Artificial Insemination

Level-I

Unit of Competence: Support Handling of Hide and Skin

Module Title:- Supporting Handling of Hide and Skin

Learning Guide -20- 23

LO 01: Prepare materials, tools and equipment’s

Instruction Sheet	Learning Guide 20

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- ✓ Selecting appropriate methods of hide/skin preservation
- ✓ Preparing preservation materials and equipment's

Recognizing mechanisms of milk synthesis and secretion This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- ✓ Select appropriate methods of hide/skin preservation
- ✓ Prepare preservation materials and equipment's

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information "Sheet 1 and Sheet 2,
4. Accomplish the "Self-check 1 and Self-check 2" **in page 5 and 11,** respectively.
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1 " **in page -12.**
6. Do the "LAP test" **in page – 13** (if you are ready).

Information Sheet-1	Prepare materials, tools and equipment’s

I. INTRODUCTION

A, General structure of Hide and skins

The terms “skins” and “hides” have differences in meaning. The distinction is one of size and substance or thickness. Smaller and lighter skins derived from sheep, goats or pigs are termed “skins”. In some species, the deciding factor will be the type of animal rather than size alone.

One of the most valuable exports of many developing countries is hides and skins. Hides are, therefore a valuable source of income to the livestock owner. If properly cured, the value of the hides is often 3% to 10% of the value of the whole animal.

The skin histology of animals normally used in leather production is similar but species differences are readily observed. There are, for examples, differences in the relative amounts of the component tissues and their arrangement in different types of skin and in different places in the skin. The component structures of the skin are capable of flexing, stretching or contracting with the movements of the body.

An animal’s skin has a number of functions, the most important being to:

- ✓ Provide a light, durable covering for the body;
- ✓ Assist in the regulation of body temperature;
- ✓ Prevent or minimize possible injury to internal organs;
- ✓ Provide a barrier to bacterial infection; and

- ✓ Provide a waterproof covering for the body while allowing moisture to leave the body, e.g., through perspiration.

1.1. The main components of the mammalian skin

1.1.1. The epidermis

It is a thin top layer covering about 1-2% of the total thickness of the entire skin. The epidermis consists of two layers of cells namely the outer horny layer and the inner layer rests on the corium. The epidermis also consists of fat glands, sweat glands, horns, erector pilli muscle etc.

1.1.2. Corium or dermis

This is the main layer of the hide or skin consisting of about 98% of its thickness. Divided in to two layers:

a. Grain or papillary layer

It is also called the thermostat layer as it keeps the body temperature through Sweat and fat glands. This upper layer of corium occupies about 10-25% of its entire thickness.

b. The corium or reticular layer

The corium proper is just below the grain layer constituting about 75-90% of the total thickness is having a netlike woven structure made of thicker and longer fibers.

1.1.3. Flesh or adipose tissue (hypodermis)

- A layer appended to the bottom of corium is called flesh or adipose layer
- It is the loose connecting tissue lying b/n the hide or skin and the actual body of the animal
- Although this layer exists in all flayed hides and skins, this is removed during the tanning operations and it is not part of the hide.

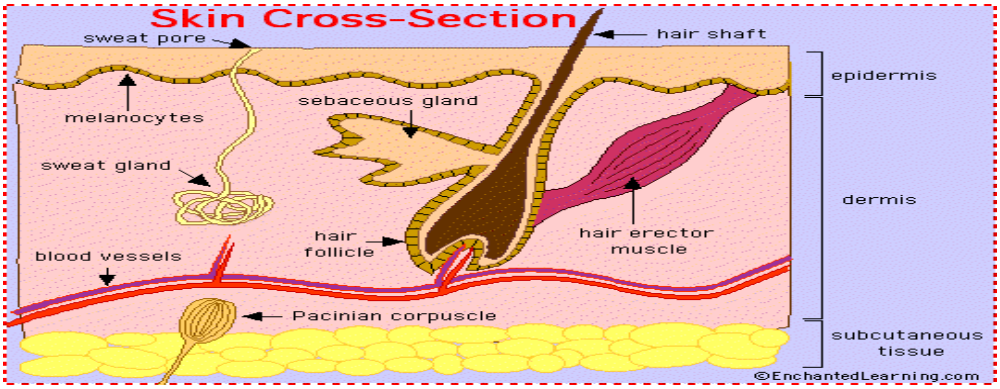

Figure 1. Histological feature of mammalian

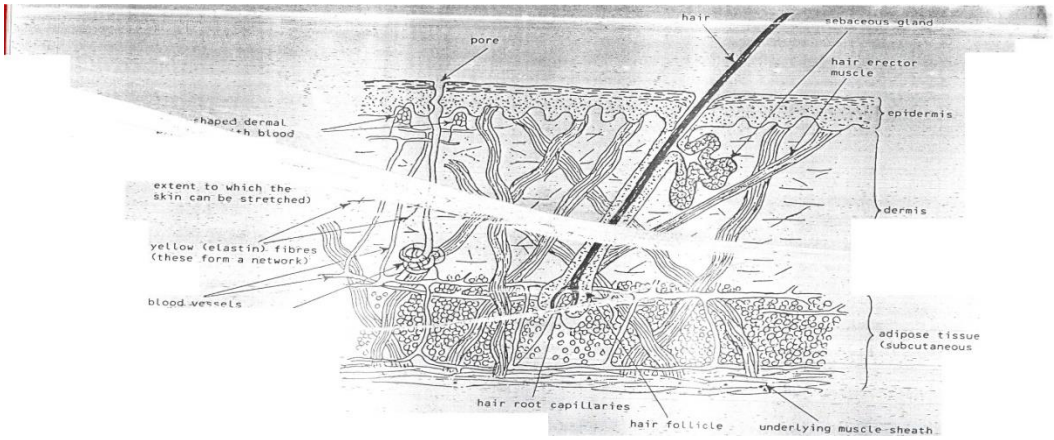

Figure 1. Histological feature of mammalian skin

1.2. Selecting appropriate methods of hides and skin preservation

Preservation prevents putrefaction and keeps skins in good condition until they are processed in tanneries. Being protein in nature, skins are susceptible to attacks by bacteria or mold that leads to putrefaction in hot and humid climates. Dust, dirt, soil,

water, blood, fodder, etc., are sources of infection apart from microorganisms that could be transmitted by air, insects, or contact with diseased animals. The weight of a fresh skin is about 60% water, ideal conditions for bacteria to thrive. The protein matter hydrolyzed by bacteria leads to loss of skin substance resulting in poor-quality leather.

Curing creates conditions whereby bacteria are prevented from destroying skins. The type of curing used depends on weather conditions, availability of materials, location of tanneries, and so on. For instance, some drying techniques do not work during the rainy season, and salting is preferred. In all techniques, the natural water is removed so that the low percentage of moisture makes the bacteria ineffective and as soon as this condition is reversed, bacteria become active again.

In tropical countries, it is advisable to begin curing within four hours of flaying depending upon outside temperature. Raw skins should be sent to the curing facility in closed carts and protected from exposure to the sun and without being rolled. Skins can be dried with or without a frame, in the sun or in a shed.

Wet salting, dry salting and brining are other methods of skin preservation. There are also more recent techniques not yet universally applied.

1.3. Principles of preservation and types of hide and skin preservation.

The following points should be considered in undertaking skin preservation:

- ✓ Point of application of the treatment and how long preservation is required.
- ✓ Methods of application and any extra equipment and handling involved.
- ✓ The cost-effectiveness of the treatment for the required period of preservation.
- ✓ The effect of salt and other chemicals in causing pollution.

The following are some of the common drying preservation techniques

1.3.1. Air drying

- ✓ Suspension drying
- ✓ Line/wire drying
- ✓ Skin drying sheds

1.3.2. Salting

- ✓ Wet salting
- ✓ Dry salting
- ✓ Brining

See the detail of this section under LO2

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Explain the function of Hides and skin for the animals. (4 points)
2. Explain the Principles of preservation and types of hide and skin preservation (5 points)

Note: **Satisfactory rating - 5 and 8 points** **Unsatisfactory - below 5 and 8 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

References

Devassy, T. J and Mr Getachew Argaw 1998. Hides and Skins Improvement Handbook.

Elliot, R.G.H. 1985. Hides and Skins Improvement in Developing Countries, FAO/Rome. FAO. Agricultural Development Paper No. 49.

Mann, I. 1962. Hides skins and glue stock. In Animal by- products processing and utilization. Pp80- 137.

Mohammed. 2000. Ethiopian hides and skins. Proceedings of a Conference Held at Debub University, Awassa Ethiopia, 10–12 November 2000, pp.133–137. Productivity Improvement Program. p 275.

Tekle Zeleke, 2008. Sheep and goat products and by-products. Ethiopia Sheep and Goat Ahmed

Training Manual on improved production and preservation techniques of hides and skin, August,2017

INFORMATION SHEET 2	PREPARE MATERIALS, TOOLS AND EQUIPMENT FOR PRESERVING HIDE AND SKIN

2. Preparing and handling materials, tools and equipment for preserving hide and skin

Tools, overalls and other protective working equipment represent the necessary equipment for people working in the slaughterhouses, meat processing facilities and other operations of the meat industry. These aids also help to protect meat and meat products against the bacterial contamination.

This category of working aids and means is very wide and involves all things that are used by workers in the individual working operations and situations, e.g.

- Knives
- Hangs and hooks for hanging meat
- Sharpening steel
- Meat choppers
- Meat saws
- Holders of price labels etc.

This category involves also all types of machinery, especially those parts of these machines, which come in contact with the meat and different containers, dishes, roast plates utensils and others aids.

The current trend is oriented at a more and more intensive protection of hygienic quality and safety of food. The consumers should be protected against the microbial contamination and for that reason, the requirements concerning hygiene of individual operations are increasing not only in the meat industry but also in catering facilities and similar establishments.

