



Unlocking Protein Resource Opportunities to Evolve Ireland's Nutrition

PRESENTED BY: Dr. Sinead Fitzsimons
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U-PROTEIN



Presentation Overview

- Overview of U-Protein
- Who is involved
- Case Study x 2
- What next?



Background

- **U-Protein** - Unlocking Protein Resource Oppportunity To Evolve Irelands Nutrition
- DAFM funded - 5 years (Nov 2020 - Oct 2025)
- Objective - to re-engineer Ireland's agro-ecological system through greater diversification and biotransformation of protein resources, to deliver sustainability, bio-circularity and quality nutrition.

Overview



Alternative Proteins for the Irish Agri-Ecosystem

Consortium & Expertise

Agricultural, environmental & natural resource economics

Dietary interventions
Nutrient Regulation



Proteomics

Marine research
Phytochemical
Novel Food Processing Technologies
Novel Food Preservation Technologies
Fresh and Processed Meat
Wheat / flour Chemistry and Technology



NUI Galway
OÉ Gaillimh

Biotransformation
Anaerobic Digestion

Sustainable production and management of protein crops

Enzyme hydrolysis

Soils, land use and sustainability



Sustainable development
Protein Functionality
Formulation Science
Safety and sensory evaluation

Grassland/Grazing management
Protein Chemistry / Functionality
Food Structure / Microstructure
Food Digestion
Process Engineering
Formulation Science
Scale up
Biotransformation
Food Preservation

5 Teagasc centres

5 Universities

U-PROTEIN Partners



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



LLa-BioEconomy
Research & Advisory



BEOTANICS



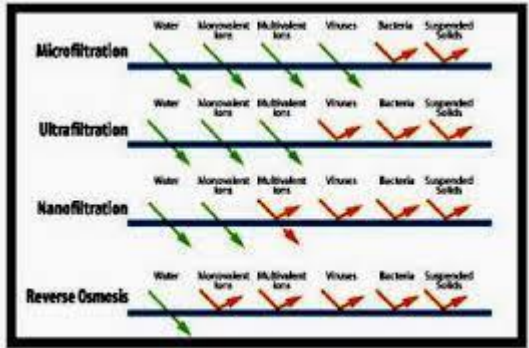
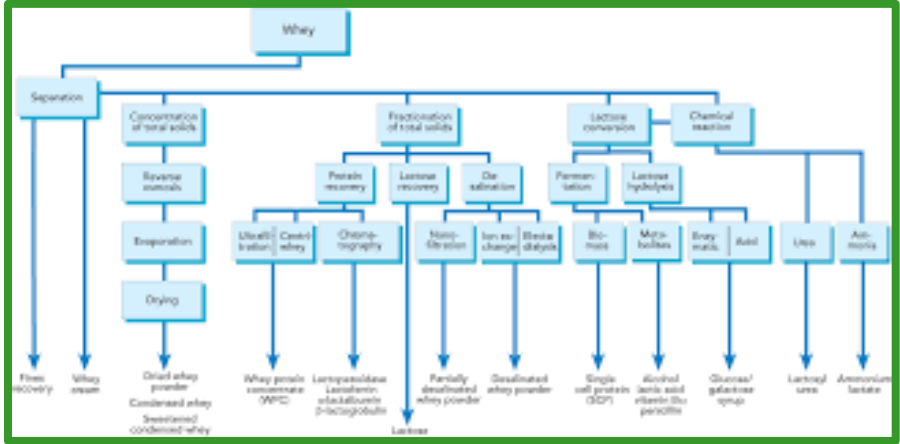
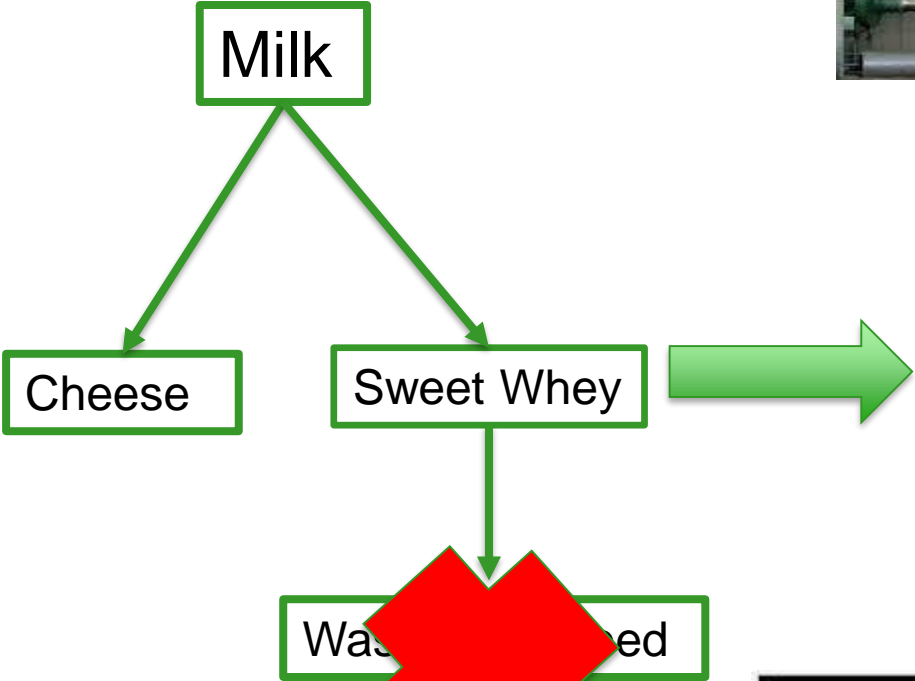
Criteria for Selection of “Crops”

