



Reducing the carbon footprint of leather

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Sustainability in leather production is a widely discussed topic within the leather community. In 2012¹ and 2014⁴ this important subject was discussed in World Leather, where BASF's footprint concept was introduced as an integral approach for sustainable leather production.

The subject is developed further in this paper in terms of the value of chemicals with lower carbon footprint, and optimisation of production processes, and value assessment in terms of the value chain.

For tanneries in general, the importance of the four different footprint topics, as illustrated in *Panel 1*, are more or less balanced. However, for a specific tannery, their significance can vary depending on region or technology. When it comes to automotive leather along the value chain, Tox Footprint and Carbon Footprint (CF) is gaining more and more interest. At present, the legislative pressure on the automotive industry concerning CO₂ emissions is still restricted on the emission of CO₂/km, but it can be expected that questions on CF of the materials used, e.g. leather, will arise in the future.

In particular, questions such as a clear definition of CF, the CF of leather, how can it be calculated, and what are the boundaries of calculation, are being discussed widely in the leather community².

The fact is that cattle are not raised for the hide but mainly for meat and milk production. The raw hide is a by-product and producing leather out of it creates the highest value. From the perspective of the leather industry, it would make most sense to start calculating the CF of leather after the slaughterhouse, as indicated in *Panel 2*. But finding the right balance – where to start and how to allocate the environmental impacts of cattle breeding between the different products – is a decision that needs to be triggered by the leather associations and societies³.

All members of the leather value chain should try to influence this decision through their representative organisations. Yet, for the tanneries, it is most useful to calculate their Corporate Carbon Footprint (CCF), as this is the one they can directly influence. The different factors that determine the CF of tanneries – the production conditions and the indirect effects, such as the production of leather chemicals and the use phase of leather – have already been discussed in a former paper⁴. The objective of this paper

is to set down the support that the chemical industry can give to the tanneries, in order to improve their CCF.

Improving the Carbon Footprint of leather

To address the CF issue, there are three areas where tanners can benefit from support and these are indicated in *Panel 3*.

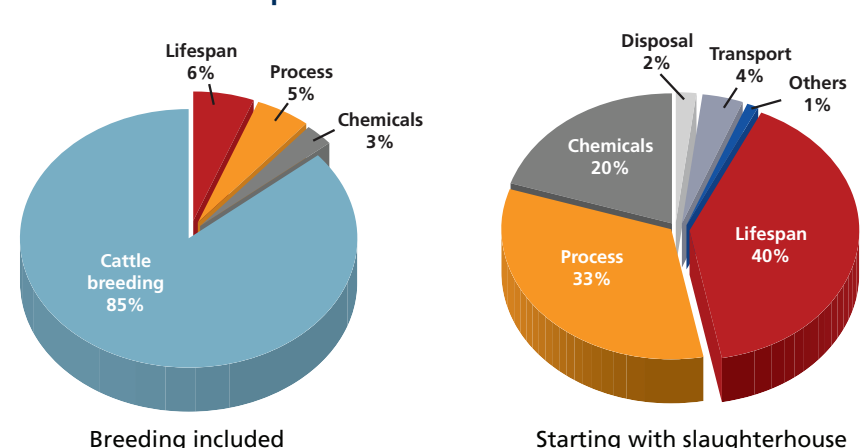
1. CHEMICALS WITH LOWER CARBON FOOTPRINT

Since 2008, BASF has published a comprehensive corporate carbon footprint, the calculation methodology used following the Greenhouse Gas Protocol standards. The standard for the chemical industry that is specific to the sector was published in 2013 with close

Panel 1: Elements of footprints: an integral part of 'sustainability for leather'

