

Supplementary Material

1 Supplementary Tables

Supplementary Table S 1: Experimental matrix for the Box-Behnken design to evaluate different medium compositions. Input variables (concentration of N, P and S) and output variables (biomass concentration, yield, MEL concentration, crude extract concentration and X_{MEL}) are shown.

Run	Std	Input variables			Output variables				
		C_{NaNO_3} (g/L)	$C_{KH_2PO_4}$ (g/L)	$C_{MgSO_4 \cdot 7H_2O}$ (g/L)	$C_{x,growth}^*$ (g/L)	$Y_{X/Gluc}$ (g/g)	C_{MEL} (g/L)	$C_{crude\ extract}$ (g/L)	X_{MEL} (%)
1	2	6	1	1.5	4.4	0.15	5.7	7.7	74%
2	14	4.5	1.5	1.5	4.5	0.15	11.0	14.0	79%
3	4	6	2	1.5	4.9	0.16	7.4	9.2	80%
4	10	4.5	2	1	4.6	0.15	9.3	11.0	84%
5	13	4.5	1.5	1.5	4.8	0.16	12.2	16.4	74%
6	3	3	2	1.5	5.4	0.18	15.8	18.8	84%
7	6	6	1.5	1	4.6	0.15	8.7	11.1	79%
8	9	4.5	1	1	4.7	0.16	13.4	17.3	78%
9	5	3	1.5	1	5.7	0.19	15.6	18.2	86%
10	15	4.5	1.5	1.5	4.6	0.15	9.8	12.2	81%
11	11	4.5	1	2	4.3	0.14	9.2	13.6	68%
12	12	4.5	2	2	4.8	0.16	9.0	13.0	69%
13	7	3	1.5	2	5.4	0.18	16.4	20.5	80%
14	1	3	1	1.5	5.2	0.17	26.1	31.6	83%
15	8	6	1.5	2	4.7	0.16	7.3	9.3	79%
16	Verification low	3	1	1	5.5	0.18	21.7	28.4	77%
17	Verification high	6	2	2	5.0	0.17	4.8	6.2	77%

* from correlation of backscatter values with dry biomass concentration

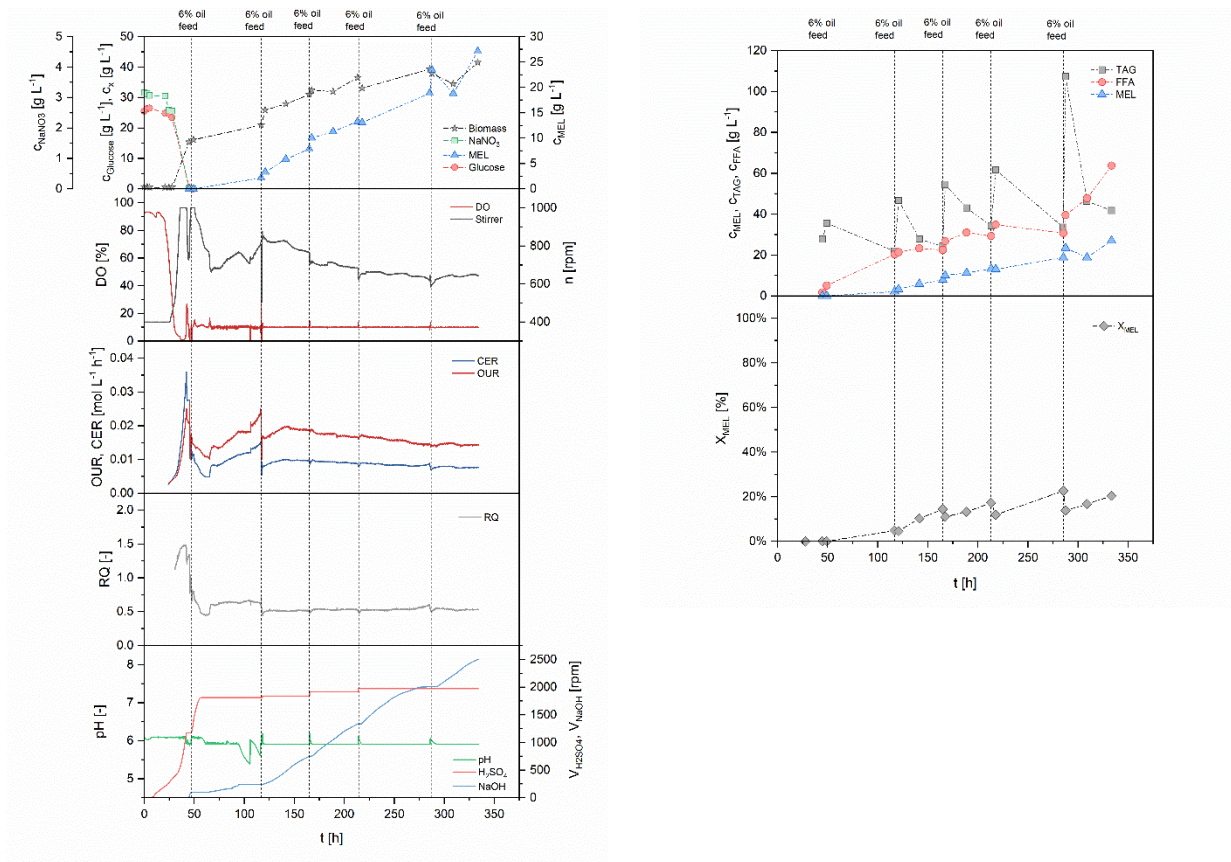
Supplementary Table S 2: Results of the sugar substrate screening. All sugars were applied at a total sugar concentration of 30 g/L to ensure comparability.