- Grow in Ireland
- Potential for Extraction
- Potential for Residual Biomass Optimisation
- Protein Quality and Safety
- Good Sensory Properties Potential
- Potential for Circularity



Note: Crops = Grassland; Cereals; Legumes; Niche Crops & Marine

Dairy Analogy



“Crops” Selected

Crops

- Faba Beans -13 Varieties
- Peas -3 winter and 10 spring
- Lupin -5 varieties
- Oca
- Mashua
- Yacon



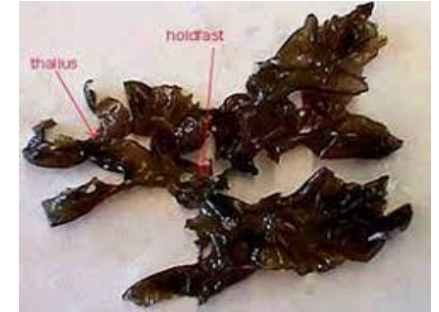
Grasses

- Mixed species sward
- Selected Foliage



Sea weed

- Porphyra sp. (Nori)
- Ulva sp. (Ulva lactuca – sea lettuce)
- Chondrus crispus (Irish moss)



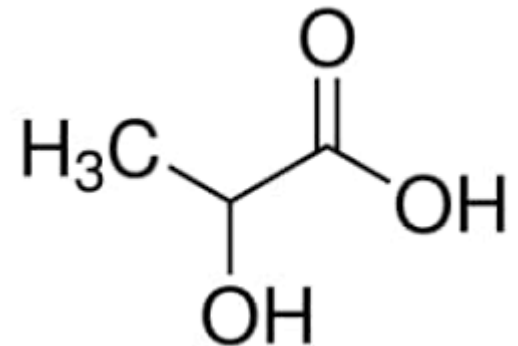
Case Study 1 - Fava Beans

- 13 Varieties available
- 7 Varieties prioritised
 - Grow in Ireland Lynx & Tundra
 - Low anti-nutrient vicine / convicine
- Protein Extracted via 2 processes (1 x standard, 1 x patentable)
- Protein levels achieved up to 85% Protein
- Extraction Yield 71.4%
- Process optimised and will be used for other crops



Fava Beans

- Residual Biomass sent to Task 4
- Compiling microbial biobank for biotransformation
- 2 strains identified for production of lactic acid from fava bean residual biomass
- Colour
- Lignocellulose.....
- Biogas

