

merino INC. research

Functional Fabrics

This information comes from a three-year project managed by The New Zealand Merino Company (NZM). The project was jointly funded by Merino Inc and Technology New Zealand, with in-kind support from NZM and Designer Textiles International (DTI). The work was carried out in The Clothing and Textile Sciences Department at the University of Otago, Dunedin (www.otago.ac.nz/textiles).

Overview

The Functional Fabrics research programme was designed to prove scientifically what New Zealand merino growers have always known: that New Zealand merino fibre and fabrics have very special performance attributes that are ideal for the active outdoor sportswear market (AOS).

The project aimed to develop:

1. New products for targeted end-uses in the AOS market
2. Commercially valuable understanding of the performance of merino and merino-blend garments as they relate to the wearer ie evidence to back-up marketing campaigns.

Three distinct research phases were required to meet these aims:

1. Development of quantitative and qualitative measurement systems
2. Optimisation of fibre, yarn and textile fabrication
3. Testing of garment-wearer interactions.

Key outcomes

Marketing

- Significant and favourable differences in wearer comfort and performance (sensory and instrumental, subjective and objective) of trial participants wearing New Zealand merino and merino blend garments compared to polyester.
- Validation of performance benefits of New Zealand merino products providing added value to support a premium priced, differentiated product offering internationally.
- Valuable marketing information for sales and marketing staff throughout the supply chain.

New product development

- Development of knowledge and technology with respect to merino fabric testing and manufacture, which allows new market opportunities to be exploited in AOS and other sectors.
- Advanced understanding of the effect of fibre, yarn, fabric and finishing components on product performance, enabling the 'engineering' of merino products for specific functional end use in the AOS sector.

- Scientific publication of test methods to validate their relevance to the active outdoor sector and add integrity via acceptance by the international scientific community.
- Development of a leadership position in the supply of innovative New Zealand Merino products to the AOS .

Phase 1: Development of quantitative and qualitative measurement systems

Until now, most fabric performance tests were based on woven fabrics. This meant that before active outdoor sportswear fabrics could be tested, specific and relevant test methods had to be developed. These included tests for:

- air permeability
- water vapour permeability
- resistance to water
- drying time
- heat transfer properties (dry/wet)
- odour
- UV transmission

In recognition of the tough treatment dealt out to merino gear during manufacture and use, the following product performance factors were included in the testing methods:

- pre-treatment of fabrics (to ensure fabric stability prior to testing)
- dry/wet/damp (fabric properties change with varying amounts of water present)
- single/multiple layers (performance is affected by layers below and above)
- relaxed and extended (fabric properties differ with different conditions in use).

An immediate commercial advantage of this work is the positioning of NZM and DTI as leaders in providing innovative and proven merino fabrics for the AOS sector.

- DTI's MAPP (Merino Advanced Performance Programme) branding will likely become a significant ingredient brand recognised for quality, integrity and innovation in the AOS sector.
- New merino and merino-blend fabrics can now be tested during development, providing DTI and approved brand partners with a technological advantage.

Phase 2: Optimisation of fibre, yarn and textile fabrication

Fabrics specifically engineered for an active outdoor end-use are more likely to command a price-premium or preferred supplier status among garment manufacturers over generic, non-targeted fabrics presented by competitors.

This project has provided useful information on the effects of manufacturing processes on particular fabric properties. For example, the effects of colouration and batch, and the effects of applying a 'wicking' finish to the selected fabrics were investigated.

The results put end-users, including those at retail, in a better position to request and/or market products with particular properties and will help textile manufacturers to develop fabrics specifically designed to exhibit superior performance measures.

