

Leather Powered by Probiotics™

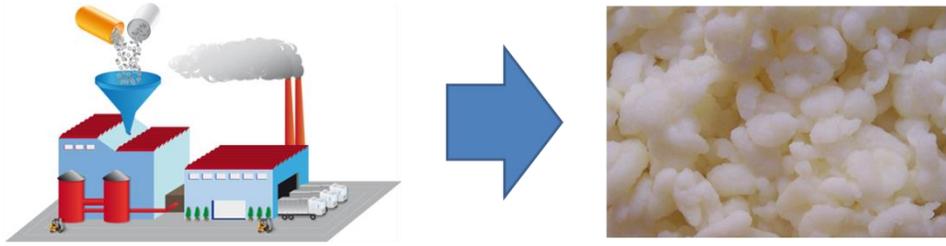
Proviaera Biotech is an SCD Probiotics affiliate specializing in the global tannery market with sustainable environmental solutions



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1. Fundamentals



Chemical synthesis

Biochemicals from Probiotics

Figure 1: Proviaera™ leather biochemicals

Proviaera Biotech offers an innovative alternative for the production of traditional products used in tanneries and based on chemical synthesis with a sustainable technology created from the use of probiotics. Therefore, the raw materials can be substituted with natural ingredients from agriculture instead other sources like the oil industry.

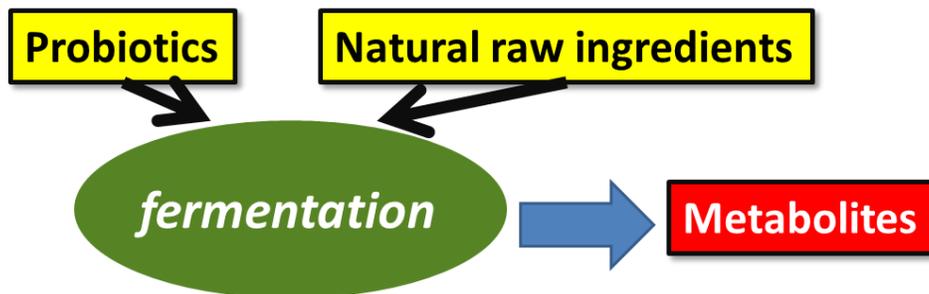


Figure 2: The Proviaera leather biochemicals are metabolites derived from a controlled fermentation using probiotic cultures and natural raw ingredients.

2. Characteristics of Proviaera™ leather biochemicals

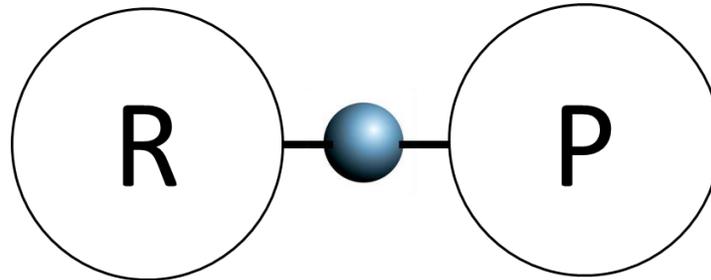


Figure 3: Metabolites are characterized by a strong polarity and as active functional radical enable them to combine the biochemicals to other organic molecules.

Metabolites contain carboxyl and hydroxyl groups conferring a high polarity to the molecules, and therefore, high solubility. They also contain very active radicals that can bond the metabolites with other organic molecules.

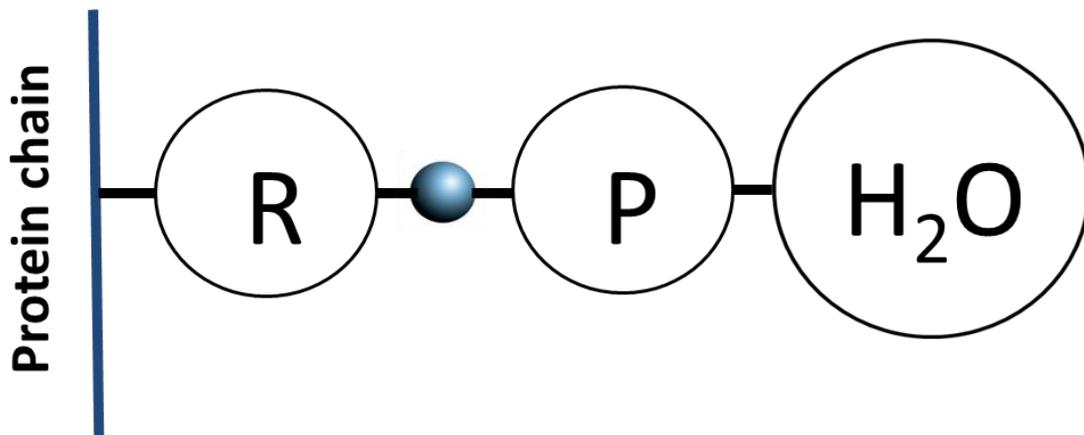


Figure 4:

- Molecules are small enough to penetrate through the net of collagen fibers.
- Active radical bonds biochemicals to the protein chain.
- Polar group enhances hydrophilic properties of protein chain.

