2018

MerinoLink Annual Conference and Field Day

Proceedings

Wednesday 20\textsuperscript{th} and Thursday 21\textsuperscript{st} June 2018

Goulburn, NSW
MerinoLink Limited is a not for profit organisation that aims to facilitate the sheep breeders and service providers link with information, knowledge and research.

MerinoLink’s founding members are from a wide range of sheep businesses with varying production systems. The members have been brought together by a common enthusiasm for profitable Merino sheep and a desire to continue to build their businesses, client businesses and the sheep industries profitability.

MerinoLink is committed to assisting our members make better use of past and current research. In addition, MerinoLink aims to build networks and add value to existing and future research and development.

MerinoLink recognises the opportunities to work together to develop research projects for the future improvement of the Australian Sheep industry.

MerinoLink aims to provide all members with access to industry organisations and facilitate a two-way dissemination of information.

MerinoLink consists of ram and commercial producers, and service providers wanting to move our industry and members forward as fast and effectively as possible. This is made possible by MerinoLink’s engagement with members and industry, education of members, exploration of research ideas and exchange of the results.

MerinoLink CONTACTS

www.merinolink.com.au

Chair: Richard Keniry (Commercial Breeder)

Vice Chair: Rick Baldwin (Ram Breeder)

Directors: Craig Wilson (Service Provider), Sally Martin (Service Provider), Steve Jarvis (Commercial Breeder), David Davidson (Commercial Breeder), Robert Mortimer (Ram Breeder), Lexi Cesnik (Service Provider) and Matt Crozier (Commercial and Ram Breeder).

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General enquiries: merinolinklimited@gmail.com
MerinoLink’s FOCUS

- To ensure all data and information disseminated by MerinoLink has integrity and a commercial focus.
- To promote the profitability of Merino sheep.
- To be open to anyone joining, embracing a wide range of ideas and perspectives.
- To provide education and networking opportunities to breeders and service providers.
- To provide mentoring to young people wanting a career in agriculture, in particular the sheep and wool industry.
- To liaise and work with organisations such as the Sheep CRC, Sheep Genetics, Australian Wool Innovation and Meat and Livestock Australia about issues and research questions relating to members and the industry as a whole.
- To promote the use of ASBV’s, Central Test Sire Evaluation, Merino Challenge and other trials that provide benchmarking information.
- To identify and initiate research and development.

2016 drop Merino Lifetime Productivity F1 Ewe – October 2017
# 2018 MerinoLink Annual Conference Program

**Wednesday 20th June 2018**

**The Mercure Hotel, 2 Lockyer Street, Goulburn NSW**

<table>
<thead>
<tr>
<th>Conference MC: Di Martin</th>
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<tbody>
<tr>
<td>Time</td>
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<tr>
<td>8:00 – 8:40</td>
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## Session 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic/Presenter</th>
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<tbody>
<tr>
<td>8:45 – 9:15</td>
<td><strong>Welcome</strong>&lt;br&gt;Richard Keniry, MerinoLink Limited Chair</td>
</tr>
<tr>
<td>9:15 – 9:45</td>
<td><strong>QPLUS Revived; Merino Breeding Fundamentals</strong>&lt;br&gt;Dr Kevin Atkins, former Principal Research Scientist&lt;br&gt;“It is only 20-30 years. I know I am old but...”. Kevin will be revisiting the QPLUS Project; What it set out to do; What was achieved; Is this work still relevant today?</td>
</tr>
<tr>
<td>9:45 – 10:15</td>
<td><strong>What are ASBV’s good at? A Journey from Raw Data to ASVBs – A Practical Approach</strong>&lt;br&gt;Mark Mortimer, Centre Plus, Tullamore NSW&lt;br&gt;Mark will take us on a journey from raw data to Australian Sheep Breeding Values (ASBV’s) to lifetime performance.</td>
</tr>
<tr>
<td>10:15 – 10:45</td>
<td><strong>The Genetic Program in Action on Farm</strong>&lt;br&gt;David Vandenberghe, Wattle Dale Merinos, Scadden, WA&lt;br&gt;Dave’s seven-year journey to DNA full pedigree. What worked well? What is the focus now? Tips and tricks for producers entering this space.</td>
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## Session 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic/Presenter</th>
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</thead>
<tbody>
<tr>
<td>11:30 – 12:00pm</td>
<td><strong>Driving Adoption in Genetics</strong>&lt;br&gt;David Packer, Adoption Manager – Genetics, Meat &amp; Livestock Australia&lt;br&gt;Dave will outline MLA’s genetics program, including the National Livestock Genetics Consortium’s role in guiding priority research, development and adoption programs. Where the UNE/MerinoLink DNA Stimulation Project fits in and opportunities for producers to get involved with MLA programs.</td>
</tr>
</tbody>
</table>

### 12:00pm – 1:00pm

**The Hour of Power- Sponsored by T. A. Field Estates**

**Encouraging Young Researchers and Industry Innovators**

5-minute presentations from up and coming industry visionaries

- **12:00pm – 12:05pm**
  - **Kate McCarthy** *(Charles Sturt University, NSW)*
  - Bone turnover in twin-born lambs at marking and weaning

- **12:05pm – 12:10pm**
  - **Octavia Kelly** *(University of Adelaide, SA)*
  - Wool cortisone & cortisol (Hydrocortisone) concentration

- **12:10pm – 12:15pm**
  - **Emma Turner** *(University of New England, NSW)*
  - Implementation of shorter shearing intervals in Ivanhoe NSW: a comparison project between 6 monthly and 12 monthly shearing

- **12:15pm – 12:20pm**
  - **Forough Ataollahi** *(Charles Sturt University, NSW)*
  - Effects of maternal supplementation with calcium and magnesium on general health and immunity of ewes and their lambs

- **12:20pm – 12:25pm**
  - **Elise Bowen** *(Murdoch University, WA)*
  - Accelerating genetic gain through utilisation of genetic technologies
<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:30pm – 12:35pm</td>
<td>Dione Howard (Charles Sturt University, NSW)</td>
<td>The endless opportunities available in the sheep and wool industry</td>
</tr>
<tr>
<td>12:35pm – 12:40pm</td>
<td>Heather Earney (Charles Sturt University, NSW)</td>
<td>Potential benefits of internal pelvimetry for lamb survival in Merino ewes</td>
</tr>
<tr>
<td>12:40pm – 12:45pm</td>
<td>Rachael Gawne (2017 Peter Westblade Scholar)</td>
<td>The Peter Westblade Scholarship Experience</td>
</tr>
<tr>
<td>12:45pm – 12:55pm</td>
<td>Will MacSmith (Corroboree Merinos, Borenore NSW)</td>
<td>Improving efficiency across the board, relying on trial work at a commercial level instead of gut feel. Combining the whole package – genetics and feed efficiency.</td>
</tr>
<tr>
<td>1:00pm – 2:00pm</td>
<td>Lunch</td>
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</table>

