

# **Artificial Insemination**

## **Level-I**

# **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**

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:**

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, Sheet 2, Sheet 3, Sheet 4, Sheet 5 and Sheet 6”.
4. 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.
5. 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.**
6. Do the “LAP test” **in page – 44** (if you are ready).

## **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.

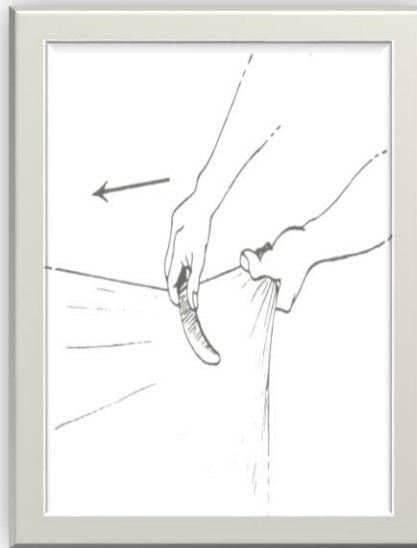
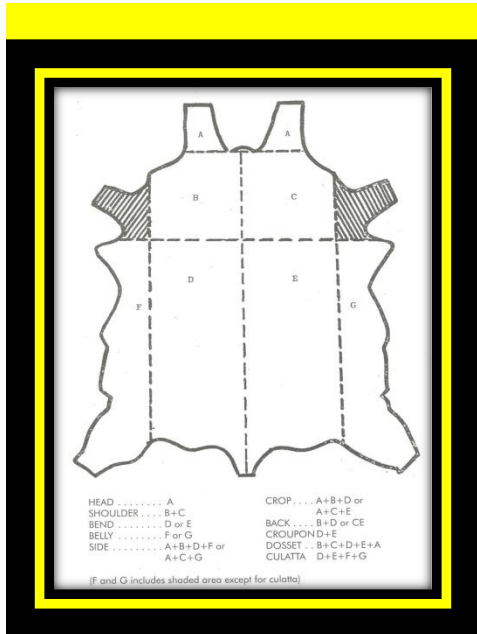


Figure 1. Subdivision of hide

Figure 2. Flying knife

The animal should be flayed in an upright position, to ensure proper bleeding and easier removal of hide.

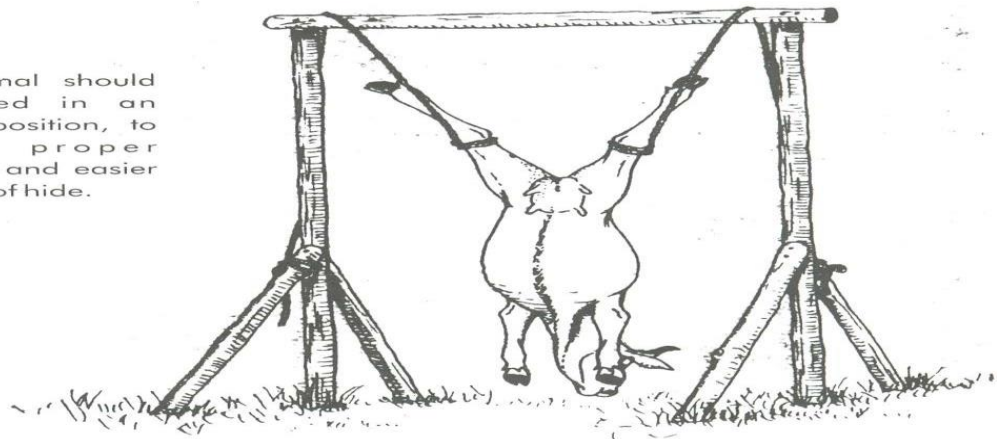
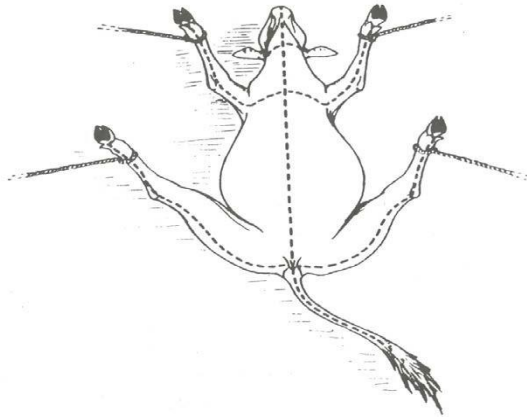


Figure 3. Method of hanging.

