Growing the AMS feed base

Dr Cameron Clark | Senior Research Fellow
Faculty of Veterinary Science, University of Sydney

cameron.clark@sydney.edu.au

FutureDairy

- R and D program, Camden
- Help farmers will challenges 20 years
- Labour, lifestyle issues
- Focus – automatic milking systems
- Supporting farmers transition
Grazing and robots
Increasing home grown forage

- Purchased feed
  - One of greatest costs
- Increasing herd size
  - Impact walking distance, milking interval
To increase home grown forage we:
1) Have targets
2) Sound data - Know what we grow
3) Accurate allocation of feed
4) Turn data into information - learn
5) Make strategic decisions
Our targets

- Targets for grazing management
  - Grazing residue (4-6cm)
  - Grazing interval (2.5-3leaf)
  - Kikuyu (4 leaf)

- Pasture cover (kgDM/ha)
  - Pre 2600
  - Post 1500
  - Av 2000

Source: Fulkerson and Donaghy
Allocate
Targets

Monitor

Allocate

Data

Monitor
Allocate

Monitor

Targets

Data

100 ha farm, 300 cows, 2,000kgDM/ha

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>2,700kg DM/ha</td>
</tr>
<tr>
<td>Post</td>
<td>1,500kg DM/ha</td>
</tr>
<tr>
<td>Rolling 2 week growth</td>
<td>60kg DM/ha/day</td>
</tr>
<tr>
<td>Stocking rate</td>
<td>3 cows/ha</td>
</tr>
<tr>
<td>Allocation per cow</td>
<td>60/3 = 20kg DM</td>
</tr>
<tr>
<td>Rotation length (regrowth t)</td>
<td>1,200/60 = 20 days</td>
</tr>
<tr>
<td>Herd allocation</td>
<td>5ha/day</td>
</tr>
</tbody>
</table>
• Typically offered as 3 allocations
  - Equal duration (8h) and amount (20/3 ~ 7kg)

• Amount of allocation
  - Feed drives voluntary cow movement
1) Robot utilisation
2) Methods to increase home grown feed
<table>
<thead>
<tr>
<th>Allocation</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>SED</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasture offered (kgDM/cow/day)</td>
<td>1.1</td>
<td>2.1</td>
<td>2.4</td>
<td>0.2</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Silage offered (kgDM/cow/day)</td>
<td>0.2</td>
<td>1.3</td>
<td>2.7</td>
<td>0.2</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Total feed offered (kgDM/cow/day)</td>
<td>1.3</td>
<td>4.2</td>
<td>5.1</td>
<td>0.2</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Proportion total feed offered per hour active access (%)</td>
<td>1.4</td>
<td>4.9</td>
<td>6.8</td>
<td>0.2</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>
### Data

1) Robot utilisation
2) Methods to increase home grown feed
Our methods to increase home grown feed

1. “Know what you grow”
   - Targets, evaluation, learning
2. Next step
   - Soil, alternative forages, fertiliser
3. Future
Our methods to increase home grown feed

1. “Know what you grow”
   - Targets, evaluation, learning

2. Next step
   - Soil, alternative forages, fertiliser

3. Future
Alternative forages

- Two jobs in one

Benefits of crop and removal of constraint

Ongoing benefit

Forage Brassica
Plant height (cm) and number of cows entering and exiting:

- Soil testing each paddock
  - Reveal nutrient deficiency
  - Reduce costs
  - Optimum soil fertility

Fertiliser
Our methods to increase home grown feed

1. “Know what you grow”
   - Targets, evaluation, learning

2. Next step
   - Soil, alternative forages, fertiliser

3. Future

Turning data into information

Source: Computers and Electronics in Agriculture 74 (2010) 66-72
• Climate driven model
• Predicted growth compared with observed
• ‘Train’ model
  - Parameters WHC, radiation use efficiency
  - Each paddock/area has own model
Paddock performance database

<table>
<thead>
<tr>
<th>Paddock</th>
<th>WHC</th>
<th>Radiation use efficiency</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>55</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>49</td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>70</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>64</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>23</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>55</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>45</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>40</td>
<td>0.45</td>
<td></td>
</tr>
</tbody>
</table>

Summary

- Imported feed price + herd size = Focus on home grown feed
  - 1st step “know what you grow”

- Novel systems for ‘pasture-based’ AMS
  - Deconstructing success of lead farmers
  - Conveying message back
Summary

• Technology
  - Decision making (provision data, “Turning data into information”)
  - Reduce repetitive tasks
Update current work

- Herding
- Tracking

Growing the AMS feed base

Dr Cameron Clark | Senior Research Fellow
Faculty of Veterinary Science, University of Sydney

cameron.clark@sydney.edu.au

Working Today on Tomorrow's Solutions
<table>
<thead>
<tr>
<th>Nutrient (%DM)</th>
<th>Perennial ryegrass (vegetative)</th>
<th>Cow requirements (^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolisable energy (MJ/kgDM)</td>
<td>11.4</td>
<td>10.3</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>3.9</td>
<td>2.4</td>
</tr>
<tr>
<td>Non-protein N</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Nitrate N</td>
<td>0.1</td>
<td>0.14(^d)</td>
</tr>
<tr>
<td>Crude protein</td>
<td>24.3</td>
<td>15</td>
</tr>
<tr>
<td>Acid detergent fibre</td>
<td>23</td>
<td>18(^a)</td>
</tr>
<tr>
<td>Neutral detergent fibre</td>
<td>49</td>
<td>45</td>
</tr>
<tr>
<td>Water soluble carbohydrate</td>
<td>7.8</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>0.53</td>
<td>0.51</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>0.22</td>
<td>0.33</td>
</tr>
<tr>
<td>Potassium</td>
<td>2.2</td>
<td>0.9</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.28</td>
<td>0.2</td>
</tr>
<tr>
<td>Sodium</td>
<td></td>
<td>0.18</td>
</tr>
<tr>
<td>Chloride</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Sulphur</td>
<td>0.43</td>
<td>0.2</td>
</tr>
</tbody>
</table>

\(^{a,b}\) Denotes requirements for adult cows.