**Session 3**

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation Title</th>
<th>Speaker Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00pm – 2:30pm</td>
<td>Moving to a Non-Mulesing Enterprise</td>
<td>Geoff Lindon, Program Manager Genetics &amp; Animal Welfare Advocacy, Australian Wool Innovation</td>
<td>Geoff will provide a summary of how 40 Merino businesses have moved to non-mulesed Merino enterprises; production benefits; wool market; what can and is AWI doing.</td>
</tr>
<tr>
<td>2:30pm – 3:00pm</td>
<td>Product Quality down the Wool Value Chain</td>
<td>Steven Read, Michell Wool Pty Ltd, Adelaide</td>
<td>Steven will outline what the range of characteristics are for the distinct categories of wool products and markets. Do we need to set up grower-to-mill alliances / networks? How hard is this from a Grower’s perspective?</td>
</tr>
<tr>
<td>3:00pm – 3:30pm</td>
<td>Wool and Meat: Can you have it all?</td>
<td>Dr John Web-Ware, Mackinnon Project, Melbourne University</td>
<td>John will explore the trade-offs for Merino breeders chasing the dual-purpose sheep, can we have it all? Is the number of lambs weaned everything?</td>
</tr>
<tr>
<td>3:30pm – 4:30pm</td>
<td>Panel of Speakers - Q &amp; A with all speakers</td>
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<tr>
<td>4:30pm</td>
<td>Conference Close - Afternoon tea</td>
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**6:30pm**

Canapes from 6:30pm in the bar

**7:30pm**

Conference Dinner
Venue – Mercure Motel, Goulburn NSW

Dinner Speaker – Lynne Strong, Clover Hill Dairies & National Program Director Art4Agriculture

‘A shared vision is a critical component of a successful partnership. Vision is what guides where a business is going and how it will get there; it is the plan and the path for the future. A shared vision allows partners to reconcile their goals and their methods for achieving those goals. Without a shared vision partners usually find themselves pulling in different directions.’
# 2018 MerinoLink Annual Field Day Program

**Thursday 21st June 2018**

**“Ravenswood”, Cavan Station, Yass NSW**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30am - 10:00am</td>
<td>Registration, Tea / Coffee on arrival</td>
</tr>
<tr>
<td>10:00am – 10:20am</td>
<td><strong>Welcome</strong>&lt;br&gt;Richard Keniry, MerinoLink Chair, Mal Peake, Bogo Merinos&lt;br&gt;Introduction and welcome to the Field Day</td>
</tr>
<tr>
<td>10:20am - 10:50am</td>
<td><strong>Sire Evaluation Overview</strong>&lt;br&gt;Sally Martin, CEO, MerinoLink Limited&lt;br&gt;What sire evaluation aims to achieve; understanding and interpreting the results; collaboration with the Monaro Farming Systems Group - <em>Sire Evaluation progeny will be penned in Sire Groups for viewing at Lunch.</em></td>
</tr>
<tr>
<td>10:50am – 11:20am</td>
<td><strong>Historic Sires Project Results</strong>&lt;br&gt;Ben Swain, Executive Officer, Australian Merino Sire Evaluation Association&lt;br&gt;Over the past 5 years AMSEA has evaluated a range of Historic Sires that were widely used 15-20 years ago. Results from the project have now been finalised and show some interesting results of where the industry has come from and perhaps where it is heading.</td>
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</table>

**Concurrent Group Sessions** (Each session will be run three times with smaller groups)

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>11:20am - 12:00pm</td>
<td><strong>Session: 1</strong>&lt;br&gt;Group 1 to Station A&lt;br&gt;Group 2 to Station B&lt;br&gt;Group 3 to Station C</td>
</tr>
<tr>
<td>12:00pm – 1:00pm</td>
<td><strong>Lunch - Sponsored by Landmark Yass</strong>&lt;br&gt;Inspections of 2017 Sire Evaluation Progeny; Live drone demonstrations (weather permitting); Opportunity to talk to our Trade Display holders</td>
</tr>
<tr>
<td>1:00pm – 1:40pm</td>
<td><strong>Session: 2</strong>&lt;br&gt;Group 1 to Station B&lt;br&gt;Group 2 to Station C&lt;br&gt;Group 3 to Station A</td>
</tr>
<tr>
<td>1:40pm – 2:20pm</td>
<td><strong>Session: 3</strong>&lt;br&gt;Group 1 to Station C&lt;br&gt;Group 2 to Station A&lt;br&gt;Group 3 to Station B</td>
</tr>
<tr>
<td>2:30pm</td>
<td>Evaluations / Close</td>
</tr>
</tbody>
</table>

**2017 Sire Evaluation Progeny on Display (16 Progeny Groups)**

- Bundilla Poll (140055)
- Centre Plus (407185 & 307603)
- Hazeldean (13.4936, 11.3542 & 12.4030)
- GRASS (142000)
- Woodpark Poll (150106)
- Rocklyn (120182)
- Pooginook Poll (125188)
- Greendale (150018)
- Boudjah (Blue 516)
- Adina (DB 11-11)
- Nerstane (150076)
- Bogo (500300)
- Centre Plus WA (338205)

**Group Session Speakers**

**Station A**

- **Effective on-farm data collection for improving productivity**<br>*Rachael Gwne, Sally Martin Consulting Pty Ltd & Jess Richards, Sheep CRC*<br>How to achieve my breeding objective; What you could be collecting at a commercial breeder level; How to use this information to make your decisions; Flock Profile testing; RamSelect App.

**Station B**

- **Eye muscle and fat scanning demonstration**<br>*Trevor Pearce, Pearce Scanning & Mark Mortimer, Centre Plus*<br>EMD/Fat scanning Demonstration; How is this information used in the Merino industry?

**Station C**

- **Practical animal assessments you could be doing on-farm**<br>*Megan Rogers, Sheep Connect NSW*<br>Wet/drying your ewes; Condition scoring; When is the best time(s) to collect this information?
MerinoLINK would like to thank our generous sponsors and supporters, who have made this event possible.
Conference Welcome – MerinoLink Direction

Richard Keniry, MerinoLink Chairman

Presentation was unavailable at the time of printing. All speaker presentations will be made available on the MerinoLink website www.merinolink.com.au post conference.
Profitable breeding objectives - the QPLU$ story

Kevin Atkins
(formerly Sheep Genetics research)

Which traits should be in my breeding objective?

