Proviera®
Probiotics for Leather™

PROVIERA® IN WET-END OPERATIONS

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Learn more about our products.

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PART 1: THE ROLE OF THE SURFACTANTS OF WET-END OPERATIONS

Surfactants play a crucial role in the wet-end operations of leather processing (post-tanning stages such as neutralization, retanning, dyeing, and fatliquoring). Their primary function is to control interactions between water, chemicals, and the collagen fiber structure of the hides.

In wet-end leather processing, surfactants are essential for:

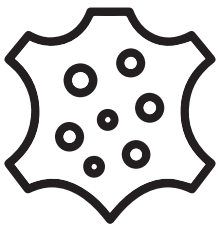
- Enhancing penetration and uniformity
- Stabilizing emulsions and dispersions
- Improving softness, dyeing quality, and overall leather performance

WETTING AND PENETRATION

- Surfactants reduce the surface tension of water, allowing chemicals to penetrate the leather more easily.
- Ensures uniform distribution of tanning agents, dyes, and fatliquors throughout the hide.
- It is particularly important because leather fibers are dense and can resist liquid penetration.

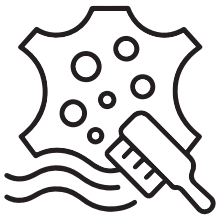
EMULSIFICATION

- Many wet-end chemicals (especially oils and fatliquors) are not water-soluble.
- Surfactants act as emulsifiers, forming stable oil-in-water emulsions.
- This ensures:
  - Even lubrication of fibers
  - Softness and flexibility in the final leather



DISPERSION

- Helps disperse solid particles like pigments, dyestuffs, and retanning agents.
- Prevents aggregation or precipitation, which could cause uneven coloring or defects.

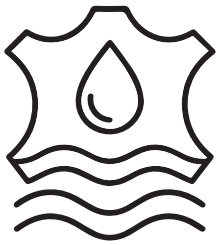


DETERGENCY AND CLEANING

- Removes residual impurities such as:
  - Natural fats
  - Dirt
  - Processing residues
- Keeps the fiber structure clean for better chemical interaction.

LEVELING ACTION (ESPECIALLY IN DYEING)

- Surfactants act as leveling agents, slowing down dye uptake.
- Prevents:
  - Patchy dyeing
  - Uneven shade distribution
- Promotes smooth, uniform coloration.



LUBRICATION OF FIBERS

- Helps fibers slide over each other during mechanical action.
- Reduces fiber damage and improves:
  - Softness
  - Grain smoothness
  - Handle (feel) of leather

CONTROL OF FOAM

- Some surfactants are designed to reduce or control foam, which is critical in drum processing.
- Excess foam can interfere with chemical penetration and process efficiency.

pH AND PROCESS STABILITY SUPPORT

- Certain surfactants help stabilize formulations across different pH ranges during wet-end stages like neutralization and retanning.

PART 2: WHY PROVIERA PRODUCTS HELP WET-END OPERATIONS

Proviera products can replace or be combined with all kinds of surfactants used in all the stages of the leather process

Proviera properties vs. Traditional synthetic surfactant properties:

Surfactant	Proviera
Chemical synthesis	Natural fermented probiotic
Surfactant properties (single chemical)	Surfactant-like properties (broth of biochemicals)
Reduce surface tension	Reduce surface tension/ Break down molecules
Big molecule size	Small molecule sizes
High evaporation point	Low evaporation point
High solid residual	Low solid residual
High concentration	Low concentration
Difficult to rinse	Easy to rinse
Remain in the leather	Do not remain in the leather

OUR PRODUCTS

ProSoak

Proviera® ProSoak® is an all-natural, environmentally friendly hide soak that improves leather quality and ensures higher leather yields. It is best used in main soaking, especially with fresh hides, and washing wet-blue/wetting back.

ProSpread

Proviera® ProSpread® is an all-natural, surfactant-free wetting and dispersing agent that disperses fat far better than traditional chemicals. It can also be used in pre-soaking, liming, retanning, fatliquoring, and dyeing.

ProDegreaze

Proviera® ProDegreaze® is an all-natural, environmentally friendly degreaser that can strip high fat hides and skins effortlessly, as well as degrease sheepskins.

ProDegreaze Plus

Proviera® ProDegreaze® Plus combines the effectiveness of a consortium of biochemicals derived from a controlled fermentation process using probiotic cultures and selected natural raw ingredients with a non-ionic surfactant that has excellent emulsifying properties.

