The effect of concentrate supplementatition level on the productitive, financial and environmental performance of pasture-based dairy cows

Walsh Scholars Reference Number: 2017283
University: University College Cork
Funding: Research Ireland (VistaMilk)

Research Instititution: Teagasc
Locatition: Teagasc Moorepark, Co. Cork
Proposed Start Date: February 2027

Project Descriptition

Grazed pasture is a defining feature of Irish dairying. Such systems are widely recognised for their 'grass fed' dairy products as well as economic and environmental advantages. Their success depends on making efficient use of grazed pasture while limititing reliance on imported feeds. However, the use of concentrate supplementatition on Irish dairy farms has increased considerably in recent years, despite an industry target of less than 500 kg per cow per year. At the same titime, contitinued improvements in dairy cow genetitics create new questitions whether addititional concentrate feed can further realise their milk productition potentitial and if this delivers sufficient economic and environmental benefits.

Concentrate feeding represents an important trade-off for modern dairy farms. Higher levels of supplementatition can increase milk productition but also increase feed costs and reliance on external inputs. There may also be implicatitions for greenhouse gas emissions, partiticularly methane produced by dairy cows. With Ireland committtted to a 25% reductition in agricultural greenhouse gas emissions by 2030,
there is a need to betttter understand how feeding strategies can be optitimised to maintain productitive and profitable dairy systems while reducing their environmental footprint. However, the relatitionship between concentrate feeding, animal performance and methane emissions has not been fully explored under modern pasture-based productition condititions.

The aim of this PhD project is to determine how concentrate feeding level influences dairy cow productitivity, methane emissions, and farm profitability. A field experiment will compare different concentrate feeding strategies in a pasture-based dairy system, measuring animal performance, feed intake, milk productition and compositition, and enteric methane emissions using state of the art techniques and measurement equipment. This will provide new insight into how cows respond to different levels of supplementatition when pasture remains the foundatition of the diet. Whole-farm economic and environmental models will be developed to explore the wider consequences of alternatitive feeding strategies. The project will provide an integrated understanding of the trade-offs between milk productition, feed costs, carbon footprint and farm profitability. The findings will help identitify concentrate feeding strategies that make efficient use of feed resources while supportiting the contitinued sustainable development of productitive, economically viable and lower-emission pasture-based dairy systems in Ireland.

Supervision

The project will be co-supervised by Dr Charles Dwan and Prof. Laurence Shalloo from Teagasc Moorepark and Dr Deirdre Hennessy from University College Cork. Charles Dwan's research focuses on feeding strategies, enteric methane emissions and the rumen microbiome in pasture-based dairy systems. Laurence heads the Animal and Grassland Programme at Teagasc, and his research background is in modelling economic and environmental sustainability of pasture-based dairy systems. Deirdre Hennessy is an Agricultural Science Lecturer in the School of Biological, Earth and Environmental Science at University College Cork, contributiting university-based expertitise in dairy systems and grassland science. Together, the supervisory team integrates applied Teagasc research in dairy system sustainability with academic oversight from a grassland and systems perspectitive.

Research Environment
You will be registered at University College Cork and based at Teagasc Moorepark, a major centre for dairy, grassland, and agri-environmental research. Part of the research in this PhD will be conducted at Teagasc Solohead, a research farm with excellent grazing infrastructure and a commercial herd of dairy cows, located near the village of Monard, Co. Tipperary. The project provides access to experimental farm data, state of the art research facilities, methane measurement technology and an interdisciplinary research environment supporting systems-based analysis of agricultural sustainability.

As a Walsh Scholar, you will engage with national and international research networks and collaborate with researchers working across agricultural economics, environmental sustainability, and farming systems analysis.

Career and Training Opportunities
The Teagasc Walsh Scholars Programme provides a structured four-year training and development framework designed to support both academic excellence and long-term career readiness. Scholars develop advanced scientific and analytical expertise alongside transferable skills in communication, project management, and stakeholder engagement through expert-led training, workshops, and tailored professional development.

Opportunities are provided to present research at national and international conferences, supporting professional networking and active engagement with the wider international research community. Dedicated final-year career supports focus on preparing scholars for impactful roles across research, industry, advisory services, and policy, in Ireland and internationally.

Through the Teagasc International Training Awards, scholars may undertake an international research placement aligned with their PhD project in an oversees institution for up to 12 weeks. Outstanding achievement may also be recognised through the Walsh Scholars of the Year and Gold Medal Awards.

Candidate Profile and Eligibility
Applicants should:

- Hold 2.1 Honours degree (or Master's) in agricultural science, economics, modelling, or a related discipline
- Be willing to engage with 'hands-on' fieldwork
- An openness to both self-directed and structured learning and personal development
- Demonstrate understanding of Irish dairy farming systems
- Demonstrate data handling and analytical skills
- Possess good written and verbal communication skills and the ability to calibrate effectively as part of a research team
- Hold a full, clean driving licence valid in Ireland
- Meet UCC postgraduate entry and English language requirements

Funding Details
This is a fully funded four-year PhD funded by Research Ireland and Ornua through the VistaMilk Research Centre, including:

- €25,000 annual stipend (exempt from income tax)
- University fees covered up to €6,000 per annum

How to Apply
Applicants should complete the online application form by **5:00pm on Friday, 4th December 2026.**

Applications must include a curriculum vitae and a 1–2-page statement of motivation submitted as part of the online application.

Interviews
Shortlisted candidates will be invited to interview in **early-January 2026**. Online interviews can be accommodated.

Further Information
Informal enquiries are welcome and may be directed to: Dr Charles Dwan – charles.dwan@teagasc.ie

Further information on the Walsh Scholars Programme is available at:
https://www.teagasc.ie/about/research-innovation/the-walsh-scholars-programme/about-the-programme/