- Wool value – fleece weight and quality
- Body weight – reproduction – feed intake
- Disease – worms and flies
- Environmental “fitness” and adaptation

Production responses – wool value

- QPlus selection lines taught us much about production responses in wool value
- Micron Premium (MP) is a very useful measure of relative market value for fleece weight and diameter
  \[ MP = \% \text{ increase in value of wool 1 micron finer than current} \]

Production responses – wool value

- Micron premium has a genetic relevance as a way of constructing a selection index of increased fleece weight and reduced fibre diameter:
  - 3%MP (mainly fleece weight)
  - 8%MP (fleece weight + diameter)
  - 15%MP (mainly fibre diameter)

Selection strategy

- Rams – shorn @ 9 and 15 months
- Ewes – shorn @ 15 months
- Breeding values for fleece weight and fibre diameter that include animal’s own performance + relatives, and then combined into a selection index
- Unselected control line used to measure response

Responses after 10 years of selection
Production responses – wool value

- Actual responses were remarkably consistent with predicted responses
- Actual selection responses in hoggets and adults used to estimate variability in economic response:
  - Actual market (1995-2016)
  - High MP market (like 1999-2002 or 2009-11)
  - Low MP market (like 1996-98 or 2004-08 or 2012-16)

What would you expect?

1. Select on economic value
   - Choosing animals that suit the current market will always deliver the best result?
2. Low risk – high return
   - Choose animals on productivity without seeking a premium. Favour fleece weight over diameter / strength / style?
3. High risk – variable return
   - Choose animals for maximum return in a favourable market. Favour high return traits such as diameter over production traits like fleece weight?

The genetics of fleece value

- High MP's value has highest variability and highest heritability
- Low MP's value has low variability and moderate heritability
- Actual market's value has moderate variability but low heritability – poor consistency of ranking since the same animal will rank differently in successive years depending on the market values

A more sensible investment strategy

1. HIGH MP index
   - Little risk – HIGH GROWTH
     - Long-term investment strategy
2. LOW MP index
   - No risk – LOW GROWTH
     - Short-term investment strategy
3. Select on current economic value
   - Just "chasing the market" – no strategy at all

Wool value responses

- The high (15%) MP line gave the greatest response in both the High and Actual markets
- The low (3%) MP line was never superior in any market
- No differences between lines in the Low market

What would you expect?

1. Select on economic value
   - Choosing animals that suit the current market will always deliver the best result?
2. Low risk – high return
   - Choose animals on productivity without seeking a premium. Favour fleece weight over diameter / strength / style?
3. High risk – variable return
   - Choose animals for maximum return in a favourable market. Favour high return traits such as diameter over production traits like fleece weight?
CONCLUSIONS

- Choose a realistic micron premium for the market for your wool and position your objective towards the top end of that expectation
- Keep the same objective for at least 5 years
- There is little risk from getting it too wrong. There is a much greater risk from trying to chase a volatile market.

Additional traits

- If we include other traits (such as worm resistance &/or flystrike resistance) together with wool value in the objective:
  - **Will these traits respond?**
  - **What will it cost in wool trait responses?**

- Our example is wrinkle score as an indicator of breech and tail strike resistance

Environmental fitness & adaptation

- Longevity
- Robustness
- Environmental sensitivity
- Cost of production

The difficulty with these traits is they often tend to diminish rather than enhance production.

Selection for production favours animals that respond better to improved environment (feed, management, markets) so improving the environment rather than the genotype in unfavourable conditions is usually better.

Breeding objectives:

- Ram breeders are attempting to implement a breeding objective on behalf of all (potential) ram buying clients
- But these clients have a vast array of objectives that can be subtly different from each other

How do we solve this potential conflict?

RamSelect: an aid to purchasing superior flock rams appropriate to your flock

RamSelect.com.au

- developed in 2015 to:

1. Identify sale rams (across flocks) and their genetic information
2. Define group traits (profit drivers) and their contribution to industry indexes
3. Allow simple changes to breeding objectives for ram buyers to rank available rams
4. Provide a platform to better manage current and future ram purchases

Which other traits should be in my breeding objective?

- Body weight – reproduction – feed intake
- Disease – worms and flies
- Environmental “fitness” and adaptation

10-year production responses

-4.00
-2.00
0.00
2.00
4.00
6.00
8.00
10.00

-2.00 -1.50 -1.00 -0.50 0.00

aFD
aCFW
index with no breech
index incl breech

15%
8%
3%

Breeding objectives: Stud Vs commercial clients

- Ram breeders are attempting to implement a breeding objective on behalf of all (potential) ram buying clients
- But these clients have a vast array of objectives that can be subtly different from each other

How do we solve this potential conflict?
1. Sale animal information
- Regular (daily) access to all available sale rams
- All types / breeds in Sheep Genetics
- Animals can be filtered at the direction of the user, according to breed, stud name and proximity, breeding objective / index, size of list, sale type
- Rams listed in rank order for chosen breeding objective
- Details of ASBV’s (& accuracies and industry averages) for many traits available for individual rams

2. Group traits & breeding objectives
- Take a large number of ASBV’s and group them into categories that relate to commercial profit drivers
- Improve the understanding of ram buyers to the contribution of these profit drivers to selection indexes – industry standard and user-specified breeding objectives

3. User-specified breeding objectives
- Encourage buyers to use all available information
- Allow variation in objectives without prejudice
- Limit confusion and complexity
- Limit undesirable outcomes

4. A platform for enhancements
- Industry background for ram purchases - secondary graphics and descriptive statistics
- Monitoring rams in the commercial flock over time
- Genomic flock profiling

Primary trait groups for breed types

<table>
<thead>
<tr>
<th>MERINO and Deluxe</th>
<th>TERMINAL</th>
<th>MATERNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wool quality</td>
<td></td>
<td></td>
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<tr>
<td>Fleece weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth</td>
<td>Growth</td>
<td>Growth</td>
</tr>
<tr>
<td>Carcase</td>
<td>Carcase</td>
<td>Carcase</td>
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<tr>
<td>Weaning percentage</td>
<td>Weaning Percentage</td>
<td>Weaning Percentage</td>
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<tr>
<td>Parasite resistance</td>
<td>Parasite resistance</td>
<td>Parasite resistance</td>
</tr>
<tr>
<td>Eating Quality</td>
<td>Eating Quality</td>
<td>Fleece weight</td>
</tr>
</tbody>
</table>

Setting your own breeding objective
- Start with a standard industry index
- Adjust emphasis for your needs

Managing your ram team + trends

Implications for Merino ram breeders
- Adopt a simple, production-based breeding objective that is relevant to all potential clients
- Maximise the complexity and detail of genetic evaluation of young rams that will allow clients to choose rams appropriate to their individual needs
What are ASBV’s good at?
A Journey from raw data to ASBV’s
To
Life time performance

A Practical Approach

- Sorry, will be talking about some theory.
- Raw data to ASBV.
- Index’s just breed for Individual production!

