



Silkspun™ offers the best of both worlds

Silkbody™ has improved a traditional 100% silk fabric by combining silk with wool and cotton, not enough to affect drying time but enough to increase warmth (insulation) and decrease the rate of heat loss (heat transfer).

Silkbody's baselayer fabrics, Silkspun™ and Puresilk™, dried faster than other fabrics tested. This was true for fabrics dried both on the line and on a hot plate (the latter simulates fabric drying on the body). Silkspun™'s blending of 13% wool and 15% cotton is an improvement over traditional 100% silk baselayers. Silkspun™ was found warmer (more insulating) than Puresilk™ while still retaining moisture-absorptive and quick-dry properties. An overview of the study conducted at Clothing and Textile Sciences (University of Otago, New Zealand) study are summarised.

Silk and silk blend knitted fabrics

The **objective** was to determine and compare selected properties of four Silkbody™ silk and silk blend fabrics. Properties relevant to acceptability and performance of next-to-the skin knit garments were measured:

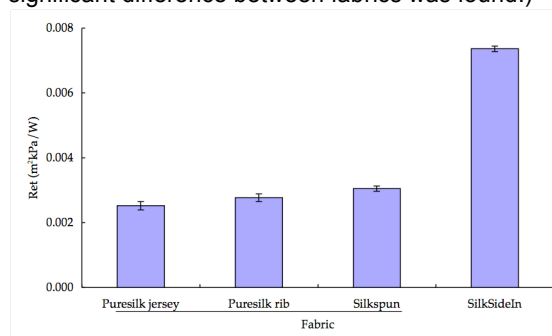
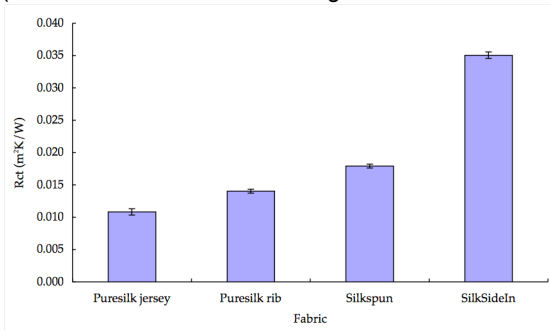
Fabric	Fibre content	Knit structure	Mass g/m ²	Thickness mm
Puresilk™	100% silk	single jersey	110.2	0.66
Puresilk™	100% silk	1x1 rib	185.0	0.92
Silkspun™	72% silk/15% cotton/13% wool	single jersey	158.9	0.74
SilkSideIn™	46% silk/54% wool	single jersey	330.0	1.68

Property	Test method
Mass	BS EN 12127:1998 Textiles – Fabrics – Determination of mass per unit area using small samples
Thickness	ISO 5084:1996 Textiles – Determination of thickness of textiles
Regain	"the ratio of the mass of moisture in a fabric to the oven-dry mass" (Denton and Daniels, 2002)
Water vapour permeability (WVP)	BS 7209:1990 BS specification for water vapour permeable apparel fabrics
Liquid Absorptive Capacity (LAC)	BS EN ISO 9073-6:2003 Textiles - Test methods for nonwovens - Part 6: Absorption
Heat transfer ('dry' and 'wet' thermal resistance)	ISO 11092: Textiles - Physiological effects - Measurement of thermal and water-vapour resistance under steady-state conditions (sweating guarded-hotplate test) (and derived values for warmth to mass and warmth to thickness ratios i.e. how warm the fabric would be if the weight (or thickness, as appropriate) were the same)
Thermal conductance	Heat flow through of dry and wet fabrics
Drying time	time to dry on a line; and time simulating drying while fabric/garment is worn (Laing, et al., 2007)

Results

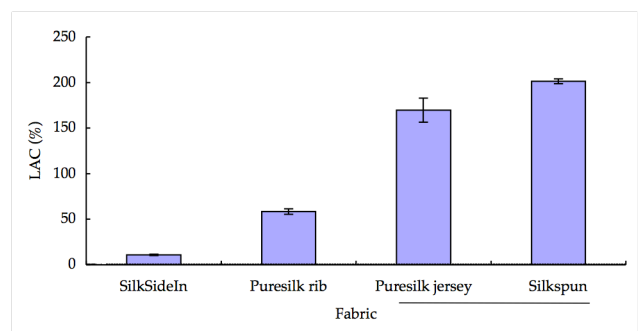
Figures below illustrate the key findings

- Insulation (warmth)** The 'dry' and 'wet' thermal resistance of dry fabrics was greatest for the SilkSideIn™, and least for the silk jersey, both for 'dry' (conduction, convection and radiative heat transfer) and 'wet' (evaporative heat transfer). (The lines under the x-axis in figures below indicate where no significant difference between fabrics was found.)

