The Effects of Poor Scouring Practice

Dr. Jock Christoe
Compromises involved in Wool Scouring

- cleanliness vs entanglement
- cleanliness vs fibre damage
- Cleanliness vs environment
Effect of Scouring on Subsequent Processing

- Residual contaminants
- Fibre entanglement
- Fibre damage
- Moisture levels
Comparative Processing Trials

- Commercial Wool Scours
  - IWS/CSIRO – 5 scours/two wools
  - ACIAR/CSIRO – 12 scours/ two series/two wools
  - ANDAR/CSIRO – 1 scour/ three configurations

- CSIRO Pilot Scour
Effect on Scoured Wool Properties

- Residual Contaminants
- Colour
Effect of Dirt on Colour

![Graph showing the relationship between whiteness (Y) and scourable solids (% cdw). The graph indicates a negative correlation, with whiteness decreasing as the percentage of scourable solids increases.]
Effect of pH on Yellowness
Effect of Residual Contaminants

- Accumulation
  - reduced processing performance
  - maintenance issues
- Processing additives
  - loss in wastes
  - change in properties
- Dust
  - Health issues
  - Yield
Relationship between Ash Content of Scoured Wool and Top

![Graph showing the relationship between ash content of scoured wool and top. The graph plots ash on top (%) against ash on scoured wool (%). There are two lines, one for skirting and one for fleece, indicating a positive correlation.]
Effect of Contaminants on Topmaking
Effect of Fibre Entanglement

- Fibre Breakage in Carding
- Increase in Noil (Romaine)
- Shorter Top
- Poor Spinning Performance
- Economic Loss
Causes of Entanglement

- Opening
- Mechanical
- Scouring Conditions
- Drying Conditions
## Effect of Opening on Entanglement

<table>
<thead>
<tr>
<th>Diameter (micron)</th>
<th>Greasy opened</th>
<th>Hauteur (mm)</th>
<th>Noil (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.3</td>
<td>no</td>
<td>71.0</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>70.1</td>
<td>6.6</td>
</tr>
<tr>
<td>21.3</td>
<td>no</td>
<td>68.6</td>
<td>6.3</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>65.7</td>
<td>7.3</td>
</tr>
<tr>
<td>22.0</td>
<td>no</td>
<td>74.6</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>75.2</td>
<td>4.4</td>
</tr>
<tr>
<td>25.7</td>
<td>no</td>
<td>86.0</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>82.1</td>
<td>3.6</td>
</tr>
</tbody>
</table>

G.A. Robinson 1986
Relationship between Hauteur and Romaine - IWS Trials

![Graph showing the relationship between Hauteur and Romaine. The graph plots Hauteur (mm) on the y-axis and Romaine (%) on the x-axis. The graph includes data points for Fleece and Skirting.](image-url)
Top Characteristics (ACIAR – First Series)

![Graph showing the relationship between Hauteur (mm) and Romaine (% noil). The graph compares suction drum scours and conventional long bowl scours. The suction drum scours show a higher Hauteur at lower Romaine values compared to the conventional long bowl scours.]
Top Characteristics (ACIAR – Second Series)

![Graph showing the relationship between Romaine (% noil) and Hauteur (mm). The graph indicates a negative correlation, with Hauteur decreasing as Romaine (% noil) increases.](image)
Fibre Damage

Graph showing the relationship between Bundle Strength (N/KTex) and pH.
Effect on Spinning Performance
Effect of Ash on Spinning

![Graph showing the relationship between End Breaks and Ash on Rovings (%)](image)
ACIAR Trials – First Series

![Graph showing the relationship between Hauteur (mm) and Tenacity (N/kTex). The graph indicates a negative correlation between the two variables as Hauteur decreases, Tenacity increases.](image-url)
ACIAR Trials – Second series

Graph showing the relationship between Hauteur (mm) and Tenacity (N/kTex) with Ends Down.
So What?
## Financial Implications

<table>
<thead>
<tr>
<th>PLANT</th>
<th>Reduction of 1% Romaine</th>
<th>Plant efficiency %</th>
<th>Product Value USD</th>
<th>Potential Gain USD/ann.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Greasy to top</strong></td>
<td>+10kg/hr</td>
<td>80</td>
<td>8.00 (10.00 – 2.00)</td>
<td>0.67M</td>
</tr>
<tr>
<td><strong>1,000kg/hr</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vertical – greasy to fabric.</strong></td>
<td>+3.5kg/hr</td>
<td>70</td>
<td>15/lin.metre (3m/kg)</td>
<td>1.32M</td>
</tr>
<tr>
<td><strong>350kg/h</strong></td>
<td></td>
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</table>
SUMMARY

- Scouring has a significant affect on topmaking performance
- Fibre entanglement can lead to substantial monetary losses
- Risk of fibre damage increases with pH