Examples from 2015 drop

Avg. = 17.74
Examples from 2015 drop

Adjusted Raw data to ASBV's
• Heritability's
• Data from relatives
• Correlated traits

Ram 1 = 18
Ram 2 = 18
Sib 1 = 15
Sib 2 = 16
Sib 3 = 17

Sib 1 = 19
Sib 2 = 20
Sib 3 = 21

Breeding is about trying to predict the future.
• Raw data
• Group Effects
• Fixed Effects
• ASBV's

Walk through – Raw Micron
• Top 5 Sires = -1.74
• Bottom 5 Sires = 0.24
• Top 5 are = -1.98 Finer
• Expected Difference = -0.99

Walk through – Raw Micron
Expected Difference  = -0.99
Actual Difference  = -0.47

Predicting the Future
Micron

<table>
<thead>
<tr>
<th>Expected Difference</th>
<th>Actual Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw data</td>
<td>-0.99</td>
</tr>
<tr>
<td>Group Effects</td>
<td>-0.91</td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>-1.02</td>
</tr>
<tr>
<td>ASBV's</td>
<td>-0.48</td>
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</tbody>
</table>
Predicting the Future

Fleece Weight

<table>
<thead>
<tr>
<th></th>
<th>Expected Difference</th>
<th>Actual Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw data</td>
<td>14.5%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Group Effects</td>
<td>15.0%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>13.0%</td>
<td>3.8%</td>
</tr>
<tr>
<td>ASBV’s</td>
<td>3.9%</td>
<td>5.7%</td>
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Index 50/50

<table>
<thead>
<tr>
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<th>Expected Difference</th>
<th>Actual Difference</th>
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<tbody>
<tr>
<td>Raw data</td>
<td>-0.12</td>
<td>6.0%</td>
</tr>
<tr>
<td>Group Effects</td>
<td>-0.33</td>
<td>8.0%</td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>-0.85</td>
<td>-1.0%</td>
</tr>
<tr>
<td>ASBV’s</td>
<td>-0.4</td>
<td>2.2%</td>
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</tbody>
</table>

SD Micron = 1.4
SD Fleece = 16%

A Practical Approach

- Sorry, will be talking about some theory.
- Raw data to ASBV.
- Index’s just breed for Individual production!

MP+ Index

- Mating in April, Weaning in December
- Limited Feed, January to June
- Lambs sold at 18 months, 48kg
- 7% micron, 0.6% strength premiums

DP + Index

- Mating in February, Weaning in October
- Limited Feed, December to May.
- Lambs sold at 15 months, 55kg
  - Portion of ewes mated to Terminals
- 4.5% micron, 0.4% strength premiums

Ewe efficiency

(007308) 2015 mating weight of 81Kg
Weaned 2 lambs @ 23.5kg & 27.0kg = 50.5kg
Adjust to 100 days = 46.75kg
Kg/Weaned % = 57%
Fleece Weight
6.3kg = 7.7%

Can you have your cake and eat it to?
1. Wean more than 57% of their weight
2. Cut more than 10% of their weight

520 lambing where this happen.
3114 where it did not.

Ewe efficiency

<table>
<thead>
<tr>
<th>DP+ Index</th>
<th>Count</th>
<th>Index</th>
<th>Kg/W%</th>
<th>GFW/WT</th>
</tr>
</thead>
<tbody>
<tr>
<td>908</td>
<td>180</td>
<td>62%</td>
<td>9.4%</td>
<td></td>
</tr>
<tr>
<td>908</td>
<td>164</td>
<td>57%</td>
<td>9.4%</td>
<td></td>
</tr>
<tr>
<td>908</td>
<td>152</td>
<td>55%</td>
<td>9.3%</td>
<td></td>
</tr>
<tr>
<td>908</td>
<td>135</td>
<td>54%</td>
<td>9.6%</td>
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</table>

<table>
<thead>
<tr>
<th>MP+ Index</th>
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<th>Kg/W%</th>
<th>GFW/WT</th>
</tr>
</thead>
<tbody>
<tr>
<td>908</td>
<td>173</td>
<td>59%</td>
<td>9.9%</td>
<td></td>
</tr>
<tr>
<td>908</td>
<td>160</td>
<td>56%</td>
<td>9.5%</td>
<td></td>
</tr>
<tr>
<td>908</td>
<td>151</td>
<td>56%</td>
<td>9.4%</td>
<td></td>
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<tr>
<td>908</td>
<td>137</td>
<td>57%</td>
<td>9.0%</td>
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</table>
Presentation was unavailable at the time of printing. All speaker presentations will be made available on the MerinoLink website www.merinolink.com.au post conference.
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Bone turnover in twin-born lambs at marking and weaning


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C Current Address: Primary Industries and Regions SA, PO Box 245, Nuriootpa, SA, 5355
D Email: Kate.Mccarthy@sa.gov.au

Bone mineralisation disorders are common in young animals such as lambs where the rapid rate of bone development results in an imbalance of nutrients and harmful effects of dietary deficiencies (Benzie et al. 1960). Vitamin D and Calcium are important for maintaining bone health. Deficiency of calcium and vitamin D could lead to bone mineralisation problems in young growing animals. The physiological control of calcium concentration is maintained by systemic hormones such as 1,25 dihydroxyvitamin D (25(OH)D3), calcitonin and parathyroid hormone (PTH). Bone and intestinal absorption of calcium are regulated mostly by 25(OH)D3 and PTH. The process of bone metabolism is monitored through different enzymes or proteins released during bone formation or resorption such as osteocalcin and serum CTX. Osteocalcin acts as a marker for bone formation whereas serum CTX is a marker for bone resorption (Risteli & Liesegang, 2005). Rickets is a bone mineralisation disorder typical in young animals, impairing the mineralisation of physeal, and epiphyseal cartilage during endochondral ossification, resulting in failure to mineralise newly formed osteoid (Wharton & Bishop, 2003). In most instances, it is caused by a dietary deficiency of Vitamin D or phosphorous. Low vitamin D concentrations in ewes has shown to be closely related to low plasma vitamin D concentration of the lamb (Dittmer & Thompson, 2011). Feeding the metabolite 25-hydroxyvitaminD3 plus calcium to wethers has been shown to increase calcium turnover in the 25(OH)D3 supplemented sheep (Bhanugopan et al., pers comm.).

