Real-time monitoring of growing pigs

Thomas Nejsum Madsen
IQinAbox

- Bridges the gap between scientific research and modern pig production
- Work with universities, research organizations and suppliers to the pig industry
- Our aim is to increase productivity and animal welfare by better use of data
- We provide sensors and software for monitoring pigs

The leading team behind IQinAbox

Thomas Nejsum Madsen
Founder of IQinAbox and Ph.D in the field of Herd Management.

Nils Toft
Leading partner in IQinAbox, former Professor at DTU Veterinary Institute.
Software in pig production

- Monitoring – general trends in industrial production
- Experience from Industry 4.0 and Machine learning?
- Challenges with biological data
- Monitoring examples
- Merging several data sources
Internet of Things – new opportunities

Adopting Cloud for Internet of Things

Cloud

User application Dashboard

Internet of Things

Multiple Networks

Lighting

Product

HVAC

Vehicle

Bluetooth SMART

New opportunities
Industry 4.0 – the 4th industrial revolution

1st
Mechanization, water power, steam power

2nd
Mass production, assembly line, electricity

3rd
Computer and automation

4th
Cyber Physical Systems
Machine learning in industrial production

"Machine learning: the science of making computers make decisions without being explicitly programmed to perform the task"
Example: Vibrations on an industrial machine
Production unit - weaners
Water flowmeter
Water consumption per hour (7 days)

- 4–5 a.m.
- 5–6 p.m.
- 12 a.m.
A change in drinking behaviour

Change in behaviour

Day

Liter vand pr time
Forecast vs. observation

Change in behaviour

Liter vand pr time

Observeret  Model

Day
Software for monitoring water and feed consumption - challenges

- Pigs change drinking behavior as they grow
- Drinking patterns vary between herds / housing systems
- Research and modelling is based on data from very few test herds
- Expensive equipment for data collection
Dynamic estimation of daily gain

- Development project with Danish Crown
- Launched in DK september 2019

Check it out…
Example – batch production
Example of deviation weekly
Daily gain estimates converted to growth curves
Examples with different deviation in growth rate (30-110 kg)

- Feeding strategy
- Delivery strategy
- ‘Looser pigs’
Growth estimation based on feed intake

- Investigation indicates that growth rate can be estimated based on feed intake
- Need to know feed composition and continues feed consumption
New joint development project with researchers

- We use technologies from the production industry in combination with results from Herd Management research (e.g. PigIT)
- IoT based sensors
- Cloud based data analysis and Machine Learning
The concept
IoT – Farm monitoring, OEM

Feeding and ventilation equipment

IoT hub

Cloud

Output

Feeding and ventilation
User interface
Central alarm facilitation

Centralized surveillance
Modular IoT-box
Trial farms

- Establishment of 5 trial farms
- Test and experimental work with various sensor types
- Logbook on diseases and disorders
- Playground for new ideas
Measuring dry feed in silos
Complex and difficult to mount load cells on existing silos
Strain gauge sensors

• Sensors mounted on silo legs
• Measure compression on silo legs
• Converts signal to weight estimate
Load cells vs. strain gauge sensors

Load cell data

Strain gauge data
Growth estimation based on feed intake

- Studies indicate that growth rate can be estimated based on feed intake.
- Need to know the feed composition and the continuous feed consumption
Automatic Detection and Recognition of Pig Wasting Diseases Using Sound Data in Audio Surveillance Systems

Yongwha Chung 1, Seunggeun Oh 1, Jonguk Lee 1, Dahee Park 1, Hong-Hee Chang 2 and Suk Kim 3

1 Department of Computer and Information Science, College of Science and Technology, Korea University, Sejong 339-700, Korea
2 Department of Animal Science, Institute of Agriculture & Life Sciences, College of Agriculture and Life Sciences, Gyeongsang National University, Jinju 660-701, Korea
3 College of Veterinary Medicine, Gyeongsang National University, Jinju 660-701, Korea

* Author to whom correspondence should be addressed.

Received: 13 June 2013 / Revised: 16 September 2013 / Accepted: 22 September 2013 / Published: 25 September 2013

The Pig Cough Monitor in the EU-PLF project: results and multimodal data analysis in two case studies

M. Hemeryck1, 2, D. Bereckmans1, E. Vranken1, E. Tullo3, I. Fontana3, M. Guarino1 and T. van Waterschoot1

1 SoundTalks, Kapeldreef 60, 3001 Leuven, Belgium
2 KU Leuven, Department of Electrical Engineering (ESAT-ETC/STADIUS), Kasteelpark Arenberg 10, 3001 Leuven, Belgium
3 KU Leuven, Department of Biosystems, Division M3-BIORES: Measure, Model & Manage Bioreponses, Kasteelpark Arenberg 30, 3001 Leuven, Belgium

Department of Health, Animal Science and Food Safety (VESPA), University of Milan, Via Celoria 10, 20133 Milan, Italy
martijn.hemeryck@soundtalks.com
**Directional sound recognition**

<table>
<thead>
<tr>
<th>Cough</th>
<th>Pen</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Pen Image" /></td>
</tr>
</tbody>
</table>

- Cough: Indicates sound frequency or intensity.
- Pen: Indicates a microphone or sensor location.
IQinAbox

- cloud based data science