A SUGGESTED PROGRAM FOR THE DEVELOPMENT OF THE HIDE AND SKIN INDUSTRY IN PAKISTAN BASED ON AMERICAN PRACTICES

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This is to certify that the

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A SUGGESTED PROGRAM FOR THE DEVELOPMENT OF THE HIDE AND SKIN INDUSTRY IN PAKISTAN BASED ON AMERICAN PRACTICES

By

BEHRAM KHAN

A THESIS

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The study became more interesting and has assumed this form due to the special interest of Dr. Brand in my project keeping in view the benefits of the study to my Country (Pakistan). It is all due to his assistance, guidance, great concern, invaluable criticisms and constant encouragement in the conduct of this work that this manuscript has assumed this form.

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CHAPTER I

INTRODUCTION

Before coming to the United States of America the writer worked in the livestock section as an Assistant Marketing Officer in the Cooperation and Marketing Department of the Government of Pakistan. This department in undivided India was designated as the Central Agricultural Marketing Department, which came into existence in the year 1935 as a result of the recommendations of the Royal Commission on Agriculture. When this department was opened in Pakistan, the sphere of its activities was extended and a new section on Cooperation was created and attached to it. This step was taken to propagate amongst the masses a spirit of cooperation and to strengthen the cooperative movement which promises so much for a newly-born state like Pakistan. This department is known at present as the Cooperation and Marketing Department and is under the charge of the Cooperation and Marketing Adviser to the Government of Pakistan.

Agriculture being the mainstay of Pakistan, the welfare of a major section of the population depends upon an effective system of marketing agricultural products including livestock and livestock products. This department in addition to many other duties is vested with the responsibility of conducting investigations into all problems of marketing and evolving effective measures to combat defects in the present-day trade in agricultural produce, and livestock products.

Survey reports compiled by this department on various commodities have brought out the fact that the producer's share in the consumer price is very small; that the quality of the produce is low, and the price paid by the consumer is very high. This is caused by several defects in the existing channels of marketing such as unorganized assembling and distribution, unregulated markets, lack of standard weights and measures, inadequate and expensive means of transportation, poor storage facilities, absence of a standard system of grading, etc.

Projects undertaken by this department include the compilation of survey reports and planning developmental works. The survey reports on the marketing of various commodities are compiled by this department and give an over-all picture

of each commodity in respect to its supply, demand, market preparation, prices, assembling, distribution, transportation, financing, grading, etc. These reports also embody a summary of the main conclusions and recommendations for rectifying the defects in the present-day trade. The development work of the department includes measures taken to improve marketing conditions through the introduction of standard grades, standardization of weights and measures, provision of market facilities, standardization of market charges and practices, issuing of price bulletins, etc.

It may be mentioned that this Department in spite of several difficulties has been able to organize several ghee and egg grading stations. As economic and political conditions become more settled and funds are made available to the department more grading stations and other marketing facilities will be established.

Jute in Pakistan is the principal export while hides and skins are second in importance. Pakistan's position in world market has been weak due to defective methods of preparation resulting in a low quality product; and the absence of a standard system of grading leading to uncertain supplies of uniformly good

quality hides. These defects weaken both internal and external markets.

To take practical steps to remedy these defects and to improve the quality of hides and skins the Pakistan Government convened an all-Pakistan Hide Dealers conference in the year 1950. As a result of this conference the Government sent the writer to the United States to study the hide and skin industry and return with recommendations for improving Pakistan position in the world market.

The writer has spent considerable time in studying the processing of hides and skins in the United States' packing plants and also the hide markets in New York, Chicago and Omaha. This background, coupled with marketing work at Michigan State College, has enabled the writer to make this study of the hide and skin industry in the United States and Pakistan.

CHAPTER II

HIDE STRUCTURE

Hide

Hide is an organ which covers the entire body and consists of two main parts or layers, the surface epithelium or epidermis and the subjacent, dense connective tissue layer—the derma commonly known as the corium. Beneath the corium is a layer of fatty and connective tissue which is called the adipose or subcutaneous tissue. This tissue layer connects the skin to the carcass.

The skin carries out several functions: It protects the animal from external injuries and injurious influences; it receives sensory impulses from the outside; it helps to regulate the temperature of the body; it excretes various substances to the outside. The skin is provided with numerous accessory organs, such as hair, sebaceous glands, etc.

The characteristics of skin have been studied from skin preparations which have been fixed in formaldehyde and then cut into cross-sections. The skin is composed of two main

parts, namely the epidermis and the corium, and these respective structures are composed of many elements. Let us consider them separately. The epidermis is composed of four layers or stratum and has associated with these, the hair, the sebaceous glands, the sudoriferous glands, the erector peli muscle, and the elastic tissue. The corium is composed of collagenous fibrils, fibers and fiber bundles, connective or reticular tissue, cellular elements, nerve tissue and blood vessels. All of these structures unite.

Epidermis

While the epidermis is removed during the beaming of skin by the tanner, a knowledge of its components, is helpful in many cases, especially when all of the epidermis is not removed, as in the case of improper unhairing. The presence of epidermal scale on the grain surface of leather results in a poor finish and often results in tender grain that will peel off very easily. Not all of the components of the epidermis remain behind to cause such difficulty.

The epidermis is known as stratified epithelium, because it is composed of four strata. These strata are, going from top

to bottom, stratum corneum, stratum granulosum, stratum lucidum, and stratum germinatum. As the germinating layer gives rise to the other three layers its characteristics will be considered first.

The stratum germinatum is the lower stratum of epidermis and is in direct contact with the corium. When this layer is completely removed from the skin the basement membrane underneath is left behind and forms the grain surface of the leather. The stratum germinatum is composed of similar cells that are at all times reproducing. These cells are spherical or columnar in shape, having small processes extending from their limiting membranes which intercommunicate them with each other, and all possesses a well-defined and easily-stained nucleus. As these cells reproduce, they push outward and since there is very little intercellular substance, they are poorly nourished. The smallest blood vessels, the capillaries, terminate in the basement membrane of the derma. The farther away the cells get from the basement membrane, the greater are the metabolic changes, due to the lack of nourishment, and in consequence to this, we find a layer in which degenerative changes are manifested by kerato-hyaline

granules in the cells. This layer is designated as the "stratum granulosum." It is composed of one or more rows of cells which are in direct contact with this stratum germinatum. These cells have either lost their power of reproduction or resort to the simple direct method, and as further reproduction occurs in the stratum germinatum they are pushed still further from the source of nourishment and the kerato-hyaline granules are changed, chemically, to eleidin. This has a very hyaline appearance microscopically and is seen as a more or less clean layer to which the name "stratum lucidium" has been applied. Still further removed from nourishment, the cells undergo dehydration and become hard and horney in nature. This represents the outermost layer of the skin and is known as the "stratum corneum." The cells of this layer are at all times being voided by wear and injury. All of these layers vary in the number of cell rows, according to the part of the skin examined. It is very difficult to demonstrate all of the layers, however in places where the skin is thick they are very apparent. The four layers are demonstrated in Figure 1.

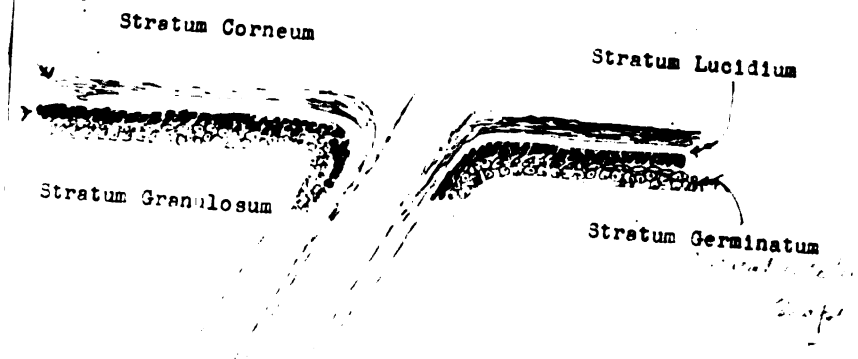

Figure 1. Demonstration of the four layers of the epidermis that are found in calf skin.

Basement Membrane

On the boundary between the epidermis and the corium is found a special basement membrane. The question as to whether this is a derivative of the epithelium or connective tissue is not yet settled, although the epidermis is removed during unhairing while the basement membrane is usually not removed. This membrane is penetrated by the marginal spines of the cylindrical cells of the stratum germinatum.

Hair

The hair on the calf skin is much softer in character than that of the steer hide. In small calf skins the hair resembles fur and is used for that purpose in the making of calf fur coats. This hair still being in the formative stage is not as thick as the adult hair and therefore is more resilient. The outer cells of calf hair are tightly packed and having but slight protrusion which do not form a good adhesive surface, do not make good material for packing purposes. During the liming process the outer cells of the calf hair are attacked and become very smooth in direct contrast to the steer hair which is not so noticeably attacked.

The hair is composed of the cuticle, the cortex and the medulla, going from the outside to the inside. The cuticle is composed of the same material as the horney layer of the epidermis. The surface epidermis dips down into the corium and forms a pocket which it lines. The pocket and its lining form the follicle in which reposes the hair root. Beginning at the bottom of the follicle we find that the root is expanded and has a bulb-like shape; the expanded part is indented on its lower surface by the entrance of a small blood vessel and this arrangement gives rise to a pincer shape. From the bulb part the hair extends upward as many rows of cells are arranged in a parallel manner. Each cell in a row is continuous with its neighboring cell and the rows of cells are arranged upon each other in layers circularly disposed about the central core of cells. Beginning in the very center of the hair we see a core composed of fairly large columnar-shaped cells arranged end to end in a row. This part is called the medulla. Outside, and surrounding the medulla, we see an area of smaller cells which constitute the cortex. On the outside of the cortex is a very thin layer of very flat cells arranged in an overlapping

manner; this is referred to as the cuticle. Figure 2 illustrates the structure of a typical hair.

Generally we can recognize three colors in hair: white, red and black, together with the various shades possible by variation or mixtures of these colors. All colors are due to high concentration of the pigment. However, basically there appears to be but a single color, red, and that goes to form red or to its total absence, and to the refractive properties of the cells which make up the hair.

Sebaceous Glands

The sebaceous glands are scattered over the entire surface of the skin. They are always associated with hair and are found on the posterior of the hair usually embedded in the epidermis as it dips down into the corium to form the hair follicle. Their excretory duct opens into the neck of the hair sac. Sometimes more than one gland is connected with one hair.

The excretory ducts of sebaceous glands are lined by a stratified squamous epithelium which is continuous with the external root sheath of the hair or directly with the malpighian layer of the epidermis.

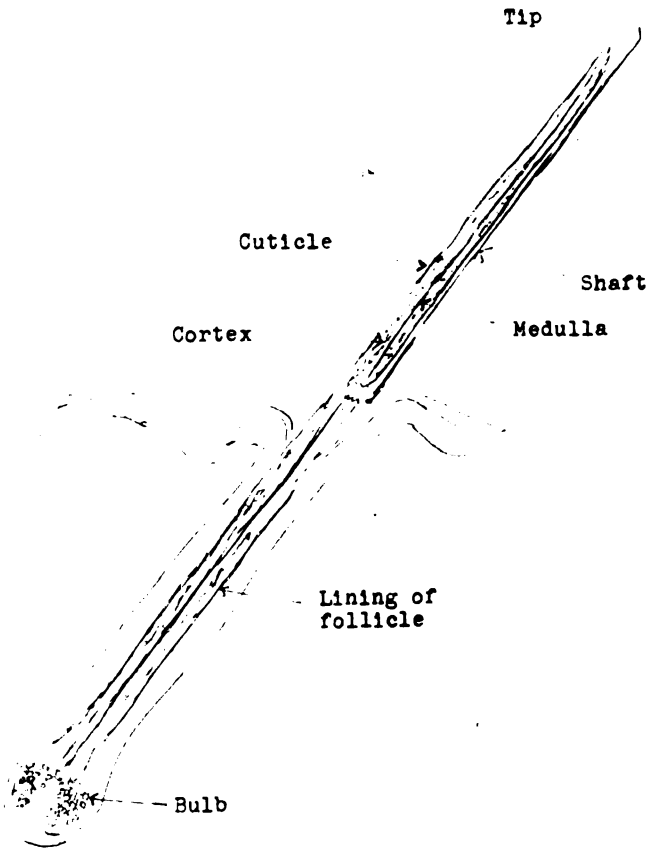

Figure 2. Diagrametic drawing of Typical Hair.

The cells which undergo fatty transformation later break down into fatty debris which is mixed with the remains of the nuclei of the horny scales and so forth. This mixture is the only secretion of the sebaceous glands and is excreted to the outside either into the slit between the hair and the external root-sheath, or directly upon the surface of the epidermis.

In sebaceous glands the secretion is connected with the destruction of the epithelial cells and, therefore, is of the holocrine type; it must be followed by a corresponding regenerative multiplication of epithelial elements.

Sudoriferous Glands

The sudoriferous or "sweat glands" are found in skin at the base of the hair root; usually on the posterior side of the hair, as shown in Figure 3. They are tubular and are of a corkscrew shape. The secretory portion has the shape of a simple, blindly terminating cylindrical tube that empties its products into the hair follicle above the sebaceous gland duct. The outer wall of the gland is composed of a membrane of connective tissue. The cellular elements on the inside of the membrane contain elongated nuclei, surrounded by mitochondria, and the

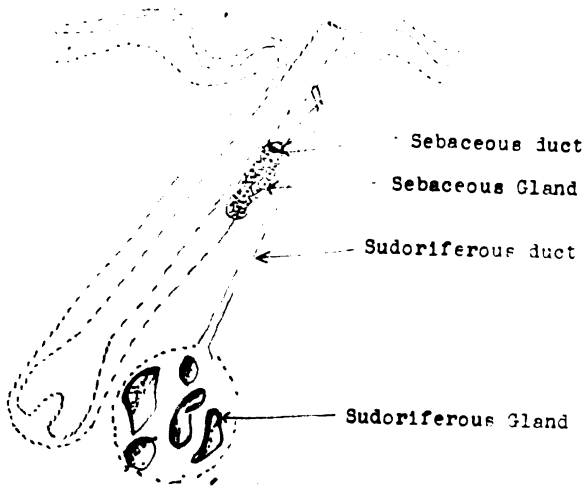

Figure 3. **Diagramatic drawing** showing the relation of the glands to the other epidermal appendages.

rest of the cellular space is filled with longitudinal fibrils. It is supposed that these "myo-epithelial" cells, by contracting, help to discharge the secretion.

The secretion of the sweat gland is watery liquid and contains nitrogenous materials, salts and lipoids.

Erector Pili Muscle

The erector pili muscle or the muscle of the hair, consists of smooth cells which are gathered into a cylindrical or band-like shaft, as shown in Figure 4. It is connected with its place of attachment by networks of elastic fibers. This muscle is involuntary and is not within the control of the animal, and the function is contraction.

