Faculty of Health and Medical Sciences

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

Anna H. Stygar[1,2] and Anders R. Kristensen[1]

[1]Department of Veterinary and Animal Sciences, University of Copenhagen

[2] Natural Resources Institute Finland (Luke), Bioeconomy and environment, Latokartanonkaari 9, 00790 Helsinki

anna.stygar@luke.fi

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?

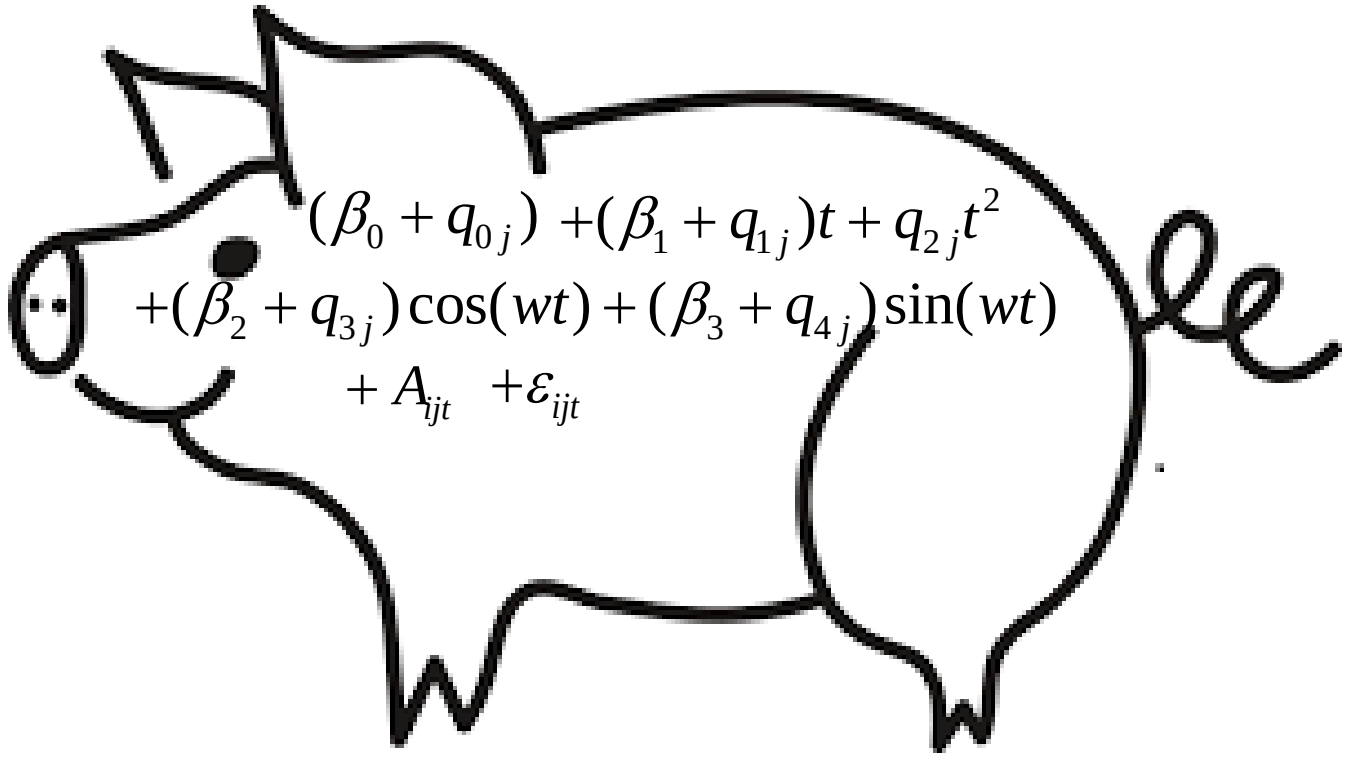
Objectives of this study

- 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

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

$$y_{ijt} = (\beta_0 + q_{0j}) + (\beta_1 + q_{1j})t + q_{2j}t^2 + (\beta_2 + q_{3j})\cos(wt) + (\beta_3 + q_{4j})\sin(wt) + A_{ijt} + \varepsilon_{ijt}$$