PROVIERA CASE STUDIES IN WET-END:

Case 1:

Objective: Demonstration of Proviera wetting back extreme conditions
Material: Buffalo wet blue, stored during 16 years
Shaved thick: 1,2-1,3 mm

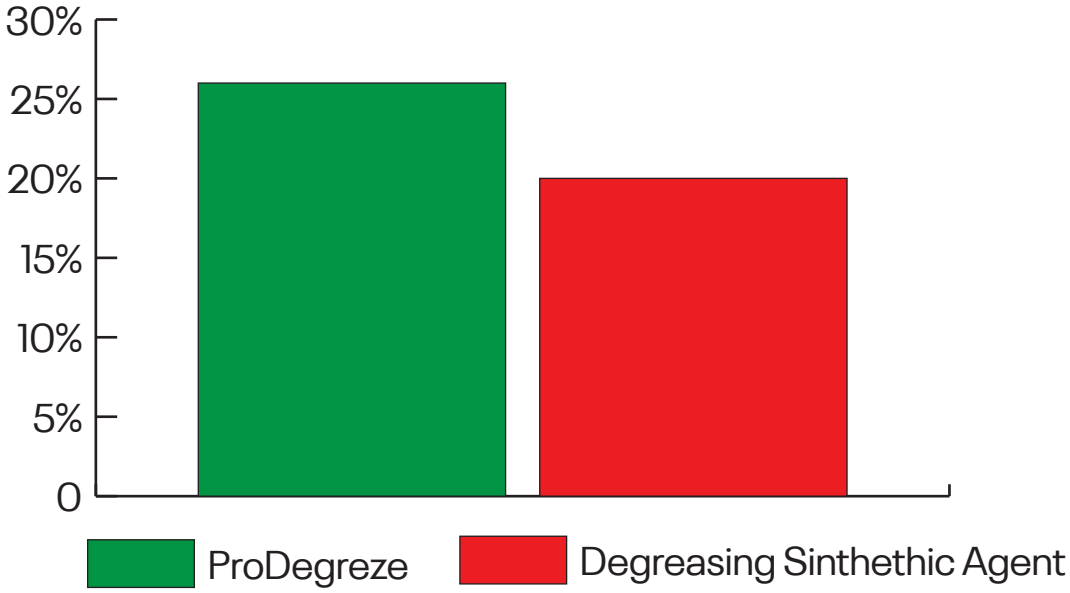
Process	#	Action	%	Chemicals	°C	Min	Control	Notes
Washing	1	Add Wet blue						
	2	Add	1000	Water	45			
	3	Run				5′	4 rpm	
	4	Drain						
Wetting back	5	Add	500	Water	60			
	6	Add	1,5	**ProSoak**				
	7	Add	1,5	**ProDegreaze Plus**				
	8	Run				10′		
	9	Add	0,7	Synthetic Oil				
	10	Run				60′	4 rpm	
	11	Run				120′	12 rpm	
	12	Check						Leather is clean and soft
	13	Run		(Automatic 5min x55)		420′		
	14	Stop Overnight						
	15	Check						

Extremly wetting back ability for dry wet-blue

Case 2: Degreasing wet-bue

Degreasing wet-blue, comparing ProDegreaze with a synthetic degreasing agent. Data provided by Sichuan Decision New Material Technology, Co. Ltd.

Degreasing ration= 1 – (fat copntent$_{final}$/fat content$_{initial}$)



Foaming Test

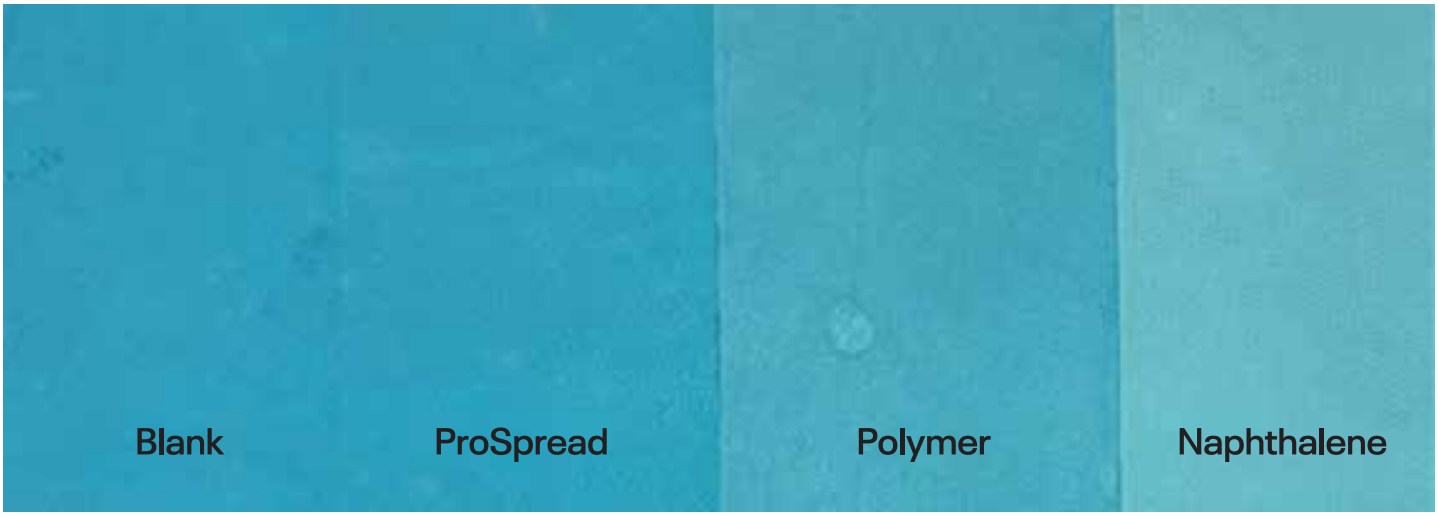
Foaming	0 min	1 min	2 min
ProDegreaze	60	0	0
Degreasing sinthetic agent	90	190	0