Curing

It is well known that bacterial action sets in very soon after the death of an animal, making it desirable to start curing as quickly as possible after the animal heat of the hide has been dissipated. Delay in curing causes the salt to be taken by the hide at a very much slower rate, thus favoring bacterial

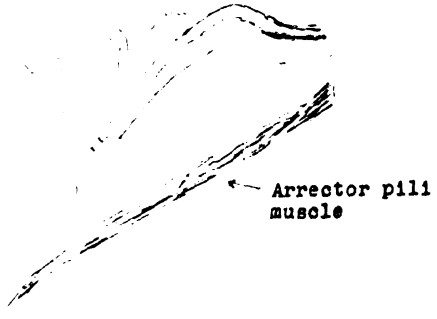

Figure 4. Diagramatic drawing showing the relation of the hair muscle to the other epidermal appendages.

action. McLaughlin and Theis[1] have proved that delaying curing one hour caused the salt to diffuse into the hide only 69 per cent as fast as when curing was started at once. A delay of six hours reduced this diffusion rate to only 26 per cent. The hide ultimately becomes saturated with salt, but the retardation of its diffusion into the hide permits more time for putrefactive changes which lower the quality of the hide.

The object of curing the hides is to protect them against the putrefactive action of bacteria. Salt does not kill bacteria, but it restricts their activities and reproduction. The primary object of the elaborate application of salt is to saturate the water of the hides with salt so as to restrict bacterial action. Time enough must be allowed to permit diffusion of salt to every part of the hides.

Approximately 62 per cent of a green hide is water. Thus, 62 pounds of water can dissolve a maximum of 23 pounds of salt. If one pound of salt is used per pound of hide (green weight), it leaves 77 pounds as undissolved salt. Some of the undissolved salt is recovered to be re-used.

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[1] McLaughlin and Theis, E. R., J. Am. Leather Chem. Assoc., XVII, 400 (1922).

CHAPTER III

THE HIDE AND SKIN INDUSTRY IN THE UNITED STATES

Hides are a by-product of the meat industry and are derived from animals killed for food or otherwise. All the hides produced thus are converted into leather regardless of the demand for the leather produced from them. The demand for meat and not for leather determines its production.

The United States is largely self-sufficient in its production of cattle hides but it does also import some hides from the surplus producing countries, mostly from Argentina, and to a lesser degree from other western and the far eastern countries. The domestic hides are about 70 per cent from large packing houses and the rest come from local slaughter-houses, butchers, farmers, etc. Those produced in packing houses are of superior grade compared to those produced otherwise.

Hides in this country are prevented from deterioration by preserving them by green-salting, but some are also cured by drying and also by dry-salting. The green-salted hides are superior compared to the dry or dry-salted hides and the tanners

prefer them. The quality of hides also varies with the season and the hides produced in summer are better than those produced in winter.

The defense program of the country has put a great strain on the domestic production and in order to assure supplies for military use the National Production Authority has placed hides under complete allocation and issues periodic quotas to local tanners. Lately, the federal government has been considering the possibilities of a continuous import trade with other countries.

Production

The annual domestic production is approximately 19,199,000 hides, while imports from foreign countries constitutes about 2,940,000 hides, making a total supply of about 22,139,000 hides available for consumption (see Table I, page 21).

As regards sheep and lamb skins, the total production is 11,739,000 skins per annum. Sheep skins are used for shoe uppers, gloves, hand-bags, etc., while some skins from shearling lambs are tanned with wool left on and are used for jackets, slippers, etc. In order to assure an ample supply of shearling

TABLE I[1]

NEW SUPPLY OF CATTLE HIDES IN THE UNITED STATES
(in thousands)

Year	Domestic Production			Net Imports	Total New Supply
	Federally Inspected Slaughtering	Uninspected Slaughtering	Total		
1945	15,541	8,093	22,634	767	23,381
1946	11,413	9,600	21,013	102	21,115
1947	15,526	8,300	23,826	39	23,787
1948	12,995	7,500	20,495	2,128	22,623
1949	13,222	7,300	20,522	154	20,368
1950	13,103	6,096	19,199	2,940	22,139

skins for the use of armed forces the National Production Authority has ordered all shearlings of military grade to be reserved for military use.

As regards goat skins, the United States is dependent on foreign producers. Her major sources of supply of goat skins are South America, Mexico, South Africa, Pakistan and India.

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[1] "Hides and Leather," Commodity Year Book, 1951, pp. 170-175.

Flaying (Skinning)

Preparing hides for the market begins with the flaying, after killing the animal. In the United States every detail of work involved in slaughtering and flaying of the animal is done in a highly specialized manner. In large packing houses flaying is done by more than a dozen highly-skilled butchers, each a specialist in a single operation so the damage in the operation is reduced to a minimum, and the takeoff conforms to the standard pattern.

The repeated performing of only one portion of the skinning job brings the work closer to perfection than is possible when the same man is required to do a number of different operations. Since defects in flaying lower the value of a hide, the big packer's hide is taken as the standard of workmanship.

The second quality grade constitutes the hides from small packing houses, where fewer workmen perform the operation and the same degree of perfection is not usually reached. Hides from the small packing houses are known as small-packer hides.

Next in quality are the hides from city butchers. In city abattoirs one or two butchers skin the whole carcass and

there is great danger of damage to the hide. Sometimes when there are several abattoirs in a city the work of flaying may be pooled and all done at one plant for greater efficiency.

Slaughter

Cattle. The cattle are kept off feed for at least 24 hours previous to slaughter. The fasted animals bleed out more thoroughly, they are easier to dress and the finish is brighter in appearance than those allowed feed up to the time of slaughter. Undue handling or excitement causes a rush of blood to the animal's capillaries from which it is drained out with great difficulty. The blood then left behind gives a pink tinge to the carcass and consequently lowers the keeping qualities of the meat.

Tools. Usually a six-inch skinning knife, a steel saw, and a stunning axe are used in the dressing of a beef animal.

Stunning. The cattle are driven to the knocking pen or tied to a post or ring in the floor and a sharp blow is given with the axe on the forehead midway between the eyes and the top of the poll. This crushes the bone into the brain structure

and renders the animal senseless to the subsequent slaughtering operation. The animal after stunning is dumped onto the killing floor, and both hind legs are shackled with chains and hoisted to an overhead rail and hung off with head downward.

Sticking. Sticking is usually performed in two ways: (a) the standard method; (b) the kosher method.

Standard method. The sticker takes a position with his back to the brisket. An incision is made over the point of the brisket towards the jaw. The knife is inserted in front of the brisket and the carotid artery is cut.

Kosher method. This type of slaughter is done for the Jews. In this method the animal is not stunned. It is hoisted and the throat is cut across.

After sticking by either method the animal remains in the hoisted position until the blood is drained out. At this point the animal is dead and the process of flaying or removal of the hide begins.

Before describing the skinning operation it would not be out of place to mention an interesting operation which I witnessed

at Shapiro and Brothers, while I was on a tour to Detroit. The killing operation in brief is given below.

Shapiro Brothers are lamb and veal dealers. A truck-load of lambs or calves is unloaded at the back door of the abattoir. The animals thus released from the truck climb to a platform leading to the shackling pen, where each one by turn is held by a hind leg and a shackle fastened thereto. The shackle works on a rail which carries the animal to the killing floor. The animals thus fastened are pushed forward so that they arrive in a hanging position in the killing room where the sticker kills them. After the animals are bled they pass through a shower to wash the hide. Next the flayers begin skinning operations.

Flaying in Large Packing Houses

Heading. The first operator is the header, who approaches the animal, which is still hanging head downward, inserts his knife at the top of the head toward his left and opens the hide from the horn to the nostril and skin is removed from the front of the face. The opening is continued from the sticking point down through the center of the jaw and

the side of the face is skinned out. The head is then turned and the opposite side is skinned. The jaw is grasped in one hand and the head is bent back on its poll and the top spinal column joint (the altas joint) is cut and the head is removed.

Shanking or legging. The carcass is then moved to the skinning bed, it is lowered to the floor and placed on its back and held upright by means of beef pritchers inserted on either side of the brisket. The leggers then open the hide on the rear of the fore shank and the rear of the hind shank. The cut is continued to the midline to be made on the belly from the neck to the bung. The tendon is severed by cutting across the shank and the dew claws are snipped off. The shanks are skinned and removed at the smooth joint below the knee and hock. This joint is at the enlargement, about an inch below the knee joint, just where it tapers down to the cannon bone. It is cut around on either side and the shank is grasped near the foot and a sharp thrust is given downward and outward.

Siding. While still in the pritched position the carcass is opened at the belly from the sticking piece to the tail. The floorman then starts working on the side. The hide is removed

with long smooth strokes of the skinning knife. The knife is held flat to the hide to avoid making cuts or scores. This is the most difficult task and the skill of the floorman determines whether the hide will be of a good pattern and free from defects in its most valuable portions. Next he starts removing the hide from the fore quarters. The floorman then starts cutting upwards from the opened center cut, beside the bag in the cow or scrotum in steer and to about six inches from the tail depending upon the size of the animal. The cut is continued to join the cut made by the hind legger. Having completed the skinning of one side, the pritcher is changed to the other side to permit the skinning of the opposite side. The breast and aitch bones are sawed to facilitate the separation of the carcass into two sides. The carcass is then slightly hoisted by hooks placed in the hind legs to permit skinning out the hind quarters.

Rumping. The tail puller skins and pulls out the tail bone and the fell-cutter removes the hide from the hind legs at the round. The rumper cuts the hide away from the base of the tail and rump. The tail is severed two joints from the body. Cut is made around the bung and it is let drop inside

the carcass. The fell-beater then removes the hide where it adheres tightly at the front of the round and flank, beating it with the back of cleavers as other workmen hold the hide and pull it, thus removing the hide down to the hips of the carcass. The carcass is now raised to a half-hoist position with the shoulder and neck on the floor. The entrails and the pluck are then removed. The butcher then removes the hide from the back and shoulders.

The carcass is then raised and hung off on the rail permitting the complete removal of the hide. The clearer-out skins the hide from the fore leg, and under the side of the neck. The hide dropper then removes the hide from the shoulder and the remainder of the neck. The hide is then spread on the floor and inspected for imperfections caused by the flayers and the defects, if any, are pointed to the respective butchers. The green hide at this stage weighs about 6 to 7 per cent of the live weight of the animal.

Skinning sheep and goats. Tools and equipment: A skinning rack on legs is about 18 inches high and six inches wide at the bottom with a sloping side about six inches high. In the absence of a rack a table or platform may be used.

While the sheep is lying on its back a foreleg is grasped and the skin is opened on the front down to the jaw, the same is done on the other foreleg. The cuts meet in front of the brisket. The hind leg is opened down the back of the leg from the hoof to the bung. The knife is held fairly flat to avoid any cut to the pelt or muscle. The hind shank is skinned and the foot removed above the hoof at the joint above two joints from the pastern. The back tendon over the hock is loosened and then the other hind leg is skinned.

Standing to the rear left side of the carcass the cut edge of the skin is grasped at the bung, pulling while fisting it with the right hand. The skin is then loosened round the flank and the udder area. Now the V-shaped piece of the pelt at the brisket is grasped. The belt is fisted over the belly. The pelt is opened down the center of the belly and it is fisted and loosened around the side and up the leg. It is better to fist up the leg than to pull the pelt down the leg, because pulling may tear the protective fell and expose the muscle. The bung is severed and the pelt is pulled from the tail. The pelt is then fisted over the shoulder and pulled off the back and neck. The head is cut at the altas joint and skinned out.

Curing Operation in the United States

The hide is allowed to cool for nearly two hours before curing is started. In big packing houses the workmen first inspect the hide for class, grade and weight and then trim off the snout, lips, ears, earbase and gristle to conform to the standard pattern. After the hide has been cooled to room temperature curing should not be delayed, because bacterial action rapidly sets in. On the other hand if curing is started before the body heat is out, bacterial action on the hide is encouraged. The hide is cleaned of blood, if any, because if it is left in the hide it not only helps bacterial action but also greatly increases the amount of salt required for effective preservation.

The places constructed for building the hide-pack have drainage towards the front. The area is fairly large. There is no hard or fast rule for the pack size but length is about twice width, say 15 by 30 feet or 20 by 40 feet in area. Pack heights do not exceed 4 to 5 feet. It is well known that folded hides show a greater shrinkage in curing than unfolded hides. Having selected the spot for the pack liberally scatter on the floor No. 2 size rock salt so that the hair side of the bottom layer of hide will be protected with brine and also prevent the

hide sticking to the floor. The pack is made level to retard the brine run-off and permit the hide to remain in good condition for a longer period. The hides are spread in the pack with flesh side up. Salt is liberally applied to each hide. On the side, the hides are folded towards inside with a liberal amount of salt filled in the laps. Care is taken so that no portion of the hide remains without salt. In making corners the flesh and hair side of the overthrown portion are well covered and the pockets are well filled with salt.. When the edges are made the hides are spread in the middle so that the pack will be made level. When the pack reaches its normal size (4 to 5 feet) the top is covered with salt. The hides remain in this condition for at least 30 days before they are sold to tanneries. Hides thus packed remain in good and marketable condition for more than 6 months.

During the curing operation, the salt causes much water to come out of the hide and drain off as brine. This causes the loss in weight of the hide known as shrinkage. One hundred pounds of green hide, containing 62 pounds of water loses about 35 pounds of water and gains about 6 pounds of salt.

The second practice is that after flaying the hides are washed to remove blood and soluble protein matter and the hair is scraped under a spray of water. The flesh side is then brushed vigorously and surplus flesh is removed. The hides are then soaked for 45 hours in a strong brine (25 per cent) and allowed to drain, after which they are salted. The brine hides produced more leather than the dry-salt process and thicker and firmer leather.

Grading in the United States

Before describing grading it is essential to be familiar with the nomenclature and classification of hides and skins:

Skin. A small hide is a skin.

Calf skin. In the case of cattle a hide weighing less than 15 pounds in the green-salted state is called a calf skin.

Kip hide. A cattle hide weighing 15 to 25 pounds is called a kip hide. It is called an overweight kip hide when it weighs from 25 to 30 pounds.

Hide. A cattle hide weighing more than 30 pounds is a hide. A cow hide is called light or heavy when its hide weighs less than 53 pounds or more respectively.

Hides from male animals. They are classified as bull, steer and stag according to the characteristics of the hide caused by castration.

Bull hides. They are taken from animals that have not been castrated, and are characterized by a very thick and rough neck and shoulders with loose flanks. They are poor in quality and the weight ranges from about 60 pounds to more than 100 pounds.

Steer hide. These are hides from animals castrated as calves after the age of about three months. The hide is smooth and uniform in thickness and structure. It is much denser and lighter than bull hide.

Stag hide. These are from male animals not castrated at so early an age as the steers, often not until they are over a year old. During the period preceding castration, they usually develop a hide like bulls, and the longer castration is delayed

the more the hide becomes like bull hide. In the market they have no official designation of their own and are accepted as steer or bull, whichever they more nearly resemble.

