BREEDING ANGORA GOATS FOR MOHAIR PRODUCTION

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SUMMARY
Moplan is a BLUP based performance recording system for the mohair industry and provides EBV's and Index values of performance based on the first two shearings. This paper examines the results of analysis of three drops and looks at lifetime performance of the animals to test the relationship between early assessment and later productivity. Genotype (the level of infusion of Texan genetic material) was found to be very important in determining productivity. While a significant correlation was found between Index and lifetime fleece value this was attributed to the level of Texan infusion. The paper raises the issue of whether genotype should be included in the Moplan analysis and whether it is appropriate to use BLUP analysis in a crossbred flock. With the further introduction of South African genetic material, it may be some time before the population settles down but Moplan still provides a powerful tool to identify superior young stock and assist in clarifying issues of selection, based on productivity.

Keywords: Angora goat, mohair, performance recording, crossbreeding.

INTRODUCTION
The objective of breeding Angora goats would seem obvious. Mohair fleece is clearly the product with fleece weight, uniformity and quality components including staple length, fineness and freedom from kemp effecting returns. However, the influence of the show ring and the hobby nature of many breeding enterprises has tended to reinforce traditional visual appraisal concepts and emphasise the aesthetic appearance characters over measured performance. To be accepted, performance recording systems must demonstrate an ability to identify superior animals. Indeed, simply defining superiority presents a problem in this debate.

Objective selection requires assessment techniques and a system of integrating the results to produce a selection index of true productivity. Moplan, a BULP based performance recording system, has been developed to assist breeders with this task. Scarth and May (1992) and Lollback and Stapleton (1995) describe the development of assessment techniques and the operation of the system.

Moplan relies on both measured and subjective assessments of the first two fleeces and early body growth. It produces both single trait EBV's (of body weight at 120, 180 and 360 days, scrotal circumference, fleece weight, staple length, subjective fineness and subjective kemp levels) and an Index combining these EBV's into a single measure of productivity using Relative Economic Values to weight the components.
This paper seeks to examine productivity of animals and the relationship between Index and lifetime performance in the industry context of introduced genetic material from Texas. This material has been shown to exhibit superior productivity and fibre quality compared to the Australian population (Stapleton 1991) and might be considered a different breed. It is of interest to determine if early genetic superiority as determined by Moplan Index is reflected in total lifetime fleece value which might be regarded as the ultimate test of superiority.

METHOD
Cudal Mohair Stud produces some 500 kids each year and all fleeces are weighted and classed at each shearing through the life of the animal. Following the processing of three drops of animals by Moplan, some 30 does from each of 6 genotypes ranging from pure Australian to pure Texan animals were selected on a “first come” basis. These animals were spread over three drops and to some extent represent a series of generations. Some 58 animals from this group had a full 8 recorded shearings and Moplan Index values.

From the last 5 National Mohair Pool Pty Ltd sales the average price of each of the main fleece types (accounting for yield, length, fineness and kemp characters) was calculated and these values were used to calculate each fleece value of the selected animals by multiplying the class value by the corrected 6 month fleece weight. Average fleece values for each shearing and genotype were calculated. Total fleece values were then calculated as a measure of progressive lifetime production. Correlation coefficients were calculated and multiple regression analysis carried out to determine the relative impact of Index and genotype on lifetime fleece value.

RESULTS
Table 1 summarises the genotype and age effects on fleece value. It can be seen that fleece value increases to about the fourth shearing and is greatest for the pure Texan genotype.

Table 1. Fleece value S (weight by class value/kg) by % Texan infusion over eight shearings

<table>
<thead>
<tr>
<th>Texan %</th>
<th>Fleece1 value $</th>
<th>Fleece2 value $</th>
<th>Fleece3 value $</th>
<th>Fleece4 value $</th>
<th>Fleece5 value $</th>
<th>Fleece6 value $</th>
<th>Fleece7 value $</th>
<th>Fleece8 value $</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7.97</td>
<td>16.50</td>
<td>12.16</td>
<td>13.87</td>
<td>11.59</td>
<td>11.63</td>
<td>10.01</td>
<td>10.48</td>
</tr>
<tr>
<td>37.5</td>
<td>10.74</td>
<td>15.30</td>
<td>15.93</td>
<td>14.98</td>
<td>14.93</td>
<td>15.26</td>
<td>15.23</td>
<td>14.98</td>
</tr>
<tr>
<td>50.0</td>
<td>12.09</td>
<td>17.51</td>
<td>17.06</td>
<td>18.37</td>
<td>16.04</td>
<td>17.35</td>
<td>14.35</td>
<td>15.82</td>
</tr>
<tr>
<td>75.0</td>
<td>10.03</td>
<td>22.27</td>
<td>21.11</td>
<td>22.28</td>
<td>19.14</td>
<td>18.18</td>
<td>16.56</td>
<td>20.09</td>
</tr>
<tr>
<td>87.5</td>
<td>10.38</td>
<td>22.48</td>
<td>20.48</td>
<td>23.66</td>
<td>20.11</td>
<td>23.18</td>
<td>17.52</td>
<td>19.48</td>
</tr>
<tr>
<td>100</td>
<td>11.41</td>
<td>24.03</td>
<td>24.05</td>
<td>25.04</td>
<td>19.15</td>
<td>21.73</td>
<td>18.34</td>
<td>20.20</td>
</tr>
</tbody>
</table>

Note. Shearings at 6 month intervals.
Table 2 summarises the genotype effect on Moplan Index and total fleece value to the second and eighth fleece point. Correlations between Moplan Index and total fleece value to the 2nd and 8th fleece point were 0.43 and 0.37 respectively (significant at 0.05%) and the correlation between Moplan Index and the percentage Texan infusion was 0.41 (significant at 0.05%).

