

## PhD Project Advertisement

**Project title:** UMTaste: Understanding the mechanisms by which umami taste influences salty and bitter taste to enable umami to drive salt reduction and improvement in meat alternative protein foods

**Project No:** FBS2024-029-Oruna-Concha-ra

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Keng Ngee Teoh, The European Committee for Umami (ECU), which is supported by Ajinomoto Foods Europe.

**Project description:**

The UK has been prioritising salt reduction since 2004 in response to the Scientific Advisory Committee on Nutrition (SACN) 2003 report on salt and health. In addition, the National Food Strategy has recommended eating less meat to reduce methane emission. Salt (NaCl) is used in foods for taste, preservation (reducing water activity), and for its impact on structure. However, salty taste remains the predominant driver for salt in many foods and although research has focused on finding sodium replacers (e.g. KCl), or extending salty taste (e.g. controlling salt distribution within a food matrix), such strategies are limited. Another approach is to use umami taste, the savoury taste associated with compounds such as monosodium glutamate (MSG). Umami taste has been shown to enable salt reduction in numerous foods; although in most studies the outcome measure was palatability rather than matched salty taste. Beyond salt, understanding and controlling the contribution of umami taste to overall taste may lead to improvements in plant-based protein foods through savoury taste and reduction in characteristic bitter taste, however, the mechanism by which umami taste enables salt reduction and bitter suppression remains inconclusive.

This project and the Doctoral Researcher will make significant contributions in this area. The research will involve extensive experimental, analytical and sensory methods as well as in-vitro cell assays to explore in detail the mechanism of action of the compounds responsible for umami taste, their individual and combined effects on salt and bitter perception (immediate and temporal), total taste intensity, and preference for salt-reduced on meat-alternative protein foods, particularly determining whether interactions occur at a receptor or cognitive level. The focus of the PhD will be primarily on:

1. Understanding whether umami tastants enable salt reduction through both receptor and cognitive mechanisms.
2. Assessing whether the ability of umami tastants to suppress bitter taste is compound specific.

The research will be undertaken in the Department of Food and Nutritional Sciences at the University of Reading (UoR) ([www.reading.ac.uk/food/](http://www.reading.ac.uk/food/)) and the Institute of Biological, Environmental and Rural Sciences (IBERS) at Aberystwyth University. Most of the experimental investigations including the chemical characterisation of tastants, sensory methods and in-vitro cell assays will be performed at UoR whereas the separation of taste fractions on a laboratory and pilot scales will be carried out at IBERS (Aberystwyth University).

The main research activities will involve:

- To develop appropriate aqueous and semi-solid food models and sensory methods to test the individual and combined effects of compounds responsible for umami taste (i.e. amino acids, 5'-nucleotides and glutamyl-peptides) on salt and bitter perception.
- To prepare and characterise taste fractions that include a wider range of glutamyl-peptides from plant sources and to scale this up using pilot filtration, evaporation, reverse-osmosis and spray drying.
- To evaluate the taste fractions collected for their salt and bitter perception in the developed models.

- To set up in-vitro receptor cell assays
- To test the individual and combined effects of amino acids, 5'-nucleotides and glutamyl-peptides on cell signalling.

### Training opportunities:

The Doctoral Researcher (DR) on this project will receive training from the supervisory team and their wider research groups in all aspects of the experimental work; This includes: analysis of tastants using state of the art LCMS equipment; sensory psychophysical and temporal methods to measure the impact of umami tastants on perception of salty, umami and bitter taste in different food matrices; separation of taste fractions on a laboratory and pilot scales, pilot preparation of taste fractions using pilot filtration, evaporation, reverse-osmosis, spray drying and crystallisation at Aberystwyth; and analysis of receptor cell response to tastants using in-vitro cell assays. This project is partly funded by the European Committee for Umami (ECU) which is supported by Ajinomoto Foods Europe. The DR will gain broader commercial experience through the project partner ECU.

The DR will also be encouraged and funded to attend relevant training courses and attend and present papers at national and international conferences.

### Student profile:

This project would be suitable for students with a BSc (2.1 or above) in Biotechnology, Food Science/Technology or any related discipline, ideally with some knowledge of food science and food product formulation.

### Stipend (Salary):

FoodBioSystems DTP students receive an annual tax free stipend (salary) that is paid in instalments throughout the year. For 2023/24 this is £18,622 and it will increase slightly each year at a rate set by UKRI.

### Equality Diversity and Inclusion:

The FoodBioSystems DTP is committed to equality, diversity and inclusion (EDI), to building a doctoral researcher(DR) and staff body that reflects the diversity of society, and to encourage applications from under-represented and disadvantaged groups. Our actions to promote diversity and inclusion are detailed on the [FoodBioSystems DTP website](#).

In accordance with UKRI guidelines, our studentships are offered on a part time basis in addition to full time registration. The minimum registration is 50% FT and the studentship end date will be extended to reflect the part-time registration.

### References:

- Maluly et al (2017) doi:10.1002/fsn3.499  
Kim et al (2017) <https://doi.org/10.1016/j.foodchem.2017.04.123>  
Wang et al (2022) <https://doi.org/10.1016/j.foodqual.2021.104503>  
Kawasaki et al (2016) <https://doi.org/10.1016/j.foodqual.2016.03.010>

**For up to date information on funding eligibility, studentship rates and part time registration, please visit the [FoodBioSystems website](#).**