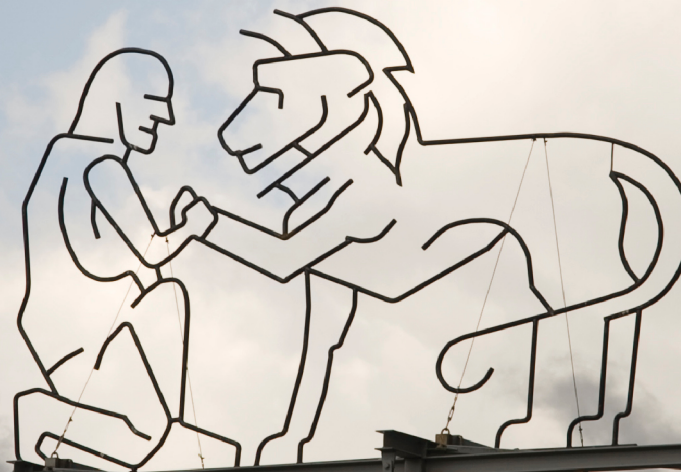




Universiteit Utrecht

- **Faculty of Veterinary Medicine**
- Department of Farm Animal Health



**When does the cow calve,
could a sensor tell us?**

- C.J. Rutten, W. Steeneveld, C. Kamphuis, K. Huijps and H. Hogeveen



Importance of calving

- **Dystocia (up to 1/3 of calves, Barrier et al., 2013)**
- **Calve mortality**
- **Cow health**





Sensor technology

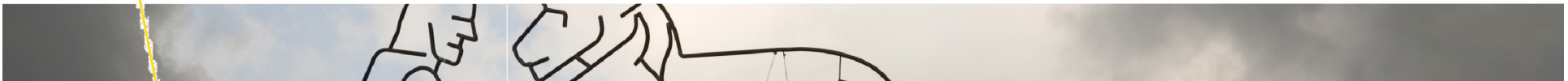
- **Many application: oestrus, mastitis, lameness etc.**
- **Not applied on calving moment**
- **Sensors for activity and rumination already in use.**
- **Is an extra application possible?**





Main question

- **Can sensor data be used to give a more precise prediction of when a cow will start calving?**





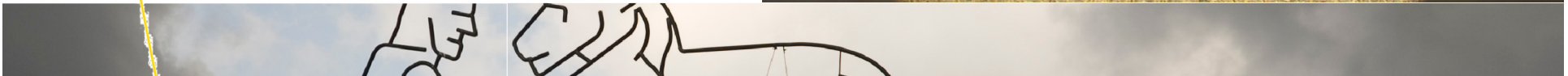
Data collection

Two farms

583 cows

110 calvings

Camera in calving pen





Moment of calving

Start of calving first image on which cow visably starts calving





Sensor

Agis Sensoor

Eartag

Measures: rumination, feeding, activity, highly active, not active and temperature





