Welfare assessments of Skin Traction, Liquid Nitrogen, and Laser Technology
Animal Welfare Assessment

Three dimensions of animal welfare

• Is biological functioning normal?
  – Physiology, health, production, reproduction

• How does the animal feel?
  – Pain, suffering, mental (affective) states

• Is the production environment like the animal’s natural environment?
  – Housing, feed, social structures, life history
Welfare assessments of mulesing alternatives

- Assess acute impact of the technologies when they are applied to animals on welfare – **not efficacy** for intended purpose of breech modification or associated long-term welfare benefits (reduced incidence of breech strike)

- Undertaken early in technology development

- Associated aim: Provide evidence of minimal impact to Animal Research Authorities to enable re-approval for next stages involving more detailed studies and technology development
How do we assess welfare in these studies?

**Biological functioning**
- Clinical measures like body temperature and haematology
- Behaviours like feeding, resting, standing

**How does the animal feel** (pain and suffering)
- Pain related behaviours
- Stress hormone cortisol

**Naturalness**
- Not assessed in these studies as our Australian production environment is based on free-range grazing, etc
Skintraction™ (Cobbett Technologies Pty Ltd)
   – A solution of sodium lauryl sulphate (7%)
   – Delivered by needleless injector into superficial skin (intradermal)

Study conducted in an animal house - October 2008
Lambs 10 - 12 weeks old and still on their mothers
Behaviours monitored by video for 12h per day on the day of treatment (day 0) and on days 1, 2, 4, 5, 7 and 13

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (unmulesed)</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Mulesing + Tri-Solfen</td>
<td>5</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Sodium lauryl sulphate</td>
<td>6</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>16</strong></td>
<td><strong>16</strong></td>
<td><strong>32</strong></td>
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Total Abnormal Behaviours

<table>
<thead>
<tr>
<th>Time post treatment</th>
<th>Total abnormal behaviours (% of time)</th>
</tr>
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<tbody>
<tr>
<td>d1</td>
<td>Control: a</td>
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<tr>
<td>d2</td>
<td>Mulesed: b</td>
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<tr>
<td>d3</td>
<td>Alternative: a</td>
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<td>d4</td>
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<td>d5</td>
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<td>d7</td>
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<td>d13</td>
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- **SkinTraction**
SkinTraction – Results and Conclusions

Physiology
- Signs of systemic response associated with the local tissue reaction to SLS
- Generally milder and shorter duration than mulesing
- Transient fever and cortisol response (2 days) comparable to Mulesing
- Feed intake and growth rate comparable to Controls – much less impact than Mulesing

Behaviour
- Only minor changes to normal behaviours
- Tendency for a small increase in abnormal behaviours on day of treatment
- Behavioural impacts very much less marked and shorter duration than Mulesing

Treatment site
- Mild oedema, followed by hardening and scab formation
- Closed wound
- Scabs starting to lift at 42 days
Physiological and behavioural effects of intradermal injection of sodium lauryl sulfate as an alternative to mulesing in lambs

IG Colditz, DR Paull, C Lee and AD Fisher

Aust Vet J 2010;88:483

Objective To assess the effects on physiology and behaviour of intradermal injection of sodium lauryl sulfate (SLS) as an alternative to mulesing.

Procedures Three groups of Merino lambs were studied: Control (n = 10), SLS (n = 11) and Mulesed (n = 11). The SLS group received SLS (7% w/v) and benzyl alcohol (20 mg/mL) in phosphate buffer, and the Mulesed group received 6 mL topical local anaesthetic as a wound dressing. Haematology, cortisol, beta-endorphin and haptoglobin concentrations, rectal temperatures, body weight and behaviours were monitored for up to 42 days post treatments.

Results SLS treatment induced mild swelling followed by thin scab formation. Fever (>40°C) was observed at 12 and 24 h, cortisol concentration was elevated on days 1 and 2, haptoglobin concentration was highly elevated on days 2–7, white blood cell count was elevated on days 2 and 4 post treatment, but average daily gain was not affected. Fever at 12 h was significantly higher in the SLS than in the Mulesed group, whereas maximum temperature, temperature area under the curve (AUC), occurrence of fever, cortisol profile, cortisol AUC, white blood cell counts and haptoglobin concentrations until day 7 were comparable. The behaviours of normal standing, total standing and total lying were modified for 2 days by SLS treatment, but changes were less marked and of shorter duration.
Purpose:

- Scoping study to assess the time course and clinical impact of cold-induced skin necrosis
- April 2011

Subjects:
Sheep
- 6 month old castrated males
- Descriptive study
Liquid Nitrogen: Results

• Initial discomfort as liquid nitrogen applied
• Some short term systemic effects of treatment – (↑ respiratory rate, ↑ rectal temperature)
• Very few behavioural impacts

Conclusion
• Impacts much milder than mulesing
Laser wool removal – welfare assessment

- Trial of human laser depilation technology in sheep
- Use same lasers as used in humans
- 14 superfine Merino sheep, ewes and wethers
  - 18-30 months of age
- September 2012 – April 2013
- Trialed on “crutching” areas of sheep and on flank skin
  - Breech
  - Face
  - Pizzle (around the prepuce)
Laser: Results

- No signs of behavioural reaction during laser treatment
- Skin temperature 30°C to 42°C immediately after treatment, dropping rapidly back to 26-28°C within one minute of treatment
- At higher doses, hard dry scabs formed at treatment sites
- Lesions slow to heal (weeks)
- Efficacy for wool removal not achieved

Conclusion

- Few acute welfare impacts: treatment well tolerated
Recommendations

1. From an acute welfare perspective, skinTraction, liquid nitrogen and laser epilation suitable for further research and development (In contrast, further R&D development of a method based on intradermal injection of cetrimide was terminated in 2007 due to unacceptable welfare impacts of the treatment)

2. Undertake more detailed welfare assessments when the technologies are better developed