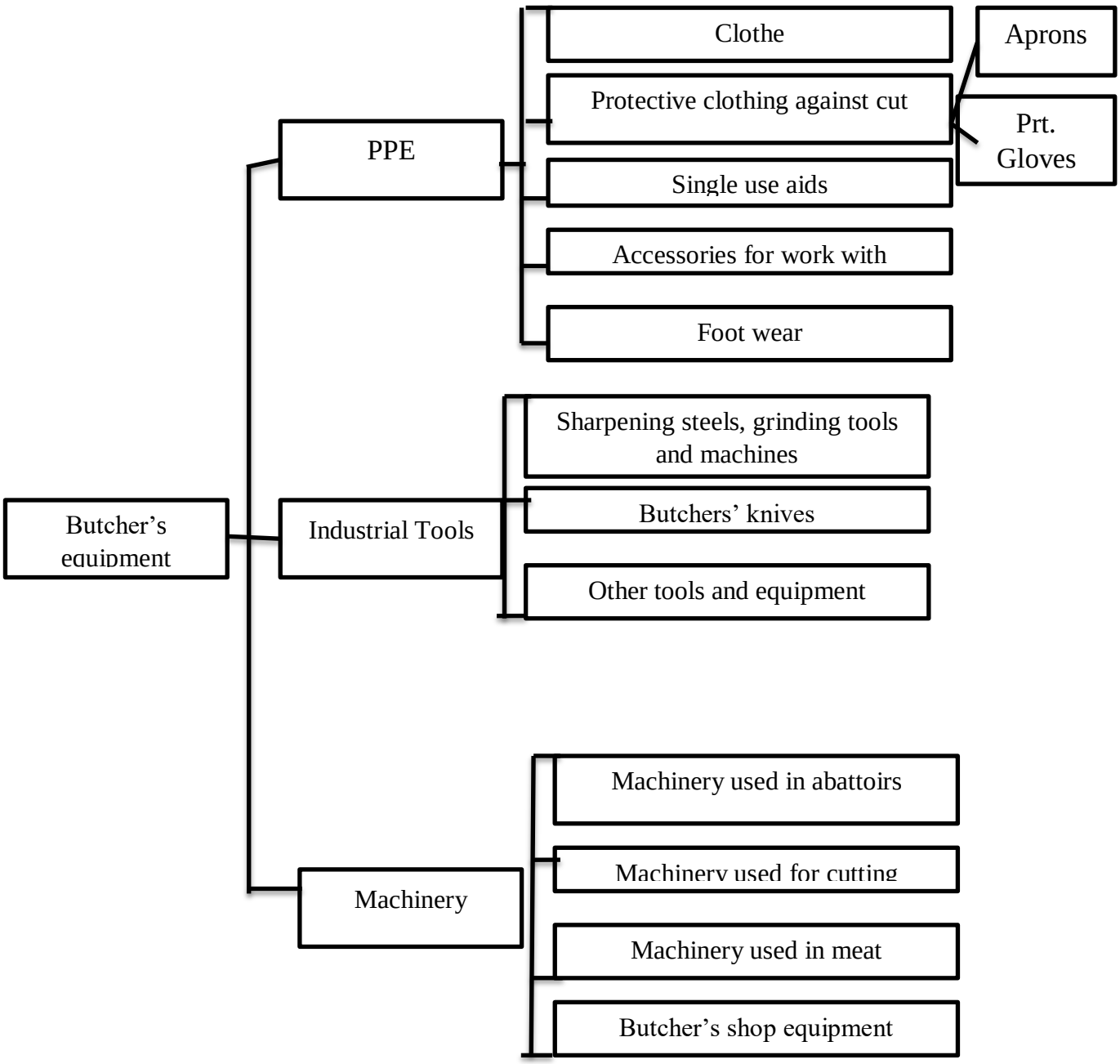

Figure 3. Butcher's Equipment

- ✓ **Washing and drainage table** helps for washing and draining of water from hides and skins before preservation can takes place.
- ✓ -**Frame**:-Useful to dry the hide and skin. the thickness depends on the materials from which the frames are made. The thickness for metal and wood are 5cm

and 7cm respectively. the frame size for exotic and local cattle breeds are (2.7m*3.1m) and (2.7m*2.4m),while the frame size for small ruminants is1/4-1/3 the size of cattle frame

- ✓ **Flaying knives** which has blunt and rounded tip helps for separating or removing hides and skin from the carcass.
- ✓ **Ripping knives** have a straight cutting edge, curved and sharpened pointed knife for inserting line to cut edge foreword and upward with the blunt back edge.
- ✓ **Mechanical flaying machine** is the machine driven by compressed air on an oscillating scissors at round to separate the connective tissue from the carcass without making any cutting on the stock.
- ✓ **Salt** which used for preservation**.**
- ✓ **Clean water and detergents** used for washing of hide and skin
- ✓ **Chemicals such as DDT-** used for disinfecting the warehouse**.**
- ✓ **Sharpening steels**:-To keep flaying knives as sharp as possible
- ✓ **Brush**:-It is made from plastic and useful to wash hide and skin to remove dirt.
- ✓ **Rope**:-useful to stretch the skin and hide of animals.
  Jar:-essential for pouring liquid substances into them.
- ✓ **Rubber hose**: - to apply water to wash hide, skin and equipments
- ✓ **Mechanical hoist*:* -** a lifting device like pulley
- ✓ **Slaughter slab**: - it is equipped with wooden or tabular steel gantry hoists such slab will allow control to be exercised over the butcher and permit hides and skins inspection and fuller use of other by products.
- ✓ **Pit:** - to burn left over and offal
- ✓ **Scales**:-Beam balance which measures 100kg must be available.
- ✓ **Table**:-Table for washing hide with dimension of (70cm*2m*1.50m).it can made from wood or cement.

Preservation and storage house constriction materials

- ✓ Corrugated iron sheet
- ✓ Rope, nail, string, wire, hammer, wood

- ✓ wire mesh and other materials for flooring
- ✓ Insect proof wooden pallet etc
- ✓ Bucket -helps for transportation of water and collection of blood.
- ✓ Wheel-barrow for transporting of different materials.

The estimation of the amount of construction materials are determined by the type and dimension of the selected area for construction.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. _____ has blunt and rounded tip helps for separating or removing hides and skin from the carcass. (3 points)
2. _____ is a straight cutting edge, curved and sharpened pointed knife for inserting line to cut edge. (3 points)
3. Explain the materials and tools for hides and skin preservation. (6points)

Note: **Satisfactory rating - 8 and 10 points** **Unsatisfactory - below 8 and 10 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1	**Prepare materials, tools and equipment for preserving hide and skin**
Operation Title:	**Selecting appropriate tools and equipment for preservation**
Purpose:	
Equipment, Tools, and Materials:	Saw, hammer ,nail, drying frame, washing table, drainage table, flaying knife ,ripping knife, wood pallet ,rope, salt, wheel barrow and others
Conditions:	Before the slaughter operation takes place all the necessary materials, tools and equipment's.
Procedure:	1. Wear personal protective clothes while preparing tools and equipment's for preservations. 2. Identify materials, tools and equipment's helps for preservations. 3. Check weather all materials and equipment's are properly work or not. 4. Follow correct handling of tools and equipment's for preservations. 5. Prepare and list the role of tools and equipment's used for preservation.
Precautions:	Be sure if the materials properly prepared
Quality Criteria:	Did PPE wear properly? Did materials and tools identified properly? Did all materials and tools are checked properly and accordingly? Did all list of materials are listed correctly?

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 4 hour.

Task 1- Identify types of tools and equipment used in hides and skin preservation.

Task 2- Determine types of PPE Used in this operation

References

Devassy, T. J and Mr Getachew Argaw 1998. Hides and Skins Improvement Handbook.

Elliot, R.G.H. 1985. Hides and Skins Improvement in Developing Countries, FAO/Rome. FAO. Agricultural Development Paper No. 49.

Mann, I. 1962. Hides skins and glue stock. In Animal by- products processing and utilization. Pp80- 137.

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Tekle Zeleke, 2008. Sheep and goat products and by-products. Ethiopia Sheep and Goat Ahmed

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Learning Guide -#21

Unit of Competence: **Support Handling of Hide and Skin**

Module Title **Supporting Handling of Hide and Skin**

LG Cod **AGR ATI1 M07 0919 LO2-LG-21**

TTLM Code **AGR ATI1 TTLM 0919 v1**

LO 02: Undertake handling of hide & skin for selection and preservation

Instruction Sheet	Learning Guide #21

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- ✓ Carry out Hide and skin selection procedures
- ✓ Carry out preservation procedures
- ✓ Undertaking work task in safe and appropriate manner
- ✓ Identifying OHS hazards and taking appropriate action
- ✓ Using Personal Protective equipment during preservation

Observing sanitary Procedures Recognizing mechanisms of milk synthesis and secretion This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to**

- ✓ Carry out Hide and skin selection procedures
- ✓ Carry out preservation procedures
- ✓ Undertake work task in safe and appropriate manner
- ✓ Identify OHS hazards and taking appropriate action
- ✓ Use Personal Protective equipment during preservation

Learning Instructions:

7. Read the specific objectives of this Learning Guide.
8. Follow the instructions described below 3 to 6.
9. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3, Sheet 4, Sheet 5 and Sheet 6”.
10. Accomplish the “Self-check 1, Self-check 2, Self-check 3, Self-check 4, Self-check 5 and Self-check 4” **in page -10, 18, 23, 26, 32 and 39** respectively.
11. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2, Operation Sheet 3 and Operation Sheet 4 ” **in page 40,41,42 and 43.**
12. Do the “LAP test” **in page – 44** (if you are ready).

Information Sheet 1	Carry out Hide and skin selection procedures

1.1. UNDERTAKE HANDLING OF HIDE AND SKIN SUPPORT WORK

1.1.1. Introduction Care during the life of animals

Skins in Ethiopia have greater economic return than most agricultural products and by-products. As a result, animal should be given due care from birth to slaughter. Management practices should ensure the health of the animal and reduce the likelihood of injuries that could damage the skin. Treatment and vaccinations should be given on time as required. Treatment against ticks should be given through regular dipping or spraying. Providing proper feed and watering sites will help prevent sheep and goats from damaging their skins while searching for feed in the bush.

Fatigued animals, especially after a long trek on foot or rail, should be allowed to recover prior to slaughter or incomplete bleeding may occur. Removing the skin is also difficult in fatigued animals leading to more chances for the skin being cut. Animals should have free access to drinking water for at least 24 hours before slaughter and either held off-feed or given very little feed.

1.1.2. Care during slaughtering and flaying

Humane methods of slaughtering animals are encouraged; however, exact practices in Ethiopia differ according to local culture, customs and religious practices.

A. Stunning

Stunning is the practice of rendering animal's unconscious just before slaughter. Proper stunning procedures reduce the chance of stained carcasses and blood splash.

The following stunning options are available:

- ✓ Mechanical instrument (Captive bolt pistol) that traumatizes the brain so that the animal loses consciousness instantaneously.
- ✓ Electrical stunning.
- ✓ Use of carbon dioxide gas.

The animal must be killed as soon as possible after stunning by bleeding.

B. Religious slaughter

Religious slaughter methods include *Shechita* by Jews, *Halal* by Muslims and *Jatka* by Sikhs. The major blood vessels and the throat are severed by a transverse cut in the shechita and halal slaughter methods. In Jatka the animal is decapitated with a single stroke using a sword. The halal method of slaughter is of importance due to the Muslim target market for Ethiopian sheep and goat meat.

Bleeding

Whatever the slaughter procedures, bleeding is best performed with the carcass hoisted by the hind legs while leaving the forelegs to kick in the usual reflex action. Animals must be stunned prior to hoisting. For sheep and goats, some flayers prefer to complete most of the bleeding on the floor adjacent to a drain. When sheep and goats possess long hair, much more care must be taken to avoid contamination with blood and dung, and bleeding on a definite slope is to be preferred. In either case, final bleeding is best carried out after suspension of the carcass.

