



The real cost of a kilo of salt

Part 2

The technical content of the May 2005 issue of *World Leather* was largely dedicated to matters concerning salinity. The effects of sodium chloride in irrigation waters on various crops were discussed, an alternative technology for salt-free curing of hides and skins was given in outline, as well as a number of possible routes for the elimination of salt from pickle.

A listing of *World Leather* publications over the previous five years where various aspects of this major problem had been addressed was also provided. This amounted to 13 publications, and reference was made to an extended listing of 45 previously published papers set out in the *Annex of Back to Basics: The*



Environment. It is seen that although no single paper would provide a solution to the problem of salinity, a grouping of related material could at least provide a meaningful foundation of information. It is hoped that this may prove of value in the development of low-salt leather manufacture.

Rising salinity is yet another global time bomb that must be addressed, and as a contributor to the problem, the leather industry has yet another challenge to overcome. With insufficient space available in the May 2005 issue to present a full compendium of related information, the second part of the series '*The real cost of a kilo of salt*' presents three more salinity-related papers.

A new salt-free approach to tanning

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The following paper provides an overview of a different approach to tanning. The technique is managed in the 'non-swelling' pH zone, and thus eliminates the need for salt within the conventional acid pickle. The fibre stabilisation provided—somewhat similar to a pretannage with glutaraldehyde—allows strong leather characteristics, such as those provided by conventional chrome tannage, to be developed within a main tanning or retanning stage.

Diisocyanates are capable of tanning leather. However, due to their toxicological properties they have never been introduced in the industry technically or commercially.

In a 1982 publication, carbamoylsulfonates, derivatives of isocyanates, were mentioned as an alternative to glutaraldehyde in producing wet white. However, the properties obtained, according to the authors of this publication, were technically difficult due to the major adjustments in pH required. The leathers obtained were very stiff and unacceptable.

However, by changing the process, it was found that carbamoylsulfonates could be used to obtain leathers of high quality. This tanning was carried out at a pH of 6 - 8 in the presence of a basifying agent. The leathers had the same quality as leather obtained by an aldehyde tanning: their colour was white, the light fastness excellent and the aging properties were good. When processed using normal retannage, leathers were obtained fitting the properties for use in automotive applications.

The carbamoylsulfonate tanning eliminates both the normal acid/salt pickle, and neutralisation as no pH adjustment is needed prior to retannage. The waste water from the total tanning process contains considerably less neutral salts by the avoidance of both these stages, and the working time is reduced as well. Although, the chemicals used in this process are more expensive than aldehyde derivatives, the processing time saved

and the reduction of chemicals in the waste water most probably evens out the cost difference.

Afterwards, retanning with chrome(III) tanning salts is possible. With special chrome complexes used in the retanning process, a remarkable reduction of dissolved chrome salts in the residual liquor of the retanning (*less than 10 ppm Cr*) was achieved. It is also possible to produce biodegradable leathers by tanning with carbamoylsulfonates.

This tanning process still needs further experimentation. This is to improve the storage stability of the carbamoylsulfonate tanning product itself. Fortunately, storage stable auxiliary products exist which are used in textile sizing that are based on the same chemistry. Therefore, this problem should be easily resolved.

Tanning with carbamoylsulfonates may be an alternative to existing processes. There are opportunities for rationalisation, and to reduce the currently high salinity generated by conventional tanning systems.

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