

Dairy Water

Dairy Water: Sustainability and resource efficiency for the Irish dairy processing industry

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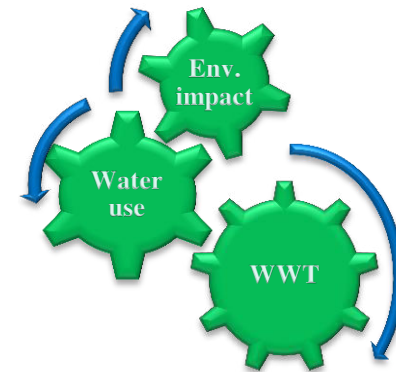
NUI Galway
OÉ Gaillimh



Ryan
Institute

Presentation contents

- Irish dairy industry
- DairyWater project
 - Wastewater treatment technologies
 - Water use
 - Environmental assessment
- DairyWater summary



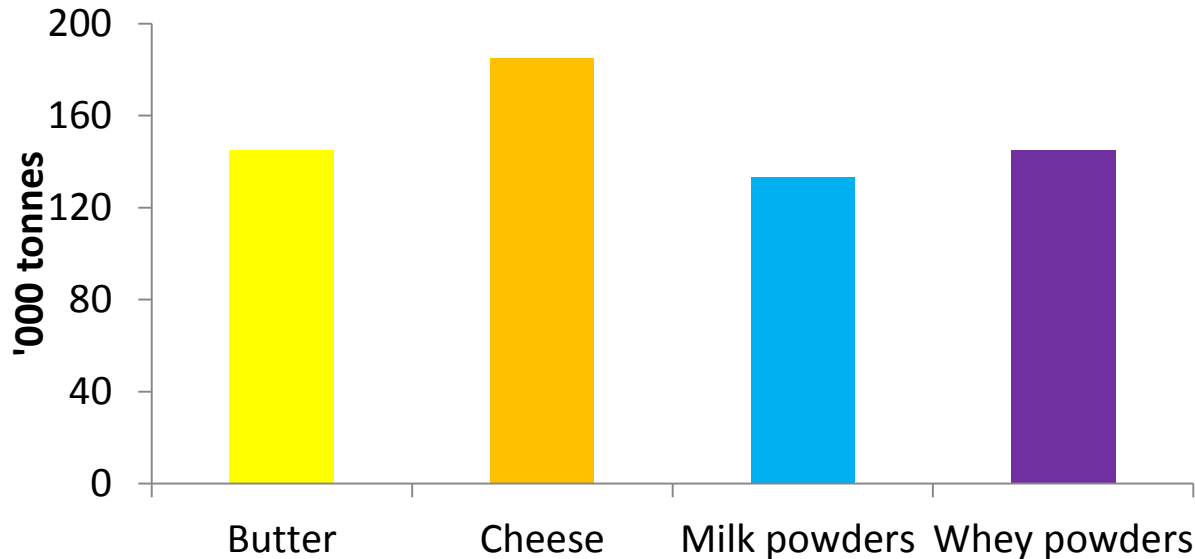
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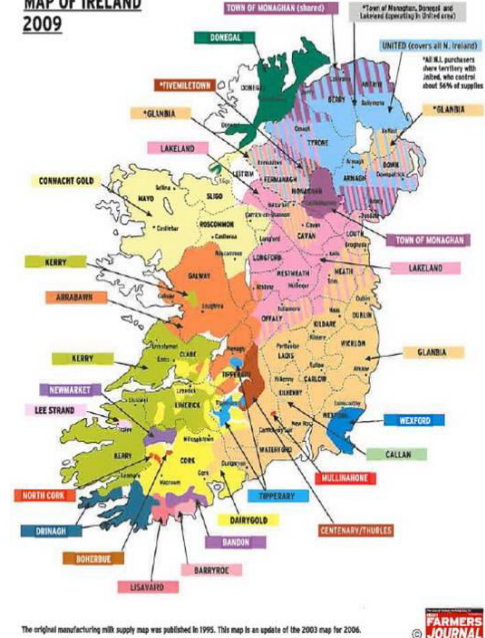


