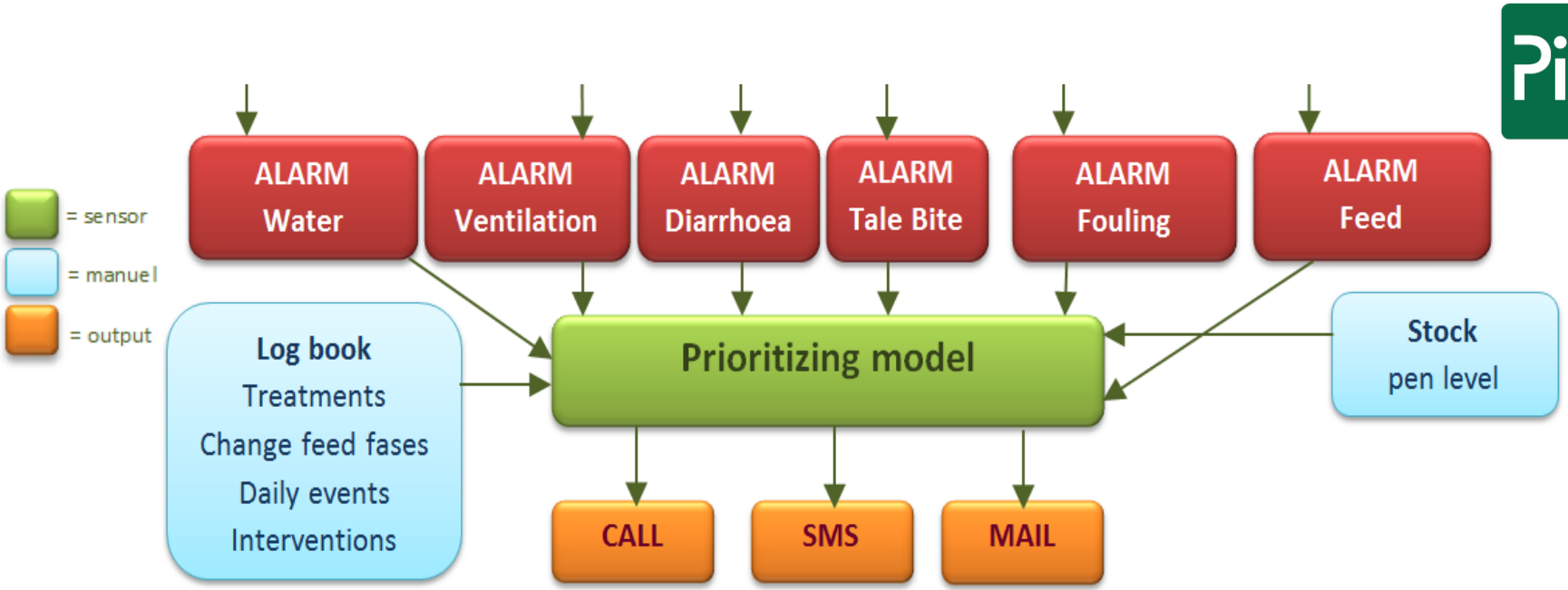
How performance impairs implementation - a review on performance of sensor-based automatic monitoring

Katarina Nielsen Dominiak
Department of Large Animal Sciences

PigIT

Background


PigIT
= sensor
= manuel
= output
ALARM Water
ALARM Ventilation
ALARM Diarrhoea
ALARM Tale Bite
ALARM Fouling
ALARM Feed
Log book
Treatments
Change feed fases
Daily events
Interventions
Prioritizing model
Stock
pen level
CALL
SMS
MAIL

