Monitoring growth of identified and unidentified pigs using data from an automatic weighing system

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Large pen with walk-through scale – solutions are needed

- Max 400 pigs
- 40,000 - 60,000 BW observations
- 3 - 5 BW obs./pig/day
- Currently provides delivery strategy

Growth alarms?
Objectives of this study

- To construct a BW monitoring tool for growing-finishing pigs using the information from frequent BW monitoring
  - Individually identified pigs (alarms for the whole batch and individual pigs)
  - Unidentified pigs (raising alarms for the whole batch)
Material and methods – growth description based on historical data

\[ y_{ijt} = \text{Initial BW} + \text{BW gain} + \text{Daily fluctuation} + \text{Random variation} + \text{Measurement error} \]

\[ y_{ijt} = (\beta_0 + q_{0j}) + (\beta_1 + q_{1j})t + q_{2j}t^2 + (\beta_2 + q_{3j})\cos(wt) + (\beta_3 + q_{4j})\sin(wt) + A_{ijt} + \varepsilon_{ijt} \]
Material and methods
Univariate Dynamic Linear Model
Identified pigs

Observation equation:

\[ y_{ijt_n} = F_{t_n} \theta_{t_n} + \varepsilon_{ijt_n}, \quad \varepsilon_{ijt_n} \sim N(0, \sigma_{t_n}^2) \]

Design vector:

- Tracking time
- Indicating which parameters should be used

System equation:

\[ \theta_{t_n} = G_{t_n} \theta_{t_{n-1}} + w_{t_n}, \quad w_{t_n} \sim N(0, W_{t_n}) \]
Material and methods
Univariate Dynamic Linear Model
Unidentified pigs

Specific pig parameters were removed

Random effect of a pig was added to random residual – new error term
Material and methods – Alarms on growth

Forecast for $y_{ijt_n}$

Error = Observation - forecast

Standardization

Tabular cusum

Alarm
Results – alarms for identified and unidentified pigs
Results – alarms for individual

Pig nr 3622

Body weight, kg

02-03 02-17 03-02 03-16 03-30

Time, MM-DD

Raw data
Filtered mean

EAAP 2018
Conclusions

• A new solution for BW monitoring
• Flexible tool
• Batch level alarms on growth are possible with unidentified pigs
• The constructed tool should be tested and calibrated at a farm level
Want to hear more about our studies?

**PigIT closing conference** – 13.11.2018, Copenhagen

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