SUSTAINABLE LEATHER FOUNDATION

Sustainable Leather Foundation's pathway to Biodegradability and Circular Economy

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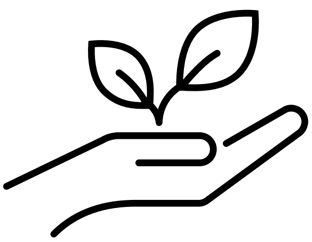

Introduction

The linear economy changes raw materials, after harvesting or extraction, through a manufacturing process, onto retail, through a consumer, who then disposes of the product into landfill or incineration, ending the life cycle.

The circular economy looks to take the end-of-life material back to the start, so the same elemental compounds are continuously used overtime. This looping prevents all the impacts of harvesting and some from manufacture from re-occurring, and through efficiencies makes the second cycle cheaper in terms of resources.

Leather is generally thought of as a linear life cycle if the atmospheric carbon is absorbed by grass, eaten by a cow, which is harvested for its meat, the hide as a by-product, enters leather manufacture, then through product manufacture, sold by a retailer into the hands of a consumer who uses it for a long time, and then places it into landfill or incineration.

Gas leaving the material in landfill (as methane) or leaving the incinerator as carbon dioxide contributes to the end-of-life impacts. The leather in landfill may not degrade rapidly and could contribute to the other impacts of landfill, e.g., land use change, water, and air quality deterioration.

Biodegradable leathers help a circular economy through their make-up elements being recycled more directly back into plants that can be used by livestock, similar in the way that plants and food can be looped back into future food. The Ellen MacArthur Foundation has repeatedly spoken about the circular economy of food and the model of biodegradable leather is the same[1].

What is Biodegradability?

To understand what a biodegradable leather is, in the end-of-life scenario, it is a material that needs to break down in a short amount of time in a natural environment. Materials that break down over hundreds of years are not thought of as biodegradable, even though they may be. Another specific requirement is that the material needs to break down thanks to efforts of micro- or macro-organisms. Micro-organisms, like bacteria and fungi use enzymes to degrade the leather. Macro-organisms, like humans, digest their food using enzymes and absorb that food into their cells.

[1] Ellen MacArthur Foundation (2019) Cities and Circular Economy for Food. [Available online at: https://ellenmacarthurfoundation.org/cities-and-circular-economy-for-food]. Accessed on 13 November 2021.

Both micro- and macro-organisms, after using the food in their cells, grow more cells, but also release carbon, CO_2, as the waste product. This CO_2 differs from fossil-based CO_2, in that the CO_2 from organisms is constantly cycled, and is known as biogenic. Fossil carbon, as its name suggests, has been locked away in the earth for millions of years and when released back into our atmosphere, increases the greenhouse gases that are currently causing problems.

Thus, biodegradability is closely linked to the biogenic carbon cycle. Biodegradability is usually measured by recording how much CO_2 is given off during the material break down. If all the carbon in the material is given off, then the material is fully biodegradable. If no CO_2 is given off, then the level of biodegradability would be said to be 0%. At this point the leather would be called completely non-biodegradable. Most leathers perform somewhere between those two levels, with at least 75% of tested leathers, to date, occurring closer to biodegradable than non-biodegradable. Leathers that biodegrade can make nutritious composts that can be used to enhance soils.

Biodegradability is defined as "the conversion of materials or substances into biomass, carbon dioxide, and water".

Biocircular Challenges

In the circular economy the aim is to lower as much of the impacts as possible, preferably energy and transport. Full elemental recycling of leather may not change that, especially the most relevant impacts like the emissions from livestock.

However, the full cycling of leather as a soil nutrient does mean that the nutrients and water required will be reduced compared to a linear farming method.

A further difficulty posed for biodegradability circularity is if the ingredients added to the biogenic leather are fossil carbon based, so adding petrochemicals will mean that at the end-of-life, the biodegradability will be lowered because the petrochemicals are not biodegradable themselves, or if they are biodegradable, when the break down occurs it gives off fossil CO_2 (or fossil methane) which then drives climate change. Biogenic and fossil methane are

more warming (in its first decade) than CO_2, so composting is preferred to anaerobic digestion.

Making the leather more biodegradable can also be challenging as non-biodegradable substances (used in processing) need to be avoided. It may be that a substance is biodegradable, however it takes a long time to biodegrade. It is also important to ensure that the substances used to make leather do not pose problems later for the soils they are added to.

SLF Approach

Soils that receive the breakdown products of leathers that have been elementally recycled, enhancing the nutrition of that soil for animal and plant biodiversity, are better off. The breakdown products of tanning processes that do the opposite of that should be discouraged or should not choose biodegradability as an end-of-life route.

In addition to the fact that leather will repeatedly displace an unsustainable product from being used because it is strong, durable, and long-lived, it is also a unique way of cycling elements.

The definitions and the way that ultimate biodegradability, disintegration, degradability, and compostability are understood in the myriad of biomes are also an important area that SLF considers. If the consumers and producers are using different language and have different expectations, then problems can begin to appear.

Tools

The Sustainable Leather Foundation's Technical Library (available through the web page) and Foundation Partnership provide a key mechanism to enhance knowledge about responsibility.

By working with industry and non-industry stakeholders, the Foundation takes the best ideas and thinking (published evidence) and translates them into technical positions and guidelines. These can be used as solutions.

The Sustainable Leather Foundation's audit standard is built on the idea that some degree of biodegradability is part of a whole balanced system and that the Foundation's ESG audit will identify (as a whole) whether a leather is sustainable or not. The explanatory notes and the standards and benchmarks support the work outlined in the audit standard. SLF encourages Partners to work with the Foundation to improve the evidence base and the quality of the standard/benchmarks used. The global industry can always improve the quality of the information it uses.

SLF's Transparency Dashboard™ showcases a Partner's progress towards institutionalised ESG across their facility and product. Biodegradability is a key component to leather's improved ESG profile, and when using SLF's Dynamic QR Code, products can now be directly linked to the Dashboard showcasing biodegradability product validation or certification.

Future

The Foundation, through its work on the Audit Standard and support of chemistry most suitable for biodegradability, feeds this information back into global best practice, promoting the understanding of biodegradability and the circular economy.

SLF also works with stakeholders to define a framework for definitions, policies, commitments, and procedures to facilitate real problem solving and innovation on biodegradability. To achieve that, we work with chemical companies, chemical associations, safety organisations, and industry bodies.

Biodegradability can only be achieved through agreements by all interested parties and whilst respecting the old ways, can also listen to suggested issues, understand modern risks, act with due diligence and can strive to continuously improve biodegradability at large.

The Foundation seeks a pathway to balance that protects people, the planet and is economically viable for the benefit of future generations.

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