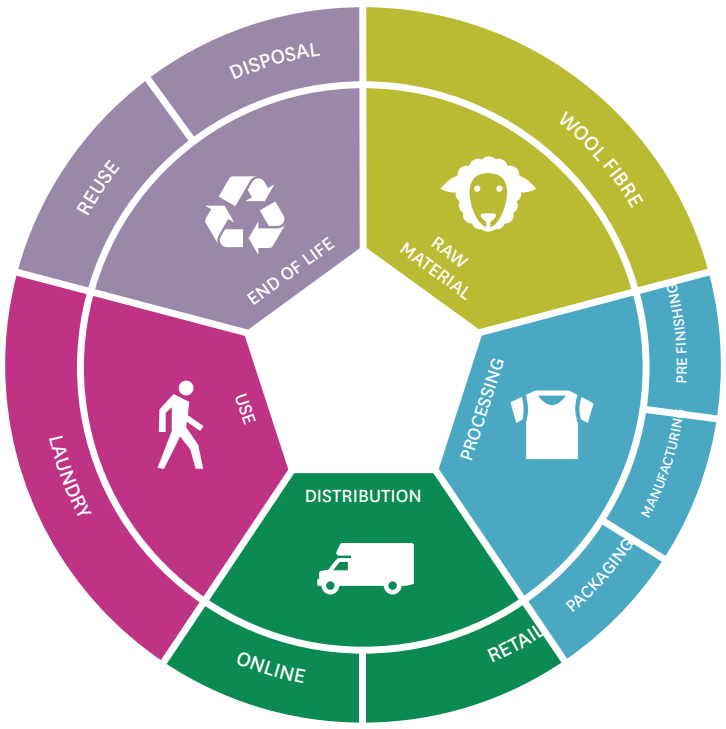
Collaboration with NZM farmers, supply chain partners and industry organisations.