Livestock production – major concerns

Optimal efficiency

Animal welfare

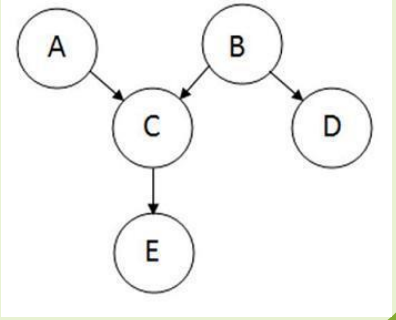
Observation 24/7 versus efficiency

Automatic monitoring 24/7

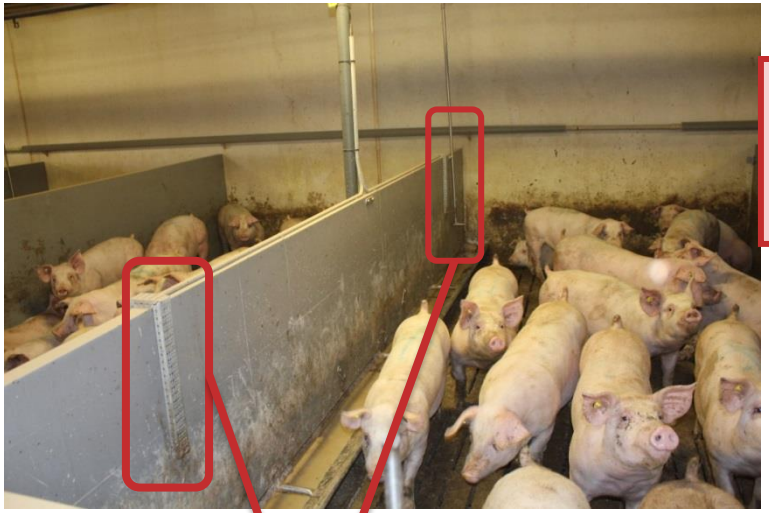
Sensors
Temperature
Water consumption

Normal pattern

Detection model



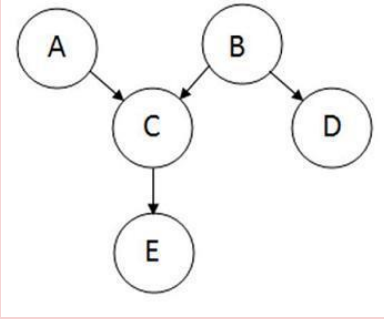
Automatic monitoring 24/7



Sensors
Temperature
Water consumption

Anormal pattern

Detection model



ALARM

True and false alarms

	Alarm	**No Alarm**
Case	True Positive (TP)	False Negative (FN)
No case	False Positive (FP)	True Negative (TN)

False Alarms

Performance = Accuracy

Sensitivity (SE):
Ability to correctly identify TP cases (sick animals)

SE = 80 %

Specificity (SP):
Ability to correctly identify TN cases (healthy animals)

