



Variations within hides and skins

PART 4: STRUCTURAL DIFFERENCES BETWEEN SPECIES

Amanda Michel, Leather Wise, UK
and
Richard Daniels, World Leather

The following information has been previously published in World Leather magazine:

PART 1: The fibre structure of raw hides and skins (Oct/Nov 2009)

PART 2: The effects of leather processing on the fibre structure (Feb/Mar 2010)

PART 3: The influence of the fibre structure on leather characteristics (April/May 2010)

The focus within the previous papers in this four-part series has been on:

- How the fibre structure of the raw skin affects the physical properties of leather and the reasons for cross-skin variations.
- The isolation and modification of the fibre structure within leather manufacture, and the reasons and outcome from these changes.
- The structure deformation in terms of compression and expansion on bending, factors that influence grain break, and the tightness/looseness of leather structure.

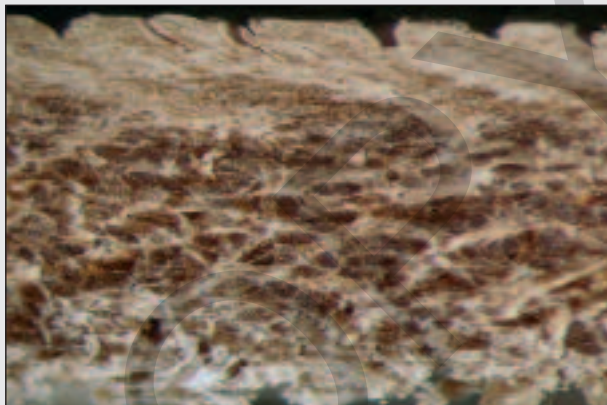
grain to main corium ratio, the grain layer being comparatively weak. Calfskins are fine grained due to the very dense grain structure, moreover, at equal low thickness they will be stronger than a coarser mature hide due to their thinner grain layer.

Other small skins

In addition to the distinctive grain patterns that are characteristic of each species, there are significant structural differences in small skins as shown in *Panels 4/1a, and 4/3a, 4/4a, 4/5a*.

Comparison can be made between the fine dense structure that is typical of a goatskin (*Panel 4/3a*) and the structure of the

