A Closer Look at Stocking Rate for Expanding Dairy Herds

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Presenters: Donal Patton
Andrew Purcell, Alf McGlew
Stocking Rate = Cows/Forage Ha

<table>
<thead>
<tr>
<th>Demand</th>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows</td>
<td>Ha</td>
</tr>
<tr>
<td>Feed Intake</td>
<td>Forage DM</td>
</tr>
</tbody>
</table>

‘One size does not fit all’
What determines farm feed demand?

- Herd Demand
  - Energy
  - Protein
  - Fibre

Factors:
- Herd Size
- Production Level
- Calving Pattern
- Parity Structure
- Age First Calving
- Culling Policy
- Liveweight
- Lactation Length
- Parity Structure

*Calving Pattern
What determines farm feed supply?

Feed Supply
- Energy
- Protein
- Fibre

Growth Rate
Grazing Ha
Cropping
External Block ha
Silage Strategy
Supplement Cost
Grazing Efficiency
Growth Pattern
Session Outline

• Stocking Rate – what the research says:
  1. Effect on milk solids per cow and per ha
  2. Effect on grass production per ha
  3. Effect on feed cost and farm profit

• Stocking Rate – what happens at farm level:
  • Feed cost and grass growth effects

• Case Study of an expanding dairy farm
  • Outline of current situation
  • Assessing the options

• Discussion and conclusions
Stocking Rate and Milk Output per cow, per Ha

‘Diminishing return once grass utilised is at max’
Comparative Stocking Rate

*Figure 1* The effect of stocking rate on the efficiency of pasture utilisation, the gross efficiency of milk production and the efficiency of the whole farm system.

- Target is 85-95kg per tonne DM available
- Enough for >80% liveweight as annual milk solids yield
Table 1: Stocking rate that optimises profit on farms growing different amounts of pasture and feeding different amounts of concentrate/cow. The proposed stocking rate for a resilient system is highlighted.

<table>
<thead>
<tr>
<th>t Concentrate DM/cow</th>
<th>Pasture grown, t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td>0.00</td>
<td>1.5</td>
</tr>
<tr>
<td>0.25</td>
<td>1.7</td>
</tr>
<tr>
<td>0.50</td>
<td>1.8</td>
</tr>
<tr>
<td>0.75</td>
<td>1.9</td>
</tr>
<tr>
<td>1.00</td>
<td>2.0</td>
</tr>
<tr>
<td>1.25</td>
<td>2.1</td>
</tr>
<tr>
<td>1.50</td>
<td>2.2</td>
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</table>

*All of these stocking rates equate to 85 kg live weight/t feed DM available.
Research- Does high SR lead to more grass growth?

Cumulative Grass DM Production

<table>
<thead>
<tr>
<th>Year</th>
<th>LSR</th>
<th>MSR</th>
<th>HSR</th>
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</thead>
<tbody>
<tr>
<td>2009</td>
<td>14.0</td>
<td>15.0</td>
<td>15.5</td>
</tr>
<tr>
<td>2010</td>
<td>14.5</td>
<td>15.5</td>
<td>16.0</td>
</tr>
<tr>
<td>2011</td>
<td>15.0</td>
<td>15.5</td>
<td>16.5</td>
</tr>
<tr>
<td>2012</td>
<td>15.5</td>
<td>16.0</td>
<td>16.5</td>
</tr>
</tbody>
</table>

Grass growth (t DM/ha/yr)
Grass utilised and Farm Profit per ha

‘Stocking rate’ effect is really a ‘grass utilised’ effect
Stocking Rate & Feed Supplements

**Supplements required**

Additional Grass

HI: SR
4.5 cows/ha

HG: SR
3.1 cows/ha

Grazed grass

Kg Dm/day


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Farm Level- How does Stocking Rate Relate to Feed Costs?