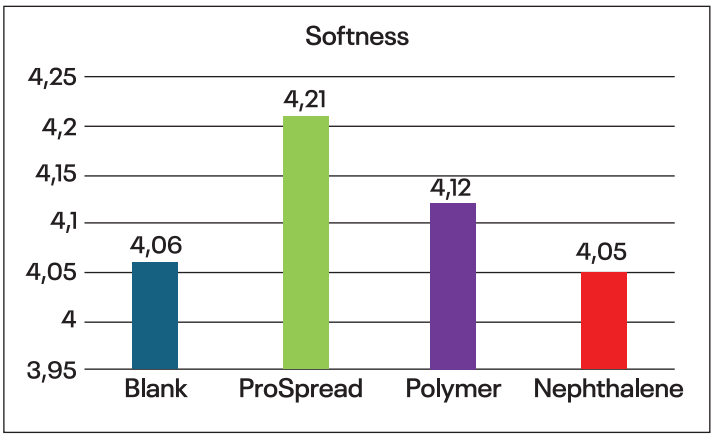
Conclusion:

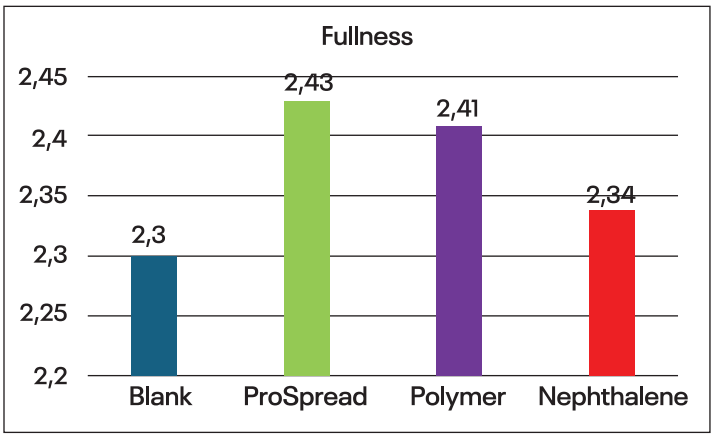
- Degreasing effect: Excellent degreasing ability
- Easy use: foamless
- Bio-base: Eco-friendly

Case 3: **Multi-functional dispersing**: Data provided by Sichuan Decision New Material Technology, Co. Ltd.

Bleaching effect:







Conclusion:

- Application: Excellence performance; very light bleaching
- Easy use: foamless
- Bio-base: eco-friendly

Case 4: Dyeing

PROBIOTIC METABOLITES AS SUSTANAIBLE LEATHER DYEING AUXILIARIES. Castell, J.C, et al, ALCA 2015.

This study focusses on the application of the biochemicals as dye auxiliaries and compares its performances with other traditional dye auxiliary families based on naphthalene sulfonic salts, ethoxylated amines and ammonia. Reduction of COD, nitrogen and sulfates is analyzed and compared in the dyeing yard effluents. Color evenness, intensity and dye penetration are assessed on the leather articles. The data obtained from the research show significant advantages with probiotic biochemicals when they are used in the dyeing process.

PRODUCTS, MATERIALS AND EQUIPMENT:

A standard bovine wet-blue was selected and pearled according to the following recipe:

% are calculated on **wet-blue** weight

PROCESS	%	Product	Time	Control	
			Minutes	T ° C	pH
Washing	200	Water		35	
	0.2	Oxalic acid	30		3.7
Drain					
Neutralizing	150	Water		30	
	2	Sodium formate	15		
	0.5	Sodium bicarbonate	60		5.5
Drain					
Washing	200	Water	15	30	
Drain					
Retanning	50	Water		20	
	10	Syntan	60		
	10	Sulfatate fatliquor	120		
	2	Formic acid 85%	60		3.5
Drain					
Washing	200	Water	15	30	
Drain. Set-out. Dry. Condition. Stake					

% are calculated on **dried** weight

PROCESS	%	Product	Time	Control	
			Minutes	T ° C	pH
Wetting back	1000	Water		30	
	2	Wetting agent	120		6.5
Drain					
Washing	1000	Water	20	30	
Drain					

% are calculated on	dried	weight			
PROCESS	**%**	**Product**	**Time**	Control	
			Minutes	T ° C	pH
Dyeing	300	Water		50	
	X	Auxiliary	10		Check pH_1
	4	Olive dye			
	1	Formic acid 85%	15		
	1	Formic acidd 85%	30		Check pH_2
Drain. Set-out. Dry. Condition. Stake					

