

PART 1



# MODERN COW LEATHER PROCESSING – Version 1.1

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# MODERN COW LEATHER PROCESSING

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HALO  
TOUCH



# INTRODUCTION

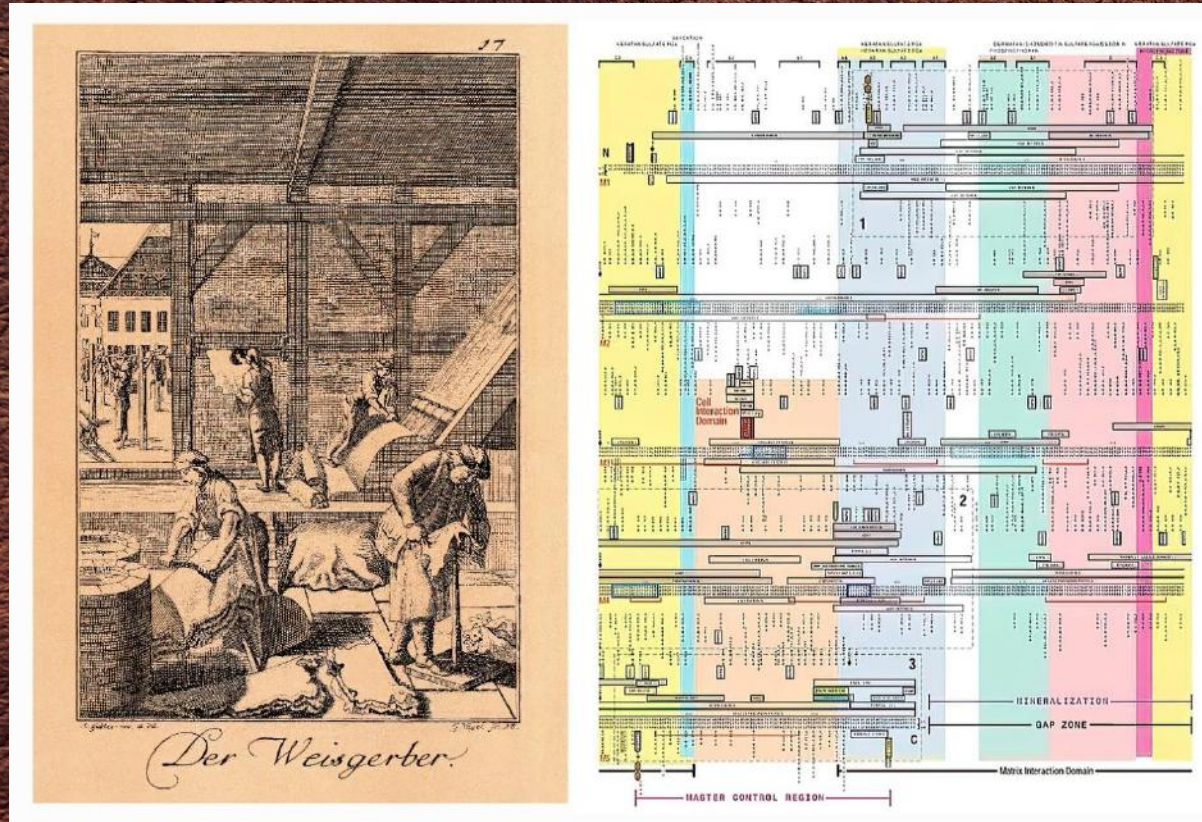
Since **pre-historic times** animal skins have been used for **protection against the elements**. The primitive preservation process was through smoking and drying. Later, vegetable extracts were used to **create the first leathers**.

**Leather making became one of the oldest known industries.**

The earliest tanning recipe was created **around 700 BC**. Chemistry and tanning **processes have continued to evolve down through the generations**.



# SCIENCE AND ART



**Working with hides and skins started as a craft.** The biggest evolution in the industry came during the Roman Empire when vegetable leathers were standardized. Later, chemistry and biochemistry were applied to the processes, and leathers obtained outstanding characteristics that were considered almost magic. During the Renaissance, art was involved in leathermaking through the application of colors and shapes.

