

Supplementary Information

Table S1: Medium composition mineral and complex enrichment performed. Trace elements added are in the same concentrations as the enrichments performed previously in our lab [16]

Medium A (mg L ⁻¹)		Mineral	Complex
Glucose		4000	4000
Tryptone		0	800
B vitamins			
Thiamine	B1	-	0.04
Riboflavin	B2	-	0.04
Nicotinic acid	B3	-	0.04
Ca-pantothenate	B5	-	0.04
Pyridoxine	B6	-	0.20
Biotin	B7	-	0.40
p-Aminobenzoic acid	Precursor B9	-	0.10
Folic acid	B9	-	0.04
Cyanocobalamin	B12	-	0.04
Medium B (mg L ⁻¹)		Both enrichments	
NH ₄ Cl		1340	
NaCl		292	
KH ₂ PO ₄		780	
MgCl ₂ · 6 H ₂ O		120	
Na ₂ SO ₄ · 10 H ₂ O		130	
Trace elements		As in Temudo <i>et al.</i> 2007 [15]	

Table S2: FISH probes used in this study. The percentage of formamide during hybridization is given.

Probe	Specificity	Formamide (%)	Sequence (5' → 3')	Reference
EUB338	Nearly all eubacteria	5-25	GCCTTCCCACATCGT TT	[54]
Chis150	Genus of <i>Clostridium</i> - species from sensu stricto I to XII	25	TTATGCGGTATTAA TCTYCCTTT	[55]
Rums278	Family of <i>Ruminococcaceae</i>	20	GTCCGGCTACCGAT CGCG	[56]
Lacto722	Genus of <i>Lactobacillus</i>	25	YCACCGCTACACAT GRAGTTCCACT	[57]
Lactococcus4	Genus of <i>Lactococcus</i>	5	CTGTATCCCGTGTCC CGAAG	[58–60]
Mega-X	Genus of <i>Megasphaera</i>	25	GACTCTGTTTTTGG GGTTT	[61]

Table S3: Elemental metabolite matrix used to set up the carbon and COD balances.

	C (Cmol)	COD (g _{COD} g ⁻¹)
Glucose	6	1.07
Acetate	2	1.07
Butyrate	4	1.82
Propionate	3	1.30
Lactate	3	1.08
Succinate	4	0.95
Valerate	5	2.06
Ethanol	2	2.08
Formate	1	0.35
H ₂	0	7.94
CO ₂	1	0.00
Biomass	1	1.36

Table S4: The catabolic distribution of both enrichments with respect to the imposed catabolic reactions obtained from the parameter estimation. The percentages sum up to 100% glucose used in the catabolism and do not include the modelled storage polymer assumed for the mineral medium enrichment.

No.	Catabolic reaction	Mineral	Complex
Glucose utilising pathways			
1	1 glucose → 2 lactate + 2H ⁺ + 2 ATP	9%	46%
2	1 glucose → 1 lactate + 1 ethanol + 1H ⁺ + 1 CO ₂ + 1 ATP		54%
3	1 glucose → 1 acetate + 1 ethanol + 1H ⁺ + 2 H ₂ + CO ₂ + 3 ATP	33%	
4	1 glucose → 0.67 acetate + 0.67 butyrate + 1.33 H ⁺ + 2.67 H ₂ + 2 CO ₂ + 3.33 ATP	43%	
5	1 glucose → 1 butyrate + 1H ⁺ + 2 H ₂ + 2 CO ₂ + 3 ATP	11%	
6	1 glucose → 0.67 acetate + 1.33 propionate + 2H ⁺ + 0.67 CO ₂ + 2.67 ATP	4%	
Lactate utilising pathways			
7	3 lactate → 1 acetate + 2 propionate + 2 CO ₂ + 1.5 ATP		75%
8a	1 lactate + 1 acetate + 1H ⁺ → 1 butyrate + 1 H ₂ O + 1 CO ₂ + 0.5 ATP		6%
8b	2 lactate + 1H ⁺ → 1 butyrate + 2H ₂ + 2 CO ₂ + 1.5 ATP		11%
9	1 lactate + 1 propionate + 1H ⁺ → 1 valerate + 1 CO ₂ + 1 ATP		8%

Table S5: Protein and RNA content of two distinct fermentative microorganisms expressed as weight percentage of cell dry weight averaged over a range of dilution rates from chemostat steady states

Microorganism	Protein content [%]	RNA content [%]	Reference
<i>Escherichia coli</i>	55-62	10-16	[68]
<i>Lactococcus lactis</i>	45 ± 2	6.5-9.5	[69]

