

Move over composting...

Scottish businesses are using industrial biotechnology to transform waste from food and drink manufacturing into competitive new products, writes **ROGER KILBURN**

Food waste is a broad term. It can refer to things as varied as pastries, stale and unpurchased at the end of the day; 'wonky' vegetables that are shunned for their shape; or the scales left over when processing fish.

Wherever it is coming from, there is a pressing need that we do something about this waste because about half of all the food produced does not get eaten, according to the ReFood 'Vision 2020' initiative. Its main aim is to bring about a change in Government strategy, to ban food waste from landfill and instead see it recycled.

The benefits could be vast – from affecting the economy, improving the level of nutrients in soil, and reducing greenhouse gas emissions. It is not limited to household food waste – 'Vision 2020' recommends that businesses collaborate with sustainability initiatives to consider, separate and eliminate food waste.

To enable this, we need to work out how best to utilise the 14.8 million tonnes of food waste that is generated each year in the UK, according to the initiative.

Much of the waste comes from the food and drink manufacturing pipeline, and collaboration here will have the greatest impact on reducing waste. The Industrial Biotechnology Innovation Centre (IBioIC), headquartered in Glasgow, aims to turn it into a business opportunity.

In Scotland, a circular economy (CE) is a priority of the Government. Its National Plan for Industrial Biotechnology (IB) outlines the country's ambition to transform the competitiveness and sustainability of multiple industries through the use of IB. The plan aims to grow IB turnover in Scotland to £900m by 2025.

IB is the process of using natural resources to create new chemicals and ingredients, taking micro-organisms and enzymes to generate industrially useful products in a growing range of sectors including chemicals, food and drink, textiles and fuel. The IBioIC's role is as a specialist in IB, forming collaborations and guiding organisations from a concept or idea through to industry adoption.

Key players in the rapidly growing IB sector in Scotland are already presenting innovative ways to take food waste and turn it into something useful. The centre works with around 110 companies, from SMEs to multinational giants,



Langoustine shells: food waste is taken by CuanTec and made into a plastic-like material (below)



Curran fibres: made from vegetable cellulose



many of which are recognising the economic and environmental potential of IB in dealing with food waste.

One of these is CuanTec, named after *cuan*, the Gaelic word for ocean. CuanTec makes a sustainable plastic-like material from leftover langoustine shells, among other food waste. To begin with, CuanTec will use its bioplastic as a sustainable alternative to plastic wrapping for the packaging of fresh fish. The bioplastic is made up of chitosan, a material with antimicrobial properties, giving it the potential to further reduce food waste by extending the shelf life of the products it eventually wraps.



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The IBioIC recently worked with Zero Waste Scotland on its *Biorefining Potential for Scotland* report, which identifies that more than 140,000 tonnes a year of harvested fruit and vegetables across the country are currently not valorised. A great example of innovation in this specific area is from Cellucomp. Using the cellulose in carrot or sugar beet peel, the company manufactures strong, stiff fibres trademarked as Curran.

So far, Cellucomp has demonstrated that it can enhance films in paints, has applications in oil and gas drilling and paper, has added it to food to reduce fat and even used it to make a skateboard! Curran has a low carbon footprint due to its efficient process, uses far fewer chemicals and does not emit toxic gases.

Scotland's £4bn malt whisky industry is world-renowned. But the whisky itself is only 10% of the product – co-products of interest are the fermentation liquid known as the 'pot ale' and the spent grains or 'draff'. Altogether, 1,600 million litres of pot ale and 500,000 tonnes of draff are made every year.

Celtic Renewables aims to take advantage of these leftovers by converting them into bio-fuels. There is a brilliant double impact here, not only in utilising waste but also creating a sustainable alternative to fossil fuels. Excitingly, just last year, this biofuel was used to power a car for the first time.

The Scottish Government's CE strategy estimates that an additional £500m-£800m could be generated for the economy by using food and drink by-products. The IBioIC and its innovative members are making huge progress in harnessing the prospects in food waste.

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