Exploring farmers’ attitudes and preferences to inform the development and implementation of breeding tools

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Farmers' use of breeding tools and participation in programs

Highly influenced by:

1. Farmers' preferences for animal traits
2. Farmers' attitudes towards breeding tools
1. Trait preferences: Analysis of Australian dairy farmers

2. Attitudes: Development of a scale for measuring farmers attitudes
Background. Why analyse farmers preferences?

1. There is no economic data (EW)
   Community based breeding programs

2. Farmers do not feel represented by selection indexes
   Miss important traits, disagree with weights

3. Preferences based on economic and non-economic criteria
   Farming style, type of animals (social and cultural identity)
Background. How analyse farmers preferences?

1. **Simplest method**: Ranking or ad-hoc weights

2. **Pairwise comparisons**: AHP, *1000minds software

3. **Choice experiments**: Realistic but complex

What is the aim of our research?
Analysis of AUS dairy farmers to inform development of selection indexes

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J.E. Pryce (La Trobe Univ.)
Review of the AUS dairy selection index. Aims

1. **Engage** the industry and boost adoption

2. **Ensure** NBO remains relevant on driving on-farm profit

3. Index(s) based on **scientific** principles but in line with farmer **preferences**:

   - Combining **Economic principles**
   - Farmer desired gains

**National Breeding Objective**
Survey method. Question example

- Preferences for improvements rather than for traits per se
- Non-economic component
Survey outcomes. Average farmer preferences
Survey outcomes. Preferences PCA
Production focused farmers

- **Production**: Protein yield, Feed efficiency
- **Functional**: Protein yield, Feed efficiency
- **Type**: Protein yield, Feed efficiency
Functional focused farmers
Type focused farmers
Selection Indexes

**Balanced Performance Index (BPI)**
- Economic index
- Blends production, type and health traits for maximum profit
- In line with farmer preferences

**Health Weighted Index (HWI)**
- Fast track fertility and mastitis resistance

**Type Weighted Index (TWI)**
- Fast track type

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Pie charts showing different indices with various categories:
- Current (APR)
- Balanced Performance Index
- Health Weighted Index
- Type Weighted Index

Categories include:
- ASI – Production
- Fertility
- Cell Count
- Feed Efficiency
- Type
- Survival
- Workability
Future research questions

Are stated preferences different from real farmer choices?

How different are they?
Development of a reference measure of farmers’ attitude towards breeding tools

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PLEASE, INDICATE HOW MUCH YOU AGREE/DISAGREE WITH EACH OF THEM.

j) The appearance of progeny fully indicates how good the bull/cow is.

- Totally disagree
- Disagree
- Somewhat disagree
- Somewhat agree
- Agree
- Totally agree

b) Using genetic merit (breeding value) to select bulls/cows improves the performance of cattle better and faster than other ways of selecting.

- Totally disagree
- Disagree
- Somewhat disagree
- Somewhat agree
- Agree
- Totally agree
- (I do not know / I do not have an opinion on this)
Background

- To analyse attitudes we have to measure them

- Psychometry: clear and tested methods (Thurstone, 1928)

- We aim to develop a reference measure of attitudes

- Other fields:

  New Environmental Paradigm (Dunlap et al., 2000)
Attitudinal scales design

- Fixed set of statements (items); agreement scores

b) Using genetic merit (breeding value) to select bulls/cows improves the performance of cattle better and faster than other ways of selecting.

- Totally agree
- Agree
- Somewhat agree
- Somewhat disagree
- Disagree
- Totally disagree

Likert scales (Likert, 1932)
1. Item construction: designed to cover all relevant aspect

2. Psychometric properties evaluation:
   - **Reliability** (Cronbach’s α)
   - **Validity**

3. Dimensionality of the scale: **Factor analysis**
Animal breeding paradigms

- A priori dimensions covering 3 breeding paradigms:
  
