DairyWater

Sustainability and resource efficiency for the Irish dairy processing industry

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Introduction

2015 was a defining year for the future of the Irish dairy industry with the abolition of European milk quotas taking effect as of April inducing a surge in milk production to unprecedented levels. This year was also the second year of the DairyWater project, which aims to develop innovative solutions for the efficient management of water consumption, wastewater treatment and energy usage within the Irish dairy processing industry.

There are now one Postdoctoral researcher and four PhD candidates working full-time on the project, who have built up a close working relationship with project stakeholders within the Irish dairy processing industry. Laboratory-scale experimental trials of the proposed technologies are well underway at the Environmental Engineering Laboratory at NUI Galway, Athlone Institute of Technology, UCC's Environmental Research Institute and CRANN at Trinity College Dublin.

Preliminary results from analyses have been disseminated to the scientific community through national conferences, an international conference (15th IWRA World Water Congress, Edinburgh, 2015) and a publication in the *Journal of Cleaner Production*. The first DairyWater workshop will take place on the 9th March 2016 in NUI Galway.

For further information, go to: www.dairywater.ie or follow the project on twitter: @dairywater

DairyWater Advisory Board meeting

The first advisory board meeting took place on the 4th June 2015 in the Engineering Building at NUI Galway. The day was structured around the project's five main research topics. A presentation was given on each research topic, which was followed by an open discussion. The members of the advisory board that attended were Rory Farrell (Lakeland Dairies), Kealan Reynolds (EPA), Liam Curran (Enterprise Ireland), Michael McCarthy (Carbery), Deirdre Gray (Aurivo Co-Op) and Mark Fenelon (Teagasc). It was a very fruitful meeting with the advisory board members making some insight and constructive comments throughout the day and look forward to working closely with them as the project progresses.

Workshop on achieving sustainability for the Irish dairy processing industry

9.30am on 9th March 2016

NUI Galway

Themes relating to the Irish dairy processing sector include:

- Challenges of the industry
- Life cycle assessment
- Water treatment and environmental issues
- Phosphorus removal & recovery

To register, email: william.finnegan@nuigalway.ie

DairyWater research activities

Laboratory-scale IASBR

Laboratory-scale intermittently aerated sequencing batch reactor (IASBR) units have been set up at NUI Galway. An initial experiment has been conducted examining the optimum operating conditions for the reactors. The results of this experiment show ortho-phosphate removal of up to 97% during the effective aeration conditions. A second experiment, which uses dairy wastewater treatment plant seed sludge, has been started in early 2016. This experiment will focus on phosphorus removal mechanisms and microbial community analysis.

Laboratory scale experimental equipment at NUI Galway /AIT (Clockwise from top: LPUV, IASBR, PUV)

LPUV/PUV disinfection systems

Novel high-energy pulsed UV (PUV) will be compared to conventional low pressure UV (LPUV) for the potential of enhanced germicidal properties and system capabilities. Methods of UV dose comparison between PUV and LPUV will be evaluated, including differences in energy outputs and spectrum wavelengths applied. The impact of wastewater characteristics e.g. suspended solids (SS) and carbon on UV efficiency is currently being investigated. To date, results indicate that inert SS may not have as much of an impact on UV treatment compared to organic SS. This may have implications when considering the type of water being disinfected e.g. rainwater versus wastewater.

DairyWater project research team joined by advisory board members from Teagasc, Enterprise Ireland, the EPA and the Irish dairy processing industry at the DairyWater Advisory Board meeting, June 2015

Other research highlights from Year 2

An initial assessment of global warming potential associated with the manufacture of dairy products in Ireland has been compiled and published in the *Journal of Cleaner Production*.

DNA was extracted from samples taken from the IASBR. It was evident from the analysis that *Proteobacteria* and *Bacteroidete* phyla were dominant in the samples and *Nostocoida limicola* may be involved in the sludge bulking processes.

Nano-zeolite has synthesised successfully and the best synthesis condition of the material and its ability to treat dairy wastewater is currently being assessed.

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Department of Agriculture, Food and the Marine
An Roinn Talmhaíochta, Bia agus Mara