**Biochemistry defined the composition and structure of the hides.** Chemistry brought the performance. Physics brought the processes. Engineering brought the automation and process controls. Today, 21<sup>st</sup>-century leathermaking is still a powerful blend of art, science and technology as well as **safe and compliant.**

# TODAY SUSTAINABLE LEATHER IS PRODUCED for performance, fashion and luxury

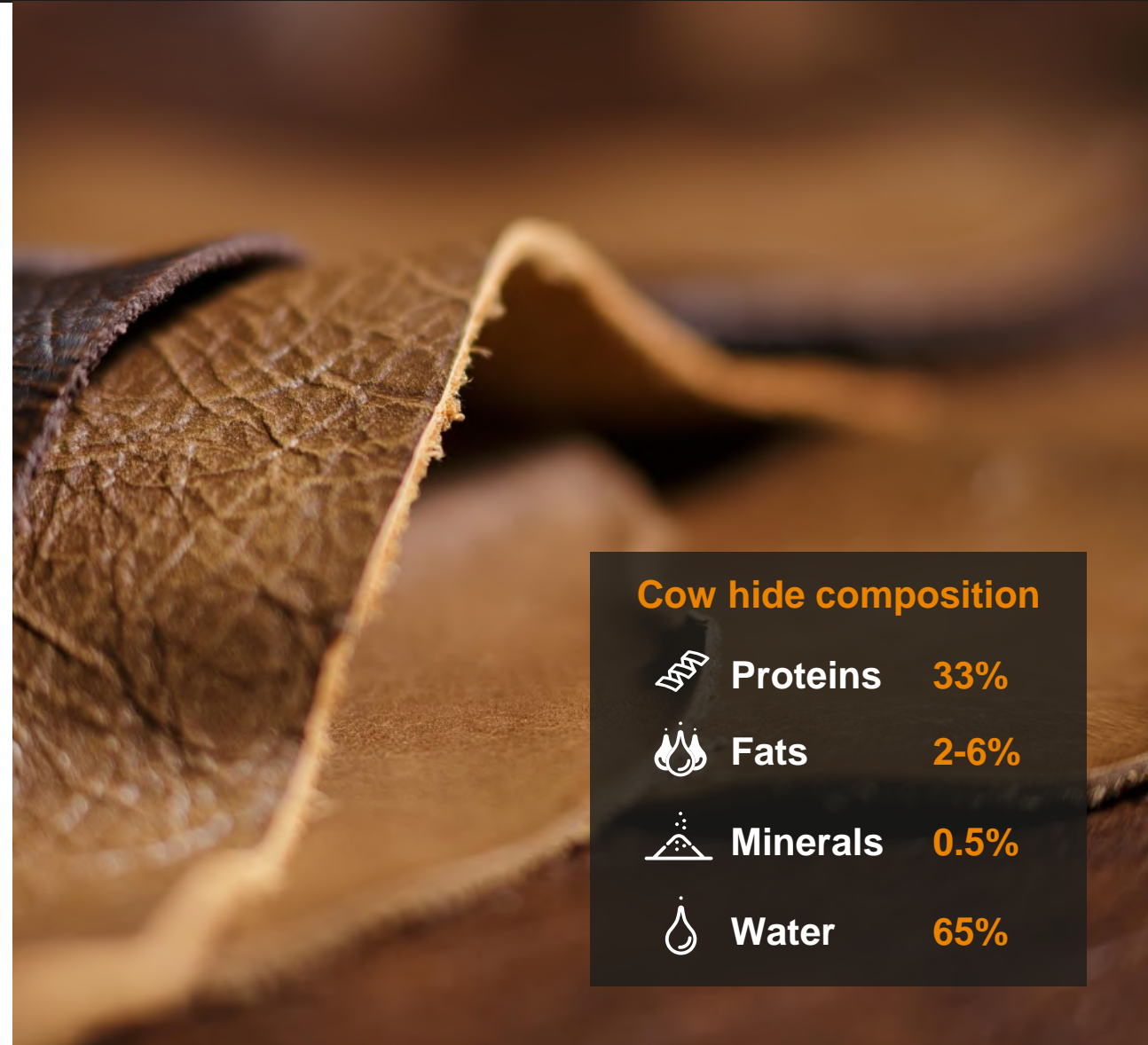
Hides are a no-waste by-product of the food industry. The leather industry uses the hides and skins produced by the meat industry, and only exists because of the meat industry.