[Scatter plot showing the relationship between Milking Platform SR and Feed Cost per litre. The plot includes a regression line and the R^2 value of 0.021.]
Case Study
Effect of changing stocking rate on annual feed budget costs
Case Study Farm

- Milking Platform 42 ha
- External block 22 ha

- 100 cows spring calving
  - 376kg MS sold per cow (491k litres total)
  - 32 replacement heifer units

- Grazing SR 2.38
- Whole Farm SR 2.01
- Annual grass production 10.5t DM

- Current feed purchases:
  - Concentrate €26,010 (4.8cpl)
  - Forage purchase €0
Current Annual Feed Budget

Approximately 4.5t forage DM per cow
Annual Feed Budget

Forage and Concentrate Budget - Grazing Platform

- Grazed Grass-Consumed: 311,678 kg DM per Annun
- Conserved Silage-Milking Block: 79,929 kg DM
- Silage-Lactating Cows: 44,263 kg DM
- Silage-Dry Cows: 88,144 kg DM
- Silage Surplus: 0 kg DM
- Silage from External Blocks: 52,478 kg DM
- Silage Purchased Cows: 0 kg DM
- Concentrate: 79,901 kg DM

Surplus forage 4 tDM
Proposal

- Increase herd size to 130 cows (30%)
  - 40 heifers reared per year

- Milking platform and outside ha remain the same

- Milking platform SR 3.10 LU per ha
- Whole Farm 2.59 LU per ha

- **Evaluate 4 options for additional feed:**
  - Grow winter feed as 1st cut silage (standing crop)
  - Buy maize silage on contract
  - Rent some extra land and zero graze
  - Invest in grass growth and grazing infrastructure
### Options to be valued by group

<table>
<thead>
<tr>
<th>Standing Silage Crop?</th>
<th>Contract Maize?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero Grazing?</td>
<td>Grow More Grass?</td>
</tr>
</tbody>
</table>

*See slides 32-36*
Discussion
Expand and grow first cut silage as standing crop

Feed Consumed per Cow kg DM

<table>
<thead>
<tr>
<th></th>
<th>Grazed Grass</th>
<th>Silage consumed</th>
<th>Concentrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg DM</td>
<td>2667</td>
<td>1423</td>
<td>1132</td>
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</tbody>
</table>

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Expand and grow first cut silage as standing crop
Buy Maize

Feed Consumed per Cow kg DM

<table>
<thead>
<tr>
<th></th>
<th>Grazed Grass</th>
<th>Silage consumed</th>
<th>Concentrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg DM</td>
<td>2682</td>
<td>1571</td>
<td>1024</td>
</tr>
</tbody>
</table>
Buy Maize

Forage and Concentrate Budget - Grazing Platform

- Grazed Grass-Consumed: 348,639 kg DM per annum
- Conserved Silage-Milking Block: 42,851
- Silage-Lactating Cows: 88,709
- Silage-Dry Cows: 115,584
- Silage Surplus: 0
- Silage from External Blocks: 20,588
- Silage Purchased Cows: 140,854
- Concentrate: 133,125

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Zero Grazing

![Bar chart showing feed consumption per cow in kg DM:
- Grazed Grass: 2676 kg
- Silage consumed: 1448 kg
- Concentrate: 1049 kg

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Zero grazing

Forage and Concentrate Budget- Grazing Platform

- Grazed Grass Consumed: 347,930 kg DM per Annum
- Conserved Silage Milking Block: 43,117
- Silage Lactating Cows: 78,350
- Silage Dry Cows: 109,855
- Silage Surplus: 0
- Silage from External Blocks: 20,588
- Silage Purchased Cows: 126,637
- Concentrate: 136,334

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Zero Grazing- Pattern of forage input

Zero grazing only applicable to 25-30% of imported forage in this scenario
Increase grass growth

Feed Consumed per Cow kg DM

- Grazed Grass: 3091 kg DM
- Silage consumed: 1327 kg DM
- Concentrate: 801 kg DM
Increase grass growth

