

FoodBioSystems DTP - PhD Project Advertisement Text

Project Title: FOODBIOSYSTEMS - Nitrosamine formation and colorectal cancer (CRC) risk in processed meats: investigating the role of nitrites, extraneous nitrates and possible nitrite replacers

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Research Group: FOODBIOSYSTEMS BBSRC DTP

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Project Description:

Processed meat intake has been associated with an increased risk of colorectal cancer, and in 2015 the WHO has categorised processed meat as “carcinogenic to humans”. The endogenous formation of carcinogenic nitrosamines is one of the most likely pathways explaining this association. The term ‘processed meat’ is imprecise, and refers to meat which has been smoked, cured or salted. In particular the nitrite content in many processed meats has been linked to increased cancer risk and the increased formation of nitrosamines. Sodium nitrite is widely used as a curing agent in meat products to inhibit growth of *Clostridium botulinum*, spoilage, oxidative rancidity and to obtain a desired red meat colour. The actual impact of nitrite in processed meat on cancer risk is however not known, and preliminary studies have not shown any difference in the endogenous production of nitroso compounds between red and processed meat intake. Some manufacturers substitute nitrite for vegetable extracts that contain nitrate to cure meats, this ultimately results in the generation of nitrite. Alternative nitrite-replacers not containing nitrate have also been developed. The objective of this project is therefore to further investigate nitrosamine formation, potential exposure to the population, and in conjunction with the industry investigate the risks/benefits of proposed alternatives.

This project will:

1. Use food intake data in combination with measurements of food nitrates/nitrites to calculate average daily intake levels.
2. Use simulated *in vitro* digestion, and a model food system to systematically assess the importance of nitrite and nitrate concentrations within the meat matrix for the formation of nitrosamines.
3. Based on 1 and 2 the typical intestinal nitrosamine exposure in the human population will be estimated, along with the dietary contribution to CRC risk.

4. Undertake an *in vivo* pre-clinical trial in a relevant animal model to study the impact of diet on colorectal cancer risk. This will be used to compare different types of 'nitrite-free' pork product against a nitrite containing product.

The PhD will generate new data on a highly topical area of food/nutrition research and will provide a unique opportunity to engage with industry stakeholders to better understand the underlying risks associated with processed meat consumption and how they could be mitigated.

Funding Notes: This project is part of the FoodBioSystems BBSRC Doctoral Training Partnership (DTP), it will be funded subject to a competition to identify the strongest applicants. Due to restrictions on the funding, this studentship is only open to UK students and EU students who have lived in the UK for the past three years.

The FoodBioSystems DTP is a collaboration between the University of Reading, Cranfield University, Queen's University Belfast, Aberystwyth University, Surrey University and Brunel University London. Our vision is to develop the next generation of highly skilled UK Agri-Food bioscientists with expertise spanning the entire food value chain. We have over 60 Associate and Affiliate partners. To find out more about us and the training programme we offer all our postgraduate researchers please visit <https://research.reading.ac.uk/foodbiosystems/>.

Training opportunities: The student will gain valuable experience in basic science techniques *in vitro* and *in vivo*. The student will also gain skills in dietary data analysis, and statistical techniques for relating dietary intake to population exposure. The student will receive extensive laboratory training, and if required, will receive animal handling training.

Student profile: The student should have, or expect to obtain, a 1st class honours degree in nutrition or a related life-science who has an interest in diet and health. Ideally the potential student should have good statistical analysis skills, laboratory experience and be able to write to a high standard.