EU-PLF Project:
Bright Farm by Precision Livestock Farming

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Animal Task Force
Warsaw, Poland
31st of August 2015

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

Prof. Noel Devisch

Prof. Leo den Hartog

Ignacio Blanco-Traba

Animal Health Consultancy

Dr. Dieter Schillinger

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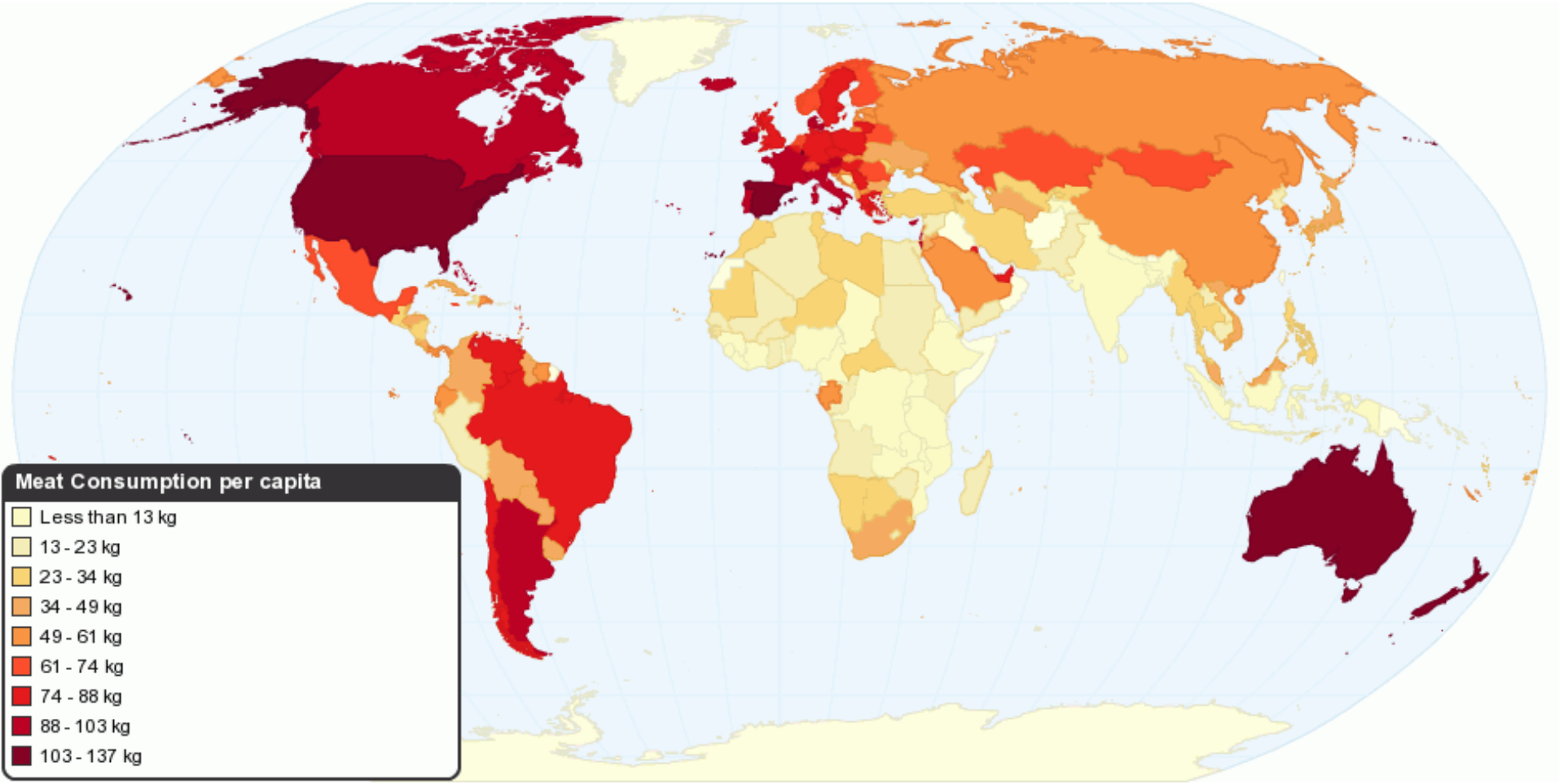
Challenges for livestock production

Problem of monitoring animals

- Livestock farming in the past …

Farmer had the time to use audio-visual scoring

Worldwide Individual Meat Consumption

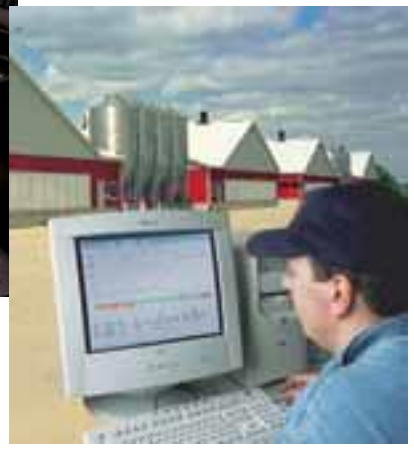


Source: FAO (2010)

Numbers of animals ⇗⇗

Number of farmers ⇘⇘

Resulting in



↳ High number of animals per farm

↳ Less available time per individual animal

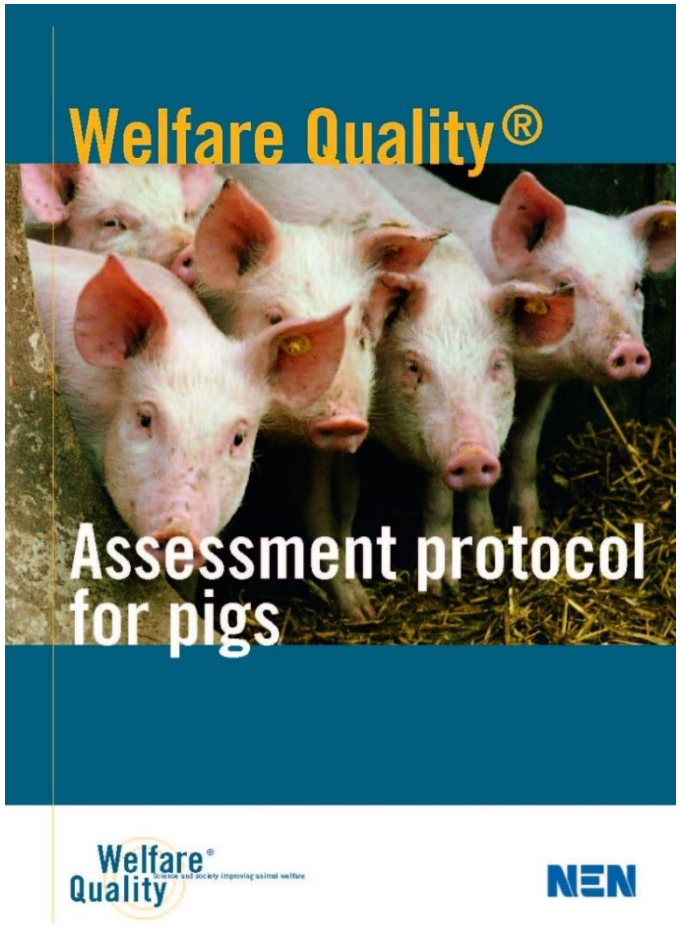
↳ More welfare and other problems

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"

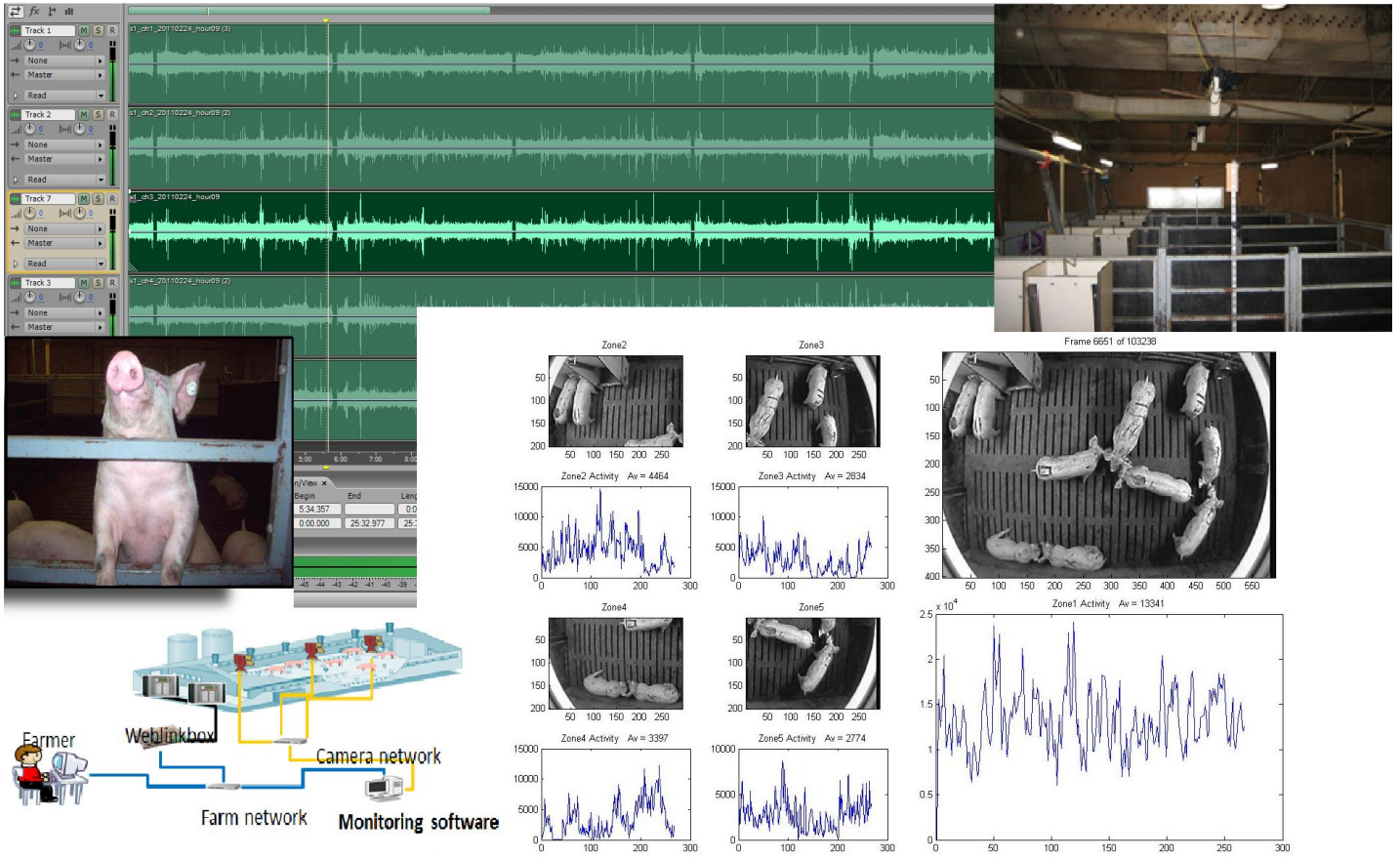
Procedure: Experts do audio-visual scoring by visiting farms and looking to (behaviour) of **animal.**



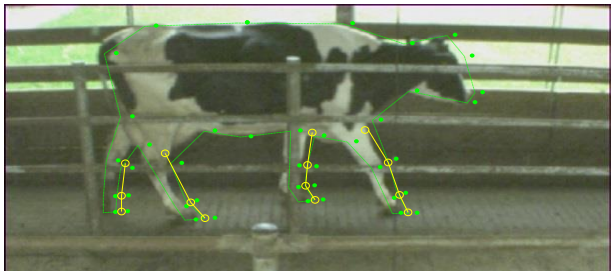

Second approach: Iceberg Indicator (2)

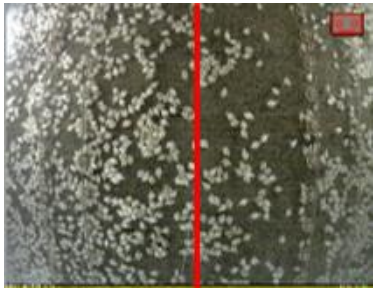
Tomorrow…Automated Systems

Technology can help to quantitatively measure **behaviour, health and performance** of animals.



