Hawkes Bay
18 May 2015

Lucerne
Grazing management

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New Zealand’s specialist land-based university
Dry matter yield and botanical composition of the ‘MaxClover’ grazing experiment at Lincoln University, Canterbury, New Zealand

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Lincoln University Dryland Pastures Research Team

MAXCLOVER PHOTO DIARY - 2002/03 to 2010/11

Funded by: New Zealand’s specialist land-based university
The ‘MaxClover’ Grazing experiment in paddock H19 at Lincoln University
Total spring LWt production

Mills et al. 2014b
## Total summer LWt production

<table>
<thead>
<tr>
<th>Year</th>
<th>CF/Sub</th>
<th>CF/Bal</th>
<th>CF/Wc</th>
<th>CF/Cc</th>
<th>RG/Wc</th>
<th>Luc</th>
<th>Not determined</th>
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<tbody>
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<td>02/03</td>
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<td>10/11</td>
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*Note: The values are given in kg/ha for each year.*

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Mills et al. 2014b
Total autumn LWt production

Autumn LWt (kg/ha)

- CF/Sub
- CF/Bal
- CF/Wc
- CF/Cc
- RG/Wc
- Luc

Not determined

Years: 02/03 to 10/11
Yield and composition of six dryland pastures over nine growth seasons

- Lucerne produced more DM than all grass based pastures in most years.

- Its tap-root enabled access to water from lower soil layers but it also used water more efficiently than the grass based pastures - especially in spring.

- CF/Sub clover was the highest yielding grass based pastures in Years 6-9.

- Yields of all pastures declined over time.

Mills et al. 2014a
All the cocksfoot pastures lost sown components at about 3% per annum

The perennial ryegrass/white clover pasture lost RG+Wc at about 10% per annum

Figure 2. Change in the proportion of originally sown pasture components (grass + clover) over time
Weed Invasion

Unsown species <5% in Year 1 .......>45% in Year 6

RG/Wc pastures
Spring WUE

![Graph showing water use (mm) against accumulated DM (t/ha) for Lucerne, Grass/clover, and Grass only.]

- Lucerne: 28 kg DM/ha/mm
- Grass/clover: 20 kg DM/ha/mm
- Grass only: 13 kg DM/ha/mm

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Lucerne Objectives

• Grazing management to maximise production, quality and persistence

• Set stocking

• Current experiments
Over 60,000 ha sown and doubling of lucerne seed sales over 10 years

“35% Rate of return on investment”
**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

Mean temperature (°C)

Growth rate (kg DM/ha/d)

Spring

Autumn

Jan

Feb

July

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Experiment 2 - flexible grazing

- 38 days resting
- 4 days grazing
- 25 days resting
- 3 days grazing
What’s going on down there?
Partitioning to roots

- Tap root dry weight (t/ha)
- Month
- 42-day
- 28-day

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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...

Growing point at the top of the plant

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Rotation 1 Pre-graze
Plot 1 (21/9/07)
2.3 t DM/ha
20-25 cm tall
MaxClover – 38-42 day rotation

Moot & Smith 2011
Practical Lucerne Management Guide
Rotation 2 Pre-graze
Plot 1 (2/11/07, 38 d)
2.9 t DM/ha
35-40 cm tall
Stocking rates in New Zealand

- Spring 14 ewes plus twins/ha
- Summer 70 lambs/ha
- Ideally 7-14 days maximum on any one paddock
- Less intensive systems – don’t open the canopy
Spring grazing
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 (7-10 days on)

- allowance 2.5-4 kg DM/hd/d – increase later in season
14 ewes + twins/ha
High numbers for 7-10 days
Fibre and salt
Maximize reliable spring growth – high priority stock
Early autumn (Feb-April)

- terminal drought ⇒ graze standing herbage
- allow 50% flowering
- long rotation (42 days) somewhere between Jan and end of May.

⇒ build-up root reserves for spring growth and increase stand persistence
Autumn = flowering plants
But don’t flush on this!
Metabolisable energy of lucerne

![Graph showing the metabolisable energy (ME) of lucerne as a function of yield (t DM/ha). The graph compares ME for leaves and stems. The ME for leaves is consistently higher than for stems across different yield levels.]

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Brown & Moot 2004
Lucerne grazing options

- Rotational grazing
- Set stocking
- Grass mixes

Pastoral 21 BLNZ funded programme
Cemetery Block
103.93ha

Main Block

Total experimental area 2013/14 = 30.0 ha

C9 (North)
New legume/grass mixes
B) Clover/grass

C9 (South)
(Old – terminated Mar 2013)
B) Clover/grass

C6/7
Legume/grass mixes
A) Lucerne/grass

H7
Spring grazing management of lucerne

47.88ha
Home Block
Objective

• Evaluate three spring grazing management strategies for lucerne monocultures
  – Rotational grazing (6 paddock system)
  – Set stocked (SS) until weaning
  – Semi set stocked (SSS) until weaning (10 day shifts)