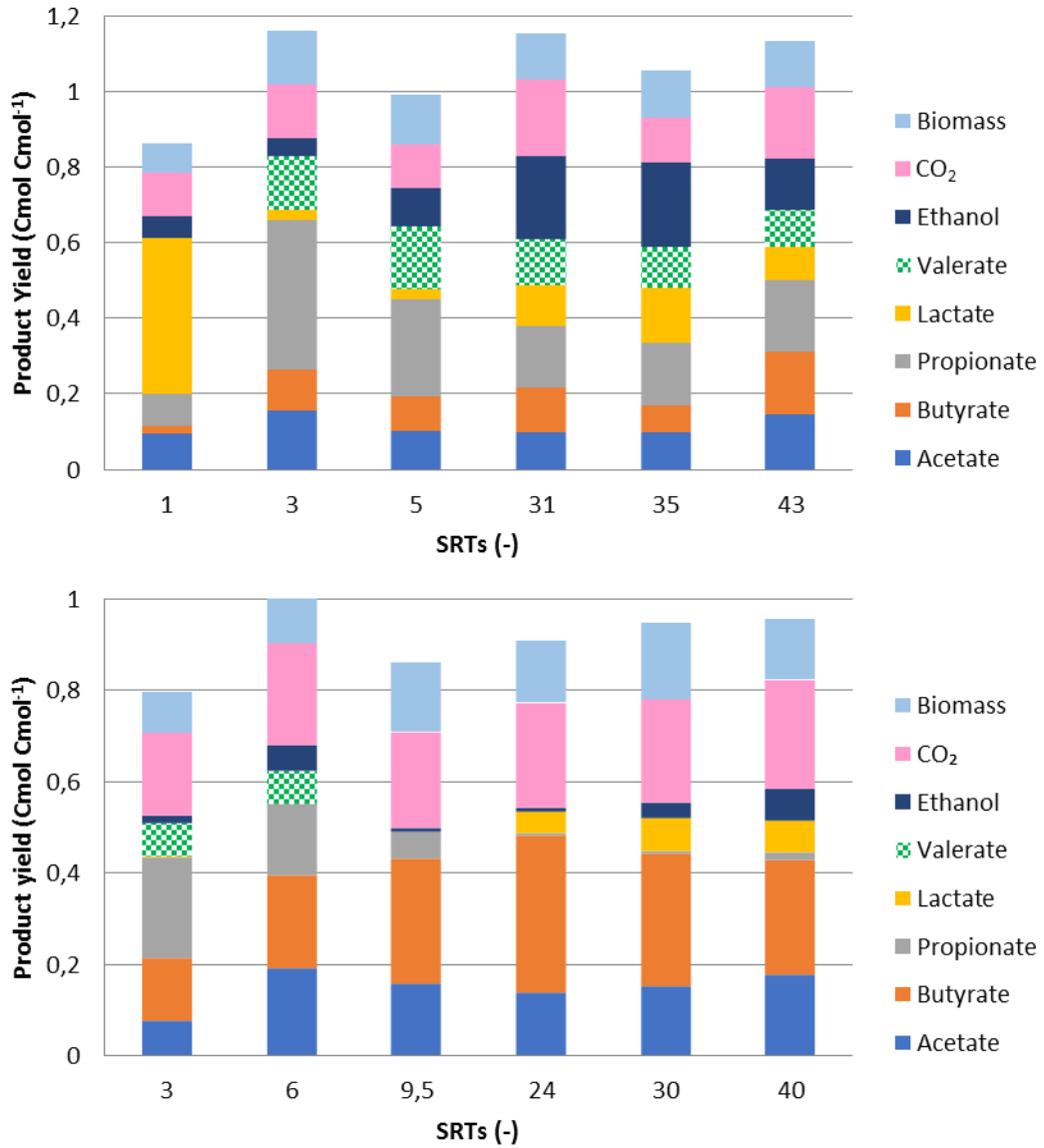


Figure S1: Product yields of the enrichment cultures on mineral (top) and complex (bottom) medium in time.

