Pasture-based automatic milking systems in Australia

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EAAP 2015 – Warsaw, Poland
Agenda for today

• Australian dairy industry
• Australian automatic milking systems (AMS)
• Research on milking intervals, incentives, impact and management
• Current & future industry issues around AMS
Australian dairy industry

- 3rd largest rural industry
- 1.69 million dairy cows (76% HF)
- ~6,200 dairy farms
- ~9.500 million litres of milk
- Average farm: 270 cows (5,500 lts/cow)
AMS status in Australia

36 farms up & running
5 farms being installed
AMS status in Australia

Robots: 144 robots
Cows: ~10,250 cows
Milk: ~56 million litres milk
AMS status in Australia

Indoor systems: 11%
Corral based systems: 6%
Pasture-based systems: 83%
AMS in pasture-based systems

What had already been proven?
AMS could work in pasture-based systems and achieve high levels of pasture utilisation

Grazing and AMS

Concept of extended milking intervals

Milking intervals in pasture-based AMS

So what next?

How can we..?

↓ milking interval - ↑ milking frequency - ↑ milk yield
Hypothesis

- Frequency – size of allocations
- Smaller allocations
- Depleted quicker
- Cows would traffic out sooner
- Lower milking intervals
- Higher milk yield
2 vs 3 way grazing trial: Design

2WG
9 kg DM/cow
12h grazing

3WG
6 kg DM/cow
8h grazing
2 vs 3 way grazing trial: Results

↓ Milking interval - ↑ Milking frequency - ↑ Daily yield (-31%) (+40%) (+20%)

PRE vs POST feeding trial

Hypothesis

• Immediate reward
• Quicker return to the dairy
• Lower milking interval
• Higher milking frequency
• Higher daily milk yield
PRE vs POST feeding trial: Design

Whole herd (175 cows)

PRE Feeding
- Pasture
  - Supplements
  - Milking
  - Pasture

POST Feeding
- Pasture
  - Milking
  - Supplements
  - Pasture
**PRE vs POST feeding trial: Results**

<table>
<thead>
<tr>
<th></th>
<th>PRE</th>
<th>POST</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return time (hh:mm)</td>
<td>11:54</td>
<td>13:16</td>
<td>**</td>
</tr>
<tr>
<td>Feeding area time (hh:mm)</td>
<td>0:56</td>
<td>0:23</td>
<td>**</td>
</tr>
<tr>
<td>Waiting time (hh:mm)</td>
<td>1:37</td>
<td>1:17</td>
<td>**</td>
</tr>
<tr>
<td>Milking interval (hh:mm)</td>
<td>15:18</td>
<td>14:17</td>
<td>**</td>
</tr>
<tr>
<td>Daily yield (kg milk/d)</td>
<td>19.29</td>
<td>19.45</td>
<td>NS</td>
</tr>
</tbody>
</table>

**Difference in time spent on each area, but not on daily yield!**

PRE vs POST feeding trial: Results

Main findings of my research

• Achievable targets for pasture-based AMS

• Identification of factors that affect milking intervals

• Incentive management (frequency, size & location)
What could the future look like?

How will Australian cows be milked in the future?
How will Australian cows be milked?

- 48% of dairy sheds were commissioned more than 15 years ago
- 56% of dairy farms spend more than 4h/d milking
- 50% of farmers are considering installing a new dairy in the future
- 50% of farmers would consider installing AMS (+22% not sure)
How will Australian cows be milked?

<table>
<thead>
<tr>
<th>Reasons to consider AMS</th>
<th>Reasons to not consider AMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifestyle (66%)</td>
<td>Economic (75%)</td>
</tr>
<tr>
<td>Make dairy attractive (58%)</td>
<td>Farm layout (41%)</td>
</tr>
<tr>
<td>Data and information (57%)</td>
<td>Financial (38%)</td>
</tr>
<tr>
<td>Higher MF and milk yield (56%)</td>
<td>Support (25%)</td>
</tr>
<tr>
<td>Reduce labour units (50%)</td>
<td>Being on call (23%)</td>
</tr>
</tbody>
</table>
Interest for more information
The Automatic Milking Systems’ KPI Project provides the Dairy Industry with key information of what is achievable under commercial conditions. Information about milk production, AMS utilisation and farm demographics will help understand how these farms ‘behave’ over a 12 month period.

