

Identification and Characterization of Species-Specific Genetic Elements for GMO-Free Cultivated Meat Engineering

BCSP 2026 PhD Studentship · Dr Francesca Ceroni

PhD Program Overview

The Bezos Centre for Sustainable Protein at Imperial College London, in collaboration with the Department of Chemical Engineering, is offering a fully funded PhD opportunity focused on the identification and characterization of species-specific genetic elements for GMO-free cultivated meat engineering. This project aims to develop a “cis-genic” genetic engineering toolkit for cultivated beef, using bovine-only genetic parts to enhance cell proliferation, differentiation and growth without triggering GMO labelling. The goal of this research is to deliver an engineering biology approach to cultivated meat that addresses consumer and regulatory concerns regarding traditional GMOs and provides a plausible path to higher consumer acceptance and streamlined regulatory approval.

Bezos Centre for Sustainable Protein Doctoral Program

This PhD program is part of the **Bezos Centre for Sustainable Protein's** broader initiative to advance knowledge and accelerate innovation in sustainable proteins, to make the food system more sustainable, equitable, resilient, efficient and healthy. The centre will do this through five pillars of work, namely research, translation, education, network and advocacy.

Research Focus

This interdisciplinary PhD will combine perspectives from synthetic biology, computational genomics, machine learning, and mammalian cell engineering to explore key themes such as:

- **Identification and characterisation of native bovine genetic elements:** identifying bovine-specific promoters, enhancers, polyAs, ncRNAs and other regulatory elements that exhibit high activity in myoblasts and adipocytes, drawing on multi-omics data including ATAC-seq and RNA-seq.
- **Machine learning for genetic part design:** applying ML-based approaches to scan the bovine genome for safe-harbour loci and endogenous regulatory sequences, building on existing frameworks recently developed in the Ceroni lab for ML-based promoter and secretion peptide design.
- **CRISPR-Cas9 cell engineering:** using targeted knock-in into validated safe-harbour sites and stable landing-pad cell lines to ensure long-term, silencing-free expression of cis-genic constructs.
- **Open-access bovine genetic part registry:** characterising the strength and kinetics of endogenous bovine genetic components and addressing the gap in species-specific regulatory biology for non-model organisms in a food-production context.

Supervisory Team

- **Principal Investigator:** Francesca Ceroni, Department of Chemical Engineering, Imperial College London

- **Co-supervisor:** Cleo Kontoravdi, Department of Chemical Engineering, Imperial College London

Program Details

- **Funding:** Fully funded for UK home students
- **Location:** The research will be based at the Bezos Centre for Sustainable Protein and the Department of Chemical Engineering at Imperial College London

How This PhD Will Contribute

This project sits at the intersection of engineering biology, cellular agriculture and food regulation. By developing a blueprint for non-transgenic cellular agriculture, the student will help reduce the time to market for cultivated beef by aligning with cis-genic regulatory pathways, which are often less stringent than transgenic ones, and contribute to lowering raw material costs and accelerating growth rates to increase product affordability. The work will benefit the engineering biology community, cultivated meat producers, policymakers and regulators, and will directly support the Bezos Centre's mission to build a sustainable, equitable, resilient, and healthy food system.

Your Profile

We are looking for an enthusiastic and highly motivated PhD candidate with:

- A background in synthetic biology, biotechnology, or engineering
- Proficiency in Python/R for genomic data analysis
- Experience with mammalian cell culture
- Familiarity with molecular cloning techniques (e.g. Gibson or Golden Gate Assembly)
- A passion for the “Future of Food” and an interest in science policy regarding GMOs