Siblings stop lambs reaching their potential

Khama Kelman, Clair Alston, David Pethick, Graham Gardner
Lamb weight and growth
Lamb weight and growth
Breeding Objectives

- Large
- Lean
- Muscle
Breeding Objectives

- Large Post Weaning Weight/Growth
- Lean
- Muscle
Breeding Objectives

- Large Post Weaning Weight/Growth
- Lean Post Weaning Fat Depth
- Muscle
Breeding Objectives

➢ Large Post Weaning Weight/Growth

➢ Lean Post Weaning Fat Depth

➢ Muscle Post Weaning Eye Muscle Depth
Breeding Objectives

- **Large** Post Weaning Weight/Growth
- **Lean** Post Weaning Fat Depth
- **Muscle** Post Weaning Eye Muscle Depth
Nutrition and Growth Hypothesis

Increased Growth Breeding Value
Heavier lambs

Restricted nutrition
Reduced response
Nutrition and Growth Hypothesis

Increased Growth
Breeding Value
Heavier lambs

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Siblings?
Information Nucleus Flock

- Sheep Co-operative Research Centre
- 8 sites across Australia with diverse climates
- 100 key industry sires per year
- Terminal, Maternal and Merino sires
Information Nucleus Flock

17,525 lambs

164,797 weights
Growth Curves
Growth Curves
Growth Curves

- Individual Fit - Brodys
  - 3 weights required
  - Predicting at the edge of the data
  - No inference from similar animals

- Population Fit - Random Regression
Growth Curves

$R^2 = 0.99$
$\text{RMSE} = 0.93 \text{ Kg}$
Weight Prediction Model

Fixed Effects*Age^3
- Birth type-rear type
- Age of dam
- Site
- Year of birth
- Gender
- Sire type
- Dambreed within Sire type

Random Effects*Age^3
- Sire
- Dam by year of birth
- Individual

Covariates*Age^3
- Growth
- Leanness
- Muscling

Multivariate normal and half couchy priors, Gibbs sampling
Analysis

Fixed Effects
- Birth type-rear type
- Age of dam
- Site
- Year of birth
- Gender
- Sire type
- Dambreed within Sire type

Random Effects
- Sire
- Dam by year of birth
- Individual

Covariates
- Growth
- Leanness
- Muscling
# Production Effects

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<th>Variable</th>
<th>Level</th>
<th>Birth weight (kg)</th>
<th>Wt day 100 (kg)</th>
<th>Wt day 150 (kg)</th>
<th>Wt day 240 (kg)</th>
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<tr>
<td>Sex</td>
<td>F</td>
<td>4.56 ± 0.02</td>
<td>26.63 ± 0.14</td>
<td>32.52 ± 0.11</td>
<td>40.61 ± 0.08</td>
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<td>M</td>
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<td>28.22 ± 0.14</td>
<td>34.25 ± 0.11</td>
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<td>31</td>
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High Growth-Multiple Births

![Graph showing growth breeding value vs weight for different sire types. Green line represents Maternal, blue line represents Merino, and red line represents Terminal. Data points are plotted for each sire type.](image-url)
High Growth-Multiple Births

Weight (Kg) vs Sire Growth Breeding Value

Correlation: 0.42
High Growth-Multiple Births

Weight (Kg)

Sire Growth Breeding Value

-5 0 5 10 15 20

0.42

0.30

1 1

2 1

2 2
High Growth-Multiple Births

![Graph showing the relationship between Sire Growth Breeding Value and Weight (Kg) with different lines representing different groups (11, 21, 22, 31, 32, 33) and arrows indicating specific values (0.16, 0.30, 0.42).]
Nutrition and Growth

Increased Growth
Breeding Value
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Reduced response

What are the industry implications.....
Industry Implications

- High growth sires attract a premium
- Triplets take 60 extra days each to reach target weights of 35 kg
- Supplementary feeding costs
- Lambing and supply systems
Lambs with high growth sires do not reach their potential weights when they have siblings. This effect varies with both birth type and rearing type.