Grass Research Day
2016
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AHDB would like to welcome you to the first Grass Research Day, held in conjunction with NIAB-TAG.

This is a great opportunity to learn about the work in which AHDB has been involved in the last few years on soil, grass and nutrient management.

There is also an opportunity to hear about work from Ireland on multi-species swards.

AHDB is always keen to conduct research that is applicable at the farm level. Today, farmers, producers and the industry have the opportunity to feed in ideas for future areas of work.

Thank you to NIAB-TAG for hosting the day.

Dr Liz Genever, AHDB Beef & Lamb
Why use the Recommended Grass and Clover List?

- Grass breeding programmes have led to 5-6 unit increase in D-value and 5-9% increase in yield in the last ten years.

- Recommended grass and clover list (RGCL) provides detailed information on independent tested grasses and clovers.

- As few as 1 in 20 varieties of ryegrasses tested will actually make it to full recommendation on the RGCL.

- New varieties need to be significantly better than what is already listed to get on the RGCL.

- Five new grass varieties were added in 2016.

Trial plots for RGCL.
What is the RGCL?

- Lists varieties based on heading date
- Provides extensive information on yield and D-value for simulated grazing and conservation management
- Lists data on ground cover and disease resistance
- Allows a comparison between varieties for a range of traits.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Heading Date</th>
<th>Simulated Grazing</th>
<th>Conservation Management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total Annual Yield (% of 10.5t DM/ha)</td>
<td>D-value</td>
</tr>
<tr>
<td>Diploid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solomon</td>
<td>17 May</td>
<td>98</td>
<td>75.3</td>
</tr>
<tr>
<td>Boyne</td>
<td>20 May</td>
<td>101</td>
<td>75</td>
</tr>
<tr>
<td>Nifty</td>
<td>24 May</td>
<td>103</td>
<td>76.9</td>
</tr>
<tr>
<td>Moira</td>
<td>24 May</td>
<td>98</td>
<td>75.1</td>
</tr>
<tr>
<td>AberDart</td>
<td>24 May</td>
<td>99</td>
<td>77.2</td>
</tr>
</tbody>
</table>
How is the RGCL produced?

- Four sites are involved – Tadcaster, Aberystwyth, Didbrook and Wardington

- Conservation management (Years one and three)
  - First cut at early ear emergence
  - Then cuts taken at six-week intervals
  - Up to five cuts per year.

- Grazing management (Year two)
  - First cut at 1.5 t DM/ha
  - Then cuts taken at three to four-week intervals.

- Two disease sites – Evesham and Dartington – used to collect data

<table>
<thead>
<tr>
<th>Year</th>
<th>Sowing</th>
<th>Conservation</th>
<th>Grazing</th>
<th>Conservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Typically, 400kg N/ha/year applied in grass evaluation for recommended grass and clover list
This does not reflect on-farm practice
This experiment aimed to test RGCL varieties under various N application rates typical of farm practice.

Experimental Design
• 3 locations
• 3 nitrogen application rates
  • 100, 200, 400kg N/ha/year
• Six intermediate perennial ryegrass varieties
• Three diploid, 3 tetraploid
• Three harvest years
• Recommended list management scheme used
• Four replicates in a randomised design.

Herbage trial sites

How do grasses and clovers respond to low nitrogen levels
Effect of N fertiliser rate on variety yield under conservation management

- Highly significant relationship between yield and nitrogen levels
- Fluctuations in the rankings of AberGreen, Montova were due to small variability in yields.
Fertiliser application and the recommended grass and clover list

Effect of N fertiliser rate on variety yield under simulated grazing

- Significant varietal differentiation
- Greatest fluctuation in the ranking under this regime
- No differences in rank with other varieties
- No interaction between N application rate and variety
- RGCL is applicable across a variety of N regimes.
Industry consultation:
- Farmer telephone survey
- 600 grassland farms
- Adviser email survey
- 10 Farmer case studies
- 3 Farmer focus groups.

