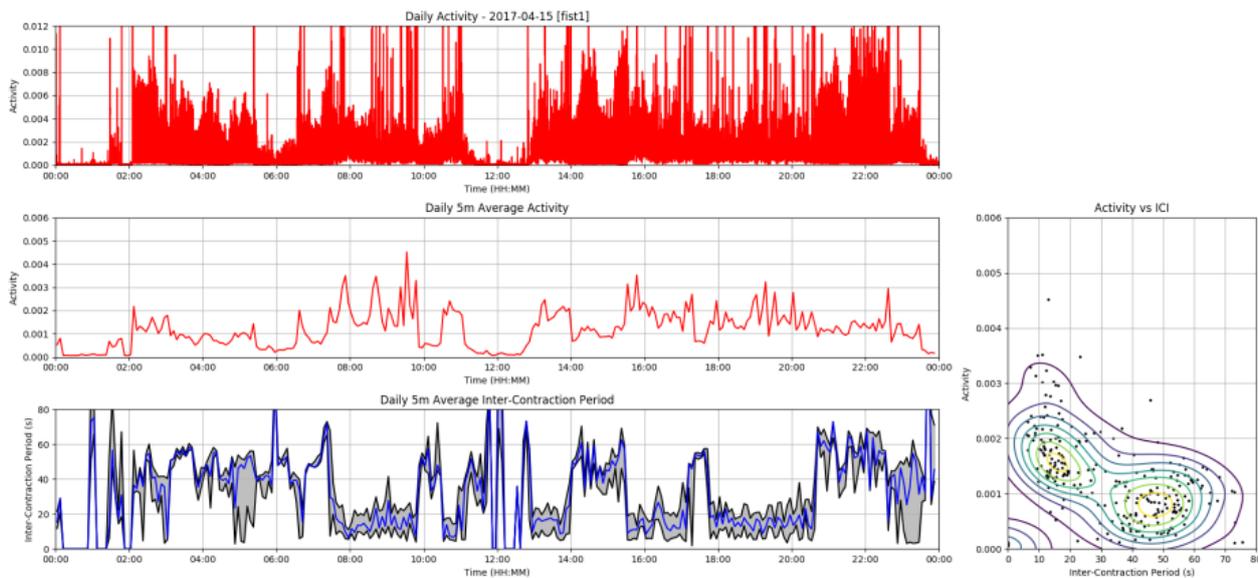


Rumination Detection in Dairy Cattle Using Acceleration Based Bolus Sensors

Andrew Hamilton, Chris Davison, Ivan Andonovic, Craig Michie

University of Strathclyde, (204 George Street, Glasgow, Scotland) andrew.w.hamilton@strath.ac.uk

Behavioural changes in dairy cows are strongly correlated to health issues which has led to the development of a variety of sensors and analysis techniques to monitor these variations. Bolus sensors located in the reticulum of the cow's digestive system are used to monitor pH and temperature, whilst accelerometer based sensors for monitoring eating and other activity have generally been confined to external collars or leg tags. New bolus sensors are now available with accelerometers included with the intention of monitoring behaviour such as eating and rumination from within the digestive system. This paper presents a method of classifying the behaviour of a dairy cow through the analysis of bolus-based accelerometers. The animals used in the trial were 6 Holstein dairy cows that had been fitted with a cannula to the reticulorumen. The cannula allowed the inspection of the contents of the rumen for other research purposes and the recovery of the bolus sensors from the reticulum. The management and monitoring of the animals throughout the trial was conducted by qualified veterinarian staff, including the oral insertion and retrieval of the sensors. A total period of 9 weeks monitoring was used during which challenge events in the form of dietary changes were introduced for 2 one week long periods where an increase in starch or sugar content aimed to disrupt the rumination behaviour of the animals. It was found through analysis of the inter-contraction-interval (ICI) and the derived activity measure of the animal, it was possible to generate 2 states of behaviour. One of the states was found to correspond to typical rumination behaviour whilst the other classed all other behaviour as one. Further work will aim to refine this classification method to accommodate other changes in the animals' dietary intake.



Acknowledgements

This article is based upon work from COST Action FA1308 DairyCare, supported by COST (European Cooperation in Science and Technology, www.cost.eu). COST is a funding agency for research and innovation networks. COST Actions help connect research initiatives across Europe and enable scientists to grow their ideas by sharing them with their peers. This boosts their research, career and innovation.