Irish dairy industry

- Raw milk production in Ireland: 5.4 billion litres from 17,000 dairy farmers¹



MANUFACTURING MILK SUPPLY MAP OF IRELAND 2009



1. IFA. 2014. Dairy Fact Sheet. Irish Farmers Association, Dublin, Ireland.

Irish dairy industry

Major Dairy Exporters and Importers

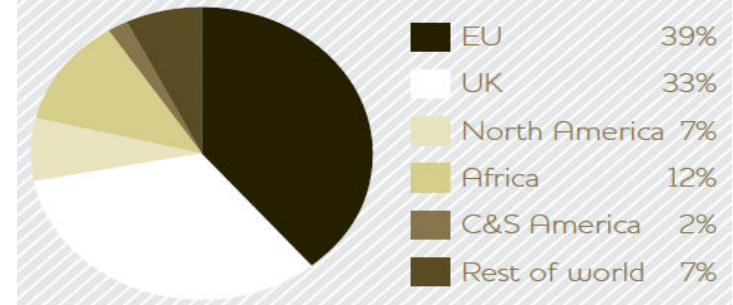


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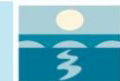
- Irish dairy board exports under the names *Kerrygold*, *Dubliner Cheese* and many more

- World's 10th largest dairy exported
- Exports 85% of products manufactured

2012 Sales by Destination



© Irish Dairy Board



Irish dairy industry

- European milk quotas were abolished (Mar '15)
- Resulting in a potential increase of 50% in domestic raw milk production
- Increase in water usage: from 13.5 billion litres to ???
- Many plants at water emissions limit
 - Irish Environmental Protection Agency (EPA)
- New technologies sought to maintain profits and adhere to regulations



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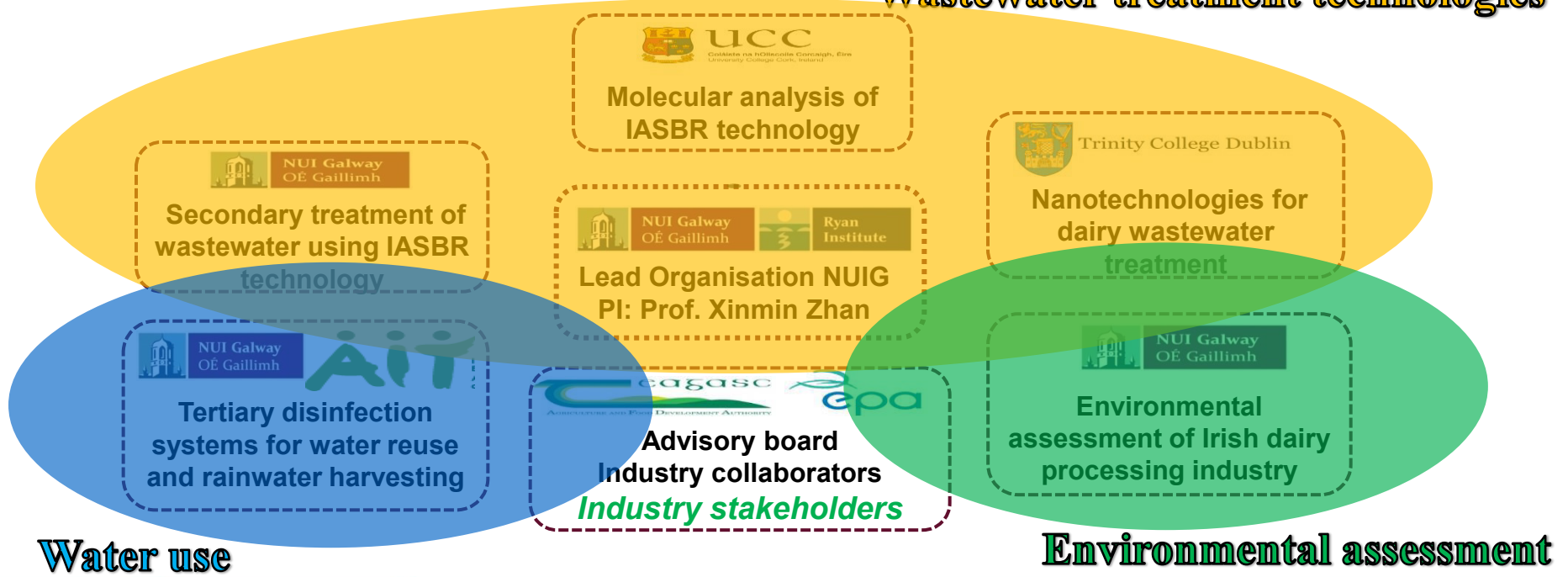
DairyWater project

- Aim: Develop sustainability and resource efficiency for the Irish dairy processing industry
- €1 million project funded by the Department of Agriculture, Food and the Marine (DAFM)
- Comprises 5 research institutions: NUI Galway; Trinity College Dublin; University College Cork; Athlone IT; Teagasc
- Includes a project advisory board which include representatives from EI, EPA, Teagasc and industry stakeholders