Table 2. Genotype effect on Moplan Index and total fleece value to 2nd and 8th shearing

<table>
<thead>
<tr>
<th>Texan %</th>
<th>Moplan Index Greasy</th>
<th>2 Fleece Value ($)</th>
<th>8 Fleece Value ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>97.1 (4.0)*</td>
<td>23.97 (3.11)</td>
<td>93.06 (9.59)</td>
</tr>
<tr>
<td>37.5</td>
<td>98.7 (5.4)</td>
<td>26.50 (5.19)</td>
<td>119.09 (14.93)</td>
</tr>
<tr>
<td>50.0</td>
<td>109.0 (5.5)</td>
<td>31.60 (4.43)</td>
<td>132.65 (8.69)</td>
</tr>
<tr>
<td>75.0</td>
<td>104.7 (5.7)</td>
<td>28.13 (8.16)</td>
<td>145.85 (31.69)</td>
</tr>
<tr>
<td>87.5</td>
<td>107.7 (7.7)</td>
<td>32.08 (5.63)</td>
<td>155.44 (23.22)</td>
</tr>
<tr>
<td>100</td>
<td>116.3 (3.4)</td>
<td>36.19 (3.74)</td>
<td>163.83 (11.75)</td>
</tr>
</tbody>
</table>

* values inferred from model and may be overestimated since no 0% sires were used.

Multiple regression suggested that genotype rather than Index accounted for the variation in lifetime fleece values though both genotype and Index were significant factors in the variation of the value of the first two fleeces.

The respective regression equations and significance levels were:

Eight Fleece Value = 0.402(ns) I + 0.654 (***) T + 54.537

and

Two Fleece Value = 0.376(*** I) + 0.045 (*) T - 12.404

where I represents the Moplan Index and T the percentage Texan infusion.

This result suggests that the correlation between Index and lifetime fleece value is largely the result of a relationship between Index and genotype. Both Index and genotype are involved in determining the value of the first two fleeces.

DISCUSSION

The paper demonstrates that the introduction of Texan genetic material has made possible a dramatic improvement in returns from mohair production. The implications for this introduction for performance recording are significant. Moplan uses BLUP analysis techniques to estimate breeding
values and a selection Index based on the first two fleeces. Genotype effects are obvious with Australian Angoras recording an average Index of 97.1 grading to a pure Texan value of 116.3. It should be noted that the Australian value may be overestimated since this value was only inferred from the model and no kids sired from Australian bucks were examined in the three drops analysed under Moplan.

The model used to create the Index values makes assumptions as to economic weightings and various corrections for environmental effects. The objective is to achieve the most accurate breeding values for all animals in the flock. To a producer this information is important for selection but concerns exist as to the real effect on lifetime production of this selection and it is of interest to examine the relationship between the Index and measures of income actually received from fleece production later in life.

While there proved to be a significant correlation between Index and total fleece value to the eight fleece, this appears to be due to the correlation between Index and percentage infusion. From this study crossbreeding (upgrading) appears to be more powerful than selection and it would seem that genotype should be included as an adjustment factor in the BLUP equation.

In some ways it is not surprising that lifetime performance is poorly predicted by the Moplan Index in this population. Variation due to kidding and environmental factors increase as the animals age and the shape of the production curve varies with genotypes. This was first established during quarantine (Stapleton 1991). Fleece weights increase rapidly with age (especially with the Texan breed) and the Texan breed shows very low kemp levels at older age when Australian animals show dramatic increases in kemp content.

These results reinforce recommendations of care in the interpretations of BLUP based analysis (and any other form of analysis) in crossbreeding situations since the assumption of an homogeneous base population is clearly broken. Some concerns about using the Moplan index alone to predict animal superiority must therefore be expressed.

Further work is required to examine the effect of the new South African genotype which has been introduced to the Australian breeding population.

While there may be some shortcomings with the current Moplan analysis technique the use of objective selection should not be discounted. High performing young animals are of great value both for themselves and for producing superior progeny and the process of data collection provides a clear incentive to producers to examine the issues involved in concepts of quality and returns from fibre production.

It should be remembered that Moplan provides information on the performance of the individual and that predicted for its progeny, based on the performance of both the individual and its relatives. The system provides comparisons of sires and facilitates the selection of high performing animals.
As the population moves away from gross strain or genotype differences, the Moplan index should become more appropriate.

REFERENCES