

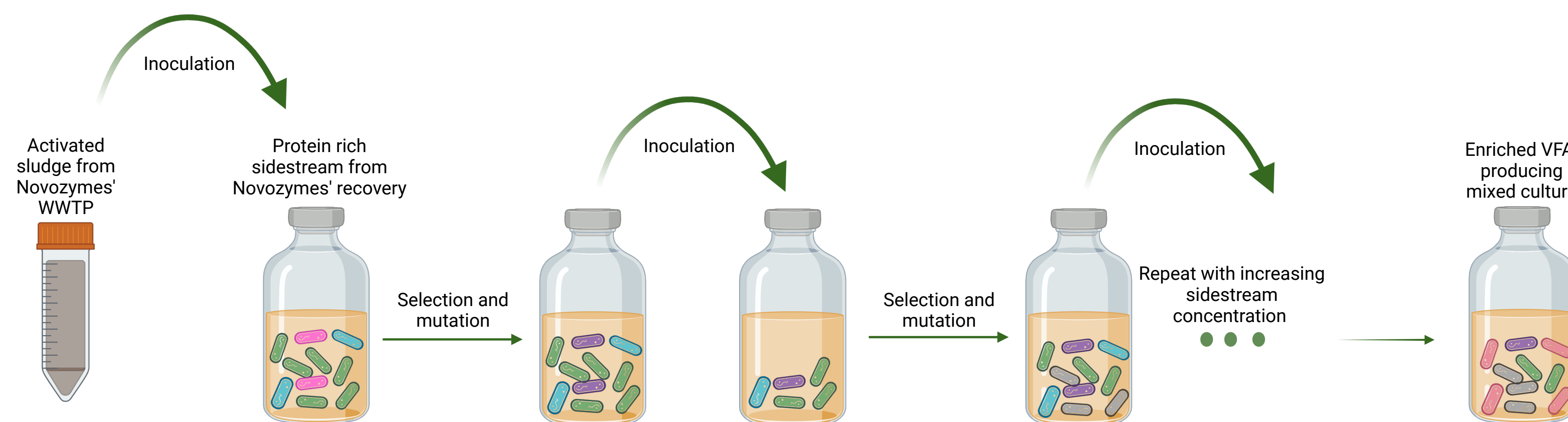
INTRODUCTION

Eco-friendly manufacturing practices are increasingly recognized for their ability to reduce expenses and environmental impact. Sustainable production methods target GHG emissions, waste, pollution, and resource depletion, creating positive outcomes for the environment. A biorefinery approach seeks to convert waste into valuable products, notably through fermentation technologies. This process not only minimizes negative environmental impacts but also creates new revenue streams by transforming waste into valuable products. Bioplastics, especially Polyhydroxyalkanoates (PHA), offer an environmentally friendly alternative to traditional plastics, utilizing waste streams to produce biodegradable polymers. This project aims to utilize mixed microbial cultures to efficiently convert one of Novozymes' residue streams into PHA, making it a sustainable alternative to fossil-derived plastics. This approach aims to manage waste while generating revenue through bioplastic production.