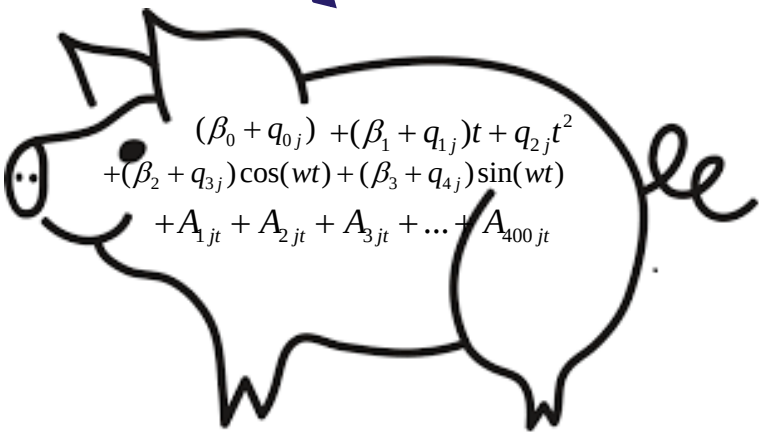


Material and methods
Univariate Dynamic Linear Model
Identified pigs

Observation equation: $y_{ijt_n} = \boldsymbol{F}_{t_n}^{'}\boldsymbol{\theta}_{t_n} + \varepsilon_{ijt_n}, \quad \varepsilon_{ijt_n} \sim N(0, \sigma_{t_n}^2)$

Design vector:

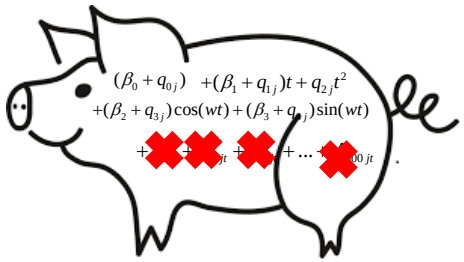
- Tracking time
- Indicating which parameters should be used



System equation: $\boldsymbol{\theta}_{t_n} = \boldsymbol{G}_{t_n}\boldsymbol{\theta}_{t_{n-1}} + \boldsymbol{w}_{t_n}, \quad \boldsymbol{w}_{t_n} \sim N(\underline{\boldsymbol{0}}, \boldsymbol{W}_{t_n})$

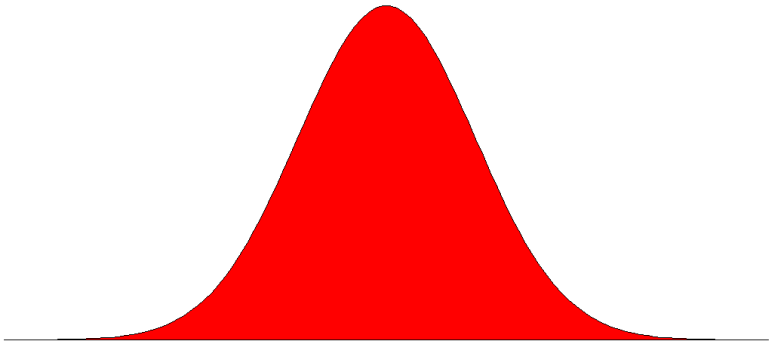
Material and methods
Univariate Dynamic Linear Model
Unidentified pigs

Specific pig parameters were removed



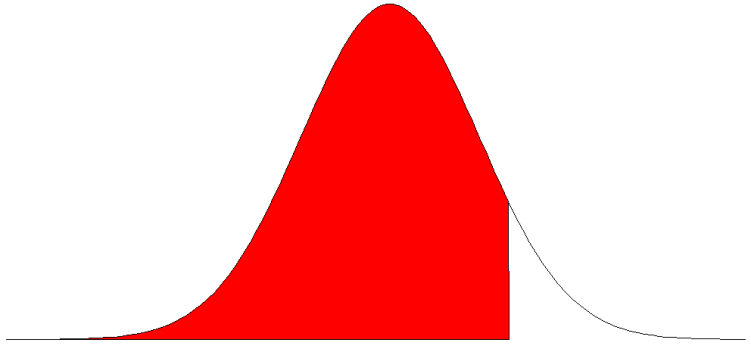
Random effect of a pig was added to random residual – **new error term**

