LOCATION

Ireland

PARTNERS

4.3

Proactive Milk Quality Control

CHALLENGE

Traditional farming involved management systems based on direct observation of animals and intuitive decision making by the farmer. Larger animal numbers and reduced available time of the farmer have necessitated changes, potentially resulting in less available time to observe and detect welfare and health issues of individual animals. At the same time, societal expectations are increasing in terms of animal well-being and animal health. Thus, it is necessary to develop alternative mechanisms to predict welfare and health issues.

AIM

This pilot aims to integrate animal behaviour and physiological data into a welfare and health scoring framework with progression to a reference system to increase animal wellbeing standards on dairy cow farms.

HOW

The use of different indicators and technological sensors will enable a large number of measured variables to be recorded, the integration of which information will allow very strong robust prediction models to be established. Biochemical tests will also be conducted to confirm health status. Thus the IoT will be used in establishing a farming system that will (a) predict when an animal is not "functioning" properly; (b) establish a target that e.g. 95% of cows had no significant issue throughout their lactation; and (c) satisfy claims of the wellbeing of animals.

BENEFIT

The development of such a system using precision technologies will provide real benefits in profitability and an improved system by providing informed, real-time solutions to the farmer. Such solutions will be delivered in ways that are comprehensible to the farmer. The pilot will result in improved dairy cow health and well-being through an early warning system, meaning early intervention during health/welfare challenges. Documentation, enabled by data capture, analysis and record keeping developed in the pilot will allow transparency in animal health and welfare status and management on-farm. It will also help achieve national objectives around continuous quality assurance and better welfare standards for cattle.

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DEMETER Integration

Pilot 4.3 used three key technologies in the project. The SMARTBOW was a commercial ear tag that allowed the monitoring of dairy cow behaviour including rumination, activity and lying behaviours. A key innovation was development of a novel sensor or point-of-care test for determining milk analyte concentrations with the potential to allow the identification of cow health conditions in early lactation. Individual animal health data were also recorded by farm personnel using the Uniform-Agri database. UNIFORM-Agri was a commercial platform that allowed the recording of animal health problems, treatment of health issues, body condition score, and milk production data.

Feedback From Farmers

The key engagement was with the farmer on whose farm the 'proof of concept' data was collected. While this farmer successfully used milk recording data and behaviour data, cow health conditions were not observed to influence the milk analyte concentrations in the biosensor. As this was to be a key data source for the solution, it was not possible to engage with a large group of farms on the biosensor. Also, the digital behaviour sensor was discontinued during the project and thus proved difficult to install on farms. However, engagement with the farmer community and other stakeholders has taken place by sharing our work through social media, blog articles, external presentations, and conferences.

Outcomes

One outcome may be represented through knowledge acquisition of a new technique to create multiplex electro-chemical sensors using milk and blood as substrates. Relationships between milk biomarkers and extra-mammary health conditions were not observed in this study, but a second outcome, in the form of scientific knowledge has been accumulated on different milk markers which can aid in progressing the use of milk for prognostic and diagnostic purposes. A further outcome can relate to the partner, Zoetis being in a position to potentially benefit by new commercialisation opportunities in this space in the future, including the potential application of the milk biosensors to other biomarkers of interest.