The metabolites are complex mixtures of organic products which most of the molecule sizes are small enough to penetrate inside the fibers of the hides/skins. When the active radical group combines with collagen, the polar groups help to introduce water molecules and therefore they become more hydrophilic. When they combine with other soluble proteins, they increase their solubility and are easier to be removed.

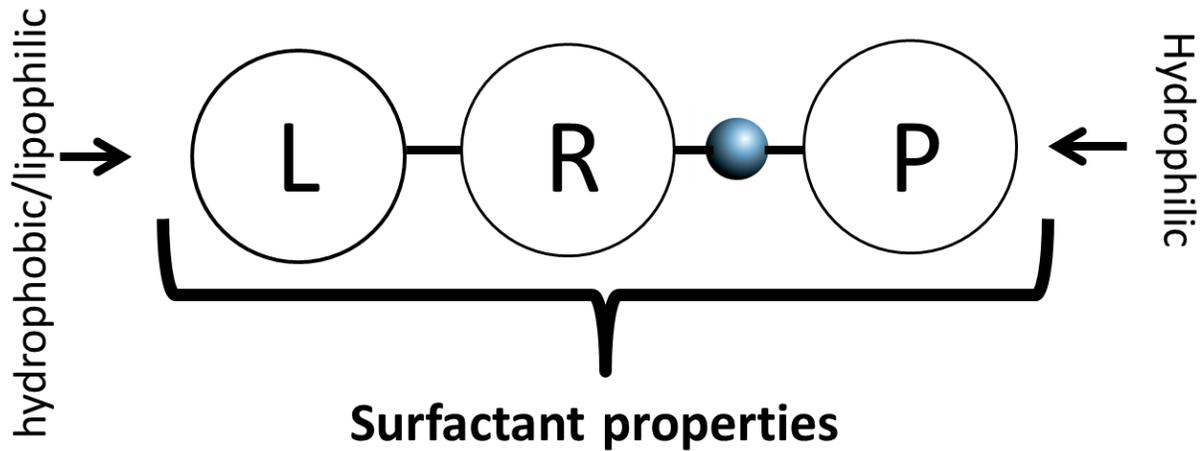


Figure 5: The reactive functional group has combined hydrophobic/lipophilic organic molecules from natural substances powering surfactant-like properties to the biochemicals

The reactive functional groups can also be combined with natural substances with hydrophobic properties. Then the combined molecules can contain hydrophilic and hydrophobic groups, thus, providing powerful surfactant-like properties.

3. The leather processing

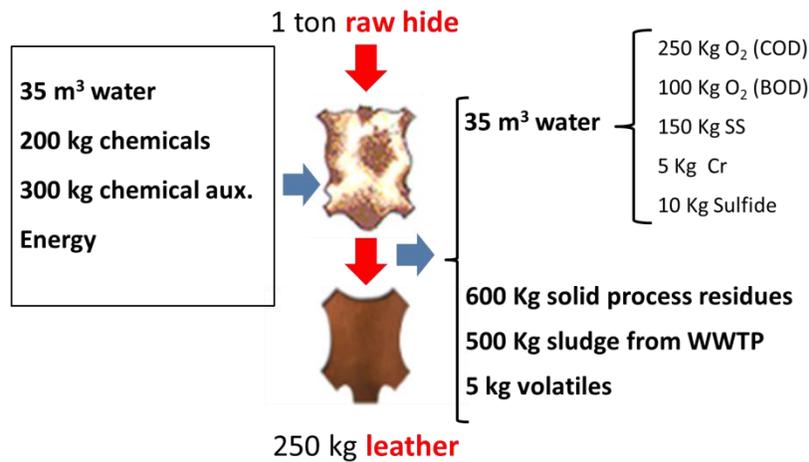


Figure 6: Source: Industrial Emissions Directive. Draft Reference Document on Best Available Techniques for the tanning of Hides and Skins. EC. 2011

The tanning industry converts hides and skins from the meat industry into leather, a noble material used in consumer goods like shoes, apparel, furniture, car interiors, bags, belts and many other. The process consists of removing a lot of substances from the raw material that cannot be converted into leather and introducing other substances that will provide the performance of the final leather article. All chemical reactions take place in water media.