substrate	$C_{x,growth}^*$ (g/L)	$Y_{X/Gluc}$ (g/g)	C_{MEL} (g/L)	$C_{crude\ extract}$ (g/L)	X_{MEL} (%)
glucose	4.6	0.15	15.7	21.6	73%
arabinose	3.4	0.11	10.1	49.1	28%
cellobiose	0.6	0.02	12.0	26.2	38%
sugar beet molasses	4.8	0.16	9.1	24.7	49%
syrup	4.0	0.13	8.7	27.5	38%
sugar cane molasses	2.4	0.08	13.9	44.9	31%
sucrose	4.6	0.15	19.5	31.7	61%
xylose	3.0	0.10	19.9	24.7	81%
fructose	3.8	0.13	21.1	25.6	82%
process water B	4.4	0.15	23.4	28.9	81%
process water A	4.4	0.15	16.3	20.9	78%

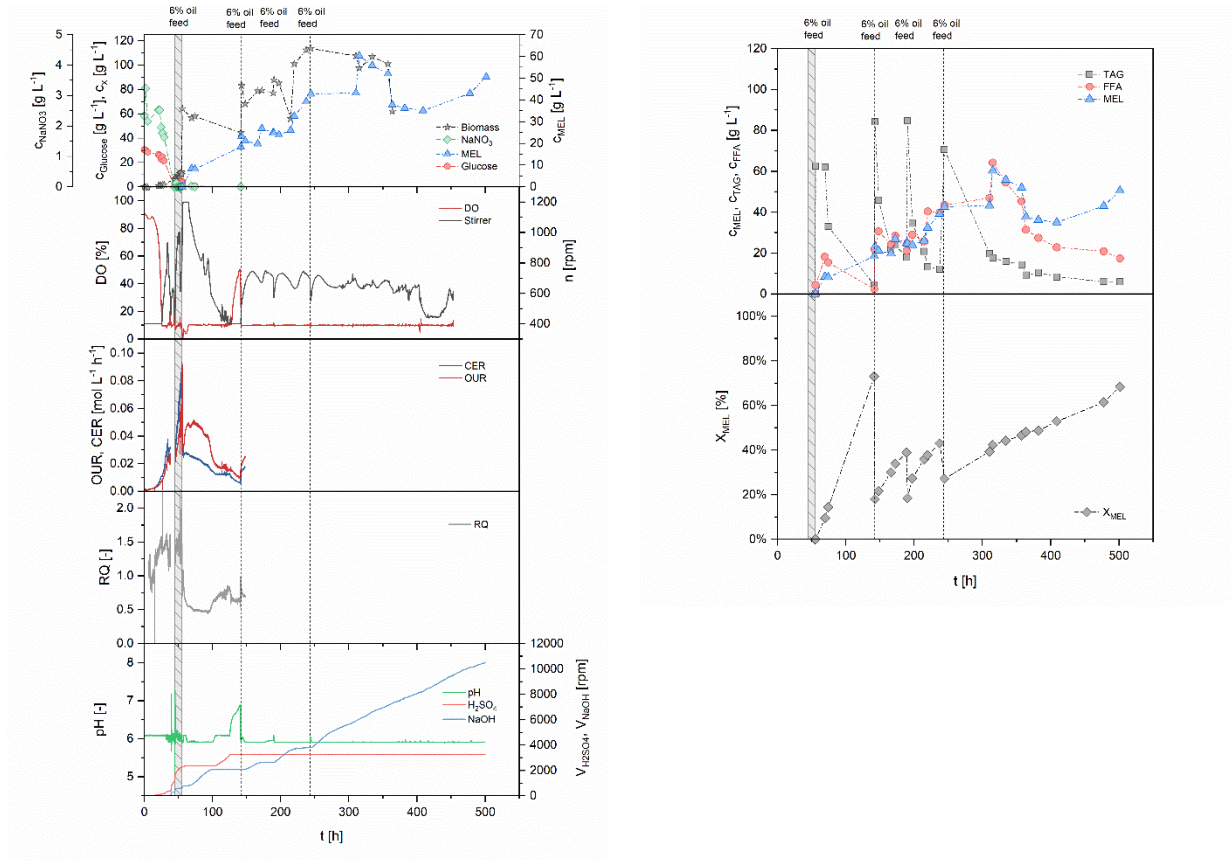
Supplementary Table S 3: Average MEL composition for the different process runs and overall mean values.