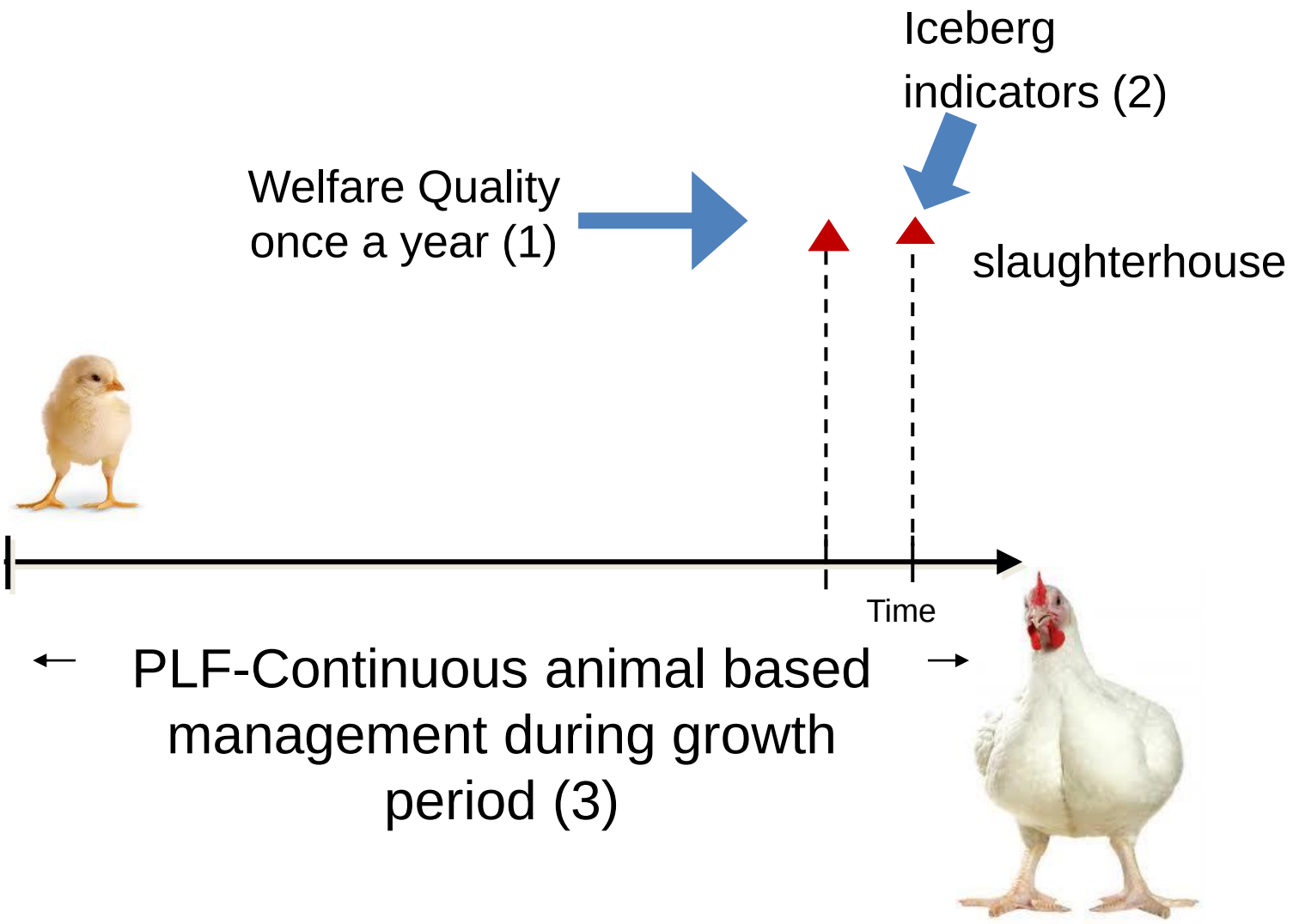
Third approach: Precision Livestock Farming (3)





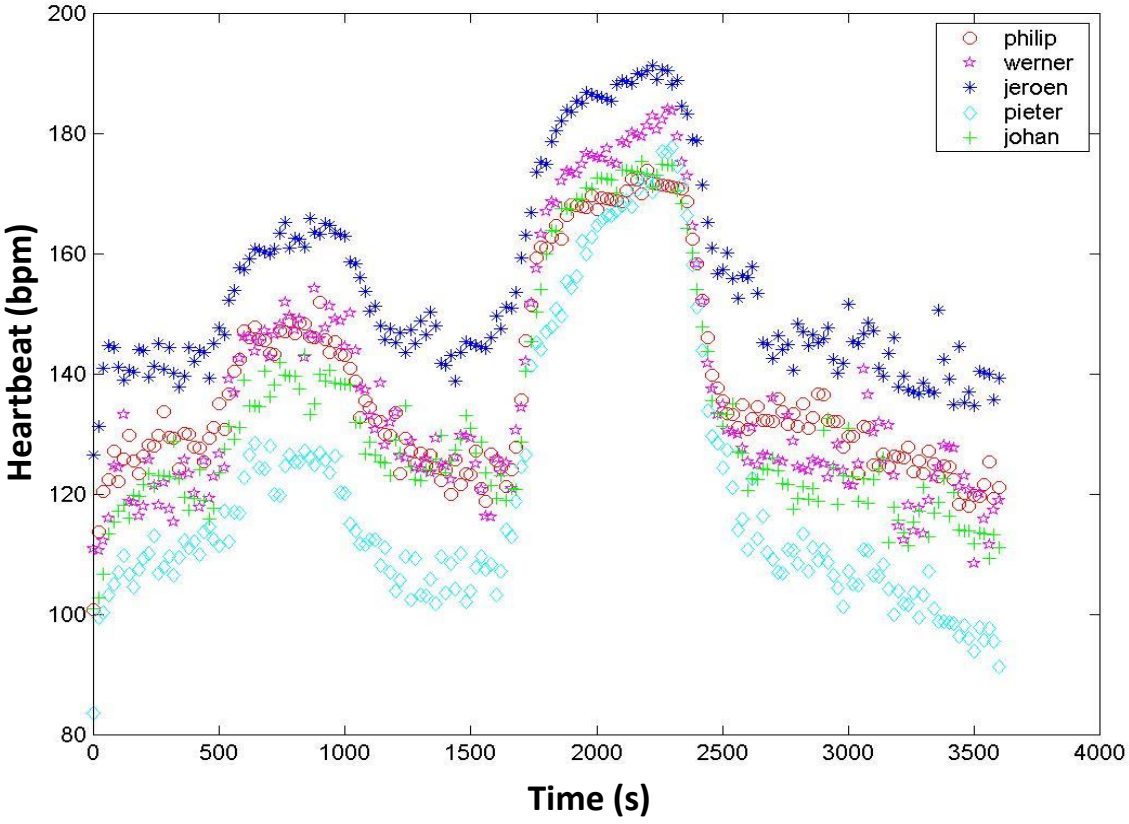
Management of livestock by continuous automated real-time monitoring of production/reproduction, health and welfare of livestock and environmental impact.

Welfare Scoring/Monitoring



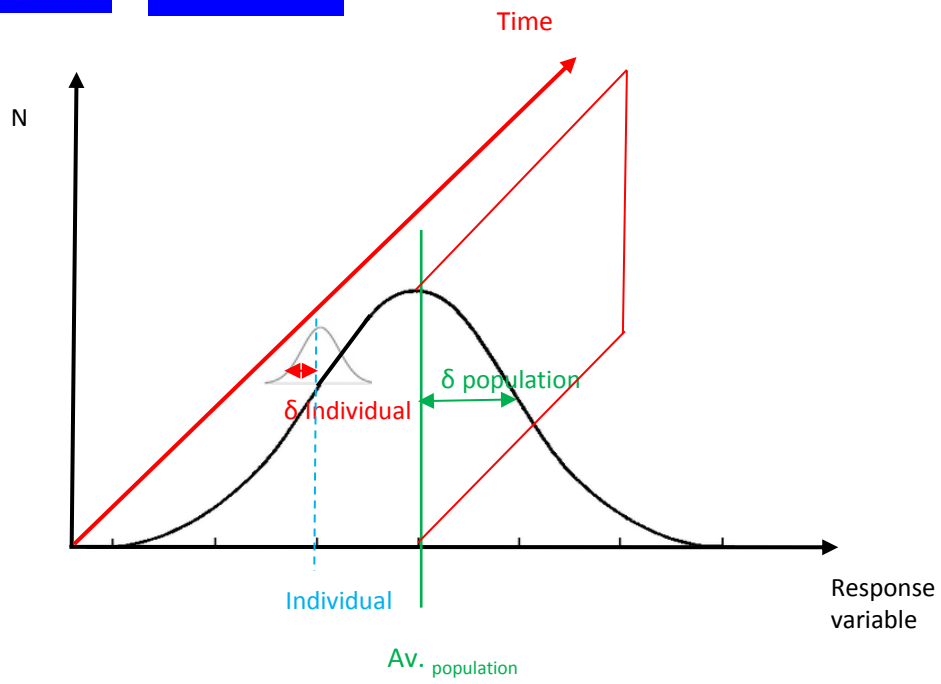
A living organism:

Complex **Individual**



A living organism:

Complex **Individual**



A living organism:

Identical

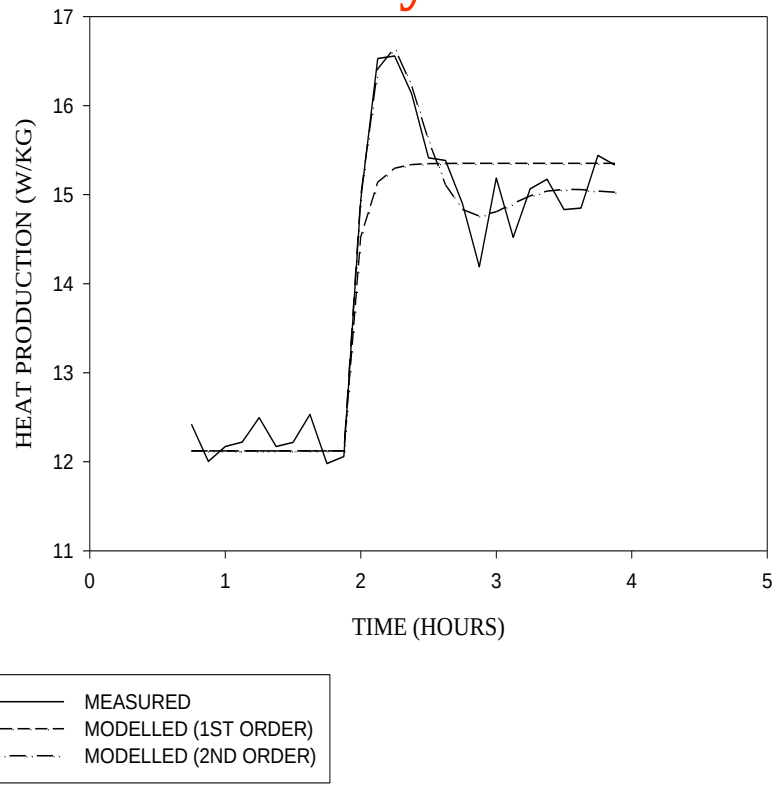
Individually different

A living organism:

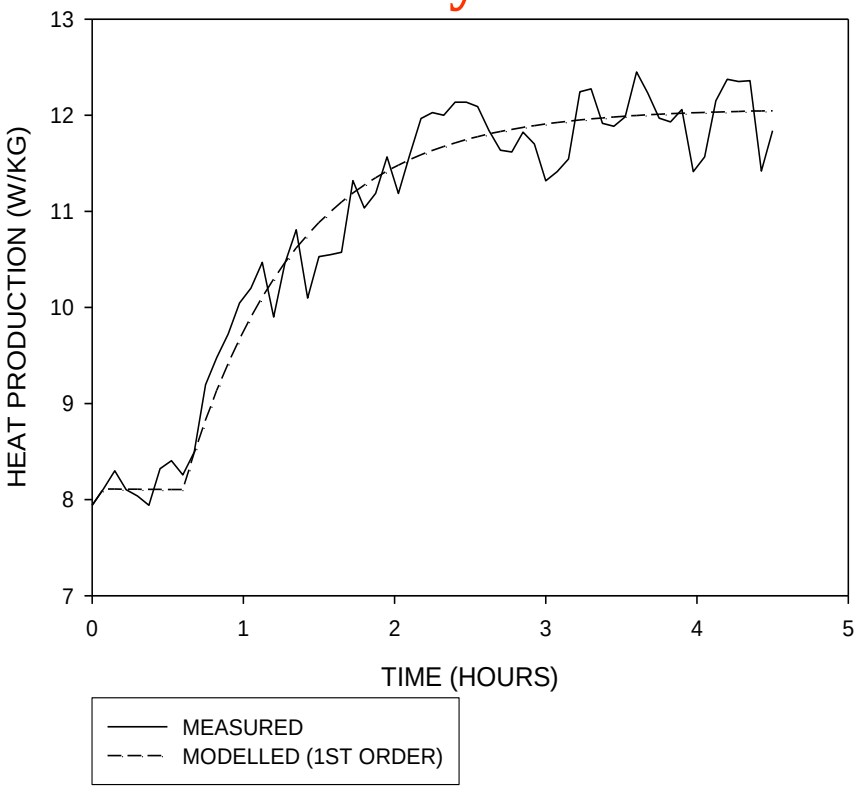
Complex **Individual** **Time-Varying**

Example: Heat production of broiler chickens

5 days old



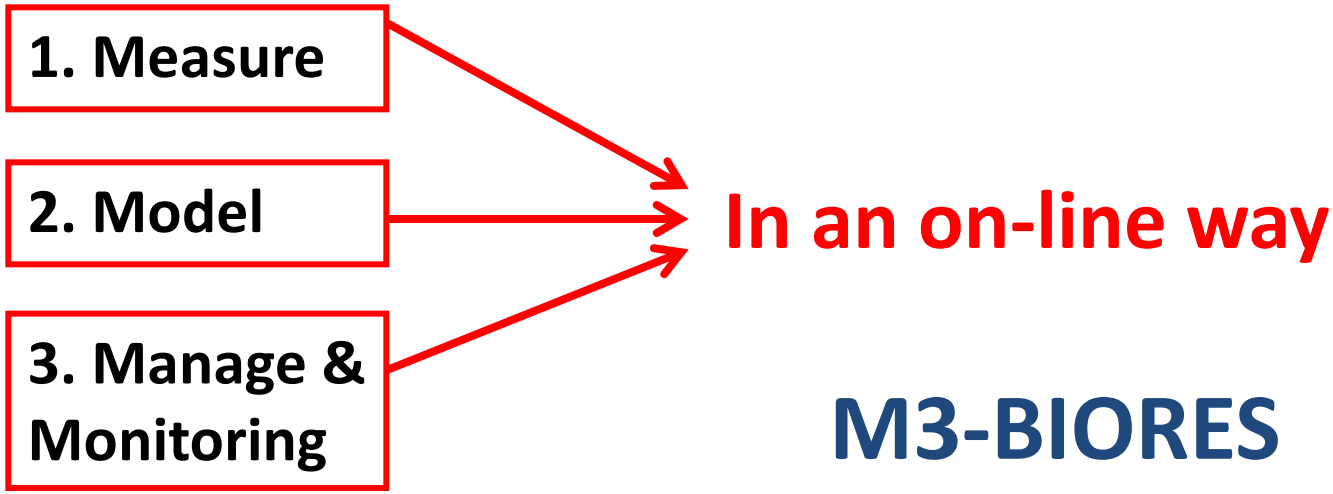
30 days old



A living organism:

Complex **Individual** **Time-Varying** **Dynamic**

Living organism = CITD - system



Examples of PLF Technology: What is possible today?