SmartWool LCA Study

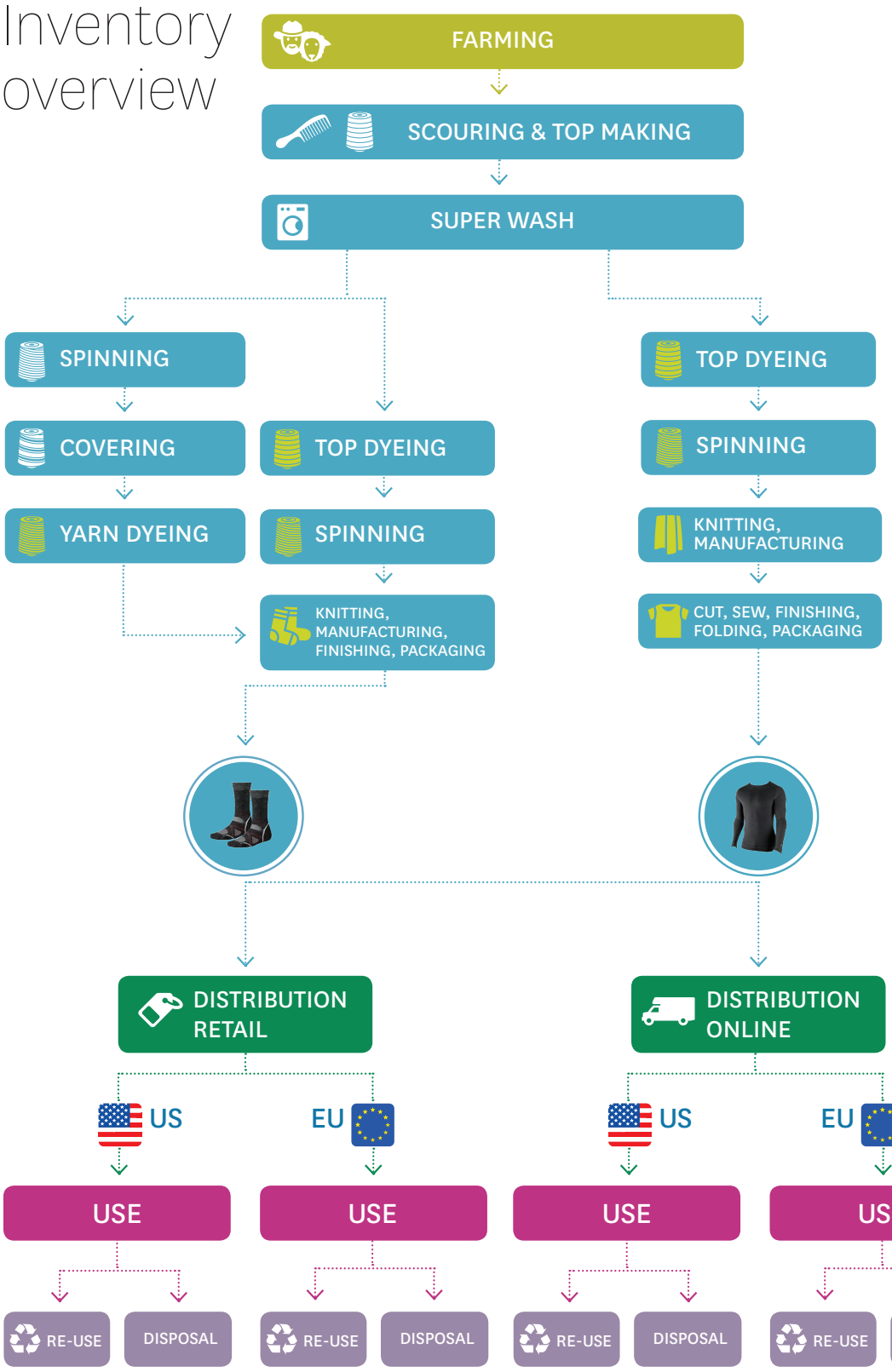
AIM

To benchmark the environmental impacts of two SmartWool products across their entire life cycle.

GARMENT
Mens next to skin
mid 250 crew in black

SOCKS
Mens PhD outdoor
medium crew socks
in charcoal

Inventory overview



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GLOBAL WARMING POTENTIAL

	EU scenario				US scenario			
Distribution	Online		Retail		Online		Retail	
End of life	Landfill	Reuse	Landfill	Reuse	Landfill	Reuse	Landfill	Reuse
Socks GWP (kg CO2 e)	7.44	7.45	9.17	9.17	6.78	6.79	8.52	8.53
Garment GWP (kg CO2 e)	33.11	33.14	34.85	34.88	32.73	32.76	34.48	34.51

Most of the global warming potential was associated with merino farming. GHG emissions on-farm are almost exclusively (94%) associated with methane from enteric fermentation (digestion process of ruminants) and nitrous oxide emissions from soils.

PRIMARY ENERGY DEMAND

	EU scenario				US scenario			
Distribution	Online		Retail		Online		Retail	
End of life	Landfill	Reuse	Landfill	Reuse	Landfill	Reuse	Landfill	Reuse
Socks PED (MJ)	73.44	73.34	98.25	98.02	53.29	53.19	77.91	77.81
Garment PED (MJ)	189.46	189.16	214.3	214	168.67	168.37	193.32	193.02

Primary energy demand was mostly driven by the processing of the wool and manufacturing of the products.

WATER CONSUMPTION

	EU scenario				US scenario			
Distribution	Online		Retail		Online		Retail	
End of life	Landfill	Reuse	Landfill	Reuse	Landfill	Reuse	Landfill	Reuse
Socks Water Consumption (kg)	66.46	66.45	69.49	69.48	115.73	115.72	127.31	127.3
Garment Water Consumption (kg)	190.62	190.58	193.65	193.61	297.97	297.93	309.54	309.5

Washing during the use phase was the main driver behind water consumption.

INSIGHTS

There was a gap in knowledge around merino apparel consumer washing and drying behaviour.

Many processing impacts were due to heating and cooling of facilities. Strategies to reduce these impacts could be further explored.

Carbon is captured in wool during the growing process and released at end of life. This process is very different to synthetic fibres. LCA methodology around renewability and the biodegrading of wool could be further explored.

Online purchasing had reduced impacts in comparison to retail pick up scenario.

Cold washing and air drying consumer messaging recommended.

Findings

- Global Warming Potential - Most of the global warming potential was associated with merino farming. GHG emissions on-farm were almost exclusively (94%) associated with methane from enteric fermentation (digestion process of ruminants) and nitrous oxide emissions from soils.
- Primary Energy Demand - Primary energy demand was mostly driven by the processing of the wool and manufacturing of the products
- Water Consumption - Washing during the use phase was the main driver behind water consumption.

Insights

- There was a gap in knowledge around merino apparel consumer washing and drying behaviour.
- Many processing impacts were due to heating and cooling of facilities. Strategies to reduce these impacts could be further explored.
- Carbon is captured in wool during the growing process and released at end of life. This process is very different to synthetic fibres. LCA methodology around renewability and the biodegrading of wool could be further explored.
- Online purchasing had reduced impacts in comparison to retail pick up scenario.
- Cold washing and air drying consumer messaging recommended.

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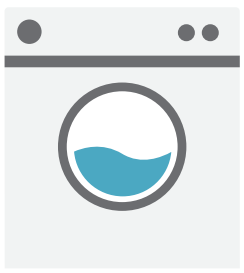
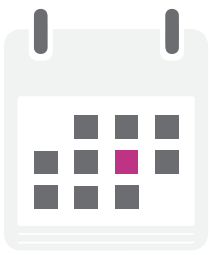
3300+ completed responses from SmartWool fan field testers via facebook link
(3,063 for socks, 257 for garments)

- 63% reported over ten wears of their SmartWool socks per month, with over half wearing them multiple times before washing.