Unidentified pigs- before the first delivery



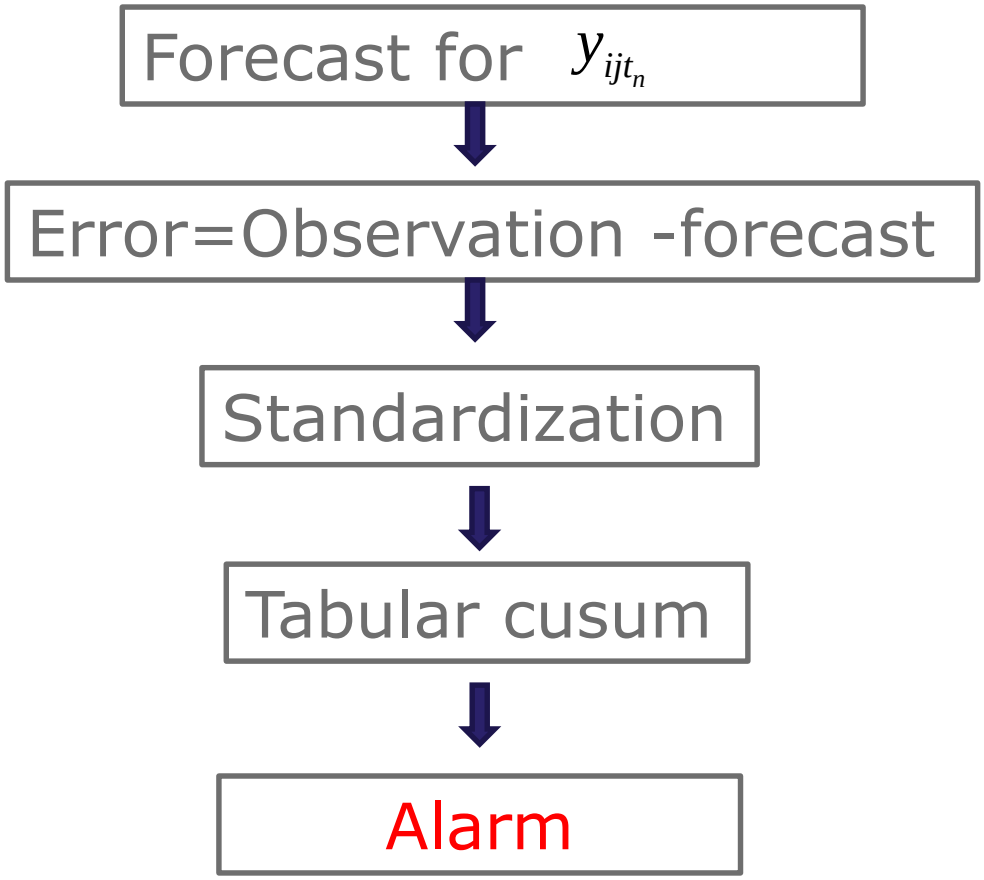
New error term

Unidentified pigs- after the first delivery

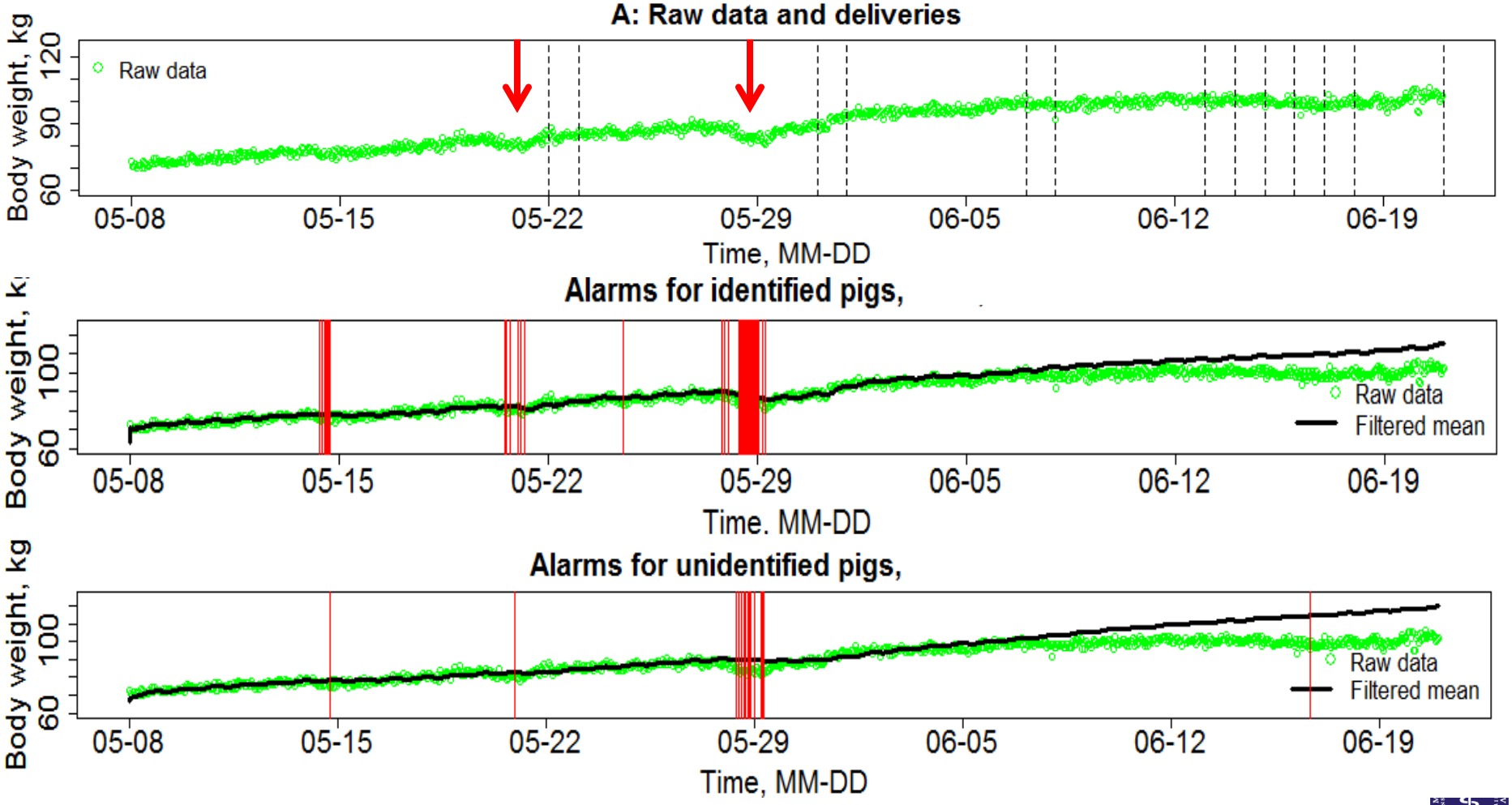


New error term

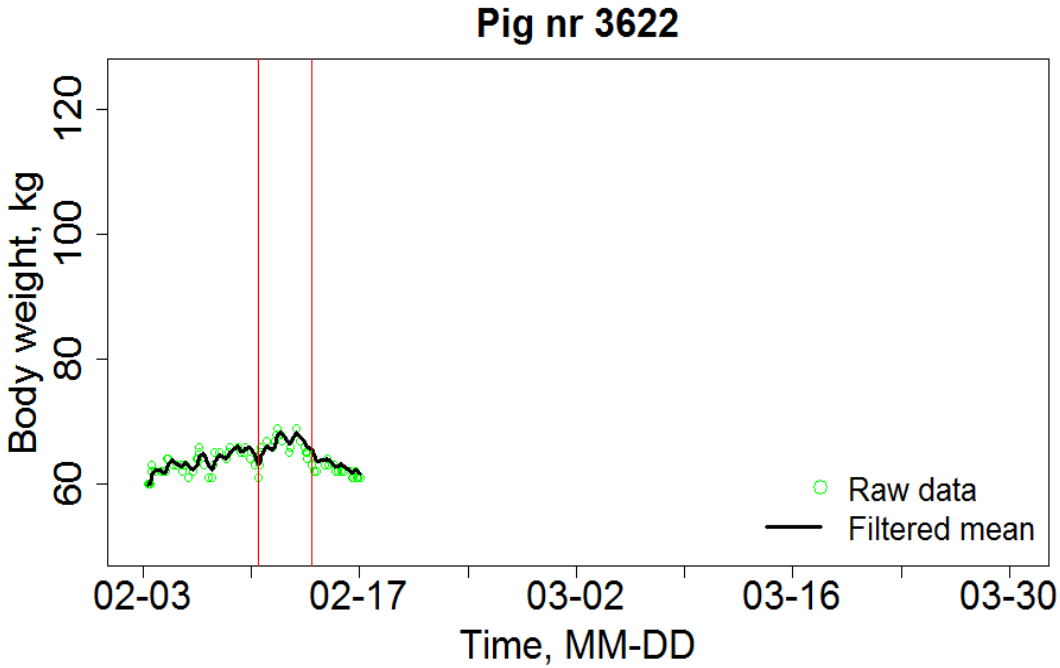
Material and methods – Alarms on growth



Results – alarms for identified and unidentified pigs



Results – alarms for individual



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

More info: Dan Jensen daj@sund.ku.dk
Anders Kristensen ark@sund.ku.dk

This research was supported by the Danish Council for Strategic Research
(The PigIT project, Grant number 11-116191)