Native hide. A hide from unbranded animal is called native hide. The term native merely indicates that the hide is without brand marks.

Colorado steer hide. It means that the hide has been branded on the side or butt area or both.

Texas steer hide. A branded hide of compact, narrow and close pattern and plump is called a Texas steer hide.

Butt branded. When a hide is branded on the butt area back of the break it is known as a butt-branded hide.

Pacific Coast hide. If an animal is slaughtered and flayed in one of the packing houses known in the trade as a west coast plant, the hide is known in the trade as a Pacific Coast hide.

Spready. Hides that are unusually wide are often called spready.

Plump hide. They have a dense structure and usually have surface area small in proportion to their weight.

Hides are also designated according to the time of the year that the animal was slaughtered such as January hides, June hides, October hides, etc., or sometimes merely as winter hides or summer hides. It is important to know the time of slaughter because it greatly affects the yield and quality of leather from them. Hides taken off during the months of July, August, and September usually give the best results. On the other hand a winter hide contains less hide substance and more hairy weight than a summer hide.

Classification

In the United States hides are mainly classed as: (1) big packer hides; (2) big small packer hides; (3) regular small packer hides; (4) country hides.

In a large packing house, many butchers are engaged in flaying the hide from a single animal. Each of these butchers becomes highly skilled in one portion of the work of flaying. This high degree of specialization results in less damage due to improper flaying and the subsequent curing is also carried

out more efficiently and the hide is cut into a correct pattern in the big packing houses, resulting in superior hides for manufacturing into leather. Such hides are referred to in the trade as big packer hides.

In small packing houses, where there is less specialization of work, and where two or three butchers may assist in flaying the hide, the hides are usually of lower standard and are known as small packer hides.

Most hides taken off by country butchers and inexperienced farmers are badly damaged in flaying and are not well cured. Although they may have come from animals of the same class as those of the big packer hide, such hides are referred to as country hides.

The hides from big packing houses have become the standard pattern, by reason of the high specialization of workmanship in the complete removal of the hide and its subsequent curing.

Grading

In the trade only the big packer hides are considered of standard pattern and they are sold under the following selection,

while the others are sold on "all weight" bases as will be mentioned below.

BIG PACKER HIDES.

Heavy native steers	-	weight from 58 pounds up
Light native steers	-	weight from 48 to 58 pounds
Extra light native steers	-	weight from 30 to 48 pounds
Heavy native cows	-	weight from 53 pounds up
Light native cows	-	weight from 30 to 53 pounds
Heavy Texas steers	-	weight from 58 pounds up
Light Texas steers	-	weight from 48 to 58 pounds
Extra light Texas steers	-	weight from 30 to 48 pounds

Butt branded steer (spready type).

Heavy	-	weight from 58 pounds up
Light	-	weight from 48 to 58 pounds

Colorado steer (side branded).

Heavy	-	weight from 58 pounds up
Light	-	weight from 48 to 58 pounds

Branded cows. All weights (30 pounds and up) and include branded hides.

Extra light steers	-	weight from 30 to 48 pounds
Native bulls	-	all weights
Branded bulls	-	all weights

Calf skins. Skins weighing 15 pounds and under are called calf skins. While skins weighing from 15 pounds to 30 pounds are called kips.

Packer Northern	-	weight from 9-1/2 to 15 pounds
Packer Northern	-	weight under 9-1/2 pounds
Packer river point	-	weight from 9-1/2 to 15 pounds
Packer river point	-	weight under 9-1/2 pounds

BIG SMALL PACKER HIDES. They sort hides in the same selection as the big packer, mentioned above and usually receive big packer prices, when the market is normal or strong. They may possibly receive a slightly lower price than the big packers price when market is not too strong.

REGULAR SMALL PACKER. He usually kills from 500 to 1,000 animals per week. He sells his stock of hides on "all weight" basis—30 pounds and up—cows, steers branded, natives

all together. He receives a price about 2-1/2 cents per pound below the big packer price depending upon the average weight or depending upon tanner's preference of small packer hides.

Country hides. They are sold on "all weight" basis by dealers who collect these hides from butchers and farmers. They receive between one and 1-1/2 cents per pound less than the small packer's price.

Calf skins. They are sold on untrimmed basis by weight, as 9-1/2 pounds down and 9-1/2 pounds to 15 pounds. They are also sold on trimmed basis by piece. Untrimmed are when heads and shanks are left on, while trimmed are those from which heads, shanks, etc., have been trimmed off.

Trimmed skins are sold in the following selection of weights: 3 pounds to 4 pounds; 4 pounds to 5 pounds; 5 pounds to 7 pounds; 7 pounds to 9 pounds; 9 pounds to 12 pounds.

Kip skins. They are from 15 pounds to 30 pounds in weight. Fifteen to 25 pounds is kip while 25 to 30 pounds is called overweight kip. While on trimmed basis they are sold as 12 to 17 pounds and 17 to 30 pounds.

Market Grades

No. 1 hide. (a) Grain damage and sores: Hides having sores or other defects on the hairside causing broken grain of whatever length and diameter are not accepted in No. 1.

(b) Warty hide: No warty hides are accepted in No. 1.

(c) Grub marks: No grub marks are allowed in No. 1 hides. Grubby hides are delivered separately on an allowance of one cent per pound less than the No. 1 price.

(d) Scored hides: A deep score or gouge halfway or more through the hide is allowed if situated below the straight line drawn through the break in the hair of the fore and hind flank, i.e., approximately less than five inches from the edges of the hide provided it is otherwise of a standard pattern.

(e) If the cut is less than three inches from the edge of the hide and can be trimmed off without spoiling the pattern, it shall be trimmed with the least possible waste and delivered as No. 1 provided it is satisfactory in other respects.

(f) A cow hide having the bags trimmed off is not considered an off pattern and if otherwise of proper pattern is delivered as No. 1.

(g) If a hind shank has a cut, hole or blemish above the hock such hide shall be accepted in No. 1 selection if otherwise satisfactory in other respects.

No. 2 hide. (a) Cut hides: Hides having a cut or hole which cannot be trimmed without spoiling the pattern of the hide is a No. 2 without trimming.

(b) Scored hides: A hide having a deep score or gouge halfway or more through the hide and located approximately within five inches or more from the edge of the hide is delivered in No. 2 without being skewered.

(c) Sore hides: A sore hide is delivered as No. 2.

(d) Grain damaged hides: Any hide having a defect on the hairside 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 is delivered in No. 2 without being skewered. This includes sores, rubs, scuffs and deep scratches.

Warty hides. (a) If the area covered by warts does not exceed 36 square inches, the hide shall be delivered in No. 2.

(b) If the areas covered by warts exceed 36 inches, but are less than 72 square inches, the hide is delivered at 2 cents per pound under the No. 1 price.

(c) If the warty areas are larger than 72 square inches the hide may be rejected, or if agreeable to both buyer and seller, it may be delivered at a price 20% to 30% lower than the No. 1 price.

(d) Any shank having a cut or hole below the knee or hock one inch or more in length shall be corrected by trimming straight across at the top of the cut.

(e) If the cut or hole be smaller than the above, such shanks shall be accepted without trimming provided it is otherwise of proper pattern.

Grubby hides. Any hide containing five or more grub holes which may be punctured by the use of a wooden skewer are graded as grubby hides. They are invoiced on the basis of an allowance of one cent per pound. The percentage of grubby hides is ascertained in a carload and applied against the weight of No. 1 hides in the car.

CHAPTER IV

THE HIDE AND SKIN INDUSTRY IN PAKISTAN

Pakistan is essentially an agricultural country and raising livestock is vital to her economy. The actual contribution made by different species of livestock has not been measured since statistical data on production for the country as a whole is not available.

In the year 1948 just after the creation of Pakistan as an independent country, the necessity of maintaining data, particularly in regard to livestock production and the available supplies of their products, has assumed greater proportion. An attempt was made by Dr. I. Hag and the author to compile whatever data could be collected from different sources and published the same in the form of a marketing series, "Livestock Wealth of Pakistan."

Pakistan, in addition to her purely agricultural resources possesses livestock wealth of which the country can justifiably take pride. Certain breeds of oxen have achieved world-wide reputations, for instance, Red Sindhis and Sahiwals for milk

and Bhagnaris and Dhaniris for draught purposes. All types of animals and birds contribute to the wealth of Pakistan by providing power, food, clothing, etc. The estimated annual production of livestock, poultry, etc., is as follows:

TABLE II[1]

	Annual Production
Domesticated livestock	over 48 million heads
Poultry	over 27 million heads
Annual catch of marine and fresh water fish	over 31 million maunds
The aggregated value of livestock, poultry, etc., had been	over 3,519 million Rupees
The value of their product	over 3,776 million Rupees

Hides

Hides are obtained from oxen and buffaloes and represent an important raw material which Pakistan produces in large quantities. Besides a substantial annual surplus of raw hides for export, small quantities of tanned and dressed leather are consigned to foreign markets.

[1] Haq, I., and B. Khan, "Hides," Livestock Wealth of Pakistan, 1949.

Approximately half of the internal demand for hides is accounted for by the country pattern shoes, one-fifth for western style shoes and the remainder for water bags, saddelry, suit-cases, ropes and other articles of industrial or agricultural use, including their repair. Considering the country's huge population, the local consumption of leather goods is small compared to that of western countries. This is due to the absence of big factories for making footwear and other leather goods, and the low quality of locally-produced leather goods. There exists, therefore, a considerable import trade in foot-wear and leather goods.

No estimates have been made of the hides collected from camels, horses, and donkeys. Camel hides are frequently used to make oil cans, table lamps and flower vases, etc., while those of equines are used for the production of coarse leather goods. It should be mentioned that considerable prog-ress has been made in western countries in developing industries which utilize the by-products of the hide and tannery industry, while in Pakistan efforts to conserve and utilize such material economically have not yet been made even on a small scale.

As a result, hide trimmings, fat scraps, hair, etc., which could be turned into products such as glue, tallow, and felt go as waste.

Production. The annual production of hides has been estimated at 5,149,000 pieces, valued at about 61 million rupees (see Table III). Owing to the greater number of oxen than buffaloes, the production of kips (88 per cent) is much higher than that of buffs (12 per cent). Of the total, 61 per cent are "fallen" hides and 39 per cent slaughtered hides.

Qualities. In Pakistan standard specifications for hides do not exist. Therefore the classification followed by merchants vary considerably. Generally speaking, they classify hides according to (1) region of production (e.g., Decca's and Northwestern), (2) type of cure (e.g., arsenated and dry-salted), (3) quality (e.g., slaughtered and "fallen"), (4) weight (e.g., lights and heavies).

Remarks. Pakistan produces many hides, more than can be utilized for internal consumption, thereby creating a surplus available for the foreign markets. Although hides have been consigned to Western markets for a very long time, the

TABLE III[1]

ANNUAL PRODUCTION OF HIDES IN PAKISTAN (1948)
(thousand pieces)

Province or State	Kips			Buffs			Grand Total
	Slaughtered	Fallen	Total	Slaughtered	Fallen	Total	
Bahawalpur state	23	33	56	5	13	18	74
Baluchistan	16	8	24	-	-	-	24
Baluchistan state	12	7	19		1	1	20
East Bengal	953	2236	3189	38	87	125	3314
Khairpur state	1	6	7	-	2	2	9
Northwest frontier province	101	43	144	81	14	95	239
Sind	27	141	168	7	51	58	226
Tribal areas and agencies	35	15	50	7	1	8	85
West Punjab	297	285	822	100	203	303	1185
Total	1765	2774	4539	238	372	610	5149

[1] Haq, I., and B. Khan, Hides - Livestock Wealth of Pakistan (August, 1949), pp. 58-66.

processing of hides and skins has not progressed sufficiently to enable Pakistan to compete in the international markets and bring maximum returns to the producer. This has been due to defective methods of flaying and curing, resulting in a comparatively low quality product and absence of a standard system of grading, leading to uncertain supplies of hides of uniformly good quality.

Defective preparation and faulty sorting of hides affect the trade adversely both in the internal and external markets.

Skins

Sheep and goat skins also represent an important raw material which Pakistan exports to foreign markets in large quantities. Both these types ot skins produce valuable leathers. Small sized goat and kid skins are generally used for white or light-tinted leather which is made into gloves, shoe uppers, etc., while large-sized skins having fine grain are converted into quality products such as Morocco leather. Cabinet maker's cheap type of Morocco leather is prepared from large-sized goat skins, having coarse grain. Sheep skins are made into imitation Morocco leather. The consumption of skins in the

country itself is small. About three-fifths of the home demand is accounted for by the manufacturer of shoe uppers, about one-fourth for water bags, book binding material and repairs and the remainder for miscellaneous articles such as ladies hand bags, suit-cases, purses, etc.

Production. The annual production of skins has been estimated at 7,564,000 pieces valued at 15 million rupees (see Table IV).

Qualities. Skins are not graded according to any standard specifications. Sorting and classification vary in different parts of the country and from market to market. The system of classification generally followed by shippers is similar to that described for hides.

Remarks. Owing to the faulty methods ot rearing animals and the defective flaying and curing foreign markets have not been favorable to sheep and goat skins from Pakistan. Improper market preparations coupled with the absence of any system of standard grading has been responsible for the underdeveloped trade in skins. Apart from improving the market preparation and introducing a system of standard grading, it is

TABLE IV [1]

ANNUAL PRODUCTION OF SKINS IN PAKISTAN (1948)
(thousand pieces)

Province or State	Sheepskins			Goatskins			Grand Total
	Slaughtered	Fallen	Total	Slaughtered	Fallen	Total	
Bahawalpur state	63	29	92	87	19	106	198
Baluchisthan	300	44	350	234	34	268	618
Baluchisthan state	239	34	273	233	34	267	540
East Bengal	170	18	188	1482	160	1642	1830
Khairpur state	9	3	12	31	11	42	54
N.W.F.P.	198	30	228	291	39	330	558
Sind	157	61	118	565	192	707	925
Tribal areas and agencies	174	20	194	279	44	323	517
West Punjab	641	195	836	1380	108	1988	2324
Total	1957	434	2391	4582	591	5173	7564

[1] Haq, I., and B. Khan, Hides - Livestock Wealth of Pakistan (August, 1949), pp. 58-66.

necessary to establish local leather industries in Pakistan for meeting its growing needs of different types of leather.

Fur and Fancy Skins

Fur skins include lambs and kids and fur-bearing animals such as jackals, lynxes, and martens. Fancy skins include reptiles such as snakes, lizards and crocodiles; and wild animals such as tigers, leopards, deer and others. The fur and fancy skins produced for home consumption is extremely small. Such skins are costly and are used for the preparation of high-class luxury goods as fur coats, fancy shoes, hand bags, gloves, caps, etc. The popular caps, like the Jinnah cap, are made from lamb skins, particularly from Karakul pelts, which are available along the Northwestern Border. Tiger and deer skins generally enter the export trade but are often mounted locally for decorative purposes.

