Cereal supplements and their role in the dairy enterprise

Key Points

• Barley at $260 per tonne is a more cost effective supplement for dairy cows than grass silage at 19c/kgDM.
• There are significant cost savings for dairy farmers from feeding grains as compared to grass silage in terms of labour, reduced wastage and reduced depreciation.
• Grain is an energy dense supplement, therefore when cows consume 1 kgDM, they will get more energy from grain than they will from grass silage.
• Feeding grain is more efficient at putting on cow condition, will increase milk production and can improve fertility by giving the cow a greater source of energy than grass or pasture silage.
• Supplementary feeds, such as grains, can overcome short term deficits but are not cost effective when there is plenty of grass available.
• Supplementary feeds can produce a more even milk flow, especially through the summer and late autumn; and in late lactation, supplementary feed can lengthen the lactation.

Introduction

Despite all the health and production benefits feeding grain can achieve, the dairy farmer needs to be confident that there will be a positive effect on his/her cheque book too!

Further information in these key areas has been supplied by Dr Jennifer Burke of Massey University who has concentrated on the health and production benefits and Jonathan Davies of Living Land Consultants who has supplied a full assessment of the financial benefits of supplementary feeding.

Why use supplementary feeding?

The main purpose of supplementary feeding in the dairy enterprise is to increase animal performance compared with feeding pasture based products alone. Supplementary feeds can also overcome short term pasture deficits and improve the supply of energy and protein yielding nutrients to productive tissues. The most important thing that the farmer must remember though is that the animal and/or system must require the additional feed for these benefits to be effective.

Extra food can be consumed by the dairy cow to increase milk production, improve fertility and/or increase / maintain live-weight. The partitioning of additional nutrients into increased milk production and live-weight gain is influenced by:

• stage of lactation – early in lactation a greater proportion of additional energy will be partitioned towards milk production;
• body condition of the dairy cow – if cows are in good condition, a greater proportion of additional energy will be partitioned towards milk production;
• quantity and quality of the main feed supply and the supplement;
• genetic potential of the cow;
• length of time of feeding.

Response to extra feed

Responses to supplementary feed can be affected by the following elements:

• extent of the feed deficit;
• quantity and quality of the main feed supply and the supplement being fed;
• stage of lactation;
• level of substitution;
• length of feeding;
• genetic potential of the cow;
• body condition of the cow.

Research has shown that on average 1kg of extra dry matter (DM) at 11.7 MJME/kg DM resulted in an additional 0.68kg milk, 23g milk fat, 25g protein, reduced pasture intake by 0.31 kgDM and 124g live-weight gain. However, there is large variation between these experiments with 50 to 100g milksolids likely for an additional kg of DM fed.

Another element to take into account is the positive effect that supplementary feed can have on a cow’s fertility.

In early lactation, supplementary feed will have a greater effect on milk production opposed to live-weight gain; however this relies on the cow being in good condition at calving. If the cow is in poor condition at calving then the feed will be preferentially used for live-weight gain. This is reversed in late lactation as the cow prepares for the next lactation.

Assuming a cow is fed 13kgDM per day of pasture and 3kgDM of supplement per day throughout early lactation, the daily consumption for silage fed cows is:
Pasture (10.5 MJME/kgDM) plus pasture silage (10 MJME/kgDM) = 167 MJME per cow per day.

And the daily consumption for grain fed cows is:

Pasture (10.5 MJME/kgDM) plus barley grain (13 MJME/kgDM) = 176 MJME per cow per day.

This results in an extra 0.15kg (2 ltrs) milk solids per cow per day or for a herd of 500 cows, 75kg (1000 ltrs) per day.

### Table 1: Modelling the effect of feeding pasture with grain supplements (Cornell Model)

<table>
<thead>
<tr>
<th>Pasture (ME-10.5 MJ, CP-25% DM, NDF-46% DM, NFC-15% DM)</th>
<th>Predicted milk production (kg/day based on the supply of metabolisable)</th>
<th>Urea cost (MJ/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasture</td>
<td>Energy 21.4</td>
<td>Protein 26.5</td>
</tr>
<tr>
<td>Maize Silage (25%)</td>
<td>21.8</td>
<td>23.9</td>
</tr>
<tr>
<td>Maize grain (25%)</td>
<td>24.2</td>
<td>22.2</td>
</tr>
<tr>
<td>Barley grain (25%)</td>
<td>24.3</td>
<td>24.9</td>
</tr>
<tr>
<td>Maize silage (25%): Maize grain (25%)</td>
<td>24.5</td>
<td>22.2</td>
</tr>
<tr>
<td>Maize silage (25%): Barley grain (25%)</td>
<td>24.6</td>
<td>25.3</td>
</tr>
</tbody>
</table>