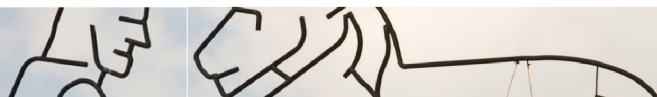
Data preparation

Expected calving dates calculated

Insemination date + 280 days

Independent variable

days to expected calving





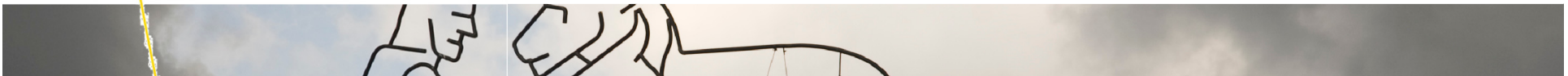
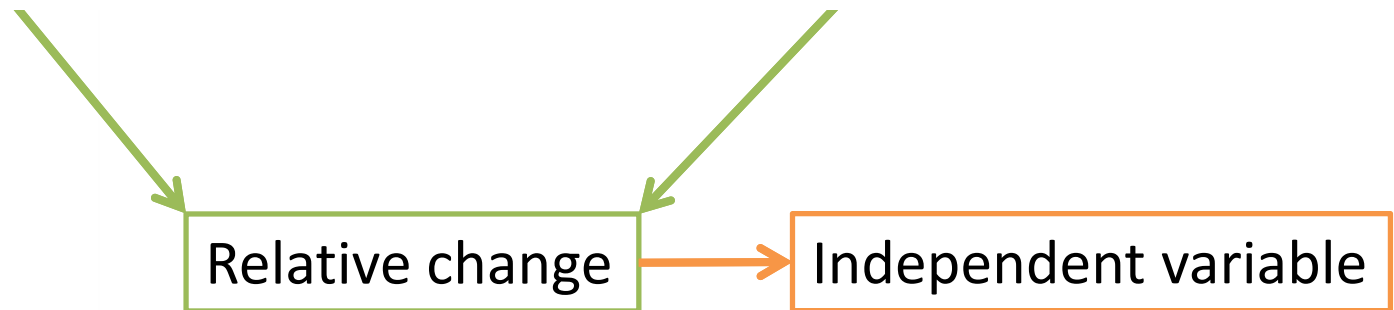
Data preparation

Calculated for:

- Ruminating
- Feeding
- Highly active
- Not active
- Temperature

=

:

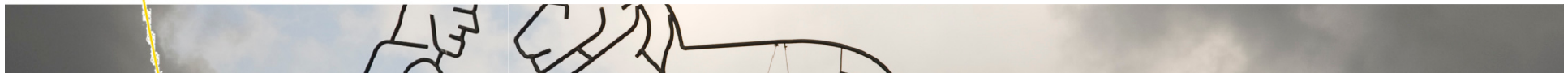




Data preparation

Sensor data selected from:

7 days before the moment of calving up to the moment of calving.





Logit model

Two models

Model 1:

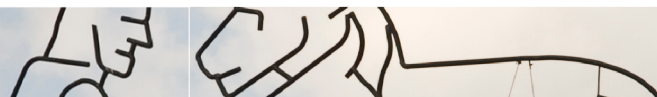
Dependent: Hour in which calving started

Independent: The days to expected calving date

Model 2:

Dependent: Hour in which calving started

Independent: The days to expected calving date,
Relative change in: Ruminating, Feeding,
Highly Active, Not Active and Temperature