DairyWater project

Wastewater treatment technologies

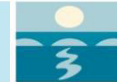


Water use

Environmental assessment

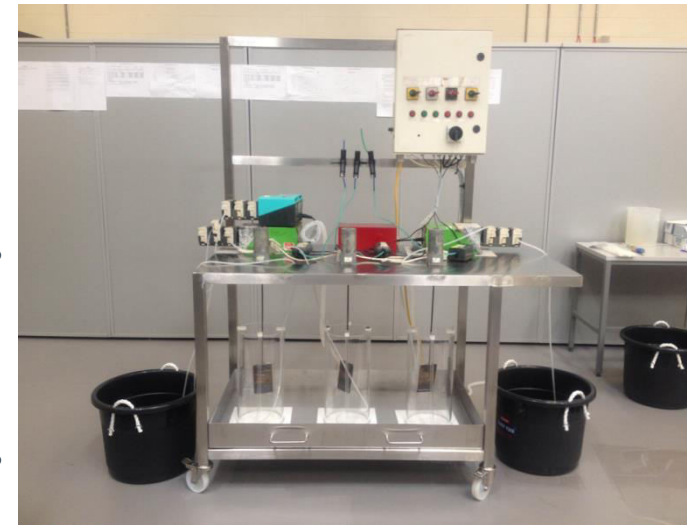
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Wastewater treatment technologies

- Development of an Intermittently aerated sequencing batch reactor (IASBR)
 - Uses biological methods to remove nutrients
 - Reduction in energy use due to reduced aeration
 - Nitrogen removal via nitrite not nitrate
 - Alkalinity remains stable due to alternating periods of nitrification and denitrification
 - Initial laboratory scale experiments
 - Pilot-scale experiments on dairy processing sites planned



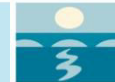
Wastewater treatment technologies

- Molecular microbial ecology studies using advanced pyro-sequencing techniques
 - Performed at the Environmental Research Institute (ERI) in UCC
 - To determine the shift of the microbial ecological structure IASBRs
- The use of nano-materials to remove nutrients and heavy metals from water and wastewater
 - Performed at the Centre for Research on Adaptive Nanostructures and Nano-devices (CRANN), TCD



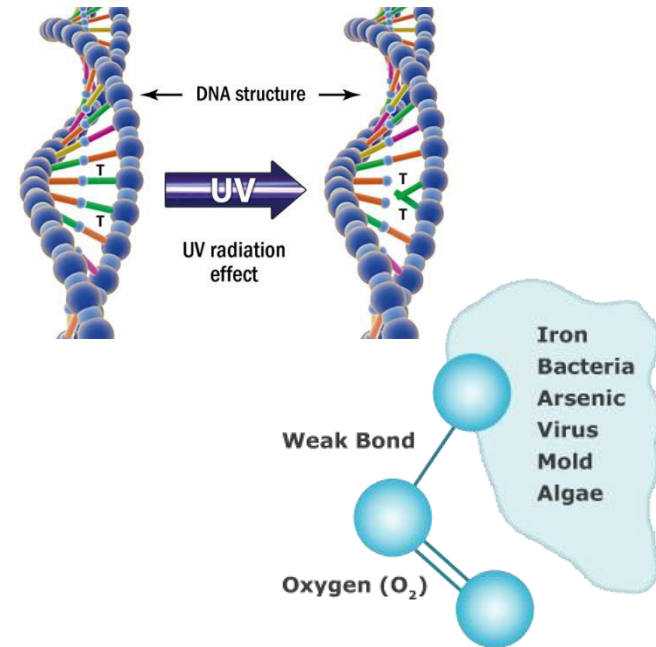
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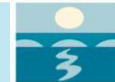
Water reuse and rainwater harvesting

- Tertiary treatment technologies for dairy wastewater effluent
 - Pulsed UV (PUV) treatment
 - Ozone treatment
- Water reuse efficiency within the Irish dairy sector
 - Tertiary treatments implemented to inform water reuse potential (e.g. condensate)
- Rainwater harvesting potential
 - Potential use of on-site stormwater