Production. The annual production of fur and fancy skins has been estimated at 1,903,000 pieces, valued at 8 million rupees. Fur skins account for 63 per cent and fancy skins 37 per cent of the total (see Table V).

TABLE V [1]

ANNUAL PRODUCTION OF FUR AND FANCY SKINS IN PAKISTAN (1948)
(thousand pieces)

Province or State	Fur Skins				Fancy Skins					Grand Total
	Lamb	Kid	Other	Total	Snake	Liz-ard	Croc-odile	Other	Total	
Bhawalpur state	70	30	2	102	-	-	-	-	-	102
Baluchistan	-	-	10	10	-	-	-	-	-	10
Baluchistan state	-	-	-	-	-	-	-	-	-	-
East Bengal	-	-	-	-	85	603	12	10	710	710
Khair state	-	-	-	-	-	-	-	-	-	-
Northwest frontier province	100	50	2	152	-	-	-	-	-	152
Sind	30	20	2	52	-	-	-	-	-	52
Tribal areas and agencies	63	57	1	121	-	-	-	-	-	121
West Punjab province	600	150	4	754	1	-	1	-	2	756
Total	863	307	21	1191	86	603	13	10	712	1903

[1] Haq, I., and B. Khan, Hides - Livestock Wealth of Pakistan (August, 1949), pp. 58-66.

Qualities. Standard grade specifications for fur and fancy skins do not exist. Assortments vary from merchant to merchant and from one place to another. The usual classification followed by shippers is:

Lamb skins: First quality (moire or Takkiy) - wool small, soft, silky and fine with everlasting curls; second quality (nazakcha) - wool soft and fine with lasting curls; third quality (Guldar) - wool bigger than those of Moire and Nazukcha, curls open and loose; fourth quality (plain) - wool loose, open and long, with practically no curls.

Kid skins: First quality (moire or Patterns) - hair, lustrous soft and soft and finely arranged; second quality (surface pattern) - hair less lustrous, less soft and less finely arranged than in the case of moire; third quality (plain) - hair not lustrous and not arranged in any order.

Crocodile skins are usually classified according to their size and the type of grain surface. Lizard skins are sorted into different colors and then classified the same as crocodile skins. Snake skins meant for export consist of primes only, the defective pieces being rejected by the shippers.

Remarks. Fur and fancy skins fetch handsome prices locally as well as in foreign markets. It is therefore, desirable that impetus should be given to this lucrative trade, both qualitatively and quantitatively.

Pakistan's Position in World Markets for Hides and Skins

Pakistan supports about 24 million head of oxen, 6 million head of buffaloes, 6 million head of sheep, and 10 million head of goats.

The world stock of cattle is estimated to be about 600 million head, while the number of sheep and goats is not known. The world production of hides and skins has been estimated to be between 76 and 102 million. Pakistan raises nearly five per cent of the world's cattle, and her estimated production of hides and skins is about 13 million—approximately 7 per cent of the world production. Thus, one important point to be borne in mind as regards Pakistan's position in the world market is that quantitatively she is a large supplier.

Another important consideration is that among the chief stock-raising and hide-producing countries of the world, Pakistan is in a position to spare a big surplus for export.

Thirdly, the fact that a large proportion of cattle hides produced in Pakistan are light-weight hides (i.e., kips) enables Pakistan to influence the world markets for kips to a greater extent than her share of the world's total production of hides and skins indicates.

As regards goat skins, Pakistan's position is somewhat stronger, with an estimated production of about one-fourteenth of the world[2] supply. Even though her share of the world's production of goat skins is only a little higher than her share of the world's production of hides and kips, it is generally believed that her position in the world's markets is stronger in the case of goat skins than it is in the case of hides. It has been claimed that certain classes of goat skins, especially those produced in Eastern Pakistan, possess unique quality.

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[2] India hide cess-enquiry committee report, Vol. 1, pp. 13 and 24.

CHAPTER V

THE HIDE AND SKIN INDUSTRY IN PAKISTAN (Continued)

Hides and skins of adequately-nourished and properly-kept animals are superior to those of animals not cared for and left to semi-starvation.

In Pakistan animals are at present bred for different purposes. Cattle are bred mainly for draught and milk and in a few cases for breeding. In general buffaloes are reared for milk with draught as a subsidiary function. Meat is, generally speaking, not even a secondary consideration, the only possible exception being the male buffalo calf. Sheep are raised for both wool and meat, the exact relative value of each product varying in the different provinces according to local habits and according to the proximity to large centers of mutton consumption. Goats are reared almost entirely for meat, milk being in some parts of Punjab an important subsidiary factor. Among all these animals, however, one factor is common, viz., the hides or the skins are invariably treated as a by-product. This is true of all countries whether economically advanced or backward. But

where cattle are bred for meat, the hide becomes an important by-product and therefore enters into the stock raisers' calculations when breeding the animals. In Pakistan, however, except in the case of the goat and to a certain extent the sheep, the value of the hides or skins hardly ever receives consideration by the producer. It is no doubt an important consideration with the butcher, but from the breeders' point of view it is of little consequence.

The improvement and proper care of the animals has been variously described (see Figure 5). The hide from a well-nourished animal has a silky mellow and supple feel, the texture is more compact, the tensile strength greater, and the surface is more even and smooth than the hide from under-nourished animals. Great emphasis should be placed on developing adequate diets for animals. At the present time the inadequacy of funds at the disposal of Pakistan limit the rate of progress. Hence it is recommended that funds be raised from the placing of a cess on hides and that it can be usefully spent on research and development in this direction, and that apart from the general benefit to the rural folk some direct improvement of hides and skins will also result.

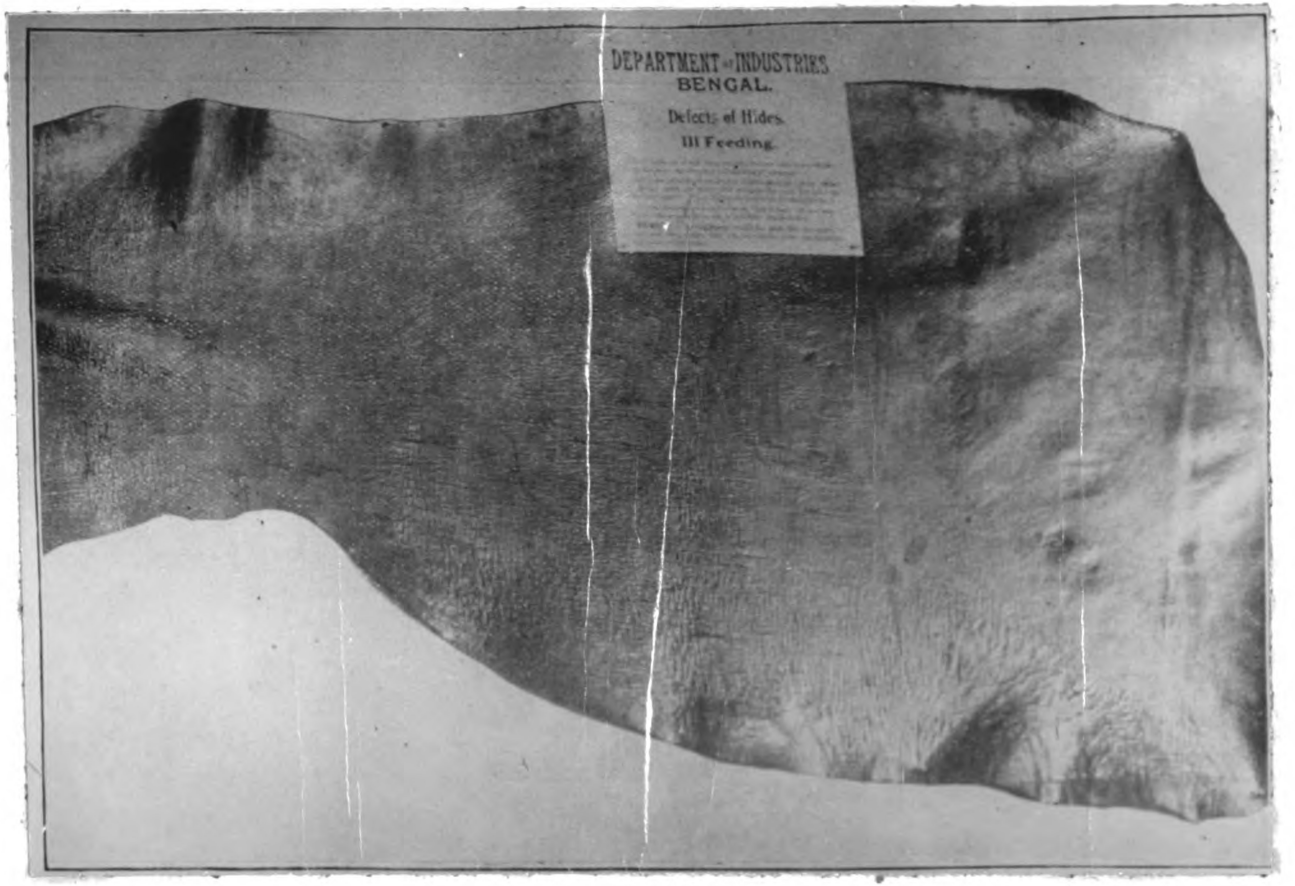

Figure 5. Photograph showing the hide from an adequately nourished animal.

Defects Due to Disease and Pests and Old Age

Disease, like anthrax, renders the hide or skin unfit for use before it is thoroughly disinfected. Rinderpest, Haemorrhagic septicaemia, "Red water" and cow and sheep pox rob the hide or the skin of some of its hide substance and thus impoverish it. Rinderpest moreover causes pock marks which greatly damage the pelt. "Black quarter," Actinomycosis, Multiple abcess, Ulurative lymphamgitis, Malignant tumours, Filaria haemorrhaidalis and all wounds, especially with maggots, cause holes, sores or breaches in the hides or the skin. Ringworm, scalies, eczema, dermatitis and intestinal paracites impoverish the hide or skin and render it liable to show marks during and after tannage.

The various forms in which the damage to the hide or the skin occurs are holes, open sores, boils and pimples, scars fully or incompletely healed, a mangey or scaly appearance, scratching or rubbing and dents.

The fighting of animal diseases is however a vast problem in which the question of national gain through the improvement of hides and skins must play a subsidiary though important part. In the eyes of the veterinary department the prevention

and treatment of the diseases of animals with a view to the improvement of hides and skins is hardly more important than the preservation intact of the brown paper wrapping or covering of a parcel. It is a fact that the primary producers principally, and the traders, shippers, and Pakistan tanners to a lesser degree, stand to gain by the reduction of the incidence of disease among the Pakistan's livestock. It is recommended that veterinary research and development work should receive greater attention than the question of breeding, feeding and maintenance of the livestock.

The present organization for veterinary research and relief in Pakistan is based on the necessity of fighting epidemics. The meagre veterinary staff employed in the provinces finds itself more than fully occupied with the work of preventing the spread of serious outbreaks of contagious diseases. Its strength, equipment and other resources have been admitted to be inadequate for the purpose of dealing with important non-contagious diseases. Needless to say that the treatment of simple ailments and diseases like boils, pimples, sores, cuts, itches, wounds, callouses, though not in itself difficult, is beyond their means. Rural folks in the countryside are not altogether

devoid of rudimentary veterinary knowledge, but it is traditional and nonprogressive. It is unusual to find any attempt to spread knowledge about animals, their diseases, and the care of such diseases.

It is important to impart elementary knowledge about such matters through school textbooks. Facilities which at present are almost nonexistent for procuring supplies of drugs and medical equipments in the rural areas should be provided by the Federal Government.

It is better that a part of the cess fund raised be spent in the form of grant-in-aid for specific purposes to the various provincial veterinary departments and leave the development work to be financed in the main by the local government concerned, and research would be financed principally by the central government.

Insects and Vermin

The most important of these are warble flies, ticks, mites, weevils, lice, etc. These are not peculiar to Pakistan but are found in many other countries. The warble is the most vicious of all these pests which damage the hides and

skins. The enormous extent of the recurring loss caused by it has been responsible for considerable research in various European countries. The problem has been attacked in Europe and America with varying degrees of success.

A complete treatise on grubs, their life habits and methods of control is available to the livestock owners by securing a copy of the United States Department of Agriculture Farmer's Bulletin No, 1596.

Although the warble problem has not so far been systematically tackled in Pakistan an examination of the larval stages has shown that the Pakistan warble fly is the same as the European and American fly, viz., the bineatum species. Its life history appears to be definitely season. The season for the different stages of the parasite's life history differs slightly in different countries. The appearance of the adult fly coincides with the rainy season from June to August but some believe it begins toward the close of April and ends towards the close of July. The warble appears on the skin from September onwards and it is between November and January or February that more of the warbled hides and skins come to the markets. The

larvae escape between November and May and after pupation appears as mature flies chiefly during the rainy season.

The nature of the damage to hide and skin caused by warbles is known to the trade. A badly damaged warbled hide looks as if it had been fired at with a shotgun. An Indian kip exhibited in the museum of the leather department of the University of Leeds has not less than 680 warble holes.

Next to warble flies the parasites which cause the most damage both directly and indirectly to hides and skins are ticks. They are found among cattle, sheep and goats.

Cattle ticks pass the greater part of their lives on the hide or the skin of the animal. When the female tick is approaching the time of egg-laying, she drops to the ground and lays eggs there. The hatched larvae ascend plants and other vegetation nearby and collect on leaves, stems, and blades of grass. They take no food during this period and if a host animal is not found, they ultimately die of starvation. Whenever the young ticks get an opportunity, they crawl up the hair of cattle or other animals and are found on all parts of the host's body, but generally they prefer the parts where the skin is thin.

Some ticks are continuous and some interrupted feeders. The sucking of blood which is the tick's sole food is of course of considerable detriment to the animal's health. Owing to the perforations which the tick makes in order to suck the blood, a ticky hide or skin looks as if it had numerous pin-holes. They look like tiny sores more or less healed and break the smoothness of the grain. The quality of the leather made from such hides and skins is appreciably reduced. Exact figures are not available to show the extent of damage caused by ticks to the hides or skins. It is estimated that the damage runs to several hundred thousands of rupees per annum.

Remedial action. In America the problem of dealing with the tick has been found to be simpler and easier than the warble problem, though not inexpensive. The tick has no mobility of its own and one field is not often infected from another. Hence whenever plenty of pasture is available, it is not a difficult matter to eradicate ticks by keeping cattle in one field till the females drop off to lay their eggs and then moving the animals to another enclosure. The cattle are not allowed to go back to the first field until the ticks have been starved out. The necessary period for the starving out varies from one to

eight months according to the season and the lattitude, but it is certain that they can be starved to death. In thickly-populated countries and in unfenced areas (as in Pakistan) the usual method of eradicating is to dip the affected animals in tanks containing tick destroying solutions. Of such solutions white arsenic, caustic soda, lye, soda ash, sal-soda, pinetar, tobacco, lime and sulphur are some of the common ingredients. When correctly compounded and used dips have been found very useful in destroying ticks. Common methods are spraying, liming, and burning of the ground on which ticks have dropped for egg-laying. Full details of the seriousness of cattle fever ticks are set forth in the United States Department of Agriculture Bulletin No. 1057. All livestock raisers should read this booklet.