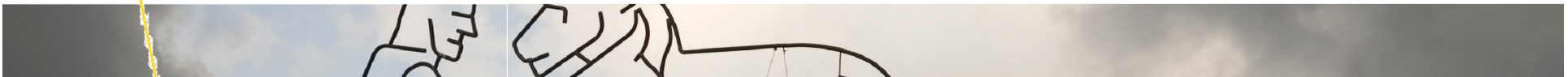




Logit model

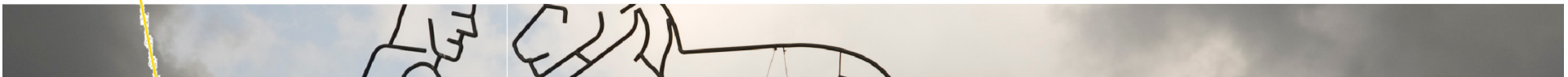
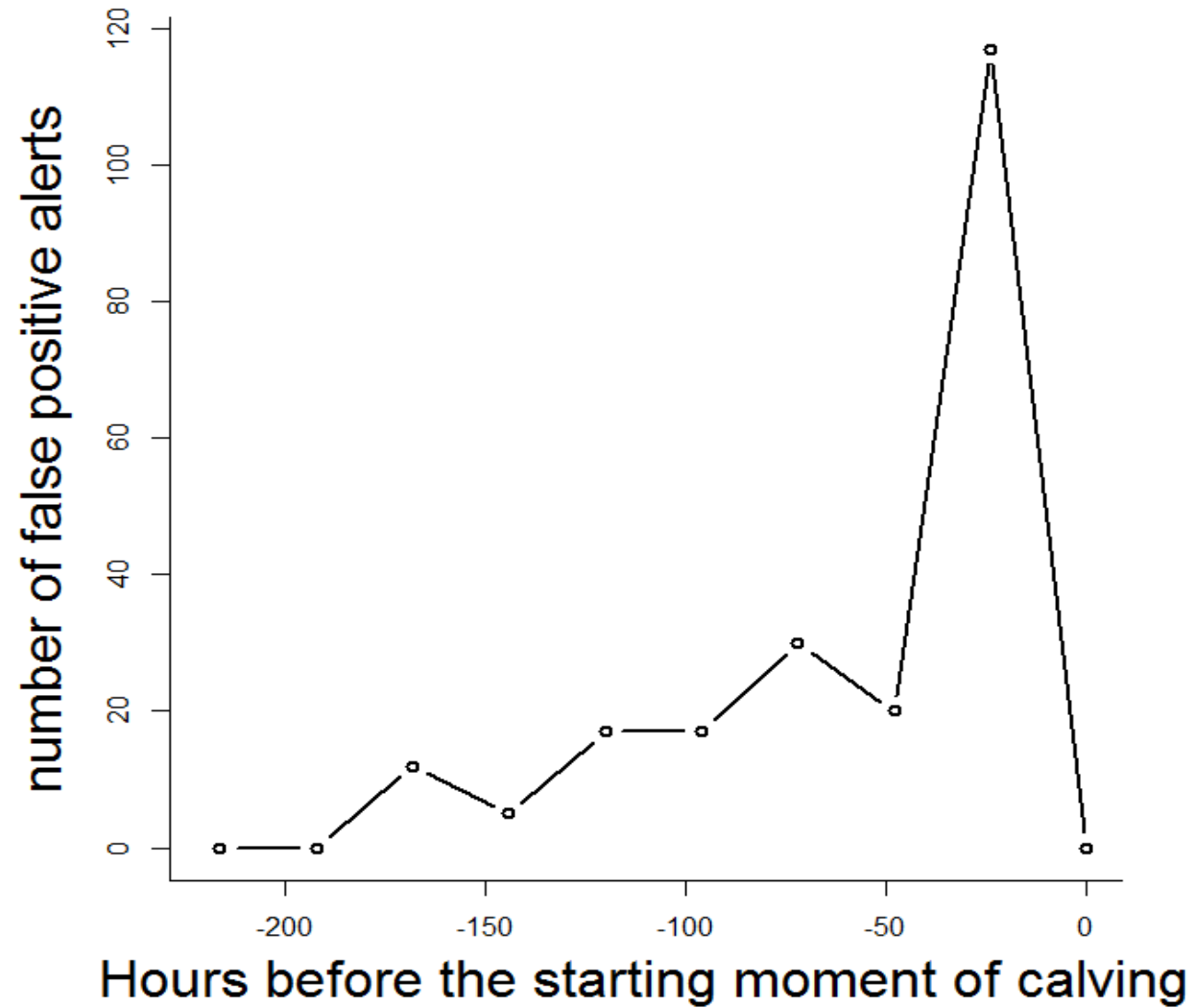
Result logistic regression

	Sensitivity	Specificity	AUC
Model 1	22%	90%	0.682
Model 2	69%	90%	0.878





False positive alerts



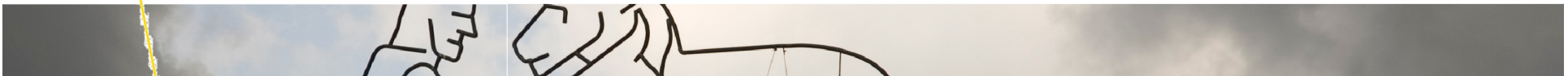


Discussion

No independent validation

Many missed cases and false positive alerts

More relaxed time window could be an option

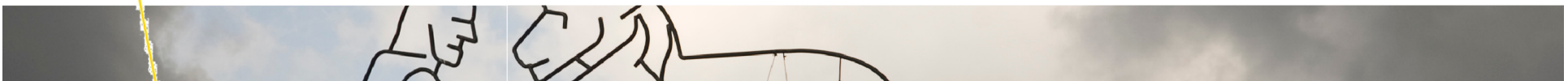




Conclusions

Potential to predict moment of calving with studied sensor

Current model needs refinement





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Thank you for your
attention!