

# Wool's Impact: Carbon Footprint

## Let's make it easier to say 'yes' to wool.

Global consumers, brands, stakeholders, and specifiers are seeking transparent information about products to inform their decisions. To make it easier for people to say 'yes' to wool products the many great natural qualities of wool need to be well supported with evidence of wool's impacts on the wellbeing of people and the environment.

Life Cycle Assessment (LCA) is used to measure the inputs and outputs involved in making, using, and disposing of a product over its life cycle. LCA helps businesses understand, communicate, and highlight where to improve their products' environmental impact. Increasingly, LCA is being used to support specifiers like architects, designers, and procurement teams to choose products. Those responsible for product selection may also look for an Environmental Product Declaration (EPD) which is a trusted summary of LCA results.

There are often many stages of transformation from the wool fibre carefully shorn from the sheeps back, to a finished wool product like carpet, acoustic panels, furniture fill, etc. That's a lot of input and output data for a brand using wool in their products to get their hands on.

**Wool Impact is making it easier for brands to access quality information about the impacts of producing wool. AgResearch was commissioned to use Life Cycle Assessment methodology to measure the "carbon footprint" of producing 1kg greasy wool on-farm, and explore different sensitivities.**

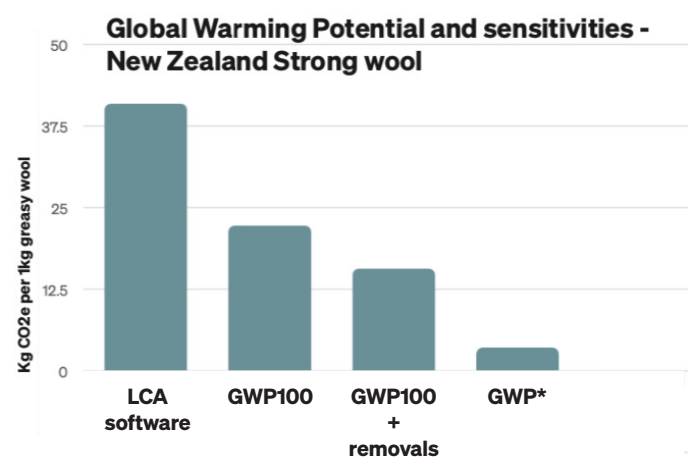
A product's "carbon footprint", expressed as its Global Warming Potential (GWP) is often used as a shorthand for understanding a products' impact on climate change. It measures the total amount of greenhouse gas emissions, including carbon dioxide – the gas most emitted by humans in the burning of fossil fuels – and methane, nitrous oxide, and fluorinated gases, which trap heat in the atmosphere, causing global warming. In addition to measuring GWP according to LCA conventions (GWP100), this work also sought to expand the discussion by; a) accounting for removals (sequestration) as well as emissions; and, b) considering the impact of long-lived gases (primarily CO<sub>2</sub> and N<sub>2</sub>O) and short-lived gases (methane - CH<sub>4</sub>) differently.

## The data source.

A provider of LCA services should seek accurate data where available. In the absence of such data, LCA software draws on databases of published information. To date, there has been limited data on the production of New Zealand strong wool.

The AgResearch climate research team of Andre Mazzetto, Shelley Falconer and Stewart Ledgard drew on Beef + Lamb NZ economic service data (2018). Data relating to New Zealand's high country sheep farms were excluded to ensure the results reflected the farming of strong wool sheep only.

## The findings.



- The carbon footprint, expressed as Global Warming Potential (GWP100) for New Zealand strong wool was 46% less than the GWP100 located for wool in a popular LCA software programme.
- When LCA software does not contain NZ specific data it uses global averages which are significantly higher than New Zealand.
- Factoring in the carbon removals associated with on-farm vegetation reduced wool's carbon footprint by 29%.
- GWP\* is another way of looking at the impact of growing wool on the climate - treating methane as a short-lived gas. The GWP\* of New Zealand strong wool was 84% less than that of its footprint using GWP100.

