FOODBIOSYSTEMS - Improving nutrition efficiency and milk quality in dairy production
Project ID: FBS2020-05

Supervisor: Dr Sokratis Stergiadis, School of Agriculture, Policy and Development, University of Reading
Email: s.stergiadis@reading.ac.uk

Co-Supervisors: Dr Katerina Theodoridou (Queens University Belfast, School of Biological Sciences), Prof Sharon Huws (Queens University Belfast, School of Biological Sciences) and Dr Tianhai Yan (Agri-Food and Biosciences Institute, Sustainable Agri-Food Sciences Division)

Project Description: Milk is the most nutritious single food but also a major provider of saturated fatty acids (SFA) in the UK diets. Certain SFA may increase risk of cardiovascular disease (CVD), and health organisations have urgently recommended substitution of dietary SFA with cis-unsaturated FA (cis-UFA), to reduce CVD-related illness. Producing milk, the main single source of fatty acids (FA) in human diets, with more cis-UFA and less SFA could contribute to this aim without requiring changes to consumer dietary habits. Additionally, the increasing global demand for milk and dairy products, and the competition for resources for food, feed and fuel require optimum use of resources in all aspects of dairy production. Improving feed use efficiency (FUE; more milk per given feed intake) and energy use efficiency (EUE; higher proportion of ingested energy retained in the body) increase farm profitability (lower feeding costs) and reduce environmental footprint (lower methane emissions) of milk production. Therefore, developing win-win management scenarios that simultaneously improve efficiency and milk nutritional quality are of paramount importance for future sustainability, and improving consumer perception, of the dairy sector. The aim of the proposed project is therefore to identify the animal, dietary, and management factors that improve FUE and EUE in dairy cows and enhance the nutritional quality of milk. This will be achieved via the following studies:
1. Investigate the effects, and the relative impact, of animal diet parameters on nutrition efficiency, methane emissions and milk quality; via a desktop study using existing data from animal studies at the University of Reading and Agri-Food and Biosciences Institute (AFBI).
2. Investigate the relative impact of husbandry practices (breeding, feeding, management) on nutrition efficiency and milk quality at herd level; via analysis of data from existing farm questionnaires and analysis of milk samples for quality parameters that will take place during the project.
3. Reveal how rumen microbes influence metabolic pathways related to nutrition efficiency, methane emissions and milk quality under different dairy diets; via an animal trial that will take place at the Agri-Food and Biosciences Institute, and metagenomics and metabolomics analyses that will take place at Queen's University Belfast and University of Reading, respectively.