To produce 250 kg of leather, it requires one ton of raw hides. The process requires 35 m³ of water that will become, at the end of the process, effluent containing a high amount of organic matter and chemicals. The effluent should be treated before draining to natural water sources to avoid pollution.

About a half ton of chemicals have to be added to process a ton of raw hides. Some chemicals react with the collagen protein to avoid putrefaction and to provide leather performances like color, softness, temple, etc. e.g. tanning agents, dyes, fat liquors.

Other chemicals, auxiliaries, are used to obtain the conditions to remove undesirable substances from hides and skins and to have the best conditions for the chemical reactions: e.g. pH adjusters, detergents, soaking agents, enzymes, reductive agents, etc.

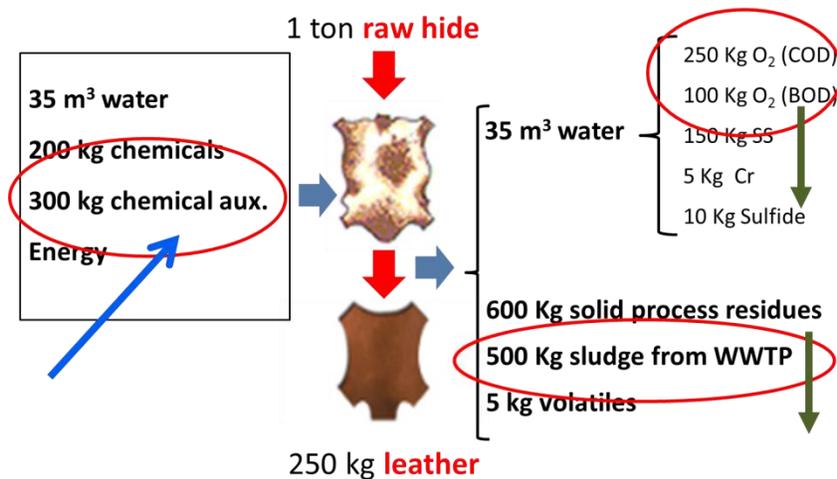


Figure 7

Proviaera™ tannery biochemicals are auxiliaries that can replace the used of surfactants like soaking agents, chemical dispersing agents and degreasers, soaking enzymes, amines, ammonia, dyeing auxiliaries, etc. Therefore, they can drastically reduce charges in the effluents like COD and BOD reducing costs in the WWTP. They can also reduce the volume of sludge.

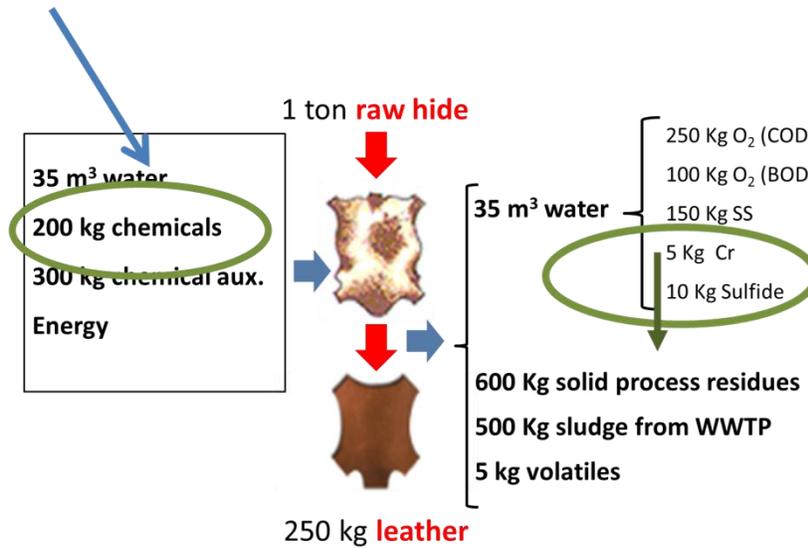


Figure 8

Furthermore, the use of biochemicals can improve the conditions for the reaction of the chemicals with better exhaustions. Therefore, the amount of expensive chemicals can be reduced which also avoids high contaminating substances going to the effluent like chromium, sulfides and other salts that need expensive equipment for their treatment.