**No meat = no leather**





Hides are very complex organs composed mostly of proteins, fats, water and minerals.

The main proteins in a hide are:

- **Collagen** – to be turned into leather
- **Keratins** – hair and epidermis, that are removed
- **Globular proteins** – removed



## Cow hide composition

	<b>Proteins</b>	<b>33%</b>
	<b>Fats</b>	<b>2-6%</b>
	<b>Minerals</b>	<b>0.5%</b>
	<b>Water</b>	<b>65%</b>

# DIFFERENCES BETWEEN hide, skin and leather

**HIDE + TANNING = LEATHER**  
**SKIN + TANNING = LEATHER**

**TANNING** is the chemical process that stabilizes the hide thermically, mechanically, chemically and microbiologically. Only a few chemicals have tanning properties. They are safe and non-toxic when used correctly.

**HIDES** are defined as skins of large animals. Eg, cows have hides, goats and sheep have skins

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**SUN TANNING IS A DIFFERENT STORY**



# DEFINING LEATHER

## ISO STANDARD 15115:2019 (International Organization for Standardization)

<material> hide (3.48) or skin (3.88) with its **original fibrous structure** more or less intact, tanned to be imputrescible, where the hair or wool may or may not have been removed, whether or not hide (3.48) or skin (3.88) has been **split into layers or segmented** either before or after tanning (3.97) and where any surface layer, however applied, **is not thicker than 0.15 mm**

### NOTE 1 TO ENTRY

If the tanned hide or skin is disintegrated mechanically and/or chemically into fibrous particles, small pieces or powders, and is then, with or without the combination of a binding agent, made into sheets or other forms, such sheets or forms are not leather.

### NOTE 2 TO ENTRY

If the grain layer has been completely removed, the term leather is not to be used without further qualification, eg, **split leather** (3.93), suede leather.

### NOTE 3 TO ENTRY

The material shall be of animal origin

# FROM HIDE TO LEATHER



VEGETABLE TANNING

CHROME TANNING

AFTER UNHAIRING

SALTED COW HIDE

**Here is a cross section of salted hide** (bottom) that shows the **fat on the lower layer**, the **hide matrix in the middle** and the **hair on top layer** (this is the grain side).

After processing to remove the hair and the lower layer we have a thick piece of hide. The color is light gray and has a rubbery feel.

**The hide can be tanned with chromium, synthetic tanning agents or vegetable extracts.** In our illustration we see the full thickness of the hide compared to the size of a one cent coin.



# COW HIDES IN NUMBERS



**The total number of cow hides** available for tanning is about 270 million each year



**A typical fleshed cow hide weighs 25 kg** (55 lb.) and has an area of 4.5 m<sup>2</sup> or 50 ft<sup>2</sup>

# NOT ALL COW HIDES ARE THE SAME

There are big differences between cow hides. Here are the main variables:



## AGE

In most countries, beef steers, heifers and cows are matured to around 24 months. Milk cows and bulls can be a good deal older. The older animals may have lower quality hides due to parasites, scratches, manure damage, growth marks and wrinkles.



## BREEDS

Breed determines the size, thickness, fiber structure, shape and hair type of the hide.



## SEX

Better quality hides in commercial quantities are usually obtained from steers and heifers. In general, bulls produce bigger and thicker hides. Certain European bulls have an excellent grain quality that's ideal for automotive and residential upholstery. Cows usually have thinner hides, with more spread and often have empty bellies and pocketing.



## FEED

Confined animals (feed yards or lots) may have less new damage but, during winter, manure can accumulate on the hide and lead to grain damage. Grass-fed animals in open fields or savanna are more prone to parasitic damage and subsequent scratch damage.



## CLIMATE CONDITIONS

Dictate which breeds are suitable for a specific location. Some breeds can tolerate severe winters, others tropical or hot climates. Geographical and climate conditions determine the best breed for locations that are suitable for meat production, not for the quality of leather they produce.



## BRANDS

Animal control by RFID (Radio Frequency Identification Device) is growing in use as it also works as a powerful traceability tool. Fire or freezing brands are still used (by law in some locations); these brands severely reduce the quality of a hide, particularly when multi-branding is used.

