**FoodBioSystems DTP - PhD Project Advertisement Text**

**Project Title**: FOODBIOSYSTEMS - A New Approach to the Production of Cultured Meat with Enhanced Texture

**Lead Supervisor:** Prof Ian Hamley, Dept of Chemistry, University of Reading
**Email:** I.W.Hamley@reading.ac.uk

**Co-Supervisors:** Dr Ruth Wonfor, IBERS, Aberystwyth University and Mr Illtud Dunsford, Cellular Agriculture Ltd.

**Project ID:** FBS2020-03
**Research Group**: FOODBIOSYSTEMS BBSRC DTP

**Application Deadline**: 6 March 2020

**Project Description:** Future food production needs to meet a growing demand for food and changing diets, as the human population is predicted to reach 9 billion by 2050. Use of resources such as phosphorous and nitrogen are already exceeded sustainable limits, with agriculture placing large requirements on these resources. Further demands on the earth systems to increase food production will not be able to be supported. However current livestock production systems are major contributors to anthropogenic climate change and so, significant increases in production to meet growing demands will be unsustainable using current systems. Yet livestock products are nutrient dense and so cannot be discounted from diets without a suitable, healthy replacement. Therefore, transformative and disruptive production methods are needed to sustainably increase food production. Cultured meat is attracting great interest as a candidate for production of livestock products with reduced environmental impacts. This exciting project is to develop a new bioreactor method to prepare cultured meat. This technology produces aligned self-releasing tissue using a templating approach within the bioreactor. The approach has exceptional potential to produce aligned tissue for cultured meat tissue production with enhanced structural and textural properties. This is a collaborative project involving the University of Reading, Aberystwyth University and CASE partner Cellular Agriculture, a UK Small enterprise based in Llanelli, Wales.

This cutting-edge project will investigate the production of aligned extracellular matrix within self-releasing tissue produced from myoblasts. This will use peptide amphiphile coatings on aligned templates in cell culture plates. The peptide amphiphiles stimulate cell adhesion and facilitate release of tissue using cell-expressed matrix metalloproteases (MMPs). The alignment template is a micropatterned Teflon substrate. This is prepared by a controlled rubbing process which leads to the production of microgrooves in the substrates. This templates the alignment of extracellular matrix produced by cells including collagen and other extracellular matrix proteins. The project involves the use of commercially available mouse myoblast cell lines for this initial work before extending the research to porcine cell lines. You will culture cells and examine the extracellular matrix produced using histochemical assays of extracellular matrix components, along with morphology and property studies and meat texture analysis, at the University of Reading. The project work at Aberystwyth will utilise the knowledge and expertise within the UK small company Cellular Agriculture's currently funded research projects at Aberystwyth and Bath on myoblast muscle cell sources and bioreactor designs to test the aligned extracellular matrix.

**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.

This project is co-funded by CASE partner Cellular Agriculture.

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:** At Reading, the project will provide training in cell culture methodologies and preparation technique for aligned tissue production using peptide amphiphiles and microgroove-patterned substrates. In addition, training in cell assay methods, electron microscopy, synchrotron x-ray scattering, rheology and texture measurement methods will be provided.

At Aberystwyth, training will be in cell culture, primarily related to the culture of cells in the Cellular Agriculture bioreactor and the extraction of primary cells from muscle tissue (from abattoir samples). The student will also be trained in further cell assay methods as well as molecular methods, such as real-time PCR.

Within the four-year period of the PhD, Cellular Agriculture will provide a placement for the student covering business management and commercialisation potentials of the research. The placement will provide experience in structuring a business case, pitch, financials, details of collaboration and engaging with senior staff within the external companies. Furthermore, Cellular Agriculture are well connected within the in vitro meat production industry, collaborating internationally and will provide experience and connections within the industry throughout the project and within the placement.

**Student profile:** This project will suit applicants with interests in biotechnology and a suitable background with knowledge of cell biology in particular. The project is interdisciplinary and also involves aspects of food science and technology, chemistry, biotechnology and agriculture. You should have a BSc or master's degree or equivalent qualification in a related field. The project involves research at Reading and Aberystwyth, as well as placements at Cellular Agriculture in Llanelli.