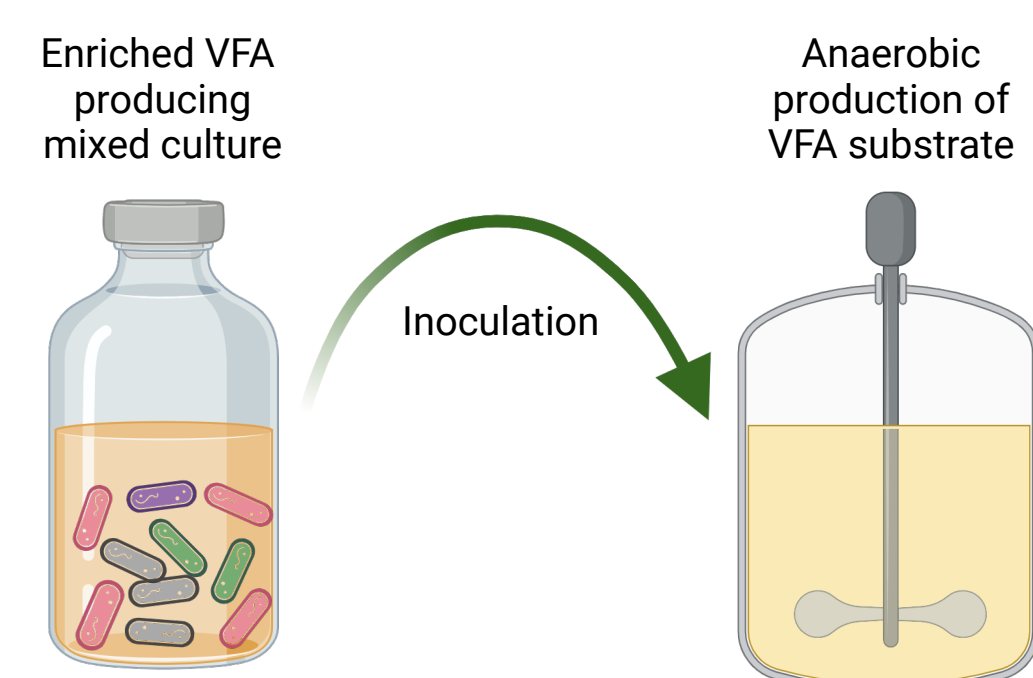
METHODS

- Adaptive laboratory evolution using activated sludge as inoculum source and a sidestream from Novozymes' recovery process as substrate for anaerobic fermentation (currently in progress)
- GC-FID for identification and quantitation of VFAs and other metabolites (currently in progress)
- UPLC for identification of metabolites (currently in progress)
- NMR for identification of unknown metabolites and characterization of PHA composition (in coming months)
- DoE and statistical optimization of the process (in coming months)