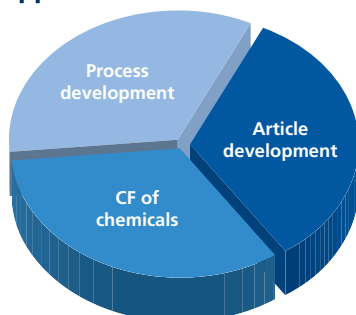


Panel 2: Carbon footprint of leather

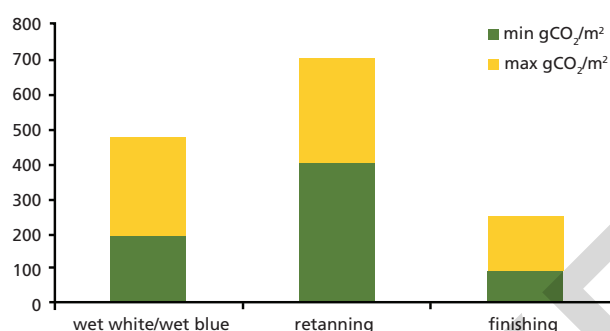




Panel 3: Carbon footprint - support by chemical supplier



Panel 4: Calculated CF of each product group



support and input from BASF. The company was also the first supplier to the leather industry that provided product carbon footprint calculations on leather chemicals.

A cradle-to-gate approach was applied, meaning that the whole BASF value chain and the production of raw materials and precursors at suppliers' facilities were considered. To do so, material and energy input and output of all process steps were determined and assessed – from raw material sourcing via production techniques employed, to the final chemical substance. The calculation methodology used follows the ISO norms 14040 and 14044 for life cycle assessment and the Greenhouse Gas Protocol Product Standard.

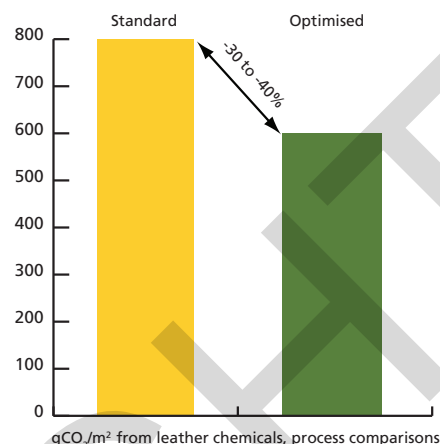
For leather chemicals, the CF of one representative of each product group is calculated – from the soaking in the beamhouse to the top coat in finishing. The main findings of this calculation were:

- The higher the complexity of the chemical structure, the higher the CF. More chemicals and energy is needed for a multi-stage synthesis of rather complex molecules such as synthetic tanning agents and dyestuffs than for a simple production process.
- Powder products are higher in CF than the corresponding liquid products, as spray drying requires significant energy.
- The highest impact on CF is in retanning, with minor impact on beamhouse processes, and least impact on finishing.

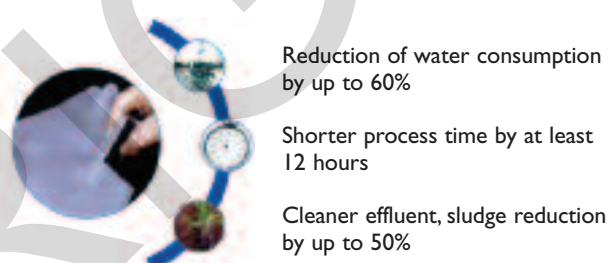
These findings are indicated in *Panel 4*.

The integrated production of BASF gives an above-average efficiency of chemical plants and improves the optimum

Panel 5: Potential for reduction 30 - 40%



Panel 6: DryFast Beamhouse System



utilisation of raw material, energy and steam, so the chemical products manufactured have a lower CF value. These values are integrated in the certification of ECO₂L (energy controlled leather) which was set up by the German Leather Federation⁶. For this reason, when using these chemicals, tanners can calculate and compare the CF of chemicals used in different recipes.

General findings are that:

- Wet-white shows a slightly higher CF than wet blue.
- Solvent based finishing is higher in CF than water-based finishing.

This shows that by careful selection of chemicals used in a recipe, it is possible to significantly reduce the CF as indicated in *Panel 5*.