Defects Due to Wounds and Injuries

Branding is confined to cattle and takes two forms—hot-iron branding and "Acid" branding. In the former case a piece of iron or other metal is heated and while still red hot is applied to the hide or the skin. The latter form is applied by wetting an instrument, usually of wire, with a strong acid.

Acid branding is naturally less painful and causes less damage to the hide or skin. A fire brand burns into and sometimes through the grain and renders that part unsuitable for good leather, for which smooth and unimpaired outer surface is necessary. Branded hides are usually sorted out for sole leather. Deep branding may weaken the whole structure of the corium and reduce the parts affected to waste, as shown in Figure 6.

Branding is resorted to with one or more of the following motives: (1) In the most rural parts of Pakistan the superstitious belief seems to be prevalent that branding is an effective remedy against certain disease, especially colic. The owner sometimes believes that he is exercising the evil spirit from the body of his animal. In no country do superstitions die an early death. In Pakistan the position is complicated by the paucity of veterinary facilities, so that even if the owner is desirous of obtaining veterinary assistance, he has to resort to branding as the second best choice. It is hoped that with the wider spread of facilities for veterinary relief branding would decrease. It is also hoped that veterinary work will go on expanding and that in a course of time the system of private

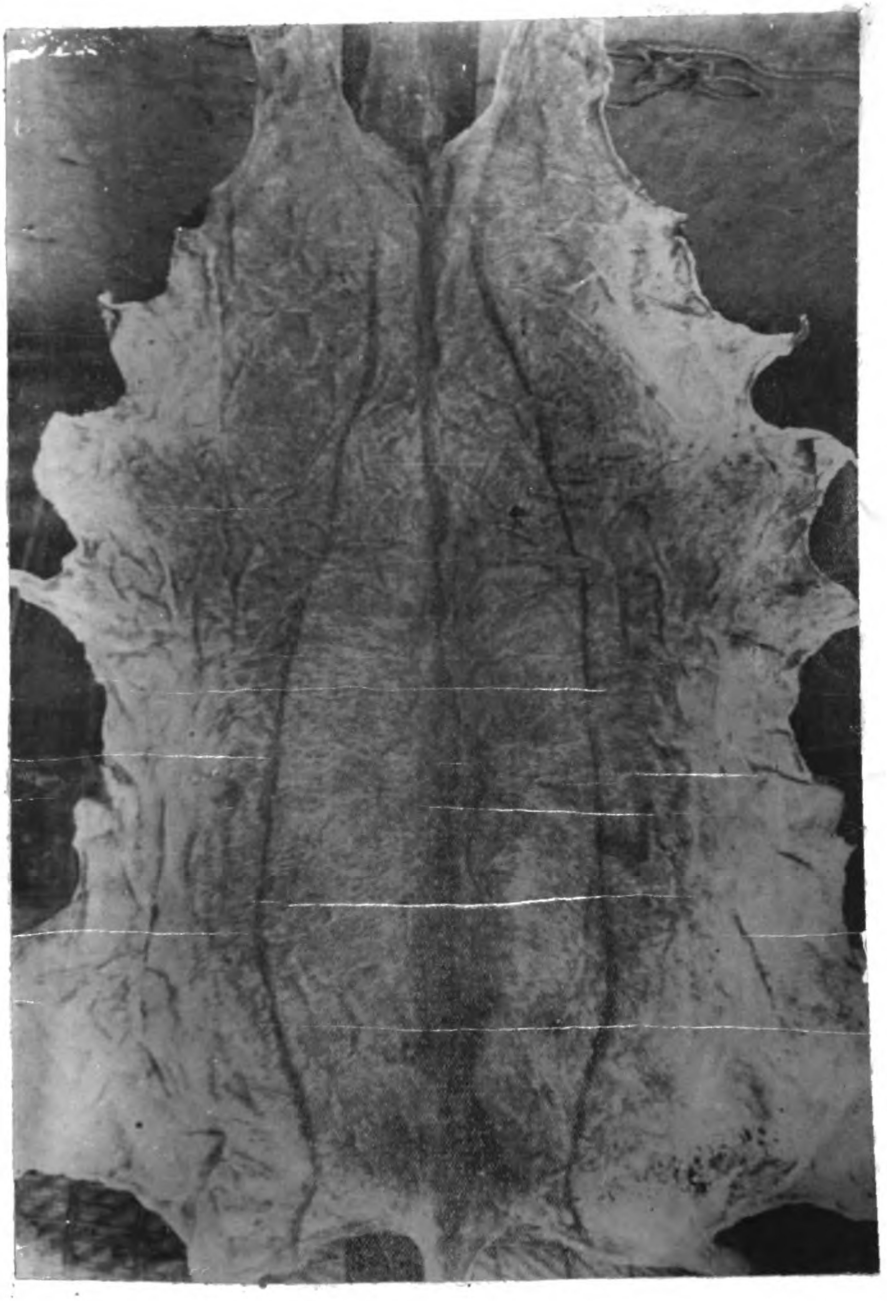

Figure 6. Photograph showing damage caused by deep brand marks.

veterinary practice will develop, and that these automatically will solve the problem of branding for purposes of cure.

(2) Sometimes branding is resorted to for the easy identification of the animals because cattle lifting is still a common crime in many parts of Pakistan, especially those lying on the border. Giving of information to the police and recognition of the animal when recovered are facilitated, if the animal bears some distinguishing marks. Moreover cattle passed for the supply of beef to the army are generally branded usually on the best part of the hide, viz., the butt with the object of rendering the substitution of inferior and unpassed cattle impossible. Various suitable substitutes can be made for this sort of branding, viz., branding on the horns and hoofs, marking with indelible dyes or coal tar that is not too hot, clipping of ears, and tattooing of the gums or inside of the ears.

(3) In certain parts of the country, the poisoning of cattle is still a somewhat common crime. The poisoner's object is to obtain the hide which according to custom, would be his prerequisite on the animal's death. Hence the owner of the cattle deliberately ruins the living hide, as shown in Figure 7. Branding

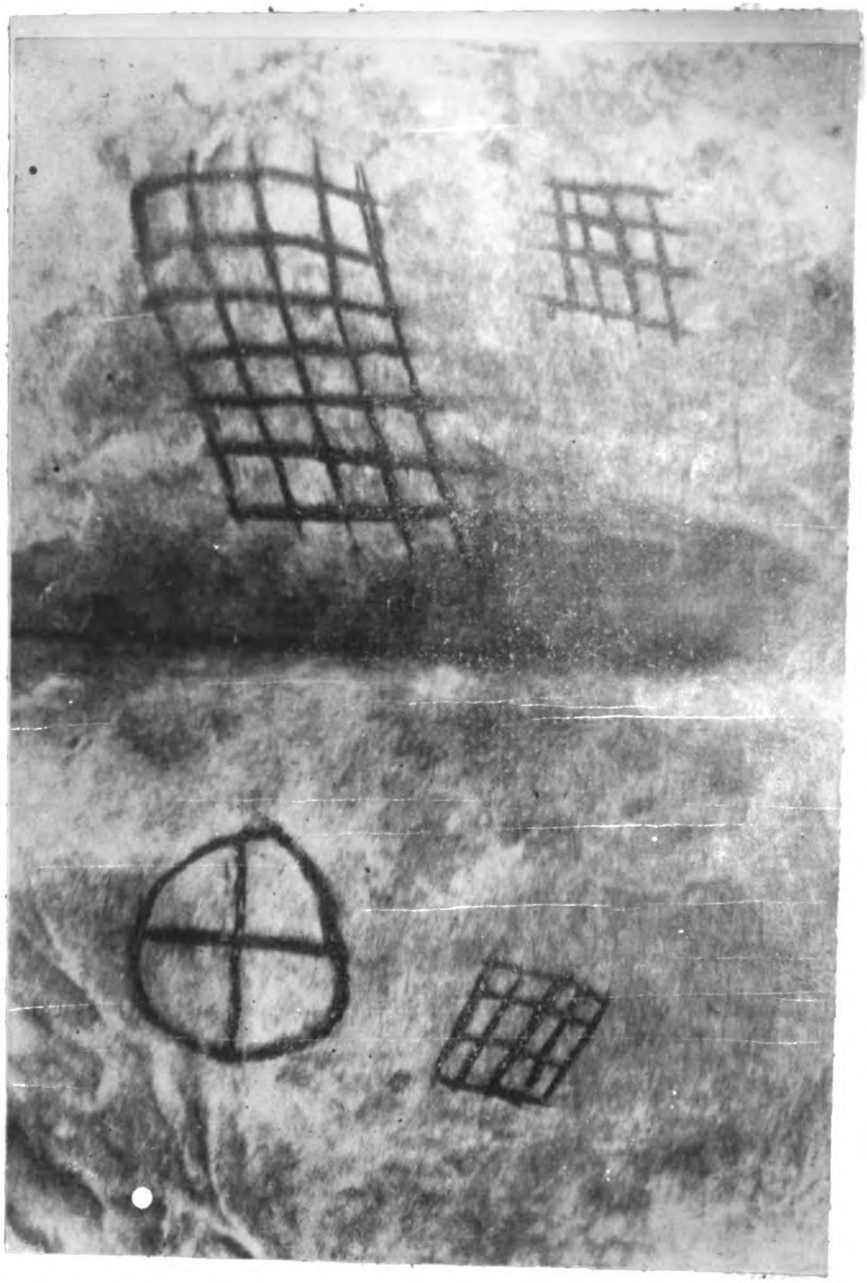

Figure 7. Photograph showing extensive brand marks.

in such cases is extravagant. The hide often looks like the skin of a zebra with all sorts of fantastic stripes.

An analogous though far more cruel form of crime which is still practiced in Madras (now part of India) is the flaying alive of the animal for the sake of the hide. The hide thief does not wish to take the risk of lifting the cattle and therefore administers a dose of some substance, which it is said to paralyze the nervous system and enables the thief to flay the animal alive without the animal being able to raise or bellow or bleat. As these crimes indicate a low level of public security, it is hoped that it will decline with increasing of security this form will diminish.

(4) Branding is occasionally inflicted for decorative purposes. Such branding is very rare in Pakistan. No specific remedy is possible, but with changing notions about what constitutes decoration we hope this form of branding will disappear in a few decades.

Goad marks. Another form of damage to hides is the scratchy and uneven grain of the best part of the hide (viz., the butt) resulting from the marks left by the goad universally used in Pakistan for driving draught animals. The goad has a

pointed nail fixed to the center of one end of a stick, and its use is sometimes so merciless that the nail punctures the butt and causes bleeding, as shown in Figure 8. It is not unusual for sores to form around such parts.

There is practically no remedy for eliminating or even materially reducing this form of damage. It is however suggested that the society for the prevention of cruelty to animals should be subsidized to carry on its work more vigorously. It is also suggested that further powers should be conferred on those who have to administer the police act and that other officials might be empowered to report cases of excessive use of the goad.

A certain amount of propaganda is no doubt possible, and if an appeal to the humanitarian sentiment, to which the average man in this country is particularly susceptible, is reinforced with an appeal to the economic interest of the owner, some good might result. In particular, schemes of education for rural people both young and adult, might include simple statements of facts relating to avoidable economic waste resulting from the present practices in the rural areas. Similar propaganda by the Society for the Prevention of Cruelty to Animals

Figure 8. Photograph showing hide damage caused by goad marks.

and other suitable organizations can, and should be assisted with small grants-in-aid for work on approved lines.

The problem of the damage resulting from yoke marks (called Kandha in Pakistani) is in essence similar to that relating to the goad marks though the nature and extent of the damage are different, yoke pressure and rubbing gradually result in thickening of that part of the hide on which it rest. Such thickened patches lose the grain, elasticity and tensility of the natural hide. The neck portion is not however, so valuable for leather as the butt which is damaged by the goad marks. The actual national loss from yoke marks is a much smaller amount than in the case of goad marks. In the case of many classes of hide the yoke damage is reduced by the fact that the pressure of the yoke is borne by a fatty lump and the hump. So long as the oxen and buffaloes are used for cart driving, it is impossible to provide a practical remedy. But the practice, prevalent in certain parts of the country, of providing some padding under the yoke, should be popularized in the same manner and through the same agency as in the case of goad marks.

The defects arising from miscellaneous sources—punctures and cuts due to thorns and barbed wire fencing, scratching of the grain owing to rubbing against hard rough surfaces (e.g., the trunks of trees, boulders, stones or brick walls, rough posts), sores and scars resulting from wounds received in panic or in a fight with other animals cause an appreciable national loss. Considering that except in a few parts of the country stall-feeding is hardly ever practiced, that large stretches of the country support only coarse shreddy vegetation, and that the ever-increasing pressure of cultivation on pasture lands has driven cattle and especially goats and sheep to jungle grazing, there seemed to be no practicable solution for this kind of damage.

The hides, and skins of "fallen" animals are, by immemorial custom over the greater part of the country, the prerequisite of the village chamar or sweeper. The owner of the animal has no further interest in the hide or skin. The chamar removes the dead carcass, and the hide or skin is supposed to be his fee for his service.

The dead body is dragged to a special spot—generally a customary assignment on the part of the local zamindar,

community or government—and skinned there. The dragging causes various injuries to the hide or the skin, usually scratching and rubbing of the grain. Not infrequently a long interval takes place before the skinning begins. During this time the hide or skin is exposed to the ravages of vultures, as shown in Figure 9. The putrifying action of heat, damp and surrounding filth causes what is technically known as "taint," a form of incipient decay. Frequently the chammar is not an expert skinner. He has no interest in the dead animals' flesh, and the skinning is therefore somewhat better as regards cuts or scores. But he tends to leave superfluous fat and flesh on the hide or the skin especially the former. The origin of this flaw is, in essence, a form of "loading" resorted to with the object of artificial addition to the weight.

Remedial actions. Many of these defects are inherent and hardly any remedy would be practicable. As regard the ancient custom of the country by which the chammar is entitled to the dead hide or skin as his prerequisite, it is not recommended that it should be disturbed. It is believed that this custom is slowly disappearing. It would be very difficult to

Figure 9. Photograph showing damage to the hide caused by the ravages of vultures.

give the chammar training or more practice. His craft is hereditary, and considering the various handicaps under which he does his work he does it remarkably well. But I think it is possible to educate him by various forms of propaganda to realize his own economic loss caused by actions which he can control.