The drawn ripping lines ensures the production of a hide with a proper shape.



**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

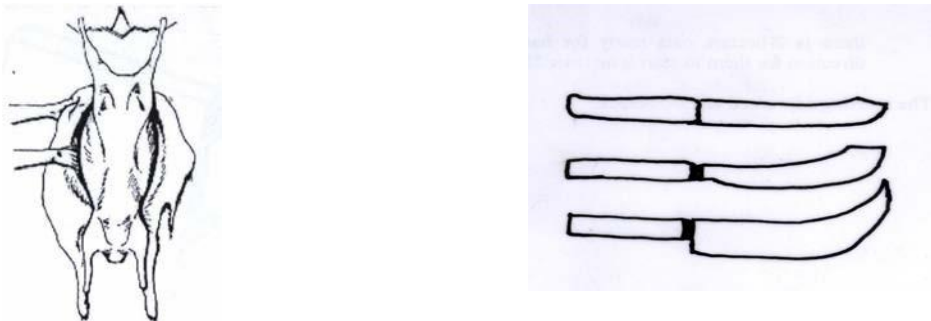
The pre-slaughter care of sheep and goats and their killing is very much the same as for cattle.

**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**

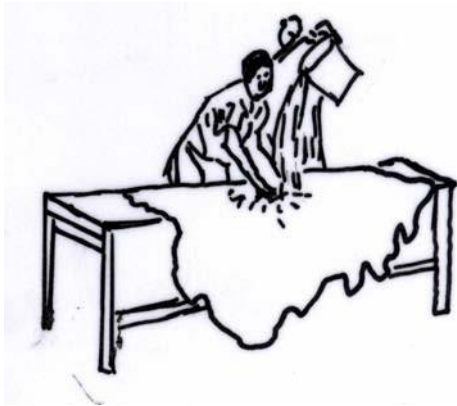
- ✓ **Incision:** Blowing air into the cut in the hind leg. Relevant in case one wants to use as water bag.
- ✓ Flayed with blunted curved knife following ripping lines.
- ✓ Hoisted by the hind legs and skins removed by pulling and fisting.
- ✓ Mechanical flaying.
- ✓ Hand flaying machine.

### 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.**

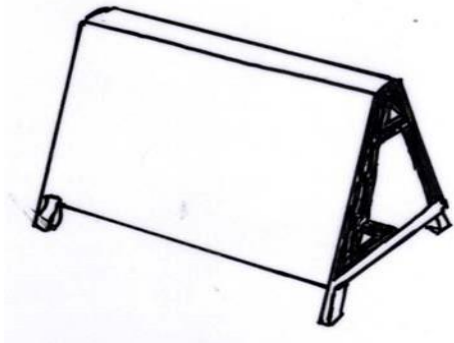
#### Fleshing

##### 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.



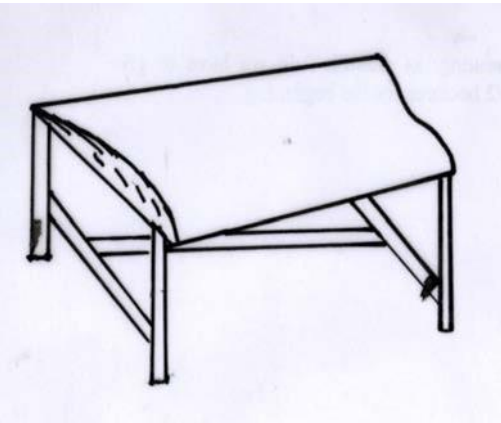
3. Care should be taken to avoid cutting or damaging the skin.
4. A wooden horse with sloping side will probably be found easier to work upon than a large table.
5. Exotic skins should be suspended and scraped for cleaning and defatting.
6. Suspend skins for defatting and, by scraping instead of cutting, 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.