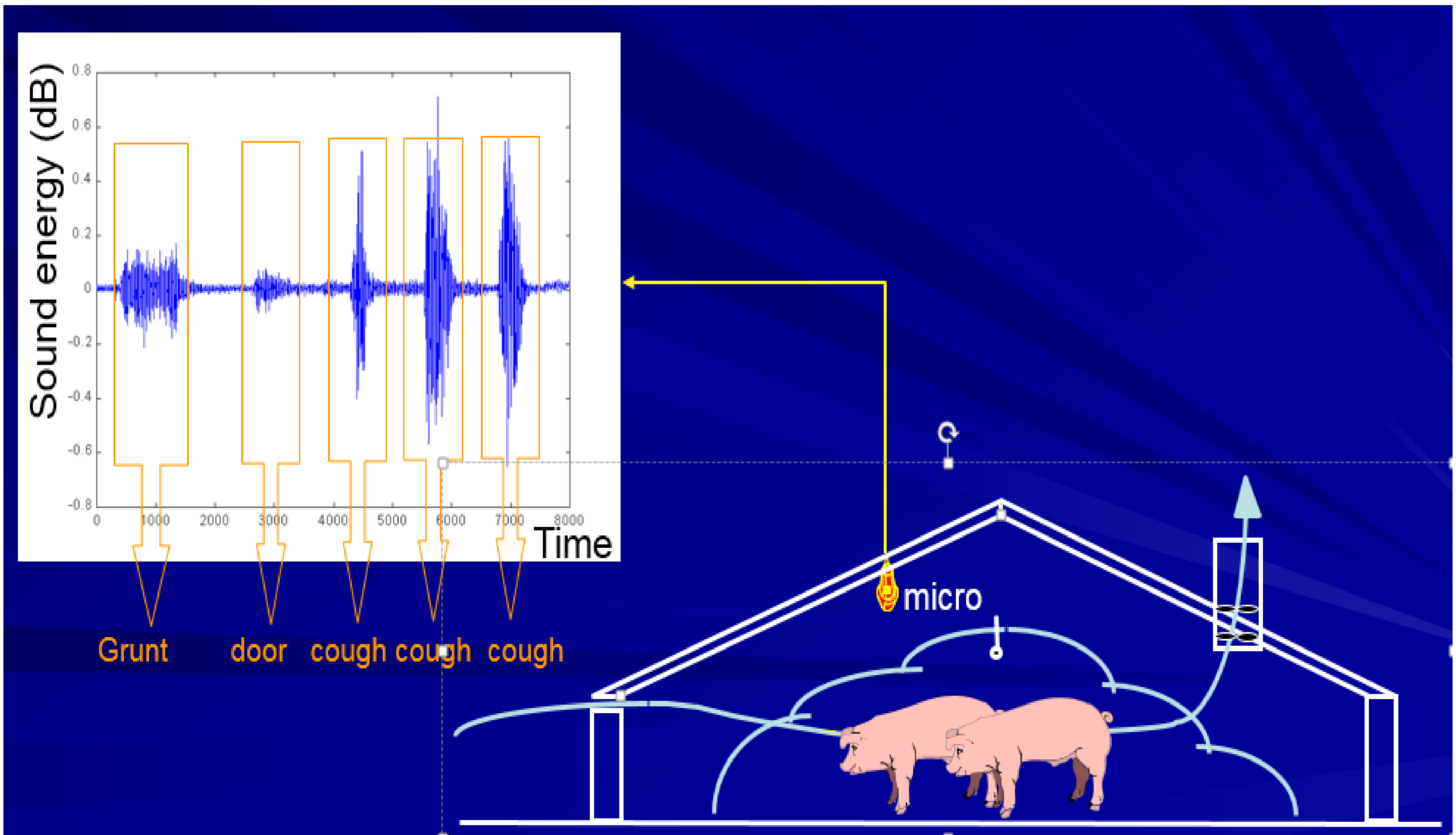
Fully automated monitoring

Infection Monitoring by On-line Pig Sound Analysis

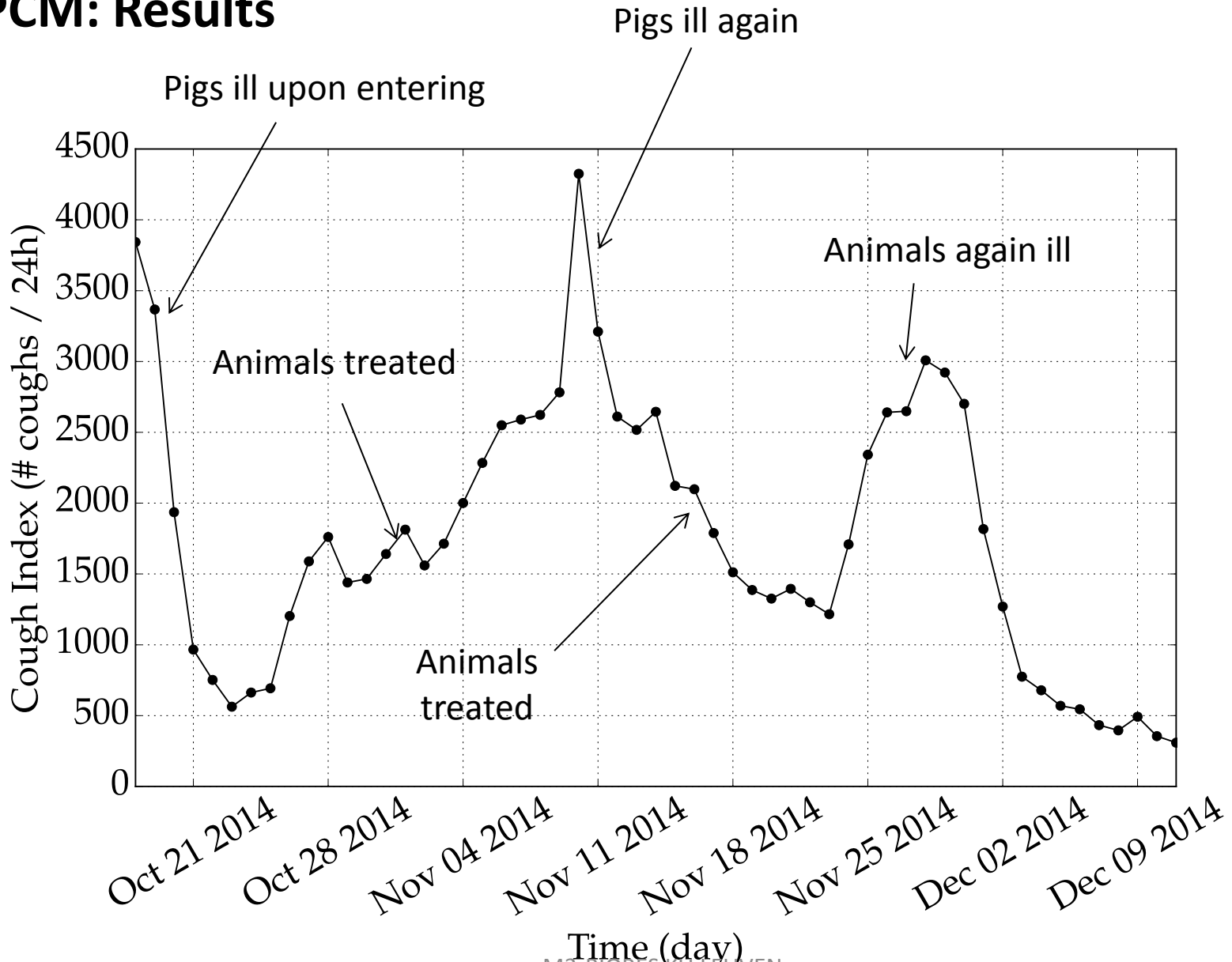
i.c.w. University of Milan, SoundTalks NV, Fancom BV

Health monitoring by on-line sound analysis:

On-line cough recognition algorithm in pig stables



PCM: Results


Pigs ill again
Pigs ill upon entering
Animals again ill
Animals treated
Animals
treated
Cough Index (# coughs / 24h)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Oct 21 2014
Oct 28 2014
Nov 04 2014
Nov 11 2014
Nov 18 2014
Nov 25 2014
Dec 02 2014
Dec 09 2014
Time (day)


SoundTalks
PCM-2012-00090

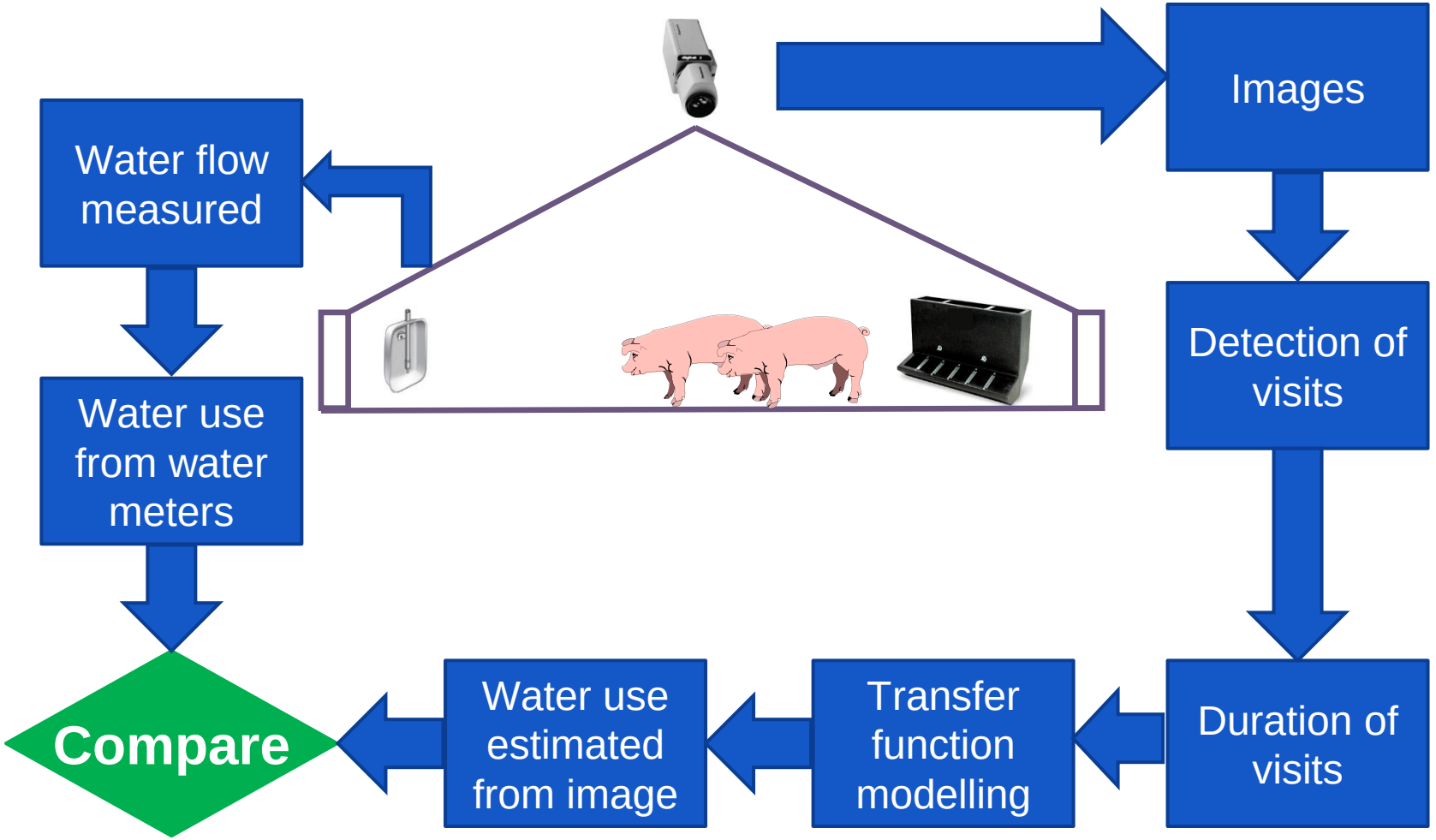
Example: Monitoring of drinking behaviour of pigs (health!)

Monitoring of drinking behaviour in pigs (i.c.w. Ughent, Fancom BV)

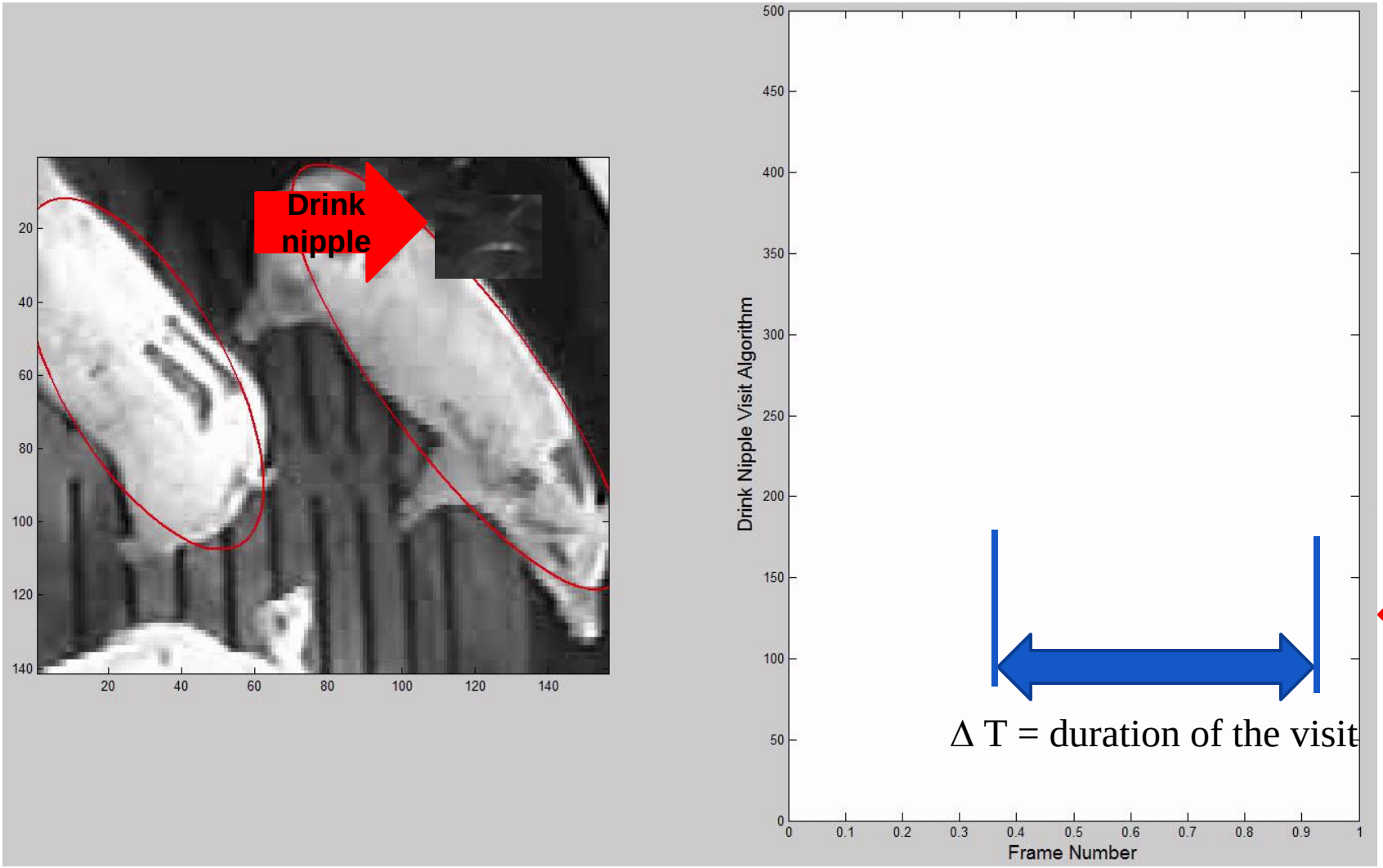
- Monitoring water usage as indicator for health status