SP = 99 %

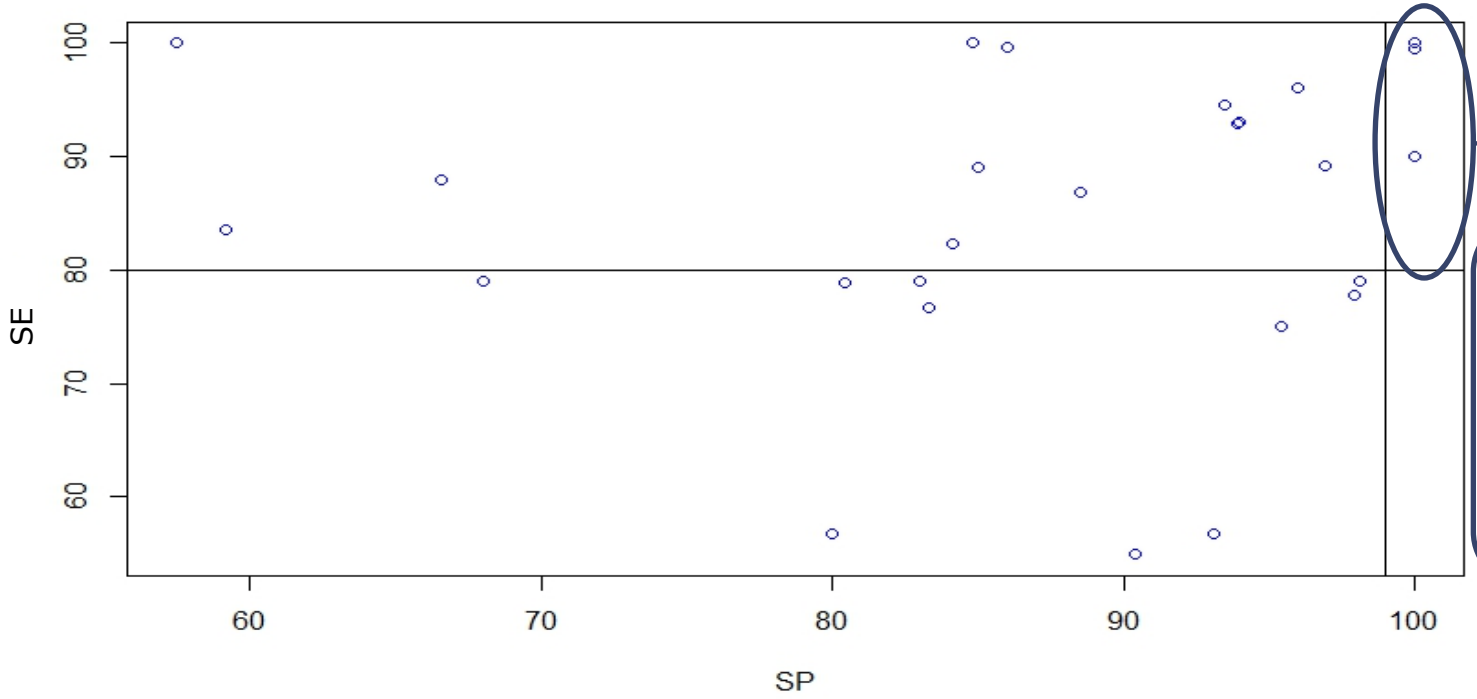
Review on methods for reducing false alarms

Aim:
To evaluate methods for prioritizing sensor-based alarms in livestock production in order to reduce the number of false alarms

Number of papers:
34 papers are included

Evaluation criterias:
Performance (minimum SE = 80% and SP = 99%)
Otherwise implementable