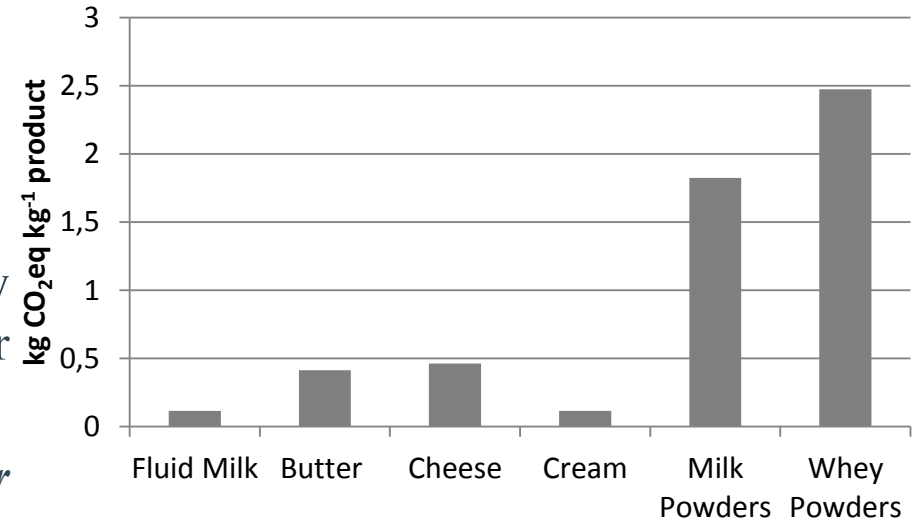
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Environmental assessment

- Perform a detailed environmental LCA for manufacture of main dairy products:
 - Fluid milk
 - Cheese
 - Butter/milk powder
- Estimate environmental sustainability key performance indicators (KPIs) for the Irish dairy processing industry
 - Presented at WWCXV on Tue: *'Water consumption and direct energy usage in the Irish dairy processing industry'*



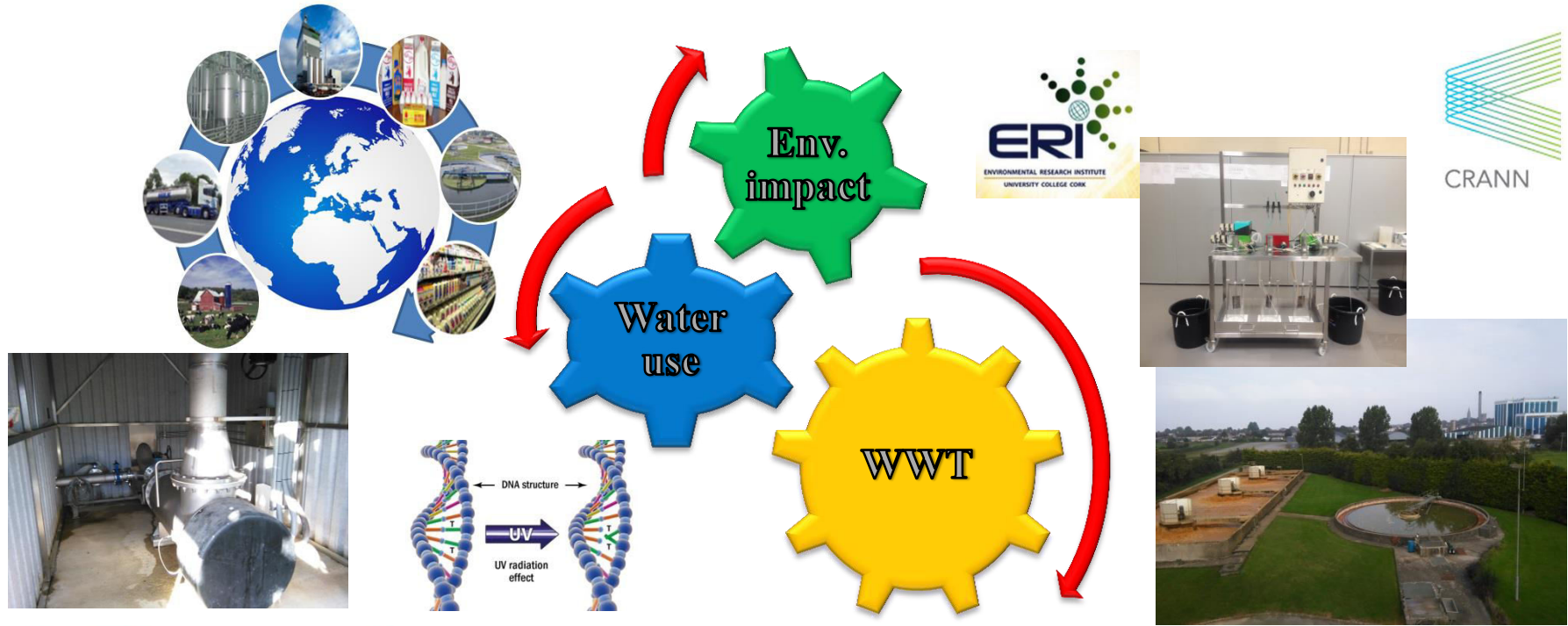
GWP of dairy products processed in Rep. of Ireland²

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Dairy Water summary



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Questions???

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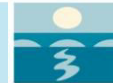


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of Technology



UCC

Coláiste na hOllscoile Corcaigh, Éire
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