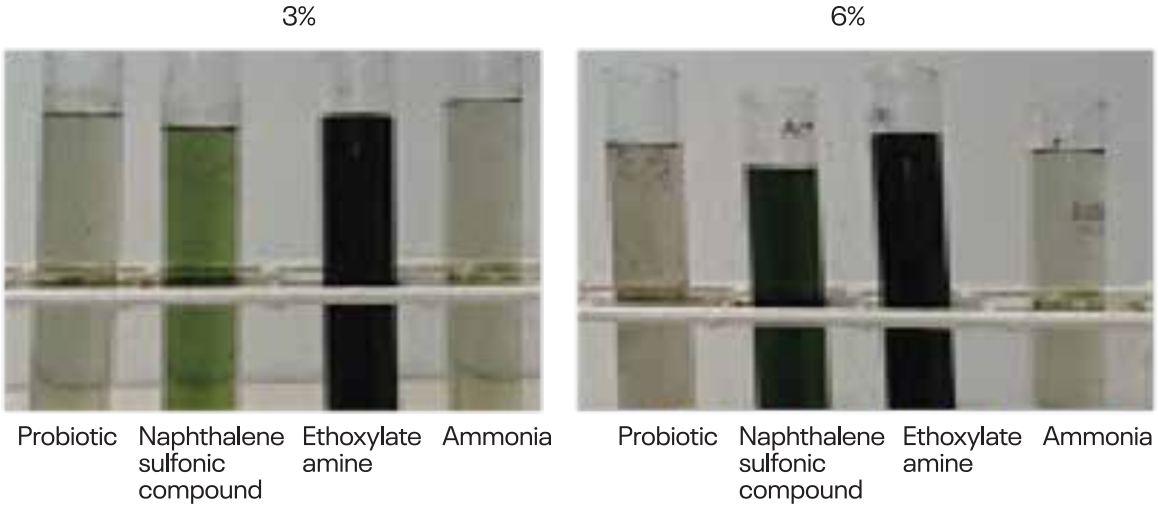
Typical dye auxiliaries were selected and added to the drums 10 minutes before the dye at 3% and 6% concentration based on dried weight.

1. Blank
2. Probiotic biochemical consortia
3. Naphthalene sulfonic salt
4. Ethoxylate amine
5. Ammonia

In the wetting back, a fatty alcohol ethoxylate 85% concentration was used as a wetting auxiliary. To the crust pieces for the probiotic tests, the same probiotic product was used for wetting back and dyeing.

The crusts were dyed with a commercial olive mixture of anionic dyes.

RESULTS AND DISCUSSIONS



Measures were taken on the leather and dyeing quality and on the effluent contaminants.

To evaluate the performance of the dyeing, the evenness and the intensity of the dyeing and the dye penetration were considered. Five leather experts evaluated the pieces of leather and classified from 5 (best results), to 1 (worst results). The taken values are the average considering statistical significance. Due to the lack of mechanical effect during the dyeing process is small A4 size pieces, penetrations were assessed with the help of microscopy and rated from 3 (best) to 1 (worst).

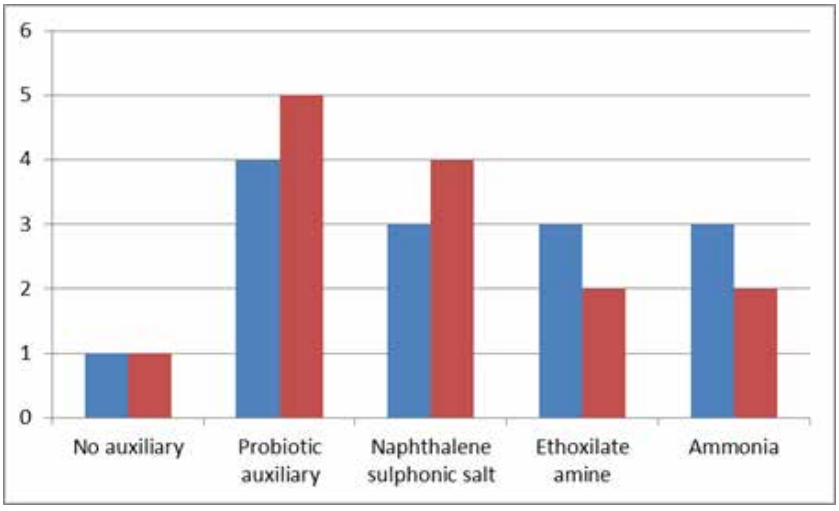
Samples of the effluents were chemically analyzed in the laboratory to determine COD and total nitrogen according internal method (Merk kit) and sulfates through ionic chromatography.

