Optimising the benefits of clover in grassland

James Humphreys¹, Dan Barrett¹, Dan Clavin¹, Katie Scully¹,² & Imelda Casey²

¹Teagasc;    ²Waterford Institute of Technology
Why clover on pasture-based beef and sheep farms?

Biological N fixation

Higher herbage production with lower inputs

Higher animal performance

Lower environmental footprints

Green deal?

https://www.true-project.eu/
Impact of clover/biological N fixation on herbage production

Herbage production (t DM/ha)

Grass-only

Grass-clover

N fixation

Clover

https://www.true-project.eu/
Growth habit of white clover

During seedling establishment white clover develops a tap root. It subsequently produces stolons; crucial for survival in mature swards.

Managing the interaction between grass and clover
Soil temperatures & grass and white clover growth

- **Grass dominant**
- **White Clover dominant**
- **Grazing <4cm**
- **Long rotations**

Soil temperature (°C)

https://www.true-project.eu/
Soil temperatures & grass and white clover growth

Soil temperature (°C)

Grass dominant

White Clover dominant

Grazing <4cm

Long rotations

November
December
January
February
March
April
May
June
July
August
September
October

https://www.true-project.eu/
Grazing Management: October to April

Grazing to <4 cm from October to April with light cattle or sheep

Allows light down to stolons and improves stolon survival

Substantially increases sward clover content in following year

Increases biological N fixation by 35%

https://www.true-project.eu/
Grazing Management: late summer and autumn

Grazing to <4 cm from October to April with light cattle or sheep
Allows light down to stolons and improves stolon survival
Substantially increases sward clover content in following year
Increases biological N fixation by 35%

Clover dominant swards from June to October
Lengthen grazing rotation from mid-July to 42 days by mid-September
Promotes high levels of biological N fixation and stolon production
Build up a big reserve of high-quality pasture by mid-September

https://www.true-project.eu/
Grazing Management: post-grazing height

Grazing to <4 cm is important throughout the year
Tighter grazing increases clover content and biological N fixation
No difference in animal performance with good management
Fertilizer Nitrogen

Fertilizer N depresses sward white clover content and biological N fixation

Band spreader or trailing shoe slurry application for spring growth and silage

Tactical use of fertilizer N depending on pasture cover targets

https://www.true-project.eu/
## Recommended fertilizer N for clover-rich swards

<table>
<thead>
<tr>
<th>Stocking rate (LU/ha)</th>
<th>&lt;1.75</th>
<th>1.75 to 2.00</th>
<th>2.0 to 2.25</th>
<th>2.25 to 2.50</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(kg/ha)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>0</td>
<td>28†</td>
<td>28†</td>
<td>28†</td>
</tr>
<tr>
<td>Mid-March</td>
<td>0</td>
<td>28</td>
<td>28</td>
<td>36</td>
</tr>
<tr>
<td>April/early May</td>
<td>0</td>
<td>0</td>
<td>28*</td>
<td>36*</td>
</tr>
<tr>
<td>May</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>June</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>July</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>August</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mid-September</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>36*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>0</td>
<td>56</td>
<td>84</td>
<td>136</td>
</tr>
</tbody>
</table>
Managing soil N levels

Mixed grazing and harvesting for silage increases the white clover content of herbage, biological N fixation & sward persistency

https://www.true-project.eu/
Fertilization: P, K & lime

Apply lime to bring soil pH up to 6.3 to 6.5

Regular application of P & K compound depending of soil test results

https://www.true-project.eu/
Reseeding at 10-year intervals at Solohead Research Farm
Over-sowing with white clover at least once within each interval
Seed mixture for grazing and silage (Acre packs)

<table>
<thead>
<tr>
<th>Species</th>
<th>Cultivar</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRG</td>
<td>Abergain</td>
<td>5.0 kg</td>
</tr>
<tr>
<td>PRG</td>
<td>Aberchoice</td>
<td>5.0 kg</td>
</tr>
<tr>
<td>Red clover</td>
<td>Aberchianti</td>
<td>2.0 kg</td>
</tr>
<tr>
<td>White Clover</td>
<td>Buddy</td>
<td>1.5 kg</td>
</tr>
<tr>
<td>Hybrid Clover</td>
<td>Aberlasting</td>
<td>1.0 kg</td>
</tr>
</tbody>
</table>

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<tr>
<td>PRG</td>
<td>Astonenergy</td>
<td>5.0 kg</td>
</tr>
<tr>
<td>PRG</td>
<td>Astonconqueror</td>
<td>5.0 kg</td>
</tr>
<tr>
<td>Red clover</td>
<td>Milvus</td>
<td>2.0 kg</td>
</tr>
<tr>
<td>White Clover</td>
<td>Crusader</td>
<td>1.0 kg</td>
</tr>
<tr>
<td>White Clover</td>
<td>Chieftain</td>
<td>1.0 kg</td>
</tr>
</tbody>
</table>

