

# Using animal behaviour to detect disease in cattle



## The Challenge

Disease is a major cause of poor animal welfare, loss of productivity and low efficiency on dairy farms. Many diseases are endemic, but if we were able to detect disease early, this would reduce the impact on the welfare of the affected animal, transmission of the disease to pen-mates, use of antibiotics and lost earnings for the farm..

## The Research

It is well-recognised that ill-health in animals and humans is accompanied by changes in behaviour, such as loss of appetite and lethargy. A study by Gonzalez et al (2008) using data from the Langhill herd at Crichton Royal Farm was one of the first studies to show that changes in behaviour could be used in an on-farm setting to detect disease. Data from the Langhill database on feed intake patterns was coupled with cow health records. Further work had been done to determine whether changes in feeding behaviour and activity can be used to detect respiratory disease in calves.



## The Results

The analysis from Gonzalez et al (2008) showed that lame cows ate for a shorter time each day, ate more quickly and had fewer feeding bouts. These changes were evident in the feeding patterns before the farm staff had identified that the cow was lame. Similarly, the study of feeding behaviour and activity in calves showed that calves with respiratory disease spend more time lying down each day and had longer lying bouts. They also spend less time feeding and had fewer visits to the feeder. Importantly, these changes were also evident 1–3 days before the clinical signs were observed. A machine learning technique was used to produce an algorithm to predict disease in calves from these data sources.

## The Impact

Interest in the use of technology to aid cow management has risen in recent years. This is driven by increases in herd size, reductions in farm staffing and a willingness by farmers to improve farm efficiency and animal health and welfare. The availability of technology that can detect changes in the behaviour of individual animals and process that data in a timely manner has also become more cost effective and available for use on farms.

The results of the studies on behavioural changes and disease has provided clear evidence on which to base computer algorithms that detect disease in commercial products. SRUC has been involved in a number of these studies.

## The Future

The use of sensors to detect behavioural indicators of disease is a developing field. Other changes in behaviour that may indicate illness will be explored, as well as how individual animals differ in their response to disease. This will be coupled with further developments in sensors and data analytics that are capable of detecting these changes. These innovations are necessary to produce disease detection systems aimed towards individual animals with the high level of accuracy that farmers require. Early detection of disease will improve animal health and welfare. It will reduce animal mortality and morbidity, thereby improving farm sustainability and reducing environmental impact.

## Additional Information:

### Publications:

Gonzalez, L.A., Tolkamp, B.J., Coffey, M.P., Ferret, A. and Kyriazakis, I., 2008. Changes in feeding behavior as possible indicators for the automatic monitoring of health disorders in dairy cows. *J. Dairy Sci.* 91:1017–1028.

Bowen, J.M., Miller, G.A., Mason, C., Bell, D., Haskell, M.J. and Duthie, C-A. 2019. Monitoring of activity and feeding behaviour for early detection of respiratory disease in pre-weaned calves. *Proceedings of the British Society of Animal Science, 75th Annual Conference.* Edinburgh. 9–11 April 2019

Duthie, C-A, Bowen, J.M., Miller, G.A., Bell, D., Mason, C., and Haskell, M.J. 2019 Feeding behaviour and activity as early-indicators of disease in pre-weaned dairy calves. *Proceedings of the British Society of Animal Science, 75th Annual Conference.* Edinburgh. 9–11 April 2019

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