



Smart Monitoring of Dairy Membrane Separation (Sensors & Predictive Modelling)

Walsh Scholars Reference Number: 2026027

University: Munster Technological University (MTU)

Funding: Teagasc

Research Institution: Teagasc

Location: Teagasc Moorepark, Co. Cork, Ireland

Proposed Start Date: September 2026

Project Summary

This PhD project will examine how routinely collected process data can be more effectively used to support decision-making in dairy processing operations. Dairy processing is energy-intensive, and incremental improvements in process efficiency, consistency, and equipment performance can deliver meaningful environmental and economic benefits. The research addresses a clear need for data-driven approaches that support more sustainable and efficient agri-food processing systems.

The project will focus on a membrane filtration process operating within a dairy pilot plant. Key objectives are to identify the process conditions that influence product quality and operational efficiency, optimise operating parameters, reduce energy use, and improve monitoring of equipment condition and cleaning effectiveness. Initial research stages will assess the quality, structure, and reliability of existing process datasets. Statistical modelling and machine-learning techniques will then be applied to analyse relationships between process variables, identify inefficiencies or abnormal behaviour, and support the prediction of optimal operating conditions.

Expected outcomes include improved process efficiency, lower energy consumption, and more consistent product quality, alongside stronger evidence to inform maintenance and cleaning decisions. The project will deliver a practical analytical framework that can be applied within industrial dairy processing environments, supporting innovation, sustainability objectives, and evidence-based best practice in agri-food processing.

Supervision

The student will be supervised by Dr Norah O'Shea (Teagasc), with co-supervision from Dr Michael D. Murphy (Munster Technological University). Dr O'Shea brings extensive expertise in dairy processing, process analytical technologies, sensor-based monitoring, and rheology, with a strong focus on data-driven understanding of dairy manufacturing systems. Dr Murphy contributes specialist expertise in energy systems modelling, optimisation, and machine learning applied to agri-food and dairy production systems. Together, the supervisors provide a highly complementary combination of dairy process science and advanced data analytics, offering a strong and well-aligned framework for the project.

Research Environment

You will be registered at Munster Technological University and based at the Teagasc Food Research Centre, Moorepark, a centre of excellence for dairy science, processing, and food systems research, for the duration of your studies. The project offers access to state-of-the-art pilot-scale processing facilities, advanced sensor and data infrastructure, and a strong interdisciplinary research community.

As a Walsh Scholar, you will benefit from engagement with national and international research networks, regular seminars, and opportunities to collaborate with researchers across dairy processing, engineering, data analytics, and sustainability.

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 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 of up to 12 weeks aligned with their PhD project. Outstanding achievement may also be recognised through the Walsh Scholars of the Year and Gold Medal Awards.

Candidate Profile and Eligibility

Applicants should ideally:

- Hold a First or 2.1 Honours degree (or Master's) in dairy, food, chemical, mechanical, or process engineering, or a closely related discipline
- Demonstrate experience in laboratory- or pilot-scale research, with strong data handling and analytical skills
- Show the ability to apply multidisciplinary approaches to hypothesis-driven research
- Possess excellent written and verbal communication skills and the ability to work effectively as part of a team
- Hold a full, clean EU driving licence (desirable)
- Meet Munster Technological University postgraduate entry requirements, including English language requirements where applicable

Funding Details

This is a fully funded four-year PhD funded by Teagasc, including:

- €25,000 annual stipend
- University fees covered up to €6,000 per annum

How to Apply

Applicants should complete the [online application form](#) by **5:00pm on Wednesday, 18 March 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 to mid-April 2026. Online interviews can be accommodated.

Further Information

Informal enquiries are welcome and may be directed to: Dr Norah O'Shea – norah.oshea@teagasc.ie; Dr Michael D. Murphy – MichaelD.Murphy@mtu.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/>