As a part of a larger study, blood samples from 40 twin lambs were taken at marking and weaning and analysed for serum Crosslaps-CTX-I and osteocalcin to assess bone turnover. Blood samples were analysed using commercial kits (MicroVue™ Osteocalcin EIA kit, Quidel, Immuno Pty Ltd, Australia, IDS Serum Crosslaps ® ELISA (CTX-I), Abacus ALS, Australia). Serum CTX-1 at weaning was lower than at marking indicating lower resorption from bone and suggested increased bone mineralisation at the time of weaning. Osteocalcin did not differ significantly between marking and weaning, indicating no change in bone resorption in suckling lambs during late lactation.

We gratefully acknowledge funding from MLA Donor Company, Charles Sturt University and DSM Nutritional Products

References:
Wool cortisol concentration does not differ between sites within individual sheep

O.A. Kelly¹, S. Weaver¹, J.E. Hocking Edwards², P.I. Hynd¹, W.S. Pitchford¹
¹School of Animal and Veterinary Sciences, University of Adelaide, Roseworthy SA 5371 Australia
²SARDI Livestock and Farming Systems, Struan Research Centre, Naracoorte SA 5271 Australia

Cortisol is a biologically vital compound, and often used as a tool to quantify stress in animals (Burnard et al. 2016). This is a new and relatively unexplored trait in wool, so to use cortisol levels to quantify chronic stress in sheep it is essential that we understand the amount of variation between body sites.

Wool samples were taken from 19 hogget ewes from Roseworthy Campus farm. They were the same breed and raised in the same contemporary group. Samples were taken from four sites over the animal (Figure 1). Wool samples were washed in isopropanol, finely ground in a ball mill, and the steroids extracted with methanol. An ELISA method was used to quantify cortisol concentrations. Log-transformed data underwent univariate analysis, with fixed effects of site and site by section, and random effects of animal and the residual being animal by site.

There was no significant difference between sites (Figure 2) and the repeatability across sites was high (99.9%). This means that an animal that has a high concentration at one site will have high concentrations at all sites, and so sampling wool at any site would provide a good indication of overall levels. This differs from reports of previous literature in other species, though these differences are often believed to be due to differences in hair growth cycle between sites (Burnard et al. 2016) which is less evident in wool.

Given it is a standard for other wool measurements, it is recommended that the midside be sampled and measured for cortisol levels to keep testing site consistent with other wool measurements such as fibre diameter and staple strength.

References:
Implementation of shorter shearing intervals in Ivanhoe NSW: a comparison project between 6 & 12 monthly shearing

Shearing at 6 monthly intervals has not been considered until recently, due to discounts on short staple length. However the market indicators show that carding wools are achieving comparable prices and more producers are choosing to shear more frequently than every 12 months. This project will investigate the merits and gains achieved by shearing 6 monthly on wool quality and quantity, improved reproduction, reduced incidence of disease, such as flystrike and lice and the financial incentives of changing shearing interval.

Currently, prices are flat between 70-100mm for staple length, with discounts starting from 65mm and increasing as staple length fall below 60mm (AWEX). It has been identified that staple length accounts for 3% of the percentage contribution for variation in price (Nolan, E. 2012).

The experiment is being conducted in Ivanhoe, western NSW. The property is located approximately 80km South West of Ivanhoe. The Ivanhoe area is classified as semi-arid rangelands, with a mean annual rainfall of 307.2mm. The area is a winter dominant rainfall and pastures. The animals are grazing on red clay banks consisting of lignum and box swamp trees, pigweed, ruby saltbush, bluebush and tumbleweed, and black clay areas consisting of lignum, Dylan bush, and clover. Currently the property has received 11mm for the year, and has only perennial species as ground cover.

The ewes (n=700) are 4 ½ year old, Collinsville bloodline. In the previous shearing (2017) the mob cut 6kg per head, at 21 micron.

The experiment is designed to compare between 6 and 12 monthly shearing intervals. Half of the flock (n=350) have been shorn at 6 monthly interval (January and August) and half of the flock will be shorn at the normal August shearing.

Nolan, E. The Economic value of Fleece Wool Attributes, report prepared for Australian Wool Innovation. The University of Sydney, Faculty of Agriculture and Environment. 2012
The HOUR of POWER sponsored by T.A. Field Estates

Encouraging Young Researchers and Industry Innovators

Forough Ataollahi (Charles Sturt University, NSW)

Effects of maternal supplementation with calcium and magnesium on general health and immunity of ewes and their lambs

Effect of maternal mineral supplementation with calcium and magnesium on immune response and energy regulation of ewes and their lambs

Forough Ataollahi a,b, Michael Friend b, Shawn McGrath a,b and Marie Bhanugopan a,b

a School of Animal and Veterinary Sciences, Charles Sturt University, PO Box 588, Wagga Wagga, NSW 2678, Australia.
b Graham Centre for Agricultural Innovation, Locked Bag 588, Wagga Wagga, NSW 2678, Australia

Metabolic disorders like hypocalcaemia and pregnancy toxoaemia cause major production loss for the Australian sheep industry. These disorders occur due to a deficiency in feedbase and pasture. High requirements of ewes to minerals such as calcium (Ca) and magnesium (Mg) at late gestation and early lactation for fetal growth and colostrum/milk production make ewes vulnerable to metabolic disorders. It has been shown that Ca and Mg are vital for a number of physiological processes in improving energy regulation and boosting immune system. The aim of this PhD study was to evaluate the effect of Ca and Mg supplementation on mineral profile, immune response and energy profile of pregnant ewes and their lambs.

A series of experiments were conducted such as a pilot trial from two weeks before lambing to 4 weeks after lambing which was followed by another study at which ewes received a long-term supplementation with Ca and Mg from one month before lambing to one month post lambing. In another study, the effect of Ca and Mg was investigated in ewes grazing on barley forage from lamb marking to weaning. Blood, urine and milk samples from ewes and blood from lambs were collected to investigate the effect of mineral supplementation.

The findings of this PhD study showed that supplementation with Ca and Mg improved ewes metabolic status. The regulation of energy in ewes supplemented with Ca and Mg was more efficient than unsupplemented ewes. Ewes in this study underwent a period of immune suppression from one week before lambing to lambing which make ewes more susceptible to infection. There was a decreased in leukocyte function and total oxidant capacity in blood of ewes at these time points. However, supplementation of ewes with Ca improved their immune responses which has many implication on the reproductive performance of ewes.

