Yield and botanical composition of lucerne, cocksfoot or ryegrass based pastures over six years
Acknowledgements

• Meat & Wool NZ Ltd/ Pastoral21
• The Cocksfoot Growers Association
• Lincoln University
Objective

To quantify annual yield and botanical composition from lucerne, cocksfoot and ryegrass based pastures

Source: Mills et al. 2008
Materials & Methods

• RCB
• RG/Wc
• CF/Sub
• Luc

• 6 replicates
  - 0.05 ha plots

Established autumn 2002

Grazed by Coopworth ewe lambs/hoggets

Source: Mills et al. 2008
Results - Total Annual Yield

Source: Mills et al. 2008
Botanical composition - RG/Wc

Year 1: 7.4 t/ha
Year 2: 1.5 t/ha
Year 3: 4.0 t/ha
Year 4: 2.3 t/ha
Year 5: 2.3 t/ha
Year 6: 4.0 t/ha

Source: Mills et al. 2008
White clover
Weeds
Ryegrass

<table>
<thead>
<tr>
<th>Year</th>
<th>2002/03</th>
<th>2003/04</th>
<th>2004/05</th>
<th>2005/06</th>
<th>2006/07</th>
<th>2007/08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total yield (t DM/ha/y)</td>
<td>0.4 t/ha</td>
<td>4.1 t/ha</td>
<td></td>
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</tr>
</tbody>
</table>

Source: Mills et al. 2008
Results - Annual LW production

Source: Mills et al. 2008

Annual LW production (kg LW/ha)

Date

Source: Mills et al. 2008
Results - Annual LW production

- Annual grasses
- Taprooted dicot weeds

Source: Mills et al. 2008
Results - Total Annual Yield

Source: Mills et al. 2008
### Botanical composition - CF/Sub

**Year**
- 2002/03
- 2003/04
- 2004/05
- 2005/06
- 2006/07
- 2007/08

**Total yield (t DM/ha/y)**

- **2002/03**
  - **Cocksfoot**: 8.4 t/ha
  - **Sub clover**: 3.7 t/ha
  - **Weed**: 1.5 t/ha

- **2003/04**
  - **Cocksfoot**: 4.7 t/ha
  - **Sub clover**: 1.5 t/ha
  - **Weed**: 0.2 t/ha

- **2004/05**
  - **Cocksfoot**: 2.5 t/ha
  - **Sub clover**: 0.2 t/ha
  - **Weed**: 0.2 t/ha

- **2005/06**
  - **Cocksfoot**: 0.2 t/ha
  - **Sub clover**: 0.2 t/ha
  - **Weed**: 0.2 t/ha

- **2006/07**
  - **Cocksfoot**: 0.2 t/ha
  - **Sub clover**: 0.2 t/ha
  - **Weed**: 0.2 t/ha

- **2007/08**
  - **Cocksfoot**: 4.7 t/ha
  - **Sub clover**: 0.2 t/ha
  - **Weed**: 0.2 t/ha

**Source:** Mills *et al.* 2008
Annual LW production

Source: Mills et al. 2008
Annual LW production

Source: Mills et al. 2008
Results - Total Annual Yield

Source: Mills et al. 2008
Botanical composition - Lucerne

Year

<table>
<thead>
<tr>
<th></th>
<th>2002/03</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total yield (t DM/ha/y)</td>
<td>&lt;0.1 t/ha</td>
<td>17.3 t/ha</td>
<td>9.6 t/ha</td>
<td>0.8 t/ha</td>
<td></td>
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</tr>
</tbody>
</table>

Source: Mills et al. 2008
Annual LW production

Source: Mills et al. 2008
Annual LW production

Source: Mills et al. 2008
Conclusions

- **Lucerne:**
  - Highest DM and LW production

- **RG/Wc:** >8 t DM/ha/y
  - Sown species 94% to <50%

- **CF/Sub:** best grass based pasture
  - Sub clover >3 t/ha/y (86% desirable spps in Yr 6)

- **Cocksfoot pastures with sub and white complement lucerne in summer dry environments with unpredictable rainfall**

Source: Mills *et al.* 2008
Lucerne issues

Lambing time

• Average 23% higher but 3-weeks later

• Ewes and lambs on lucerne pre-weaning?

• Increase flexibility of lucerne management
  - “graze at 10% flowering?”
Growth:
is dry matter accumulation as a result of light interception and photosynthesis

Development:
is the ‘age’ or maturity of the regrowth crop e.g. leaf appearance, flowering

Growth and development are both influenced by environmental signals
The Canopy: the energy capture device
Vegetative growth

Above ground growth rate (kg DM/ha/d)

Mean temperature (°C)

Source: Moot et al. 2003
Partitioning to roots

Tap root dry weight (t/ha)

Month

42-day

28-day

Source: Moot et al. 2003
Seasonal grazing management

Early autumn (Feb-April)

• drought ⇒ graze standing herbage
• allow 50% flowering
• long rotation

⇒ build-up root reserves for spring growth and increase stand persistence
Dry matter production in spring

Source: Moot et al. 2003
First paddocks grazed in autumn are first paddocks used in spring.
Lucerne development

A) Vegetative

- Leaf appearance at successive nodes morphology

- Constant in Thermal time
  - 35 °Cd in winter – summer
  - delayed in autumn (40 - 60 °Cd)
Herbage mass (t DM/ha)

Date

28 Aug 25 Sep 23 Oct 20 Nov 18 Dec

Non-grazed
Grazed

Dryland Lucerne - Ashley Dene

Source: H.E. Brown
Seasonal grazing management

Late autumn/winter (May-July)

• hard grazing once growth stops (frost) ⇒ decrease aphid population

• spray for weeds 10-14 days after winter graze

grazing/spraying June
nodes developing at low temperatures
B) Reproductive (flowering)

- Long day plant
  flowers earlier in summer than spring/autumn due to photoperiod

- Time of flowering is also temperature dependent
  e.g. 380-550 °Cd as photoperiod changes (14.5-16.5 h)
Implications for seasonal grazing management

Spring

- 1st rotation aided by root reserves to produce high quality vegetative forage.

- can graze before flowers appear (~1500 kg DM/ha) ideally ewes and lambs but

Never lamb on or set stock lucerne
Lambing (set stock) on grass paddocks

Photo: ‘Bonaverce, Marlborough
Once priority stock go onto lucerne…. They stay on it!
Doug and Fraser Avery “Bonavaree”
1100 ha 25% lucerne (55% of easier country)
Seasonal grazing management

Spring/summer (Nov-Jan)

- Priority is stock production (lamb/beef/deer)
- Graze 6-8 weeks solely on lucerne
- 5-6 paddock rotation stocked with one class of stock (10 day max.)
- Allowance 2.5-4 kg DM/hd/d – increase later in season
Summary

• Spring is animal priority
  – *can graze before flowering or buds (2000 kg DM/ha)*

• Ewes and twin lambs pre-weaning

• Autumn/winter is time for the plant

• Always 7-10 day rotation – spring, summer and autumn

• High quality feed for high value stock

• Never set stock lucerne
They grow healthier with lucerne...
