Smart Farming for Europe: Value Creation through Precision Livestock Farming

Daniel Berckmans
KU Leuven, Belgium

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Overview

• What is Precision Livestock Farming (PLF)?
• Examples to create VALUE
• Conclusions
Thank to the M3-BIORES team and our partners
What is Precision Livestock Farming (PLF)?
Today...Automated Systems

Technology can help to quantitatively measure behaviour, health and performance of animals.
What is Precision Lifestock Farming?

“Management of livestock farming by continuous automated real-time monitoring/controlling of production/reproduction, health and welfare of livestock and environmental impact.”
A living organism:

- Complex
- Individual
- Time-Varying
- Dynamic

Living organism = CITD - system

1. Measure
2. Model
3. Manage = Monitoring

- Fully Automated
- Continuously
- In Real-Time

M3-BIORES KU LEUVEN
Examples of PLF Technology:
What is possible today?

Fully automated monitoring
Several sensing techniques can be used:

- Image
- Sensors
  - Heart rate (bpm)
  - Heart rate monitor (Polar S610i)
- Sound
Example 1:

Lameness Monitor for cows

i.c.w. Wageningen, The Netherlands
VoLcani Research Institute, Israel
De Laval, Sweden
Individual lameness detection of cows

Experimental setup

- Farm with 1000 cows
- Camera 25 fps
- Resolution: 1920 x 1080 pixels
- 90 cows recorded for 2 months
- 8 cows had lameness evolution
Results: Active Appearance Model
Back posture
Results

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<tr>
<th>Cow</th>
<th>True Positive Rate</th>
<th>False Positive Rate</th>
<th>Accuracy</th>
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<tr>
<td>Total</td>
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<table>
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<tr>
<td>Individual</td>
<td>0.91</td>
<td>0.06</td>
<td>0.91</td>
</tr>
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Individual threshold can increase the sensitivity with more than 10%
Value:

Welfare

Health

Euros
Example 2:

On-line Pig Sound Analysis

i.c.w. UMIL, Italy

SoundTalks, Belgium

Fancom, The Netherlands
On-line Pig Sound Analysis
Pig cough monitor into a Commercial product
Localize cough sounds and follow the infection front in a house

Using several microphones in a stable, the location of the cough sounds can be determined.

Microphone
Detected Cough

Main future application: Reducing the use of Antibiotics
Example 3:

Monitoring of pigs’ drinking behaviour

i.c.w. Ughent, Belgium
Monitoring of pigs’ drinking behaviour

- Monitoring duration of visits to the drink nipple in a pig pen

- Estimate hourly water use by real-time analyses of drink nipple visits
Model-based monitoring of water use

- Water flow measured
- Water use from water meters
- Compare
- Water use estimated from image
- Transfer function modelling
- Duration of visits
- Detection of visits
- Images
Model-based detection of visits
Hourly water use can be estimated with an accuracy of 92% or 200 ml over 13 days
Example 4:
Early Warning System for Broiler Houses
i.c.w. Fancom, The Netherlands
Vision-based Early Warning System for Broiler Houses

• Solution?
• Farmers can use automatic tools to continuously monitor the welfare and health of their broilers
• Detecting malfunctioning in broiler houses
• Produce alarms in real-time when malfunctioning happens (in feeder or drinker lines, light, climate control, etc.)
Farmer logbook and manual video observation as references
Event detection

Feeder line

Defect Feeder line

Measured values
Smoothed values within 25% range
Smoothed values out of 25% range
Predicted values

Normal situation

Problem in feeding lines
Measured vs. modelled animal distribution

Prediction window: 1 light period = 5 hours
Detected events in the validation experiment over 42 days

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**Conclusion**: Events in a broiler house could be detected using top-view image analysis with an accuracy of 95.24%
Value:

- Euros
- Labour and Time
Value: Summary
Value: For more Stakeholders

Governments

Press

Researchers

Citizens

Consumer

“Animal People”

Companies
Conclusions

- Fully automated and continuous monitoring (25 images/s, 20,000 sound samples/s, 24 h a day, 7 days a week) of animal variables is a reality.

- PLF aims to offer a management tool that creates added value for the stakeholders, and meanwhile improves animal welfare, animal health, environmental impact, labour and time, euros (€), and social recognition.

- Value must be created for different stakeholders.

- If the farmer does not get value, the animal will not get it.

- Collaboration: “animal people” & “PLF people”
7th European Conference on Precision Livestock Farming - ECPLF 2015, Milan - Italy

15 -18 September 2015

Organiser: Dr. Marcella Guarino
Thanks for your attention

For more information you can check our website: http://www.m3-biores.be

Questions

Contact: daniel.berckmans@biw.kuleuven.be