Late heading perennial ryegrass cultivars (PRG)

Red clover: very high production in first 2 to 4 years

White clover and hybrid clover: persistent in the sward

https://www.true-project.eu/
## DAFM Recommended White clover Varieties 2020

Control Mean: 9.4 t DM/ha

<table>
<thead>
<tr>
<th>Variety Name</th>
<th>Rel. yield (%)</th>
<th>Leaf Size</th>
<th>Clover (%)</th>
<th>Year listed</th>
<th>Breeder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barblanca</td>
<td>105</td>
<td>Large</td>
<td>50</td>
<td>2009</td>
<td>Barenburg</td>
</tr>
<tr>
<td>Violin</td>
<td>101</td>
<td>Large</td>
<td>44</td>
<td>2020</td>
<td>DLF</td>
</tr>
<tr>
<td>Dublin</td>
<td>102</td>
<td>Large</td>
<td>50</td>
<td>2018</td>
<td>Teagasc</td>
</tr>
<tr>
<td>Chieftain</td>
<td>98</td>
<td>Medium</td>
<td>47</td>
<td>2005</td>
<td>Teagasc</td>
</tr>
<tr>
<td>Buddy</td>
<td>100</td>
<td>Medium</td>
<td>45</td>
<td>2015</td>
<td>Teagasc</td>
</tr>
<tr>
<td>Iona</td>
<td>94</td>
<td>Medium</td>
<td>44</td>
<td>2014</td>
<td>Teagasc</td>
</tr>
<tr>
<td>Crusader</td>
<td>95</td>
<td>Medium</td>
<td>42</td>
<td>2009</td>
<td>Barenburg</td>
</tr>
<tr>
<td>Aberherald</td>
<td>97</td>
<td>Medium</td>
<td>45</td>
<td>2003</td>
<td>IBERS</td>
</tr>
<tr>
<td>Coolfin</td>
<td>104</td>
<td>Small</td>
<td>47</td>
<td>2017</td>
<td>Teagasc</td>
</tr>
<tr>
<td>Galway</td>
<td>95</td>
<td>Small</td>
<td>38</td>
<td>2017</td>
<td>Teagasc</td>
</tr>
<tr>
<td>Aberace</td>
<td>95</td>
<td>Small</td>
<td>33</td>
<td>2016</td>
<td>IBERS</td>
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Red clover mixture:

Very high production for 3 to 6 years; annual production of 13 to 16 t DM/ha
Fixes >300 kg N/ha. Very high requirement for K & P.
Four-cut system with zero-grazing in autumn

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<tr>
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<tr>
<td>Hybrid RG</td>
<td>Aston crusader</td>
<td>9.0 kg</td>
</tr>
<tr>
<td>Red clover</td>
<td>Milvus</td>
<td>4.0 kg</td>
</tr>
<tr>
<td>White Clover</td>
<td>Barblanca</td>
<td>1.0 kg</td>
</tr>
</tbody>
</table>

Seed mixture predominantly for silage (Acre packs)

Red clover mixture:

Very high production for 3 to 6 years; annual production of 13 to 16 t DM/ha
Fixes >300 kg N/ha. Very high requirement for K & P.
Four-cut system with zero-grazing in autumn
Post-emergence dock control

https://www.true-project.eu/
Post-emergence dock control
Over-sowing white clover seed into established swards

Bare open sward
Moist soil conditions
2 kg seed per acre (5 kg/ha)
Mix with ‘carrier’ fertilizer
Apply dirty water/slurry
Max 8 cm pre-grazing height
Low cover over winter

https://www.true-project.eu/
Bloat

We have not lost a cow because of bloat in over 20 years

We have not had to treat any cow for bloat in over 20 years

Sward clover contents ranging from 10 to 50%

Keep cattle on clover from turnout to housing: adapt during the grazing season

Care when moving cattle into swards with very high clover contents

Treatments are available: bloat oil etc.
Conclusions & Recommendations

Graze out to <4cm between October and April; Lower the cost of production

Graze to 4 cm/mowing during the main grazing season; Grow more pasture

Build up covers between July and September; No loss in nutritive value

Feed out during the autumn and early winter; Low post-grazing height during winter

The less fertilizer N applied the better; Increase clover content and BNF

Lower environmental footprint

https://www.true-project.eu/
Conclusions & Recommendations

Alternate grazing & harvesting for silage; Mine out soil N under grass dominant

Regular application of K and P; Particularly important on red clover silage swards

Reseeding and over-sowing to maintain clover contents

Post-emergence dock control; you get one opportunity - don’t miss it

Avoid bloat by adapting cattle & sheep to clover-rich swards

https://www.true-project.eu/