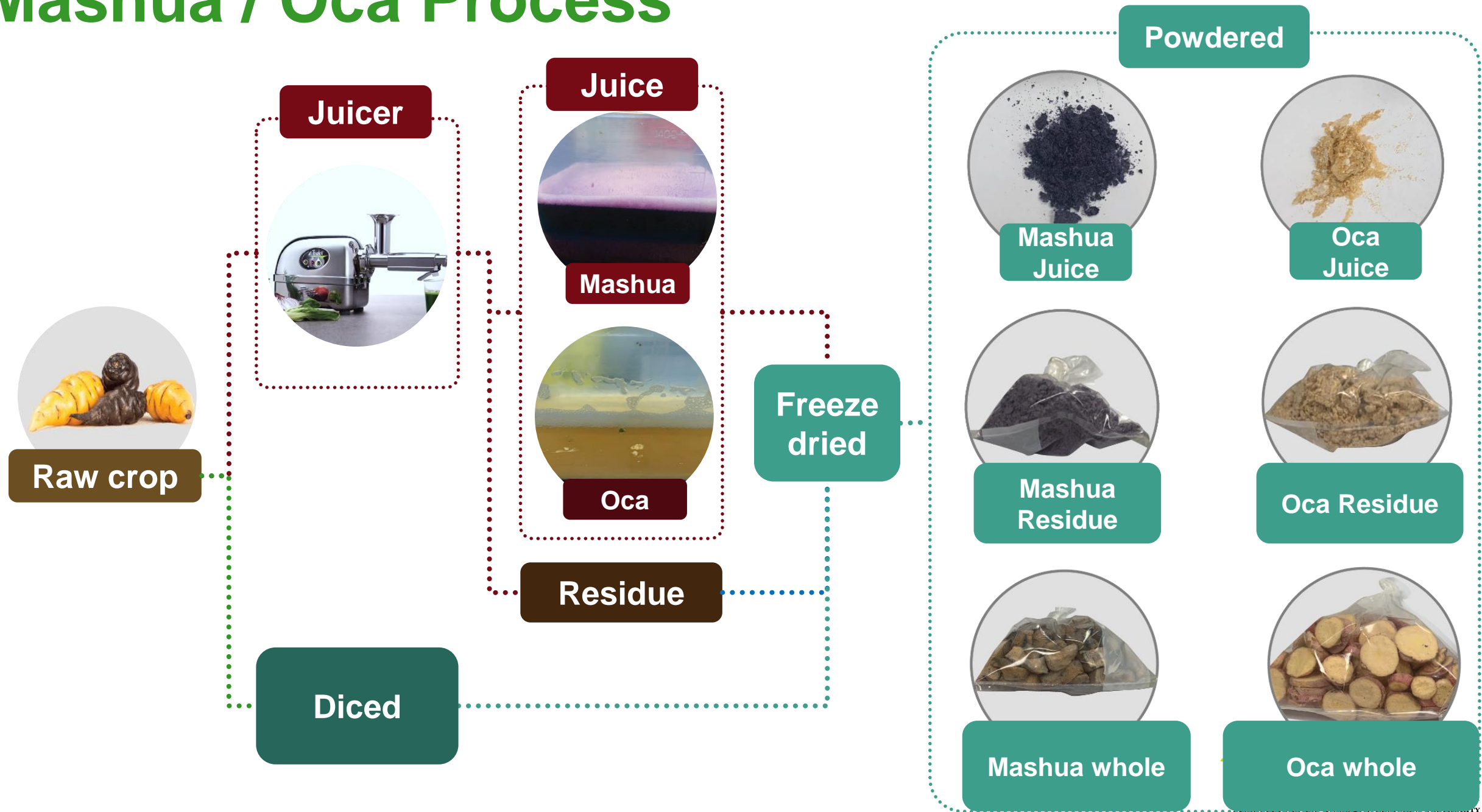


Case Study 2 - Oca and Mashua

- Oca is an Andean tuber that is the second most widely cultivated tuber after potato
- Mashua is also an Andean tuber crop fourth most widely cultivated after potato in the Andean region
- Suited to growth conditions in Ireland ✓
- Good protein profile ✓



