

SHEEP SKIN GLYCOGEN CONTENT RESPONDS TO LEVEL OF NUTRITION

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The outer root sheath of the wool follicle contains a store of glycogen. The role of this energy store in wool synthesis is not well understood but it has been observed that follicle glycogen content varies throughout the inherent follicle cycle (Shipman *et al.* 1955). Although the modern Merino has a very long anagen phase, wool synthesis ceases in a proportion of follicles due to nutritional factors at the break of season in the Mediterranean climate of Western Australia (Schlink and Dollin 1995). The objective of this experiment was to determine whether the glycogen content of Merino skin is responsive to changes in nutrition.

Fourteen Merino wethers were stratified by liveweight and randomly allocated to one of two groups (mean liveweight 33.9±1.40 kg; n=7). All sheep were fed a diet of 25% lupins, 73% wheaten chaff and 2% mineral mix. The control group received 1.3x maintenance for the duration of the trial. The low nutrition group were fed 0.75x maintenance for 12 weeks, then *ad libitum* to a maximum of 2x maintenance for six weeks. Glycogen content of skin strips was assayed enzymatically using a modification of the method of Chan and Exton (1976). Wool production was determined by periodically clipping 100 cm² midside patches.

The low nutrition group lost 17% of their liveweight to reach a minimum mean liveweight of 28.2±1.32 kg after 12 weeks, and after 6 weeks of refeeding their mean liveweight had increased to within 1.5 kg of the mean control value.

Skin glycogen concentration was depleted during the period of low nutrition and replenished when intake was increased (Figure 1a). Glycogen content of the low nutrition group was lower than the control group from weeks 5 to 12 (P<0.05). Wool production was reduced by 40% in the low nutrition group by week 12 and responded rapidly to the increase in nutrition (Figure 1b). There was a significant linear relationship between skin glycogen content and wool production ($r^2=0.70$; P<0.01).

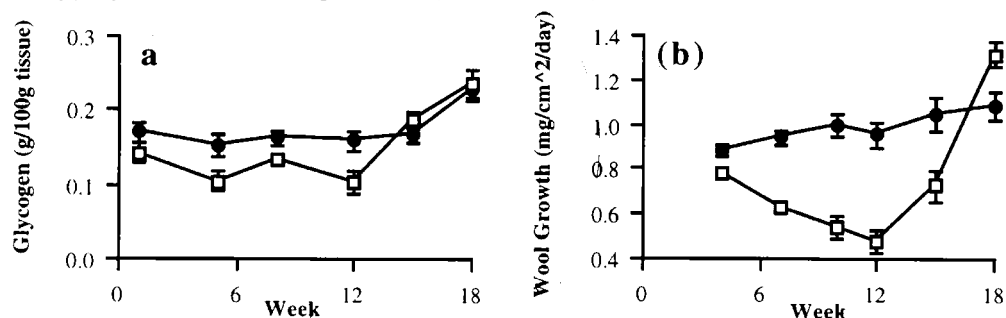


Figure 1. The effect of nutrition on (a) skin glycogen concentration and (b) clean wool production of sheep fed at 1.3x maintenance (circles) or 0.75x maintenance (squares) (weeks 1 to 12) then 2x maintenance (weeks 12 to 18) (±s.e.m.)

The results suggest that the glycogen stored in the skin is used by the follicle for wool production. It has been proposed that the energy store plays a role in cell division and/or keratinisation (Ryder and Stephenson 1968). Work is under way to examine the association of cell division rate with skin glycogen dynamics. Further investigation is required to determine whether depletion of glycogen stores limits wool growth, or whether less glycogen is required when wool production declines.

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