc. Na₂S during unhairing. Abrasion due to low float and higher or longer drumming can also cause dulling of grain.
- 5) **Lime blast:** The formations of insoluble calcium carbonate (CaCO₃) that can take place in or on the grain layer of limed stock if exposed to air for long. Washing limed pelts with water of temporary hardness can also give rise to Lime Blast.
- 6) **Mechanical damage:** Some mechanical operations viz Fleshing and Lime Splitting performed in Beam House can damage the skins if not taking care.

5.1.2 Defects occurring during Pickling, Degreasing & Tanning

- 1) **Acid burn during pickling:** Use of undiluted acid, acid water mixture without proper cooling or its addition when the drum is stationary can lead to acid burn.

- 2) **Acid swelling:** Less salt concentration in pickle bath before addition of acid causes acid swelling of the skin.
- 3) **Drawn grain:** Due to astringent pH difference, thermal effect, neutralization effect or high agitation etc. the grain becomes drawn.
- 4) **Case Hardening:** Poor process control may lead to rapid tanning and fixation on the surfaces preventing further penetration known as case hardening.
- 5) **Yellowing and hydrolysis of pickled stock:** If pickle skins are stored for a longer period (>6 month), the grain becomes yellowish due to hydrolysis accompanied by loss of fiber strength. An acid damaged skin in this way will swell a great deal & appear glassy and round or swollen while neutralized and washed.
- 6) **Chrome patch/ stain:** Quick addition of basifying agents or very high pH during the final stages of tanning causes this patchiness.
- 7) **Chrome soap:** Sometimes due to poor degreasing, stains of insoluble fat soaps are formed, which cannot be colored during dyeing.

In general, the defects observed at pickle and wet blue stages are:

- Flay cut
- Cockle/ekeke
- Gouge mark
- Brand mark
- Corduroying
- Machine defect
- Purification
- Wound
- Scratch
- Scar

5.2 Grading and labeling pickle and wet blue

5.2.1 Grading of pickle and Wet blue

The most accepted grading method in different parts of the world is to examine the hides/skins/leather visually and by physical handling.

For grading at pickled /wet blue stage the materials are kept in a pile below the level of elbow and the defects are identified on the surface of the leather and finally graded to be used for the production of suitable end products. Later each grade is again sorted for different thickness range especially in case of skins.

Thickness of the hides and skins are assessed by pressing it between thumb and fingers after folding and the materials of varying thickness are thus segregated.

First grade:

- No visible defects in the central part of the skin;
- No sign of putrefaction;
- Free from dirt;
- Coming to the periphery of the skin or the legs or tail, ONLY ONE of the following defects is accepted:
 - a. few defects caused by diseases
 - b. few defects from parasites
 - c. one branding mark
 - d. one wound open or cicatrized

Second grade

In addition to defects in the periphery of the skin, on the legs and tail, defects are accepted in shoulder or bellies:

- a. few defects caused by diseases
- b. few defects from parasites
- c. one branding mark
- d. one open or cicatrized wound few traces of putrefaction and some dirt are accepted in the periphery of the skin on the legs and tail.

Third grade:

The third grade shall be done according to the following requirements: In addition to the defects mentioned for the second grade, the following defects are accepted in low/medium concentration in the best part of the skin (butt):

- a. few defects caused by diseases
- b. few defects from parasites
- c. few branding marks
- d. open or cicatrized wounds traces of putrefaction and some dirt are accepted except in the best part of the skin (butt). Please note that all defects mentioned should not cover more than 25 % of the total area of the skin!

Fourth grade

The fourth grade shall be done according to the following requirements: In addition to the defects mentioned for the third grade, defects are accepted in low/medium. concentration on the skin if they do not cover more than 40% of the total skin area!

Rejects

All skins presenting more defects than those accepted for the fourth grade and skins of which more than 50% of the area cannot be transformed into leather are classified as rejects. In addition, the following skins shall be included in the rejects:

- Fallen skins
- Untrimmed or poorly trimmed skins
- Ground and ball dried skins
- Smoked skins



Figure 5.1: Grading of pickle pelt and wet blue leather

5.2.2 Labeling of pickle and wet blue

The graded pickle and wet blue leathers are labeled with the following particulars.