This table illustrates the predicted milk production from the energy or protein supplied in the diet made up of pasture, maize silage, grain or mixtures of maize silage and grain. The cost of urea estimates how much energy is wasted when the cow removes excess protein. Protein not utilised is excreted as urea in the urine and is an energy utilising process. Therefore diets with lower urea costs are not wasting as much protein either because the dietary protein intake has been reduced and/or the protein is being used more efficiently which is the case when grain is fed with pasture.

### Economic Impact of Feeding Grain

The purchase price of the supplement needs to be taken into account when looking at making the transition; however the farmer also needs to consider other factors such as:

- Wastage factor
- Feed value – MJME/kgDM
- Cost of feeding
- Capital investment
- Depreciation
- Labour

These combined will give the farmer the price per unit of energy consumed by the cow.

Although the capital cost of an in-shed grain feeding system may be higher than a silage wagon, the depreciation is lower and the labour to feed animals is nearly nil. Similarly the wastage is nearly nil in in-shed feeding systems as compared to up to 20% when supplements are fed on to pasture and all cows get access to the same amount of feed.

When all these variables are taken into account (except labour) then the following tables show comparisons between the cost of grass silage fed and the cost of barley fed.

### Table 2: Cost of grass silage fed (c per MJME)

<table>
<thead>
<tr>
<th>The delivered price of silage per kg/DM</th>
<th>$18c</th>
<th>$19c</th>
<th>$20c</th>
<th>$21c</th>
<th>$22c</th>
<th>$23c</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 MJME per kgDM</td>
<td>3.46</td>
<td>3.6</td>
<td>3.74</td>
<td>3.88</td>
<td>4.02</td>
<td>4.16</td>
</tr>
<tr>
<td>12.5 MJME per kgDM</td>
<td>3.12</td>
<td>3.24</td>
<td>3.37</td>
<td>3.49</td>
<td>3.62</td>
<td>3.74</td>
</tr>
<tr>
<td>13 MJME per kgDM</td>
<td>2.83</td>
<td>2.95</td>
<td>3.06</td>
<td>3.18</td>
<td>3.29</td>
<td>3.4</td>
</tr>
</tbody>
</table>

### Table 3: Cost of barley fed (c per MJME)

<table>
<thead>
<tr>
<th>The delivered price of silage per kg/DM</th>
<th>$200</th>
<th>$220</th>
<th>$240</th>
<th>$260</th>
<th>$280</th>
<th>$300</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 MJME per kgDM</td>
<td>2.36</td>
<td>2.56</td>
<td>2.75</td>
<td>2.95</td>
<td>3.15</td>
<td>3.34</td>
</tr>
<tr>
<td>12.5 MJME per kgDM</td>
<td>2.27</td>
<td>2.45</td>
<td>2.64</td>
<td>2.83</td>
<td>3.02</td>
<td>3.21</td>
</tr>
<tr>
<td>13 MJME per kgDM</td>
<td>2.18</td>
<td>2.36</td>
<td>2.54</td>
<td>2.72</td>
<td>2.9</td>
<td>3.08</td>
</tr>
</tbody>
</table>

Prices compared:

- Barley $240/t on farm – 2.5-2.6c per MJME
- Barley $250/t on farm – 2.7-2.8c per MJME
- Silage 19c/kgDM on farm – 2.9-3.2c per MJME
- Silage at 20c/kgDM delivered on farm – 3.1-3.4c per MJME

Therefore barley at $280/t is the same price as 11MJME of silage at 19c/kgDM landed on farm and 20% wastage factor.

### In Summary

Although there is a slight risk with feeding inefficiency mid lactation, the pros far outweigh the cons.

The above data clearly demonstrates that grain feeding can be very cost effective. It will not only assist with putting on cow condition and improve fertility but will also provide higher levels of energy resulting in increased milk yields and therefore improved profitability.

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