Feedback:
- High level of confidence in grassland recommendations
- RB209 widely used – largely via hard copy (60% of advisers)
- Widespread use of software used to provide RB209 recommendations
- Eight edition of RB209 was too complicated
- Simplifying structure
The survey showed no relationship between fertiliser use and RB209 recommended rates.

Need to make the recommendations easier to understand.

Option 1. N recommendations for cutting

<table>
<thead>
<tr>
<th>Indicative DM yield$^1$ (t/ha)</th>
<th>1st cut</th>
<th>2nd cut</th>
<th>3rd cut</th>
<th>4th cut</th>
<th>Total N applied$^2$ (kg N/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-7</td>
<td>70</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>70</td>
</tr>
<tr>
<td>7-9</td>
<td>80</td>
<td>50</td>
<td>-</td>
<td>-</td>
<td>130</td>
</tr>
<tr>
<td>10-13</td>
<td>100</td>
<td>75</td>
<td>$75^3$</td>
<td>-</td>
<td>250</td>
</tr>
<tr>
<td>11-14</td>
<td>120</td>
<td>90</td>
<td>$70^3$</td>
<td>$30^3$</td>
<td>310</td>
</tr>
</tbody>
</table>
## Option 1 (cont’d) N recommendations for grazing

<table>
<thead>
<tr>
<th>Indicative DM yield(^1) (t/ha)</th>
<th>Jan/ Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Total N applied (kg N/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-5</td>
<td></td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>5-7</td>
<td></td>
<td>30</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>6-8</td>
<td></td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>20</td>
<td></td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>7-9</td>
<td></td>
<td>40</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td></td>
<td>30</td>
<td>130</td>
</tr>
<tr>
<td>9-12</td>
<td></td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td></td>
<td>180</td>
</tr>
<tr>
<td>10-13</td>
<td></td>
<td>30(^2)</td>
<td>40</td>
<td>40</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>230</td>
</tr>
<tr>
<td>11-14</td>
<td></td>
<td>30(^2)</td>
<td>40</td>
<td>50</td>
<td>50</td>
<td>40</td>
<td>30</td>
<td>270</td>
</tr>
</tbody>
</table>

## Option 2  N recommendations based on management sequence

<table>
<thead>
<tr>
<th>Management sequence</th>
<th>Indicative DM yield (t/ha)(^1)</th>
<th>N rates (kg N/ha) by Grass Growth Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good/Very good</td>
<td>Average</td>
</tr>
<tr>
<td>G</td>
<td>3-4</td>
<td>0</td>
</tr>
<tr>
<td>GGG</td>
<td>6-8</td>
<td>30-30-20</td>
</tr>
<tr>
<td>GGGGGG</td>
<td>9-12</td>
<td>30-30-30-30-30-30</td>
</tr>
<tr>
<td>SG</td>
<td>5-7</td>
<td>50-0</td>
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<tr>
<td>SG</td>
<td>6-8</td>
<td>60-30</td>
</tr>
<tr>
<td>SSG</td>
<td>7-9</td>
<td>70-30-30</td>
</tr>
<tr>
<td>SSG</td>
<td>8-11</td>
<td>80-50-40</td>
</tr>
<tr>
<td>SSSG</td>
<td>10-13</td>
<td>90-60-60-40</td>
</tr>
<tr>
<td>SSSSG</td>
<td>11-14</td>
<td>100-75-75-30-30</td>
</tr>
</tbody>
</table>

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1 DM yield as harvested in the field. Does not include spoilage in the clamp.
2 As manufactured fertiliser and crop available N from organic materials.
3 If previous growth has been severely restricted by drought, reduce or omit this application.
Perennial rye-grass (PRG) is the most widely sown grass species in north west Europe, but there are problems with the heavy reliance of PRG on N fertiliser such as:

- Volatile price
- Potentially unsustainable production
- Environmental impacts (water, soil and biodiversity).