Panel 4/1a: Calfskin – cross-section



Panel 4/1b: Calfskin – grain



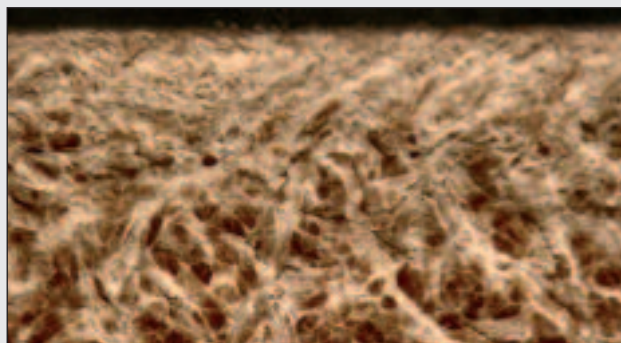
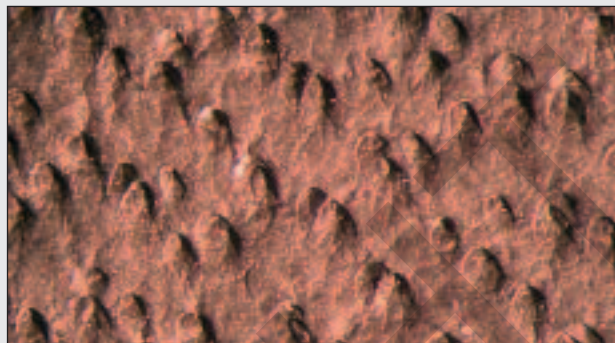
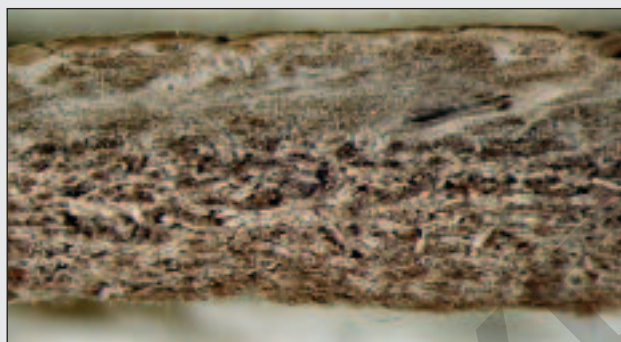
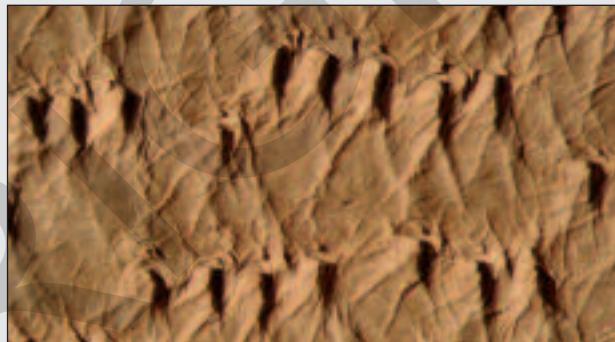
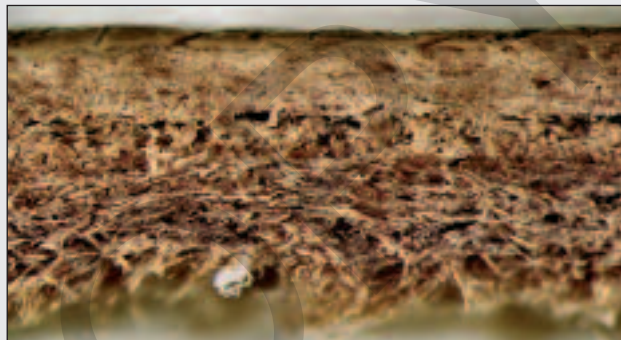
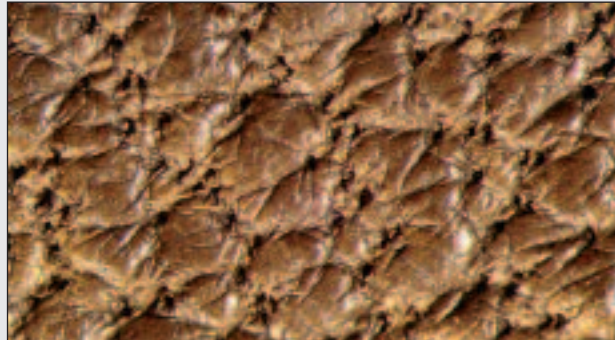
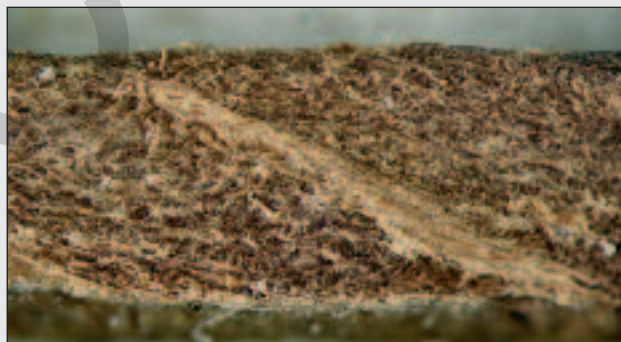
All of the images provided have been based on the structure of calfskins and mature bovine hides, but the observations are general regardless of the type of skin or the leather type being manufactured. However, the degree of variation found in the raw skins, the process modification required, and the properties of the final leather are species/breed specific.

Calfskins and mature bovine hides

Calfskins have a very fine vertical structure when compared to the mature animal, as shown in *Panel 4/1a and 4/2a* respectively. The ratio between the thickness of the grain layer to the main corium structure remains reasonably constant if the calf develops into the mature animal. Although a bovine hide can provide considerable strength, if the structure is sheared by splitting/shaving to thickness typical of calfskins, the structure is significantly weakened. This is due to the resultant increase in

domestic sheep (*Panel 4/4a*). The more open fibre structure of the sheepskin – due in part to the voids that remain following removal of the high natural grease content – will favour softer, looser and weaker leather. Moreover, in this example, a loose and more open structured layer at the junction between the grain and corium can be identified. This is not typical of all species of sheep, but when present will lead to a greater weakening of the structure and even delamination.

Pigskins also have a dense grain and robust structure, but the structure is very varied across the skin. This is weakened in some areas by a high natural grease content that must be removed. In addition, the hair follicle – unlike most other species – is not just located in the grain layer, but penetrates throughout the whole skin structure. This feature is revealed in *Panel 4/5a*, and together with the deep and open follicle pattern of the grain surface, places limitations on the use of these leathers. ☉

**Panel 4/2a: Bovine hide – cross-section****Panel 4/2b: Bovine hide – grain****Panel 4/3a: Goatskin – cross-section****Panel 4/3b: Goatskin – grain****Panel 4/4a: Sheepskin (domestic) – cross-section****Panel 4/4b: Sheepskin (domestic) – grain****Panel 4/5a: Pigskin – cross-section****Panel 4/5b: Pigskin – grain**