MAKING CHOICES: PREFERENCE-BASED APPROACHES TO DERIVING BREEDING GOALS

T.J. Byrne, P. R. Amer, K. F. Smith, P. F. Fennessy, and P. Hansen

Application to sheep, dairy cattle, and plant breeding
Introduction

- Scientists design breeding goals
- Not always the same as farmers breeding goals
- How can we better develop breeding goals that align the opinions of scientists and farmers?
Survey methodology

- Software called *1000Minds*
- Allows surgeons to rank patient for heart surgery in a fair way
- Objective and transparent
- Very successful in the health system
- Used widely in all sorts of fields
We used it for

- Ranking the importance of traits
  ... for wool sheep in Australia (Meat & Livestock Australia)
  ... for dairy cattle in New Zealand (DairyNZ)
  ... for meat sheep in Ireland (Sheep Ireland)
  ... for pasture plants in Australia (Dairy Futures CRC, Meat & Livestock Australia)
For the Australian fine-wool industry we want to:
- Rank the importance of traits
- Assess whether breeding objectives align with industry expectations
- Determine differences in trait ranking across the range of varying wool types within the industry

- Understand the opinions of farmers
- Design better breeding goals
Wool sheep

- Surveyed breeders and farmers of fine-wool sheep

- General information survey:
  - Direction
    - Fine wool retaining wethers, dual purpose, or Merino wool selling wethers
  - Category
    - Registered or commercial breeder, or ram buyer
  - ...

- 1000Minds survey
Which of these 2 (hypothetical) flocks do you prefer? (given they're identical in all other respects)

(Left)
- Increase adult clean fleece weight by 0.5 kg

or

(Right)
- Increase hogget weight by 5 kg

Trade off
Results - General

- 350 breeders/farmers completed the survey
- Largest respondent groups were:
  - Over 50 years-of-age
  - Registered breeders
  - Merino wool producers selling surplus animals
Results - General

- Wool style percentages from survey:
  - 17% medium
  - 37% fine-medium
  - 27% fine
  - 16% super-fine
  - 4% ultra-fine

- Balanced industry representation
### Results – trait ranks

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<thead>
<tr>
<th>Trait</th>
<th>Rank (farmers)</th>
</tr>
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<tbody>
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</tr>
<tr>
<td>Fleece weight</td>
<td>2</td>
</tr>
<tr>
<td>Hogget weight</td>
<td>3</td>
</tr>
<tr>
<td>Worm egg count</td>
<td>4</td>
</tr>
<tr>
<td>Staple strength</td>
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<td>Fibre diameter</td>
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<th>Correct rank?</th>
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The traits marked with a red circle indicate the traits that are of particular interest for further analysis.
Results

- Lower preference for improvements in fibre diameter
- Higher preference for improvements in worm egg count
- Customised indexes & ram rankings for specific farming circumstances
Results

- By direction
  - Fleece weight most important fine wool breeders least important dual purpose breeders
  - Strength most important fine wool breeders least important dual purpose breeders
Results

- By category
  - Hogget weight most important for commercial breeders, least important for ram buyers
  - Breech wrinkle most important for ram buyers, least important for registered breeders
  - Length most important for registered breeders, least important for ram buyers
Programme design

1. Choose breeding goal
2. Define breeding objective
3. Choose appropriate selection criteria
4. Design breeding scheme including genetic evaluation system

Alignment of breeding objective with industry expectations
Relevance of selection criteria
Obtain mandate for change
Key points

- **1000Minds** method:
  - Objective and fair
  - Farmer input
  - Informative
  - Develop breeding goals which align to the opinions of scientists **and** farmers