Performance distribution



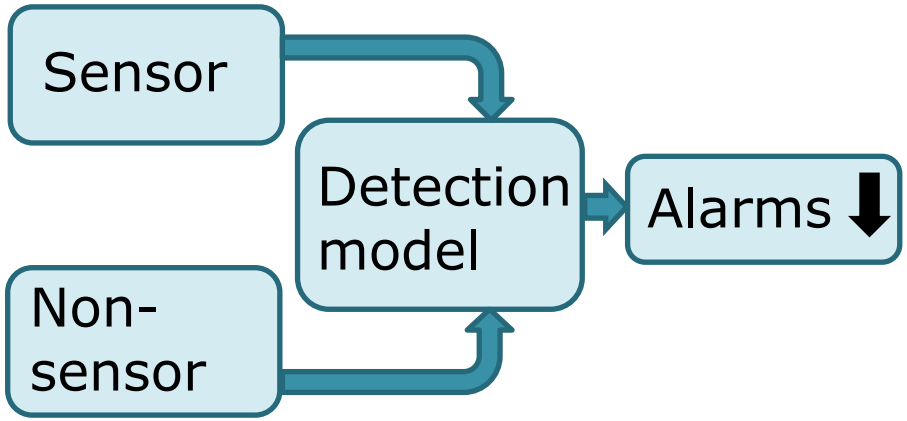
Three papers

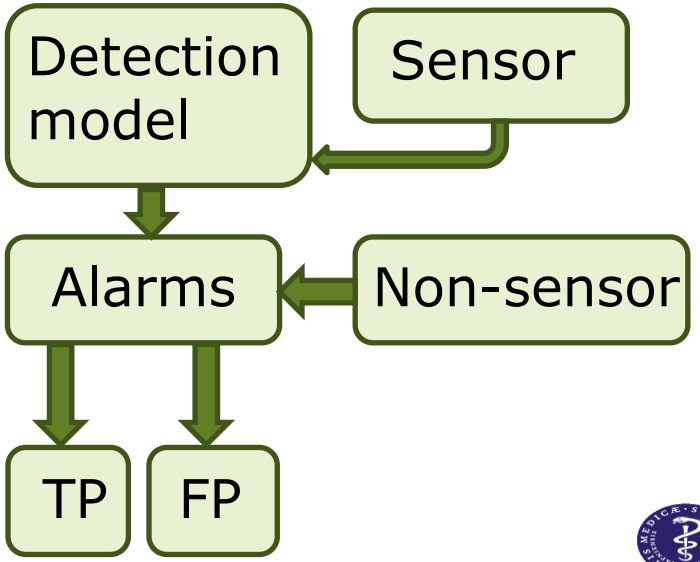
But still not implement-able

Alternative approach - prioritization

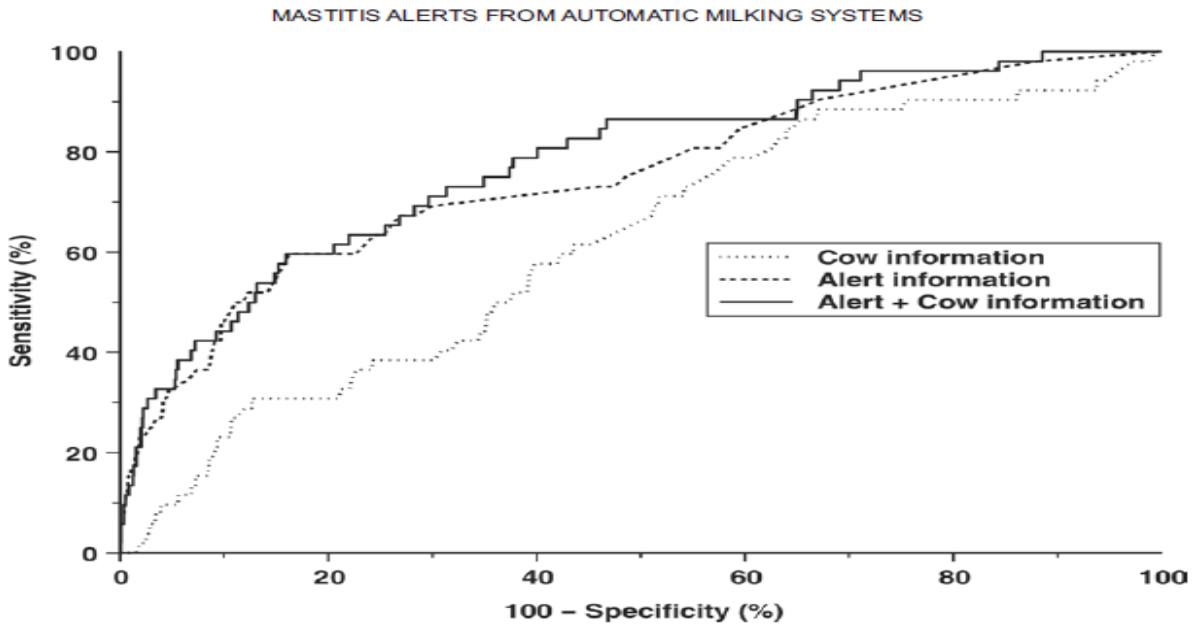
Combine sensor data with non-sensor data (additional information)

- Animal specific (age, illness-history, high-risk period in cyklus)
- Herd specific (prevalence of illness, level of management, risk-attitude)
- Non specific (season of year, geography)





Prioritizing method – Naive Bayesian Network



Steeneveld *et al.* 2010

Review - conclusions

For 20 years a satisfying performance has been sought for - but the quest has not been fulfilled

Combining sensor- and non-sensor data generates highest performance

Reducing false alarms through prioritization deserves more attention in future research

Thank you

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knd@sund.ku.dk