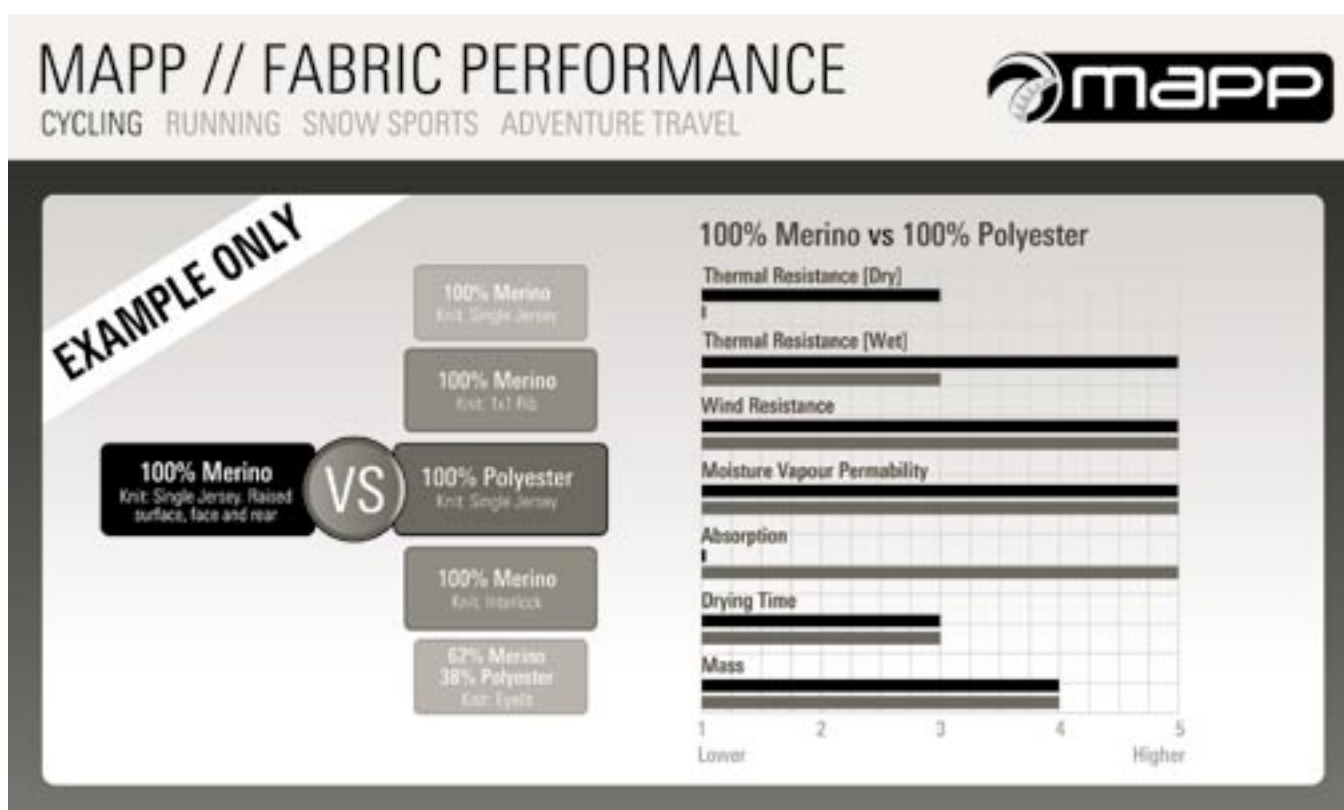
Phase 3: Performance scales and testing

Information provided by the new test methods allows particular fabrics to be given a performance rating from 1–5 based on how well they meet the desired attributes of a particular active outdoor sub-sector. However, as a survey of outdoor sports people found similarities between the desired attributes across the sub-sectors; road cycling, mountain biking, under/mid layer snow sports and travelling/hiking and camping, the rating scales have broad applicability.

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A diverse group of fabrics with varying fibre content (e.g. cotton, polyester, wool, blends) and structure (e.g. knits, wovens, other constructions) were tested using the new test methods to develop robust scales with intervals relevant to a wide range of apparel fabrics.

Tools such as the performance scales (see below) on which different performance attributes can be rated, enable users of New Zealand merino fabrics to significantly advance their technical 'sell-in' to purchasers of their fabric or garments and to encourage the technical 'sell-through' of these products at retail level in a format that is technically accurate, relevant and easily understood.



Garment-wearer interactions

Improved knowledge of interactions between garment and wearer is of great commercial value and is also the area where there was the least available knowledge prior to this project.

