EU-PLF Project: 
Bright Farm by Precision Livestock Farming

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Animal Task Force
Warsaw, Poland
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Overview

• Challenges for Livestock Production
• What is Precision Livestock Farming (PLF)?
• Where is PLF today: Examples of PLF
• Conclusions
M3-BIORES team

253 A-Publications
359 Conf papers
16 products
2 spin-off companies
15 patents
EU-PLF – Bright Farm by Precision Livestock Farming

EU-PLF Partners

EU-PLF Advisory Board

Prof. Jos Metz
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Challenges for livestock production
Problem of monitoring animals

- Livestock farming in the past ...

Farmer had the time to use audio-visual scoring
Worldwide Individual Meat Consumption

Source: FAO (2010)
Numbers of animals ↔
Number of farmers ↔
Resulting in

High number of animals per farm

Less available time per individual animal

More welfare and other problems
Challenges for livestock production

- Over 60 billion animals are slaughtered every year, increase with up to 40%?
- **Health**: Relationship between animal health and healthy food
- **Animal welfare** (e.g. EU)
- **Environmental Issues**
- **Social importance**
- **Economic importance** including Valorisation of knowledge
3 approaches in European focus on animal behaviour
First approach: Welfare Quality (1)
Europe has invested in a methodology to quantify Animal Welfare

“Welfare Quality”

Procedure: Experts do audio-visual scoring by visiting farms and looking to (behaviour) of animal.
Second approach: Iceberg Indicator (2)
Technology can help to quantitatively measure **behaviour**, **health** and **performance** of animals.
Third approach: Precision Livestock Farming (3)

Management of livestock by continuous automated real-time monitoring of production/reproduction, health and welfare of livestock and environmental impact.
Welfare Scoring/Monitoring

- PLF-Continuous animal based management during growth period (3)
- Welfare Quality once a year (1)
- Iceberg indicators (2)
- slaughterhouse

Time
A living organism:

Complex

Individual

Heartbeat (bpm)

Time (s)
A living organism:

Complex

Individual

AV. population

Response variable

N

δ

Individual

6 population

Time
A living organism:

Identical  

Individually different
A living organism:

- Complex
- Individual
- Time-Varying

Example: Heat production of broiler chickens

**5 days old**

**30 days old**
A living organism:

- Complex
- Individual
- Time-Varying
- Dynamic

Living organism = CITD - system

1. Measure
2. Model
3. Manage & Monitoring

In an on-line way

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Examples of PLF Technology:
What is possible today?

Fully automated monitoring
Infection Monitoring by On-line Pig Sound Analysis
i.c.w. University of Milan, SoundTalks NV, Fancom BV
Health monitoring by on-line sound analysis:

On-line cough recognition algorithm in pig stables
PCM: Results

Animals treated

Animals ill upon entering

Pigs ill again

Animals again ill
Example: Monitoring of drinking behaviour of pigs (health!)
Monitoring of drinking behaviour in pigs (i.c.w. Ughent, Fancom BV)

- Monitoring water usage as indicator for health status
- Estimate hourly water use in a pig pen by analysing hourly duration 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

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Model-based detection of visits

$\Delta T = \text{duration of the visit}$

Drinking nipple
Hourly water use can be estimated with an accuracy of 92% or 200 ml over 13 days
Example : Real time monitoring of problems in a broiler house

i.c.w. Fancom BV
eYeNamic monitor tool
Vision-based Early Warning System for Broiler Houses

- Solution?
- Farmers can use automatic tools to continuously monitor the welfare and health of their broilers
Experiment’s ground plan

- Camera
- Dimensions:
  - 63.5 m
  - 21 m
  - 19.8 m
• Detecting malfunctioning in broiler houses
• Produce alarms in real-time when malfunctioning happens (in feeder or drinker lines, light, climate control, etc.)
Birds and housing

• Experiment rounds: 42 days
• Initial broiler weight: weight of 40±5 grams
• Broiler type: ROSS 308 broilers
• House capacity: 28000 broilers
• Climate control: Fancom FUP1EA2
Farmer logbook and manual video observation as references
Measured vs. modelled animal distribution

Measured distribution
Predicted distribution

Prediction window: 1 light period = 5 hours
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

Distribution (%) vs Date (dd/mm)

16/05
17/05
Detected events in the validation experiment over 42 days

**Conclusion:** Events in a broiler house could be detected using top-view image analysis with an accuracy of 95.24%
Cow lameness monitor: i.c.w. Volcani, DeLaval, Wur

Aggression monitor: Umil, TIHO, Fancom BV

Scratching behaviour: Ughent, ILVO

Weight estimation: Fancom BV, Agrifirm
Value Creation through Precision Livestock Farming
Value for farmer:

- Welfare
- Health
- Environmental Impact
- Consumer
- Social Recognition
- Labour and Time
- Euros
PLF is a tool that helps farmers and stakeholders

- Press
- Researchers
- Governments
- Companies
- Veterinarians
- Consumer
- Citizens
The PLF Business Model

Cost of PLF investment & operation shared along the value creation chain by payment for access to data pool

PLF Service Provider
(funding, set-up, service, data)


Feed  Farmer  Slaughter  Retailer

ConSUMER
General Conclusions

• PLF offers **fully automated continuous real time** detailed monitoring and management of animals.

• PLF brings the farmer to the individual animals that need his/her attention, active management tool.

• PLF is a **tool that helps** farmers and stakeholders.

• PLF will allow the animals to drive the system.

• **Efficient implementation of PLF needs collaboration** between researchers, farmers and stakeholders!
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The views expressed in this presentation are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Commission.
Thank you for your attention

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

Questions

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