<b>Self-Check -1</b>	<b>Written Test</b>
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**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: _____
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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 Debu 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

### 1.1. 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.

#### 1.1.1. 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.

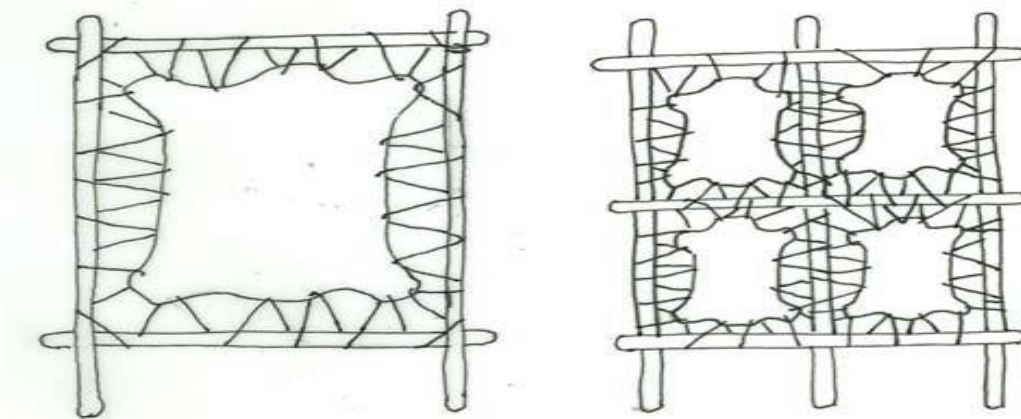
Large frames meant for hides, 3 m × 3 m, can be adapted for skins by partitioning allowing four skins to be stretched (Figure 11).

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.



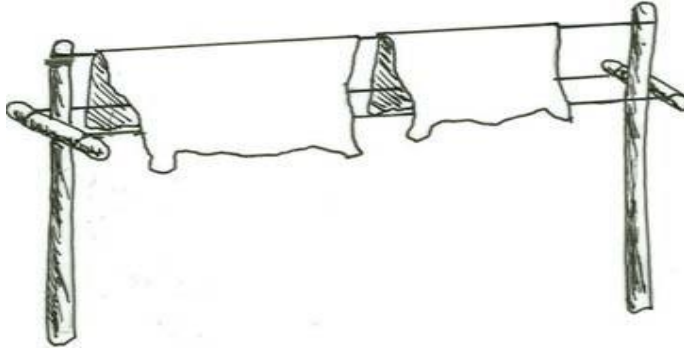
**Figure 1. Frame drying.**

**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 2. Suspension drying over cords**

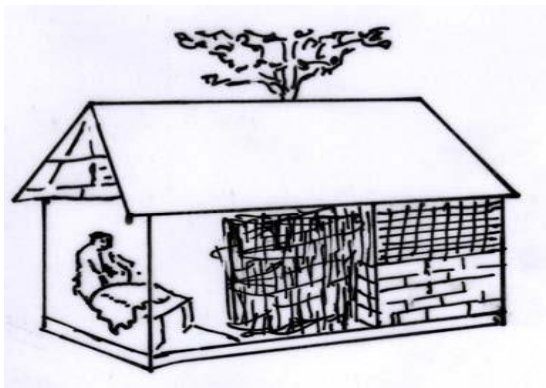
**1.3. Ground drying:** This method, in which skins are placed directly on the ground, is the worst technique to use. It produces dried material of the most appalling quality, and consequently of the poorest value to the producer. Because of the lack of air circulation between skin and soil, moisture 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 3. 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 4. 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 5. Salting skins on a cement floor. Figure 6. Salting practice ESGPIP.**