The value of mixed swards

1. Growth of multi-species swards (seasonal/annual)
2. Performance of animals grazing multi-species swards
3. Effect of N fertiliser application level.
Multispecies swards - agronomy

The effect of sward type and N rate on DM yield (kg DM/ha) under simulated grazing in 2014

The effect of functional group and annual nitrogen input on annual DM yield (kg DM/ha) 2014

The effect of sward type and N rate on DM yield (kg DM/ha) under simulated grazing in 2015

The effect of functional group and annual nitrogen input on annual DM yield (kg DM/ha) 2015
Four sward types:

- **PRG**: PRG only @ 163kg N/ha/year
- **PRG and WC**: PRG and white clover @ 90kg N/ha/year
- **6 Species mix**: 6 species @ 90kg N/ha/year (PRG, Timothy, White Clover, Red Clover, Plantain, Chicory)
- **9 Species mix**: 9 species @ 90kg N/ha/year (PRG, Timothy, Cocksfoot, White Clover, Red Clover, Birdsfoot Trefoil, Plantain, Chicory, Yarrow)

The effect of sward type on lamb weaning weights

- **The effect of sward type on days to slaughter**

The effect of sward type on faecal egg counts (Trichostrongyle) at 10 weeks of age

- **The effect of sward type on the time between first and second anthelmintic treatment**
**AIM:** Developing new highly productive and climate-smart deep rooting grass and clover varieties to improve soil hydrology

**Challenge:** Changing rainfall patterns

BBSRC and industry funded science developing improved rooting systems in grasses and clover for sustainable livestock systems and for ecosystem

www.sureroot.uk
Plant roots important for:

- Improving soil structure
- Adding organic matter
- Nutrient uptake
- Improving water movement through the soil.

BBSRC and industry funded science developing improved rooting systems in grasses and clover for sustainable livestock systems and for ecosystem services.
Improve root designs in:

- Festulolium grass hybrids
- Perennial ryegrass
- White clover.

Comparing root growth in the field between current and novel grass and clover and grass/clover mixtures.
Testing the effect of new varieties on water flow

Assessing productivity and viability on eight commercial development farms

1. Sheep - South West  
2. Sheep – Wales  
3. Beef  
4. Eggs  
5. Dairy  
6. Pig  
7. Turkey  
8. Organic dairy  

BBSRC and industry funded science developing improved rooting systems in grasses and clover for sustainable livestock systems and for ecosystem

www.sureroot.uk
The impact of soil compaction

Assess the limiting layer of the soil compaction

<table>
<thead>
<tr>
<th></th>
<th>Trampled</th>
<th>Soil bulk density (g/cm³) at 0-10cm</th>
<th>Oct 11</th>
<th>Oct 14</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SRUC</td>
<td>1.02</td>
<td>1.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HAU</td>
<td>1.17</td>
<td>1.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SRUC</td>
<td>1.02</td>
<td>1.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HAU</td>
<td>1.17</td>
<td>1.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SRUC</td>
<td>1.02</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HAU</td>
<td>1.17</td>
<td>1.14</td>
</tr>
</tbody>
</table>
Soil compaction and reduction in grass yield

<table>
<thead>
<tr>
<th></th>
<th>SRUC</th>
<th>Harper Adams</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reduction (t/ha)</td>
<td>Reduction (%)</td>
</tr>
<tr>
<td></td>
<td>Stock Tractor</td>
<td>Stock Tractor</td>
</tr>
<tr>
<td>2012</td>
<td>0.6 0.3</td>
<td>6.5 1.0</td>
</tr>
<tr>
<td>2013</td>
<td>0.4 1.0</td>
<td>5.6 11.5</td>
</tr>
<tr>
<td>2014</td>
<td>1.6 2.0</td>
<td>11.0 14.3</td>
</tr>
<tr>
<td>All years</td>
<td>2.6 3.0</td>
<td></td>
</tr>
</tbody>
</table>

The greatest yield reductions were for first cut silage
Animal Compaction
• Cow tracks
• On/off and strip grazing with back fence
• Good network of tracks and gateways
• Grasses with dense tillering.

Mechanical Compaction
• Reduce weight – important to reduce subsoil compaction
• Reduce pressure – important to reduce topsoil compaction.

General Points
• Check drains and ditches
• Soil visual assessment to confirm extent and depth of compaction.
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