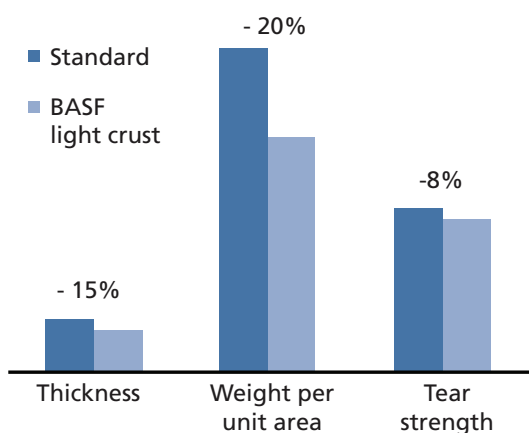
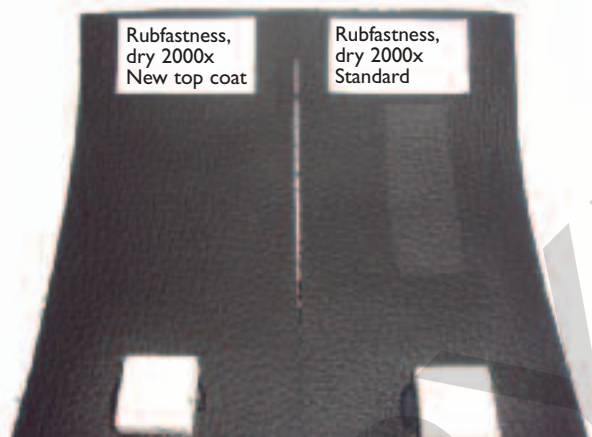
2. OPTIMISATION OF PRODUCTION PROCESSES

Besides the selection of chemicals with a low CF, the optimisation of process parameters such as process time, float length, temperature, number of washings, drying steps, etc., is very important to improve the CCF.

Especially in the beamhouse, an optimised process can contribute to save energy by incorporating recycling processes and smart selection of chemicals as indicated in *Panel 6*. Significantly less water needs to be heated up and a shorter process time contributes to a reduction of the overall CCF of a tannery.

3. DEVELOPMENT OF LEATHER ARTICLES

The development of leather articles may not contribute directly to a reduction of the CF of a tannery, but it can lead to a reduction of value chain CFs, and this can be measured by a life

**Panel 7: Specific light leather****Panel 8:**

cycle assessment. The attempt of the automotive industry to reduce CO₂ emissions focuses on two options:

1. On the optimisation of the power system and on the usage of lightweight material. The lighter a vehicle, the less energy it consumes for driving, so this in turn triggers the development of specific lightweight leathers. With a specific product selection and an optimised process, it is possible to reduce the weight of the leather significantly without deteriorating its tear strength as indicated in *Panel 7*. However, given the calculations that in a premium car with leather interior where 0.5 – 1.0 % of the weight of the car is derived from the leather, it is obvious that the contribution of lightweight leather to the reduction of CO₂ emissions is limited.
2. Upgrading the leather quality so that the off-cut in the production of, say, car seats is reduced as this loss is part of the equation. Also the development of leather articles with a prolonged life time. Both approaches can have a positive impact on the CF in a life cycle assessment.

One such example are leathers that have an excellent wear resistance so that the beauty of the leather is maintained over an extended period of time. Top coats with improved abrasion resistance and anti-soiling properties can have this effect.



Dr Brigitte Wegner from the leather business unit at chemical manufacturer BASF, speaking on carbon footprint at the 2014 CICB Sustainability Forum in Novo Hamburgo, Brazil.

CREDIT: CICB

When viewing other materials versus leather, the prolonged durability and long-lasting beauty of leather can turn the scale in CF comparisons.

Summary:

The Carbon Footprint of leather is, and will be, an ongoing topic in the future. Optimised processes and specific chemical selection can lead to significant improvement of the CCFs of tanneries.

However, it should be taken into consideration that the Carbon Footprint is only one topic. For a sustainable leather production, the impact of Tox Footprint, Water Footprint and Resource Footprint have to be considered of similar importance. ☺

Legend:

- 1) G. Wolf, S. Meier, A. Lin, (Leather and Sustainability: From contradiction to value creation) *World Leather*, December 2013/January 2014, p.14-16
- 2) C. Clarke, *ILM* December 2013/January 2014, p.24-26; *ILM* May/June 2014, p. 18-19
- 3) <http://cotance.com>
- 4) B. Wegner, P. Saling, G. Wolf, (Carbon footprint – a new challenge for the leather industry) *World Leather*, February/March 2012
- 5) <http://www.basf.com/group/corporate/en/sustainability/environment/climate-protection/co2-bilanz-2013>
- 6) <http://www.eco2l-leather.com/en/guideline/>