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STUDY ON DIFFERENCIATION OF COW AND BUFFALO LEATHER

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Microscopy is an important tool for the investigation of leather as the nature of leather depends largely on the properties of the fibres and the way in which they interweave. It is therefore possible to a great extent to assess the quality and nature of leather from micro scopical observation. Keeping in view the above factors, relating to hides and skins structure, the structure variation according to location on the same hide, and also the variation introduced by processing, various leather samples were processed from various parts i.e. butt, belly & shoulder from each of cow and Buffalo hide. While taking into consideration the structural variation influenced by processing, samples were also prepared using various tannages seperately and also in combination.

Key words: Leather differenciation, Cow leather, Buffalo leather.

INTRODUCTION

All leather is made by treating animal skin with tanning agent. Histological studies of hides and skins are helpful in understanding the process of tanning. It may be said in fact, that without histological knowledge background it is difficult to study or control tanning process. Collagen fibres are woven or interlaced in a natural characteristics of hides and skins. If the fibre bundles are closely interlaced in all directions, the skins of animals are considered normally of good structure. The fibre pattern will vary within a skin with high angle of weave in the bend areas and with very low angle of weave in the belly. The skins of female animals always average lighter than those of males and generally have greater tensile strength and finer grains. The skins of young animals have structures, that are fine and compact and have good tight grain patterns. The skin which originally covered the back of the animal has a more compact weave and a denser hair growth than that of the belly regions. The least compact structure and sparse hair growth is to be found in the four axillae. By varying the tanning process it is possible to introduce limited change in the structure of the skin to produce leather with the required physical properties, where two main features of fibre structure are involved.

(1) The splitting up of the fibre bundles.

(2) The angle at which the bundles interweave.

Writing in 1945, the late Dr. Dorothy Jordan Lloyd, then Director of the British Leather Manufacturers "Research Association", described the development of microscopy for leather research as one of the three major achievements of twenty five years work. The Annual report of the Research Association for 1922 included reproductions of thirty photo-micrographs, the pioneering work of Miss Kaye & Dr. Maarriott. Then after thirty five years work i.e. upto 1957 the BLMRA possessed a total of more then 30,000 photomicrograph of hides, skins, pelts in process and also raw and finished leathers.

In 1981 BLMRA, introduced electron microscopy and so extended the value of microscopy to the manufacturer and user of leather. The object of this paper is to initiate the research work on leather under microscope in Pakistan, as no work has been initiated, and reported within the country.

EXPERIMENTAL

Processing for cow/buffalo leather samples upto chrome process was the same. From chrome onward, the process used for each of the leather sample is given separately.

Wet salted cow and buffalo hides, used in these studies, were purchased from Rangiwara market, Karachi.

METHODS

The hides were cut into bend, belly and shoulder for the preparation of vegetable sole, combination sole, vegetable crust, combination upper, upholstery and chrome upper leathers. These leather were studied under microscope for the identification of cow/buffalo hides.

(1) *Sole leather.* The bend after main tanning with mimosa extract 40 % was tempered, bleached and stuffed as usual.

(2) *Processing of combination sole leather.* One bend normal tanned with chrome (wet blue) with 4.5 mm thickness neutralised as usual then retanned with 6 % Mimosa powder.

(3) *Processing of vegetable crust.* One belly of 1.6 mm thickness treated with the vegetable tanning material for main tanning, then retanned and fat-liquored.

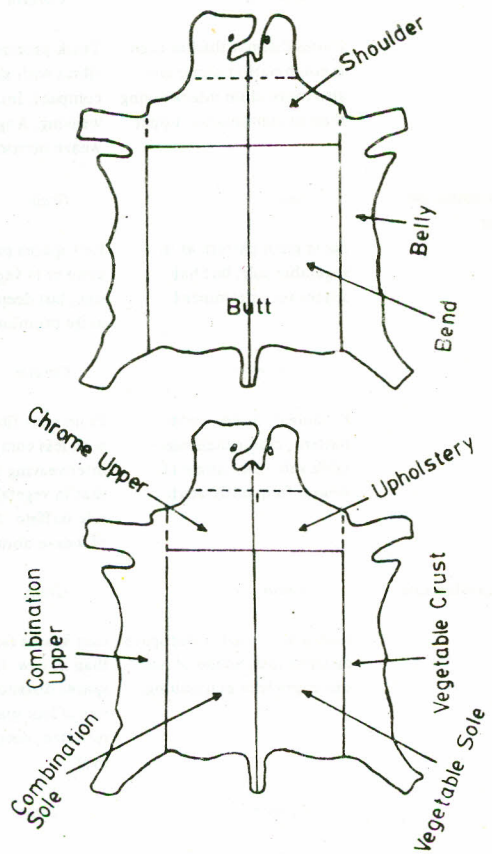
(4) *Processing of combination upper.* The wet blue belly of 1.8 mm thickness after usual neutralisation retanned with 8 % Quebracho and 4 % Mimosa powder.

