Progress and challenges in precision dairy farming

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Precision Dairy Farming

What?

Automatically, continuously monitor real-time production, behaviour and health of individual cows.

Why?

Maximize potential, minimize labor input, early detection & intervention.
## Sensor technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Country</th>
<th>% Dairy farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor system (general)</td>
<td>NLD</td>
<td>39%</td>
</tr>
<tr>
<td>Automated heat detection</td>
<td>FRA</td>
<td>19%</td>
</tr>
<tr>
<td></td>
<td>BEL</td>
<td>24%</td>
</tr>
<tr>
<td>Automatic milking system</td>
<td>NLD</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>DEU</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>NOR</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>BEL</td>
<td>10%</td>
</tr>
</tbody>
</table>

References available upon request
On farm implementation

- “Management by exception”
- Early detection
- Adapt farm management
- Follow-up treatment
Reasons to invest

- Improved detection: 80%
- Improved profitability: 50%
- More insight: 60%
- Reduced labor: 40%
- No conscious decision: 10%

Steeneveld & Hogeveen (2015)

Activity meter / pedometer
Rumination sensor
## Reasons NOT to invest

<table>
<thead>
<tr>
<th>2008</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Not familiar with available systems (55%)</td>
<td>- Prefer to invest in other things (48%)</td>
</tr>
<tr>
<td>- Undesirable cost-benefit ratio (30%)</td>
<td>- Uncertain about profitability (38%)</td>
</tr>
<tr>
<td>- Information overload (36%)</td>
<td>- Poor integration (13%)</td>
</tr>
<tr>
<td>- Not familiar with available systems (6%)</td>
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</tr>
</tbody>
</table>

Russell & Bewley, 2013

Steeneveld & Hogeveen (2015)
Slow adoption rate

- Development driven by technology rather than by need? (Bewley, 2010)

- Lack of ... (Yule & Eastwood, 2012)
  - Data integration
  - Interaction between farm advisors & technology
  - Trust in technology
Drowning in data . . . starving for information

On-farm technologies have brought an onslaught of information that we're still struggling to mine. While it assists in the decision-making process, ensure automation is your best fit before investing.
How to optimize dairy data?

- Improve data quality
- Decision support systems
- Benchmarking tools
- More data integration
- Multi-actor approach
Improve data quality

- “Garbage in, garbage out.”

- Common errors in datasets:
  - Missing data
  - ID errors
  - Input errors

“... 52% of the cows were labeled as having incorrect reproduction data.”

Hermans et al. (2017)
Decision support systems

Data → Insight → Action
- Standard operating procedures (SOP)
- Written down, step-by-step instructions
- Practical & unambiguous
Benchmarking tools

- “Comparing the farm’s performance with that of others, based on objective criteria”

- Not new, more possibilities

- Careful with the interpretation of numbers!
“One obstacle to precision farming is a lack of compatibility between software produced by different manufacturers.”

Parliamentary Office of Science and Technology (2015)
“Complementary types of knowledge – scientific, practical and other – must join force [...] to develop innovative solutions which are more ready to be applied in practice and cover real needs.”

*European Commission’s Horizon 2020 program*
Multi-actor approach

4D4F

Data Driven Dairy Decisions for Farmers

www.4D4F.eu

Thematic Network

Data & sensors

2016 - 2019

15 project partners
Conclusion

Implement
Integrate
Involve
Thank you

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