Forage surplus 30tDM (135 high quality silage bales)
Grazing SR 3.10 Farm SR 2.59
<table>
<thead>
<tr>
<th></th>
<th>Silage</th>
<th>Maize</th>
<th>Zero Grazer</th>
<th>More Grass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meal Purchase</td>
<td>45740</td>
<td>41822</td>
<td>42721</td>
<td>33246</td>
</tr>
<tr>
<td>Imported forage costs</td>
<td>17458</td>
<td>20798</td>
<td>16139</td>
<td>0</td>
</tr>
<tr>
<td>Extra Feed Cost</td>
<td>37188</td>
<td>36610</td>
<td>32850</td>
<td>7235</td>
</tr>
<tr>
<td>Bank Loan Buildings</td>
<td>10700</td>
<td>10700</td>
<td>10700</td>
<td>10700</td>
</tr>
<tr>
<td>Bank Loan Grassland</td>
<td></td>
<td></td>
<td></td>
<td>11400</td>
</tr>
<tr>
<td>Machinery costs</td>
<td></td>
<td></td>
<td></td>
<td>5730</td>
</tr>
<tr>
<td>Additional cow costs</td>
<td>7200</td>
<td>7200</td>
<td>7200</td>
<td>6900</td>
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<tr>
<td>Own ha silage cutting</td>
<td>-2847</td>
<td>-2860</td>
<td>-2847</td>
<td>3070</td>
</tr>
<tr>
<td>Net Diff overheads</td>
<td>€15053</td>
<td>€15040</td>
<td>€20783</td>
<td>€32070</td>
</tr>
</tbody>
</table>

*Relative to current position*
### Marginal cash change (whole farm) before own labour

<table>
<thead>
<tr>
<th>Base Milk Price cpl</th>
<th>Silage</th>
<th>Maize</th>
<th>Zero Grazer</th>
<th>More Grass</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>-€10160</td>
<td>-€7945</td>
<td>-€11552</td>
<td>€9767</td>
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<tr>
<td>30</td>
<td>-€3783</td>
<td>-€1352</td>
<td>-€5175</td>
<td>€17121</td>
</tr>
<tr>
<td>34</td>
<td>€2586</td>
<td>€5232</td>
<td>€1194</td>
<td>€24464</td>
</tr>
</tbody>
</table>

Where €2800 capital is borrowed to fund herd expansion

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Key Targets for Optimum Farm Stocking Rate

- 14.5+ tonnes of grass dry matter grown per ha
- Utilise 80 to 85% of grown (11+ per ha)
- 85 to 90% home-grown feed
- 280 days at grass
- Cows yielding 80 to 85% of weight as milk solids
- 80% of total LU as milking cows
- 5.0 tonnes forage DM per LU equivalent

‘Invest in grass at high and low milk prices’
Group worksheets for costing options
## Grow a Standing Crop of Grass Silage

1. **Calculate farm forage deficit**

2. **How many ha of 1\textsuperscript{st} cut silage?**

3. **Cost of growing the crop**
   - Land Rental: €
   - Fertilizer: €
   - Slurry: €
   - Harvest + transport: €
   - Other: €

   **Total Forage cost**: €

Extra Concentrate: €

**Total Additional Feed Cost**: €

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Guideline 6\text{tDM} per ha first cut

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# Purchase Maize on Contract

1. **Calculate farm forage deficit**

   Add +10% for maize intake

| Total maize DM required | - |

2. **Options for purchase**

   - **Fresh tonnes needed**
     - a) €44 per t @ 25% DM
     - b) €48 per t @ 32% DM

3. **Total cost @ 27% DM**  
   - Total cost @ 32% DM  
   - Extra Concentrate (minus extra maize DMI)  
   - **Total Additional Feed Cost**  
   - €

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Rent some extra land and zero graze

1. Calculate farm forage deficit

2. How many ha @ 10.5 t DM?*

3. Cost of growing the grass (totals)
   - Land Rental €
   - Fertilizer €
   - Slurry €
   - Other €

4. 75% grass as silage @ €40 per tDM harvest €

5. Annual cost zero grazer for remaining 25% €

6 Extra concentrate total €

**Total Additional Feed Cost** €

Guideline 80-85% utilised
# Invest in extra grass growth and grazing infrastructure

1. **Calculate farm forage deficit**

2. Extra tonnes DM per ha (whole farm 64 ha)*

3. Reseed 48 ha

4. Soil fertility (extra to reseeding)
   - ± 5t lime per ha for 45 ha over 2yrs
   - 0.75 bags 16% P per acre for 3yr 55 ha
   - 1 bag 0:7:30 on 45 ha for 3 yrs

5. Extra slurry + contractor cost

6. Infrastructure cost (roads etc.) €18,000

**6. Total Additional Cost**

| Annual cost over 7 years | € |

*Guideline 80-85% utilised