



Hossein KIANI

Technology Centre:	DPTC - Dairy Processing Technology Centre
Academic Mentor:	Dr. Ronald Halim
Company Partner:	Arrabawn Co Operative Society Ltd.
Company Mentor:	Hugh McDonnell

Dr. Hossein Kiani attended his PhD degree (2010-2013) in University College Dublin, School of Food and Biosystems Engineering and performed a collaborative research project. He also completed his MSc in University of Tehran and his BSc in Urmia University both in Food Science. After completing his PhD studies, Dr. Kiani was appointed as an assistant Professor at the University of Tehran, where he taught several courses, established a new research lab, and performed several research projects.

Dr. Ronald Halim

Dr. Ronald Halim, an academic staff member in UCD School of Food and Biosystems Engineering, has substantial experience in microalgae cultivation and biorefinery application, having worked in the area for more than 10 years and secured more than €350k of external research funding throughout his career. He has made significant contributions to the field relative to opportunities. This includes a total of 27 peer reviewed publications sitting on the scientific committee of Algae Biomass Summit for the past three years. He was awarded several competitive fellowships from the Australian and German research councils.

Mr Hugh McDonnell

Mr Hugh McDonnell is the operations manager at Arrabawn Ingredients site in Nenagh Co. Tipperary. He has a degree in Food Business from University College Cork, a post Graduate Diploma from Dublin City University and a Master's in Business Administration from University College Limerick. Hugh has over 27 years of experience in meat and dairy ingredients processing at a senior level, having worked both for multinational and co-operative entities in Ireland. Hugh has been working at Arrabawn since the start of 2018 as a senior manager on the executive leadership team.

Host Institution: University College Dublin (UCD)

UCD is the largest academic institution in Ireland. It hosts many outstanding world-class research infrastructures including UCD Conway Institute of Biomolecular and Biomedical Research and UCD Institute of Food and Health.

Technology Centre/ Technology Gateway: DPTC

The DPTC is a strategic center with outstanding achievements serving the Irish dairy sector with excellent knowledge support. This center gathers the industry and the academia in Ireland together to address the major issues of the dairy industry. It provides world class research and innovation capabilities through knowledge transfer and training activities. The DPTC also translates learning and know-how from other industrial sectors to the Irish dairy sector.

Industry Partner: Arrabawn Co Op

Arrabawn is a large, fast growing, diversified agri-based organisation at the heart of Ireland's globally recognised, premium dairy industry with more than 100 years history. A revenue of €271 million, with 402 employees, 1000 milk suppliers and processes 400 million litres of milk annually. Significant capital investment programmes are underway at Arrabawn through deploying the very best technology to protect the environment.

Hossein's project

“Towards circular bioeconomy in Irish dairy industry: using algae as biological factories for the rapid transformation of waste nutrients in milk permeate into bioactive high-value products”

The dairy industry is one of the largest industries in Ireland and accounted for approximately 2% of the nation's total export in 2018. The industry generates a number of waste streams that can pose significant harm to the environment if disposed of without treatment. Many of these waste streams, however, are rich in nutrients and can potentially be used for other applications beyond the dairy industry. Successful translation of these waste streams into commercial products will reduce the cost of waste treatment while potentially generating new revenues for the dairy industry. To this end, the proposed project will examine the use of milk permeate, a dairy liquid waste rich in sugar and other nutrients, as a potential nutrient source for the cultivation of microalgae strains with high contents of bioactive compounds (ω -3 oil). Microalgae are single-celled aquatic organisms able to rapidly convert CO₂ and nutrients into biomass via photosynthesis. In this study, the extent to which microalgae cells are able to utilise the nutrients supplied in the milk permeate to promote their own growth and product accumulation will be investigated. The research will evaluate optimum conditions, biomass productivity and the industrial scalability of the permeate supplemented cultivation.

In essence, the project will use microalgae cells as 'biological factories' that convert waste nutrients from dairy processing into high-value ingredients. High-purity isolates of these bioactive products can be extracted from the biomass for potential applications in the nutraceutical industries. The outcome of the fellowship will be the development of a novel and scalable waste treatment process that will provide the dairy industry with valuable co-products and potential new avenues of valorising their waste. The project will arm the Irish dairy industry with a more cost-effective waste treatment process and enhance its long-term global competitiveness.

