

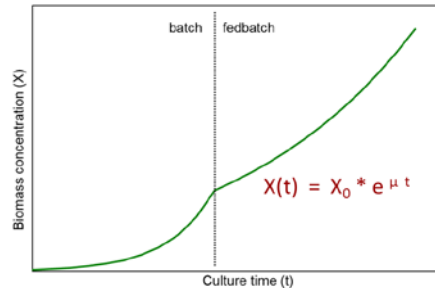
Control of microbial growth rate in fed-batch

Loïc Habegger, Kelly Rodrigues Crespo, Michal Dabros

Context

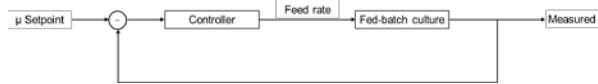
The growth rate of microbial cultures is controlled in order to:

- increase biomass productivity and product quality
- prevent substrate or product inhibition
- suppress overflow metabolism (Crabtree effect)



Results

A feedforward-feedback controller [1] was implemented to maintain a desired growth rate (μ) in fed-batch cultures:

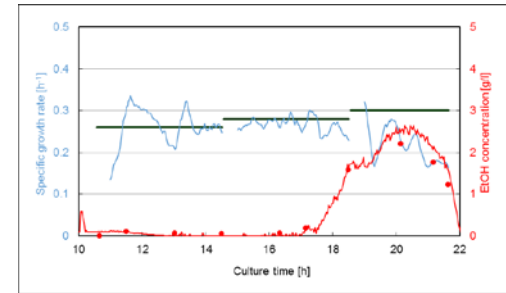


The growth rate is estimated in real-time from on-line measurements of biomass.

Applied to Crabtree-positive organisms, the controller helps prevent overflow metabolism [2].

[1] Dabros et al. *Bioproc. Biosyst. Eng.* 33 (2010) 1109–1118

[2] Habegger, Rodrigues, Dabros. *Fermentation* 4 (2018) 79



S. Cerevisiae grown at different growth rate setpoints. Overflow ethanol appears at $\mu > 0.28 \text{ h}^{-1}$.

Conclusion

The control strategy is simple, robust and flexible.

Major challenge: precise and noise-free biomass monitoring.

Current work: effect on productivity and product quality.

Potential: BioPAT