CHAPTER VI

SLAUGHTERING IN PAKISTAN

The general—perhaps the universal—practice in Pakistan is to tie the legs with ropes and then "throw" the animal. The floor is invariably hard and damages the hide, especially in the case of heavy animals.

Flaying

It is however in connection with the handling of the carcass that some of the most serious defects occur.

It is true that compared with flaying in certain other tropical countries, e.g., Nigeria, East Africa, etc., flaying in Pakistan has been almost perfect and excellent. But compared to American methods the standard of hide flaying is poor. The flesh side of the hide often gets scored and even cut by careless use of the flaying knife. The knife cuts make long and sometimes deep dents into the substance of the hide and occasionally even slit the hide, as shown in Figure 10.

Figure 10. Photograph showing damage caused by unskilled flayers.

These cuts or scores reduce the tensile strength of the leather produced from the hide or skin so damaged. If the leather is finished on the flesh side its appearance is also marred. If the leather is intended for belt, straps and other purposes involving its subjection to sharp or sustained strains, the value of the leather is seriously reduced. On account of these facts the raw hides or skins go down in the "grading" or "selection."

The reasons for causing much national loss are: (1) in the flayer's lack of skill and general carelessness; (2) material and environmental (unsuitable knives, insufficient space, dim light, lack of suitable arrangements for suspending the carcass, etc.), and (3) those connected with conditions of meat supply, the system of buying the slaughtered hide and the system of employment of flayers and their work.

Remedial action. Training by itinerant trainers and demonstrators would yield good results, the practice of employing juveniles and women as helpmates should be discouraged. Flaying is a craft and long and sustained practices is a sine qua non of faultless work. The saving affected by the employment of untrained men cannot be a large amount, and in all

probability they are more than counterbalanced by the depreciation of the hide flayed by nonprofessionals.

The use of fist and the elbow and the wooden knife or hammer should be encouraged by suitable propaganda and demonstrations.

Careless and indifference as well as lack of experience, are the only excuses for unnecessary cutting and scoring of skins and hides during flaying. The loss to the farmer, livestock raiser, butchers and tanner for the inferior hides may be estimated in millions of rupees annually. "Butcher Cuts," scores and other flaying damage are doubly regrettable because they can by care and effort be avoided.

A dull knife is the cause of cuts in many instances, but a sharp knife in the hand of an inexperienced skinner, or an indifferent person, will also result in unnecessary cuts and scores. In Pakistan there are no large packers and slaughtering is done in municipal slaughter houses by individual butchers who slaughter from 1 to 10 animals a day.

A blunt mallet is satisfactory for removing heavy hides but should never be used on light skins as it will break and weaken the grain, making the leather of less value.

The space available for flaying is, broadly speaking, insufficient. The flaying has often to be done on the same spot where the animal's throat is cut. Apart from the defects arising from the lack of room for free movement when flaying, the hide must get stained with blood and dung and other filth. Uneven flooring harbors filth and micro-organisms, both of which are injurious to the "grain" hide. The lighting arrangement is unsatisfactory and often makes it impossible to avoid flaying flaws. The slaughter houses have no arrangements for heating which is bound to affect the response of the flayer's hands and fingers in the cold weather. Moreover owing to the exigencies of the meat trade in Pakistan, slaughtering and flaying generally speaking have to take place in the evening in the big cities and in the early hours of the morning in the towns. In the winter this is very trying to the generally ill-clad and none too well nourished flayer.

From the point of view of hide-flaying, however, the most important drawback is that few slaughter houses have suitable arrangements for suspending the carcass. It is not very expensive to have facilities for suspending the carcass, on the lines of the American Packing Houses. The animal,

immediately after it has been stunned, is suspended by its hind legs. The throat is then cut and the blood is allowed to drain off. The hanging carcass is then moved slowly along a trolley or conveyor. A team of flayers is employed, each doing a specific task. In Pakistan this system of teamwork is so far unknown. There are no large slaughter houses in the country to use such teamwork. But there seems to be no reason why adequate and efficient equipment for suspending the carcass can not be provided in the slaughter houses.

Hide purchased before slaughter. Of greater consequence however is the system, sanctioned by tradition, under which the hide is purchased while the animal is still alive. It is clear that the butcher can have no great incentive left for careful flaying when the hide, however it might be flayed, has already become someone else's property.

It is an irrational practice. It should be discouraged because it takes away the monetary incentive from the butcher's and the flayer's mind, and gives rise to an unnatural relation between the flayer and the purchaser of the hide characterized by the absence of a sense of responsibility on the part of the former towards the latter.

Piece wages. Very often flayers are employees of the butchers who pay them by piece. The piece wage leads to hurried and even scamped work which the butcher, having no further interest in the hide, doesn't supervise.

Lack of supervision. If flayers were in the employ of the purchaser of the hide on the living animal or in the employ of the slaughter house authorities, some of the evil results of the system described above would be reduced.

The flayers are seldom required to have a license. There being no system of registering the flayers. Even though a license is necessary at Karachi the purpose of the license is to insure against undue congestion. It is not designed to confer power on the licensing authority to compel the licensee to turn out satisfactory work. The net result is that even when the slaughter house authorities insist on a license being taken out, they do not hold themselves responsible for the quality of the flaying, the butcher feels no incentive in property which has ceased to be his own, and the flayer has to hurry through with his work as his earning depends on the quantity and not on the quality of his work.

Present practice. The manner in which Pakistan hide or skin is handled after it is taken off the carcass leaves much to be desired. Instead of being immediately spread or pegged to dry in the shade above the ground, the hides or the skins are all thrown together on the ground. The cooling and drying takes place unevenly. Harmful micro-organisms soon begin their insidious though deadly work on the substance of the hide or the skin. The stains due to blood, dung, dirt, etc., get time to get more firmly fixed. In most places the hides and skins are removed by contractors from the slaughter houses and it is not unusual for the hide or a skin to be left on the floor for even twenty-four hours before it is removed. A green hide or skin is perishable and the nature and extent of the damage which such delays in its removal must cost can be easily imagined.

Preparation. The methods followed in Pakistan for preparing hides and skins for curing and preservation, though somewhat in advance of those in some other Asiatic countries, are still in the main, primitive. Considering that labor employed in foreign tanneries is costly, the primary producer of the hide or the skin in Pakistan stands to gain more than the

money equivalent of the extra labor. It is both possible and desirable that as much as possible of the preparatory work should be done by the primary producer and that the only irreducible minimum should be left to be done at the exporting ports or in the foreign ports. The primary producers and the members of their families usually have plenty of spare time which they should be trained to put into their goods. The removal of foreign matter, the shaving of the flesh side so as to reduce the matter in which bacterial action is liable to start, the preparation of the smooth surface by applying preservatives and the stretching of the hides on frames or, if that be not practicable, by pegging them out on the ground are among the important preparative processes needing more attention than they receive at present.

Chief defects. The chief defects are: (1) adherence of foreign matter, (2) freezing, sun blisters, (3) uneven cooling and drying and crumping, (4) over-drying, and (5) dragging and scratching or rubbing of the grain.

(1) Foreign matter. A minor form of damage is that caused by the presence of foreign matter like blood, flesh, dung, manure, and farm and floor refuse, as shown in Figure 11.

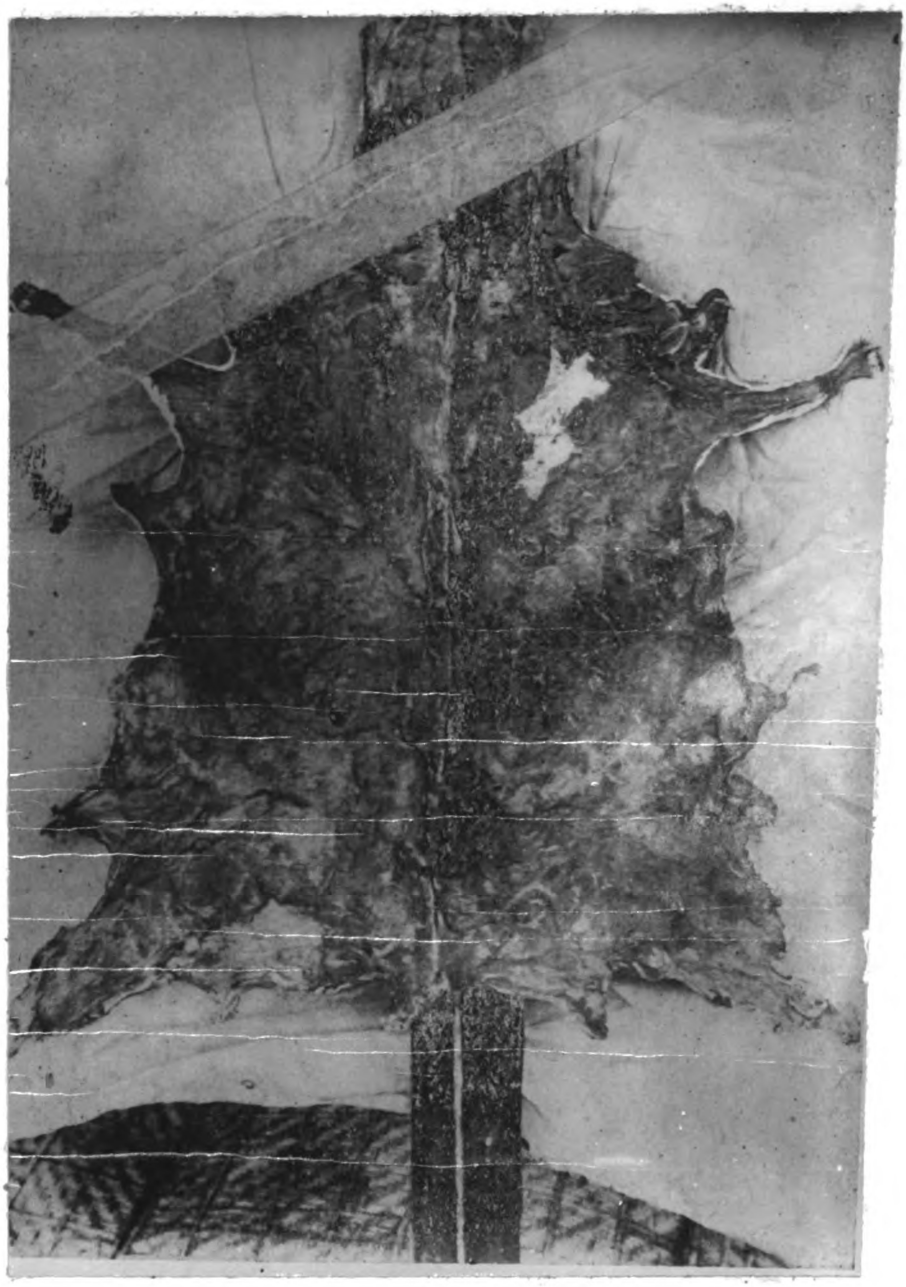

Figure 11. Photograph showing damage caused by refuse left on the hide during curing.

They give the hide or skin a dirty appearance, make handling unpleasant, cause difficulties regarding the proper valuation of the article, and involve unnecessary labor in the tannery to cleanse it.

Suitable propaganda, designed to appeal to the economic interest of the producer should go a long way to increase the general standard of cleanliness.

(2) Freezing, sun-blisters or burns and surface drying. Owing to the climate that prevails over the greater part of Pakistan freezing does not take place except in the highly mountainous regions. Freezing does not by itself damage the hide substance, but alternate exposure to bitter cold at night and a bright and warm sun at midday tends to cause damage, especially on account of undue expansion and contraction. In the present circumstances the installation of air-conditioned cellars is not advisable and practicable, but all that can be done is to educate the producer to realize waste.

Sun-blisters and burns are far more common. In districts with stony or gravelly soils and even cities and towns hides and skins are often left to dry on boulders, stones and gravel and on stones or brick flooring. These get considerably

heated up during the middle of the day in the hot weather. The parts resting over them are apt to get blistered and burnt. Sometimes the surface dried up so fast that a hard crust is formed which retards the drying of the interior substance.

All these defects can be avoided with a little care and thought. The value of drying in the shade is not unknown to the average primary producers in Pakistan but he is somewhat careless and indifferent. Systematic propaganda is needed to bring home to him the heavy price he has to pay.

Uneven drying and cooling. Uneven drying and cooling takes place not only in the case of "fallen" hides and skins from the villages but also in hides and skins from the slaughter houses. When exposed to dry on a flat surface the "green" hide or skin is apt to crumble, as shown in Figure 12. When this occurs and unless it is put right, some portions cool down and dry more quickly than others. Such unevenly-dried pieces depreciated considerably. Sometimes the hide is laid flat on the ground and secured by pegs, but though this helps considerably against crumbling, the contact with the ground even on the hair side is not desorable. In some parts of the country rough wooden frames called "farma" are often used

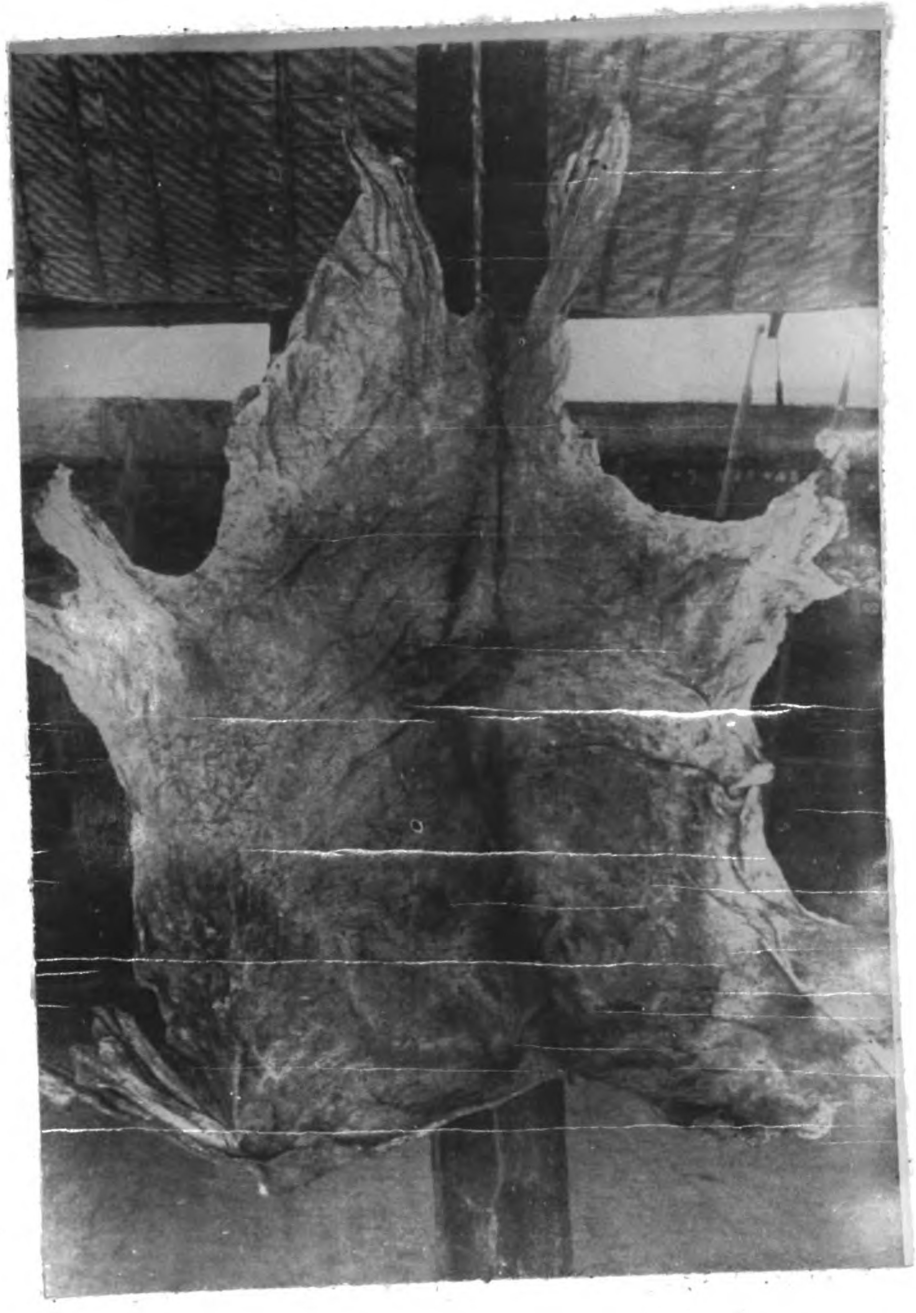

Figure 12. Photograph showing irregular shape caused by uneven drying.

