

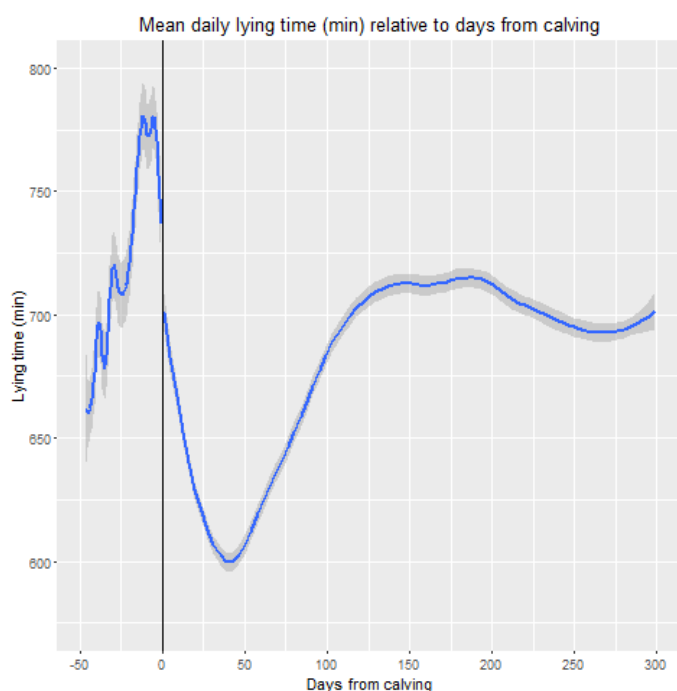
Towards life-long sensing of dairy cow behaviour using accelerometers

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During the last decade, the use of accelerometers for heat detection and measurement of other types of dairy cow behaviour has increased considerably, not just for research purposes, but also for management purposes on commercial farms. Leg-mounted IceQube[®] accelerometers (IceRobotics Ltd, Edinburgh, UK) measure lying time (LT), number of lying bouts (LB), number of steps (Steps) and Motion Index (MI, an expression of overall leg activity) of cattle automatically. So far, automated data collection has typically focused on the lactation period, because of easy data download at each milking. Thus, automated sensor data from the dry period is lacking or at best scarce. As part of the Dairy Animal Sensor Integrated Engineering (DASIE) project funded by Innovate UK, around 100 Holstein Friesian dairy cows at Harper Adams University have worn IceQube[®] accelerometers for a varying period between August 2014 and present day, primarily collecting data from the lactation period. Additionally, dry period data were collected for some cows via an antenna in the dry barn. This study aimed to describe cow behaviour during the lactation as well as the dry period. Using data collected from the right hind leg starting late August 2014 to late July 2016, mean daily LT, LB, Steps, and MI was calculated for days of more than 10 observations. For plotting, data were smoothed using the loess function in R-package ggplot2. The figure shows the development of mean lying time across lactation and dry period, revealing distinct periods of very different levels of lying time, such as the peak prior to calving and the nadir about 4 weeks after calving. If the sensor is attached at first calving, the current battery life of five years allows for continuous data collection throughout five consecutive lactations. In conclusion, given that data collection infrastructure is also present in the dry barn, IceQube[®] accelerometers enable life-long real-time sensing of dairy cow behaviour, including the dry periods.



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