### Table 1: General farm information

<table>
<thead>
<tr>
<th>Breed of cows</th>
<th>Farm 1</th>
<th>Farm 2</th>
<th>Farm 3</th>
<th>Farm 4</th>
<th>Farm 5</th>
<th>Farm 6</th>
<th>Farm 7</th>
<th>Farm 8</th>
<th>Farm 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holstein, Holstein x Jersey, HJx Brown Swiss, Holstein x Brown Swiss, Red Holstein</td>
<td>Holstein</td>
<td>Holstein</td>
<td>Holstein and Brown Swiss (5%)</td>
<td>Holstein</td>
<td>Holstein</td>
<td>Holstein</td>
<td>Holstein</td>
<td>Friesian x Jersey</td>
<td>Holstein</td>
</tr>
<tr>
<td>Calving system</td>
<td>Year round</td>
<td>Seasonal</td>
<td>Split (3 batches)</td>
<td>Year round</td>
<td>-</td>
<td>Year round</td>
<td>Split (2 batches)</td>
<td>Seasonal</td>
<td>Seasonal</td>
</tr>
<tr>
<td>Milking area (ha)</td>
<td>55</td>
<td>60</td>
<td>100</td>
<td>40</td>
<td>100</td>
<td>75</td>
<td>43</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>Number of robots (#)</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Feed stations (#)</td>
<td>0</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>14</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Gate time changes</td>
<td>6:30, 13:00 &amp; 20:00</td>
<td>1:30, 9:30 &amp; 16:30 &amp; 23:30</td>
<td>2:00, 8:00 &amp; 17:00</td>
<td>Barn with free cow traffic</td>
<td>0:00, 10:00 &amp; 16:00</td>
<td>4:00, 11:00 &amp; 22:00</td>
<td>5:00, 14:00 &amp; 16:30</td>
<td>1:30, 9:00 &amp; 16:30</td>
<td>2:30, 9:30 &amp; 16:00</td>
</tr>
</tbody>
</table>
AMS KPI Project

All this information is available online

### Table 2: Herd information

<table>
<thead>
<tr>
<th></th>
<th>Farm 1</th>
<th>Farm 2</th>
<th>Farm 3</th>
<th>Farm 4</th>
<th>Farm 5</th>
<th>Farm 6</th>
<th>Farm 7</th>
<th>Farm 8</th>
<th>Farm 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows in milk (#)</td>
<td>198</td>
<td>41</td>
<td>149</td>
<td>186</td>
<td>310</td>
<td>368</td>
<td>122</td>
<td>66</td>
<td>105</td>
</tr>
<tr>
<td>Heifers (%)</td>
<td>34%</td>
<td>34%</td>
<td>34%</td>
<td>32%</td>
<td>15%</td>
<td>36%</td>
<td>26%</td>
<td>68%</td>
<td>36%</td>
</tr>
<tr>
<td>Animals that calved (#)</td>
<td>9</td>
<td>1</td>
<td>23</td>
<td>12</td>
<td>26</td>
<td>49</td>
<td>29</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Farm stocking rate (milking cows/ha)</td>
<td>4</td>
<td>0.68</td>
<td>1.49</td>
<td>4.65</td>
<td>3.10</td>
<td>4.91</td>
<td>2.84</td>
<td>0.73</td>
<td>2.10</td>
</tr>
<tr>
<td>Robot stocking rate (milking cows/robot)</td>
<td>66</td>
<td>14</td>
<td>50</td>
<td>62</td>
<td>52</td>
<td>368</td>
<td>41</td>
<td>22</td>
<td>35</td>
</tr>
<tr>
<td>DIM (#)</td>
<td>160</td>
<td>260</td>
<td>182</td>
<td>144</td>
<td>193</td>
<td>185</td>
<td>162</td>
<td>151</td>
<td>214</td>
</tr>
</tbody>
</table>

### Table 3: Daily milk production and quality

<table>
<thead>
<tr>
<th></th>
<th>Farm 1</th>
<th>Farm 2</th>
<th>Farm 3</th>
<th>Farm 4</th>
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<th>Farm 6</th>
<th>Farm 7</th>
<th>Farm 8</th>
<th>Farm 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily milk production (kg/day)</td>
<td>4,372</td>
<td>993</td>
<td>3,893</td>
<td>5,792</td>
<td>6,834</td>
<td>7,186</td>
<td>2,704</td>
<td>1,080</td>
<td>2,577</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>3.87</td>
<td>3.79</td>
<td>3.82</td>
<td>3.96</td>
<td>-</td>
<td>3.15</td>
<td>4.08</td>
<td>4.6</td>
<td>-</td>
</tr>
<tr>
<td>Protein (%)</td>
<td>3.34</td>
<td>3.47</td>
<td>3.34</td>
<td>3.35</td>
<td>-</td>
<td>3.3</td>
<td>3.5</td>
<td>3.37</td>
<td>-</td>
</tr>
<tr>
<td>Somatic cell count (x 1000)</td>
<td>188</td>
<td>75</td>
<td>172</td>
<td>146</td>
<td>-</td>
<td>320</td>
<td>84</td>
<td>107</td>
<td>-</td>
</tr>
</tbody>
</table>
AMS farmers priorities

• Feed allocation / management
• Maximizing system capacity
• Data needs to provide information
• Different needs of different farmers
Industry priorities

• Economics and benchmarking
• Training needs
• Herd testing and breeding

Efficient cows

40% more milk with 10% less milkings
Conclusion

- AMS is not a new way of farming
- Good understanding of what is achievable
- Still work to be done for pasture-based systems
- Management of huge amount of data
- Need to have an industry approach

Integrations of technologies on dairy farms enable innovation only if they can have a positive impact on farm (sustainability)
Thank you very much for your attention!