4. Properties of Proviaera™ tannery biochemicals

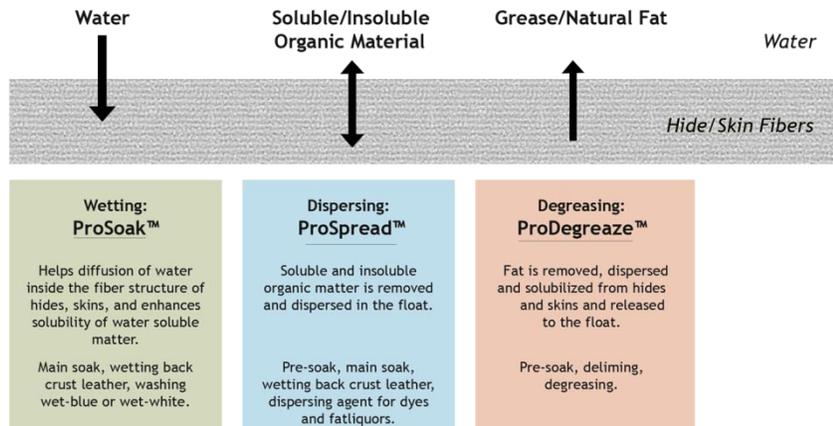
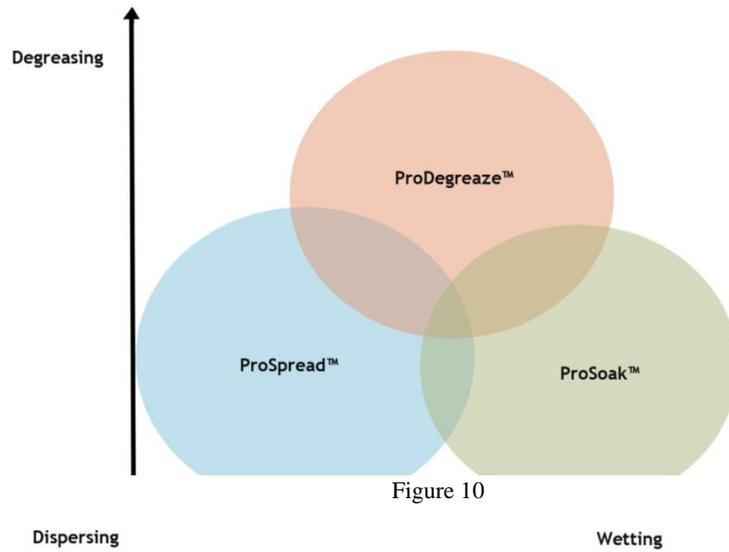


Figure 9

Proviaera tannery biochemicals have been designed to provide specific properties required for the treatment of hides and skins: a soaking agent with wetting properties, a dispersing agent to disperse organic material (either substances in the hides and skins or chemicals used in the leather process), and a degreaser capable of removing natural fats and grease from inside the fibers.



These properties can be positioned with a rectangular Cartesian coordinate system. The x (horizontal) axis represents the hydrophilic/hydrophobic balance, and the y (vertical) axis represents the emulsifying properties.

5. Conclusions

Leather Powered by Probiotics™ means:

- Use of auxiliaries based on a blend of biochemicals derived from a controlled fermentation process using probiotic cultures and selected natural raw ingredients.
- Replacement of traditional leather processing chemicals.
- Non-enzyme based technology providing innovative solutions to reduce effluent load while improving leather quality and area yield.
- 100% biodegradable and natural.
- Effective across a wide range of conditions during the leather making process.
- Application is tailored to each tannery's unique process and protocols.

ProSoak™:

ProSoak hydrates hides and skins at any stage of leather process.

ProSoak allows an effective re-absorption of water lost during the curing and transport process.

ProSoak improves wetting back crust leather without the need for surfactants and ammonia.

ProSoak may help to reduce processing time, increases the performance of the unhairing and liming auxiliaries and, therefore, has a lower environmental impact.

ProSoak eliminates the need for bactericides in soaking for up to 24 hours.

ProSpread™:

ProSpread is a natural dispersing agent used in the beamhouse operations to remove undesirable and non-leather making substances (manure, blood, dirt, unstructured proteins).

ProSpread is also used in the wet-end operations for better dispersion of retanning agents, dyes and fatliquors resulting in a uniform temper and improving dye penetration.

ProDegreaze™:

ProDegreaze is a degreasing agent used in beamhouse operations to release natural fats.

ProDegreaze also can be used in wet-end operations to achieve a more uniform uptake of retanning agents, dyes and fatliquors.

ProDegreaze is highly effective at removing and dispersing natural grease and has positive influence on the layout of the leather.

ProDegreaze significantly reduces effluent load and is APEO free.

ALL NATURAL



The data above are based on our current knowledge, experience and tests conducted. Since results may vary based on local procedures and condition we recommend that customers verify product performance conducting their own test.