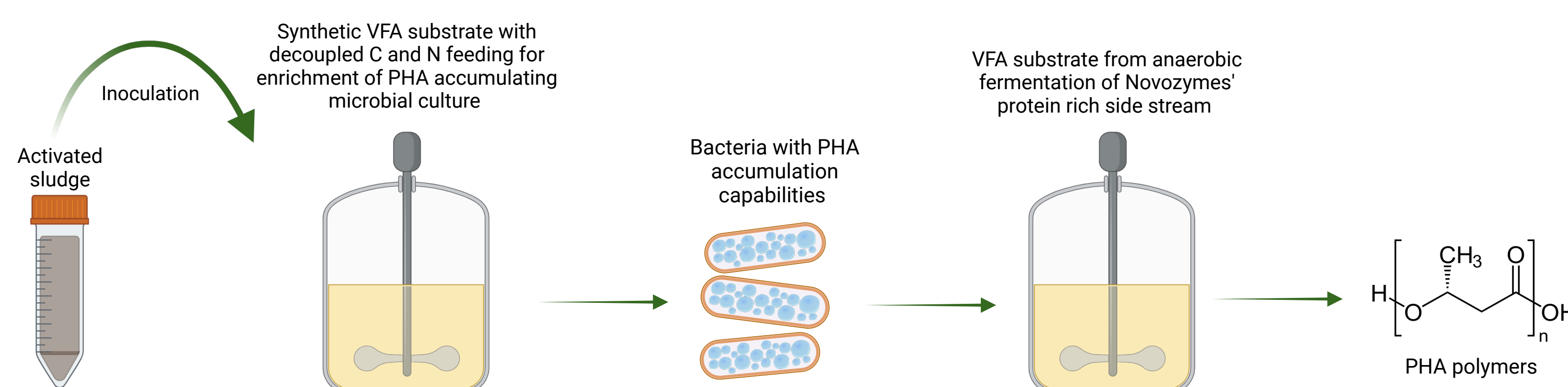
Adaptive Laboratory Evolution



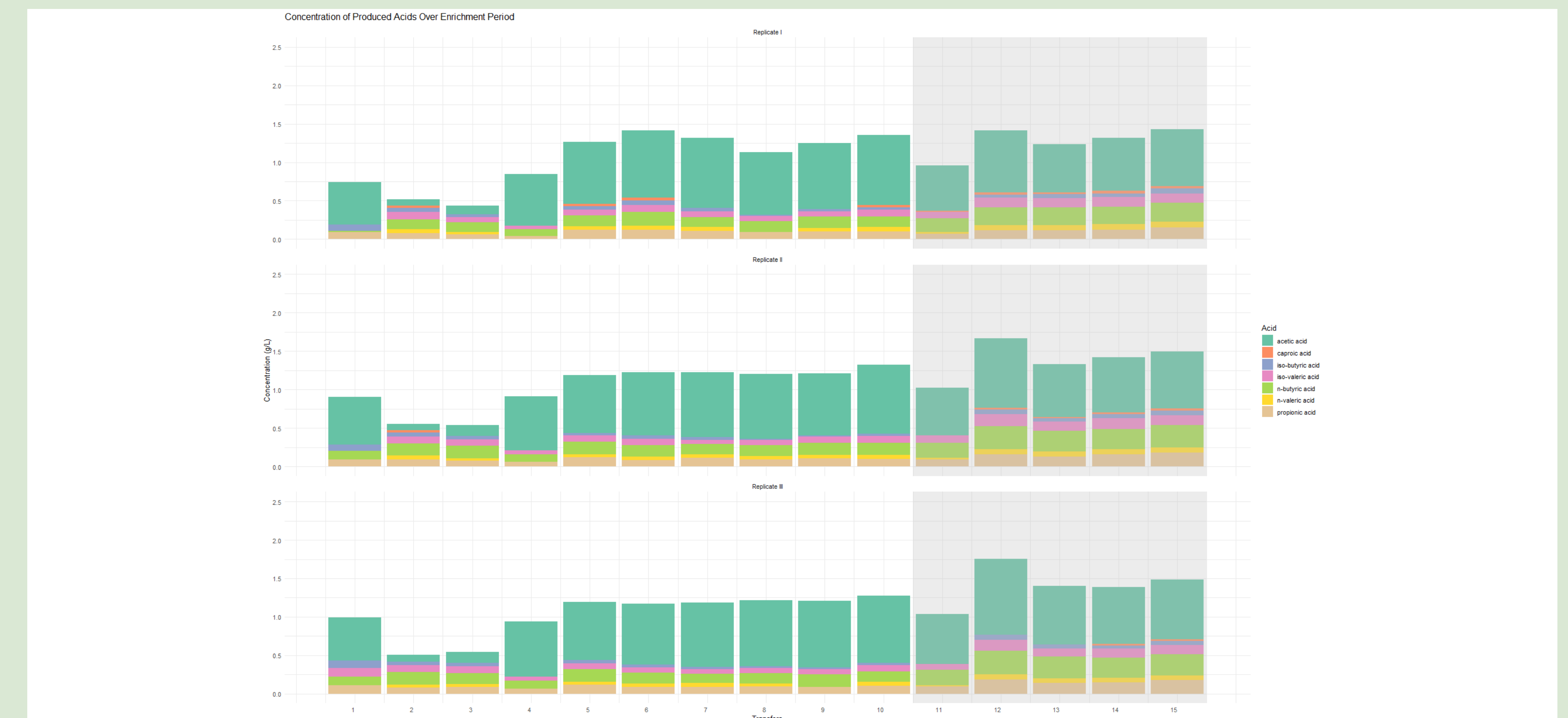
Anaerobic fermentation for VFA production