Dye auxiliary	%	DQO mgO_2/L	N_2 mg/L	$SO4_2^-$ g/L	Exhaustion	Evenness	Intensity	Penetration
Blank		5000	30	1	5	1	3	1
Probiotic aux	3	4700	32	1.2	5	4	4	1
Probiotic aux	6	4100	31	1.1	4	5	5	2
Naphthalene sulf.	3	6500	46	2.8	3	3	3	3
Naphthalene sulf.	6	7900	44	3.4	3	4	3	3
Ethoxylate amine	3	8200	150	2.8	2	3	2	3
Ethoxylate amine	6	14300	300	1.3	1	2	1	3
Ammonia	3	4400	340	2.1	5	3	3	2
Ammonia	6	5000	590	1.6	5	2	4	2
Legent:		5 = best	1= worst	(penetration 3 = best)				

The following graphics will help show a better comprehension of the results and conclusions:

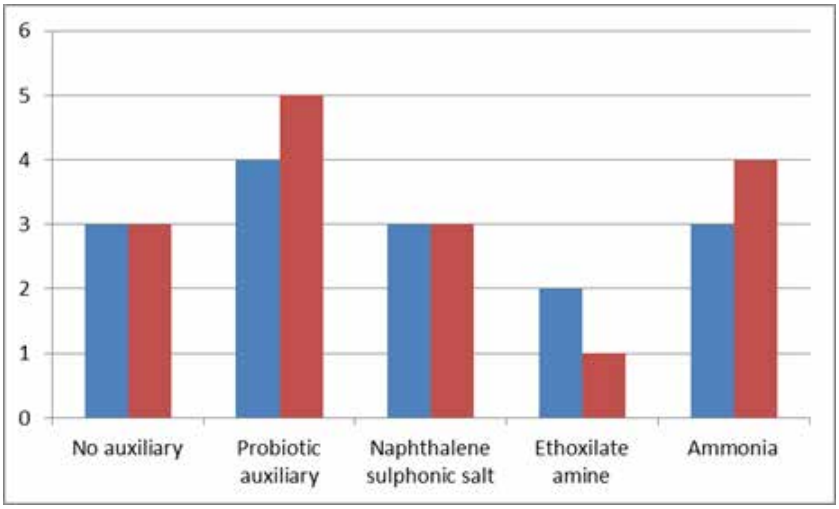
On the leather color:

Evenness:



The probiotic auxiliary improved evenness compared with traditional dyeing auxiliaries and influences positively in the results because evenness increases at higher concentration, contrary to EA and ammonia.

Intensity:

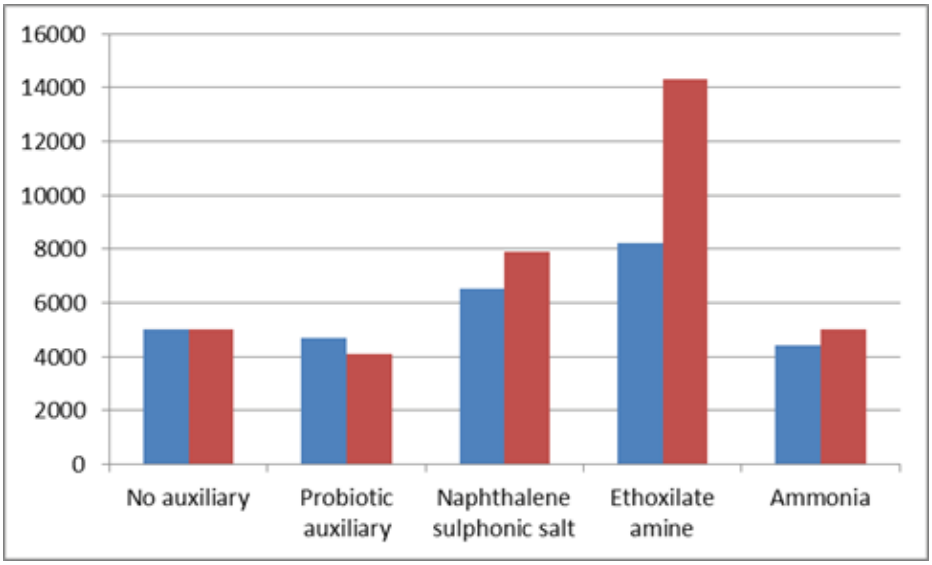


The probiotic auxiliary improved intensity compared with traditional dyeing auxiliaries and influences positively in the results because evenness increases at higher concentration.