for drying hides. This arrangement is quite satisfactory. A drying frame need not be costly, as rough timber or bamboo can be had in most rural areas fairly cheap. The piecing together of the parts is a simple matter. If the frame has, besides the four outside pieces, the necessary number of intermediate strips both longitudinal and latitudinal, one frame can be used for hides and skins of varying dimensions and both sides can be used. The work of designing such frames and popularizing their use and of providing the necessary facilities for their supply or local manufacture should engage the attention of the local authorities. As the production of "fallen" hides and skins by each producer is casual and small, cooperative methods should be encouraged. So as to reduce the capital cost to individual producer.

Over-drying. Over-drying is another common defect during the preparatory stage, and gives the hide a stony feel. It renders resoaking at the tannery very difficult.

Rubbing and scratching. Rubbing and scratching of the grain often occurs in the case of hides left on the ground to dry; the damage occurs chiefly when the hides are turned; heavy

hides are particularly liable to it. With little extra care and thought it can be altogether avoided.

CHAPTER VII

THE CURE AND PRESERVATION OF HIDES

The cure of raw hides and skins is one of the most important factors determining the grading or selection by the tanners. Recent research has shown that the bacterial decay of raw stock begins soon after the animal dies—whether a natural death or in slaughter house. Hence "cure" is necessary for preserving the raw stock from decay during the period of storage and transport. Not only should the putrefactive action of bacteria and other micro-organisms be checked, but also, if possible, the bacteria, etc., should be killed.

The curing methods in use vary according to the locality, the climate, the materials available for curing, the length of time for which cure is desired and the atmospheric conditions in which the tanning is to take place. They can however be broadly divided into two groups, wet and dry curing.

Wet-curing

Wet-curing is green or wet salting. Common salt is spread evenly on the flesh side and is rubbed in. The saline liquor into which the natural moisture is converted permeates the hide substance and draws out the blood which, if allowed to remain, would cause discoloration. It is, however, a cheap method which serves the needs of Pakistan tanners, but it requires considerable care and judgment. The cure should begin soon after, but not much before the animal heat has been given out, the salting must be thorough and even and must not be disturbed too much, the brine must be properly drained out. The salt used must be pure, clean and fresh. Impure or unclean salt generally result in stains which are not always perceptible in the raw stock but come out indelible during tannage. The use of "spent" salt is risky, and it is desirable to discourage its use. For proper cure the quantity of salt should be about the same as the weight of the hide. Technical research should be undertaken to find a cheap but efficacious substitute, e.g., a mixture or compound by which salt is denatured and rendered unfit for human consumption. Along with the technical investigation the education of the men

concerned should be promoted. This should begin with the important slaughter houses and then be extended to the smaller ones. The problem of educating the village chamar is difficult, but as the small hide and skin dealer or his collecting agent is the only available link with the producer in the village, a few such dealers and agents will have to be trained as preliminary to the training of the chamars. It is also feasible that by offering inducement it should be possible to train a few scores of such men in each province. It will also be useful to appoint demonstrators or demonstrations parties. The wet-salting method is best adapted to the local circumstances of this country.

Dry-curing

Dry-curing takes various forms but the simplest and the cheapest is drying the hide or the skin in the air. It has the additional advantage of lightness in transport. If properly carried out preferably in the shade, it undoubtedly enables the raw stock to be kept indefinitely, unless other conditions are unfavorable. It must be kept from being wetted or damped by contact with water, steam or vapor. The air-dried stock

becomes almost as hard to the touch as stone; this is why air drying is alternatively called flint-drying. In spite of these disadvantages and risks, air drying is extensively resorted to, the chief reasons being its simplicity and cheapness.

In order to prevent insects and maggots from attacking air-dried stock it is usual to treat the surface with a solution of white arsenic, which "poisons" the surface.

Dry-salting

Salt is rubbed on the flesh side while the hide is still "green." The salting and drying processes are repeated—sometimes as often as six times. This method suits the damper regions far better than air-drying; hence it is extensively employed in the rainy season and in damp places, e.g., eastern Pakistan, but is more costly than air-drying and by adding weight increases the cost of transportation. It also lends itself easily to "loading" and thus to fraudulent weighting, that is, the hide is plastered with mud mixed with cement and other materials, as shown in Figure 13. The plastering is often ingeniously done and gives a misleadingly neat appearance to the flesh side.

Figure 13. Photograph showing worker scraping a "loaded" hide.

Dry-salted stock is however less liable to putrefaction and damage by insects than merely air-dried stock. The dry-salted stock is now largely cleaned by exporters.

Remedial Actions

Dirty or bloody skins and hides keep poorly regardless of the amount of salt present. All filth (which is ideal food for germs) should be removed before the curing salt is added. A quick wash in cold water and the removal of the excess of water before salting will yield a good return in the price of this skin or hide. When dirty salt is used it adds germs to the skin and such germs that live on dirty salt are able to destroy skins and hides even when part clean salt is added. A clean skin or hide will keep better than a dirty one and will produce much better leather.

Manure, blood and other filth encourage germs (bacteria) to multiply and become active, and destruction of skins and hides results.

Regardless of the method used in curing a skin or hide, there are some musts which should be followed:

(1) Careful take-off is so important, every cut, score or tear reduces the value of the skin for leather manufacture.

(2) Excessive amount of fat left in the hide are undesirable as they interfere with salt or brine entering the skin or hide.

(3) Cleanliness is an essential with skins and hides as it is with meat.

(4) Dirt and filth means germ life and since the animal skin already has a large amount of germ life present and the circumstances for germ development are ideal in a freshly flayed animal skin, more filth must not be added which would mean more germ life.

(5) Keep the animal as clean as possible.

(6) Let the skin or hide lose its animal heat before salting. This will require 1 or 2 hours according to the weather. It is very poor practice to leave skins or hides from one day's kill until the next day before salting.

(7) Hides and skins should be trimmed to a good pattern. Remove snouts, ears and long shanks, tail and uneven edges. This will assure a better cure, and those parts removed all have no leather value.

(8) Apply the proper sized clean salt liberally. For calf skins use medium coarse ice cream salt. For hides use a coarser grade. In the trade the most ideal salt for calf skins is known as G.A. size salt. For hides, No. 2 rock salt. If old salt is used on hides, at least half new salt should be mixed with the old.

(9) Store the salted skin or hide in a cool dry place.

(10) Protect the cured skin or hide from insects or rodents. The reason for all this is that a skin or hide will make good leather if it is properly preserved. Clean salt should be used because even dirty salt cannot prevent germ life from developing. The germ life on dirty salt is so accustomed to the salt, that it is capable of destroying valuable skin substance even when such dirty salt is present.

The following suggestions are also worth consideration:

(1) The scientific aspect of the use of "green" hides in the local tanneries without a suitable cure for keeping the stock from the initial stages of bacterial decay should be investigated.

(2) The producers of raw stock should be trained in the scientific handling of the various stages of proper wet-salting.

This work should begin in the important slaughter houses and then be extended to other less important ones. Raw stock dealers and their collecting agents should be induced by suitable means to acquire some grasp of the proper stages and processes. It is hoped that this knowledge will, in due course, filter down to the producers of "fallen" raw stock. A few experimental demonstrations should be made and the result watched before launching out any ambitious schemes of demonstrations.

(3) Technological research should be undertaken to find cheap, easily applicable and efficacious substitutes for common salt.

(4) The use of arsenic should be encouraged, but as it is deadly poison its use must be kept under control. Arsenication could take place on the spot, the primary producer would benefit in the form of additional price for work done in spare time. But at the same time its widespread distribution in the rural areas is very risky. Hence this process should be left to be done at central curing houses—possibly on cooperative lines. Meanwhile research should be undertaken to find out efficacious substitutes which would not be poisonous to human

beings and could not be mistaken by rural folks for any edible article.

(5) The economic waste resulting from plastering for the purpose of loading (Figure 13), and other forms of loading and also from the various defects due to unscientific methods of dry-curing should be brought home to the primary producer and the dealer by means of suitable advertising, posters, and slides. Attempts should be made to ascertain whether and under what conditions the work done at the exporting centers can be done as near the place of production as possible.

(6) The suitability of dry-brining process should be ascertained.

(7) Technical research should be undertaken with the object of finding suitable substitute for khari salt for dry-curing.

Defects Due to Loading and Adulteration

Reference has already been made to various defects, some of which amount to deliberate loading or adulteration. The former term is generally used to denote the foreign matter which should be but is not removed from the raw stock or which

is brought in from outside and left on it. It may be part of the animal body, e.g., blood, flesh, fat, tail bones, pieces of horn or of the hoofs, cheeks and other trimmings. These should be removed if satisfactory cure is intended. It is moreover a very common practice in many parts of the country to aggravate the evil by bringing the genuine foreign body and fixing or plastering it on the raw stock.

Loading. Loading is done with one or two objects, viz., to conceal defects or to gain false weight. The defects which loading can help to conceal are scores, and butcher cuts, holes caused by warbles, ticks and other vermin, vulture marks, stains and many other defects on the flesh side. The more common motive of loading is however to gain false weight. Loading is therefore done in those parts of the country where hides are sold by weight. In some cases excessive salt, usually spent salt, is used, and some of it is left on the hide for the purpose of adding weight. The reason why air-dried stock is often preferred by foreign tanners is that they are sure of what they are buying.

Adulteration. Sometimes the stock is wetted just before railing or local shipment. The practice of accepting weight as recorded in the railway receipt at the station of dispatch has encouraged the mode of adulteration.

A part from giving false weight, loading may cause damage—sometimes serious—not contemplated by the person responsible for the loading. Thus the use of impure salt and mineral causes stains and discoloration. Adulteration may seriously affect the hide or skin substance. Thus, prolonged soaking may result in its partial dissolution.

All these forms of loading and adulteration do not go undetected, and tanners and shippers endeavor to make ample allowance generally to cover themselves against damage to the stock or loss in its weight. But, even then the national loss remains.

Remedial actions. Apart from the education of the primary producer, so as to enable him to see how enormous the loss is to the country as a whole and how he too must bear a share of it, the remedy, if any, is in the hand of the trade. The Government can, however, force it by enforcing compulsory grading and strict inspection of the consignments before shipment.

CHAPTER VIII

THE APPLICATION OF AMERICAN PRACTICES IN PAKISTAN

It is a fact that Pakistan, being a young country, there is neither any big packing house on the level of the United States nor does there exist any big development and research program to improve the beef-type animal. It would be futile to attempt development in total of the United States methods at the beginning. However, there seems to be no reason why adequate and efficient measures suitable to conditions in Pakistan should not be applied, for its development and mould them according to her environment.

As has been mentioned, great improvements in the quality of hides and skins can be effected by suitable nourishment and proper care of the animals. Pakistan, being largely an agricultural country, there should not be any dearth of fodder and concentrates, but a little effort to organize the livestock producers and to form them into cooperative societies which should provide fodder and concentrates throughout the year and also provide other marketing facilities for their members.

Hides and skins, being perishable commodities, require immediate attention after the animal is slaughtered to prevent autolysis and bacterial action affecting the quality of hides and skins. Detailed suggestions have already been made in the discussion in the previous chapter regarding each stage in the process of preparation. However there are a few other operations which should also receive adequate consideration if proper development in the industry is to be sought.

Slaughtering

The custom to tie all the four legs of an animal and to drop him on the floor must change for the practice prevalent in the United States. The animal should be stunned first and then suspended by his hind legs; the throat should then be cut while the animal is hanging with head down, from the pully. The equipment for suspending the carcass should be provided in the slaughter houses. This would not only allow thorough bleeding of the animal but would prevent soiling the body in blood and dung and as well as prevent bruising by tossing him to the ground, moreover it would save labor because one man would be able to secure an animal however furious it may be.

Whereas by performing the same operation by the present method (of "tying and tossing") a team is required to secure an ordinary animal for slaughtering and the body is all soiled with dung and blood and the hide is damaged and bruised.

Halal Method (cutting the throat). In Pakistan the population is predominantly Moslems who slaughter the animal by cutting the throat ("Halal"). This can be very easily accomplished by the method called "kosher." This process I witnessed in the packing houses supplying to Jewish population. This method is briefly as follows. In this method the animals are not stunned. They are brought into the slaughter house by a narrow lane, the end of which is guarded by a big door which can be raised and lowered at will. The door is lifted knee-high when the animal reaches the dead end. The hind legs of the animal are chained by the attendant from the slaughter house side through the slit made by the lifting of the pan. The door is then gradually raised while the man at the pulley raises the animal slowly from the ground to a convenient height, and the head of the animal stretched on the ground for cutting the throat.

This process may further be facilitated by a very simple device consisting of a wooden pole 4 to 5 feet long, with a board 9" x 12" x 1" attached to one end. The board has a thick canvas strap fixed to its longitudinal sides as is shown in Figure 14. The head of the animal is caught in the strap loop in such a way that the board rests against the frontal head bone and the strap under the jaw bones. The animal is thus perfectly secured with the head stretched and the throat can be very easily cut. This method exactly fits in the requirements of Pakistan Halal method. This will prevent spoiling the hide pattern and would avoid too wide cutting of the throat which is very often the case in the present "tie and toss method." It is the pattern which counts mostly in the grading of the hides and Pakistan will save quite a big sum of money by offering good standard pattern hides in foreign markets.