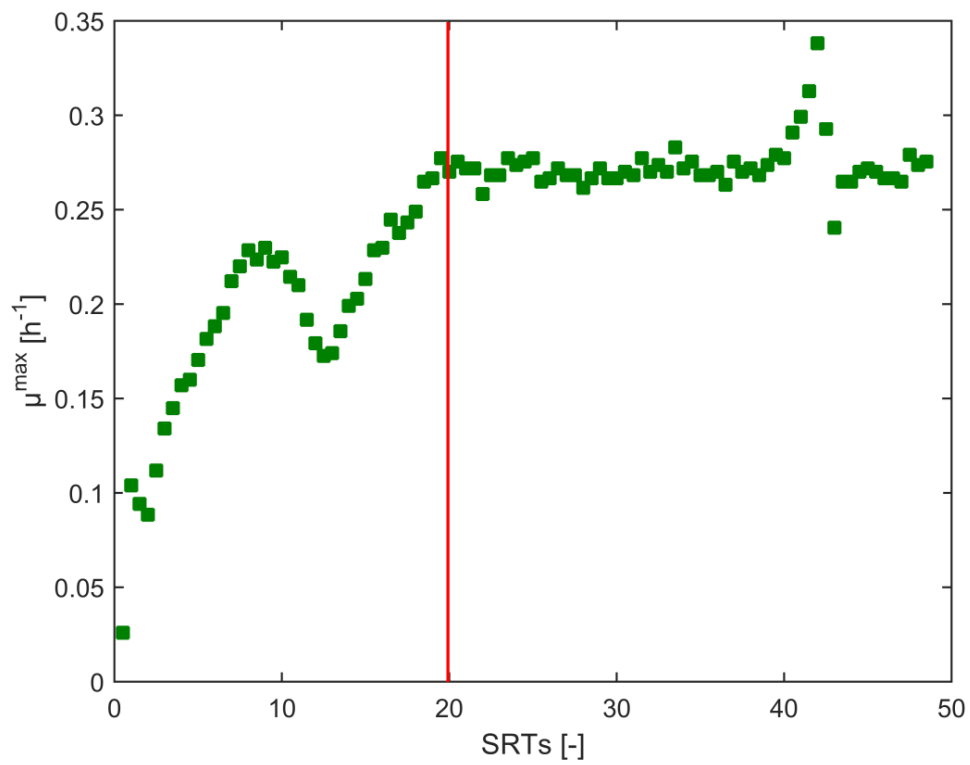
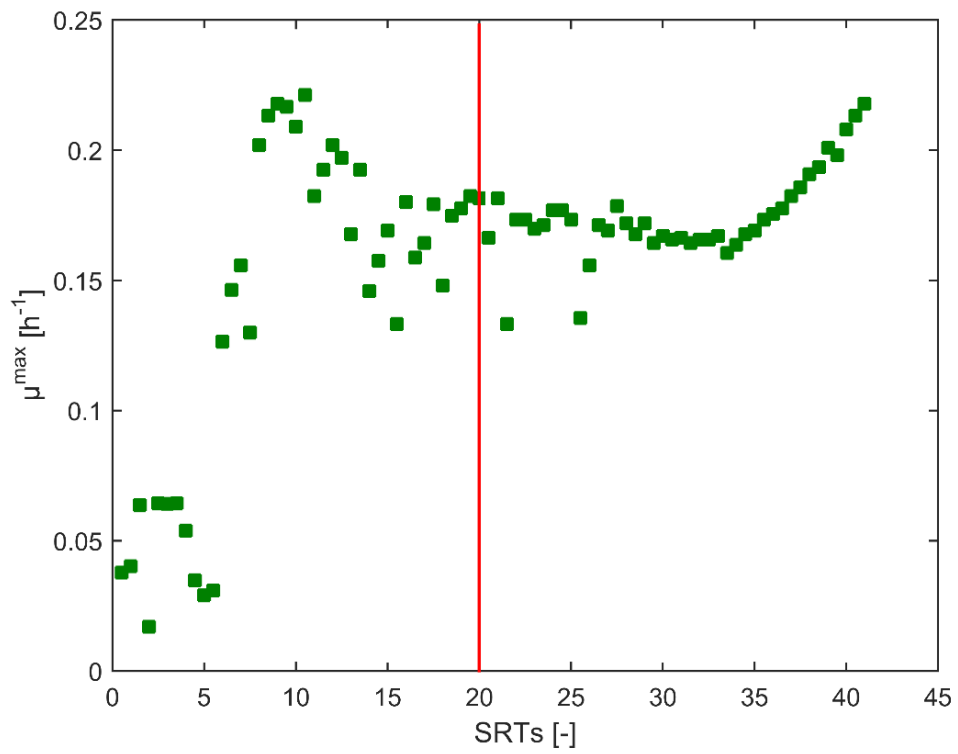


Figure S2: Estimated growth rate for the enrichment cultures on mineral (top) or complex (bottom) media as function of time.