On the effluents:

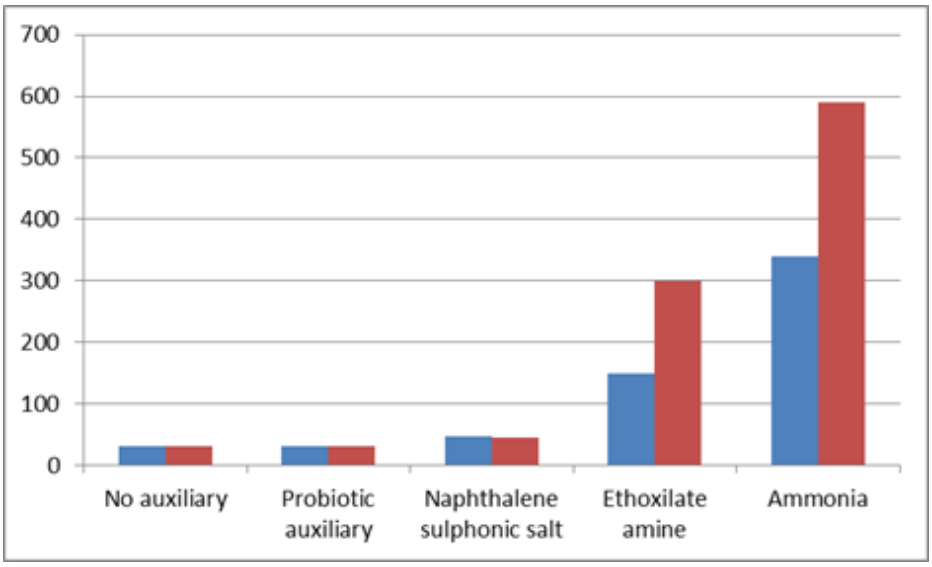
To have statistical significance, tests were repeated and values were analyzed to assure operating at 95% confidence level.

Chemical demand of oxygen (COD): expressed in mg O_2/L:



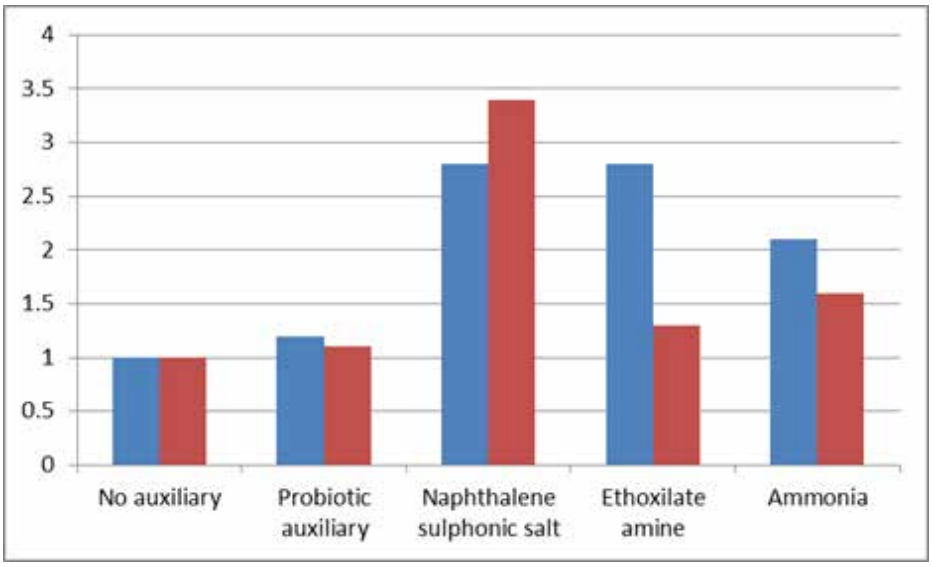
Dye auxiliaries contribute to higher chemical demand of oxygen, while probiotic auxiliary can reduce the values even more at higher concentrations of product.

Total nitrogen: expressed in mg NT/L



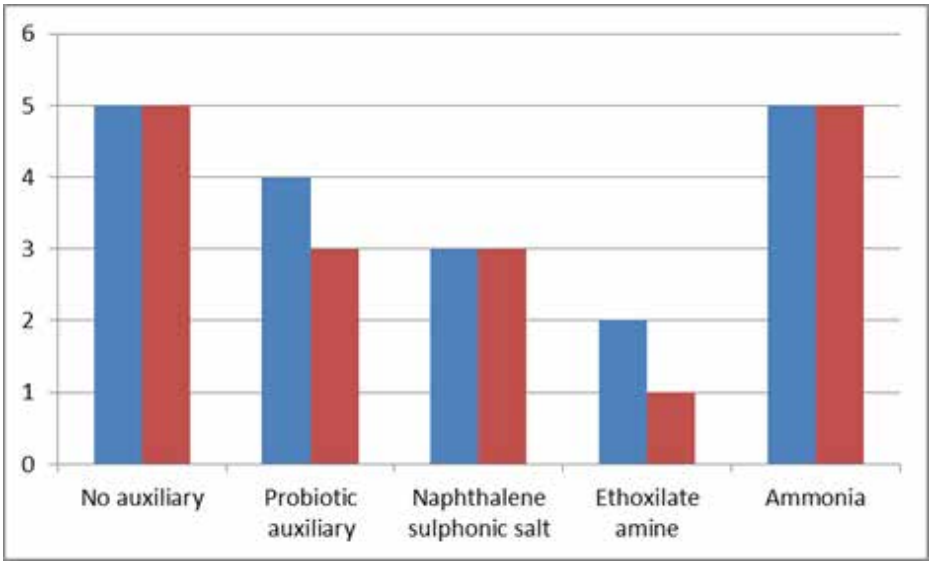
EA and ammonia contribute to higher levels of nitrogen in the effluents.