1. Flaying Cattle

The value of the hide depends to a very great extent on the flaying. To flay properly the following points must be observed.

i) A proper and sharp knife should be used;
ii) The knife should be held properly;
iii) The correct ripping cuts should be made;
iv) The carcass should be flayed immediately after slaughter

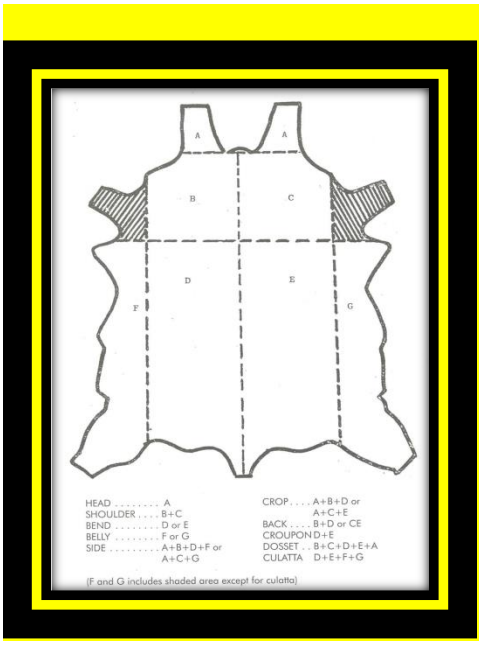
vi) The carcass should be kept steady;

vii) The hide should be kept free of blood and manure; cutting, gouging or scoring

viii) The hide or skin should be pulled or beaten off whenever possible;

ix) Long cuts with the knife should be made, not short ones.

- ✓ A proper flaying knife is one with a curved blade more than 15 cm long with a rounded, blunt tip.



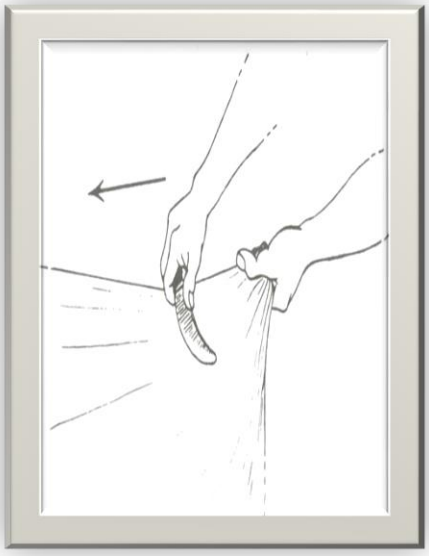


Figure 1. Subdivision of hide

Figure 2. Flying knife

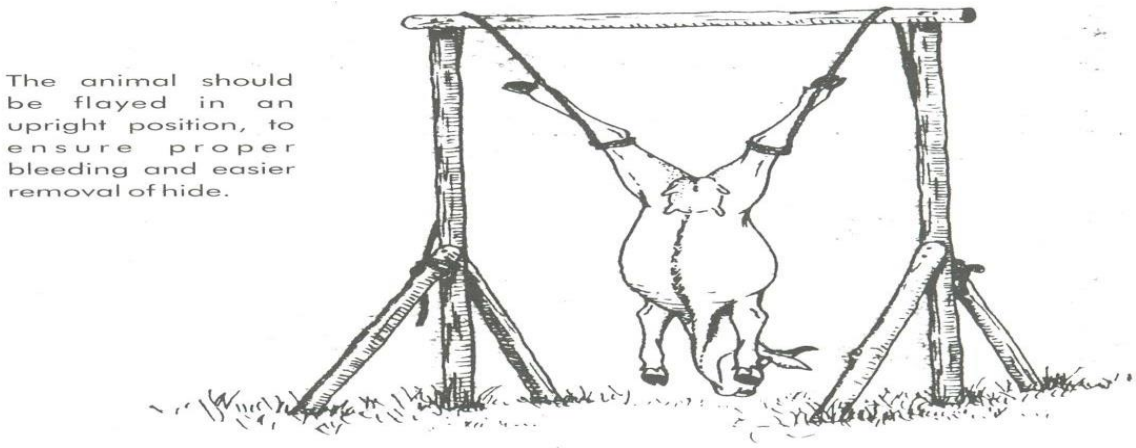


Figure 3. Method of hanging.

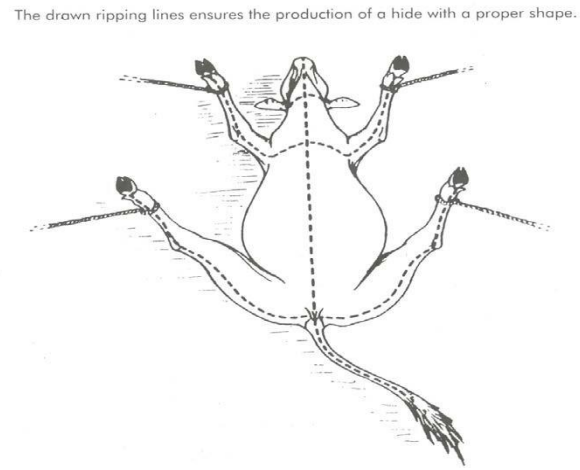


Figure 4. Ripping procedure.

In the ripping of the carcass, the following cuts must be used/

i) One long, straight incision on the center belly line, from neck to anus;

ii) Two incisions around the hocks;

iii) Two incisions on the forelegs around the knees;

iv) Two straight and downward cuts on the inside of the inside of the forelegs from the knees to the breast bone;

v) Two similar cuts on the back of the hind legs starting from the hocks and finishing at the anus.

Flaying then consists of pulling the hide away with one hand and cutting with the other. When the bellies are sufficiently flayed, the carcass should be hoisted and the remaining hide pulled off.

I. The tail is flayed by one long incision on the inside to remove the tail bones and then the hide is pulled down.
II. The fat around the hump must be carefully cut away.
III. Evisceration of the carcass should not take place until the hide is off.
IV. The custom of cutting up the meat and putting it on the hide should not be followed.

In flaying, the knife should be used as little as possible. Sheep and goat skins need only a very few cuts.

In some places, wooden or brass mallets are used to beat the hide or skin off the carcass. The mask or face skin should always be saved and taken off with the hide. Ears must be cut off.

2. Flaying Sheep and Goats

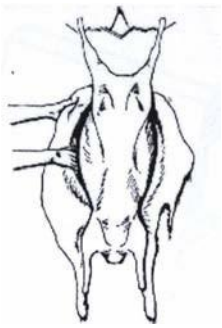
The pre-slaughter care of sheep and goats and their killing is very much the same as for cattle.

The ripping cuts for sheep and goats are:

i) One long, straight incision from the jaw to the anus, on the center of the belly;
ii) Four circular cuts around the shanks;
iii) Two cuts on the inside of the forelegs, from the shank to the breastbone;
iv) Two cuts on the back of the hind legs from shank to anus.

It is better as a rule not to make all the ripping cuts, but to pull the skin off unopened. Such skins are called “cased”. The skin is peeled off the carcass (which is hung up) like a glove, the knife being used as little as possible.

Cased skins must always be opened up for drying, washing, etc.



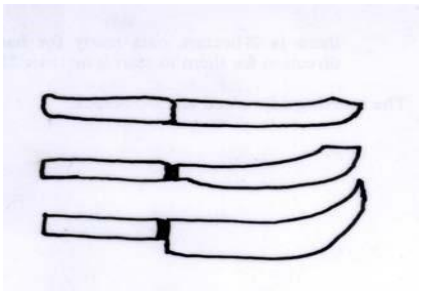


Figure 5. Flaying of goats and sheep using flaying knife and proper ripping and flaying knives.

Appropriate flaying methods

- ✓ **Incision:** Blowing air into the cut in the hind leg. Relevant in case one wants to use as water bag.
- ✓ Flayed with blunted curved knife following ripping lines.
- ✓ Hoisted by the hind legs and skins removed by pulling and fisting.
- ✓ Mechanical flaying.
- ✓ Hand flaying machine.

1.1.3. Activities after flaying and before preservation

Washing

As soon as hide and skin is flayed, it should be washed. Whenever possible it should be spread out over a sloping cement table of 250cm by 200cm in size and wetted with clean and fresh water from pipe or shower in order to wash dung, blood and other remaining dirt. This operation is considerably facilitated when the animals are washed and cleaned with a brush before slaughtering. It is proved that through washing with cold and clean water after flaying it is possible to reduce the number of microorganisms by half. If the flesh side is contaminated with blood or dirt it should be turned with the flesh uppermost and washed and cleaned with the smooth edge of the scraper or with a brush for about two minutes

After the completion of washing, the hides are placed with the hair uppermost on wooden floors for draining and losing the natural body heat. The time taken varies from 30 minutes to one hour

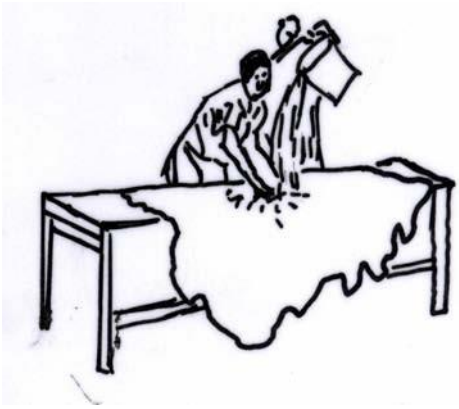


Figure 6. Washing of the flesh side before preservation.

Fleshing

How to flesh

1. Use a curved-edge flaying knife
2. The excess tissue can gently be removed by keeping the knife at a low angle and without exerting heavy pressure.
3. Care should be taken to avoid cutting or damaging the skin.
4. A wooden horse with sloping side will probably be found easier to work upon than a large table.
5. Exotic skins should be suspended and scraped for cleaning and defatting.
6. Suspend skins for defatting and, by scraping instead of cutting, remove the fat using a sharp curved-edged knife. As far as possible, the fat on the flesh side should be completely scraped off as fat will not permit proper curing and subsequent tanning.
7. Flesh before tissue and meat dry up.
8. Wash skins by pouring water over them after they have been spread out as flat as possible, over a wooden “horse.” Use a firm “scrubbing brush” or coarse broom and make vigorous strokes down the skin to remove blood, dirt, etc., as the water is applied.

9. Fleshing and washing can be conducted satisfactorily using a wooden “horse” as shown in in **Figure 7** However, a large, curved top table (Figure 9) can be used if a “wooden horse” is not available.

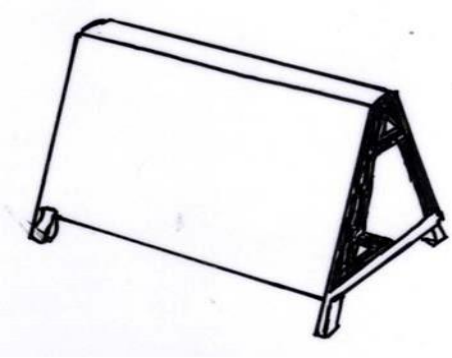


Figure 7. Wooden horse for fleshing.

Another method of fleshing uses a “fleshing beam” and a “fleshing knife.” A fleshing beam is a piece of wood over which the hide is draped for scraping. A common type of fleshing beam can be fashioned out of a 15-cm wide board 1.75–2 m long. One end should be cut to a blunt point and all edges rounded and smoothed. Legs are attached near the pointed end so that the fleshing beam slants upward from the ground to waist level. While this is the most common type of beam, others such as rounded logs can be used. A fleshing knife is a blade with a handle on both ends allowing even pressure to be exerted as the blade is pushed down the hide. Blades should be dull as the goal is to push and scrape all fat, meat and membranes off the hide, leaving only the skin.