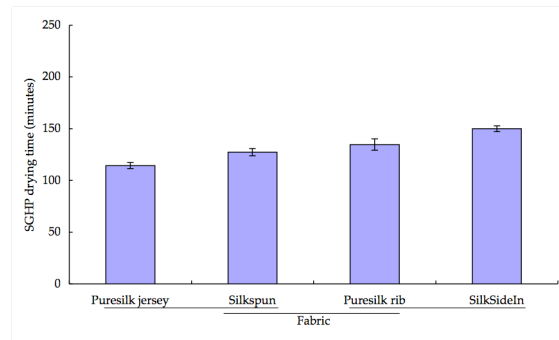
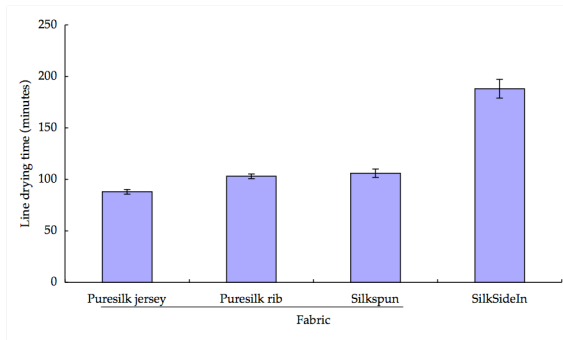


- Water vapour permeability** (measure of the passage of water vapour through fabrics) Results for all fabrics were similar.

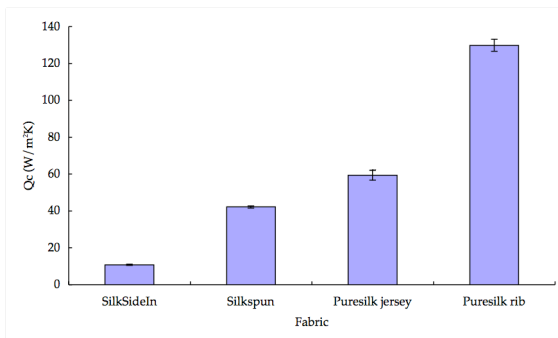
- Liquid absorptive capacity** (60s immersion in water, then weighed) SilkSideIn™ absorbed the least, with Silkspun™ and Puresilk™ were similar to each other, retaining the most water.



- Drying time** Puresilk™ and Silkspun™ dried the fastest (line drying and simulated on-skin drying). Silkspun™ includes cotton fibre (considered absorbent) but the drying time was no different to Puresilk™.



When line dried, SilkSideIn™ differed from the other three fabrics and, if a fabric/garment was worn wet and drying occurred on the wearer's warm body, the difference in drying time between Puresilk™ jersey (shortest) and SilkSideIn™ (longest - approximately 40 minutes longer) may be important because of heat loss.



When the fabrics were wet SilkSideIn™ conducted the least heat (lowest Qc) and was thus the most insulating, providing some compensation for the greater drying time. However, thermal resistance is closely related to thickness and mass, so the high insulation reflects the fact SilkSideIn™ was thicker and heavier than the other fabrics. Examining the warmth to thickness and warmth to weight ratios shows Silkspun™ is the warmest per unit mass and per unit thickness. While wet, the SilkSideIn™ was again the warmest and the Puresilk™ rib loses the most heat per unit mass and thickness. The Silkspun™ was the warmer yarn if all yarns fabrics were matched for mass and thickness.

Conclusions

1 When all properties of the fabrics are compared, similarities and differences become more apparent. Selection of the appropriate fabric depends on consumer preferences and end-use. All properties may need to be considered.

Property	Puresilk™ single jersey	Puresilk™ rib	Silkspun™	SilkSideIn™
Resistance to dry heat transfer	●	●●	●●●	●●●●
Resistance to wet heat transfer	●●	●●	●●	●●●●
Insulation when fabric is wet	●●	●	●●	●●●●
Mass	Y	Y Y Y	Y Y	Y Y Y Y
Thickness	▣	▣▣	▣	▣▣▣
Water vapour permeability	◆◆	◆◆	◆◆	◆
Liquid absorption capacity	◆◆◆	◆◆	◆◆◆	◆
Drying on line	⊕	⊕	⊕	⊕⊕⊕⊕
Drying on body	⊕	⊕⊕+⊕⊕⊕⊕	⊕+⊕⊕	⊕⊕⊕

2 The fabric with a higher proportion of wool (SilkSideIn™) absorbed more moisture and took longer to dry than the predominantly silk fabrics. SilkSideIn™ took the longest time to dry. This suggests that proportionately more water may have been held in the wool than in the silk structures.

3 Inclusion of wool fibre seems to improve thermal resistance of the fabric when dry but may adversely affect performance when wet (although not all fabrics were controlled for structure and for fibre). Examining the warmth to weight and warmth to thickness ratios showed the SilkSideIn™ wool blend fabric had higher 'dry' thermal resistance than the 100% silk fabrics. However, when wet, more moisture was retained and while drying took longer on the line, any difference was less apparent when the simulated on skin method was used. There may be a critical level at which wool content modifies water transfer behaviour and thermal resistance of the fabric. Silkspun™ 13% wool content appears to be below this level allowing positive properties of silk to be retained and adding further desirable properties of wool.

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Denton, M. J. and Daniels, P. N. eds. 2002. Textile terms and definitions. 11th ed. Manchester, Great Britain: The Textile Institute.

Laing, R. M., Wilson, C. A., Gore, S. E., Carr, D. J. and Niven, B. E. 2007. Determining the drying time of apparel fabrics. Textile Research Journal 77 (8): 583-590.