Nottingham BBSRC DLA Programme : Sweetness at Subzero: Sugar Reduction Strategies in Alternative Protein Ice Cream (CASE project)

University of Nottingham, School of Biosciences

Start date September 2026

About

Thanks to £14m of funding awarded by the Biotechnology and Biological Sciences Research Council (BBSRC), the University of Nottingham and Nottingham Trent in partnership with the National Biofilms Innovation Centre (NBIC) are offering fully funded innovative four-year cohort-based training in frontier science.

Postgraduate researchers will be recruited to a research cluster within each of the overarching research areas:

- Alternative and Emerging Protein sources for Sustainable food and feed (Sustainable Agriculture and Food Security) - Cluster lead Professor John Brameld
- RIC@N-DLA: Multiscale RNA Science from mechanisms to applications (Bioscience for Human Health) – Cluster lead Dr Federico Daja-Bailador
- Future Genomes Across Life – Engineering biology for sustainability and innovation (Biotechnology for Sustainable Growth) – Cluster lead Professor Thorsten Allers

Project description

We invite applications for a BBSRC fully funded CASE studentship to investigate sugar reduction strategies in alternative protein ice cream. This sits under our Sustainable Agriculture and Food Security theme and is offered through partnership with Magnum Ice Cream Company.

Ice cream delivers a multisensory experience, where flavour, sweetness, texture, temperature and texture all interact. At subzero temperatures, perceived sweetness and flavour are reduced, yet the mechanistic drivers remain poorly understood.

Limited research has explored physical and sensorial properties of protein interactions at frozen temperatures. It is hypothesised that protein might alter ice crystal growth and impact melting behaviour, which in turn will affect how sugars and flavours are distributed and released during consumption of frozen desserts. Psychophysics taste studies and temporal sensory methods will be used to quantify how trigeminal cold temperature and texture modulate sweetness and flavour intensity, as well as flavour measurement (e.g. GC-MS and APCI) to measure flavour release and perception across different model systems varying in sugar and protein type. This study will combine sensory studies with food structure, food flavour and protein functionality to support the development of lower sugar formulations that incorporate sustainable protein sources that also maintain sensory appeal.

Aims and Objectives

Characterise the functional and structural properties of protein bases in the frozen systems.

Measure psychophysical function and temporal sweetness perception of a range of sugars and alternative sweeteners in a model protein matrix.

Quantify how cold perception and texture modulate sweetness and flavour-sweetness pairings, with a focus on mechanisms.

Develop and validate predictive models to optimise sugar reduction in protein based frozen formulation without impacting sensory appeal.

Why choose this project?

The successful candidate will join a supportive, interdisciplinary environment anchored by the Sensory Science Centre (SSC). The SSC conducts world leading sensory and consumer research to advance sustainable behaviour and the links between perception and food choice. The centre achieves this via ISO standard sensory/consumer facilities and an external expert sensory panel.

In parallel, the student will undertake a placement with The Magnum Ice Cream Company (TMICC), gaining end to end, onsite experience of pilot scale production and factory operations, chocolate and ice cream processing, and associated business alignment processes. They will integrate with the University's sensory and flavour research teams, join an existing cohort, participate in bimonthly research meetings and an annual research away day, and access internal training in Sensory Evaluation, Statistical Methods and Interpretation, Consumer Sensory Science, Food Flavour, plus TMICC's ice cream technology and intellectual property courses.

The SSC's multidisciplinary collaborations (food flavour, brain imaging, food structure, computer science) and sustainability focus enrich the training and research context available. The group fosters a collaborative culture, promotes work–life balance via wellness initiatives, provides conference presentation opportunities and international networking with world leading researchers.

For informal enquiries about the project please contact Dr Qian Yang.

Requirements

Applications are invited from candidates with backgrounds in Bioscience, Biochemistry, Microbiology, Biotechnology, Chemistry, Chemical/Biochemical/Process Engineering, Environmental Science, Pharmacy, Computer Science, Maths or related disciplines who have/expect to graduate with a first/upper-second UK honours degree, or equivalent qualifications gained outside the UK.

Applications are also welcome from candidates with a 2:2 undergraduate degree or lower, who hold a Masters degree in a relevant area or three or more years of full-time work experience relevant to your undergraduate degree, or to the PhD projects you are applying for.

Funding details

Funding is available for four years from October 2026. The award covers tuition fees at the UK rate, plus an annual stipend. The UK Research and Innovation (UKRI) stipend is tax free and was set at £20,780 for 2025/26 entry.

UK and International candidates are eligible to apply.