Management practices of dairy cows grazing kale

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Winter feeding for dairy cows

- Regaining body condition lost through lactation is a common goal for many NZ dairy systems
- Body condition score: 4.5 at drying off, 5.0 at calving
- Kale major component of their winter diet
  - high DM yield carried through winter with less deterioration in nutritive value compared to other feeds
- But, body condition gain on kale often does no meet farmers expectations

Survey of kale DM yield and utilisation

- Survey of kale feeding from 49 paddocks on 31 different farms across Canterbury
- DM yield, forage composition and utilisation measured
Kale DM yield across Canterbury, 2007

Average: 10.9 t DM/ha
Intermediate stem types: 9.9 t DM/ha
Giant stem types: 13.6 t DM/ha

Kale utilisation (% of pre-grazing DM consumed) in 49 paddocks across Canterbury, winter 2007

- Kale utilisation ranged < 40 % to > 90 % on kale yields that ranged from 5-17 t DM/ha. Mean 80%.
Utilisation

\[ y = 0.7961x + 0.0759 \]

\[ R^2 = 0.8079 \]

For every 1 kg increase in allowance, intake increased by 0.8 kg/cow/day


Intake and kale allowance

For every 1 kg increase in allowance, intake increased by 0.8 kg/cow/day
Actual and target intake in 49 paddocks across Canterbury, winter 2007

- Two thirds of the herds consumed less than the targeted DM intake by more than 1kg DM/cow/day.

Because utilisation was generally high and yield assessments accurate, low kale intakes were probably due to poor allocation – getting the break size wrong.

Kale quality

<table>
<thead>
<tr>
<th>% total DM</th>
<th>Crop ME</th>
<th>Diet ME</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>12.7</td>
<td>12.7</td>
</tr>
<tr>
<td>17</td>
<td>11.6</td>
<td>12.2</td>
</tr>
<tr>
<td>19</td>
<td>9.7</td>
<td>11.4</td>
</tr>
<tr>
<td>20</td>
<td>9.8</td>
<td>11.0</td>
</tr>
<tr>
<td>20</td>
<td>6.6</td>
<td>10.1</td>
</tr>
</tbody>
</table>


Stemmy, giant type cultivars

Leafy, intermediate stem cultivars


Lincoln University, Christchurch, New Zealand
Adaptation to crop

Offering kale without fibre

Table 3. Effect of four dietary proportions of kale: grass silage on dry matter intake and rumen pH

<table>
<thead>
<tr>
<th>Kale: Grass silage ratio</th>
<th>Kale DMI kg/day</th>
<th>Grass silage DMI kg/day</th>
<th>Total DMI kg/day</th>
<th>Mean rumen pH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100:0</td>
<td>85:15</td>
<td>60:40</td>
<td>0:100</td>
</tr>
<tr>
<td>Kale DMI kg/day</td>
<td>7.32</td>
<td>6.35</td>
<td>4.90</td>
<td>-</td>
</tr>
<tr>
<td>Grass silage DMI kg/day</td>
<td>-</td>
<td>1.71</td>
<td>3.26</td>
<td>8.87</td>
</tr>
<tr>
<td>Total DMI kg/day</td>
<td>7.32</td>
<td>8.06</td>
<td>8.18</td>
<td>8.87</td>
</tr>
<tr>
<td>Mean rumen pH</td>
<td>6.26</td>
<td>5.91</td>
<td>6.32</td>
<td>6.32</td>
</tr>
</tbody>
</table>

French and Keogh, Morepark Dairy Production Research Centre, Dairy Levy Research Update 2009, series No. 9
Kale intake and utilisation on leafy and stemmy cultivars

- Kale Utilisation Experiment, Lincoln University, 6 weeks, winter 2008
- Regal and Caledonian sown on 1 Nov or 15 Dec 2007
- All offered at 11 kg kale + 3 kg straw allowance
- Measurements of utilisation, nutritive value, intake, effects on soil structure

Lincoln University, Christchurch, New Zealand
Regal

Lincoln University, Christchurch, New Zealand

Caledonian

Lincoln University, Christchurch, New Zealand
Kale Utilisation Experiment, Lincoln University, 6 weeks, winter 2008

<table>
<thead>
<tr>
<th>Cultivar and sowing date</th>
<th>t DM/ha Pre Graze</th>
<th>% leaf</th>
<th>% DM</th>
<th>% Utilisation</th>
<th>kg DM eaten/cow/day</th>
<th>BCS gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Nov Caledonian</td>
<td>17.3</td>
<td>23</td>
<td>14</td>
<td>88</td>
<td>9.4</td>
<td>0.45</td>
</tr>
<tr>
<td>1 Nov Regal</td>
<td>15.8</td>
<td>34</td>
<td>14</td>
<td>88</td>
<td>9.4</td>
<td>0.47</td>
</tr>
<tr>
<td>15 Dec Caledonian</td>
<td>14.4</td>
<td>28</td>
<td>13</td>
<td>91</td>
<td>9.7</td>
<td>0.48</td>
</tr>
<tr>
<td>15 Dec Regal</td>
<td>12.8</td>
<td>37</td>
<td>13</td>
<td>89</td>
<td>9.5</td>
<td>0.47</td>
</tr>
</tbody>
</table>

- ME intake of kale > 115 MJ ME/cow/day
- BCS gain low even in well fed cows on kale

Feedings systems of kale

Lincoln University, Christchurch, New Zealand
Rumen ammonia and pH on once per day kale feeding (9 am)

Jim Gibbs unpublished data

Systems to improve rumen function

- Once versus twice per day break
- High versus low allowance (+/- straw)
Alternative crops – Fodder beet

Performance on kale versus fodder beet fed outdoors, and grass silage indoors, Irish study

Table 2. Effect of winter forage and allowance on animal performance parameters

<table>
<thead>
<tr>
<th>Allowance</th>
<th>Kale</th>
<th>Grass silage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forage</td>
<td>Fodder beet</td>
<td>Kale</td>
</tr>
<tr>
<td>Dry period</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liveweight gain</td>
<td>69</td>
<td>54</td>
</tr>
<tr>
<td>Body condition score gain</td>
<td>0.37</td>
<td>0.25</td>
</tr>
<tr>
<td>Subsequent performance for first 8 weeks in milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk solids yield (kg/day)</td>
<td>2.16</td>
<td>2.92</td>
</tr>
<tr>
<td>Liveweight loss (kg)</td>
<td>127</td>
<td>139</td>
</tr>
<tr>
<td>Body condition score loss</td>
<td>0.40</td>
<td>0.11</td>
</tr>
</tbody>
</table>

9 kg kale or fodder beet + 5 kg silage; adlib grass silage

Lincoln University, Christchurch, New Zealand
Alternative crops – Fodder beet

Tips for allocating kale

- Have a plan
- Adapt cows gradually to kale
- Feed the right amount
  - Know paddock areas
  - Accurately estimate crop yields
  - Determine crop quality
  - Measure break sizes correctly
- Use straw/silage/hay to control ‘intake rate’ and anti-nutritional factors
- Use grass for springer cows if possible
- Make the system workable for staff