# It's wool.

## Can sequestration be measured at a sector level?

Wool is produced as part of a living eco-system; with emissions and removals on-farm. Woody vegetation (made up of indigenous forest, mānuka/kānuka, exotic forest, indigenous shrubland and exotic scrub) covers around 2 million hectares, or just under 20 percent of all sheep farmland area in New Zealand, and around 77 percent of it is indigenous. Factoring in the carbon removals associated with this vegetation reduced wool's carbon footprint by 29%.

## GWP\* - another way of looking at the impact of growing wool on the climate.

Where GWP100 estimates the emissions impact on global warming when a product is produced, compared to the absence of the product, GWP\* answers a different question; what is the extra warming impact over a period of time and what is the direction of change in the warming impact? Gases such as carbon dioxide and nitrous oxide build up in the atmosphere over a long time (they have lifetimes of around 1000 and 300 years respectively). Methane is different. It is a short-lived gas and decays significantly within 12 years through natural processes.

Methane makes up 84% of on-farm emissions associated with wool production so it's important that methane's impact on global warming is considered intelligently. A recent Intergovernmental Panel on Climate Change (IPCC) report stated that if total methane emissions are decreasing by 0.3 percent or more each year (New Zealand sheep numbers have been decreasing over the last 30 years) then the activity is not creating any additional warming. If this is the case, GWP100 overstates the impact of methane when emissions are stable or decreasing by 3.5-4.5 times. The GWP\* of producing New Zealand strong wool is 84% less than the GWP100 of producing New Zealand strong wool.

**Combining GWP\* with on-farm sequestration shows that New Zealand wool has not added any additional warming over the last 20 years.**

As an agricultural nation, New Zealand has invested around \$80 million in initiatives to reduce greenhouse gas emissions, including methane, to meet national targets. These initiatives include; breeding low methane emitting sheep, alternative forages that contribute to a low methane diet, methane inhibitors, and more ([nzagrc.org.nz](http://nzagrc.org.nz)).

## Top takes from this work.

AgResearch's carbon footprint work tells us that brands relying on the information that feeds LCA software for New Zealand strong wool information may be overstating New Zealand wool's impact. Brands using New Zealand strong wool will benefit from using accurate data. The significant areas of woody-vegetation on New Zealand sheep farms has a dramatic effect in reducing the carbon footprint of wool. A more holistic way of reporting is required to capture the impact of producing wool.

The inclusion of GWP\* methodology illustrates that there are multiple ways to tackle impact measurement. UC Davis' CLEAR (Clarity and Leadership for Environmental Awareness and Research) Centre has a good explainer on GWP\*. As a point of note, GWP\* is not currently widely accepted and could not be substituted for GWP100 in an LCA that was intended to inform an Environmental Product Declaration (EPD).

## Details.

AgResearch is a New Zealand Government-owned Crown Research Institute. The same trio that did this work also published a report in The Environment Review Assessment Journal on the carbon footprint of New Zealand sheepmeat and beef, work commissioned by Beef + Lamb New Zealand and the Meat Industry Association. Wool Impact drew on the same dataset and on-farm allocation methodology as that work, but also explored the trials and tribulations of other allocation methodology.

In this study, the impacts of sheep farming were allocated between meat and wool. A biophysical allocation was used that saw 69% of the the impacts attributed to meat, and 31% attributed to wool. Currently, the costs of producing and selling New Zealand strong wool outweigh the revenue received on-farm. Some argue that wool therefore is a by-product of meat production. Best practice LCA suggests that where co-products can be separated by allocation methodology, they should be.

## What's next?

GWP is only one of 16 or so impact categories that can be measured using LCA, and that feed into an EPD. Wool Impact is now looking at how to credibly encompass all relevant impact categories.

In evidencing wool's impacts, it's important to know that LCA is essential but insufficient when it comes to representing all of the broader indicators of eco-system wellbeing; climate, land, water and living beings. Wool Impact is advancing a more holistic story of wool that better represents the many positive contributions wool production makes to Aotearoa New Zealand.