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

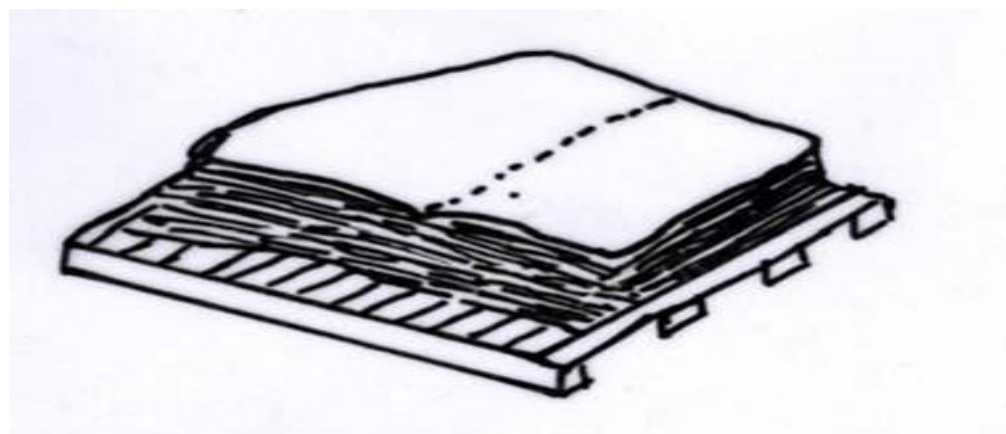
The stack is allowed to cure for about five days. It is then opened and put in a new pile with the top skin going to the bottom, applying additional salt wherever necessary. Again, the skins remain for five days in the pile. The skins are then

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.

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

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

**Give short answer for the following questions.**

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

### 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 place 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 until 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 = 40 frames x 7days x 30cm

2 rows

**= 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 3m x 3m 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 3m x 3m
2. For long hide 3m x 2.75m
3. For medium hide 2.75 m x 2.75m
4. For smaller hide 2.5m x 2.5m

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

5. Large skin = 1.5 x 1.5m
6. Medium skin = 1.3 x 1.3m
7. Small skin = 1.2 x 1.2m

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.

<b>Self-Check 3</b>	<b>Written Test</b>
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**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**

## 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.

**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

## 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).


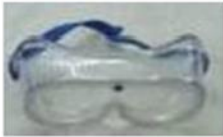



**Figure 20 Eye protection**



Appropriate personal protective equipments and their usage are listed below

<p>Rubber boots</p> 	<p>Rubber-boots cover the feet, ankles and the lower legs.</p>	<p>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 <u>sharp tools</u> and damage from obstacles such as nails or broken glass on the ground which may cause injury to bare feet.</p>
<p>Gloves</p>  <p>Rubber glove</p>  <p>Cloth glove</p>	<p>Gloves are coverings for the hands. There are separate parts for each finger and thumb. There are also long (elbow length) and short gloves.</p>	<p>It is used when handling fertilizers and other corrosive chemicals. Gloves are necessary to protect the skin from exposure to toxic materials.</p> <p>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.</p> <p>Gloves should be checked often for rips or holes</p>

Safety Gear	Description	Function
<p data-bbox="207 317 318 344">Coverall</p> 	<p data-bbox="539 317 834 457">This is a loose fitting garment worn over ordinary clothes. Coveralls can have long or short sleeves</p>	<p data-bbox="878 317 1268 489">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</p> <p data-bbox="878 506 1284 583">When a coverall is not available a long sleeve shirt and long pants are worn.</p>
<p data-bbox="207 711 313 739">Goggles</p> 	<p data-bbox="539 711 846 884">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.</p>	<p data-bbox="878 711 1284 909">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.</p>
<p data-bbox="207 953 347 980">Respirator</p> 	<p data-bbox="539 953 850 1115">Dust mask /Respirator is an apparatus worn over the face to cover the nostrils. They also contain elastic bands to hold them in place.</p>	<p data-bbox="878 953 1284 1251">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</p>

<b>Self-Check -5</b>	<b>Written Test</b>
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**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**

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

## 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 cured 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 stock 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 patten 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.