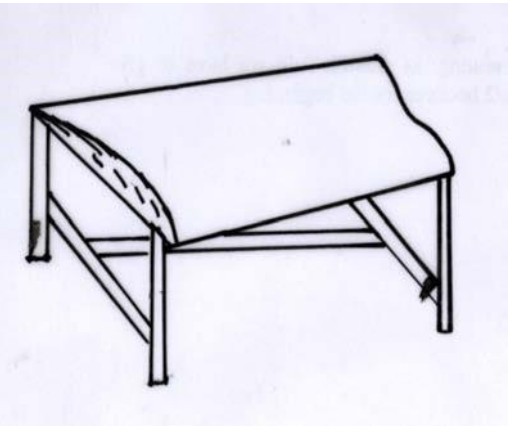


Figure 8. Fleshing beam. **Figure 9. Curved-top table used in preparation of skins.**

To flesh a hide, spread it over the pointed end of the fleshing beam and let it drain briefly. Push downwards, scraping off unwanted material using the fleshing knife. To make fleshing easier and lessen the chance of cutting the hide, it is important to flesh with the lay of the hair. The legs should be fleshed towards the belly and the hide from the tail pushing towards the neck.

Figure 10. Fleshing using a fleshing knife

Trimming and Lacing

So as to suspend a hide or skin, holes have to be cut all round it in which strings or reims (ropes made from hide or skin) can be inserted.

A large hide may require up to 34 holes. Either a knife may be used or a No. 12 punch. The holes should be about 2 – 3 cm from the edge and symmetrically placed.

To lace the hide into a frame, the hide is first suspended by two ropes from the top pole, then tied down to the bottom one by two more ropes attached to the tail piece.

In this way a straight central line will show whether the hides have been symmetrically hung.

Lacing should be done by two workers, one on each side, and each ensuring that their ropes have the same tension. The ropes should not be too tight.

In hide sheds, hides are hung flesh side towards each other so that one stick will stretch two humps.

The laces are stretched to the pegs in the same way as is done on a frame.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Among the following one can help improving shape of raw materials for preservations or Processing.

   A. Trimming B. washing C. fleshing D. None

2. Washing of hides and skins before preservation helps for: -

   A. removing of dung and blood B. Removing of irregular flaps and shapes

   C. Removing of unwanted subcutaneous tissues D. All

3. From the following one is not affect the size of warehouse.
   a. Amount of hide and skin collected
   b. Space between consecutive frames
   c. Number of accumulated frames
   d. All are affect the size of house
4. Explain and discuss in groups about most important requirements before the animals are slaughtered.
5. What are the most important post-mortem slaughter operations?
6. Define and discuss the following terminologies in groups.
   - ✓ Hides and skins
   - ✓ Flaying and ripping
   - ✓ Preservation and tanning

Note: **Satisfactory rating - 8 and 10 points** **Unsatisfactory - below 8 and 10 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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Training Manual on improved production and preservation techniques of hides and skin, August,2017

Information sheet 2	Carry Out Preservation Procedure

2.1. Preservation of Hides and skin

1. **Preservation:** is a process of partial dehydration to keep hides and skins in good condition without Spoilage. Preservation is the name given to a variety of procedures, which can be applied to hides and skins in order to reduce, or stop spoilage. Preservation can only ***maintain quality***. It follows that a bad preservation will allow deterioration of all a skin, irrespective of its original quality.

   Most hides and skins are preserved in one way or another before being shipped to a tannery, but it is not always necessary in the manufacture of leather freshly flayed hides and skins may be dispatched immediately to the tannery and made into leather. Unfortunately, few tanneries are sited close enough to their source of raw material to be able to receive fresh skins. Generally though, tanneries are still geographically isolated from their raw material.

2.1.1. Preservation Techniques

A. Air drying

- ✓ Suspension drying
- ✓ Line/wire drying
- ✓ Skin drying sheds

B. Salting

- ✓ Wet salting
- ✓ Dry salting
- ✓ Brining

1. Air drying

Drying of skins can be done in different ways. The techniques include drying on the ground, using suspension/frame drying, drying by suspension over cords or wires, and

tent and parasol drying. Drying depends on the temperature, relative humidity and movement of air. For example, a skin can be dried in three hours in a dry atmosphere.

A fresh skin placed in warm surroundings will dry more rapidly in moving air. Even if the air is humid but moving, it will dry a damp skin.

Therefore, it is bad practice to hang a skin in a closed space with solid walls and no air movement, as this leads to putrefaction. Air currents should move freely in drying skins even if the air is hot. If a skin does not dry in 2–3 days, the chance of putrefaction is very high. Air drying can be done in the following ways:

1.1. Suspension frame drying:

This can be practiced in different ways depending on local conditions and availability of skins. The best option is to frame dry under a shed. While frame drying in the open is cheaper, it is better to use a shed where suitable cross ventilation occurs.

Large frames meant for hides, 3 m × 3 m, can be adapted for skins by partitioning allowing four skins to be stretched (Figure 11).

Suspension frame drying in the sun is acceptable provided that the temperature of the skin does not reach the point of degradation of collagen. Sun drying makes skins crack when folded and become very difficult to soak in the tanneries. Sheep skins are very sensitive to heat damage.

Suspension frame drying has the following advantages:

- ✓ It allows free flow of air on both sides of the skin.
- ✓ If not in a shed, rain drains off the surface and does not collect in puddles on the skin.
- ✓ Sun rays strike obliquely not directly.
- ✓ It permits the skin to cool off rapidly from the large exposed surface area.

- ✓ Neither hair slip nor putrefaction begins as there are no folds or points of contact between the skin and any solid object. But during the rainy season, due to still air and high relative humidity, some percentage of skins may putrefy.
- ✓ Better grading possibilities.
- ✓ Dried skins can be stored for a longer period of time than salted skins.
- ✓ Transporting dried skins is cheaper as the weight is only half that of the salted skins.
- ✓ Corrosion is avoided as opposed to the case of salted skins where containers and transporting vehicles may become corroded.
- ✓ It is less expensive as salt is not purchased.
- ✓ Less worry of environmental contamination as compared with disposing salt.

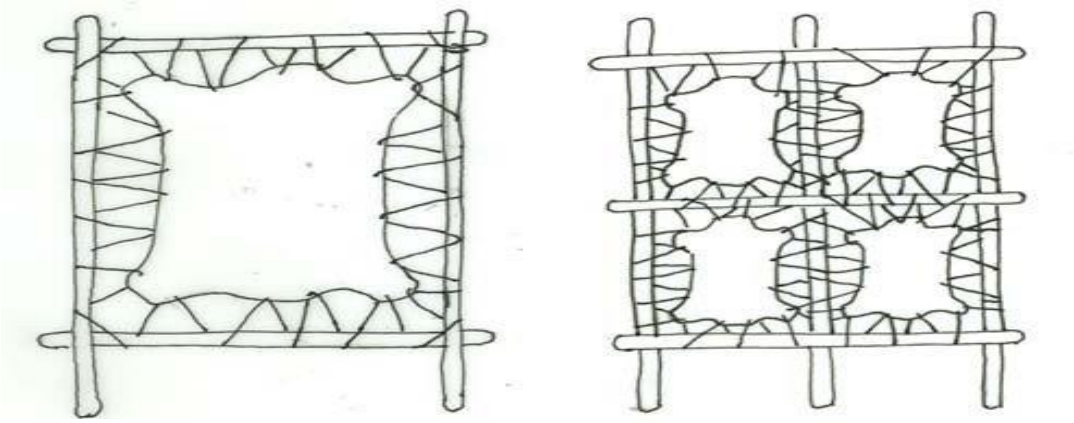

Figure 2. Frame drying.

The following problems are associated with suspension frame drying

- ✓ Difficulty in rehydrating dried skins including extra cost and potential loss of skin substances leading to holes.
- ✓ Uneven shape by improper stretching during drying.
- ✓ Loss of surface area by the cuts for lacing and consequent trimming.

1.2. Suspension drying over cords or wire: This technique is employed where wood is scarce. Skins are suspended symmetrically along the backbone with the hair or wool hanging down over a wire not thicker than one's little finger. The

overhanging sides of the belly and flanks must be prevented from touching each other and the shanks from folding inwards. Sticks or straw can be used to adhere to the wet flesh, ensuring that every part of the skin is free and open to the air (Figure 12).

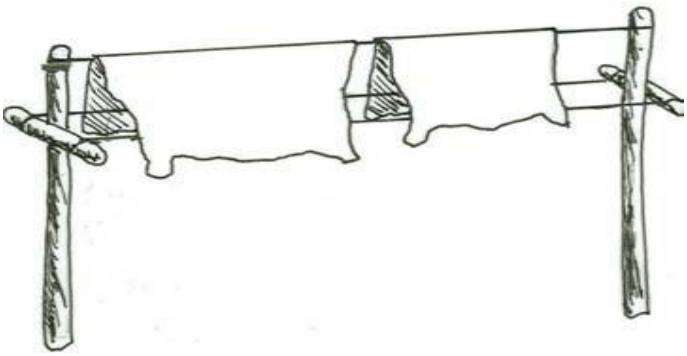

Figure 3. Suspension drying over cords

1.3. Ground drying: This method, in which skins are placed directly on the ground, is the worst technique to use. It produces dried material of the most appalling quality, and consequently of the poorest value to the producer. Because of the lack of air circulation between skin and soil, moisture is trapped under the skin and the physical damage is irreparable. Much of the damage caused at this stage may not be fully seen until processing.

Figure 4. Ground drying results in serious, irreparable damage to skins.

1.4. Skins drying shed: Drying sheds have three sections:

- Working area
- Drying area
- Storing area

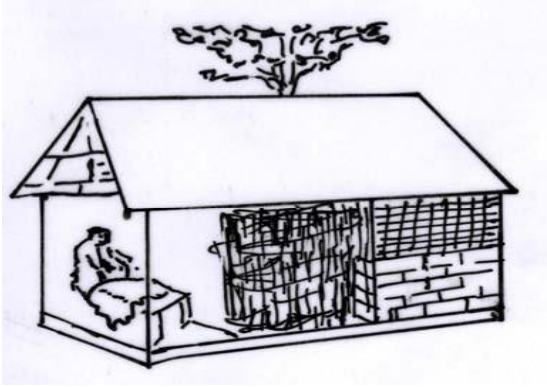

Figure 5. Skins drying shed.

2. Salting

2.1. Wet salting: The skin is spread on the floor or a wooden pallet and common salt is uniformly applied on the flesh side equal to 30–40% of the green hide weight. A second skin is now spread on the first one with the flesh side up and salt applied in the same manner. A pile of about 100 skins may be made or to an approximate height of 1 m. (Figure 18 to 19).

Figure 6. Salting skins on a cement floor. Figure 7. Salting practice ESGPIP.

The salt absorbs water from the skins, and the brine (mixture of salt and dissolved fluids) is allowed to drain.

The stack is allowed to cure for about five days. It is then opened and put in a new pile with the top skin going to the bottom, applying additional salt wherever necessary. Again, the skins remain for five days in the pile. The skins are then removed and excess salt removed from the flesh side and the grain side to keep it clean.

Bacteria are not destroyed in this technique but a condition is created where they become ineffective. Salt absorbs about 20% of the water from the skin. Some salt is absorbed by the skin to the extent of 13–17%. In smaller skins, the percentage of salt used based on green weight is higher. Rock salt, lake salt and sea salt can be used. Any salt used should have a sodium chloride content of 94–95%.

