Breeding for quality lamb meat from Merinos

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Background

• Merinos ➔ role in wool and meat production systems
  • Self-replacing Merino flocks
  • Dual purpose selection indexes via MerinoSelect (DP, DP+)

• Increasing consumer preferences for lamb of premium quality

• Decline in meat quality from selection for lean meat yield in other breeds

• Implications for Merino breeding programs
  • Intramuscular fat (IMF), shear force (tenderness)
  • pH
  • Meat colour, mineral content
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  • Meat colour, mineral content
Intramuscular fat (IMF)

- Key driver of eating quality
  - Tenderness
  - Juiciness
  - Flavour

- 4 % IMF lower limit

- 4.6 % average IMF level in Merinos
  - Information Nucleus flock
  - 1200 Merino records
Variation in IMF of Merino lamb loins

Source: Information Nucleus flock carcass data
Meat quality traits

- Determined post mortem
- pH
  - Colour
  - Tenderness
  - Shelf-life of lamb
- High pH
  - Dry, firm and dark-cutting meat
  - Acceptable at 5.7 and below
Meat quality traits

- Shear force (tenderness)
- Fresh meat colour (lightness, redness)
- Retail colour stability
- Nutritional value
  - Iron content of the muscle
  - Zinc content
pH - variation in Merino lamb loins

Source: Information Nucleus flock carcass data
Shear force (tenderness) - variation in Merino lamb loins

Source: Information Nucleus flock carcass data
Retail colour stability of Merino lamb loins

Source: Information Nucleus flock carcass data
Variation in iron content of Merino lamb loins

Source: Information Nucleus flock carcass data
How do Merinos perform in meat quality?

Source: Information Nucleus flock carcass data

<table>
<thead>
<tr>
<th>Trait</th>
<th>Target</th>
<th>Mean</th>
<th>Range</th>
<th>Heritability</th>
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<tbody>
<tr>
<td>IMF (%)</td>
<td>4 - 5</td>
<td>4.6</td>
<td>1.9 – 10.4</td>
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<td>pH</td>
<td>5.7</td>
<td>5.7</td>
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<tr>
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<td>31.0</td>
<td>12.3 - 95.1</td>
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<tr>
<td>Fresh colour redness</td>
<td>9.5</td>
<td>18.5</td>
<td>10.9 - 28.6</td>
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<td>34.1</td>
<td>24.4 – 47.0</td>
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<tr>
<td>Retail colour stability</td>
<td>3.3</td>
<td>3.2</td>
<td>2.0 - 6.4</td>
<td>Low</td>
</tr>
<tr>
<td>Iron content</td>
<td>20</td>
<td>22.1</td>
<td>12.0 - 39.9</td>
<td>Moderate</td>
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<tr>
<td>Zinc content</td>
<td>20</td>
<td>25.9</td>
<td>14.2 - 44.9</td>
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</table>
Eating quality traits

- Tenderness
  - Soluble collagen
  - IMF
- Juiciness
  - IMF
  - Protein structures
- Flavour
  - Fatty acid profile
  - Protein and lipid oxidation
- Overall liking
## Relationships with yearling wool production traits

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<tr>
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<th>yCFW</th>
<th>yFD</th>
<th>yWT</th>
<th>ySS</th>
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<td><strong>Shear force</strong></td>
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<tr>
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<tr>
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## Relationships with key production traits

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<tr>
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## Relationships among meat quality traits

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<th>pH</th>
<th>Redness</th>
<th>Lightness</th>
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Summary

• Improving meat quality in Merinos is feasible
  • Traits are heritable
  • IMF, pH and iron content

• Generally meat quality traits little affected from breeding emphasising wool production
  • Low to negligible genetic relationships
  • Monitor traits
    IMF where fleece weight is emphasised
    pH where fibre diameter is emphasised

• On-going research gathering more data
  • More accurate heritability and genetic relationships
  • More genetic relationships ➔ reproduction and welfare traits
Summary

- Breeding for quality lamb from Merinos
  - Breeding objectives
  - Indexes to improve meat quality while managing changes in other traits
  - Genomic information ➔ ASBVs e.g. eating quality indexes for terminal sire breeds

(Source: Sheep Genetics web site, accessed 16/07/2019)
Acknowledgments

Innovative research undertaken by the meat science and genetics programs of the Sheep CRC underpins this work.
Thank you

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