Complementary and Antagonistic Relationships between Breech Flystrike Indicator Traits and Key Production Traits

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AGBU

A national flystrike R&D technical update  1st August 2012
Introduction

- Breech fly strike difficult trait to directly select on
- Focus on breeding for resistance through indicator traits
- Wrinkle, wool cover and colour, dags and fleece rot
- Require correlations between indicator and production traits
- Across v within flock effects also an issue
Importance of visual traits

• Main goal to increase resistance to breech strike through indirect indicators
  – simultaneously with productivity improvements
Importance of visual traits ~ Other goals

– Robust resilient sheep
– Increased survival
– Smaller/less crutching
– Reduced reliance on chemicals
– Improved wool quality
  • Colour, character and fleece rot
– Reduced urine stain and dags
  • Contamination and flystrike
– Production
  • Some favourable / unfavourable associations
What data is available

• Sheep Genetics Database
  – Australia’s Genetic evaluation for sheep
• Industry ram breeder flocks
• Plus;
  • Sheep CRC Information Nucleus flocks
  • Australian Merino Sire Evaluation
  • Research Flocks
    – AWI breech flocks
    – SA Selection Demonstration Flock
    – QPLU$
Fly strike indicator traits

- Current
  - Breech and body wrinkle
  - Breech cover
  - Dags
  - Wool colour
  - Wool character
  - Fleece rot

- Future
  - Face Cover
  - Urine Stain
  - Others?
Visual Scoring ~ Breech Traits

Body wrinkle

Breech wrinkle – Lambs

Breech cover

Dag

Score 1 | Score 2 | Score 3 | Score 4 | Score 5
Visual Scoring ~ Wool Traits

Wool colour

Wool character

Fleece rot

Score 1  Score 2  Score 3  Score 4  Score 5
How much data is there?

- Wrinkle
- Breech Cover
- Colour
- Dag
Accuracy increasing
Why ASBVs

What about the effects of environment and nutrition

- Single or twin (-0.3 to -0.5)
- Born in a drought (-0.5 to -1.0)
- From a maiden dam (-0.1 to -0.2)

Need to select for genes, NOT nutrition
How heritable are these traits?

- Breech Cover
- Breech Wrinkle
- Body Wrinkle
- Colour
- Dag
- Fleece Rot

Heritability levels range from 10% to 50%.
Maternal effects?

Proportion of Phenotypic variance (%)

- Breech Cover
- Breech Wrinkle
- Body Wrinkle
- Colour
- Dag

Bar chart showing the proportion of phenotypic variance for different traits.
Why are across flock effects important?
## Correlations with breech wrinkle

<table>
<thead>
<tr>
<th>Trait</th>
<th>Across Flock (all animals)</th>
<th>Within Flock (Home-bred only)</th>
<th>Flock Average ASBV (Last 5 Yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight</td>
<td>-0.23 ±0.04</td>
<td>-0.14 ±0.05</td>
<td>-0.33</td>
</tr>
<tr>
<td>Fleece weight</td>
<td>0.26 ±0.04</td>
<td>0.20 ±0.05</td>
<td>0.04</td>
</tr>
<tr>
<td>Fibre diameter</td>
<td>-0.26 ±0.03</td>
<td>-0.22 ±0.05</td>
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### All visual traits ~ Preliminary

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<td>0.28</td>
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<tr>
<td><strong>Fleece weight</strong></td>
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<td>0.18</td>
<td>Nsd-0</td>
<td>0.32</td>
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<td><strong>FDCV</strong></td>
<td>0.10</td>
<td>0.27</td>
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<td><strong>Staple Length</strong></td>
<td>-0.10</td>
<td>-0.37</td>
<td>0.14</td>
<td>-0.20</td>
</tr>
<tr>
<td><strong>Staple Strength</strong></td>
<td>-0.03</td>
<td>0.05</td>
<td>-0.11</td>
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Sire Variation ~ Wrinkle & Fleece Weight
Within types
Across Flock Averages ~ Wrinkle & Fleece Weight
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<th>Body Wrinkle</th>
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<td>Nlb</td>
<td>-0.18 (0.07)</td>
<td>-0.12 (0.08)</td>
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<tr>
<td>Nlw</td>
<td>-0.19 (0.08)</td>
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Unfavourable Favourable
## Correlations within visual traits

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<tr>
<td>Body Wrinkle</td>
<td>0.29</td>
<td><strong>0.68</strong></td>
<td></td>
<td></td>
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<tr>
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<td>-0.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dag</td>
<td>0.07</td>
<td>0.16</td>
<td>0.14</td>
<td>-0.09</td>
<td></td>
</tr>
<tr>
<td>Fleece Rot</td>
<td>0.02</td>
<td>-0.07</td>
<td>0.11</td>
<td><strong>0.71</strong></td>
<td>-0.13</td>
</tr>
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Introduction of ASBVs for wrinkle
Emphasis variable between flocks

- **Flock A**
- **Flock B**

The graph shows the trend of emphasis variable over the years from 2005 to 2011, comparing Flock A and Flock B.
Response in other traits for Flock B
Conclusions

• Clear differences between within flock and across flock correlations
  – Some favourable
  – Some antagonistic
  – No bigger than Fleece Weight v Fibre Diameter

• Research flocks have demonstrated power of across flock selection
  – SDF and T13

• More traits in future eg. Urine stain and face cover
Conclusions

• Sire selection strategies
  – There are high indexing, high fleece weight, low winkle, low dag, low cover sheep and flocks
  – Opportunities already exist for across flock selection to make significant improvements
  – Need to balance all traits, Top sires by definition break the correlation averages
  – Will influence the selection responses achieved
• Multiple predictions required?
• Care required when selecting across flock
Acknowledgements