Total sulfates: expressed in mg SO_4^{2-}/L



Origin of sulfates comes from dyestuffs but also from traditional dye auxiliaries, especially, naphthalene sulfonic salts.

Exhaustion



Dye auxiliaries delay the fixation of the dyes in the leather and, therefore, reduce their fixation in the leather fibers and exhaustion. The probiotic auxiliaries have a limited dispersing effect on the dyes but increase their solubility to uniform the dyeing behavior when dyes are blended to obtain specific shades. The bleaching effect of the dye auxiliaries is minimized and has very little influence in the dye fixation.

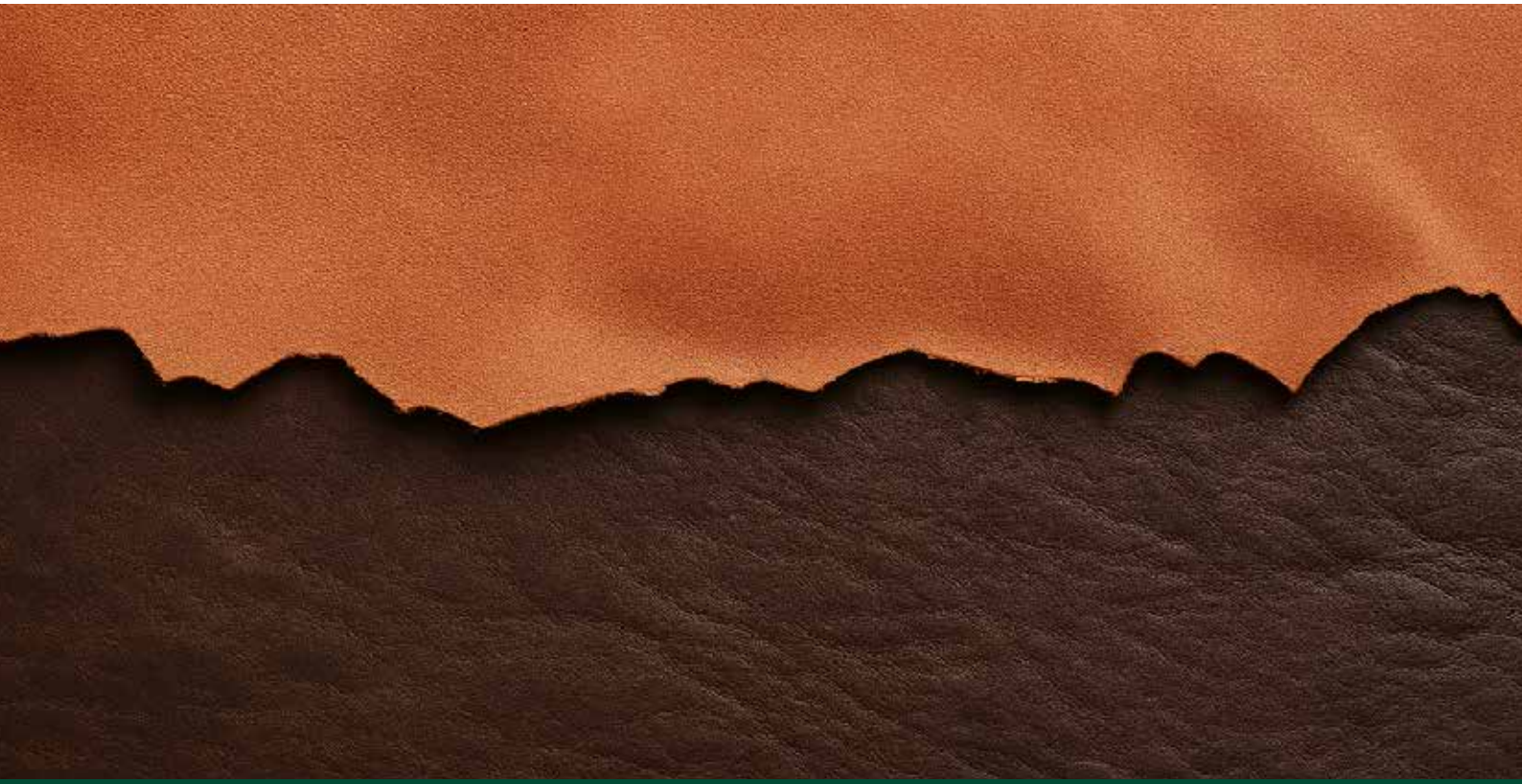
CONCLUSIONS

Metabolites from controlled fermentation of natural ingredients with probiotics are consortia of biochemicals characterized by their small molecule size, powerful functional groups and surfactant-like properties. Such qualities offer tanners an exceptional opportunity to replace some chemical auxiliaries based on chemical synthesis of oil derivate with natural and sustainable alternatives.