- Estimate hourly water use in a pig pen by analysing hourly duration of drink nipple visits

Model-based monitoring of water use

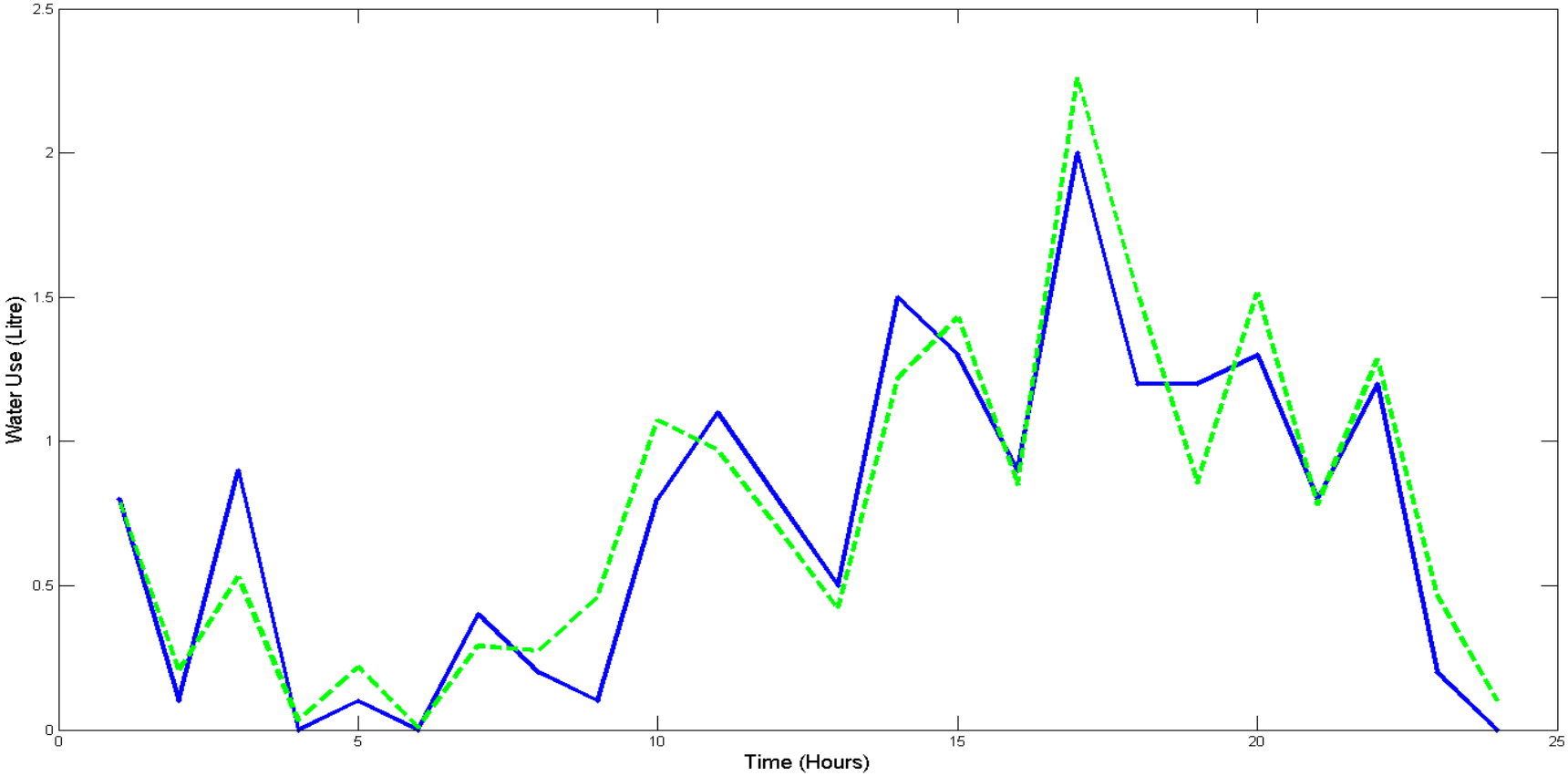


Model-based detection of visits



Play

Results

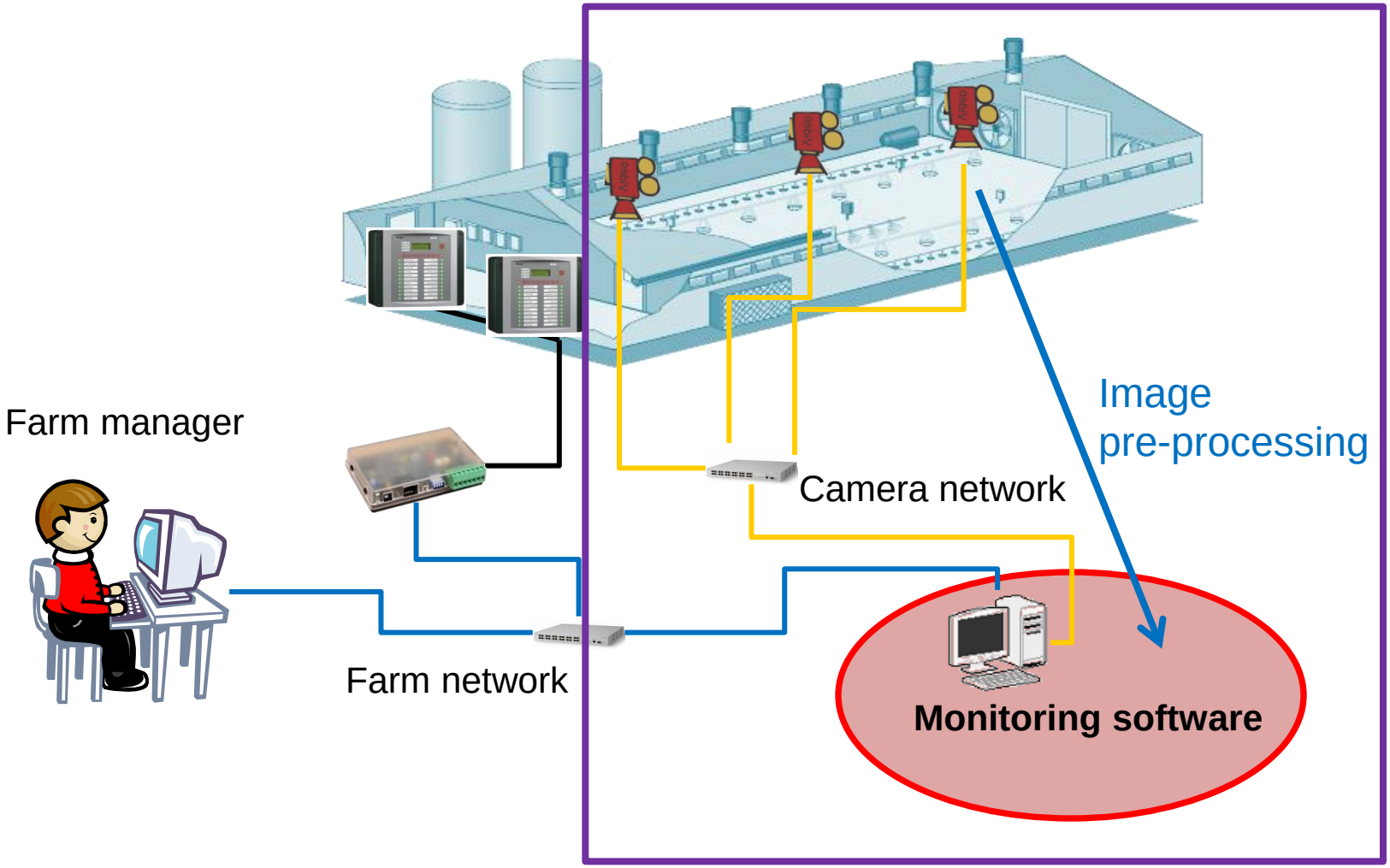


Hourly water use can be estimated with an accuracy of 92% or 200 ml over 13 days

Example : Real time monitoring of problems in a broiler house

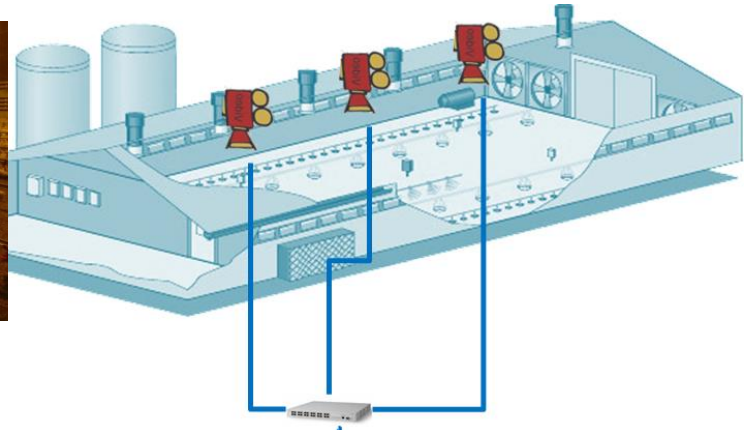
i.c.w. Fancom BV

eYeNamic monitor tool

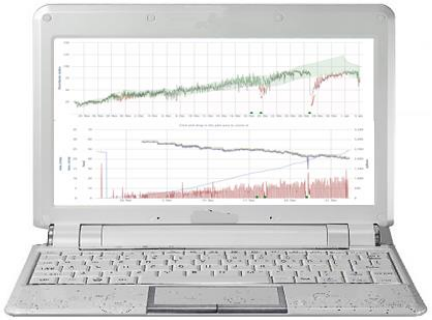


Vision-based Early Warning System for Broiler Houses

- Solution?
- Farmers can use automatic tools to continuously monitor the welfare and health of their broilers