# HIDE CHARACTERISTICS

## of the major producing countries

COUNTRY	VOLUME MILLIONS	ANIMAL FEED SYSTEM	GRADES	MAIN BREEDS	USES	OTHER	HIDE PRESERVATION METHODS
<b>Brazil</b>	38	Mostly grass-fed (80%)	<ul style="list-style-type: none"> <li>5% full grain</li> <li>70% corrected grain</li> <li>20% low grades</li> </ul>	Zebu Brahma	Upholstery, shoe uppers, leather goods and automotive	<ul style="list-style-type: none"> <li>Damage by ticks, wire and grubs</li> <li>Hides are thin, have a hump</li> <li>Branded</li> </ul>	<ul style="list-style-type: none"> <li>Short term preservation and salting</li> </ul>
<b>USA</b>	34	Grass-fed, grain finished	<ul style="list-style-type: none"> <li>Full grain 30%</li> </ul>	Various; Angus and Hereford breeds	All uses	<ul style="list-style-type: none"> <li>Largest global supplier of hides with consistent thickness, size and seasonal quality</li> <li>Branded</li> <li>Winter hides can have manure and frost damage</li> </ul>	<ul style="list-style-type: none"> <li>Fresh processing of hides</li> <li>65% brine cured for export</li> </ul>
<b>Europe</b>	26	Mostly Grass-fed	<ul style="list-style-type: none"> <li>Mostly full grain</li> </ul>	Various	All uses	<ul style="list-style-type: none"> <li>Wide range of sizes and qualities</li> <li>Calf and veal for premium leathers</li> <li>Heavy bulls of top and medium quality for upholstery</li> <li>Steer, heifers and beef cows of good quality</li> </ul>	<ul style="list-style-type: none"> <li>Fresh and salted</li> </ul>
<b>China</b>	25	Grass-fed	<ul style="list-style-type: none"> <li>Mostly full grain</li> </ul>	Various	Shoes and leather goods	<ul style="list-style-type: none"> <li>Hides are sold by area</li> <li>Production concentrated on third and fourth quarters</li> </ul>	<ul style="list-style-type: none"> <li>Salted</li> </ul>
<b>Argentina</b>	14	Grass-fed	<ul style="list-style-type: none"> <li>90% full grain</li> <li>10% corrected grain</li> </ul>	European Angus and Angus cross-bred	All uses	<ul style="list-style-type: none"> <li>Hides are smaller and thick, making good quality full grain and good suede</li> <li>Spring hides may have parasites</li> </ul>	<ul style="list-style-type: none"> <li>Salted and fresh</li> </ul>
<b>Mexico</b>	7	Mostly grass and feed lots	<ul style="list-style-type: none"> <li>20% full grain</li> <li>40% corrected grain/auto</li> <li>40% low grades</li> </ul>	Various	Automotive upholstery, shoes, leather goods	<ul style="list-style-type: none"> <li>North has better selections</li> <li>Damage by ticks and parasites</li> <li>Broad types of hides, variation in size and weight. Branded by law</li> </ul>	<ul style="list-style-type: none"> <li>Fresh processing of hides and salting</li> </ul>
<b>Australia</b>	7	Grass and grain-fed	<ul style="list-style-type: none"> <li>Mostly corrected grain</li> </ul>	Various	Upholstery, shoes, corrected grain	<ul style="list-style-type: none"> <li>55% is produced in Queensland – ticks an issue</li> <li>NSW/Victoria produce better quality but have flies in the summer and lice/mites in the winter</li> </ul>	<ul style="list-style-type: none"> <li>Fresh and salted</li> </ul>

