The efficiency of lateral shift irrigation systems on dairy pastures

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- The Tasmanian dairy industry is the largest agriculture consumer of irrigation water in the state
- Improving the efficiency of water use is viewed as being critical to the sustainability of the dairy industry
- Efficiency of water use is very dependent on the capability of the irrigation delivery system
- Irrigation using lateral shifts are common for irrigating pastures in the Tasmanian dairy industry
- This study examined the accuracy, distribution uniformity (DU), coefficient uniformity (CU) and adequacy of lateral shift irrigation systems on four commercial dairy farms

Table 1. Irrigation performance indicators for lateral shift irrigation systems on four Tasmanian dairy farms

<table>
<thead>
<tr>
<th>System</th>
<th>Mean irrigation applied (mm/hr)</th>
<th>Distribution uniformity</th>
<th>Coefficient uniformity</th>
<th>System adequacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral 1</td>
<td>42</td>
<td>20%</td>
<td>43%</td>
<td>55%</td>
</tr>
<tr>
<td>Lateral 2</td>
<td>36</td>
<td>35%</td>
<td>59%</td>
<td>69%</td>
</tr>
<tr>
<td>Lateral 3</td>
<td>83</td>
<td>43%</td>
<td>82%</td>
<td>76%</td>
</tr>
<tr>
<td>Lateral 4</td>
<td>81</td>
<td>49%</td>
<td>83%</td>
<td>90%</td>
</tr>
</tbody>
</table>

1 DU – Irrigation distribution uniformity calculated using catch cans
2 CU – indicates on average how uniform the sprinkler pattern is
3 Estimate of the proportion of the field that would receive at least 80% of the target depth

- Irrigation distribution uniformity ranged from 20 to 49% and failed to reach the attainable efficiencies of 60 - 75% DU for lateral shift irrigation systems
- This low DU resulted in between 51 to 80% of the pasture being under or over irrigated
- Low DU increases pumping costs, risk of nutrient loss through leaching and runoff, with potential loss of pasture production from either water stress or waterlogging
- Improving the DU of lateral shifts would better match irrigation amounts to pasture demand and would therefore improve the management of irrigation scheduling

Figure 1. Application (mm/hr) and distribution uniformity (mm/hr) for sprinkler patterns of four lateral shift irrigators (● = lateral irrigation position)

- Common factors that can affect DU of lateral shift irrigation systems can include:
  - Wind
  - Incorrect sprinkler spacing
  - Incorrect operating pressures

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