(5) *Processing of upholstery leather.* The wet blue of shoulder of 2mm thickness pretanned with 33 % basicity chrome (2 %), and tanned with vegetable tanning material 8 % Mimosa powder.

(6) *Processing of chrome upper.* The wet blue shoulder of 1.6 mm thickness retanned with 50 % basicity chrome (4 %) and neutralized as usual, then again, retanned with 3 % naphthlene base retanning agent and 3 % resinous tanning material followed by dyeing and fat liquoroing.

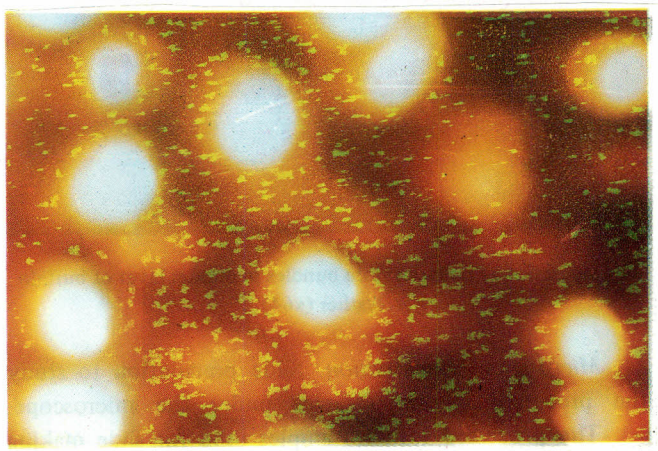
The same processing receipes were followed for each of the leather samples from cow and buffalo hide to keep the structural variation due to processing, as constant for both cow and buffalo, both the cow & buffalo hides were taken from matured animals, to keep the structural variation because of age factor as constant.

Various leather samples processed from the cow & buffalo hide

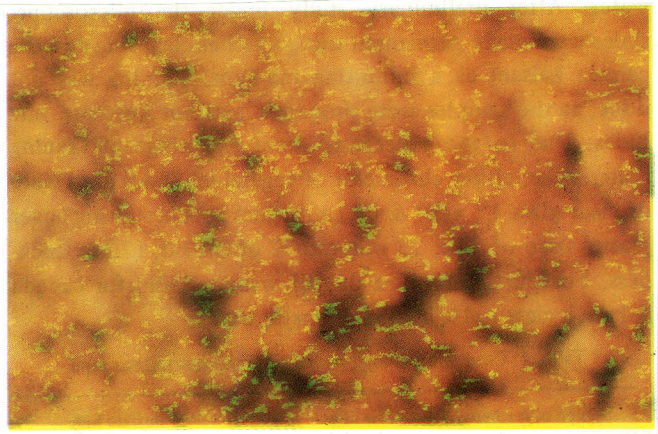


Details of the processed leather samples from cow & buffalo hides.

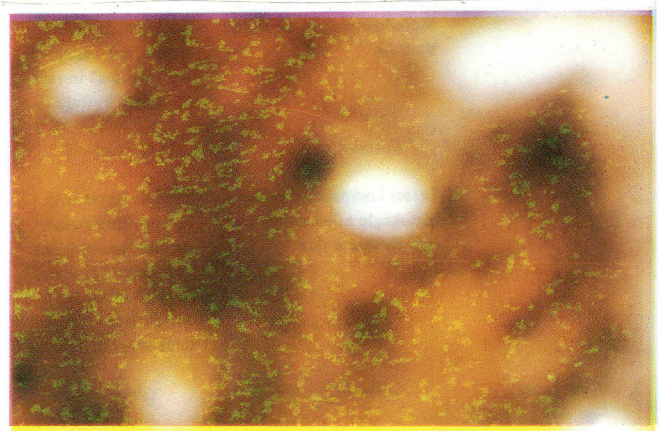
Comparative analysis of grain and fibres under microscope cow/ buffalo.