		MEL-A (%)	MEL-B (%)	MEL-C / MML-A (%)	MEL-D / MML-B/C (%)
B1	mean	47.2	19.5	26.3	7.1
	SD	2.8	0.5	2.5	0.4
B2	mean	38.9	12.4	40.4	8.3
	SD	7.0	4.1	2.2	3.1
FB1	mean	47.1	21.7	20.6	11.6
	SD	7.9	2.8	2.3	2.1
FB2	mean	47.8	19.0	23.3	9.9
	SD	9.2	3.2	4.2	2.3
FB3	mean	43.4	20.6	25.3	14.0
	SD	7.9	5.7	6.1	2.7
FB4	mean	43.5	22.5	18.4	15.5
	SD	5.8	3.3	3.2	2.0
Overall average	mean	45.8	20.7	22.8	11.6
	SD	2.14	1.47	3.25	3.34

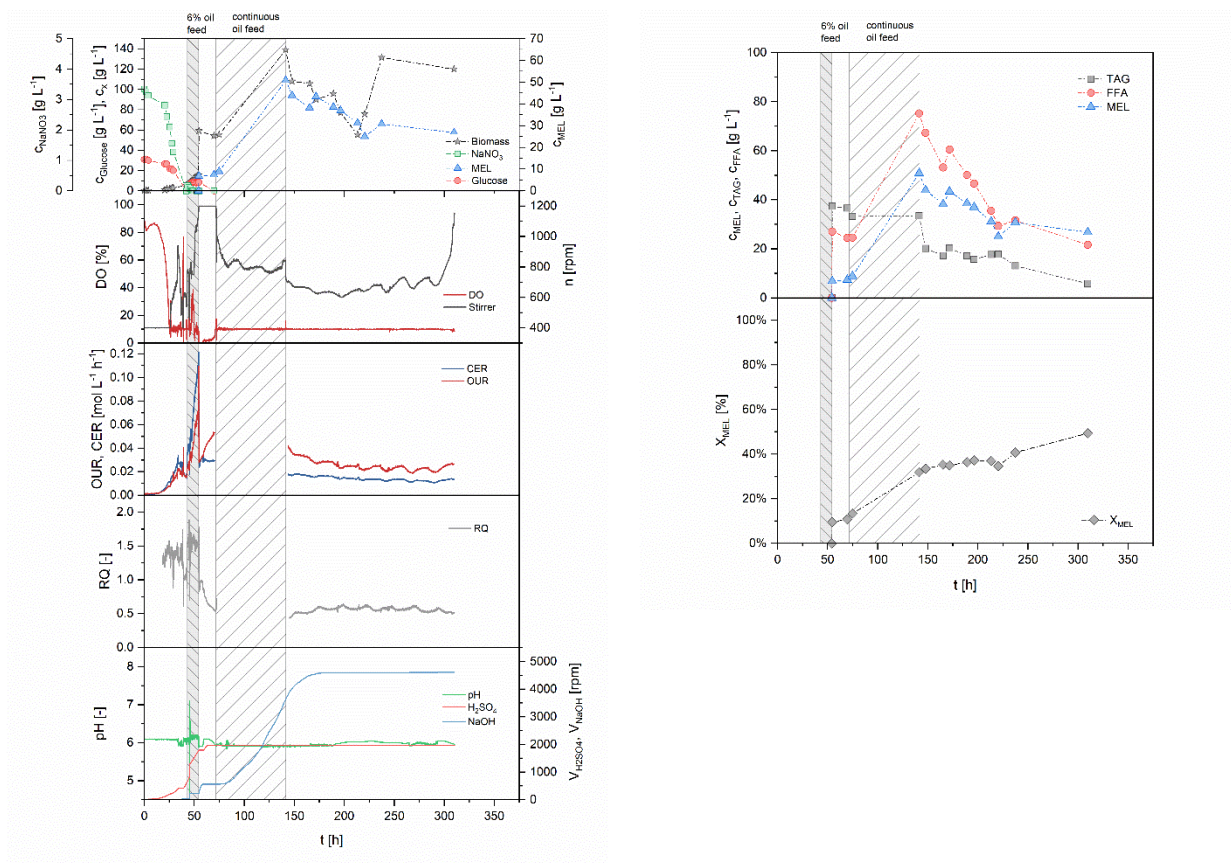
2 Supplementary Figures



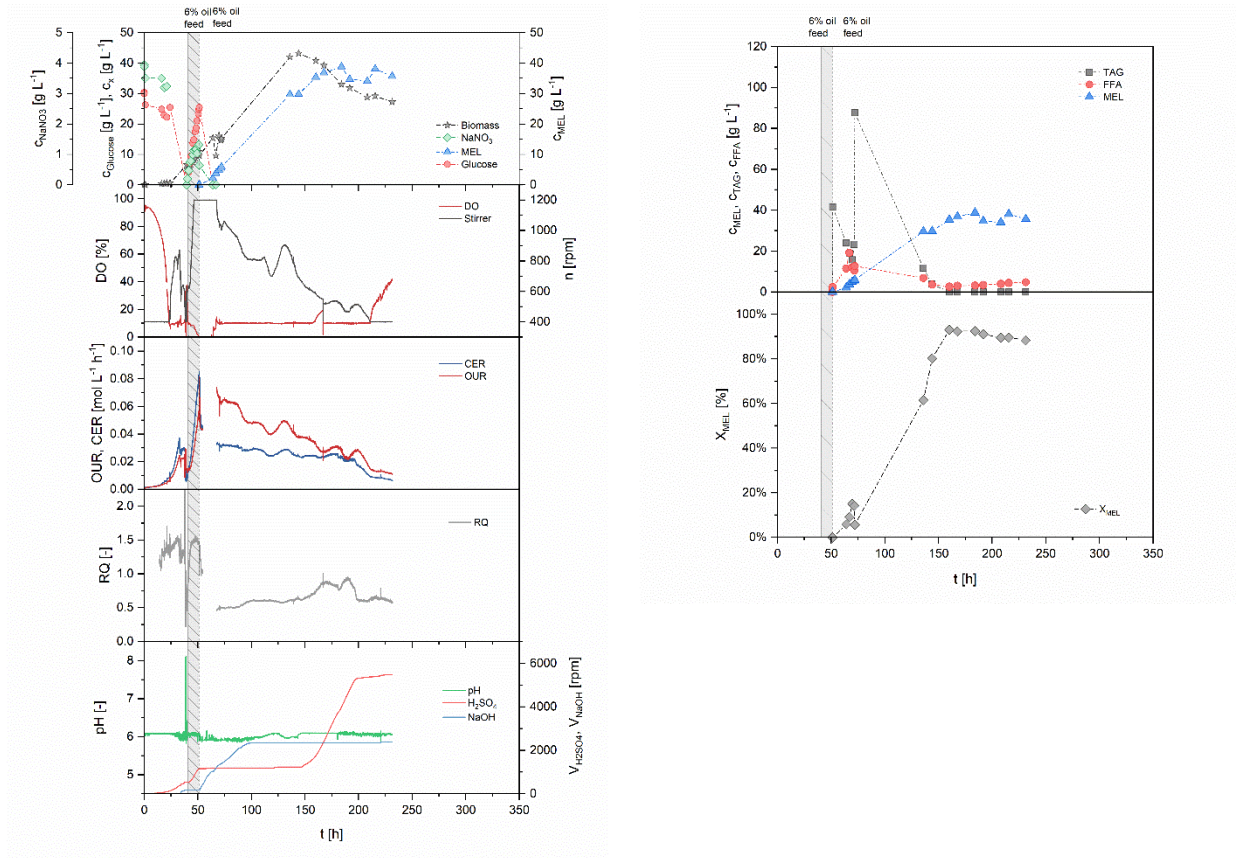
Supplementary Figure S 1: Process data for the two-staged batch with repeated oil feeding (B2). Growth was performed in batch mode, and production was initiated with 6 % rapeseed oil at 42 h and maintained using multiple oil feeds of 4 % at 118, 165, 214 and 286 h.