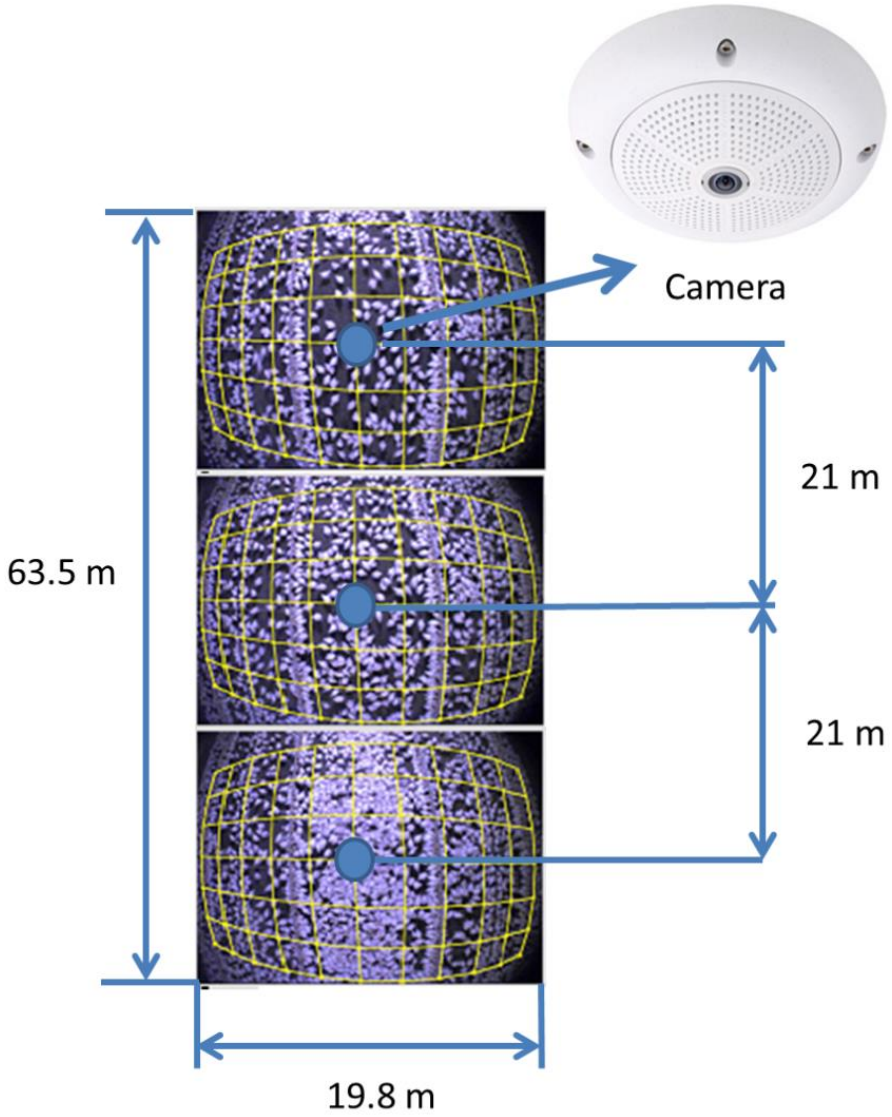
Farm manager dashboard



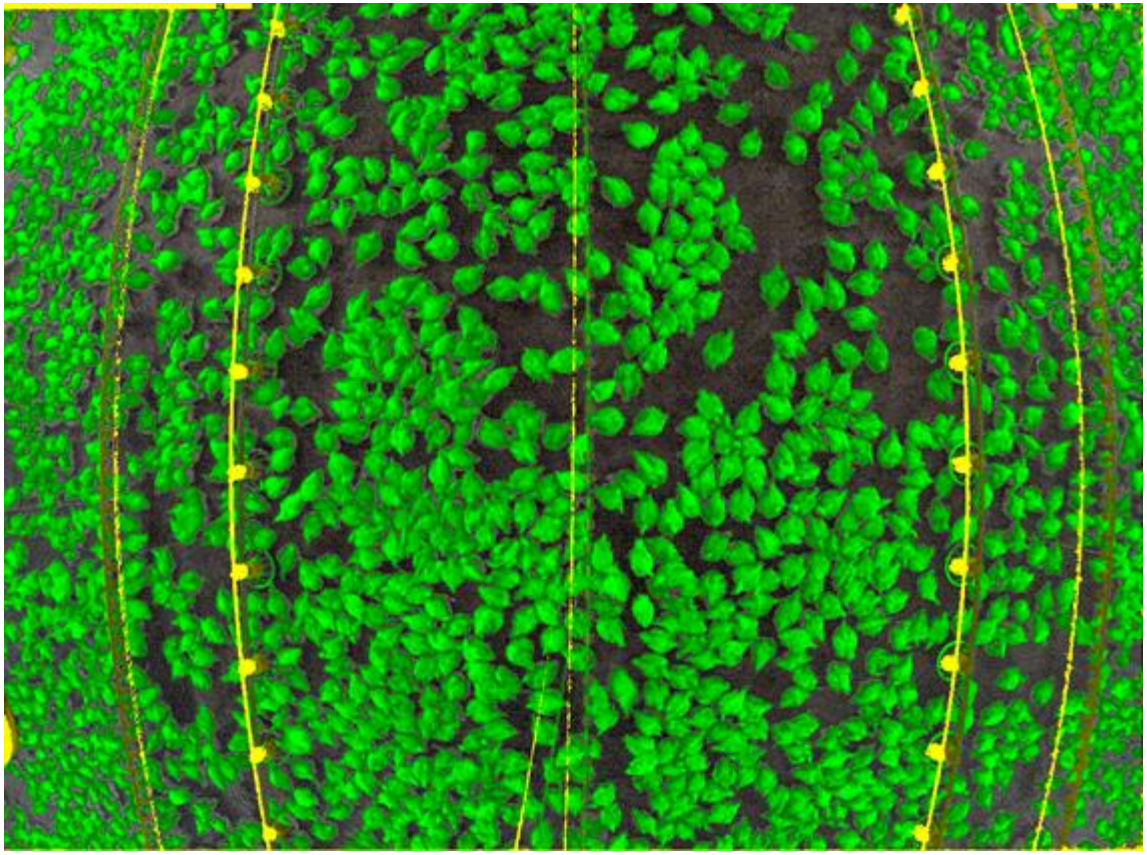
Welfare monitor software

Camera network

Experiment’s ground plan

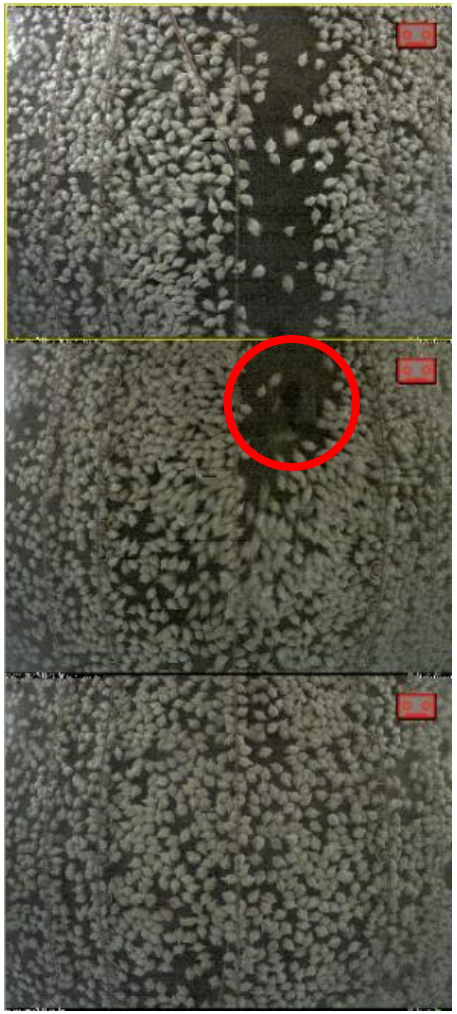


- Detecting malfunctioning in broiler houses
- Produce alarms in real-time when malfunctioning happens (in feeder or drinker lines, light, climate control, etc.)