Mashua / Oca Process



Analysis of dried powders for protein content



Mashua Juice



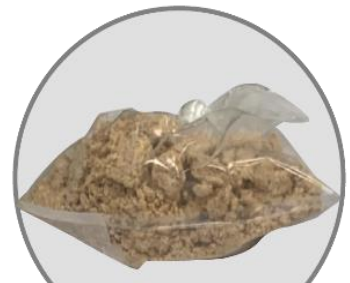
Mashua residue



Mashua whole



Oca Juice

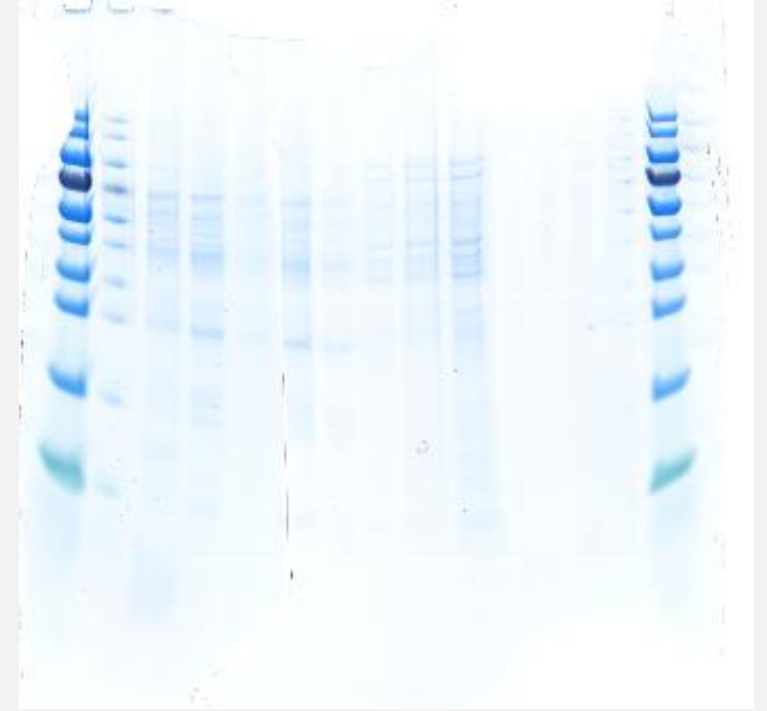


Oca residue



Oca whole

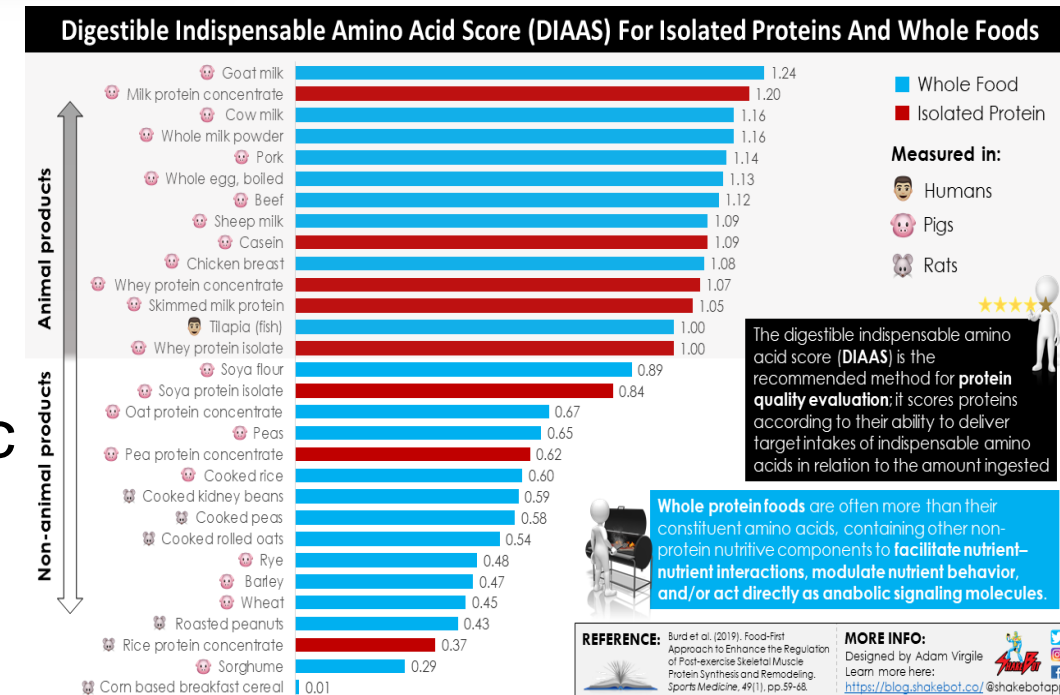
Gel protein analysis



- Each blue line representing an individual protein

What next?

- Extracted protein analysed for its amino acid profile & peptides
- Protein functionality
- Food formulation
- In-vitro digestion;
 - Digestible Indispensable Amino Acid Score (DIAAS)
 - INFOGEST models
- Human trials to evaluate the human metabolic responses to the consumption of extracted protein



What next?



- New novel protein products
- Digestibility score
- Biomass transformation products
- Land use models
- LCA /Kg Protein



U-PROTEIN

How will U-Protein Grow

Viable New Farm Enterprise

Impact

Crop Selection
& Land Use

Crop Valorisation
(Extraction &
Biotransformation)

Alternative Nutrients
(e.g., Protein)
& Components

Supply Chain
Integration

Time

U-PROTEIN Contacts

Project Co-ordinator	Mark Fenelon	
Principle Investigator	Ewen Mullins	
	Lead	Co-Lead
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Thank You!

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