The efficiency of immune responses in lambs born from supplemented mother was greater which has many impacts on their future life. Long-term maternal supplementation improved weight gain of lambs at marking. Lamb weight at around lamb marking is an important factor affecting weaning weight which might cause an early weaning occur. Early weaning may be a good strategy to increase productivity and also to make sure that ewes have a greater period to rest and recover their body condition.

The effect of mineral supplementation on energy regulation was further investigated by evaluating the effect of mineral supplementation on the expression level of genes regulating energy balance. This study indicated that high energy demands of twin-bearing ewes at late gestation imposed an increase in the expression level of genes mediating energy balance.

It is concluded that supplementation of ewes with Ca and Mg at gestation and lactation can improve the immunity and energy balance of ewes and their lambs.
Accelerating genetic gain through utilisation of genetic technologies

By Elise Bowen, Sheep Data Management

Aim: to improve genetic gain (measured by average flock index)
- Stage 1: 2016-2017
  - Focus on in-flock ewe selection
- Stage 2: 2017-2018
  - Ram selection within and outside the flock and mating allocation
- Stage 3: 2018-2019
  - Widespread dissemination of improved performance genetics and evaluation

Stage 1: 2016-2017
- Emphasis on index when selecting breeding ewes and sire team
- Retaining spring drop ewe lambs in flock

<table>
<thead>
<tr>
<th>Year</th>
<th>n ewes</th>
<th>% ewe lambs</th>
<th>Avg dam index</th>
<th>Avg sire index</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>940</td>
<td>19.4</td>
<td>162.0</td>
<td>182.4</td>
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<td>2017</td>
<td>1079</td>
<td>16.3</td>
<td>165.5</td>
<td>193.5</td>
</tr>
<tr>
<td>2018</td>
<td>1068</td>
<td>19.3</td>
<td>171.3</td>
<td>199.6</td>
</tr>
</tbody>
</table>

Stage 2: 2017-2018
- Selection of industry-leading AI sires
- MateSel for allocation of ewes to rams
- Utilise high-indexing ram lambs

<table>
<thead>
<tr>
<th>Conception</th>
<th>n ewes</th>
<th>Avg dam index</th>
<th>Avg sire index</th>
<th>Avg prog. index</th>
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<tbody>
<tr>
<td>Natural</td>
<td>887</td>
<td>169.8</td>
<td>196.6</td>
<td>183.2</td>
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<tr>
<td>AI</td>
<td>101</td>
<td>178.5</td>
<td>226.1</td>
<td>202.3</td>
</tr>
<tr>
<td>Total</td>
<td>988</td>
<td>170.7</td>
<td>199.6</td>
<td>185.1</td>
</tr>
</tbody>
</table>

Stage 3: 2018-2019
- Genomic testing of top AI ram lambs
- Widespread use of best AI ram lambs

Sheep CRC case study:
"Using selection decisions to improve ASBVs – Climbing to the top of the tree"
- Aim to move average flock ASBVs into top 20% of industry
- Sourcing rams in the top 1-10% of industry on index
- Reducing generation interval by 1 year
- Projected to take 5-8 years to achieve goal
Dione Howard is a soon-to-be veterinarian from Lockhart, NSW. She grew up on the family farm which is home to Illawarra Merino Stud and from there developed a love for sheep and wool. Dione is a young wool industry ambassador and is sponsored by Australian Wool Innovation to be a member of the Art4Agriculture Young Farming Champions program.

Dione has attended AWI's Young Woolgrower Study Tour to China and Hong Kong, presented to students in schools, at the Sydney Royal Easter Show and at the Australian Farm Institute’s Round Table Conference. Dione has just completed an Honours project which investigated the communication and extension preferences of Australian sheep producers. She is passionate about Australia’s wool industry and is looking forward to sharing her experiences and opportunities that exist for youth in wool.

For young people with an interest in wool there are many ways to get involved in the industry. The following is a list that Dione has put together of some industry initiatives for those looking for a place to start, or for their next step in industry involvement:

<table>
<thead>
<tr>
<th>Industry Initiatives</th>
<th>School Students</th>
<th>Tertiary Students</th>
<th>Working in Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Merino Challenge:</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Young Farming Champions Program:</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Breeding Leadership Program:</td>
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<td><a href="https://www.wool.com/breedingleadership">https://www.wool.com/breedingleadership</a></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Peter Westblade Scholarship:</td>
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<td></td>
<td>✓</td>
</tr>
<tr>
<td>Australian Wool Education Trust Scholarships:</td>
<td>✓</td>
<td></td>
<td>✓</td>
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<td><a href="https://www.woolwise.com/scholarships/">https://www.woolwise.com/scholarships/</a></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dione’s tips for young people who are passionate about the sheep and wool industry:

1. Keep at it! If you get knocked back for a position or a scholarship, give the next opportunity a go.
2. The sheep and wool world is small and people talk! Make sure you take the opportunity to network and you never know where a conversation might take you.
3. Find yourself a mentor (or several!) in the sheep and wool industry – have that conversation or press send on that email.
4. Don’t be afraid to step outside your comfort zone – apply for that position or course, even if it’s over the other side of the country!
5. All your hard work will pay off – whether it’s on farm or hitting the books at university, your passion for the industry will take you places.

You can find Dione on:
Email: dionehoward13@gmail.com
Twitter: @dione_howard / Instagram: @dionehoward_ / Facebook
Neonatal lamb mortality in Australia is ranges from 10 to 35% (Hinch and Brien, 2014) and 48% of pre weaning losses occur in the neonatal period (Fowler, 2007). The chances of lamb survival is determined by the complex interactions between parturition, environment, nutrition and ewe and lamb behaviour (Nowak et al., 2008).

Dystocia can explain up to 48% (Refshauge et al. 2016) of these deaths. Meat and Livestock Australia (2015) ranked dystocia as third based on cost for conditions influencing sheep performance. The cost of dystocia to the sheep industry is $142M per annum (Lane et al., 2015). These costs can be attributed to the slowing of potential genetic gains, reduced productivity and mortality of ewe and lamb. Strategic management of ewe nutrition and selection based Australian Sheep Breeding Values (ASBVs) for the genetic traits of lambing ease and birth weight are strategies current adopted by industry to reduce the occurrence of dystocia. However, the development of a tool/method to identify ewes most a risk of dystocia would be highly beneficial due to the improved accuracy and practicality of assessing lambing ease.

