Professur für Cellular Agriculture
TUM School of Life Sciences
Technische Universität München

Master's Thesis Offer starting 01.08.2024

Master Thesis on Sustainability Assessment and Process Optimization in Cultured Meat Production

Background

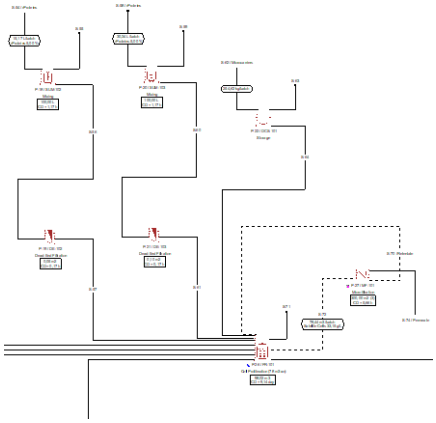
As cellular agriculture advances toward commercialization, robust and scalable downstream processes become a key bottleneck. Efficient harvesting, separation, and purification steps are critical for ensuring product quality, economic viability, and environmental sustainability of cultured meat. While 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 modelling and data integration.

Skills that you will acquire

- Advanced modelling skills in SuperPro Designer, with a focus on energy/material flow analysis
- Understanding of circular economy strategies in biotechnological systems
- Linking sustainability metrics with process engineering and infrastructure design

Objectives

- Model a sustainable baseline process for cultured meat production in SuperPro Designer
- Quantify the impact of circular strategies such as:
    - Media recycling (e.g., TFF, reverse osmosis)
    - Anaerobic digestion of organic waste
    - Energy integration via combined heat and power (CHP)
    - Heat recovery via heat pumps and exchangers
    - Carbon capture and reuse (e.g., via algae cultivation)



Tasks

- Define material and energy inputs for each unit operation and sustainability intervention
- Build a modular and adaptable SuperPro simulation to test various facility configurations
- Derive key process KPIs (e.g., waste reduction %, heat savings, emissions avoided)
- Provide visualizations and decision support for future facility design

Qualifikation

- Enrolment in a Master's program in biotechnology, bioprocess engineering, chemical engineering, or a related field.
- Strong interest in process modelling and sustainable food production technologies..
- 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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