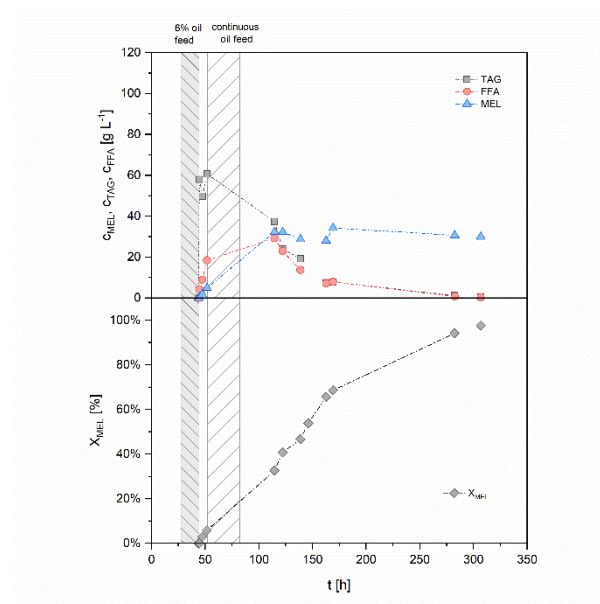
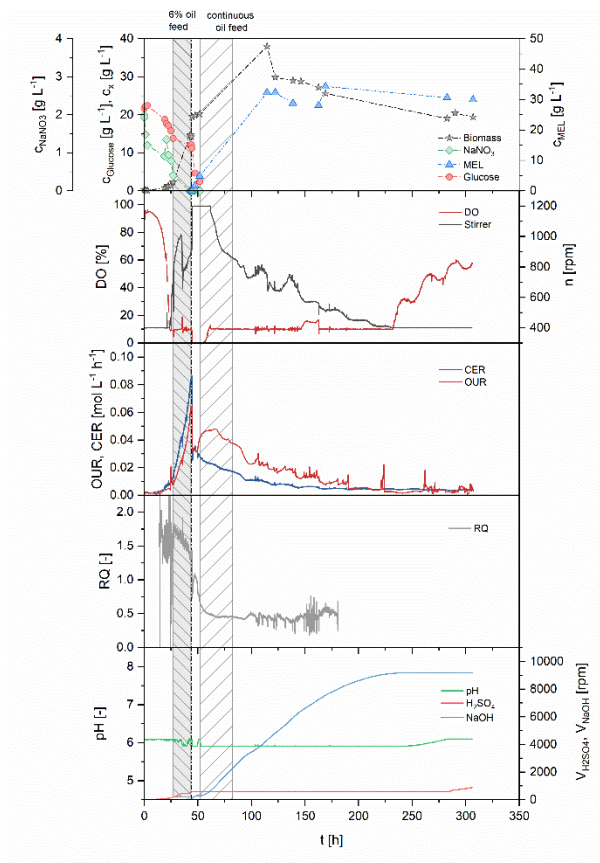
Supplementary Figure S 2: Process data for process FB1. Growth was performed in batch and additional fed-batch mode with an exponential feed rate at $\mu_{set} = 0.08 \text{ h}^{-1}$, and production was initiated and maintained using multiple oil feeds of 6 % at 56, 142, 190 and 242 h.



Supplementary Figure S 3: Process data for process FB2. Growth was performed in batch and additional fed-batch mode with an exponential feed rate at $\mu_{set} = 0.09 \text{ h}^{-1}$, and production was initiated with 6 % rapeseed oil at 55 h and a continuous oil feed between 71-141 h (6 % in total).



Supplementary Figure S 4: Process data for process FB3. Growth was performed in batch and additional fed-batch mode with an exponential feed rate at $\mu_{\text{set}} = 0.09 \text{ h}^{-1}$, and production was initiated and maintained using two separate oil feeds of 6% at 51 and 72 h.



Supplementary Figure S 5: Process data for process FB4. Growth was performed in batch and additional fed-batch mode with an exponential feed rate at $\mu_{\text{set}} = 0.08 \text{ h}^{-1}$, and production was initiated using 6 % rapeseed oil at 44 h and a continuous feeding between 52-82 h (6% in total).