Irish Partnered Research Stimulus Fund Projects Supported under the European Research Area for Monitoring & Mitigation of Greenhouse Gases from Agri- and Silvi-culture (ERA-Gas) Call 2016

Lead Irish Partner, Lead Irish Institute + Other Irish Collaborating Institutions	**Project Title and Summary** (hyperlink to details on total award and European partners)	**DAFM Grant Award to Irish Partners**
Sinead Waters, Teagasc sinead.waters@teagasc.ie **Other Collaborating Irish Institutions:** University College Dublin, Irish Cattle Breeding Federation	**Predicting appropriate GHG mitigation strategies based on modelling variables that contribute to ruminant environmental impact (Rumen Predict)** Ruminant production accounts for ~ 9% of anthropogenic CO_2 and 37% of CH_4 emissions. In addition, release of methane results in 6-12% less energy being available to the animal. Ruminants contribute towards NO_2 to the environment, which has 296 times more warming potential than CO_2. A major challenge exists as *Food Wise 2025* sets ambitious growth targets for agriculture including a 60% increase in primary production by 2025 while simultaneously adhering to strict international and EU legislation (Paris Agreement 2015) in limiting GHG emissions. 'RumenPredict' aims to establish the role of diet, host genetics, and the rumen microbiome on environmental outputs (CH_4 and NO_2), generating guidelines to implement effective GHG mitigation strategies under varying conditions. Standard microbial analysis platforms will be validated for international laboratories, facilitating the amalgamation and augmentation of international rumen microbiome datasets. We also aim to discover DNA based biomarkers that can be integrated into the genomics selection breeding programme for the selection of animals with a rumen microbiome that facilitates greater feed efficiency and lower environmental footprint. This will allow the implementation of the most appropriate mitigation strategies depending on geographical areas or upon feeding particular diets and will facilitate breeding of more environmentally sustainable cattle.	€244,418

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Karl Richards, Teagasc Karl.richards@teagasc.ie **Other Collaborating Irish Institution:** National University of Galway	**Mitigating Agricultural Greenhouse Gas Emissions by improved pH management of soils (MAGGE PH)** Maintenance of soil pH is critical for agronomic performance due to its direct effect on nutrient availability but it has also been shown to potentially effect emissions of the potent greenhouse gas nitrous oxide (N_2O). Nitrous oxide accounts for c. 40% of national agricultural emissions. MAGGE PH will investigate the effect of soil pH on N_2O emissions and effects on the soil microbial community responsible for emissions. The project objectives are: 1. to evaluate the effects of soil pH on N_2O emissions 2. to understand the biogeochemical mechanisms effected by pH manipulation 3. provide country specific emissions factors and 4. to disseminate the findings to stakeholders. MAGGE PH will identify the role of soil pH control on N_2O emissions from Irish soils. This will provide verifiable estimates of greenhouse gas emission reductions that could be achieved by correcting soil pH via lime addition. MAGGE PH will provide country specific emission factors for soil pH control through the application of lime and if successful these will be incorporated as a mitigation measure within the Irish greenhouse gas emission inventory. The application of lime represents a win-win solution for farmer to both improve agronomic yields and reduce greenhouse gas emissions.	€244,999

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Bruce Osborne, University College Dublin bruce.osborne@ucd.ie **Other Collaborating Irish Institution:** Teagasc	**Managing and Reporting of Greenhouse Gas Emissions and Carbon Sequestration in different landscape mosaics (GHG Manage)** A typical European farmed landscape comprises a mosaic of land use/land cover elements comprising different crops, including forestry, and contrasting management practices. Whilst quantification of the contribution of these different landscape elements to the greenhouse gas (GHG) balance is a major challenge this does provide an opportunity to offset one land use or land parcel against another to reduce on-farm greenhouse gas emissions and enhance carbon sequestration. In the GHG Manage project we aim to assess the GHG exchange characteristics and carbon sequestration capacity of typical European landscape mosaics, using archived data sets, as well as through the use of innovative experimental and modelling approaches that can be applied down to the farm scale. Of particular importance will be the development of new techniques for assessing GHG emissions over small areas of land over short time scales. We will investigate whether there are optimal configurations of different landscape elements and associated management practices that can be used to compensate for differences in GHG emissions, as well as assess their economic and social consequences. This information will subsequently feed into the development of reporting tools and process-based models for quantifying on-farm GHG budgets and thereby contribute to improved National reporting capability.	€236,134

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Catherine Stanton, Teagasc catherine.stanton@teagasc.ie **Other Collaborating Irish Institution:** University College Cork	**Refining direct fed microbials (DFM) and silage inoculants for reduction of methane emissions from ruminants (Methlab)** The European Council recently agreed a set of climate and energy targets for 2030 (40/27/27 package), with important implications for the EU agricultural sector. Reducing agricultural green-house-gas (GHG) emissions is a challenge, particularly as agricultural intensity is increasing globally. In this proposal, on-farm lactic acid bacteria (LAB) technologies such as feed supplements and/or silage inoculants, currently used to increase production and improve health of ruminant animals, will be refined with a methane-reducing benefit. To achieve this, live microbial cultures with demonstrated ability to reduce methane *in vitro* and suitable for industrial use will be isolated and exploited in animal trials, to confirm efficacy of methane reduction effects on the rumen microbiome and production parameters *in vivo*. A route to market is considered relatively straightforward as DFMs and silage inoculants have LAB as a main microbial ingredient and are already commercially available, accepted, and used on farms worldwide. This proposal thus supports the development of a competitive, sustainable and profitable global Agri-food sector. The partners in this proposal are all from Global Research Alliance (GRA) member countries that share the goal of reducing methane emission intensity across ruminant classes in a manner that maintains agricultural production and sustains environmental integrity.	€218,920