AWI Breech Strike R&D Technical Update
Maritime Museum, Sydney
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Laser Technology Proof of Concept

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Objectives

- An initial scoping study into the suitability of laser technology to permanently remove wool from the skin of sheep (transfer of heat down the wool fibre to destroy the follicle bulb); could it reduce fly & shearing costs?

- A preliminary assessment of the acute welfare impacts of laser technology (See Colditz & Small presentation)

- Patent owned by Zeta LLC, Denver Colorado USA

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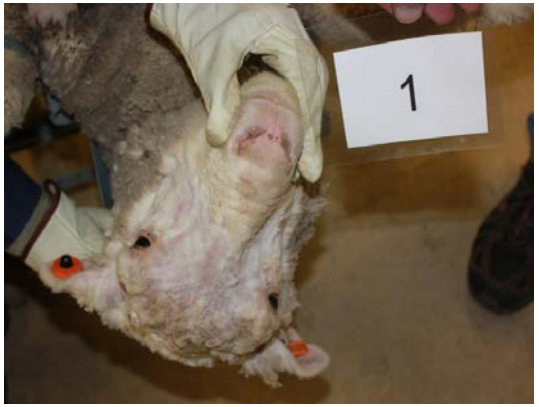
Sheep

- 44 Merino ewes and wethers 12 – 18 month old “Chiswick” fine wool
- Crutched then clipped with Oster clippers (40 or 10 blade)

“Crutch”



“Wig”

“Ring”

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Laser settings

- **2 Lasers assessed**
  - Alexandrite laser: 740 nm
  - Lumenis diode laser: 800 nm
- **Energy settings: 25 J/cm² to 100 J/cm²**
- **Pulse widths: 2 ms to 400 ms**
- **Pulse-stacking : 1 to more than 15**

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Results

- **Application of laser treatment was well tolerated – few behavioural signs of discomfort**
- **Skin temps 30 – 42°C at end of treatment, dropping to 26 - 28°C within one minute**
- **Excess dosage**
  - Transudate within several minutes
  - Scab formation – lifted after several weeks
  - Scarring, wound contraction
  - Wool regrowth adjacent to scar
- **Lower dosage**
  - Transudate variable
  - Lighter scab formation
  - Wool regrowth under scab

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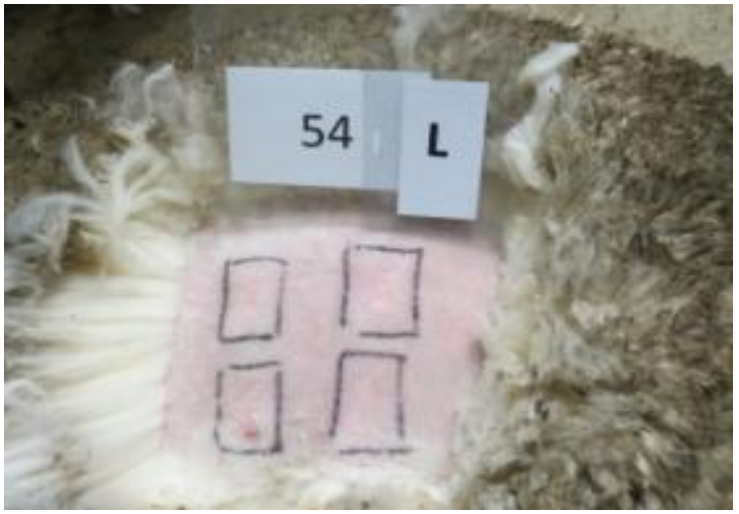
Midside; 2ms, 15 J/cm²

Day 1



Day 108

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Sheep “90”: 2ms, 25 J/cm²

Immediately before treatment

Immediately after treatment

Tail and LHS breech only

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Day 43
New skin under

Day 107
Distortion of bare area by scarring and not follicle removal

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Sheep “8”: 40ms, 40 J/cm²

Day 0

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Sheep “8”: 40ms, 40 J/cm²

Day 45

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Sheep “8”: 40ms, 40 J/cm²

Day 86

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Lumenis Lightsheer: Sheep “42” 30 ms, 60 J/cm²

Day 0

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Lumenis Lightsheer: Sheep “42” 30 ms, 60 J/cm²

Day 35
Wool growth under plaques

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Lumenis Lightsheer: 30 ms, 60 J/cm²

Day 86
Wool regrowth, no skin damage

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Conclusions

- Excess dosage causes skin damage, scarring and wound contraction , healing can take > 45 days
- Low dosage can cause scab formation, followed by wool regrowth
- Little behavioural response to treatment – well tolerated
- Have not been able to replicate results on several sheep tested in US
- Proof of concept not demonstrated in these trials

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Why?

- Right wavelengths, pulse period and energy?
- White fibres absorb & transfer less heat to wool follicle; check black wool?
- Best effect in humans is dark hair on fair skin; can the target wool be treated?
- Wool is non-medulated, does this have an impact?
- There are many variables, fibre diameter, depth, density, curvature, suint /wax, wrinkles, moisture
- Will new dual laser technology warrant further work? ……..under review.

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