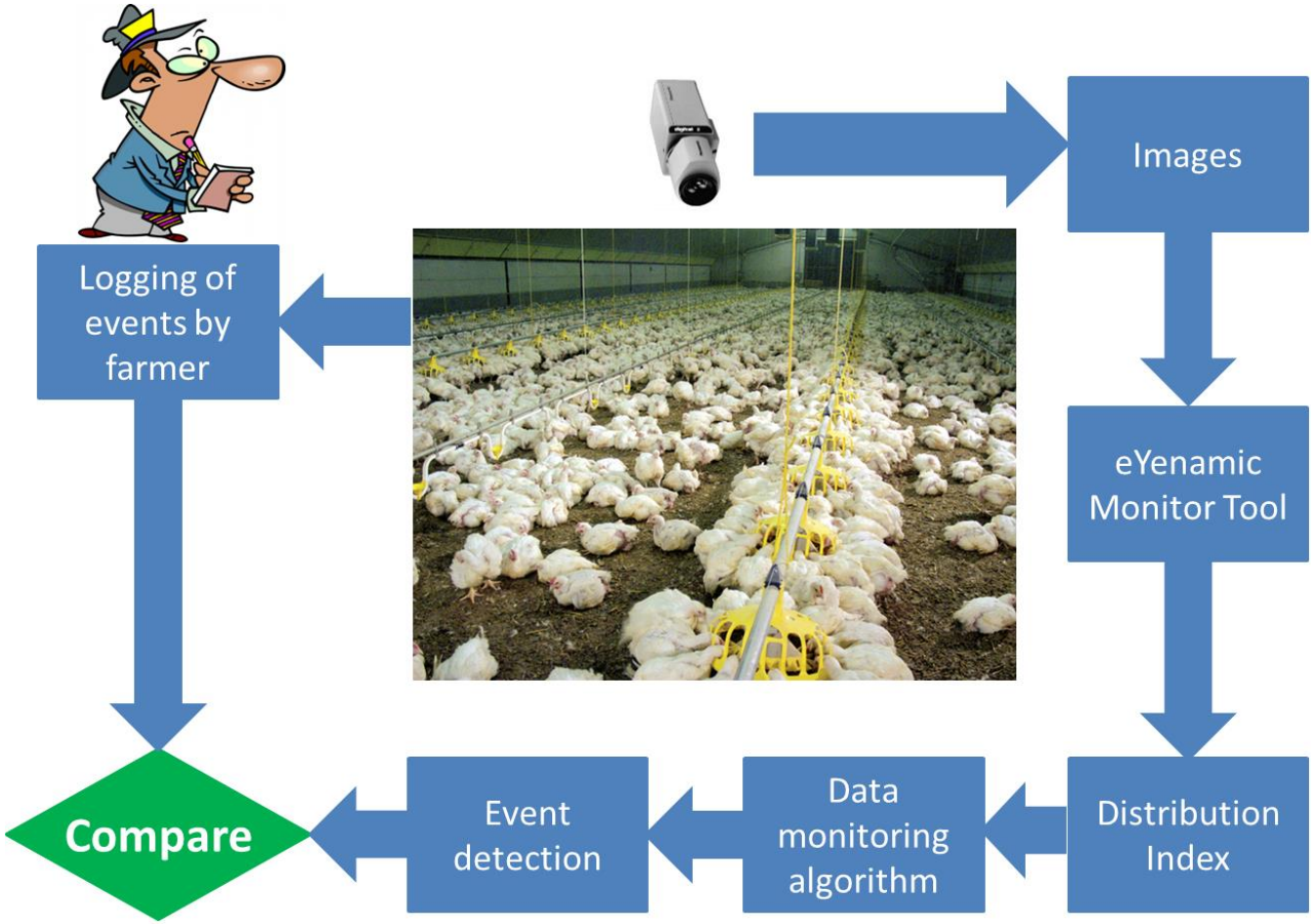


Birds and housing

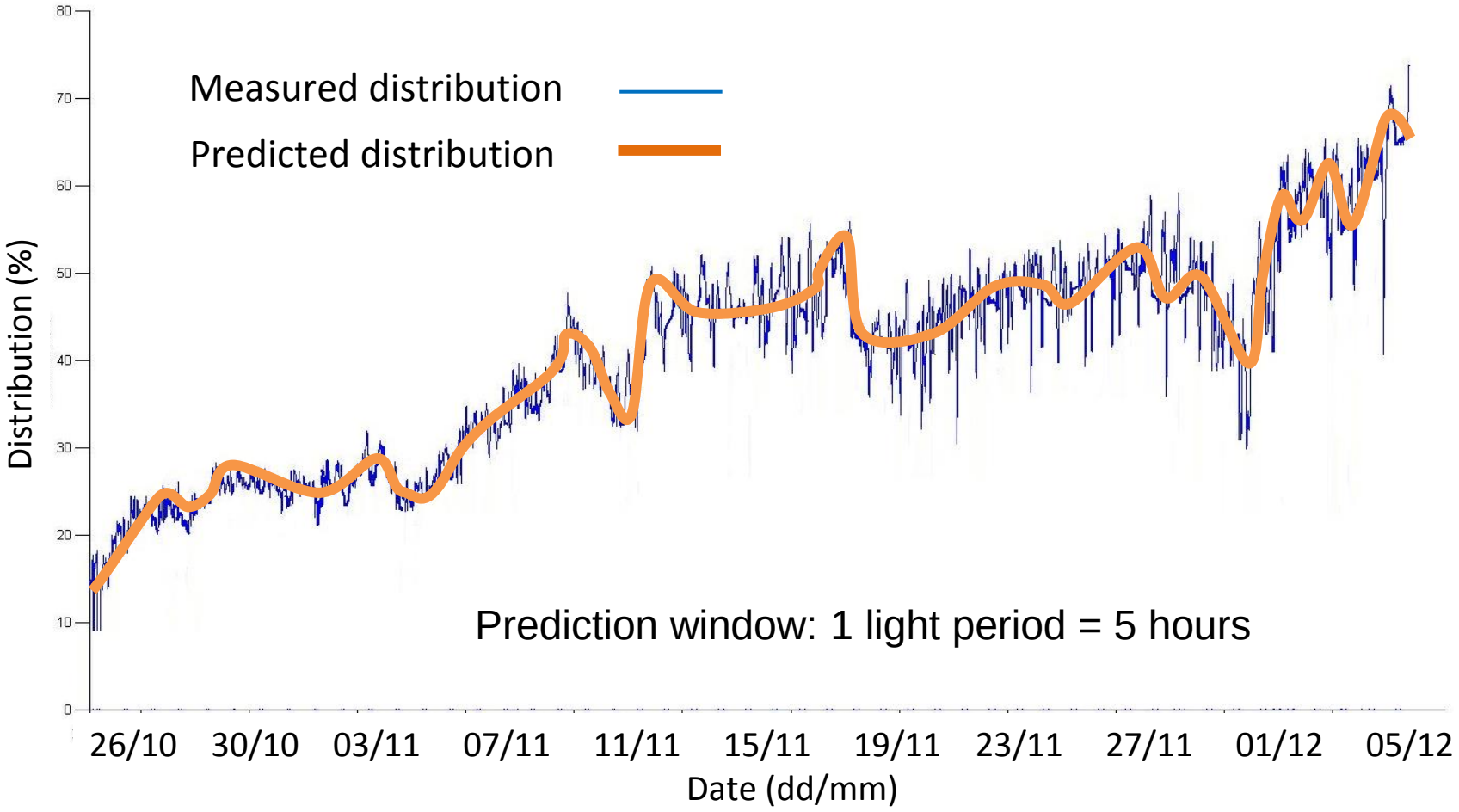
- Experiment rounds: 42 days
- Initial broiler weight: weight of 40±5 grams
- Broiler type: ROSS 308 broilers
- House capacity: 28000 broilers
- Climate control: Fancom FUP1EA2



Farmer logbook and manual video observation as references



Measured vs. modelled animal distribution

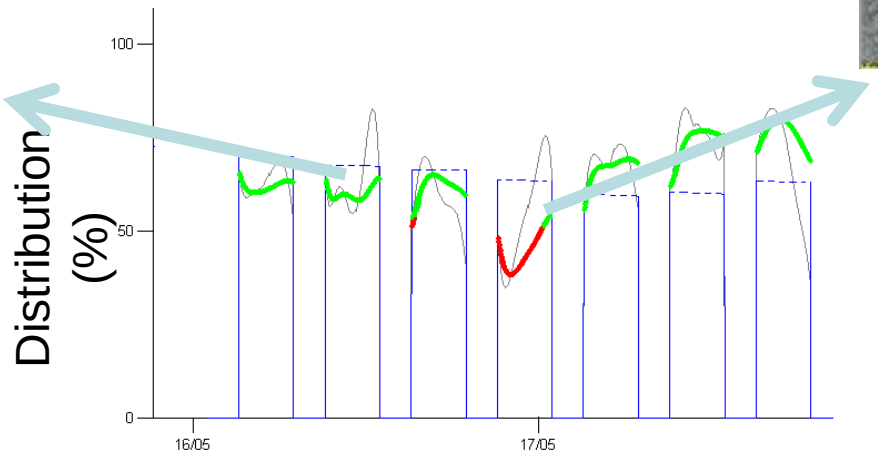


Event detection

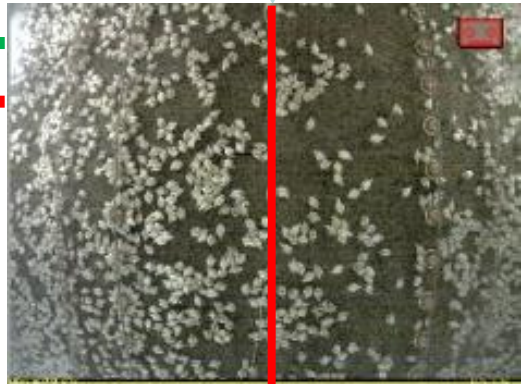
Feeder line

Normal situation

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

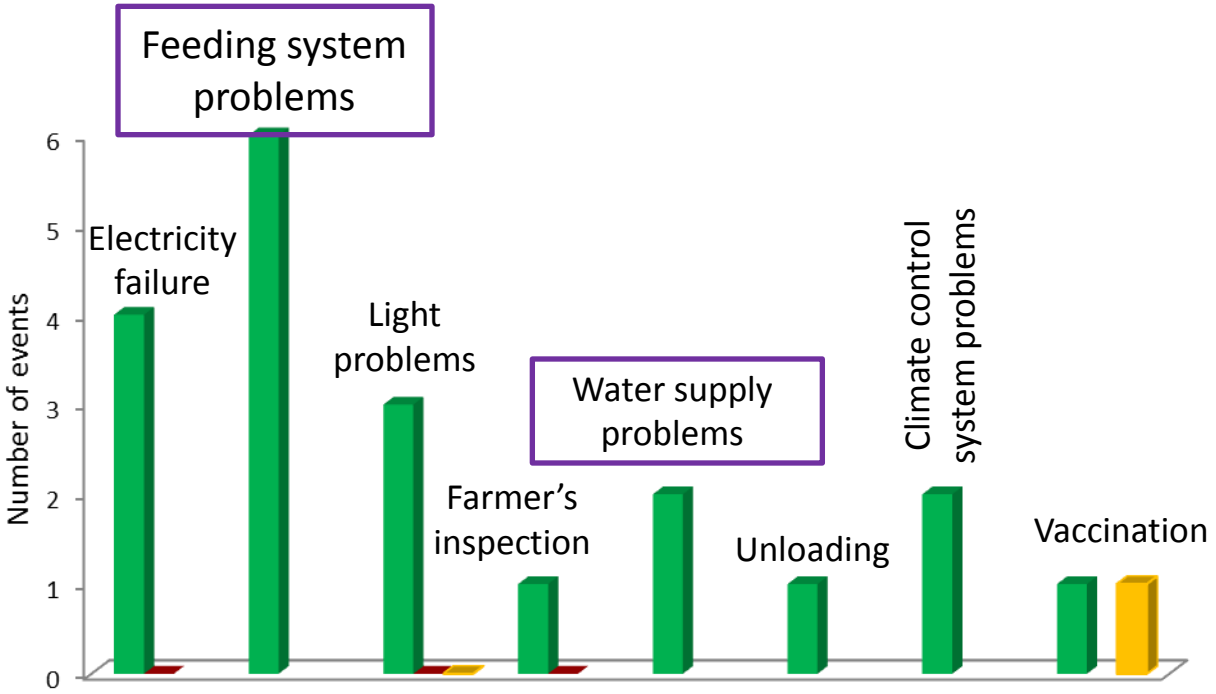


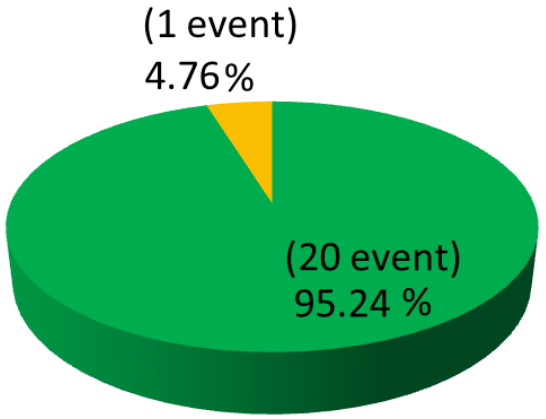
Defect Feeder line



Problem in feeding lines

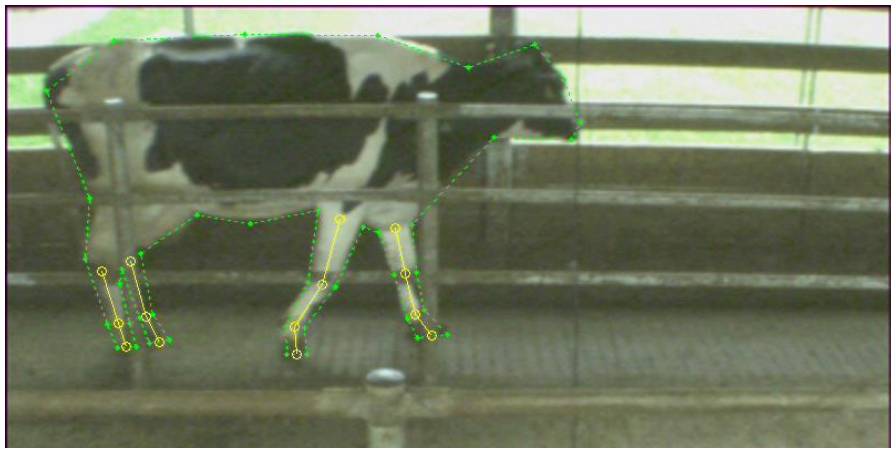
Detected events in the validation experiment over 42 days





