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 not 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

50% 95%

Intake and kale allowance

\[ y = 0.7961x + 0.0759 \]

\[ R^2 = 0.8079 \]

- 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.

**Kale quality**

<table>
<thead>
<tr>
<th>% total DM</th>
<th>Crop ME</th>
<th>Diet ME</th>
<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>
<td>44</td>
<td>12.9</td>
<td>12.9</td>
</tr>
<tr>
<td>17</td>
<td>11.6</td>
<td>12.2</td>
<td>11</td>
<td>12.4</td>
<td>12.8</td>
</tr>
<tr>
<td>19</td>
<td>9.7</td>
<td>11.4</td>
<td>14</td>
<td>11.6</td>
<td>12.6</td>
</tr>
<tr>
<td>20</td>
<td>9.8</td>
<td>11.0</td>
<td>15</td>
<td>9.4</td>
<td>12.0</td>
</tr>
<tr>
<td>20</td>
<td>6.6</td>
<td>10.1</td>
<td>16</td>
<td>8.6</td>
<td>11.5</td>
</tr>
</tbody>
</table>

Stemmy, giant type cultivars

Leafy, intermediate stem cultivars

Adaptation to crop

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>100:0</th>
<th>85:15</th>
<th>60:40</th>
<th>0:100</th>
</tr>
</thead>
<tbody>
<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

Offering kale without fibre
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

Kale plants from different cultivars and sowing dates

- Caledonian 1 Nov
- Caledonian 15 Dec
- Regal 1 Nov
- Regal 15 Dec

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

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Feedings systems of kale

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Rumen ammonia and pH on once per day kale feeding (9 am)

Jim Gibbs unpublished data

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Systems to improve rumen function

- Once verses twice per day break

- High versus low allowance (+/- straw)

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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>Fodder beet</th>
<th>Kale</th>
<th>Grass silage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forage Dry period</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liveweight gain</td>
<td>89</td>
<td>84</td>
<td>61</td>
</tr>
<tr>
<td>Body condition score gain</td>
<td>0.37</td>
<td>0.25</td>
<td>0.61</td>
</tr>
<tr>
<td>Subsequent performance for first 8 weeks in milk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk solids yield (kg/day)</td>
<td>2.16</td>
<td>2.62</td>
<td>2.97</td>
</tr>
<tr>
<td>Liveweight loss (kg)</td>
<td>127</td>
<td>119</td>
<td>94</td>
</tr>
<tr>
<td>Body condition score loss</td>
<td>0.40</td>
<td>0.31</td>
<td>0.22</td>
</tr>
</tbody>
</table>

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

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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