• After weaning SS and SSS lambs mobbed up and moved to an 8 paddock rotational grazing system (RECOVERY PHASE)
Ashley Dene Lucerne - H7 - Grazing Treatments

Shelter Belt

20-day rotation - Rep 1
Set stocked - Rep 1

20-day rotation - Rep
Set stocked - Rep 2

20-day rotation - Rep
Set stocked - Rep 3

20-day rotation - Rep
Set stocked - Rep 4

Plot 1
Plot 2
Plot 3

Plot 4
Plot 5
Plot 6

6 Plot Rotation

Ashley Dene Road

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Project 3 –
Spring grazing management of lucerne
Total LWt produced - Lactation

Lactation phase - E&L

Total spring LWt production (kg/ha)

Control
Rotational
SS
Semi SS

Growth season
Set-up year
2009/10
2010/11
2011/12
2012/13
2013/14
2014/15

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Crop canopy

Leaf area index

Start of grazing

Closed canopy

Set Stocked
Rotational

Sep-11  Oct-11  Nov-11  Dec-11
1. Manage lucerne pure swards first.
2. Choose paddocks to lamb on **early in autumn** – shelter, older, early clean-up graze and winter herbicide application.
3. Lucerne grass mixes – grass transition.
4. Early and late for condensed lambing (1 cycle).
5. **Drift onto lucerne ~14 d prior to lambing.**
6. Lucerne 15-20 cm tall and keep it there.
7. **Stock at about half the rotational grazing rate**

RULES FOR SET STOCKING cont’d.

8. SS for 4-5 weeks – then rotate.
9. SS lambs use the taller feed as shelter.
10. Stocking rate to keep closed canopy!
11. Canopy gets taller over 4-5 weeks not shorter.
12. Once canopy reduces begin rotational grazing.
14. Paddocks need autumn (6 wks) recharge.

The Blog: https://blogs.lincoln.ac.nz/dryland/
Lucerne/grass mixes

C7(E) 4.0 ha
C7(W) 8.01 ha
C6(E) 5.2 ha

Luc/Brome
Luc
Luc/CF
Luc/CF
Luc/Brome
Luc

Luc/Brome
Luc
Luc/CF
Luc
Luc
Luc/CF
Luc/CF

Lambing and runoff

Tracks for stock movement

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Early spring

Plot 1 - Luc

Plot 2 – Luc/CF
Total Accumulated LWt production

- 2012/13
- 2013/14
- 2014/15

Accumulated total LWt production (kg/ha)

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DM Yield

![Graph showing the total accumulated yield (kg DM/ha) for Luc, Luc/Brome, and Luc/CF from July 2012 to July 2015. The graph includes annotations for E&L, WL, Grazers, Start of grazing, Restocked 7 Nov, and Weaning 20 Nov.]

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Lucerne/cocksfoot mix – Sept 2013
The website...

Info on:
- Current projects
- Field day presentations
- Scientific publications
- FAQs
- Postgraduate study
- Direct link to Blog (text & video posts)

www.lincoln.ac.nz/dryland
Conclusions

• Lucerne growth rate is seasonal based on storage and remobilization of reserves

• Lucerne can be grazed or cut and carried based on yield – not time of flowering

• Replace nutrients removed through cut and carry (K)

• Minimize soil evaporation by timing of irrigation
Case study – Bonavaree farm, Marlborough
Over grazed – high erosion risk
Annual rainfall at ‘Bonavaree’
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Salt bush

Young lucerne

Chemically fallowed land

Landscape farming
### ‘Bonavaree’ production change over 10 years

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2012</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land area (ha)</td>
<td>1100</td>
<td>1800</td>
<td>↑ 64%</td>
</tr>
<tr>
<td>Sheep numbers</td>
<td>3724</td>
<td>4158</td>
<td>↑ 12%</td>
</tr>
<tr>
<td>Lambing (%)</td>
<td>117</td>
<td>145</td>
<td>↑ 24%</td>
</tr>
<tr>
<td>Lamb weights (kg)</td>
<td>13.3</td>
<td>19</td>
<td>↑ 43%</td>
</tr>
<tr>
<td>Lamb sold (kg)</td>
<td>38324</td>
<td>74460</td>
<td>↑ 94%</td>
</tr>
<tr>
<td>Wool (kg)</td>
<td>18317</td>
<td>20869</td>
<td>↑ 14%</td>
</tr>
<tr>
<td>Sheep:cattle</td>
<td>70:30</td>
<td>50:50</td>
<td></td>
</tr>
<tr>
<td>Gross trading profit (ha)</td>
<td>$317</td>
<td>$792</td>
<td>↑ 149%</td>
</tr>
</tbody>
</table>

Moot & Avery 2013
References & Links

Lincoln University Dryland Pastures Website: http://www.lincoln.ac.nz/dryland
Lincoln University Dryland Pastures Blog: https://blogs.lincoln.ac.nz/dryland/
The MaxClover Photo Diary: http://www.lincoln.ac.nz/conversation/drylandpastures/MaxCloverPhotoDiary (18 MB; PDF)


