Combining automatic milking and grazing using detailed cow information

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EAAP 2016, Belfast, UK
Background

Autograssmilk - EU project

- Stop decline of grazing on AM farms !!!
- Evaluate technologies to support the integration of grazing and AM systems
Introduction

- Combining grazing and robot milking:
  - Increase of variability in cow activity level and pattern throughout the day
  - Less information about feed (grass) intake

- How to deal with?
Data collection

- On 4 research and 2 private farms (NL, B, DK and F)

- Collected by robots: DeLaval and Lely
Data collection

- Collected by cow attached sensors - activity
  
  - IceTag at left hind leg
    (IceRobotics Ltd., UK)
  
  - Smarttag Neck (Nedap, NL)
  
  - Lely neck tag (Lely Industries, NL)
Data collection

- Collected by cow attached sensors: eating time
  - Smarttag Neck (Nedap, NL)
  - Lifecorder+ (research tool, F)
# Results robots

- **Technical performance of the farms during grazing season**

<table>
<thead>
<tr>
<th>Farm id and year</th>
<th>Cows</th>
<th>Robots</th>
<th>Cows per robot</th>
<th>MF per cow per day</th>
<th>Cows with MI &gt; 14 h (%)</th>
<th>MY level (kg/d)</th>
<th>Pasture access per day (h)</th>
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</thead>
<tbody>
<tr>
<td>NL1 2013</td>
<td>52</td>
<td>1</td>
<td>52</td>
<td>2.45</td>
<td>21.9</td>
<td>25.4</td>
<td>11</td>
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<tr>
<td>NL1 2014</td>
<td>60</td>
<td>1</td>
<td>60</td>
<td>2.31</td>
<td>28.5</td>
<td>25.7</td>
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<tr>
<td>DK1 2014</td>
<td>94</td>
<td>2</td>
<td>47</td>
<td>2.58</td>
<td>22.7</td>
<td>26.6</td>
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<td>DK2 2014</td>
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<td>3</td>
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<td>2.81</td>
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<tr>
<td>F1 2014</td>
<td>73</td>
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<td>2.03</td>
<td>36.8</td>
<td>28.6</td>
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<tr>
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<td>65</td>
<td>2.09</td>
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<td>28.9</td>
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<td>74.3</td>
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<td>1.66</td>
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<td>17.1</td>
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<tr>
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<td>44</td>
<td>2.00</td>
<td>63.4</td>
<td>19.2</td>
<td>24</td>
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</table>
Results: milking robot visits

Distribution throughout the day
Results activity

- Distribution of hourly activity throughout the day
  - **IceTag leg sensor** - individual cow
Results activity

- Distribution of hourly activity throughout the day
  - **IceTag leg sensor** - herd average

![Graph showing hourly activity](image-url)
Results activity

- Distribution of hourly activity throughout the day
  - **Nedap Smarttag Neck** - individual cow
Results activity

- Distribution of hourly activity throughout the day
  - **Nedap Smarttag Neck** - herd average

![Graph showing activity distribution throughout the day.](image)
Results – activity for heat detection

- Distribution of hourly activity throughout the day
  - **Nedap Smarttag Neck** - individual cow
Results heat alerts

Sensitivity and specificity on NL1 2014 farm

- Sensitivity
- Specificity

% Sensitivity and Specificity across different numbers of consecutive 2-hour periods with significantly increased activity.
Results eating sensor Nedap

Eating pattern one cow throughout 3 days

- eating when in barn
- eating when access to pasture

Eating time per 15 min (min)

220 221 222 223
Results eating sensors Nedap

Herd eating time per day in barn and pasture

- **time eating barn**
- **time grazing pasture**

<table>
<thead>
<tr>
<th>day number (2014)</th>
<th>time eating barn</th>
<th>time grazing pasture</th>
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<tbody>
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<td>264</td>
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</tbody>
</table>
Conclusions

- The project has shown that:
  - Increasing grazing resulted in a lower milking frequency and lower milk production per cow.
  - Lower milking frequencies in full time grazing are mainly due to low milking visits during the night.
  - In order to cope with the different characteristics of activity measurements, a different approach for oestrus detections models is needed.
  - Actual information from eating sensors is promising for daily cow and herd management purposes.
Thank you for your attention!!

- Acknowledgement

This research was funded by the European Union's Seventh Framework Programme managed by REA-Research Executive Agency http://ec.europa.eu/research/rea ([FP7/2007-2013] under grant agreement no. SME-2012-2-314879.)