

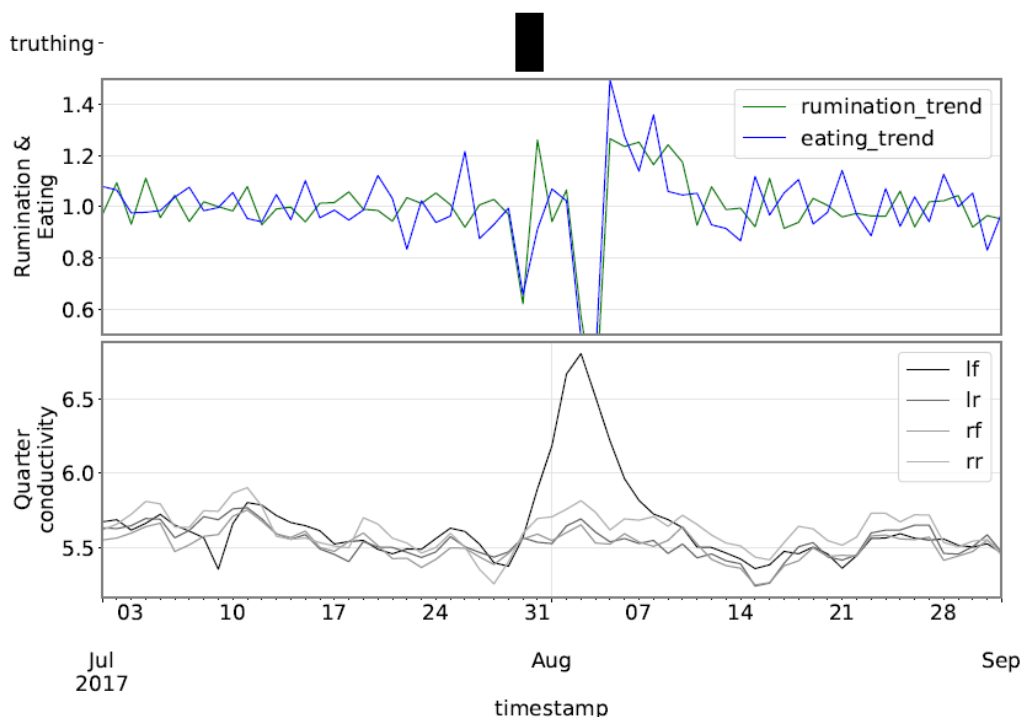
## Early Detection of Mastitis in Dairy Cattle through Sensor Data Combination

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Within the past 20 years, digital technologies have become an increasingly relevant tool within agriculture. Low cost sensors, enabled with wireless communications, allows for rapid and widespread deployment of measurement systems that provide support for farm operations. Much of the focus has been the development of independent systems, however there exists significant potential to combine information from multiple sensor modalities to obtain greater insight on animal welfare.

172 milking cattle were equipped with neck mounted activity collars (Silent Herdsman), which provide oestrus detection as well as eating, rumination, and inactivity time budgets. This information was integrated with four quarter conductivity and milking visit variation from robotic milking units (Fullwood Merlin2). These measurands have been shown individually to relate to animal welfare events such as oestrus, lameness, and/or illness. We present here a study on whether a combination of the above measurands would facilitate early detection of mastitis, enabling automatic intervention (for example increased milking frequency) before clinical signs being visible to a skilled farm operative. 32 cases of mastitis were detected over a 9 month period from March 2017 to December 2017. Each of these cases was correlated with data from the robot milker for a period of one month before and after the observed mastitis event. The data was analysed to assess how far in advance of skilled operatives could each measure and detect the instance of mastitis. By combining measurands, it was possible to detect 75% of cases in advance of the herdsman. Furthermore, in 72% of the cases, changes to eating and rumination alerted a welfare issue before changes in milk conductivity. This evaluation provides validation that combining currently separate on-farm systems and sensors can provide earlier detection of mastitis than skilled herdsmen.



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