

CASE STUDY: Pioneering new R&D project for Perthshire snack business



Case Study Partner

Abertay University delivers first rate teaching, research and innovation in food science, with all courses and projects designed for real-world impact. Through its Food Innovation at Abertay service, the University engages with food and drink businesses at local, national and global level, offering specialist staff, equipment and facilities to meet industry challenges. The project leads, Dr Keith Sturrock and Professor Alberto Fiore, have extensive experience in food chemistry and food processing and have particular expertise in the mitigation of acrylamide formed by the Malliard reaction in food production.



“Working with industry like this is vital for our work to have real impact.”

—
Professor Alberto Fiore

Overview

In 2023, the European Commission will be issuing an update to the benchmark it first issued in 2018 to encourage food processors to minimise acrylamide levels in food products in the interests of consumer safety.

Acrylamide is a natural chemical compound that can form in starchy foods cooked or fried at high temperatures, including coffee, biscuits, cereals and crisps. It is created when sugars react with amino acids at temperatures above 120C and has potential health implications as a probable carcinogen, although scientific evidence has not yet proven a direct correlation with human health. The main goal of the regulation is to encourage processors to implement steps to lessen the formation of acrylamide as a precautionary measure.

Abertay University, one of the leading centres for acrylamide research in the UK, approached local crisp manufacturer, Taylors Snacks, to suggest a collaboration to research and develop an inline digital monitoring system to measure and manage levels of

acrylamide in crisp production in real time. This will be a first for the industry.

This builds on the substantial work that Taylors Snacks, producers of Mackie's of Scotland crisps (recently rebranded to Taylors Snacks), has already undertaken to develop tools and techniques to minimise acrylamide levels in recent years.

The project has been made possible by funding from Innovate UK's Knowledge Transfer Partnership (KTP) scheme. Over 29 months, Abertay University will explore the full process of crisp manufacturing at Taylors Snacks to build an in-depth understanding on which to create the inline digital monitoring. This innovative technology that will anticipate acrylamide levels and allow processes to be modified in real time.

“In the home, acrylamide would occur in burnt toast or chips that have been in the oven for too long, but in industry, it's more nuanced.”



“This is pioneering work which will blaze a trail in the industry,” says James Taylor, Managing Director of Taylor Snacks. “As a third generation family business, we’ve always been proud to produce quality products and we constantly aim to exceed the best practice benchmark.”

This project with Abertay University will give us the tools to optimise processes to continue to produce safe, great tasting products for the snack market while also supporting the rest of the sector who will also benefit and learn from this valuable innovation work with Abertay University.”

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From its base in Errol, Perthshire, Taylors Snacks Ltd produces crisps, popcorn and other snacks for retail, export, wholesale and food service. The business was built as a joint venture in 2009 with Mackie’s of Scotland, famous for its ice-cream and, more recently, chocolate. Last year, the two businesses separated into family ownership between the Taylors and the Mackies to time with the next generation taking the reins and focusing on driving each specific market forward. Taylors Snacks launched as an independent brand in May 2023.

Food Science. He has dedicated the last 15 years to acrylamide research, working with a number of businesses including multinational processors:

“The aim is to develop innovative technology that will anticipate acrylamide levels and allow processes to be adapted in real time. To do this, we need first to build a full understanding of the processes and how to reduce the levels of acrylamide as much as possible to satisfy both customer and food assurance expectations without compromising the unique characteristics of the product which make it so popular.”

The collaborative research will take a holistic approach, exploring the full process from the raw materials to cooking processes and the end product, explains Professor Alberto Fiore, who is co-leading the project with forensic chemistry expert Dr Keith Sturrock at Abertay University’s Division of Engineering and

Acrylamide forms naturally in many familiar foods, including biscuits, coffee, crisps and chips, when cooked above 120c and the asparagine (amino acids) and sugars react.

RHASS Presidents’ Initiative for 2023

This case study is one in a series, highlighting where farmers, across a range of different sectors, have benefited from scientific advancements.



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“In the home, it would occur in burnt toast or chips that have been in the oven for too long, but in industry, it’s more nuanced,” says Professor Fiore. “Working with industry like this is vital for our work to have real impact.

We can come up with the perfect solution in the lab, but it’s when we take it out of a control situation into real life that we see the implications and where we can make improvements.

An associate from Abertay University will be based at Taylors Snack’s Head Office to manage the project and maximise the research development and knowledge transfer.

Gillian Black, Technical Manager at Taylors Snacks, who has worked in the food industry for over 15 years as a technical lead, as well as in quality assurance and new product development, praises the extensive scientific support the collaboration gives the business exposure to:

“We don’t have access to the research and development teams of some of the much bigger multinational businesses.

Working with Taylors Snacks will give us valuable insights and live scenarios that will positively impact wider industry research and development.”

Professor Fiore’s research and collaborative work on acrylamide mitigation has included looking at all variables from plant varieties to the radio frequency of ovens, introducing new technology or naturally occurring antioxidants, and developing recipes.

The turnaround, frequency and volume of lab test results and research is much greater than we’d be able to do on our own. It will also allow us to run additional taste panels if we develop recipes to ensure we retain the taste and ‘crunch’ of crisps that our customers enjoy at the same time as further enhancing food safety standards. We are pleased to see this partnership underway and to benefit from the world-leading insights and experience of Professor Fiore and his team.”

Taylors Snacks, which does all its crisping in Scotland, will also be contributing towards the cost of the project.



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