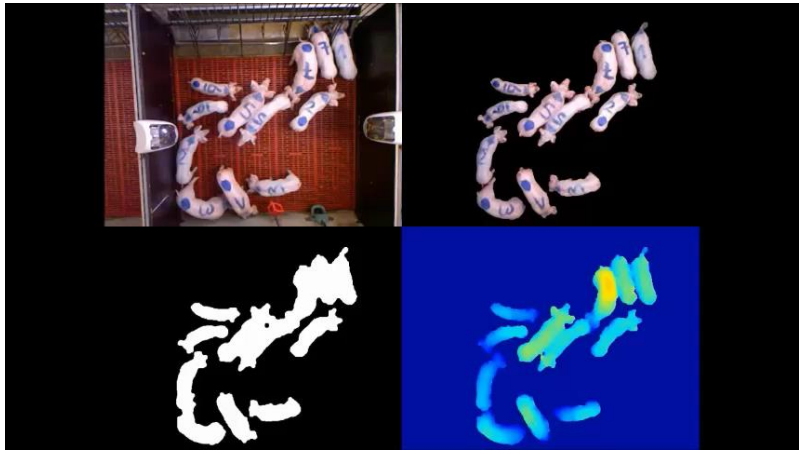
Conclusion: Events in a broiler house could be detected using top-view image analysis with an accuracy of 95.24 %

Cow lameness monitor: i.c.w. Volcani, DeLaval, Wur



Play

Aggression monitor: Umil, TIHO, Fancom BV



Play

Scratching behaviour: Ughent, ILVO

Play

Weight estimation: Fancom BV, Agrifirm

Play

Value Creation through Precision Livestock Farming

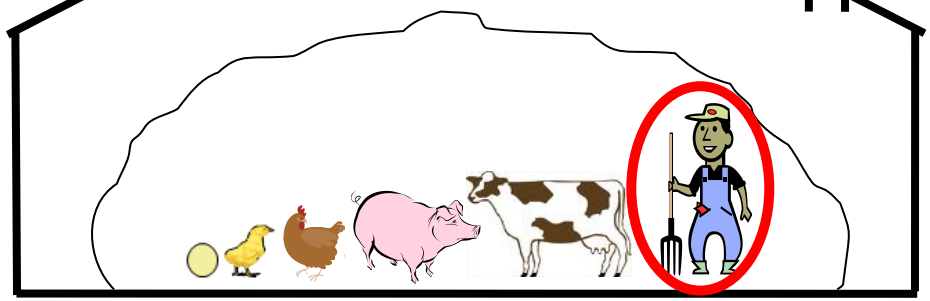
Value for farmer:

Welfare

Health

Environmental Impact

Euros

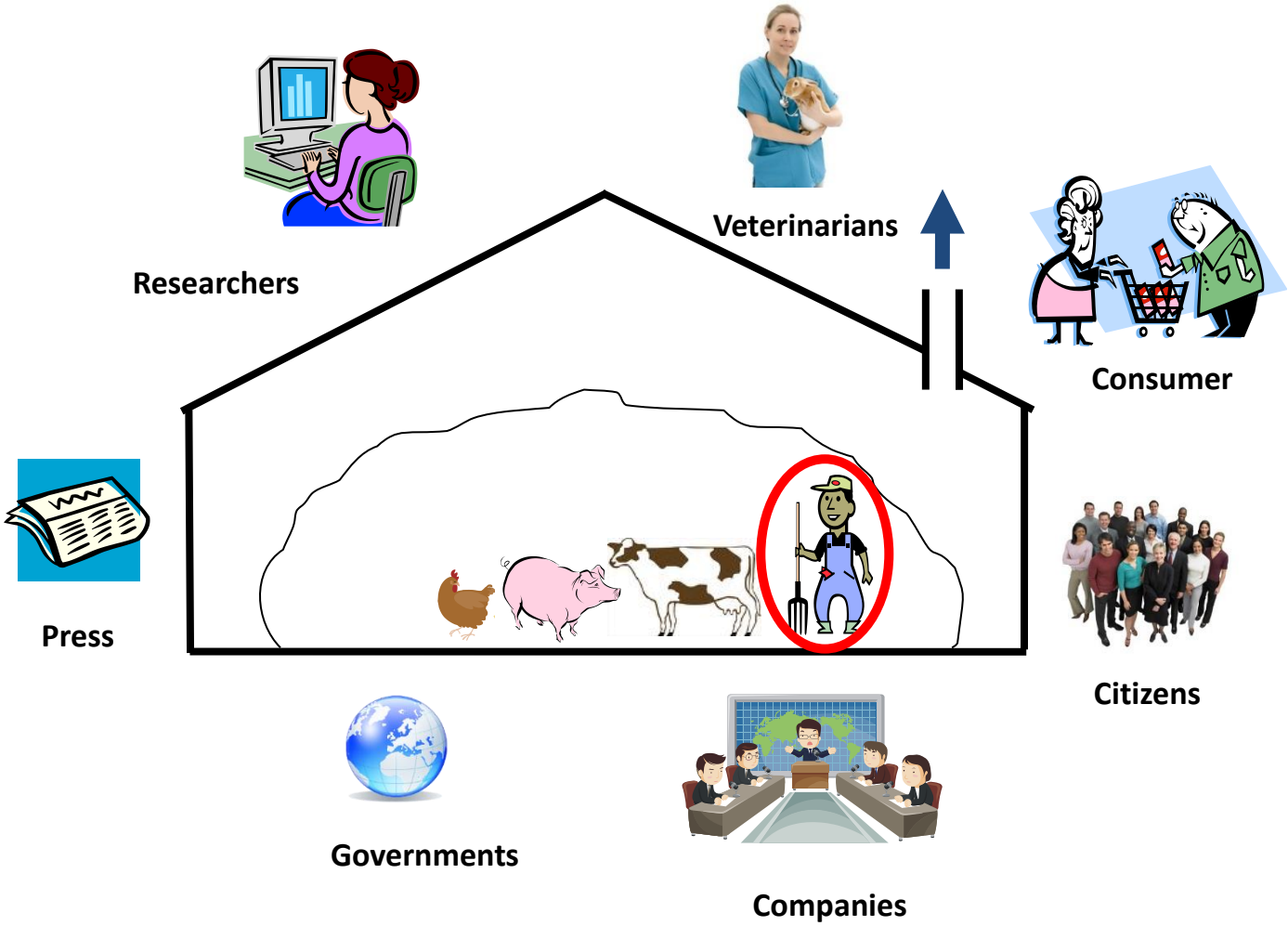


Labour and Time

Social Recognition

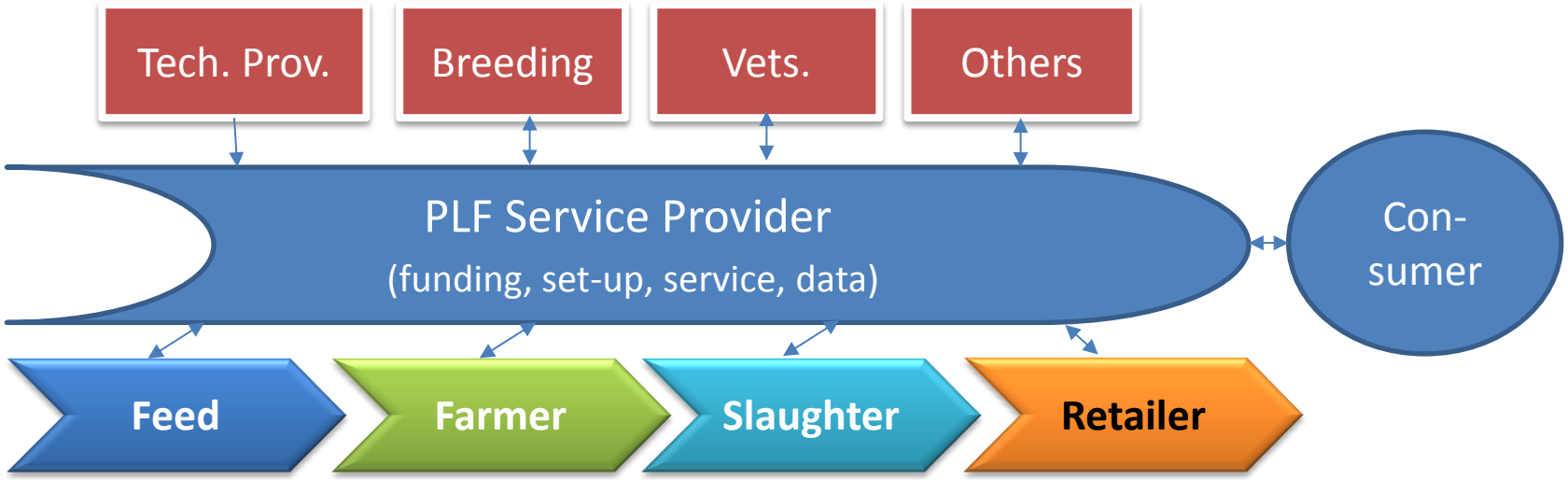
Consumer

PLF is a tool that helps farmers and stakeholders



The PLF Business Model

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



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!

7th European Conference on Precision Livestock Farming - ECPLF 2015, Milan - IT

15-18 September 2015

Organiser: Dr. Marcella Guarino

Acknowledgments and Disclaimer

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Thank you for your attention

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

Questions

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