# UNITED STATES COW HIDE CLASSIFICATION



GUIDE TO PACKER HIDE SELECTIONS WITH ESTIMATED WEIGHTS				NET WEIGHT RANGE	
				POUNDS (lb.) CURED	
Selection	Type	Description		Trimmed & Fleshed	
Extra Heavy Native	Steers and heifers	Free of brands		64 up	
Heavy Native				47 up	
Extra Heavy Butt-branded	Steers and heifers	Branded one or more times back of break in flank		64 up	
Butt Branded				47 up	
Extra Heavy Colorado (Side branded)	Steers and heifers	Branded one or more times forward of break in flank		64 up	
Colorado Branded				47 up	
Extra Heavy Branded	Steers and heifers	Branded one or more times		67 up	
Branded				47 up	
Extra Heavy Texas	Steers and heifers	Texas Panhandle Area origin		64 up	
Heavy Texas				47 up	
Native – Light	Steers and heifers	Free of brands		55 down	
Texas – Light	Steers and heifers	Mix of Texas		55 down	
Branded – Light	Steers and heifers	Branded one or more times		55 down	
Heavy Native Cows (Dairy)	Milk breed cows	Free of brands		45 up	
Native Cows (Dairy) Light				45 down	
Heavy Native Cows (Beef)	Beef breed cows	Free of brands		45 up	
Native Cows (Beef) Light				45 down	
Heavy Branded Cows (Beef)	Beef breed cows	Branded one or more times		45 up	
Branded Cows Light (Beef)				45 down	
Selection	Type	Description		Curved Conventional	
Native Bull	Males	Free of brands		85 up	
Branded Bull	Males	Branded one or more times		85 up	

# UNITED STATES

## Wet blue classification

In the United States, wet blue is sold by surface area (ft<sup>2</sup>) or weight in pounds (lb) (considering 50-60% moisture). Price varies by class and type.

Class name	Characteristics	Hide type
Native	No brands	Heifer, steer or jumbo
Butt Branded	Only one brand below the center of the leather	Heifer, steer or jumbo
Colorado	Multiple brands or one brand above the center line	Heifer, steer or jumbo
M Cattle	Mexican breeds raised in the US – distinctive mark on the right butt cheek	Mix of heifer, steer and jumbo
Special	Over a third of the leather is defective through natural or process defects	Mix of heifer, steer and jumbo

**Note:** wet blue types made in the USA do not include cow leather

### OTHER CLASSES

**Heifer** (best quality): **HNH** (Heavy Native Heifer) > **BBH** (Butt Branded Heifer) > **BH** (Branded Heifer)

**Steer** (best quality): **HNS** (Heavy Native Steer) > **BBS** (Butt Branded Steer) > **BS** (Branded Steer) > **HTS** (Heavy Texas Steer)

### HIDE TYPE WEIGHTS

**Heifer:** fresh hide weight up to 58 lb. (26 kg)

**Steer:** fresh hide weight between 59 and 92 lb. (27 to 42 kg)

**Jumbo:** fresh hide weight above 93 lb. (42 kg)



**Geographic influence.** Usually, the **best hides** are from above the 37<sup>th</sup> parallel; **manure damage** can occur during the winter season

# BRAZIL

## Wet blue classification

This is the typical wet blue grading, ranging from premium to lower grade quality:

**TR I Extra Heavy** – Average area 52-56 ft<sup>2</sup>, Average weight 28-30 kg

Leathers come from 100% Zebu bulls. They are apt for heavy finished leathers, shoe leathers, waxy leathers, belts, horse saddlery and upholstery. Better grades can have lighter finishes.

**TR I Standard** – Average area 48-52 ft<sup>2</sup>, Average weight 24-26 kg

This is the main type of leather from the central part of Brazil, which has the largest herds and produces better beef cattle. Leathers can have a wide number of applications: shoes, upholstery, automotive and leather goods.

**TR II** – Average area 46-48 ft<sup>2</sup>, Average weight 22-24 kg

**TR III** – Average area 46-48 ft<sup>2</sup>, Average weight 21-23 kg

**TR IV** – Average area 46-48 ft<sup>2</sup>, Average weight 20-22 kg

Leathers for shoes, automotive and price-conscious upholstery, and some types of leather goods. As the grading reduces so the amount of finishing increases, to hide the imperfections.

