

## FoodBioSystems DTP - PhD Project Advertisement

### Project title:

FBS2021-83-Chen: Digital Design and Scale-up of Bioprocesses for Cultured Meat Production

**Lead supervisor:** Dr Tao Chen, University of Surrey, Department of Chemical & Process Engineering

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### Co-supervisors:

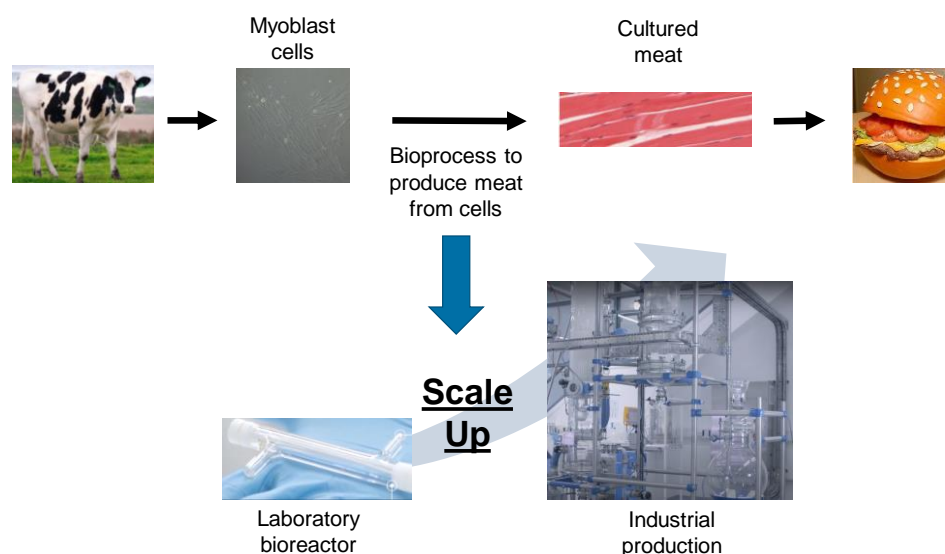
Dr Ruth Wonfor, Aberystwyth University

Mr Illtud Dunsford, Cellular Agriculture Ltd

### Project description:

Cultured meat, while enjoying great advocacy for its environmental, health and moral credentials, is still within the R&D phase. A key limiting factor is the cost, which is still not competitive with conventional meat. Therefore, efficient design, scale-up and operation of the production bioprocesses are critical for a viable product. Cultured meat research has largely focused on laboratory studies of the choice of cells, culture medium and bioreactor; however it is unclear how such results could be translated to large-scale production.

Successful scale-up of industrial biotechnology has often relied on computer modelling to understand the constraints on mass/heat transfer and mechanical stress at different scales. Such a digital design approach has led to reduced time and resources in process scale-up with significantly improved production efficiency and reduced costs. Research into model-based process design for meat culturing in bioreactors is lacking, and so there is a need for novel research in this area to help alleviate one of the biggest barriers to market, the cost of producing cultured meat.



**Fig. 1:** Bioprocess design & scale up is crucial to produce cost-effective cultured meat with minimum environmental impact.

**The aim of this project is to assess the use of computer modelling to aid the design and scale-up of bioprocesses for cultured meat production.** This multidisciplinary project will combine expertise in cell biology (Aberystwyth University), computer-aided bioengineering (University of Surrey) and industrial application (Cellular Agriculture Ltd). The specific objectives are:

1. Develop and validate a computer model for meat culturing bioprocess at small-scale, based on the laboratory data at Aberystwyth and the state-of-the-art bioreactor at Cellular Agriculture.
2. Extend the small-scale bioreactor model to larger scales (pilot and full production).
3. Demonstrate the potential of the developed methodology for scale-up through simulation studies.

### **Training opportunities:**

This multidisciplinary project will develop a unique set of skills in the PhD student to be applied to the AgriFood sector, through creation of an interface between experimental and computational studies for process design and optimisation. The student will be trained in chemical engineering (computer programming, mathematical modelling and specialised modelling software tools), as well as cell biology (cell culturing, biological analysis and microscopy). Furthermore, the student will have the opportunity to gain valuable industry experience through a three-month placement at Cellular Agriculture Ltd, a leading start-up company specialising in bioprocess for cultured meat. The student will benefit from Cellular Agriculture's wealth of experience in the exciting, upcoming industry of cultured meat and links to large scale companies involved in the industry.

### **Student profile:**

This project would be suitable for students with a degree in bioengineering, chemical engineering, tissue engineering or a closely related subject.

### **Funding details:**

This PhD is a CASE funded project and so has support from the industrial partner, Cellular Agriculture Ltd. The project is part of the FoodBioSystems BBSRC Doctoral Training Partnership (DTP), it will be funded subject to a competition to identify the strongest applicants.

The studentship is open to UK and international students (including EU countries) however due to funding rules, no more than 30% of the projects can be allocated to international students.

The funding will include a tax free stipend (minimum £15, 285 per year), support for tuition fees at the standard UK rate (currently £4,407 per year) and a contribution towards research costs. **Please note** that the host universities have not yet confirmed the level of fees charged to international students funded by the DTP. Fee levels may vary across the institutions. This information will be shared on the FoodBioSystems DTP website as soon as it becomes available.

### **To apply**

Please go to [FoodBioSystems DTP website](#) for information on how to apply for this studentship. The closing date for applications will be 8 February 2021.