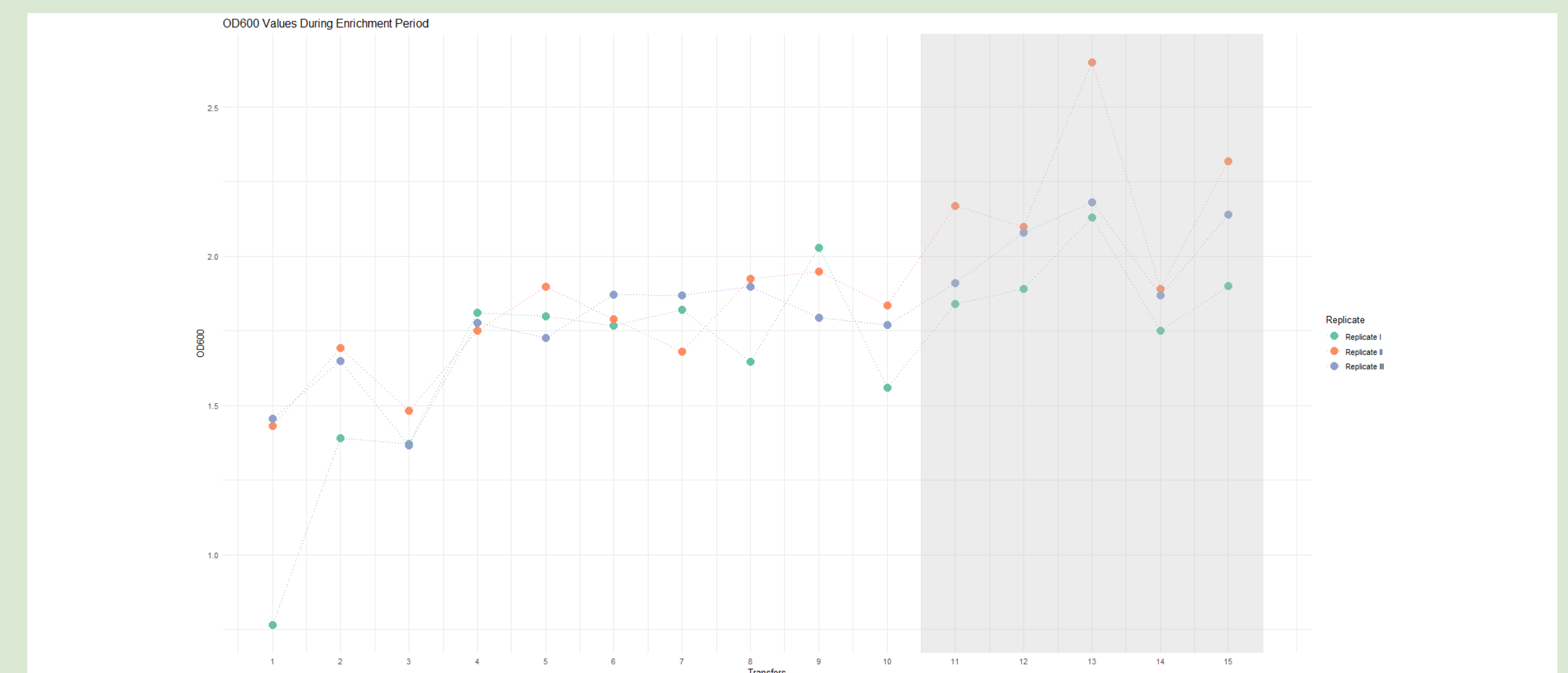
Aerobic enrichment of a PHA-accumulating MMC and PHA production



CURRENT RESULTS



Concentrations of produced VFAs after 24 h following inoculation with previous culture. The grey area depicts an increase in concentration of the sidestream from 50% to 75%.



Growth monitoring by measurement of optical density (600nm). The grey area depicts an increase in concentration of the sidestream from 50% to 75%.

FUTURE RESEARCH

- Enrichment of PHA culture on synthetic VFA substrate
- PHA production using produced VFA substrate
- DoE and statistical optimization
- Techno-economic assessment and LCA

FUTURE AMBITIONS

- Pursue an industrial PhD
- Work with biorefinery practices with the ambition to bridge the gaps between academia and industry