Does irrigated Kikuyu stack up?

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What Kikuyu brings to the cow’s table

- Do nothing and it establishes
- High growth: 120 kg/ha/day
- CP ✔️ NDF high? ME low?
### Best practice

<table>
<thead>
<tr>
<th>Units of N per day</th>
<th>4 leaf – N applied each harvest</th>
<th>Long rotation – harvested every 2(^{nd}) harvest date</th>
<th>4 leaf – N applied every 2(^{nd}) harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>1.2</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>2.4</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>3.6</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
Irrigation system and water quality

Center pivot

Surface irrigation fresh water x 2 sites

Surface irrigation salt load
Irrigation system and water quality

Center pivot

Surface irrigation
fresh water x 2 sites

Surface irrigation
salt load
Soil moisture sensing
Typical Soil Moisture Dynamic Curve - Clay

- **Saturation / Waterlogging**: Rapid drainage (gravity)
- **Field Capacity / DUL**: Slow plant water uptake. Incorrectly termed “Waterlogging”
- **PAW (Plant Available water)**
- **Peak plant water usage / uptake = Max plant growth**
- **Slowing plant water uptake**
- **Perm Wilt Pt**

Soil Moisture Content (VSW%) vs. TIME (days)
Six harvests over 142 days

<table>
<thead>
<tr>
<th>Kg/ha</th>
<th>TSP</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOP</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Urea</td>
<td>4 levels</td>
<td></td>
</tr>
</tbody>
</table>

- H1 Long rotation: 21 days, 21 days, 26 days
- H2 Long rotation: 28 days
- H3 Long rotation: 19 days, 25 days

14 Nov | Dec | Dec | Jan | Feb | March | April
Nitrogen dose response DM/ha (all sites)
Response to Nitrogen: DM and growth/ha (all sites)

Cumulative yield after 6 cuts

- **0 N**: 8.4 T, 60 kg/d
- **1.2 N**: 11.5 T, 83 kg/d
- **2.4 N**: 12.1 T, 87 kg/d
- **3.6 N**: 13.3 T, 97 kg/d
### Site differences 4-leaf DM and growth /ha (2.4 N/day)

<table>
<thead>
<tr>
<th>Surface</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>fresh fresh</td>
<td>9.2 T 69 kg/d</td>
</tr>
<tr>
<td>fresh salty</td>
<td>10.2 T 72 kg/d</td>
</tr>
<tr>
<td>Fresh pivot</td>
<td>10 T 70 kg/d</td>
</tr>
<tr>
<td>Fresh pivot</td>
<td>19 T 135 kg/d</td>
</tr>
</tbody>
</table>
Nitrogen dose response DM and growth/ha (Pivot)

<table>
<thead>
<tr>
<th>Nitrogen Dose (N)</th>
<th>Dry Matter (T)</th>
<th>Growth (kg/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 N</td>
<td>12.5</td>
<td>89</td>
</tr>
<tr>
<td>1.2 N</td>
<td>18.1</td>
<td>130</td>
</tr>
<tr>
<td>2.4 N</td>
<td>19</td>
<td>135</td>
</tr>
<tr>
<td>3.6 N</td>
<td>19</td>
<td>135</td>
</tr>
</tbody>
</table>
Pivot advantages

• Pivot: small volumes more frequently
• Surface: more water less often
  – Water logging - oxygen stress for 3 days
  – Wilting point - a day or two
  – Reduced growth potential
Salt did not restrict kikuyu performance

<table>
<thead>
<tr>
<th>Irrigation</th>
<th>Water catchment</th>
<th>Salt concentration dS/m</th>
<th>Kikuyu sensitivity to salt dS/m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh water surface</td>
<td>Harvey</td>
<td>0.46</td>
<td>3-6</td>
</tr>
<tr>
<td>Salt load surface</td>
<td>Collie</td>
<td>2.19</td>
<td></td>
</tr>
</tbody>
</table>

1.3 – 3.0 dS/m is high salinity.
Avoid frequent light waterings, moderate leaching is needed
Fertilising frequency at 2.4 N/day DM/ha

After every second cut

11.4 T

After each cut

12.1 T

Cumulative after 6 cuts
4 leaf vs long rotation DM/ha (2.4 N/d)

4 leaf

12.1 T

Long rotation

16.4 T

Cumulative after 6 and 3 cuts
4 to 4.5 leaf

Long rotation
7+ leaves
HAC: Late summer harvest 4 (2.4 N/d)

4 leaf

- ME 9.4
- CP 16%
- NDF 56%
- L:S 2.8

- ME 9.5
- CP 17%

Long rotation

- ME 7.7
- CP 11.2%
- NDF 64%
- L:S 0.5

- ME 9.3
- CP 15%

- ME 8.7
- CP 15%

- ME 7.1
- CP -

Warning
Digestibility 53%
<table>
<thead>
<tr>
<th>Feed Type</th>
<th>$/T DM</th>
<th>WUE T DM/ML</th>
<th>SC/MJ ME</th>
<th>$/kg CP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kikuyu 1.2 N/day</td>
<td>48</td>
<td>4.0</td>
<td>0.5</td>
<td>0.26</td>
</tr>
<tr>
<td>Pivot</td>
<td>102</td>
<td>1.5</td>
<td>1.2</td>
<td>0.59</td>
</tr>
<tr>
<td>Surf. fresh</td>
<td>120</td>
<td>1.4</td>
<td>1.4</td>
<td>0.70</td>
</tr>
<tr>
<td>Surf. salty</td>
<td>130</td>
<td>1.1</td>
<td>1.5</td>
<td>0.76</td>
</tr>
<tr>
<td>Other feeds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kikuyu 2018</td>
<td>152</td>
<td>0.9</td>
<td>1.57</td>
<td>0.61</td>
</tr>
<tr>
<td>Maize 2018</td>
<td>138</td>
<td>4.9</td>
<td>1.36</td>
<td>1.97</td>
</tr>
<tr>
<td>Millet 2018</td>
<td>172</td>
<td>1.0</td>
<td>1.59</td>
<td>0.75</td>
</tr>
<tr>
<td>Dairy pellets</td>
<td>511</td>
<td>3.93</td>
<td>2.38</td>
<td>2.37</td>
</tr>
<tr>
<td>Wheat</td>
<td>306</td>
<td>2.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Kikuyu does stack up!

- WUE ✔
- Cheap home grown feed ✔
- Supplements needed
  - High NDF limits VFI ➙ energy intake ➙ milk production
Best practice

- Graze at 4 leaf
- 1.2 N/day
- Pivot
- Use soil moisture sensors
- Trials could be improved
What we need to do better next year

Does residue accumulation increase growth?
Does residue accumulation reduce growth?
Removal of the apical bud reduces leaf growth
Tissue tests – nitrate, magnesium potassium, calcium

- Nitrates levels of up to 0.01% were found. Toxicity is estimated at 0.34%. Nitrates accumulate when CP > 23%
Kikuyu tillering