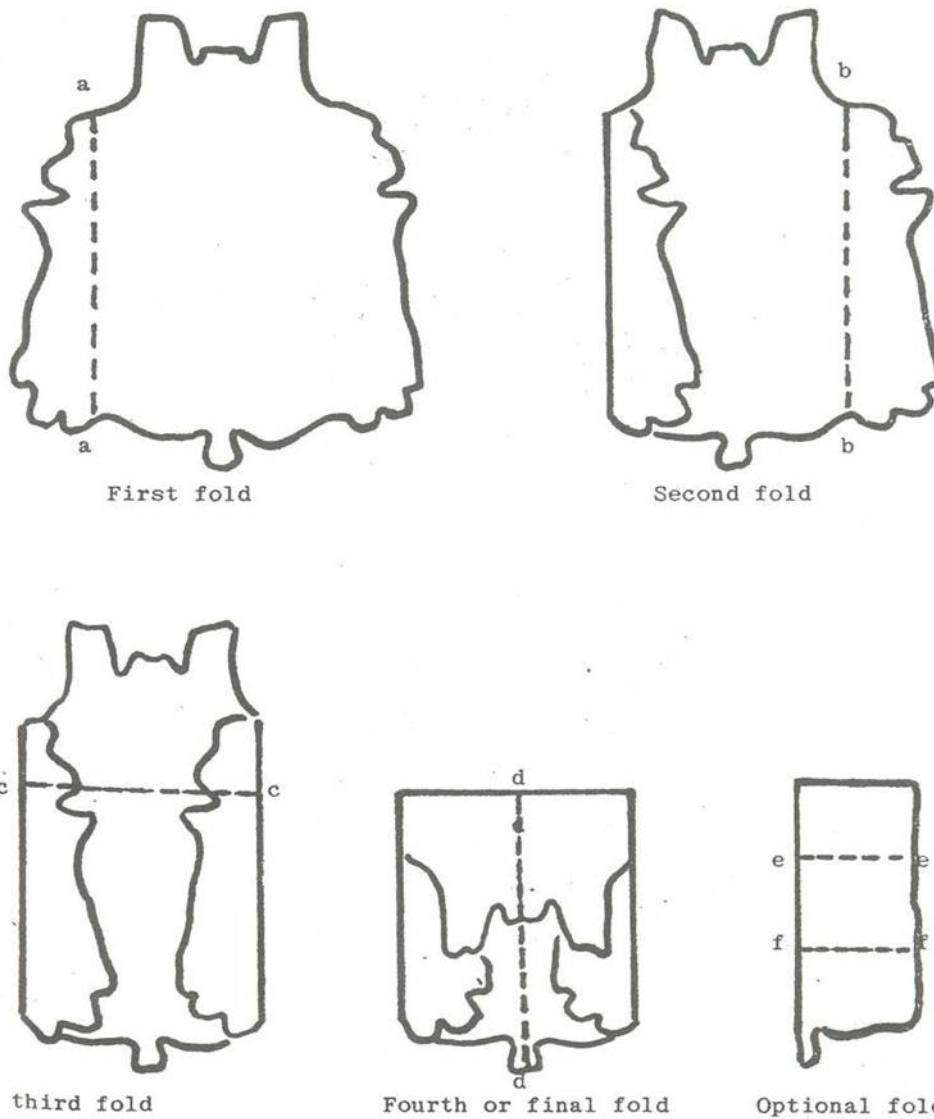


Figure 7. steps of folding hide and skin.



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.

**Directions: Match the following terms correctly**

**Matching**

**A**

1. First fold
2. Waste
3. Second fold
4. Third fold
5. Forth fold

**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
- 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>Operation Sheet 1</b>	<b>Preservation Of Hides and skin</b>	
Operation Title:	<b>Soaking in brine Solution</b>	
Purpose:		
Equipment, Tools, and Materials:	<ul style="list-style-type: none"> <li>• Vat/drum</li> <li>• Brine</li> <li>• Water</li> <li>• Hide and skin</li> </ul>	
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:	<ol style="list-style-type: none"> <li>1. A brine solution in the proportion of one to three by mass of salt to water shall be prepared in vats or drums;</li> <li>2. The density of such a solution shall be correspond to a relative density of 1.2;</li> <li>3. A quantity of salt of at least 25% of the mass of the fresh hides or calfskins shall be used in solution;</li> <li>4. 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;</li> <li>5. 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;</li> <li>6. Such hides and calfskins shall be made to drain for not more than 1 hour.</li> </ol>	
Precautions:		
Quality Criteria:		