The salt should not be too fine or too coarse. If too powdered; the salt flows out as brine and is not absorbed to the desired extent. The suggested size is two to three millimeter grain. Rock salt is the most ideal salt for curing but sea salt is most commonly used. The main disadvantage of wet salting is the formation of “red heat” which makes the flesh side of the skin red through the action of halophilic (salt-loving) bacteria and other organisms that have salt tolerance.

2.2. Dry salting: This technique is very similar to wet salting but skins are dried after the initial salting. This method gives the advantage of both drying and salting. This technique is especially well-suited for preparing skins/hides for export and at the same time overcoming the problem of wet salting. The initial steps are the same as in wet salting; however, salting has to be done without any delay after flaying.

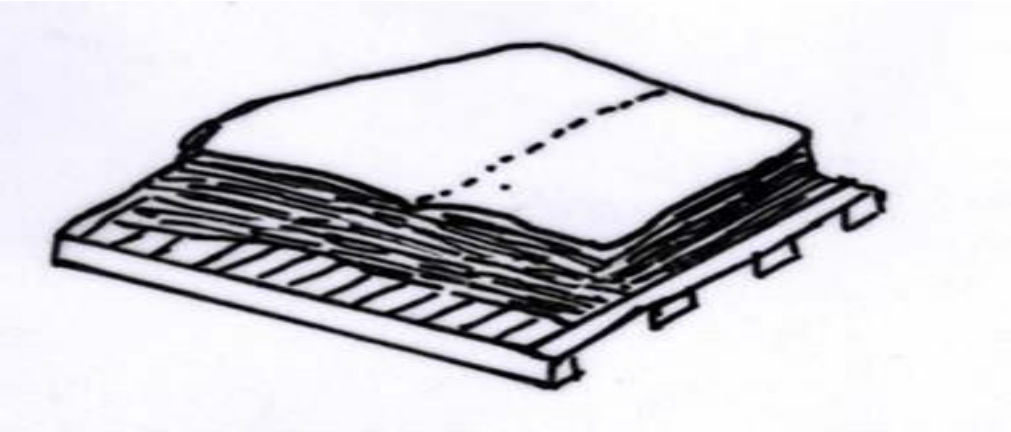

Figure 17. Salted of skins on a pallet.

3. **Brining*:*** Green fleshed and washed skins are soaked in brine (salt solution) for 24 hrs.

It has been the practice in some countries to recover and re-use salt swept from skins before these are shipped or sold, sometimes after mixing with fresh salt. It must be recognized that the risk of contamination of sound, fresh raw stock in this way is very high. This is generally practiced where salt is either considered too costly for economic use or is not readily available.

Generally, the best preservation method is salting depending on the distance of raw skin production from tanning factories.

The second best option is air drying. Air drying takes a long time for processing. Dried skins require soaping and wetting before processing. This process has added cost to the tanneries.

Self-Check 2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Which one of the following method of preservation is suited preparing hide and skin for export purpose? (2 Points)
   A. Wet salting
   B. Dry salting
   C. Brining
   D. Ground drying.
2. ----preservation method is soaking hide and skin salt solution for 24 hours. (2 Points)
   A. Wet salting
   B. Brining
   C. Dry salting
   D. Baling
3. Of the following which process adds cost to the tanneries
   A. Air Drying B. Salting C. wet salting d. None

Give short answer for the following questions.

1. Mention the main objective of preservations. (4 Points)
2. Discuss on factors helps to choose preservation methods. (3 Points)
3. Mention and discuss air drying methods of preservation with their advantages and disadvantages. (3 Points)
4. Mention types of salting methods of preservation with their differences. (3 Points)

Note: **Satisfactory rating 10 and 12 points** **Unsatisfactory below 10 and 12 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 3	Undertaking work task in safe and appropriate manner

3.1. Constructing ware house and drying frames

Designing were houses/drying sheds for hides and skins

The construction of shed for the preservation of hides and skins is advisable because the shed offered facility for close supervision, protection from the, protection from weathering, and also protection from insects and vermins etc

3.1.1. Selection of site for the construction of drying sheds

Before starting the construction of shed, emphasis should be given in selecting appropriate site based on the following factors

1. **Topography;** the area should be high mountain or hilly and level and also not marshy. The site should be located to obtain sufficient sun exposure and mild wind. The site should be gentle slope and the soil type should be sandy for good drainage
2. **Away from residential area**; construction of drying sheds in areas where people live may cause deterioration of health. so, the sheds should be far away from residential area and also the direction of the dominate wind should also be considered together with other parameters.
3. **Proximity to slaughtering places**; to ensure that the hides and skins may be delivered as fresh as possible and minimize transportation cost. Generally, the sheds must be constructed as close as possible to the source of hide and skins
4. **Availability of water**; - water should be available as cheap and in plenty (in free access). the shed should be near to watering point for washing hides and skins
5. **Accessibility to market areas** - as soon as h/s preserved and stored they should ultimately reach to market otherwise long storage is the cause for the damage of most h/s
6. **Availability of infrastructures**

7. **Availability of transportation facilities and tanning industry**

Designing ware house /D.shed /

3.1.2. The size of the ware house; it depends on

- ❖ The amount of h/s purchased or collected for preservation
- ❖ The no. of frames to be accumulated
- ❖ Arrangement of frames which can be in one row, two row and can also be in 3 rows
- ❖ Space b/n two consecutive frames i.e 30cm
- ❖ No. of drying periods, which is about 7 days

N.B the above five factors are only used to calculate the length of the drying place not the whole length of the house or drying shed which include working place and storage. Since there is no written material on how to calculate the whole length of the ware house/ area of ware house, we are forced to show how to calculate of the drying place only

The ware house /drying sheds have three portion; Namely

A. **working place**: with a slops floor where hides /skins are prepared on table prior to suspension on frame like washings, fleshing and trimming

B. **drying place**: - this is a place where h/s are taken from working placa to be preserved by suspension on frames.

C. **storage place** - this is a place where h/s which have finished their drying period will be stored untie they are marketed the length of drying place of the ware house /drying shed can be calculated by considering the above five factors

Example1: suppose in a certain area these are unorganised abattoirs which have its own drying shed. In this abattoir 40 cattle are slaughtered every day. Calculate the length of the drying place in meter when the frames are arranged in two rows? Assume 7 days for drying period of hides and 30cm between two consecutive frames.

Solution - length of drying place?

Given -7das of drying period

40 cattle, which is equivalent to 40 frames

Frames arranged in 2 rows

Space b/n two consecutive frames is 30 cm

D. length = $\frac{40 \text{ frames} \times 7\text{days} \times 30\text{cm}}{2 \text{ raws}}$

= 4200cm = 42meter

length of the drying place is **42 meter**

Example 2. Below You have given the needed parameters for designing drying shed. Calculate

a/ the number of frame needed in the drying place

b/the length of the drying place

c/ the width of the drying place

Given

- ✓ 80 sheep slaughtered daily
- ✓ Frame size 3x3m
- ✓ Drying period 7 days
- ✓ Space between two consecutive frame is 30 cm
- ✓ Frames arranged in 3 raw
- ✓ Space between raw 50 cm

3.1.3. The use of drying frames as an integral part of the structure or to be inserted later

Depending on the size of the shed there are two types of frames

1. **Movable frame**
2. **Permanent frames**

The movable frames are preferred for a variety of reasons that it provides flexibility for future use and allow use of lighter material in construction of frames.

Fixed frames are usually permanent and are fixed in the drying place

It is advisable to add a few frames to accommodate extra hides that might become available in some days and change in climates. Attention should be given when determining the size of the frames required for skin. Especially if you use multipurpose frames the size is 3mx3m for hide and 1.5m *1.5m for skin. Note that one frame for hide can be used for 4 skins after dividing the frame in 4 parts

Generally, the drying shed should be constructed well for best preservation of hide and skin. for instance the shed should have cross ventilation to set fresh air so, we have to made the top of the ware from wire mesh. The roof should be protected from rain and direct sun light. The roof should be extended considerable distance from the frame to avoid rainwater splash on hides. Floor should be made in a way to protect damp penetration and should be clean and sloppy especial in the working and storing place.

3.1.4. Constructions of hide/ skins drying frames

The frames to lace of hide and skin be made from different available materials like locally available wooden materiel etc. Air drying using frame suspension is most common and effective in our country.

On average the recommended frame size for both h/s is

1. For very long hide 3mx3m
2. For long hide 3mx2.75m
3. For medium hide 2.75 mx2.75m
4. For smaller hide 2.5mx2.5m

the above frame can be modified for skins by dividing the frame in to four equal parts

5. Large skin = 1.5x1.5m
6. Medium skin = 1.3x1.3m
7. Small skin = 1.2x1.2m

The minimum distance b/n two consecutive frames should be around 30 cm to allow air circulation and to permit an operator to pass between two frames.

Self-Check 3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Explain the factors considered before site selection for Hides and skin preservation. (5 points)
2. Explain the factors determining ware house size for hides skin. (3 points)

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 4	Identifying OHS hazards and taking appropriate action

4. Identifying OHS hazards and taking action

What is risk management? Risk management involves developing systems to identify and analyze hazards, and eliminate or minimize any harmful consequences.

What is a hazard? A hazard is anything that has the potential to cause harm to people, equipment, structures and/or the environment. Hazards in the work place may include violence, hazardous chemicals, and electricity, working from ladders or moving patients. **What is a risk?** Risk is the probability, high or low, that somebody could be harmed by the identified hazard, considered in conjunction with how serious the harm could be. Risk is judged or assessed in terms of likelihood (how likely is it that the event will happen?) and consequence or impact (how bad will an event be if it happens?).

Risk assesses who could be harmed and what would the consequences be. The assessment needs to consider foreseeable hazards or risks that may cause harm to an individual or has a latency period e.g. asbestosis following exposure to asbestos. What is reasonably practicable? Deciding what is 'reasonably practicable' to protect people from harm requires taking into account and weighing up all relevant matters, including:-

- The likelihood of the hazard or risk concerned occurring
- The degree of harm that might result from the hazard or risk
- Knowledge about the hazard or risk, and ways of eliminating or minimizing the risk
- The availability and suitability of ways to eliminate or minimize the risk
- After assessing the extent of the risk and the available ways of eliminating or minimizing the risk, the cost associated with available ways of eliminating or minimizing the risk, including whether the cost is grossly disproportionate to the risk

Hazards may includes

- ✓ Chemical hazards during processing of raw materials and able to use according to manufacture instructions.
- ✓ Electrically hazards.
- ✓ Machinery handling hazards during processing.
- ✓ Suffocation hazards in the work places.
- ✓ Toxic gases hazards.
- ✓ Fire hazards.