Accordingly, this part of the project set out to measure the physical and sensory responses of 10 well-trained male athletes resting, running and walking under controlled laboratory conditions (both hot and cold) to garments constructed from three different fabrics readily available in the AOS market.

The trial results showed some significant and favourable differences in comfort and performance for those athletes wearing New Zealand merino and merino blend garments compared to polyester interlock garments typical for AOS applications.

The diagram over the page outlines this part of the research.

Merino NZ inc.

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How does New Zealand Merino measure up for the active outdoors?

Clothing layers create a barrier to heat transfer from the body to the ambient environment (under 'normal' ambient conditions), and alter sweat evaporation from the skin. This results in increased skin and core temperatures, and reduced cooling efficiency during activity.

How will a fabric behave when in garment form and given a workout outdoors?

We measured physical and sensory responses of 10 'well-trained' male athletes to garments constructed from three knit fabrics:

1. 100% polyester, interlock, 230g/m²
2. 52% wool, 18.8 micron/ 48% polyester, plated/ eyelet, 207g/m²
3. 100% Merino wool, 18.8 micron, single jersey, 197g/m²

HEAT CONTENT OF THE BODY

Measurable differences were found when wearing garments made from the different fabrics.

TIME TO ONSET OF SWEATING

Measurable differences were found when wearing garments made from the different fabrics.

SKIN TEMPERATURE

Measurable differences were found when wearing garments made from the different fabrics.

SENSORY ANALYSIS

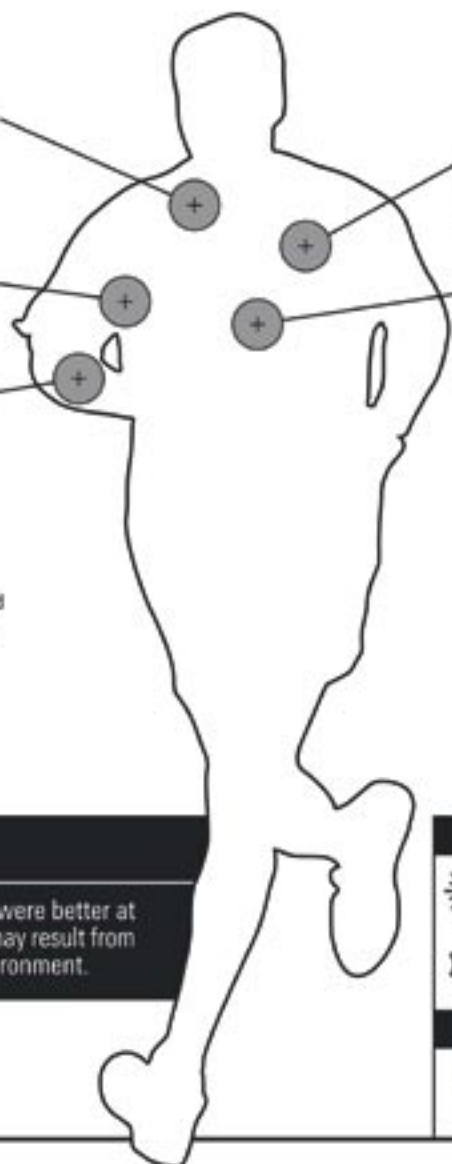
Thermal sensation and comfort, perceived exertion and sensation of wetness were measured.

HEART RATE

Measurable differences were found when wearing garments made from the different fabrics.

CORE TEMPERATURE

Measurable differences were found when wearing garments made from the different fabrics.



VERDICT

Merino single jersey garments were better at minimising fluctuations which may result from changes in exertion or the environment.

TEST ENVIRONMENT

- 32°C ± 2°C
20 ± 2% Relative Humidity
- 8°C ± 2°C
40 ± 2% Relative Humidity

ACTIVITY

- Rest, Run, Walk
- Motorised treadmill

This is a research summary. For further information contact: Gretchen Kane, International Marketing Manager, New Zealand Merino Company, phone 03 377 7990