The concept, that larger pelvis reduces the occurrence of dystocia in sheep was suggested by McSporran and Fielden (1979). Based on the observation that ewes with a eutotic history had a significantly larger pelvic width and area than ewes with a dystocic or a randomly selected member at post mortem examination. While Kilgour and Haughey (1993) found that ewes selected for rearing ability in the Trangie Fertility Flock had 8.1% greater mean pelvic opening than ewes in the Trangie Random Flock. Similar observations have been made in cattle (Holm et al., 2014 and Morrison et al., 1986). As a result, the Rice pelvimeter was a developed, this tool allows the live measurement of pelvic width and height in cattle. After measurement the selection of desirable females can occur. Holm et al. (2014), shows a significant decrease in the rate of dystocia in heifers with desirable pelvic area along with an increase in unassisted births (Table 1).

Table 1. Effects of the use of internal pelvimetry for selection in heifers on calving fate, after adjusting for lean body weight (Holm et al., 2014).

<table>
<thead>
<tr>
<th>Fate</th>
<th>Dystocia</th>
<th>Unassisted Birth</th>
<th>Calf birth weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culled</td>
<td>58 %</td>
<td>19%</td>
<td>29.0 kg</td>
</tr>
<tr>
<td>Retained</td>
<td>28%</td>
<td>41%</td>
<td>29.5 kg</td>
</tr>
</tbody>
</table>

A modified Rice pelvimeter was developed for use in sheep and has successfully measured the pelvic dimension in Dorper ewes in South Africa ($r^2=0.8$) (van Rooyen et al., 2012). However, when the same tool was trialed in Australia within the Cowra Agricultural Research and Advisory Station flock the correlation was $r^2=0.0039$. The differences in correlation can be attributed to age effects, breed effects and methodology differences.

The trial Cowra Agricultural Research and Advisory Station concluded that the modified rice pelvimeter could not correlate live and actual pelvic measurements. Therefore, the no observation could be made on the effect of ewe selection for pelvic area on lamb survival. If a suitable tool was developed the sheep and wool industry can significantly increase productivity, genetic gains, animal welfare and the sheep population in Australia. Through reduced neonatal and ewe mortality, development of stronger lambing ease ASBVs and reduced stress to ewes and lambs.

Reference list available upon request.
Rachael Gawne is an Animal Scientist from Narrandera, NSW and is now working as a Sheep Consultant for Sally Martin Consulting Pty Ltd and sub-contracting to MerinoLink Limited. Rachael has always been passionate about livestock production and assisting producers in making management decisions and saw herself building a career within the sheep and wool industry. Whilst completing her studies through Charles Sturt University Wagga, she developed a strong interest in the sheep and wool industry, and in particular, Merino production. In 2017, Rachael applied and was awarded co-recipient of the Peter Westblade Scholarship.

The Peter Westblade Scholarship honours the Late Peter Westblade, a true visionary who was passionate about breeding profitable sheep and a strong supporter of young people interested in agriculture. The Scholarship exists to promote the practical skills associated with the sheep and wool industry and aims to identify, train and develop the next generation of leaders amongst young men and women in the Australian sheep industry.

Scholarship Objectives

- Provide practical hands on education and mentoring opportunities for young people (18-30 years) wanting a career in the Australian sheep and wool industry.
- Encourage young people into the sheep and wool industry by demonstrating and showing opportunities and career pathways.
- Promote and demonstrate new technologies within the sheep and wool industry

Scholarship Scope

The Peter Westblade Scholarship provides:

- Mentoring from industry innovators and leaders
- Opportunities to be involved in the sheep and wool industries largest commercial genetic trial
- Opportunities to be involved with Sheep CRC activities and initiatives
- Practical training appropriate to the skill set required in the sheep and wool industry
- An opportunity to develop wider networks of key contact in the sheep and wool industry
- Travel opportunities; Resource books
- Promotion, utilisation and adoption of new technologies
Will MacSmith (Corroboree Merinos, Borenore NSW)

Improving efficiency across the board; relying on trial work at a commercial level instead of gut fee.
Combining the whole package – genetics and feed efficiency.

*Presentation was unavailable at the time of printing. All speaker presentations will be made available on the MerinoLink website [www.merinolink.com.au](http://www.merinolink.com.au) post conference.*
Moving to a Non-Mulesing Enterprise
Geoff Lindon, Program Manager Genetics & Animal Welfare Advocacy, Australian Wool Innovation

PLANNING FOR A NON-MULESED MERINO ENTERPRISE

Report on interviews of 40 woolgrowers during 2017 with a diverse range of environments and sheep types.

By Geoff Lindon, AWI

Increasing numbers of Merino enterprises are moving away from relying on mulesing as their main tool to reduce the risk of breech flystrike. Instead, enterprises are turning to other control methods, such as breeding for low breech wrinkle and dags, increasing reliance on worm and fly control chemicals, additional crutching and accelerated shearing to manage the risk of breech flystrike on their properties.

To understand the successes, and potential pitfalls of moving to non-mulesed enterprises, interviews were held with forty wool-growers that have either never mulesed or recently ceased mulesing. Several additional businesses that continue to mules or have returned to mulesing were also interviewed.

The interviews highlighted the large diversity in woolgrower’s
- climate, environment and thus risk of breech strike;
- type of Merinos (Superfine, Fine, and Wools from Spanish, Peppin, SA Merino, and Dohne backgrounds);
- enterprise mix (specialty wool-growing to highly diverse livestock and farming enterprises);
- business structure and size (sole trader to family partnerships and corporates);
- calendar of operations (times and lengths of joining, crutching, lambing, shearing, jetting);
- animal health programs (due to varying risk of parasites and diseases); and
- skills, attitudes and philosophical approaches to sheep management, changing markets and appetite for risk.

Whilst there were common themes across the non-mulesed enterprises; due to the large diversity, they were addressed and managed very differently. There is not one recipe, each woolgrower needs to have a plan that is relevant to them and their business.

Woolgrowers were interviewed either by telephone or during property visits. Most interviews lasted for an hour with several lasting up to 3 hours. The time and commitment of the woolgrowers interviewed is gratefully appreciated. Their responses are summarised below.

1. PLAN FOR SUCCESS

All the woolgrowers interviewed highlighted the importance of having a well-considered detailed plan in writing before starting the move to a non-mulesed enterprise.

It is important that the plan has the full support of everyone in the business, including management, staff, contractors, shearers, livestock agents and ram suppliers. Many of the woolgrowers interviewed spent some time finding the right people to work with to support their wish to move to a non-mulesed merino enterprise.

Some woolgrowers commented that after all the planning it still took a leap of faith to make the change. A good number of woolgrowers were also of the view that after several years it was easier than they first thought and other issues were now the focus of their business.
2. THINK BEYOND MULESING

Most of the woolgrowers interviewed acknowledged that ceasing to mules is a step in a journey rather than a destination and is part of a larger requirement for **continuous improvement in animal welfare**.

