Pig cough monitoring in the EU-PLF project: first results

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Agenda

1. Introduction
   – Precision Livestock Farming

2. Materials and Methods
   – Pig Cough Monitor
   – EU-PLF

3. Results and Discussion
   – 3 cases

4. Conclusions
Precision Livestock Farming

- Stress factors traditional livestock farming
  - Global increase meat demand (population, net income increase)
  - Ethical & environmentally friendly (e.g. antibiotics reduction)
  - Economic incentives: economies of scale

- Hanton & Leach, 1981
  - Livestock farming as process control technology

- Berckmans, 2006: Precision Livestock Farming (PLF)
  - Farmer decision support
  - Animal at the center
  - Conditions:
    - continuous monitoring
    - prediction animal variables reliable wrt environmental changes
    - real-time integration measurements / algorithms
Pig Cough Monitor (PCM)

- **PLF**: acoustic monitoring of fattening pigs

- **Hardware**
  - Continuous recording
  - Robust to farm environment

- **Cough detection**
  - Sound acquisition
  - Event selection, feature extraction
  - Classification

**Embedded board in sealed enclosure**

**Cabling (mic / power)**

**Condenser microphone**
EU-PLF

- Aim: economic application PLF-technology

- Data collection
  - 60 pig fattening rounds
  - 10 farms over Europe
  - Quantitative: microphone (PCM), camera, …
  - Qualitative: batch metadata, welfare assessments, …

- Data combination
  - Here: first results
Cases

- 3 cases
  1. Comparison batch X, Y farm A
  2. Batch farm B
  3. Batch farm C
- PCM-data over duration of single batch
- Selection based on logbook info
- Cough index: number of cough groups / day
  - Cough group: cough < 5s apart (episodes)
  - Per day (daily occurring patterns)
  - Relative levels (number of animals unknown)
Case 1

Farm A Compartment X

Piglets entering (no pre-heating)

Cough-related relative increase

Date

Cough index

Case 1

Farm A Compartment Y

Cough index

Piglets entering (no pre-heating)

No increase

Date

Case 2

Farm B

Relative increase near end

baseline

Date

Mar 05 2013
Mar 19 2013
Apr 02 2013
Apr 16 2013
Apr 30 2013
May 14 2013
Case 3

Major power breakdown: ventilation failure

Long lasting effect!
Conclusions

- PCM allows PLF in real economic setting
- Here: first results of pig cough detection on 3 selected EU-PLF farms
- Effectiveness in practical setting
- Real added value: identification of issues
- Early warning system potential
- Further scientific and economic analyses required
  - Additional batch metadata
  - Different PLF-sensor inputs
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