4.2. The risk management process

Managing work health and safety risk is a proactive and ongoing process. The risk management process can be briefly described covering the following key stages:

1. Establishing the context
2. Identifying the hazards
3. Assessing/analyzing the risks
4. Eliminating or controlling the risks, considering the hierarchy of risk controls
5. Monitoring and reviewing risks and controls
6. Communicating and consulting during each step of the process.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define Risk. (2 points)
2. Define Hazards. (2 points)
3. Define risk management. (2 points)

Note: **Satisfactory rating 3 and 5 points** **Unsatisfactory -below 3 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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Training Manual on improved production and preservation techniques of hides and skin, August,2017

Information Sheet 5	Using Personal Protective equipment during preservation

5.1. PERSONAL PROTECTIVE EQUIPMENT

The use of personal protective equipment and clothing is an immediate but only short-term solution for dealing with health hazards and safety risks at the work place. The use of personal protective equipment should be only considered as the last and supplementary solution, where it is not possible to completely eliminate or prevent exposure to hazards.

The most commonly needed personal protective equipment in tanneries and effluent treatment plants are• protective clothing (gloves, safety shoes/boots, aprons);

• Protective goggles and shields; and
• Respirators
• hearing protection;

Figure 18 personal protective equipment

5.2. SELECT THE CORRECT PERSONAL PROTECTIVE EQUIPMENT

While numerous types of personal protective equipment are available in the market, selecting the most appropriate and cost-effective one is not an easy task.

Respirators

Respirators, covering mouth and nose, prevent the entry of chemicals into the body through inhalation. They need to be worn whenever the concentration of airborne pollutants (dust, vapours, and gases) cannot be reduced to acceptable levels by other means

Factors to be considered for the correct selection of appropriate respirators are:

- Type of contaminant or contaminants;
- Expected and permissible concentration in the workplace (the latter also called threshold limit value);
- Type of activity of worker: The respirator must be compatible with hard hats, goggles, other personal protective equipment; the worker must be able to communicate and perform required job duties;
- Acceptability to the workers (comfort, type of activity);
- Proper respirator fit (Careful check is required when you have workers with beards!).

The most common respirators required in tanneries for day-to -day operations are air purifying respirators which clean the air by filtering or absorbing contaminants before the respiratory system.

Figure 19 Half Masks Respirator

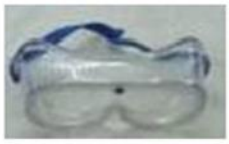
Eye protection

Safety glasses and safety goggles protect eyes from chemical splashes and exposure to dust, vapour, mist and fume or other foreign bodies (e.g. splinters).

Figure 20 Eye protection

Appropriate personal protective equipments and their usage are listed below

Rubber boots 	Rubber-boots cover the feet, ankles and the lower legs.	Rubber boots are waterproof, that is, the feet are protected from getting wet. Checks should be made to ensure that there are no holes in them. The feet are also protected when using sharp tools and damage from obstacles such as nails or broken glass on the ground which may cause injury to bare feet.
Gloves  Rubber glove  Cloth glove	Gloves are coverings for the hands. There are separate parts for each finger and thumb. There are also long (elbow length) and short gloves.	It is used when handling fertilizers and other corrosive chemicals. Gloves are necessary to protect the skin from exposure to toxic materials. It is important to wear the right type glove for proper protection according to the job that must be carried out. Rubber/ plastic gloves can be used when spraying. If they get wet the hands are still protected. Cloth gloves are used to protect the hand from bruises when using tools. Gloves should be checked often for rips or holes

Safety Gear	Description	Function
Coverall 	This is a loose fitting garment worn over ordinary clothes. Coveralls can have long or short sleeves	Coveralls are worn over all of a person's clothing to ensure that they are not soiled and that the skin is covered for added protection against harmful substances such as pesticides When a coverall is not available a long sleeve shirt and long pants are worn.
Goggles 	This is a close fitting protective glasses with side shields. It has an elastic band to fit around the head to hold it in place.	It protects the eyes from dust particles, fumes and harmful chemicals. Safety glasses or goggles should be worn when spraying chemicals or carrying out any job where the eyes should be protected.
Respirator 	Dust mask /Respirator is an apparatus worn over the face to cover the nostrils. They also contain elastic bands to hold them in place.	The dust mask is used to prevent inhalation of dust or smoke. The respirator can also protect against dust or smoke but it is used primarily when spraying pesticides to prevent the inhalation of poisonous fumes from the chemicals. It has a filter so when worn on the face you are able to breathe clean air. The dust mask is disposable while the

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Explain the importance of PPE. (2 points)
2. List the types of PPE used in the hides and skin preservation. (2 points)

Note: **Satisfactory rating 3 and 4 points** **Unsatisfactory -below 3 and 4 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

References

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Training Manual on improved production and preservation techniques of hides and skin, August,2017

Information sheet 6	Observing sanitary Procedures

1. CLEAN UP ON COMPLETION OF PRESERVATION OF HIDE AND SKIN WORK

1.1. Proper storing of preserved hides and skin

Storage of preserved hides and skins is as important as the preparation and preservation. In developing countries like Ethiopia, a good percentage of hides and skins are lost during storage and transportation especially during rainy seasons. A significant loss is due to damage caused by insects while dried hides and skins are stored before sending to tanneries.

As large percentage of hides and skins are produced in the rural areas, the maximum damage happens in the rural drying sheds.

The main problems in drying sheds include:

- ✓ Highly infested stores
- ✓ Leaking roofs
- ✓ Storage of hides and skins on the floor without the use of slatted platform
- ✓ Lack of insecticide
- ✓ Improper use of insecticide
- ✓ Long storage before sending to tanneries
- ✓ In rural areas more than the above problems, there will be no proper store itself.

Due to the conditions mentioned above, the hides and skins get damaged by insects and totally rejected.

The main insect damage is due to larvae of beetles of the Dermestes spp known as hide beetles

- ✓ Eggs are laid increases or folds
- ✓ They also favor fatty tissues (hence reducing this tissue by careful Flaying and particularly, by good fleshing before drying or salting is essential).

- ✓ The larvae feed on the hair and grain of infested stock, even penetrating the hide or skin completely.

Precautions to be taken to avoid damages during storage are (for frame dried ones):

1. Clean the store and drying sheds to get rid off the existing insects both on the roof and the building.
2. Burn the infested hides and skins
3. Repair all the leaking roofs of the stores and drying sheds
4. Provide protection for cured hides and skins from rain or sun.
5. Provide slatted platforms or improvised with wooden poles for storing of hides and skins.
6. spray or dust the dried hides and skins with insecticide (having insecticide content as 5% DDT)
7. In rural areas, improve the storage sheds with available materials,
8. Minimize storage time.

Storage of wet salted hides and skins

Precautions:

Especially if there is a delay in dispatching or processing in the tanneries

1. Store on pallets
2. Don't mix with cried hides and skins
3. The piles should not be more than 1 to 1.5 m.
4. Bundle only just prior to transportation
5. Open as soon as they arrived in the tanneries
6. Loose bundling in case of skin

1.2. Transportation of hides and skins

During transportation, by movement of goods, the surfaces will rub together and causes considerable damage to grain, folded edges and comers.

Therefore, the problem can be avoided: -

- ✓ By tight baling and adequate covering which will prevent much of the damage.
- ✓ Protect against wetting as wetting cause immediate bacterial action and putrefaction.
- ✓ Make sure that hides and skins don't come into contact with rust or iron or sea water.
- ✓ Special care has to be taken to make sure hides and skins don't get heated up in closed compartments during summer months and when wet salted sock transported by providing air vents.

1.2.1. Folding and Baling

If the dried hides are required either for export by land, by air or by sea, or even if they are needed to be transported for an appreciable distance within the country of origin, presentation in terms of baling and folding after grading is important for good marketing of hides and skins.

The same pattern of folding can be applied to dried or salted hides and skins but greater care must be exercised with dried hides which are more liable to crack on folding. The practical difference is that folds need to be made without undue haste the dried goods being less flexible than salted stock are more prone to development of cracks if folded too rapidly or put under excessive pressure.

The Centre point of the upper, shorter side will be on the backbone line at the neck end and that of the lower, shorter side will be on the backbone line at the tail end.
Fist fold – the belly area to the left of the pattern is folded over to the right to lie on top of the pattern which is then withdrawn from under the folded area without disturbing it. The pattern is next replaced in its original position but with the first fold now beneath it, the left outside edge of the fold coinciding with the left, longer side of the pattern.

Second fold – the corresponding area the right of the pattern is folded similarly. The pattern is then with-drawn and placed on top of both folds so that its longer sides now coincide with the outer, straight edges of the two folded areas. The lower, shorter side

of the pattern is next moved down to a point approximately 60 cm below the roof of the tail, i.e. its upper, shorter side is about that distance from the neckline and the area of hide within that of the pattern is roughly 1.2 m x 1.2 m.

Third fold – the shoulder/neck area of the hide is now folded down over the upper, short side of the pattern which is then withdrawn carefully and replaced on the hide so that one long side of the patter lies along the backbone line, the pattern, as a whole, projecting to the right of the backbone line.

Fourth fold – the partly folded area of hide to the left of the backbone line is folded over to the right to lie over the longer, left side of the pattern which is finally withdrawn. The right, longer edge of the new fold should now coincide with that of the hide beneath it.

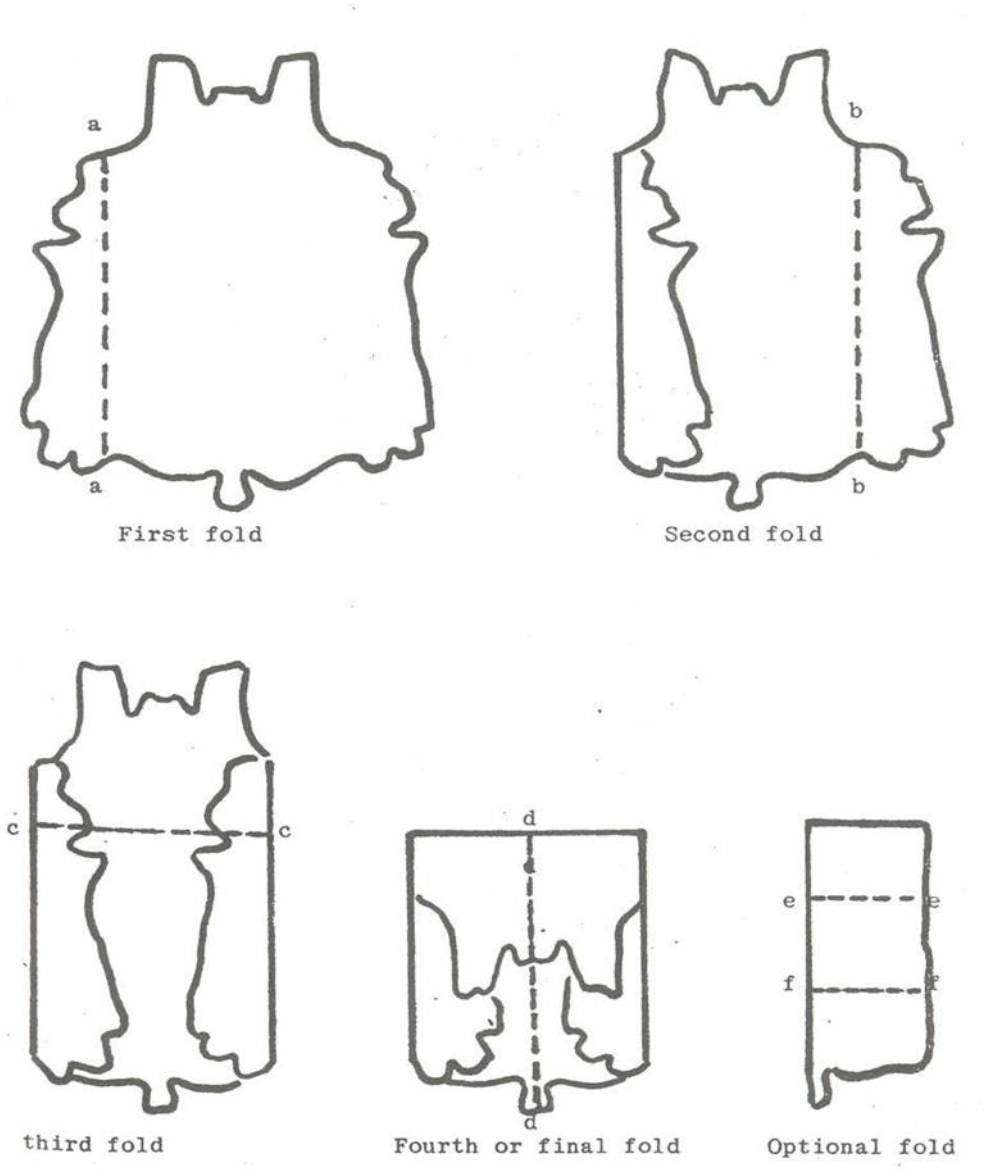

Figure 8. steps of folding hide and skin.