- 83% reported over five wears of their SmartWool garment per month with 80% wearing it multiple times before washing.

- Cold machine washing most common washing method. For drying, tumble drying was the most popular method for socks and air drying for garments.



- Respondents reported that the service life for both socks and garments was not a single year, but longer. Most shared that their products were still going strong well after two years of wear.

- Compared to the default LCA use scenario of a one year service life and one wash per week, we found that SmartWool socks and garments were worn heaps but washed less often and lasted longer.

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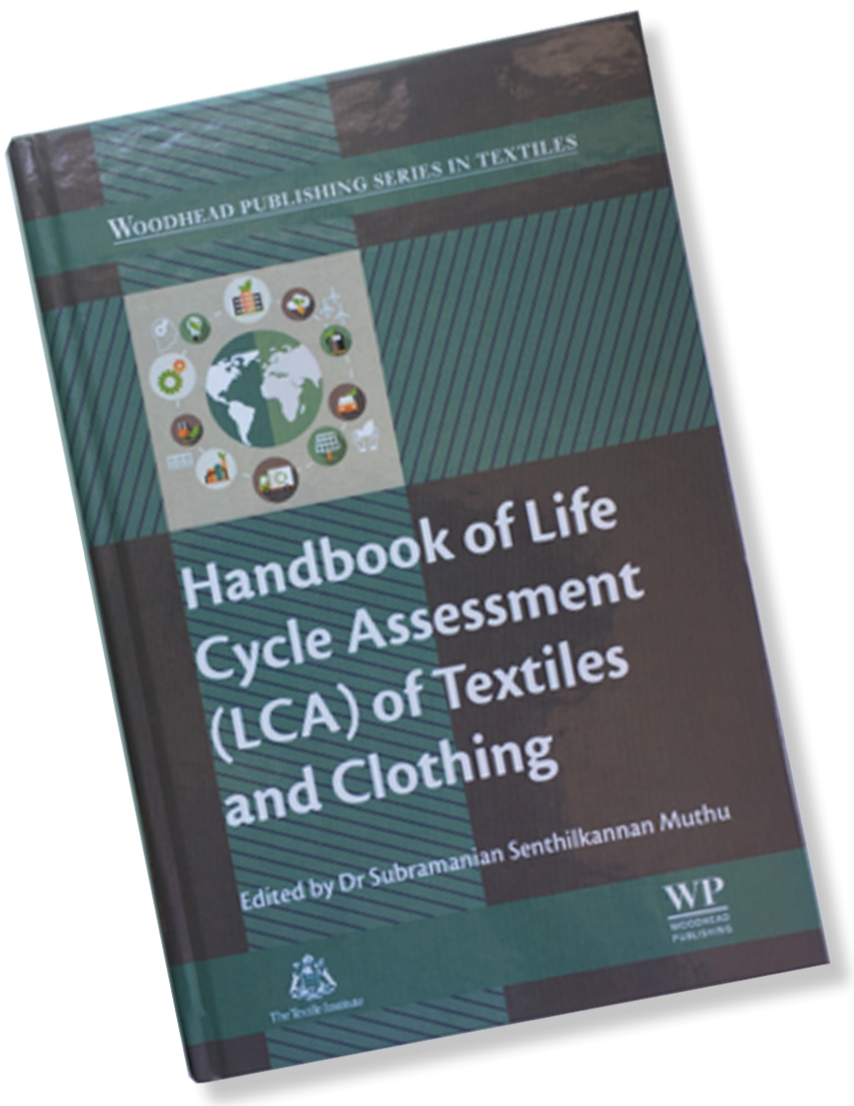
Wool LCA methodology - a work in progress

Follow-up work

- Case study in wool LCA book chapter (2015)
- Data submitted to IWTO towards SAC/MSI/Higg index wool data update (2015/2016)
- Additional impact categories (manufacturing phase) supplement report to include toxicity and eutrophication indicators. supplement report (2015)
- Waste water testing (2016)
- Use phase of wool apparel - supplement report (2016)

Wool specific considerations

- Wool and meat burden allocation
- Carbon sequestration
- Wool product lifespan and consumer use behaviour
- Sheep farming diversity, biodiversity and land use
- Recognition of renewable, biodegradable and safety attributes e.g. no microplastic pollution
- End of life global trends
- Product Category Rules and Environmental Product Declarations for wool products



Included as a case study in:

Muthu, S. (Ed.). (2015) Handbook of Life Cycle Assessment (LCA) of Textiles and Clothing. Woodhead, Cambridge

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