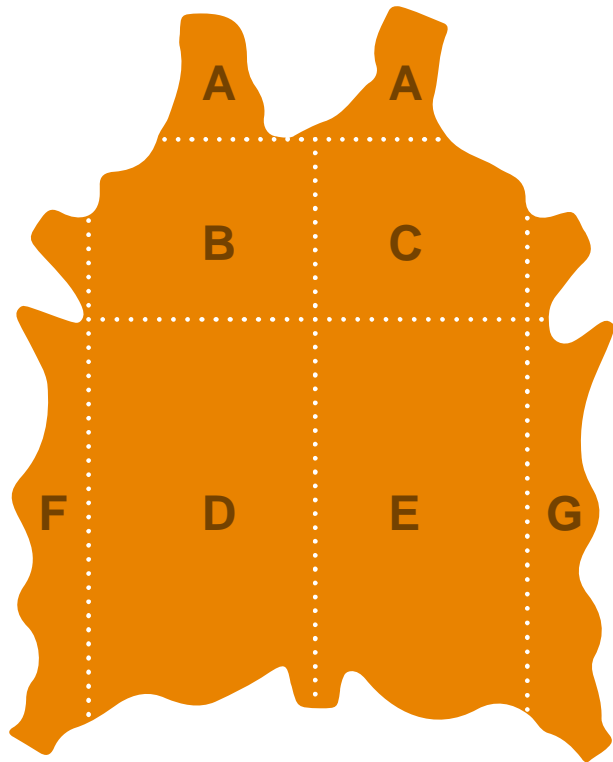
**TR V Economic** – Average area 46-48 ft<sup>2</sup>, Average weight 18-20 kg

Leathers for low grade upholstery and shoes with a heavy finish eg, safety shoes.

**Reject** – Average area 46-48 ft<sup>2</sup>, Average weight 18-20 kg

Leathers used for shoes with a heavy finish, such as safety shoes and safety items.

# PARTS OF A HIDE AND TYPICAL DEFECTS



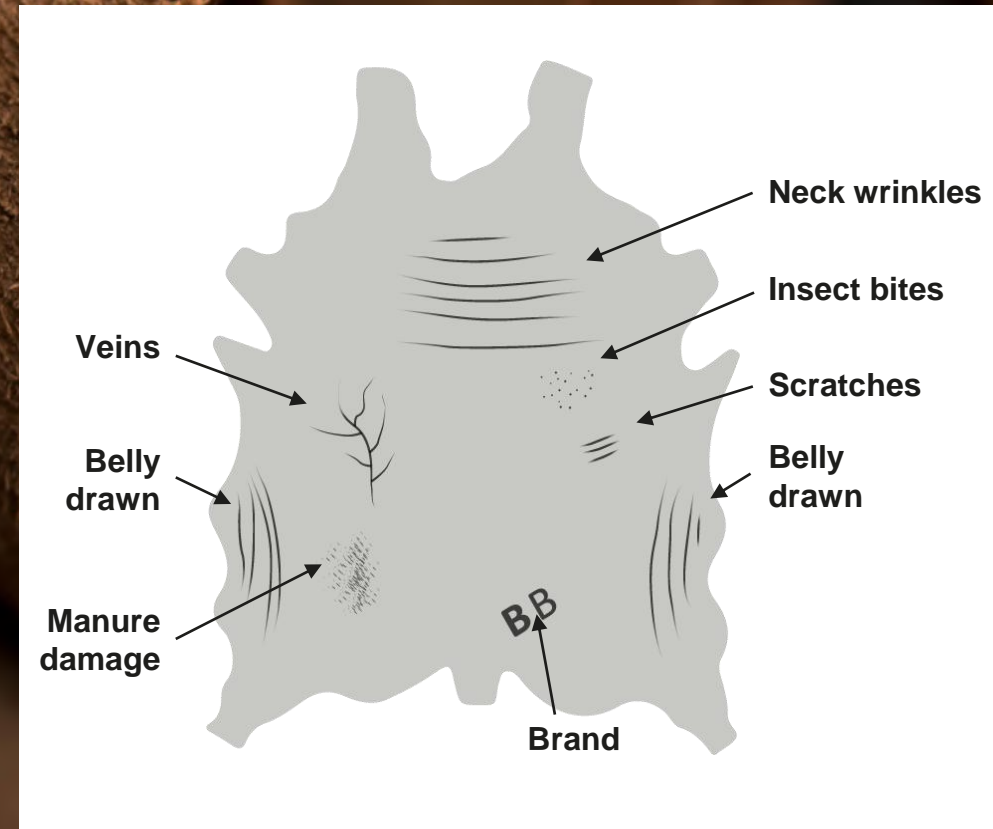
**Belly:** F and G

**Side:** A,B,D and A,C,E

**Bend:** D and E

**Shoulder:** B+C

**Croupon:** D+E



# TYPICAL NATURAL DEFECTS FOUND ON LEATHER

## BRANDS

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## SCRATCHES

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## VEINS

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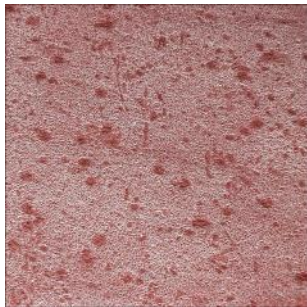
## WRINKLES