This degree of fold is as far as is normally applied to dried or dry-salted stock; as mentioned above, it is possible with wet-salted stock, with greater flexibility, to continue folding to produce a parcel by folding the hide, after the fourth fold, in equal thirds so that the hide is further reduced in area.

The method of folding just described refers to the hide being folded, in effect, flesh side out. It has to be said, at this point, that there are two schools of thought regarding the

best way to fold, flesh side out or hair side out. It is usually true that penetration by any extraneous material more readily penetrates the hide from the flesh side, therefore it is argued that there is more risk of damage to the hide unless it is folded hair side out.

When sheep or goat skins are being folded, these smaller skins can be folded in a similar manner, but there is no need to use a pattern as it is possible to judge the best lines of folding by eye.

When dried or dry-salted stock has been folded as described above, the next step in preparation for transport can be undertaken. This can be done by passing heavy twine or strong plastic type twice round a group of about 10 hides or an equivalent weight of skins, in both directions, to produce a very firmly tied bale.

1.2.2. Packing for Export

A clean pallet, measuring 1.2 m x 1.2 m should be covered with a sheet of hessian approximately 1.8 m wide and 6 m long (to allow 2.4 m to overlap on both sides of the pallet). This will allow a load of about 48 hides (nearly one ton in weight at 50 lbs each) to be build up on the pallet and still permit the load to be wrapped.

If wet-salted hides, for example, are folded to the size described under folding and baling it is possible to pack these in seven or eight layers of six (made of two parallel lines of three folded hides) alternately at right angle to the adjacent layer or layers. These techniques assist in making the load stable on the pallet.

The hessian covering should finally be brought around the sides of the stack, overlapped on top and folded in at the two free sides. This can then be secured with the aid of a mechanical binder using several passes of plastic strip.

elf-Check -1	Written Test

Directions: Match the following terms correctly

Matching

A

1. First fold
2. Waste

3. Second fold
4. Third fold
5. Forth fold

C. Offal of hide and skin
D. The right, longer edge of the new fold should now coincide with that of the hide beneath it.
E. The shoulder/neck area of the hide is now folded down over the upper
F. Baling

Note: **Satisfactory rating 6 and 8 points** **Unsatisfactory -below 6 and 8 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

B

A. The belly area to the left of the pattern is folded over to the right to lie on top of the pattern
B. The corresponding area the right of the pattern is folded

Operation Sheet 1	**Preservation Of Hides and skin**	
Operation Title:	**Soaking in brine Solution**	
Purpose:		
Equipment, Tools, and Materials:	• Vat/drum • Brine • Water • Hide and skin	
Conditions:	Not later than 5 hours after flaying, cleaned hides or calfskins shall be soaked in brine solution for stacking in the following manner:	
Procedure:	6. A brine solution in the proportion of one to three by mass of salt to water shall be prepared in vats or drums**;** 7. The density of such a solution shall be correspond to a relative density of 1.2**;** 8. A quantity of salt of at least 25% of the mass of the fresh hides or calfskins shall be used in solution**;** 9. The vat or drum shall be loaded with hides or calfskins provided that the solution shall be recharged with salt amounting to 12% of the mass of hides or calfskins when loading every following lot**;** 10. Hides or calfskins in load shall be stirred every 15 minutes at intervals of 1 hour for the duration of 8 to 10 soaking hours in brine solution which shall not exceed a total of 24 hours**;** 11. Such hides and calfskins shall be made to drain for not more than 1 hour**.**	
Precautions:		
Quality Criteria:		

Operation Title: 2	**Salting and Stacking**	
Purpose:	Preservation of Hides and skin	
Equipment, Tools, and Materials:	• sodium carbonate • naphthalene • boric acid**.** • sodium chloride	
Conditions:	Cleaned hides or calfskins shall be treated with a salt mixture for stacking and stacked in the following manner: -	
Procedure:	**1.** For salting hides of calfskins, a mixture of sea-salt or rock-salt with antiseptic products shall be used for example a mixture which consists of 100kg of salt plus 2kg of naphthalene, plus 2.5kg of sodium carbonate or 100kg of salt + 1kg of naphthalene + 1kg of boric acid**.** **2.** The sea-salt or rock – salt used shall be a good technical quality containing not less than 98% sodium chloride with no ad-mixture of ferrous salts**;** **3.** Don't use any recovered salt, originating from brushing of hides or calfskins**,** **4.** For a large hide and skins use, salt crystals which will pass through a screen with a mesh of between 1.25 and 3.15 mm and for calfskins salt crystals which will pass through a screen with a mesh of between 0.4 and 1.0 mm**.** **5.** Use a quantity of salt mixture of at least 40% of the mass of fresh hides or calfskins shall be used**;** **6.** After coding, cleaning and draining of hides and skins salt them as quickly as possible and not later than 5 hours after flaying, a hide or calfskin shall be laid with its flesh side up on a smooth, clean and solid surface and the salt mixture shall be spread evenly over the entire surface of the hide or calfskin**.** **Stacking** 2. Salted hides or calfskins shall be stacked with their flesh side up, by spreading one on top of the other;the height of the stack shall not exceed 1.5m; 3. For draining any liquid, the stack shall have a small slope to the sides in order to avoid the formation of cavities or hollows in the centre in which the liquids can accumulate; if some hides are very large in size, then their edges shall be spread with salt and folded inside.	
Precautions:		

Quality Criteria:	

Operation sheet:3	**Constructions of hide/ skins drying frames and lacing**
Purpose:	**For proper hides and skin preservation**
Equipment, Tools, and Materials:	• Rope, nail, string, wire, hammer, wood • Frame • Hide or skin • Rope or string for tieing h/s on frame*string from wasted h/s can also be used Ladder to facilitate lacing
Conditions:	
Procedure:	**A.** Constructions of frame 1. Select types of materials to be used /constructed the basis for selection are - Availability of material - Frame type to be constructed - Cost of materials - Durability of materials - Protection against insects 2. Decide the size of the frame to be constructed average size of frames 3mx 3m - for cattle of larger animals 1.2x1.2m for smaller ruminants /sheep of goat / 3. Decide the number of frames - the no of frames varies based on • The drying place available in the drying shed • The climate of the area / the no of days' h/s staged

	on frame • The no of h/s purchased /collected • Economic factor 4. Measure and cut materials in to recommended size 5. Fix the frames **B.** lacing 1. Make a hole on the edge of h/s with 2-3cm from the edge 2. Insert the rope through the hole made 3. First tie the upper part of the h/s 4. Using uniform tension finish lacing the h/s on frame.
Precautions:	• care should be given while making hole on the edge of h/s for lacing. wire should not be used since it is not elastic it can tear the h/s during stretching. • wire also cause rust which leads to the development of strains during tanning. • Avoid over stretching and under stretching.
Quality Criteria:	
Operation sheet: 4	**Folding and baling of hide and skin**
Purpose:	
Equipment, Tools, and Materials:	• Table • Hide and skin
Conditions:	
Procedure:	**First fold**; the belly area to the left of the pattern is folded over to the right **Second fold;** the corresponding area to the right of the pattern is folded similarly **Third fold;** the shoulder /neck area of the hide is folded down over the upper pattern **Fourth fold**; the partly folded area of the hide to the left of the back bone line is folded over to the right **Fifth fold**; fold the hide in equal thirds (optional fold)
Precautions:	Shake hides to make free of salt (for wet salt stock) Spread out flat on a clean area of floor or on a large table made of metal or wood (size of table 1.8m x 1.2m) Place the flesh side down Place the pattern symmetrically on the hair side of the hide and

	fold
Quality Criteria:	Did hide and skin were folded as required?

LAP Test	**Practical Demonstration**

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 20-24 hours.

Task 1: Do soaking of hides and skins in brine solution

Task 2: Do Salting and stacking procedure correctly

Task 3: Construct hides and skins drying frames and lacing

Task 4: Undertake folding and bailing of hide and skin

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Training Manual on improved production and preservation techniques of hides and skin, August,2017

Learning Guide #22

Unit of Competence: **Support Handling of Hide and Skin**

Module Title: **Supporting Handling of Hide and Skin**

LG Code: AGR ATI1 M07 0919 **LO3-LG-22**

TTLM Code: **AGR ATI1 TTLM 0919 v1**

LO 03: Handle materials and equipment

Instruction Sheet	Learning Guide # 22

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- ✓ Handling and transporting Materials, equipment's and Machinery
- ✓ Maintaining clean and safe work site

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- ✓ Handle and transporting Materials, equipment's and Machinery
- ✓ Maintain clean and safe work site

Learning Instructions:

13. Read the specific objectives of this Learning Guide.
14. Follow the instructions described below 3 to 6.
15. Read the information written in the information "Sheet 1 and Sheet .
16. Accomplish the "Self-check 1 " **in page 2**.
17. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1" **in page -3.**
18. Do the "LAP test" **in page – 3** (if you are ready).

Information sheet 1	Handling and transporting Materials, equipment and Machinery

i. Handling and transporting Materials, equipment and machinery

- Materials, equipment and machineries which are useful during hide and skin preservation must be handled carefully.
- Consumables must be disposed appropriately, other equipment have to be washed, disinfected after every use in order to keep their hygiene.
- It is better to maintain clean and safe work site while working.

Information sheet 2	Clean and safe work site

1.1. Clean and safe work site

Basically maintaining clean and safe work site and clean, and dispose material tools and equipment are inseparable it is two sides of coin therefore if you clean reusable materials well and dispose the unwanted properly and based on General occupational hazard safety precautions you are already strike to maintain a safe work site.

Disposable materials properly buried in deep enough trench and should be covered with quicklime and then with soil or use Burning. But Burning is the most difficult because the Fumes and smoke may be a problem to the surrounding environment.

Mud holes should be frequently filled or exclude the animals away from it quickly.

