RESPONSE TO SELECTION FOR BETWEEN-SHEEP VARIATION 
IN FIBRE DIAMETER

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This experiment was designed to demonstrate that response to 
selection for reduced between-sheep variation in fibre diameter is 
biologically and commercially unimportant. Theoretical studies and 
experiments with laboratory animals suggest that response to such 
selection in quantitative characters is poor. A spate of recent 
published recommendations suggest, however, that this result is not 
widely known or accepted.

Adopting the approach of Howe and James (1973) it can be shown 
that the change in phenotypic variance after one generation of selection 
will be $h^2$ times the change made in the parents where $h^2$ is the 
heritability. This effect is halved where selection is in one sex. 
Similarly the total change at equilibrium will be about twice the change 
after one generation with continued selection.

Two groups of Polwarth rams' were selected from a drop- of 300 in 
order to maximise the difference in variance of fibre diameter measured 
on first adult fleece. The groups were each mated to 1200 Polwarth ewes. 
AI was used to ensure uniform influence of all rams. Wether 
progeny were measured for fibre diameter of first adult fleece.

The means and variances of the selected ram groups and their 
progeny are shown in Table 1.

TABLE 1: Means and between fleece variances in fibre diameter of 
selected ram groups and their progeny.

<table>
<thead>
<tr>
<th>Group</th>
<th>Rams No.</th>
<th>Rams Mean (μm)</th>
<th>Rams Variance (μm$^2$)</th>
<th>Progeny No.</th>
<th>Progeny Mean (μm)</th>
<th>Progeny Variance (μm$^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uniform</td>
<td>12</td>
<td>24.9</td>
<td>0.206</td>
<td>478</td>
<td>20.5</td>
<td>2.66</td>
</tr>
<tr>
<td>Variable</td>
<td>12</td>
<td>25.1</td>
<td>1.002</td>
<td>434</td>
<td>20.8</td>
<td>2.95</td>
</tr>
</tbody>
</table>

The ratio of progeny variances was $1.11 (0.1 > P > 0.05)$, the value that 
would be predicted if a heritability of 35 per cent was assumed. The 
experiment thus reasonably confirms the theoretical estimate of response.

There was no difference in the distribution of fleeces among 
visual fineness classes nor in the value of the lines made at shearing. 
The difference in variance of measured fibre diameter thus had no effect 
on the value of wool from the progeny groups.

Apart from providing no obvious advantages, selection aimed at 
reducing between sheep variation also limits the extent of directional 
selection for production characters.


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