Flaying

Pakistan as mentioned cannot afford to erect large packing houses of the United States style, but at the same time it can however obtain the benefits resulting from the specialization of work in the big packing houses.

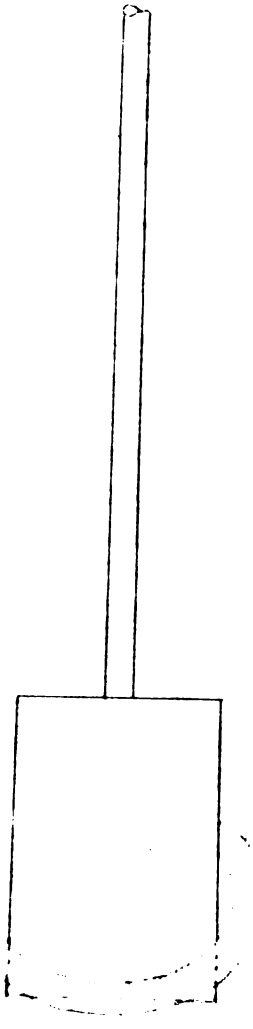

Figure 14. Halali butcher's aid.

It is needless to start with big plants. The only thing she should do is:

(1) Provide trolleys and other simple equipment which will help in conveniently handling the animal.

(2) Stop piece-work system of flaying.

(3) The flayers should be all registered and licensed issued only to those who qualify. A test should be given on the job after training and education.

(4) The flayers should be the employees of the authorities owning the slaughter house (in most cases it is the local government or the district board authorities).

(5) The flayers should be able to do all the skinning operations with perfection but he should be quite an expert in the special operation which he is required to do again and again on each carcass for which he is held responsible if any cut or score occurs at that particular job (as is the case in big packing houses in the United States).

(6) Greater incentive should be given for work done satisfactorily and up to the standard and a fine imposed for not keeping up to the standard.

(7) Provide for good lighting in the slaughter houses to facilitate strict supervision and thorough inspection of each hide that comes out of the slaughtering floor.

Grading

Grading can easily be adopted in Pakistan. The specification already mentioned in the section on grading can be changed to fit the conditions in this country. Special consideration should be made for the type of the hide, cut, score, grubs, warts and other damages resulting from curing operation, and hide sorted accordingly.

Preserving

Hide and skin is a living tissue when removed from the animal body after slaughter. As such it is not different from meat and subject to the same type of spoilage. A spoiled hide and skin loses its value as leather.

To avoid such spoilage the hides and skins are preserved by curing. The various methods, their merits and demerits, have been discussed in detail in previous chapters. In this chapter mention will only be made of the best method practiced

in some leading packing houses and research laboratories on experimental basis and from which good results have been claimed.

Argentina is an important cattle raising country and she has developed a great packing industry. Argentina has become noted as an enormous producer and exporter of hides. The hides from their large packing houses are known as Frigorifico hides and are comparable to the United States big packer hides. In the matter of cure, they are considered even superior to the United States big packer's average run of hides.

The cure used by Argentina is called "Brine Cure." Much investigation and research work has been done on Brine Cure in Research Laboratory at the University of Cincinnati and in the research institutions of the big packers like Swift and Company, etc. The results of the various laboratories and tannery scale tests have shown the superiority of Brine Cured hides over those cured by various other methods. The merits claimed by various investigators are given in a brief summary in the following lines.[1]

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[1] Curing Hides and Skins in Saturated Brine. Frank L. Debeukelaer. (A summary of the address of Dr. O. Flaherty, Director of the Tanner's Research Laboratory, University of Cincinnati.)

(1) "The cure is faster, more uniform and affords greater protection when product is subjected to adverse conditions during shipment or subsequent storage."

(2) "The cure practically eliminates so-called 'salt-stains' even after prolonged storage."

(3) "Produces leather of plumper and cleaner grain."

(4) "Requires no washing of hides before 'soaking back,' permits latter process to be shortened, and allows subsequent Beam House practice to be followed without modification."

Experimental work has also established the necessity for brining in saturated or nearly saturated brine for a minimum of about 14 to 16 hours. Brine curing of hides and skins have emerged from the experimental stage and is now in practical operation at a number of packing stations.

The essential equipment needed for this method of curing consists of units for preparing saturated brine in adequate volume and for the brining process together with means for transferring the solution from point of make-up to that of usage. Proper agitation of the charge during brining is a must. The brine should be kept at or close to the saturation point during the curing cycle. The saturation strength can be tested

by Salometers, shown in Figure 15. The charge should consist of one part by weight of green hide and four parts by weight of saturated brine. However, a large proportion of brine may be necessary to insure proper agitating device employed. In other words, sufficient brine should be used to secure proper agitation whenever the above minimum ratio is inadequate. A vat capacity of 8 cubic feet for each 100 pounds green hide or skins should be adequate. A paddle-wheel type of agitator is very satisfactory.

Equipment for producing saturated brine will depend on the requirements for saturated brine in terms of volume and rate of production. In design, this dissolver or restrengthening box may be extremely simple, consisting of a tank of sufficient cross-sectional area and depth to hold rock salt in excess of the amount required for rapid saturation of the partially unsaturated brine and to form a bed having satisfactory percolating performance. All that is needed is an oval-shaped tank constructed from concrete with means for circulation of brine through a salt-restrengthening box and for keeping hides moving through the brine.

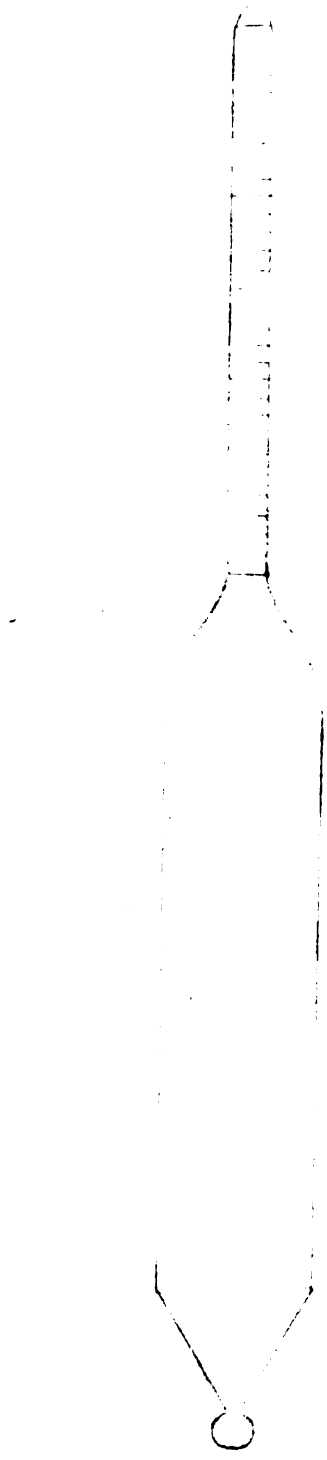

Figure 15. A salometer.

Brining

The brine curing although quite a simple operation requires very strict supervision in all its detail if satisfactory products are to be obtained. The operation begins by having the curing tank charged with saturated brine to not less than four times the estimated green weight of hides and skins to be cured. Promptly after trimming and weighing, each individual hide is thrown on the surface of the brine, as fully spread out as possible. Brine circulation through the salt restrengthening box and mixing of the curing tank contents should start with the introduction of the first hide. Continue this procedure for at least six hours after placing the last hide in the curing tank. If at this time a Salometer reading shows the brine to be practically saturated, circulation may be discontinued and stirring of the vat charge may be intermittent thereafter but should be at least on an hourly basis, and for sufficient interval to insure changing the position of all hides in the vat. This procedure should be continued for at least 14 hours after the last hide is placed in the brine.

At the end of the brining period, the hides are withdrawn from the curing solution and permitted to drain for a

period sufficient to rid them of more of the adhering brine. The "draining" can be recovered and reused.

Brine hides are ready for shipment several weeks earlier under comparable conditions, than green salted hides.

It is possible to use a given batch of brine repeatedly, provided it is periodically processed to remove dissolved organic matter. This is accomplished by coagulating the organic matter through heating the brine to the boiling point. Heating also serves to sterilize the brine. The most satisfactory temperature range for the brining process is 60° F. to 70° F. Temperature above 75° F. should not be employed.

For calf skins the brining period may be shortened to about 6 to 8 hours since the structure and the thinness of the skin permits rapid take-up of dissolved salt. Draining and holding in pack are required as in the case of hides.

The "Brine Curing" method of preserving hides is very well suited to Pakistan Hide Industry and can be applied in its simplest form as follows:

The animal should be washed thoroughly. After slaughter the hide should be washed to remove blood, dung, and soluble protein matter and the hair should be scraped under a spray of

water. The flesh side should be then brushed vigorously to remove surplus flesh and fascia. The hide should then be soaked for 48 hours in strong brine and drained after which they should be salted and dried as before.

In addition to the better curing obtained by brining it removes more of the coagulable proteins in the skin than does salting. The brine hide show no salt stains and the leather is plumper than from the regular cured hides and show uniformity. Brine hides give slightly superior leather yields, plumper leather, and freedom from salt stain.

The substitution of brining and then dry-salting for dry salting alone, the quality of Pakistan hides could be improved to a very great extent. This will not involve any great expense, because in Pakistan there is no scarcity of salt. The only initial expense would be the construction of brine tanks and other requirements mentioned above at important slaughter houses in big consuming centers. The initial expenses and the operation costs can be very well offset by levying a nominal fee per piece or per dozen pieces.

CHAPTER IX

SUMMARY

Hide is an organ such as meat and bacterial action will soon deteriorate its value as leather if not looked after and well-preserved soon after it is flayed.

In the United States the hide is well flayed and properly cured. In large packing houses the hides are of very high quality, because flaying is very systematic, each flayer is an expert on the part he flays and is accountable for any damage done to that part. The flayers are the employees of the packer. The hide is well cleaned of blood and manure and then properly cured with proper grade of salt and placed in the pack for about 30 days before they are shipped to tanneries.

The slaughter houses are well equipped with modern killing equipment and conveyors. The animal is hung from hind legs after stunning and the hide is thus prevented from being soiled with dung and blood, as well as from damages and bruises caused by struggling on hard floors.

In the United States the hides are sold on a basis of quality. There are standard grades and every consideration is given to the quality of the hide and proper pattern. Every dealer tries to compete on quality basis and intentional adulteration and loading is not done.

Hide is an important raw material which Pakistan produces in large quantity. Her annual production of hides and skins is valued at about 84 million rupees (Pakistan currency) and her export is valued at about 53 million rupees. The domestic industries are not well developed to take care of her large production. Therefore it is mainly exported to foreign markets. But it is not commended in the international market and her produce is exchanged at very low rates and only when there is great demand. This has been due to defective flaying, curing and absence of standard specifications. The sorting followed by merchants varies considerably and the buyer is uncertain of supplies of uniformly good quality hides. This has affected her trade adversely.

There is much to be done at every phase of preparation from breeding and feeding to the final stage when the hide reaches terminal market for export. The preparation of the

hide on the killing floor is very essential and needs immediate attention. This could be accomplished by:

(1) Flaying, curing should be improved.

(a) Organizing elaborate research program and issuing popular pamphlets giving improved and economical methods of preparing hides.

(b) Providing peripatetic demonstration parties for educating flayers, curers and other connected with the preparation of hides.

(c) Controlling skin diseases, especially mites and warble fly infestation on a large scale.

(2) All hides, whether for internal consumption or export, marking according to standard specification should be required by law. See Appendix for detail specifications for grading to be done by the Cooperation and Marketing Department.

(3) The producers should be organized in cooperative societies for collective marketing of their produce.

(4) Survey should be undertaken for investigating the availability of hides from camels, horses, donkeys and mules,

the uses to which they are put at present, and the possible uses to which they might more profitably be put in the future.

(5) While developing the local tanning industry efforts should be made to take up simultaneously the manufacture, standardization and marketing of by-products such as glue, obtained from hides, trimmings, fat scraps, hair, etc., which are being wasted at present.

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APPENDIX

TABLE VI

GRADES FOR HIDES

Special Characteristics		
Prime	Second	Third
Hair side. Hides should be from young or middle aged animals with no rib marks or signs of emaciation. Brand-iron marks and marks due to external injuries not allowed. No pox, sore or marks of skin diseases allowed, but one small scab and a small sore may be allowed if not on the butt. One small superficial scratch not affecting the grain allowed if within 4 inches of the outer edge of the neck or belly portion only. Flesh side. No deep cuts allowed. Not more than 4** shallow cuts other than on the butt permitted. One open not more than 3 blind warbles* allowed. State or Condition. The hides shall be reasonably clean and free from flesh, fat and extraneous matter. Horns, ears,	Hair side. Slight rib marks allowed. Not more than one brand mark allowed which may only be on the belly, neck or cheek. No pox or skin disease marks allowed. Two small scabs or sores allowed if not on the butt. In the case of kips and buffaloe hides there may be on the butt provided within 2 inches of the line of the spine. Marks due to external injuries permitted on belly. Superficial scratches not affecting the grain allowed.	Hair Side.+ Rib marks freely allowed. At least one-half of the hide shall be free of brand marks. At least half the side shall be unaffected by pox, scab sores and skin diseases. Marks due to external injuries allowed if on neck, belly or below kip joints. Reasonably free from deep scratches. Flesh side.** Shallow cuts allowed. A reasonable number of deep cuts or holes permitted if not on the butt. Not more than 10 open and a reasonable number of blind warbles* allowed.

TABLE VI (Continued)

Special Characteristics		
Prime	Second	Third
feet (from above the Fetlocks) and tail beyond 4 inches shall be removed.	Flesh side.** Shallow cut allowed and one deep cut allowed if not on the butt. Not more than 5 open and 8 blind warbles* allowed.	State or condition. The hides shall be reasonably clean and free from flesh, fat and extraneous matters. Horns, ears, feet (from above the Fetlocks) and tail beyond 4 inches shall be removed.

Limits of Weight for All 3 Grades

	Green Prior to Curing (wt. in lbs.)				Cured Hides (wt. in lbs.)			
	L.	M.	H.	C.	L.	M.	H.	C.
Kip	8 to 18	18 to 28	28 and up	Under 8	2 to 8	8 to 13	13 to 25	Under 2
Buff	25 to 40	40 to 60	60 and up	Under 25	2 to 10	10 to 20	20 to 40	Under 2

L = Light. M = Medium. H = Heavy. C = Calf. * Warble holes are holes or spots which can be opened with a blunt skewer. **Shallow cuts are cuts not exceeding one-fourth

TABLE VI (Continued)

of the thickness of the hide. + Bull hides weighing over 12 pounds shall not be graded higher than C. Young bull hides up to 12 pounds may be place in B grades but not in A. ‖ In the case of heavy and medium weight buffaloes only "one sore or cut mark in the hair or flesh side within two inches of the spine" may be permitted.