

Project title: The Impact of Cellular Agriculture on Land Use and the Environment in the UK and Africa

Ref: OP2411

Keywords: Cellular Agriculture, Biotechnology, Cultivated Meat, Biodiversity, Land use

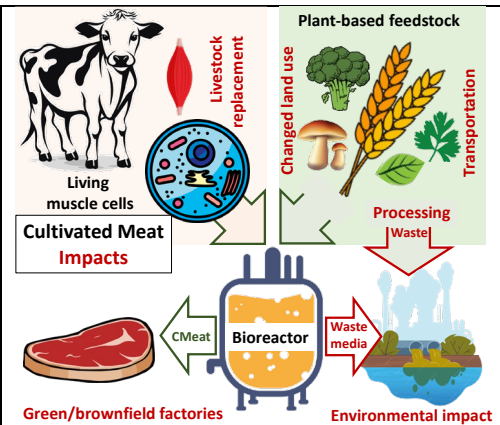
One Planet Research Theme:

Climate & Climate Change | Earth System Processes | Anthropocene | Environmental Informatics

Lead Supervisor: Dr James Henstock, Northumbria University

Key Research Gaps and Questions:

1. What are the implications of the growing 'cultivated meat' industry for land usage and environmental impact?
2. Will adopting cellular agriculture help developing regions to preserve natural habitat or present new problems?
3. Can we design biomanufacturing and supply chain technologies to help the industry grow sustainably?



Project Description: Cellular agriculture – manufacturing meat and milk using biotechnology rather than animals is emerging as a viable way to feed the growing global population with high-protein alternatives to intensively farmed livestock. CellAg has rapidly grown from its proof-of-concept origins in 2013 to become a \$3Bn industry supported by national governments in China, Singapore, USA, Netherlands and the UK as part of Net Zero policies and long-term food security plans. However, to disrupt even part of the \$1.3T meat industry which produces over 300 million tons of meat annually will require major changes in the way that land is used for food and feedstock production. Whilst 'lab-grown' alternatives may be more efficient than farming livestock, the current manufacturing techniques are derived from the biopharmaceuticals industry and require complex international supply chains, single-use plastics and release substantial CO₂ and eutrophied wastewater containing animal cytokines and growth factors.

In this project, you will model the challenges that mass-scaled biotechnology may present to the natural environment, and investigate technological solutions to these problems which you will test in the laboratory, e.g. the impact of waste culture media on environmental microbiomes, alternatives to CO₂-buffered bioprocessing, locally-sourced feedstocks, replacement of single-use plastics with sustainable or recyclable alternatives, and decentralised manufacturing. Working with our partners WildBio in South Africa, you will focus your studies on comparing the environmental challenges and impacts of CellAg in heavily industrialised economies and Southern Africa, as cultivated protein reaches price parity with conventional meat and both demand and supply increase. You will experience the research and policy culture in South Africa and work with scientists to understand and mitigate the environmental impact of this emerging biotechnology.

Prerequisites: Students with a strong interest in cultivated meat and biodiversity conservation. Desirable skills include computer modelling, cell culture laboratory experience and engineering. For more information, please contact Dr James Henstock (james.henstock@northumbria.ac.uk)

