Determination of Percentage of Medullated Fibres in Wool

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The dichlorobenzene method for the determination of percentage of medullated fibres is more precise as compared to the projection microscope method; 300-400 fibres should be observed for accurate assessment of the percentage of medullated fibres from wools of different qualities.

Medullation signifies the presence of a hollow canal inside the fibres; it is both a virtue and a drawback of Indian wools. Fragmented or partially medullated fibres in wools are an asset, whereas hairy or kemp fibres are detrimental, as these fibres break in processing and shed when the product is in use. The occurrence of medullation is relatively less in exotic wools and is limited to a few breeds. The precise estimation of the presence of pure, hetero and hairy type of fibres is of prime importance where emphasis is laid on the introduction of hetero type fibres and elimination of the hairy fibres in breeding programmes. The estimation of the percentage of medullated fibres is done according to Indian standard specification IS: 2899¹. In this standard, at least 450 fibres are observed and classified into three categories, namely, non-medullated (pure), partially medullated (hetero) and coarsely medullated (hairy) fibres. It is experienced that this way of observing may involve some alterations in comparison to the dichlorobenzene test². The partially medullated fibre may be counted into non-medullated or coarsely medullated ones, depending on the portion of the partially medullated fibre cut and observed³. This paper deals with such a probability. Also, an attempt has been made to assess the optimum number of observations required for the precise estimation of the percentage of medullated fibres in wools of different qualities.

Materials and Methods

Six divergent quality breed wools (48 - 56s), namely, Chokla, New Zealand, Malpura, Rambouillet (½ × Chokla (½), Rambouillet (½ × Malpura (½) and Rambouillet (½ × Malpura (½) were taken for the study. About 200 partially medullated fibres from each breed of wool were separated by the dichlorobenzene technique and slides were prepared according to the IS specification¹ to see whether they are projected as partially medullated or non-medullated fibres. The approximate length of fragments in the analysis taken was 0.4 mm. The mounting medium used was liquid paraffin.

To find the optimum number of fibres to be observed for the precise estimation of the percentage of medullated fibres, fibres from test samples of the six breeds were observed by the dichlorobenzene technique and counted into three categories accordingly. The full length of the fibre was dipped in dichlorobenzene for the purpose. Three test samples were prepared according to the standard and all the fibres in the test sample, about 700, 500 and 500, were observed and recorded in the record sheet so as to obtain a large number of observations for statistical analysis⁴. Analysis was done using the relation

\[ n = \frac{t^2 pq}{d^2} \]

where \( n \) is the number of observations, \( p \), percentage of fibres of a particular category, \( q = 100 - p \), \( d \), acceptable range of error, and \( t \) is confidence coefficient.

Results and Discussion

The observations made with the projection microscope from slides prepared from hetero type of fibres are presented in Table 1. It is seen that, in general, all the partially medullated fibres are not projected as they are, since some portions of them projected themselves as non-medullated fibres, depending on the portion which has been cut. Since these observations were made by cutting the mid portions of at least 200 fibres from each breed, this anomaly seems to be taken into account to decide the distribution of fibres into the three categories wherever a precise amount of medullation is required in a given sample.

The percentages of pure, hetero and hairy type of fibres observed in the six breeds by the dichlorobenzene method are given in Table 2. The three native breeds possessed hairy fibres as well, whereas such type
Table 1—Percentage of Non-medullated and Partially Medullated Fibres Observed from Partially Medullated Fibres under the Projection Microscope

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Wool</th>
<th>Quality</th>
<th>Non-medullated</th>
<th>Partially medullated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rambouillet (I) × Rambouillet (J)</td>
<td>56s</td>
<td>44</td>
<td>56</td>
</tr>
<tr>
<td>2</td>
<td>Chokla (I)</td>
<td>56s</td>
<td>49</td>
<td>51</td>
</tr>
<tr>
<td>3</td>
<td>Malpura (I)</td>
<td>48s</td>
<td>56</td>
<td>44</td>
</tr>
<tr>
<td>4</td>
<td>New Zealand</td>
<td>48s</td>
<td>57</td>
<td>43</td>
</tr>
<tr>
<td>5</td>
<td>Malpura</td>
<td>40s</td>
<td>8</td>
<td>92</td>
</tr>
<tr>
<td>6</td>
<td>Rambouillet (I) × Malpura (J)</td>
<td>44s</td>
<td>17</td>
<td>83</td>
</tr>
</tbody>
</table>

Table 2—Percentage of Non-medullated, Partially Medullated and Coarsely Medullated Fibres in the Wools Observed by Dichlorobenzene Method

<table>
<thead>
<tr>
<th>Wool No.*</th>
<th>Non-medullated (%)</th>
<th>Partially medullated</th>
<th>Coarsely medullated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>79</td>
<td>21</td>
<td>nil</td>
</tr>
<tr>
<td>2</td>
<td>71</td>
<td>29</td>
<td>nil</td>
</tr>
<tr>
<td>3</td>
<td>55</td>
<td>38</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>75</td>
<td>25</td>
<td>nil</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>49</td>
<td>41</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>65</td>
<td>30</td>
</tr>
</tbody>
</table>

*Wool Nos. correspond to wools at SI Nos. 1 - 6 in Table 1.

of fibres are not found in crossbred and New Zealand wool. From a large number of observations made, the number of observations required to know the percentage of fibres of different categories was calculated and the values are given in Table 3. It is observed that at 95% confidence coefficient and at 5% acceptable percentage of error, 300 - 400 fibres should be observed to precisely know the percentage of medullated fibres in 48 - 56s quality wools.

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References