

Title	Understanding the effects of variation in individual animal production on greenhouse gas emissions (BIGDATA)
Project Timeframe	May 2018 – Sep 2020
Countries Involved	New Zealand (Massey University, AbacusBio Ltd., Dairy NZ, Gallagher Animal Management, Waitatapia Farming) UK (Agri-Epi Centre Ltd., Innovent Technology Ltd.)
Aim	To develop systems to enable real-time tracking of feed intake and production, which can be used to optimize farm management practices and reduce greenhouse gas emissions for commercial dairy and beef farms in New Zealand.
Research Highlights	<ul style="list-style-type: none"> • Evaluated the suitability for in-field use of a sensor-based grazing and rumination recording collar for dairy cows – the AfiMilk Silent Herdsman collar. • The research found that the Collar has low value in terms of recording activities in outdoors. • The gathered data was analysed alongside data from the UK national databases (DEFRA, DGAD), and the following limitations were identified: <ul style="list-style-type: none"> – modifications are necessary to separate cow movements with grazing and rumination activity and cow movements without grazing and ruminant activity to allow more precise interpretation of dairy cow behaviour; and – behaviour recording accuracy of the Collar is challenged during high humidity weather conditions (i.e. when cows are under heat stress). • Found that the proof of concept (i.e. the walk-on integrated field monitoring platform) is a useful working tool for real-time monitoring of beef cattle to gather data for intensive statistical analysis of beef animal production. The platform is the first of its kind to measure real-time animal productivity in the field. • Data analysis methodology for single animal food intake and production has been developed, which may provide a blueprint for future datasets and the development of farm management models to minimise GHG emissions and optimise food (meat, dairy) yields by real-time tracking of intake (grazing times, pasture quality) and production (weight gain, growth rate) of individual animals. • A working relationship with Agri-EPI Centre Ltd, Scotland is established, providing access to food intake and production data from DEFRA.



<p>Future Work</p>	<ul style="list-style-type: none"> • Refine the algorithms for use the AfiMilk Silent Herdsman collar in outdoor settings. • Develop a weight and production model to determine trial sizes to ensure accuracy of production. • Test the beef platform on commercial farm trials. • Develop business case for adoption.
<p>Key Research Output(s)</p>	<p><u>Journal article(s)</u> Proctor, L.E., Archer, J.A., Sise, J.A., Zhang, X., Crowley, J.J., Amer, P.R. (2020) Impact of trait genetic gains on methane emissions from NZ beef and dairy farms. <i>New Zealand Journal of Animal Science and Production</i>, 80: 76-79.</p>