Cross section of grain layer of cow leather exhibiting hair follicles pattern (x64)



Cross section of collagen fibre bundles in corium layer of cow leather (x64)



Cross section of grain layer of buffalo leather exhibiting hair follicles pattern (x64)

Gross section of collagen fibre bundles in corium layer of buffalo leather (x64)

Microscopic examination. Slide preparation to study the processed leather samples under the microscope.

The processed leather samples used for slide making were ¼ x ½ inch in size. The apparatus used was a freezing microtome. After cutting the sections were placed into water. After preliminary study under the microscope, slides were made permanent using xylol as cleansing and the canada balsam as a mounting medium. Staining was not done, as the samples were processed and not were the raw hides. Due to the processing there was tinge of tanning material i.e. either chrome or of vegetable. Slides used were of clear glass 1" x 3" & of 1mm thickness mounting cover glasses used of 22 x 22 mm size & of 0.13-0.17mm thickness. For putting xylol a droper was used and for canada balasm a glass rod ¼ inch in diameter used.

Table 1. Comparative analysis of fibres under microscope.

S. No.	Type of leather	Cow hide	Buffalo hide
1.	Chrome upper	*Grain*	*Grain*
		More hair spaces, close and shallow.	Less distinct hair spaces, size restricted than that in vegetable sole buffalo.
		Corium	*Corium*
		Lesser compact interweaving. Angle of weave towards slightly acute side.	Thicker fibres with compact interweaving fibres prominent and distinct appear to be more isolated in comparison to vegetable sole buffalo.
2.	Upholstery	*Grain*	*Grain*
		Hair spaces more distinct than that in vegetable crust.	Hair spaces less distinct. Interspaces distance less than that in vegetable crust. Hair spaces larger in size in comparison to vegetable crust.
3.	Combination upper	*Grain*	*Grain*
		Hair spaces more in number than in vegetable and combination sole pattern, interspaces Lesser Hair spaces appear not much deep.	Hair spaces more in number than in vegetable sole, interspaces distance less. Hair spaces restricted insize, deep.
		Corium	*Corium*
		Very prominent and close interweaving. Angle of weave appears towards obtuse side.	Thick bundles, closer interweaving with obtuse angle of weave.
4.	Vegetable crust	*Grain*	*Grain*
		Hair spaces appear in rows, interspaces distance is less, size of hair space much smaller than in sole, and also spaces are less distinct.	Hair spaces less distinct, smaller insize than in vegetable sole buffalo.
		Corium	*Corium*
		Fibres distinct thicker than is combination upper and also more close interweaving than in combination upper.	Thick prominent fibres with slight compact. Interweaving. Angle of weave obtuse.
5.	Combination sole	*Grain*	*Grain*
		Same grain pattern as in vegetable sole, but hair spaces very prominent	Hair spaces pattern same as in vegetable sole, but deeper and more prominent.
		Corium	*Corium*
		Prominent interweaving pattern, closer than vegetable sole cow. Angle of weave, frequently acute.	Prominent fibres with less compact interweaving than that in vegetable sole buffalo. Angle of weave obtuse.
6.	Vegetable sole	*Grain*	*Grain*
		Hair space closer. Inter spaces distance loss. Shape of hair space quadrilateral oblong.	Hair spaces farther than in cow. Inter spaces distance more size of hair space more resticted, deep and oval.
		Corium	*Corium*
		Thinner fibres with closer interweaving than that in	Thicker compact with fibres interweaving,

(continued .....)

(Table 1, continued)

vegetable sole buffalo, with low angle of weave. i.e. on acute side generally.	angle of weave higher i.e. On obtuse side, mostly in comparison to cow.

INFERENCE

It is observed that in cow, hair spaces are more in-number and appear shallow with lesser interspaces than that in buffalo. Weave pattern in cow is compact with angle of weave towards slightly acute side than that in buffalo. In buffalo, fibres are thicker compact, interweaving with prominent and distinct appearance. Hair spaces deeper and more prominent having more inter spaces distance than in cow.

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