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## PARASITES AND INSECT BITES

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# PRESERVING AND SHIPPING HIDES

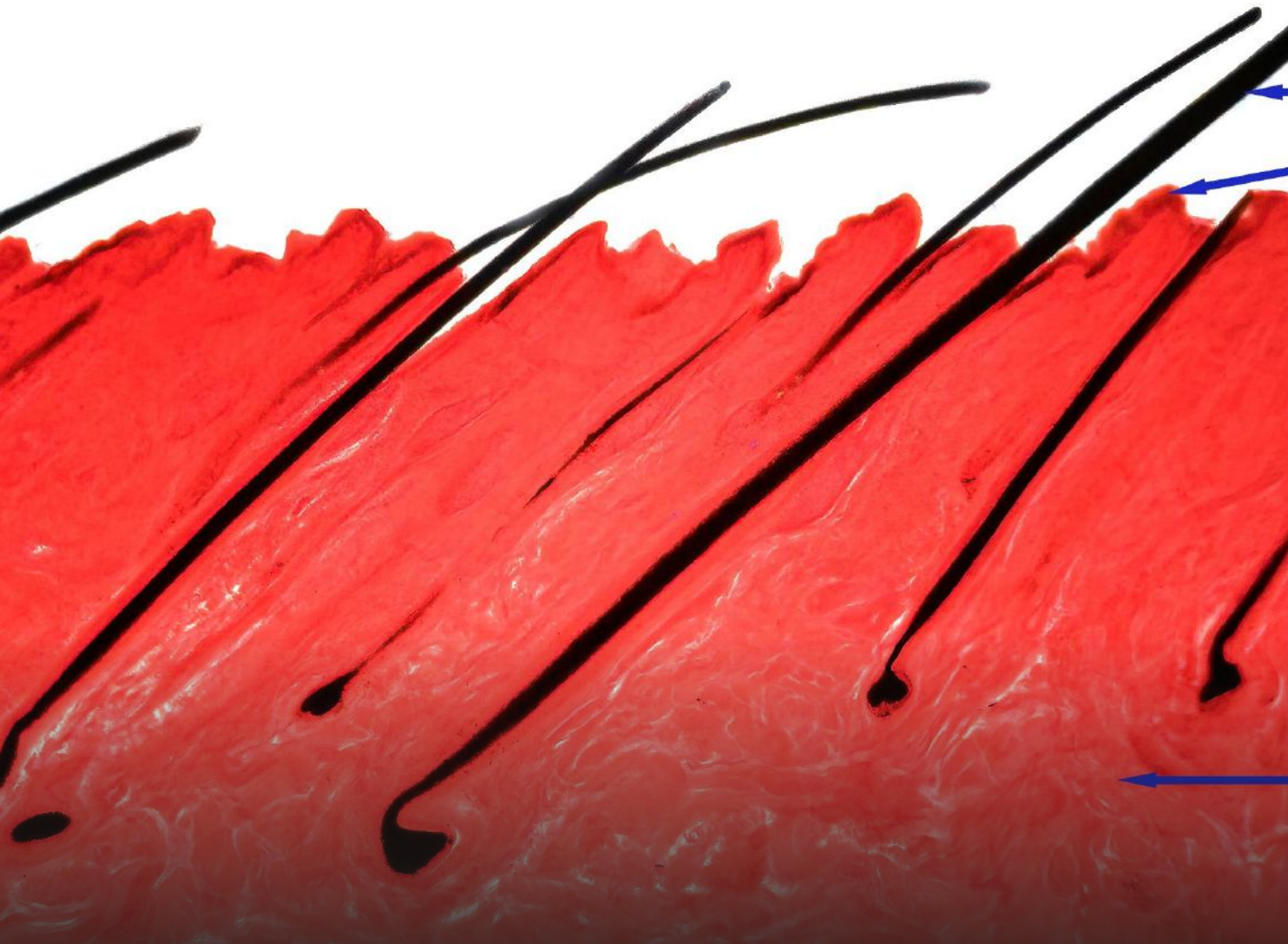
**Hides can be processed fresh** after removal from the animal, or they can be preserved. Globally, about **30% of hides are processed fresh; 70% of them are preserved by salting** (or brine curing) then processed locally or overseas. **Salted hides** have solid salt added to **dehydrate and saturate the hide**. In brine curing the hides are immersed in a salt solution for **24 hours to saturate the hides with brine**.