<b>Operation Title: 2</b>	<b>Salting and Stacking</b>	
Purpose:	Preservation of Hides and skin	
Equipment, Tools, and Materials:	<ul style="list-style-type: none"> <li>• sodium carbonate</li> <li>• naphthalene</li> <li>• boric acid.</li> <li>• sodium chloride</li> </ul>	
Conditions:	Cleaned hides or calfskins shall be treated with a salt mixture for stacking and stacked in the following manner: -	
Procedure:	<ol style="list-style-type: none"> <li>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.</li> <li>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;</li> <li>3. Don't use any recovered salt, originating from brushing of hides or calfskins,</li> <li>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.</li> <li>5. Use a quantity of salt mixture of at least 40% of the mass of fresh hides or calfskins shall be used;</li> <li>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.</li> </ol> <p><b>Stacking</b></p> <ol style="list-style-type: none"> <li>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;</li> <li>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.</li> </ol>	
Precautions:		
Quality Criteria:		

<b>Operation sheet:3</b>	<b>Constructions of hide/ skins drying frames and lacing</b>
Purpose:	<b>For proper hides and skin preservation</b>
Equipment, Tools, and Materials:	<ul style="list-style-type: none"> <li>• Rope, nail, string, wire, hammer, wood</li> <li>• Frame</li> <li>• Hide or skin</li> <li>• Rope or string for tying h/s on frame*string from wasted h/s can also be used</li> </ul> <p>Ladder to facilitate lacing</p>
Conditions:	
Procedure:	<p><b>A. Constructions of frame</b></p> <p>1. Select types of materials to be used /constructed</p> <p>the basis for selection are</p> <ul style="list-style-type: none"> <li>- Availability of material</li> <li>- Frame type to be constructed</li> <li>- Cost of materials</li> <li>- Durability of materials</li> <li>- Protection against insects</li> </ul> <p>2. Decide the size of the frame to be constructed</p> <p>average size of frames</p> <p>3mx 3m - for cattle of larger animals</p> <p>1.2x1.2m for smaller ruminants /sheep of goat /</p> <p>3. Decide the number of frames - the no of frames varies based on</p> <ul style="list-style-type: none"> <li>• The drying place available in the drying shed</li> <li>• The climate of the area / the no of days' h/s staged on frame</li> <li>• The no of h/s purchased /collected</li> <li>• Economic factor</li> </ul>

	<ol style="list-style-type: none"> <li>4. Measure and cut materials in to recommended size</li> <li>5. Fix the frames</li> </ol> <p><b>B. lacing</b></p> <ol style="list-style-type: none"> <li>1. Make a hole on the edge of h/s with 2-3cm from the edge</li> <li>2. Insert the rope through the hole made</li> <li>3. First tie the upper part of the h/s</li> <li>4. Using uniform tension finish lacing the h/s on frame.</li> </ol>
Precautions:	<ul style="list-style-type: none"> <li>• 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.</li> <li>• wire also cause rust which leads to the development of strains during tanning.</li> <li>• Avoid over stretching and under stretching.</li> </ul>
Quality Criteria:	
<b>Operation sheet: 4</b>	<b>Folding and baling of hide and skin</b>
Purpose:	
Equipment, Tools, and Materials:	<ul style="list-style-type: none"> <li>• Table</li> <li>• Hide and skin</li> </ul>
Conditions:	
Procedure:	<p><b>First fold;</b> the belly area to the left of the pattern is folded over to the right</p> <p><b>Second fold;</b> the corresponding area to the right of the pattern is folded similarly</p> <p><b>Third fold;</b> the shoulder /neck area of the hide is folded down over the upper pattern</p> <p><b>Fourth fold;</b> the partly folded area of the hide to the left of the back bone line is folded over to the right</p> <p><b>Fifth fold;</b> fold the hide in equal thirds (optional fold)</p>
Precautions:	<p>Shake hides to make free of salt (for wet salt stock)</p> <p>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)</p> <p>Place the flesh side down</p> <p>Place the pattern symmetrically on the hair side of the hide and fold</p>
Quality Criteria:	Did hide and skin were folded as required?

<b>LAP Test</b>	<b>Practical Demonstration</b>
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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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