Improving lamb survival with calmer sheep

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BSc (Animal Science)
Animal Production Systems
Background

- Loss of 10 million lambs per year
- 40-60% die within first 3 days
- Inadequate maternal care
Improving lamb survival

- Ewe-lamb bond
  - Selective
  - Vital for lamb survival

- Temperament
  - Reactivity of an animal to humans and isolation
  - Correlates with a ewe’s maternal behaviour
My research

- Investigating the role of temperament on the establishment of the ewe-lamb bond
- Calm and Nervous merino sheep
Selection protocol

- Calm ewes
- Nervous ewes
- Ram
- Lamb Crop
- Top calm rams (10) All ewes
- Top nervous rams (10) All ewes
- All ewes
- Other rams castrated

TEMPERAMENT TESTING

BREEDING
My experiments

- Determine if temperament is due to nature or nurture
- Detect differences in bonding behaviour of ewes and lambs with different temperaments
Inherited trait ($h^2$ 0.26 - 0.40)
- Not fixed at birth
- Modulated by maternal behaviour
- Hypothesis:
  Lamb temperament will be determined by the interaction of its genes with maternal behaviour
Nature vs. Nurture

Lamb born from calm ewe
  Calm ewe
  Nervous ewe

Lamb born from nervous ewe
  Calm ewe
  Nervous ewe
## Results

- **42 lambs**

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<tr>
<th>Birth ewe</th>
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Nature vs. Nurture
Open field test
Open field test

Bleats (per min)

Squares crossed (per min)

Jumps (per min)

Latency to jump (sec)

* P value < 0.05
Open field test

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Nature Nurture

* P value < 0.05
Open field test

**Bleats (per min)**
- Nature: C, N
- Nurture: C, N

**Squares crossed (per min)**
- Nature: C, N
- Nurture: C, N

**Jumps (per min)**
- Nature: C, N
- Nurture: C, N

**Latency to jump (sec)**
- Nature: C

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Open field test

Bleats (per min)

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* P value < 0.05
Testing at weaning

- 3 min Arena test
- 1 min Box test
Box and Arena test

Bleats (per min)

Crossings (per min)

Agitation

Nature

- Nervous
- Calm

*** p value < 0.001
Box and Arena test

- Bleats (per min)
  - Nervous vs. Calm
- Crossings (per min)
  - Nervous vs. Calm
- Agitation
  - Nature vs. Nurture

*** p value < 0.001
Box and Arena test

Bleats (per min)

Crossings (per min)

Agitation

Nature

Nurture

Calm

Nervous

*** p value < 0.001
Box and Arena test

- **Bleats (per min)**
  - Nervous: 18
  - Calm: 9

- **Crossings (per min)**
  - Nervous: 16
  - Calm: 8

- **Agitation**
  - Nervous: 70
  - Calm: 50

*** p value < 0.001
Conclusion

- Temperament not modulated by maternal behaviour
My experiments

- Determine if temperament is due to nature or nurture
My experiments

- Determine if temperament is due to nature or nurture
- Detect differences in bonding behaviour of ewes and lambs with different temperaments
Bonding behaviour

- Behaviour is influenced by temperament
- Calm ewes show better maternal behaviour than Nervous ewes
  - more bleats and grooming
  - more time on birth site
- ‘Natural’ farming conditions

Hypothesis:
  Calm ewes and lambs show better bonding behaviour than nervous ewes and lambs
Bonding behaviour

Ewe

Time to 1st stand + lick lamb
Bonding behaviour

Ewe

Time to 1\textsuperscript{st} stand + lick lamb

Rejection behaviour
Bonding behaviour

Ewe

- Time to 1st stand + lick lamb
- Rejection behaviour
- Isolation from flock
Bonding behaviour

**Ewe**

- Time to 1st stand + lick lamb
- Rejection behaviour
- Isolation from flock
- Movements from birthsite
### Bonding behaviour

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<td>Acceptance at the udder</td>
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2006 Results

- Observed 23 ewes

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<tr>
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<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Experienced</td>
<td>4</td>
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- Limited to day observations
- Overcrowding
- Direct observations
- Unknown ID of dead lambs
Solutions

- Remote controlled cameras
- Move the lambed ewes out
- Tag lambs after observations
2007 Results

- 43 complete recordings

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Murphy's results (1999)

### Lamb mortality

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<tr>
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<th>Nervous (519)</th>
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<tbody>
<tr>
<td>Singles</td>
<td>7%</td>
<td>16%</td>
</tr>
<tr>
<td>Twins</td>
<td>16%</td>
<td>26%</td>
</tr>
<tr>
<td>Total mortality</td>
<td>54 (11%)</td>
<td>103 (20%)</td>
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<tr>
<td>Lamb birth weight</td>
<td>4.51± 0.15</td>
<td>4.41 ± 0.10 kg</td>
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Outcomes

- Know the genetic and behavioural role of temperament in the ewe-lamb bond
- Improve the establishment of the bond
- Improve lamb survival
Acknowledgements

- **Supervisors**
  - Dr Dominique Blache
  - Dr Raymond Nowak

- **Sponsors**
  - School of Animal Biology
  - Meat and Livestock Australia

- **Farm supervisor and helpers**
  - Pascal, Aprille, Monique, Celine, Ken & Steve