Salting is the **most efficient and cost-effective way of preserving hides** for up to one year. The hides are put on pallets with **about 40 hides each**. **A container can hold around 600 hides (USA)**.



**Increasingly, the global trend is to avoid salting** by processing fresh hides either with or without refrigeration

# COW HIDE CROSS SECTION



Hair

Epidermis

**Here is a typical cross section** of an American cow hide stained with Hæmatoxylin. It shows the **different thicknesses and lengths of the hairs**. The area shown is the **grain area**, which is defined as being from the **surface (epidermis) to the bottom of the hair follicles**. This is the most valuable area of the leather.

Collagen  
fibers

# A LOOK AT LEATHER'S STRUCTURE

## LEATHER GRAIN

Area from the surface to the bottom of the hair follicle. Fibers are fine and elastic on the top and get bigger and thicker going down. To get the required thickness, grain leathers usually contain part of the split

## LEATHER SPLIT

Area from the bottom of the hair follicle to the flesh side. Fibers are closely interwoven. Closer to the bottom, fibers get finer and sit parallel to the flesh side



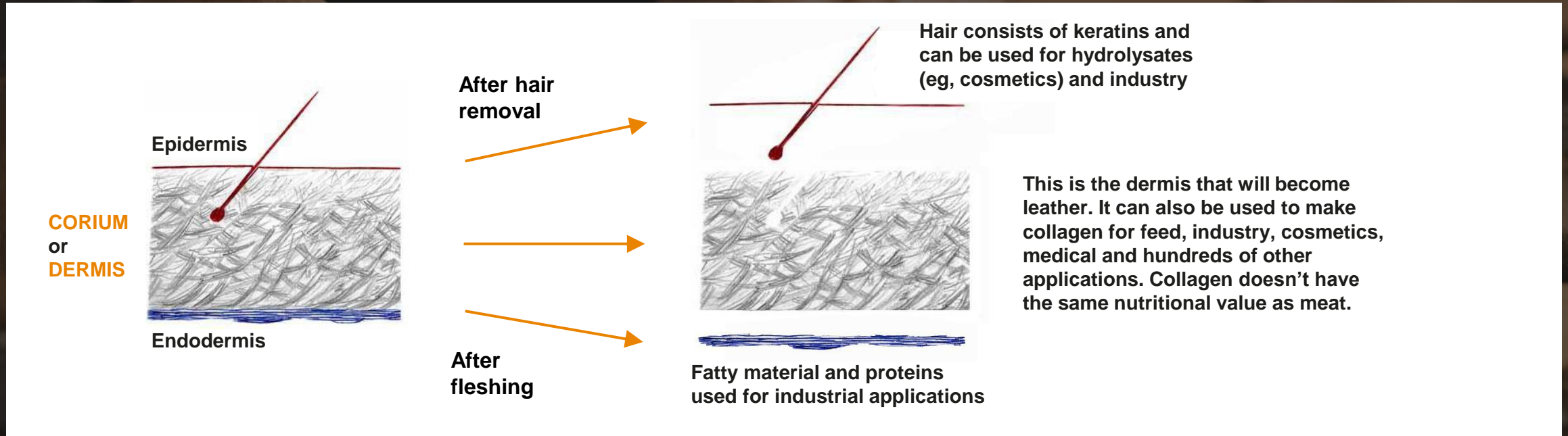
## LEATHER TYPES

- full grain
- snuffed grain
- corrected grain
- nubuck

## LEATHER TYPES

- splits
- suede
- PU splits

# INDUSTRIAL COW HIDE BY-PRODUCTS



**Hides are trimmed to** remove parts that cannot be used to make leather. **They are fleshed** to remove the endodermis before curing or after processing (liming). **After hair removal**, collagen, the central part of the hide (dermis), will be **transformed into leather**. Only a few cow hides are **tanned 'hair on'**.



**THANK YOU** FOR YOUR ATTENTION