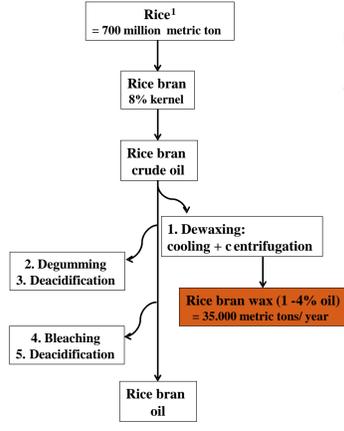


Optimisation of food waste materials for food manufacture resilience

Utilisation of a by-product of rice production to structure liquid oils

Rice bran wax (RBW) is a by-product of rice bran oil production (Fig. 1). RBW has been proposed as novel ingredient to structure liquid oils. RBW represents a promising alternative for the replacement of saturated triglycerides (Fig. 2).



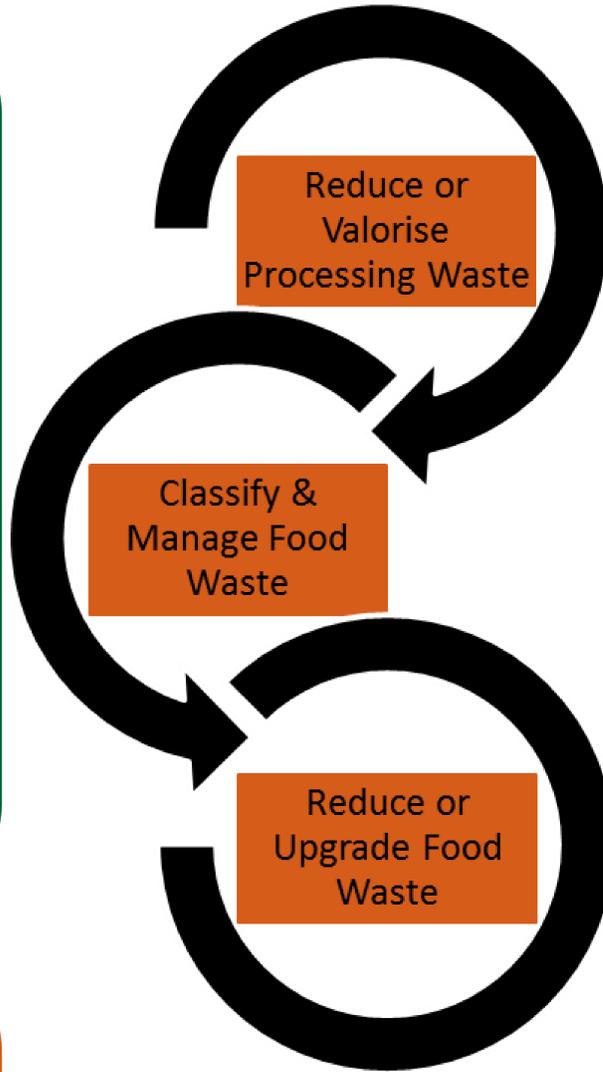
In this project, the microstructural, rheological and thermal behaviour of sunflower oil structured with RBW is being investigated (Fig. 2)



Fig. 2: Example of liquid (a) and gelled sunflower oil (b). Oleogel prepared adding 1% (wt%) to sunflower oil.

Fig. 1: Flow diagram of rice bran wax production

¹Blake AI, Co ED, Marangoni AG (2014) Structure and Physical properties of Plant Wax Crystal Networks and their relationship to Oil Binding Capacity. J Am Oil Chem Soc 91: 885-903



Using new processing techniques to extend product shelf life

	After Drying	Rehydration at 50 °C
Raw Carrot		N/A
Air Dried, 50 °C		
ScCO ₂ (pure), 50 °C		
ScCO ₂ (EtOH), 50 °C		

Supercritical carbon dioxide with an ethanol co-solvent to dry and rehydrate carrot samples (by Brown, Fryer et al. 2008)

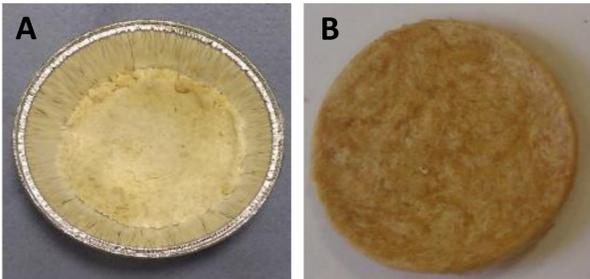
Manufacturing biscuits with increased resource efficiency

In this project biscuits have been manufactured using a heated press instead of a conventional oven. This alternative process has enabled biscuits to be produced without additional water.



Biscuit processed in conventional oven. Water added as an ingredient at a concentration of 16%

Biscuit processed with no additional water added as an ingredient, moisture would be present in flour, sugar and butter ingredients

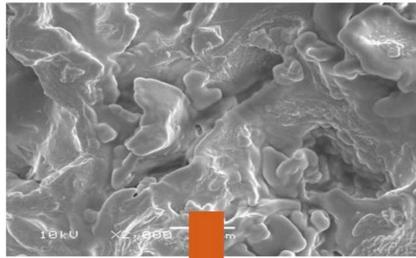


(A) processed in oven, (B) processed using heated press

Biscuits could only processed using the heated press at this low water concentration, offering a more resource efficient manufacturing process than the conventional oven bake process.

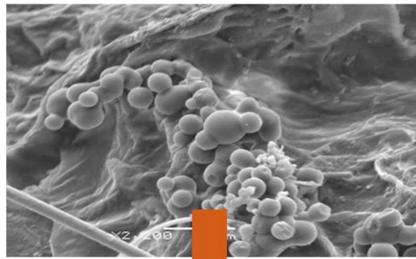
Upgrading food waste to produce novel food materials

Coffee waste



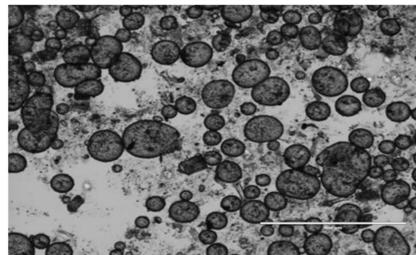
Aqueous Treatment

Particulate emulsifiers



Emulsification

Particle Stabilised Emulsions



New way of categorising food waste

Without agreed consensus on how to measure or even categorise waste, it is difficult to design a waste management strategy for a particular scenario. In this respect there is a need for a framework which provides a structure around which to assess various types of waste at various stages in the supply chain, evaluate their environmental impact and provide informed guidance on the most appropriate methodology or technology to implement to address these particular waste issues. As a result, a novel categorisation to classify the different types of food waste has been developed.

Characteristic	Food-waste product
	Packaged beef steak
Edibility	Edible
State	Spoiled
Origin	Animal based
Complexity	Single product
Animal product presence	Meat
Stage of the supply chain	Manufacturing
Treatment	Processed
Packaging	Packaged
Packaging biodegradability	Biodegradable
Best management option	1.- Anaerobic digestion 2.- In-vessel composting 3.- Thermal treatment with energy recovery

Nine-stage categorisation to improve the decision-making in food waste management