Their journey to improve animal welfare did not start or cease with the decision to cease mulesing.

3. SHEEP TYPE

With hindsight, many businesses felt they ceased mulesing while their sheep’s breech wrinkle score was too high, requiring an urgent focus on breeding to reduce breech and tail wrinkle, to the detriment of other traits. Their advice where possible, is to **create a low wrinkle flock prior to ceasing to mules**.

They believe that there is a shortage of rams that have low wrinkle and dags and high fleece weight, particularly for the fine and super fine Merino types. There was frustration in how to confidently find rams that met the low wrinkle, low dag and high worm resistance criteria while aware it will take some time for ram breeders to breed them.

4. FOCUS ON MANAGEMENT

The key to the success of non-mulesed enterprises was a **flexible management approach** and the ability to react quickly to an unseasonal high risk or incidence of strike. Businesses with a greater focus on the wool enterprise appeared more able to react quickly compared to businesses with other large enterprises and thus less likely to be able to tactically react with sufficient speed.

Husbandry programs were heavily influenced by **sheep type and environmental risks**. One woolgrower in a hot, low worm region, did not drench, did not jet or crutch in most years; his whole focus was on high cutting, low wrinkle genetics. At the other extreme, some woolgrowers were either crutching 5 times per year or using flystrike prevention chemicals 3 times per year or a combination thereof.

A woolgrower who introduced lower wrinkle and cover sheep, quickly found they were less suited to their environment with fleece rot and body strike increasing 7 to 11 times compared to their original sheep. Jetting for body strike became a priority.

There was a strongly held view that **improved flock husbandry and management** was important to reduce the risk of breech strike for non-mulesed Merino enterprises. Increasing condition score both genetically and through increased nutrition, reducing risks of other parasites and diseases and thus general health and robustness of the flock is believed to lead to a reduced risk of breech strike.

In most cases it required increased labour for additional surveillance, crutching, stain management, worm control and chemical prevention. However, the extent of the extra labour required varied across environments and sheep types.

**Long acting chemical control** options were a focus for enterprises in high strike, high worm and high dag environments. Long acting drench injectables and capsules become a more important aspect of the animal health program after ceasing to mules.

The short-term need for these products overrode the longer-term concerns regarding increased parasite resistance, but woolgrowers are aware that managing the longer-term resistance issue is part of the future continuous improvement plan required for non-mulesing enterprises; it just had to take a lower priority in the early years in a non-mulesed enterprise.

Most businesses have **shorter joinings**, ranging from 3 to 6 weeks. This reduces the risk and consequences of an unexpected fly wave during lambing when management options are limited.

All enterprises were concerned about how, in a sudden severe fly wave, they could protect their sheep particularly if they cannot access their animals due to floods, personal illness, etc.
5. FINANCIAL IMPACT

The additional cost of moving to a non-mulesed enterprise varied; figures quoted by growers were around $2-3 dollars per head per year or 50c/kg greasy per year for husbandry costs. However, most woolgrowers were unclear on the details because a range of variables changed, making it difficult to attribute costs accurately. In general, the focus for woolgrowers was on improving the future demand and viability of wool, their determination to succeed and to make it a good financial decision as soon as possible. No business interviewed moved to a non-mulesed enterprise with the intention to improve immediate financial gain.

The key considerations after making sure that the incidence of breech strike was under control was reducing the discount on restocker sale sheep and maximising the wool sale premium.

Restocker Sale Sheep Discounts

The discount for non-mulesed restocker sheep sales is the biggest financial cost for most businesses but this was very variable between regions. It was addressed in a variety of ways:

- Returning to mulesing
  - the discount on restocker sales, along with increased flystrike were the key reasons that businesses returned to mulesing.
- "Avoiding" the discount by
  - retaining older ewes in the Merino flock or moving them to the prime lamb flock (up to 7 and 8 years of age) and then selling them direct to the abattoir. This “avoided” the discount on unmulesed 5 years old ewes.
  - classing out young ewes and retaining them for first cross lamb production.
- Retaining wethers for wool production, then selling to an abattoir

Enterprises with lower lambing percentages and low relative numbers of restocker sheep sales (ultra-fine types, or areas where there are wild dogs, OJD or high stocking rates) are less impacted by the discounts.

The size of the discounts varies between regions, depending on abattoir competition and proximity to high profile restocker sale yards. The size of the non-mulesed discount on 1 to 5 years old ewes, ranged from 0% to 40% with 25% being a rough guide. To further minimize surplus sheep discounts, businesses use a range of options such as:

- Using livestock agents with strong links to other non-mulesed businesses;
- Sellers creating their own contact list of non-mulesed restockers;
- Using Auctions Plus to reduce the cost of passing in sheep;
- Classing out high wrinkle ewes early, selling them as prime lambs off grass or via a feedlot;
- Selling the high wrinkle ewe hoggets via the abattoir and penning the lower wrinkle saleyard sheep on skin and wrinkle type;
- Selling restockers preg tested in lamb to prime lamb sires. If sold off-shears and treated with CLiK the sale is more transparent and helps reduce the likelihood of discounting.

Wool Price Premiums

The premiums for non-mulesed wool have been very small to modest and in most cases, are yet to cover the additional enterprise costs.

However, the premiums are increasing particularly for direct sales with tight traceability. To increase the premiums for non-mulesed wool, businesses are using a range of options:

- Declaring “Non-Mulesed” on the National Wool Declaration and crutching 3 months before shearing to reduce stain;
- Participating in other Quality Assurance Scheme such as SustainaWOOL and Responsible Wool Standard;
- Visiting overseas mills and brands, creating their own brand for boutique products and formally marketing their "wool" and "story" to the supply chain;
• Selling at specific auction sales with forward notification to buyers;

6. CHECKLIST FOR MOVING TO A NON-MULESED MERINO ENTERPRISE

• Plan ahead - a more flexible management approach is likely to be required
• Review flock calendar of operations (joining time and length, date of crutching and shearing) and animal health program (Worm and fly control, vaccinations, drench and jet programs) refer to FlyBoss.com.au
• Get all people in the business on board
• Understand how your environment is different to others, consult local growers
• The focus needs to be on improving lifetime welfare and having a continuous animal welfare improvement approach, rather than mulesing itself;
• Reduce wrinkle and increase production using a sheep type well suited to your environment. Consult your genetic advisor or ram supplier;
• Access additional labour;
• Find preferred livestock and wool selling brokers;
• Review all Quality Assurance programs available to you;
• Minimise restocker sheep sale discounts and maximise wool price premiums; and
• Be determined to make it work.

The full document can be found on AWI’s website www.wool.com/flystrikelatest
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