

Master's Thesis Offer starting 01.08.2024

Master Thesis on Quantitative Downstream Process Modeling for Cultured Meat in SuperPro Designer

Background

As cellular agriculture advances toward commercialization, robust and scalable downstream processes become a key bottleneck. Efficient harvesting, separation, and purification steps are critical for ensuring product quality, economic viability, and environmental sustainability of cultured meat. While upstream processes such as cell cultivation have been explored extensively, there is a lack of quantitative models that simulate and optimize downstream operations at pilot and industrial scale. This thesis is embedded in the EU-funded [FEASTS](#) project (Fostering European Cellular Agriculture for Sustainable Transition Solutions), and aims to support strategic process development through modeling and data integration.

Skills that you will acquire

- Advanced modeling skills using SuperPro Designer for downstream processing.
- Fundamentals of filtration, centrifugation, cell separation, and tissue structuring in cellular agriculture.
- Critical understanding of mass balances, cost estimation, and environmental impact analysis in downstream bioprocesses.

Objectives

- Develop a quantitative process model for downstream operations in cultured meat production.
- Integrate key unit operations such as cell harvesting, concentration, washing, and formulation into the simulation.
- Estimate process efficiency, material yields, and resource consumption under different scale-up scenarios.
- Conduct sensitivity analyses and evaluate techno-economic and environmental trade-offs.

Tasks

- Set up and refine a **modular downstream process model** in SuperPro Designer.
- Identify critical parameters and propose **optimization strategies** for cost and sustainability.

Qualifications

- Enrollment in a Master's program in biotechnology, bioprocess engineering, chemical engineering, or a related field.
- Strong interest in process modeling and sustainable food production technologies.
- Analytical mindset and basic knowledge in mass balances, unit operations, or separation techniques.
- Previous experience with SuperPro Designer is a plus but not required.

We look forward to receiving your comprehensive application documents (grades, short motivation and your preferred starting date). Please send them via email to katharina.brenner@tum.de.

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