- a) Name and address of the manufacturer;
- b) Country of origin;
- c) The number of pieces and/or total area;
- d) The type and grade;
- e) The total mass, in kg;
- f) Batch or code number; and

Procedure for Grading and labeling pickle and wet blue

Steps to be followed for assorting skins:

1. Prepare the received goods in a place which is comfortable for assortment

2. Prepare a table which is used to put pickle/wet blue skin(one person can assist by putting the pickle/wet blue on the table)
3. Now the skin is ready to get Grading by applying the parameters like size and type as per the standard.
4. Finally, the man who is assisting the graded can put the goods as a pile in different classes as instructed by the graded.
5. Indicate respective grade on each pile.

5.3 Records and documentation

Records to be managed for grading of pickled pelt and wet blue leather.

Table 13 : Record management for grading of pickle and wet blue

S.No	Date of processing	Lot number (Processing batch)	Quantity in number	Grade	Size (S,M,L, ExL)	Remark
1						
2						
3						
4						
5						

Self-check-5

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short answer: (10 points)

1. What criteria should be considered in Inspection and selection of wet blue hide leather to process full grain article? (4 points)
2. One of the defect happened in the process of pickle is acid swelling, how we overcome this problem? (3points)
3. Coming to the periphery of the skin or the legs or tail, write the accepted defects in grade three pickle and wet blue leather. (3 points)

Test II: Multiple choice

Directions:

Choose the correct answer for each question and write only the letter that corresponds to your answer. (2 points each)

1. _____ is causes the degradation of fibers and loss of hide substance.
 - a) Under soaking
 - b) over soaking
 - c) Lime blast
 - d) None
2. Which of the following defect is accepted for grade two wet blue leather in the periphery of the skin, on the legs and tail or bellies?
 - a) Few defects caused by diseases
 - b) Few defects from parasites
 - c) Few branding marks
 - d) All
3. If we add an undiluted acid (acid water mixture) without proper cooling in the process of pickling when the drum is stationary the defect caused is _____
 - a) Lime blast
 - b) acid brine
 - c) drawn grain
 - d) acid swelling

Test III: Fill in the blank space

Directions:

Write the appropriate answer for each questions in the provided blank space.

1. Poor process control leads to rapid tanning and fixation on the surfaces preventing further penetration is known as _____
2. The formations of insoluble calcium carbonate (CaCO_3) that can take place in or on the grain layer of limed stock if exposed to air for long time is causes _____.
3. In the pickling process, less salt concentration in pickle bath before addition of acid causes _____

Lap Test

Name..... ID.....

Date.....

Time started: _____ Time finished: _____

Instructions

1. Pickled or wet blue skins can be given to the students and they should be asked to do grading.
2. Wet blue hides can be given to the students and they should be asked to do grading
You can ask your instructor to correct your work

References

1. Guide Line for grading of Hides and skins by quality, Based on the works of Mr. Alfred Lesuisse, Senior Leather Industry consultant, UNIDO
2. Grading of raw sheep, goat and pickled sheep skins by defect and size, CES-11 2019 2nd Edition
3. Leather - Wet-blue chrome tanned sheep and calfskins, and goatskins Specification, ES 46:2013 1st edition
4. Raw hide and calfskin part I: Description of defects, ES ISO-2822-1: 2008
5. Raw hide and calfskin part II: Guidelines for grading on the basis of mass, ES ISO-2822-2: 2018
6. Raw hide and calfskin part III: Guidelines for grading on the basis defects, ES ISO-2822-3: 2018
7. Grading of raw cattle hides calf skins by appearance and mass, CES-29 2019 2nd Edition
8. Skin, hide and leather defect, Jean J. Tancous
9. Possible defects in leather production (Definitions, causes, consequences), Gerhard John
10. Selection and grading hand out; Compiled by Taye Tibebu
11. ETHIOPIAN STANDARD ES

Participants of this Module (training material) preparation

No	Name	Qualification (Level)	Field of Study	Organization/ Institution	Mobile number	E-mail
1	Ashenafie Mulat	BSc.	Leather engineering	Gonder poly technique collage	0910110187	ashenafimulat119@gmail.com
2	Tarekeng Jida	Msc	Chemical engineering (Leather Techenology)	LLPIDRC	0911055370	tarekegnb039@gmail.com
3	Weldeyesus wendowesen	Msc	Leather engineering and Fashion Technology	TVTI	+251915854419	abay1015@gmail.com