To maintaining clean and safe work site Apply the following safe operating procedures and OHS requirements;

- Immediately after use, you should sort the disposable materials

- Handle all skin and hide equipments safe and clean
- Use means of proper handling methods for equipments
- Never dispose waste materials every where

Self-Check 2	**Written Test**

Name: _____ Date: _____

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

1. What is the importance of cleaning work site? (2pts)
2. How to maintaining clean and safe work site? (3pts)

Note: **Satisfactory rating – 5 points and above Unsatisfactory - below 5 points**

You can ask you teacher for the copy of the correct answers.

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 3 hour.

Task 1. Clean the work site correctly.

Learning Guide #23

Unit of Competence: Support Handling of Hide and Skin

Module Title **Supporting Handling of Hide and Skin**

LG Code: AGR ATI1 M07 0919 **LO4-LG-23**

TTLM Code: **AGR ATI1 TTLM 0919 v1**

LO 04: Clean up on completion

Instruction Sheet	Learning Guide # 23

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- ✓ Storing Preserved hides and skin until transport
- ✓ Return materials to store and disposing based instruction
- ✓ Cleaning, Maintaining and storing tools and equipments
- ✓ Disposing all waste Products

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- ✓ Store Preserved hides and skin until transport
- ✓ Return materials to store and disposing based instruction
- ✓ Clean, Maintain and store tools and equipments
- ✓ Dispose all waste Products

Learning Instructions:

19. Read the specific objectives of this Learning Guide.
20. Follow the instructions described below 3 to 6.
21. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.
22. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4” **in page -6, 9, 12 and 14** respectively.
23. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ” **in page -15.**
24. Do the “LAP test” **in page – 16** (if you are ready).

Information sheet 1	Storing Preserved hides and skin until transport

1.2. Preservation of Hides and Skins

The basic idea of curing or preservation is to keep the hides and skins in good condition without putrefaction until they are processed in tanneries. Being proteinous in nature, hides and skins are liable to attacks by bacteria or mould which leads to putrefaction especially in hot and humid conditions. Dust, dirt, soil, water, blood, fodder etc. act as continuous source of infection apart from the transmission of micro-organisms by air, insect, or contact with diseased animals. On the weight of a hide or skin, it will have about 60% natural moisture, and it is very ideal condition for bacteria to thrive.

The proteinous matter is hydrolyzed by bacteria leading to loss of hide substance resulting in poor quality leather. By curing, we are creating conditions whereby the bacteria is made ineffective as we need very drastic conditions for destroying the bacteria. The type of curing depends very much on the weather conditions, availability of materials, location of tanneries, and so on.

When transporting the raw hides or skins to curing yard, they should be sent in closed carts without exposing to sun and without rolling them. In the abattoir itself, the hides and skins should not be exposed to sun before being preserved.

In drying, it can be with frame or without frame, in the sun or shade. In salting, it is wet salting or dry salting or brining. There are more recent techniques based on scientific developments but still not universally applied.

The important factors to be taken into account while deciding the type of preservation to be adopted are:-

a) Point of application of the treatment and for how long preservation is required.

b) Methods of application and any extra equipment and handling involved.

c) The cost-effectiveness of the treatment for the period of preservation likely to be needed.

The effect of salt and other chemicals in causing pollution also has to the taken into accounts. If the raw material is to be exported, the preservation must be long term in its effect whereas if the raw material is for local processing with short distance transport for the point of origin, short-term protection is adequate. If a tannery receives its raw stock in smaller quantities from several small abattoirs delivering over a period, longer-term protection is necessary.

1.3. Storage

When hides are not to be dispatched for sale within a few days, they should be treated with an insecticide.

Insecticides can be of two kinds, liquids such as solutions of arsenic in water, or powders such as D.D.T., gammexane, pyrethrum, derris or naphthalene, etc.

Solutions of arsenic for this purpose are similar to those used in dipping tanks, and if no other means of treating them are available, the hides may be dipped in the dipping tank. Although arsenication is generally used for dry hides, it is better to use it for the uncured hides. Great care must be taken in the use of arsenic, since it is a deadly poison and must always be kept under lock and key.

Other commercial dips are preferable and should be diluted in accordance with the instructions for preparing normal strength dip solution (often 1 : 300). Sodium silicofluoride may be used as a spray in the proportion of 0.5 kg to 10 litters of water, if it is available.

If powders such as gammexane are used, they should be mixed with an inert powder such as diatomite using a machine to mix them. If pyrethrum is grown locally, it can be dried and ground into a powder, and dusted over hides and floors, etc.
During the wet season, hides stored for a long time should be taken out into the sun occasionally, to prevent the formation of moulds, which are not affected by insecticidal dips or powders. Baling prior to export can be carried out solely by hand, but there is a risk that the ties may not remain secure with much handling.

As already indicated, in connection with the use of plastic binder tape, several types of power-operated and manual presses, as well as devices for secure application of binding material, are available. Particularly in climates with low relative humidities, these mechanical aids are advantageous because they can be used to exert just sufficient pressure to enable firm and tidy bales to be produced without cracking along the folds.
They are made in a range of sizes, capacities, powers and styles, to meet the nature of the work for which they are intended. One such press is fitted with a stopping device which automatically shuts off the pressure when the bale is compressed to the required extent and holds it at that point while the fastening material is applied.

1.4. Transporting hide and skin

In tropical & sub tropical developing countries various forms of transportation may be employed to carry hide & skin from point of collection & storage (after drying or curing have been carried out) either to the large market or for export.

Motor transport of different types & animal drown transport may be involved even boats may also employed in some countries, particularly when large vehicles are used care must be taken that the goods are tied in bundles & are not loose also that the bundle are stowed securely so that there is no danger of damage being caused by scraping or other frictional movement

Self-Check -1	Written Test

Directions: Match the following terms correctly

1. Define Basic ideas of preservation.(2 Points)
2. Explain the importance of preserving Hides and skin with insect sides. .(2 Points)

Note: **Satisfactory rating 4 points** **Unsatisfactory -below 4 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information sheet 2	Return materials to store and disposing based instruction

1.1. Cleaning, maintaining and returning materials to stores

After using of all the material the material should be cleaned and inspect for defects and put back to the store.

The first step is, of course, to have a “good store” for your machinery when it's not working. But “it's not enough to store into the shed, shut it down, and leave it.” First thing is to make sure a machine is in good repair before you put it away, after that, it's pretty much a matter of following three simple rules:

- ✓ Put it away clean
- ✓ Put it away dry and
- ✓ Put it away lubricated.

All three of these rules are aimed at keeping rust producing moisture away from bearings and other vital parts.

1.2. Disposing of waste product.

Wastes are unwanted material or substance produced by human activity, which is usually referred to as rubbish, trash, garbage or junk. Wastes can be considered, as those materials no longer required by an individual, institution or industry. Wastes are thus regarded as by-products or end products of the production and consumption process respectively.

1.3. Salt residues and Offal of hide and skin

The concentrated liquor emanating from piles of salted hides is very rich in chloride and nitrogen compounds. A special problem is the spent brine disposal. Legislation in many countries does not allow brine discharge into the sewer, it must be disposed of as waste, which is very costly. The reuse potential is rather limited mainly due to risks

associated with the increase of halophilic bacteria. Disposal of the excess solid salt used is an important environmental problem as well. The thermic treatment used prior to recycling is known but very expensive. Disposal on special depositing sites is necessary. The problem of salinity is especially pronounced in arid areas, affecting the quality of water used for irrigation and livestock watering.

Self-Check -2	Written Test

Directions: Match the following terms correctly

1. What are the three simple rules in keeping clean work place and machines.(4 Points)

Note: **Satisfactory rating 4 points** **Unsatisfactory -below 4 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information sheet 3	Cleaning, Maintaining and storing tools and equipment's

3.1. Clean, maintain, dispose and store tools and equipment

Maintaining is repairing of the broken or damaged material or it is a way of giving an additional life or extending the serviceability of material

Cleaning is the processes of removing dirt, grime, scraps and grease from all Surfaces, equipment, etc

Safety refers to the condition of workers and animals being free rom danger, harm, or risk

- Before and after doing skin and hide preservation care must be taken for not to damage or break any materials, tools, and equipment.
- The importance of Clean, Maintain and store tools and equipments are
- To clean work
- To save the work site environment
- It protect from chemical, accidental, body contact hazards
- It increases the duration of the materials, tools and equipments
- For future use

After maintaining and cleaning, return and store all the materials and equipments properly in their proper places

.

Self-Check -3	Written Test

Directions: Match the following terms correctly

1. Define the term maintaining, cleaning and safety.(4 Points)

Note: **Satisfactory rating 4 points** **Unsatisfactory -below 4 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information sheet 4	Disposing all Waste products

4. Disposing all Waste products

Waste is “the unwanted remains, residues or by products which are no longer wanted by the owner”. Waste is assumed to be valueless to the owner. Slaughterhouse and Hides and Skins wastes are associated with discharge of highly organic matter. These wastes if directly disposed of in the land create aesthetically objectionable Public Health and Environmental pollution.

Composition of Slaughter house and Hides and Skins waste.

- ✓ Blood
- ✓ Rumen ingesta
- ✓ Horns
- ✓ Hooves
- ✓ Bones
- ✓ Hides and Skins fleshing
- ✓ Hide and skins splits and trimmings
- ✓ Condemned meat
- ✓ Gall bladder
- ✓ Foetus etc.

4.1. Characteristics of Slaughterhouse waste

Slaughterhouse effluents are considered detrimental worldwide due to their complex composition of fats, proteins, and fibres, as well as the presence of organics, nutrients, pathogenic and non-pathogenic microorganisms, detergents and disinfectants used for cleaning activities, and pharmaceuticals for veterinary purposes. Therefore, the treatment and disposal of wastewater from slaughterhouses and meat processing plants are an economic and public health necessity.

Self-Check -4	Written Test

Directions: Match the following terms correctly

1. List the Composition of Slaughter house and Hides and Skins waste.(4 Points)

Note: **Satisfactory rating 4 points** **Unsatisfactory -below 4 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information sheet 5	Reporting Work out comes to supervisor

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, lack of slaughter facilities, inappropriate flaying, and poor handling and preservation of these raw materials

Quality: A measure of excellence or a state of being free from defects, deficiencies, and significant variations, brought about by the strict and consistent adherence to measurable and verifiable standards to achieve uniformity of output that satisfies specific customer or user requirements.

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

Grain Break: Any hide having a defect on the hair side causing the grain to be broken one inch or more in length or diameter, or having two or more such defective spots, which aggregate in measurement one inch or more in length or diameter. This includes sores, rubs, scuffs and deep scratches.

Slaughter defects: refer to cuts or holes and gorges to the hides and skins making them unfit for the subsequent use up the value chain mainly due to poor slaughtering facilities, inadequate flaying skills and motivation and poor illumination during slaughter

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

Any defects that results for rejection of hides and skin on the national and global market should be reported to immediate supervisors before preservation takes places

accordingly. Reporting may vary from industry to industry or their procedure may vary based on their capacity in the market.

Self-Check -5	Written Test

Directions: Match the following terms correctly

1. Define the term quality.(2 Points)
2. Define Slaughter defects. (2 Points)

Note: **Satisfactory rating 4 points** **Unsatisfactory -below 4 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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