The application of probiotic technology to prepare hides and skins for the tanning and the successive operations of leather making improves the quality of the leather articles and save costs while reducing environmental impact.

Compared with traditional chemical auxiliaries, probiotic metabolites are able to penetrate into the smallest interspaces of the fibril collagen structure, cleave off and disperse substances from hides and skins not suitable to be converted into leather, solubilize organic material and improve the uptake of the reagents that confer final leather properties.

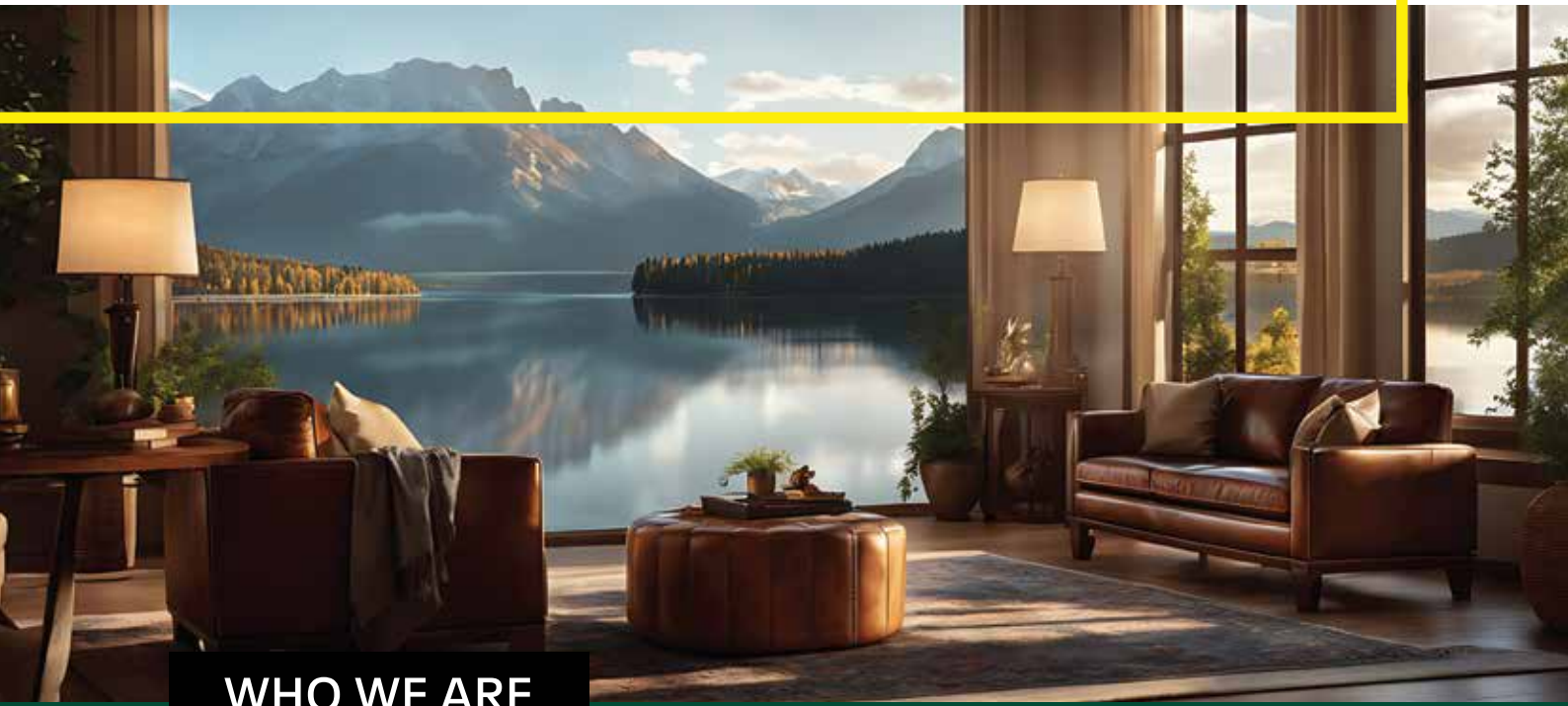
They can be used as dye auxiliaries to improve the evenness, the intensity of the colors, compared with other dyeing auxiliaries, reducing COD and avoiding other contaminants from traditional dyeing auxiliaries like naphthalene sulfonic salts or ethoxylate amines and improve dye exhaustion.



Proviera®

Probiotics for Leather™

ALONG WITH OUR PARTNERS, WE'RE CHANGING THE WAY LEATHER IS MADE.



WHO WE ARE

Proviera® is committed to providing a full spectrum of probiotic and biochemical solutions for various Probiotics for Leather™ applications. Conceived through proprietary consortia technology, these products are designed to provide cutting-edge, superior performance, and cost-effect alternatives to traditional chemicals.

Learn more about our products.
Visit www.Proviera.com

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