

# Validating accelerometer technology to detect play behaviour in weaned dairy calves

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## Relevant sector

- Calf health
- Welfare
- Precision livestock technology

## Objectives

Animal welfare is an increasingly important subject that is gaining interest not only from veterinarians and scientists, but also from consumers. The public drive for higher welfare standards has increased the need for research to better understand the needs and nature of animals. Play behaviour is commonly observed in young animals and may be adversely affected by negative experiences. Thus, play can be regarded as an indication of a positive welfare state. Observational methods of recording animal behaviour can be labour intensive and impractical for studies of long duration. The increase in commercially available accelerometer technology has allowed for detailed analysis of animal behaviours in a more efficient manner than continuous visual observations. Accelerometers have been validated for detecting play behaviour in newborn ( $\leq 48$  h old) dairy calves but not in any other age group of cattle. The objective of this study was to determine the ability of accelerometers to detect play behaviour in older calves (3 to 5 months old), with a particular focus on motion index (MI) – a proprietary measure of overall animal activity (IceTag, Peacock Technology, Scotland).

## Materials and methods

Eight weaned female Holstein-Friesian calves (age  $118 \pm 16$  d) were recruited from a 50-cow dairy herd in central Scotland. Calves were housed in a straw-bedded group pen of up to ten calves and had *ad libitum* access to water, concentrate pellets and straw. Accelerometers (IceTag, Peacock Technology) were attached to one hindlimb of each calf for a 48-hour period. Sensor data were downloaded in 15-min intervals at the end of the recording period. These devices measure acceleration forces which occur during animal movements and output a variety of activity data including step count, lying times and a measure of overall activity termed “motion index (MI)”. Calf behaviour was filmed continuously over the same 48-hour period using two cameras providing an unobstructed view of the calf shed. Behavioural analysis was conducted using one-zero sampling to identify the presence (1) or absence (0) of play within each 15-min interval corresponding to the IceTag data output. Visual observations and MI data were compared and formatted in 2x2 contingency tables for the calculation of the sensitivity (Se), specificity (Sp) and balanced accuracy of different MI thresholds to detect the presence of play.

## Results

The number of 15-min intervals in which play events were recorded varied between calves and ranged from 9 to 39 (median 26) over the 48-hour recording period. The median MI was 6 (range 0 to 2343). The MI threshold which best correlated with visual identification of play behaviour was  $MI \geq 69$  (sensitivity = 94.42%; specificity = 93.60%; balanced accuracy = 94.01%).

## **Conclusions**

The results of this study suggest that IceTag generated MI data can be used as a more time efficient alternative to visual analysis to detect play behaviour in weaned dairy calves. This technology can be implemented as a research tool in comparing play, an indicator of positive welfare states, in weaned dairy calves across different management systems.