  1. Traditional breeding: animal appraisal
  2. Genetic breeding: EBVs selection
  3. Genomic breeding: gEBVs
<table>
<thead>
<tr>
<th>Statements</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td>The appearance of a bull/cow is sufficient for telling its performance.</td>
</tr>
<tr>
<td></td>
<td>The appearance of progeny fully indicates how good the bull/cow is.</td>
</tr>
<tr>
<td></td>
<td>...</td>
</tr>
<tr>
<td>Genetic</td>
<td>Using genetic merit (breeding value) to select bull/cows improves the performance of beef</td>
</tr>
<tr>
<td></td>
<td>better and faster than other ways of selecting.</td>
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<td></td>
<td>...</td>
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<tr>
<td></td>
<td>...</td>
</tr>
<tr>
<td>Genomic</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>It is important that opportunities for selection of beef with genomic and DNA/gene</td>
</tr>
<tr>
<td></td>
<td>information are fully utilized.</td>
</tr>
<tr>
<td></td>
<td>Genomic and DNA/gene information will be the only information used to select bull/cows in</td>
</tr>
<tr>
<td></td>
<td>the future.</td>
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<td></td>
<td>...</td>
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- 14 initial items ➔ Cronbach’s α ➔ 8 final items
# Sheep and beef farmer population sample

<table>
<thead>
<tr>
<th>Country</th>
<th>Breeds</th>
<th>n</th>
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<tbody>
<tr>
<td><strong>Beef</strong></td>
<td></td>
<td>total</td>
</tr>
<tr>
<td>Australia</td>
<td>International 1</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>International 2</td>
<td>23</td>
</tr>
<tr>
<td>New Zealand</td>
<td>International 3</td>
<td>23</td>
</tr>
<tr>
<td>Spain</td>
<td>Local 1</td>
<td>59</td>
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<tr>
<td></td>
<td>Local 2</td>
<td>26</td>
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<td>Local 7</td>
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<td></td>
<td>Crossbreed</td>
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<tr>
<td><strong>Dairy sheep</strong></td>
<td></td>
<td>total</td>
</tr>
<tr>
<td>Spain</td>
<td>International 4</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Local 8</td>
<td>11</td>
</tr>
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<td></td>
<td>Local 9</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Local 10</td>
<td>41</td>
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</table>

Total 618
## Factor analysis results: Dimensions

<table>
<thead>
<tr>
<th>Attitudinal paradigm</th>
<th>Items</th>
<th>Attitudinal dimension (Factor Analysis)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
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<tr>
<td>Traditional breeding</td>
<td>The appearance of a bull/cow is sufficient for telling its performance.</td>
<td>0.066</td>
</tr>
<tr>
<td></td>
<td>The appearance of progeny fully indicates how good the bull/cow is.</td>
<td>0.085</td>
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<tr>
<td></td>
<td>Using genetic merit (breeding value) to select bull/cows improves the performance of beef better and faster than other ways of selecting.</td>
<td>0.505</td>
</tr>
<tr>
<td></td>
<td>Combining information from several traits into selection indices is the best way to summarise genetic merit information (breeding values).</td>
<td>0.570</td>
</tr>
<tr>
<td>Genetic &amp; Genomic breeding</td>
<td>The use of genomic and DNA/gene information to select bull/cows will improve the performance of sheep better and faster than any other method.</td>
<td>0.736</td>
</tr>
<tr>
<td></td>
<td>It is important that opportunities for selection of beef with genomic and DNA/gene information are fully utilized.</td>
<td>0.712</td>
</tr>
<tr>
<td></td>
<td>Genomic and DNA/gene information will be the only information used to select bull/cows in the future.</td>
<td>0.614</td>
</tr>
<tr>
<td></td>
<td>It is important that opportunities for selection of beef cattle with new genetic developments (transcriptomics, epigenetics, gene regulation networks and metagenomic) are fully utilized.</td>
<td>0.733</td>
</tr>
</tbody>
</table>
Results. Attitudes across sample; species
Results. Species

$G \& G$ factor score  —  Tradicional factor score
Results. Beef breeds
Results. Education

- Basic
- Secondary
- Technical training
- University
- Post-graduate
Results. Farm ownership structure
Results. Production system
Results. Farming family
Uses of reference measure

- Benchmark farmers’ attitudes over time...
- ...across groups of farmers, breeds, livestock species, countries and world region

- To design tailored extension activities
- Assess the impact of extension
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Thank you!

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