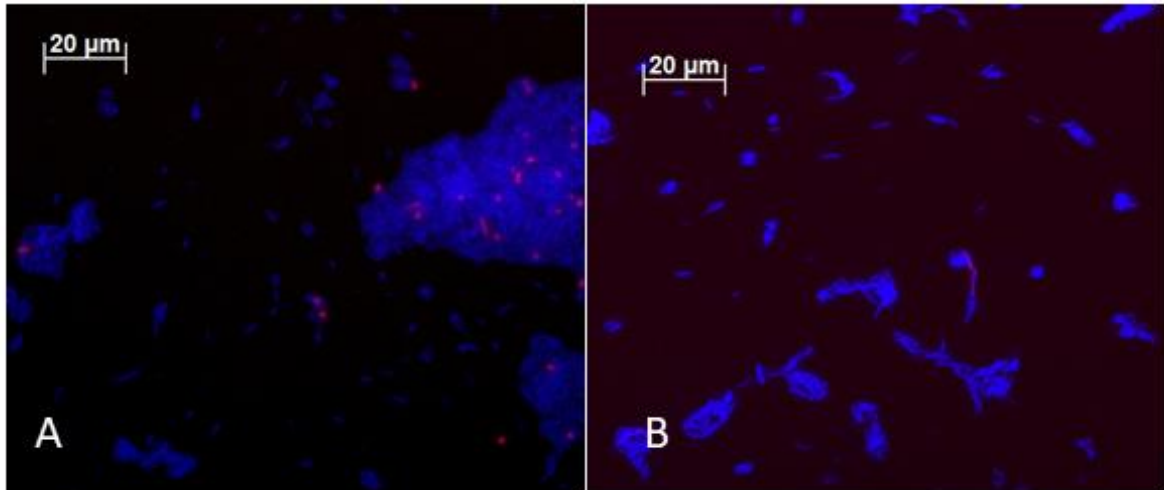


Figure S3: FISH analysis of the complex medium enrichment using the rums278 probe (A) and the mineral medium enrichment using the Lacto722 probe (B). Target probe is in red using the Cy3 fluorescent label, eubacterial is in blue using the EUB338 and Cy4 as fluorescent label

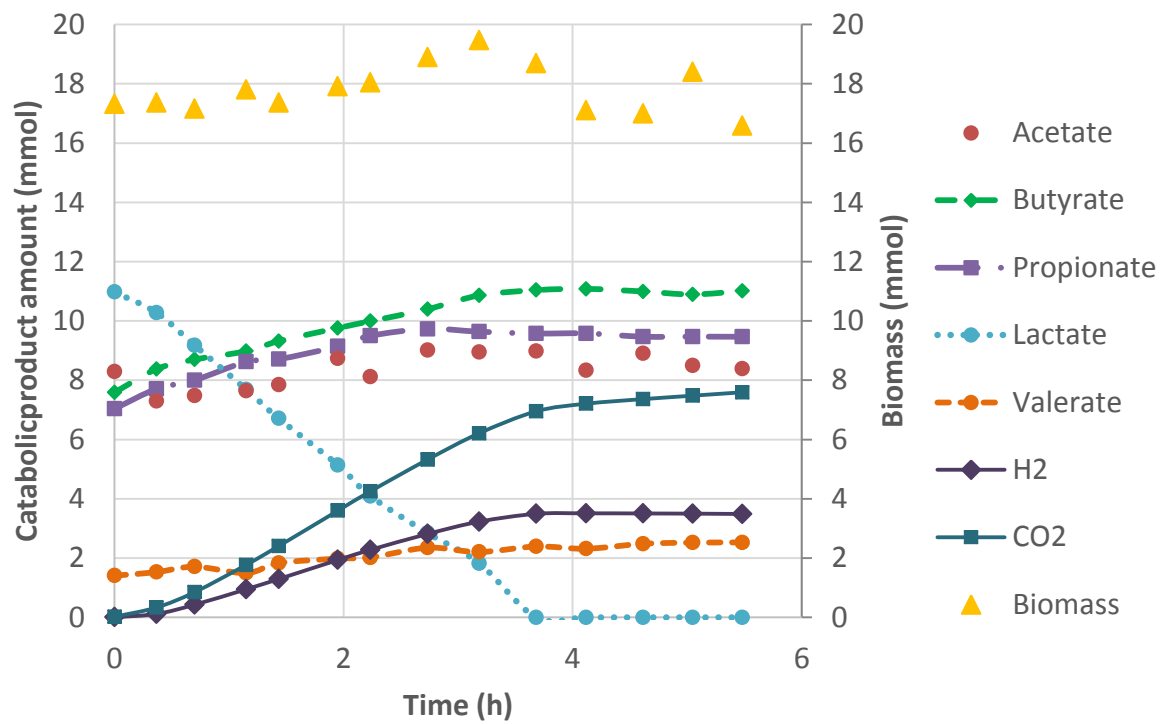


Figure S4: Batch experiment with lactate as carbon source and the same amount of peptides and B vitamins as for glucose in the enrichment culture on the complex medium. Ethanol is not shown as the GC measurements showed ambiguous results for this compound.

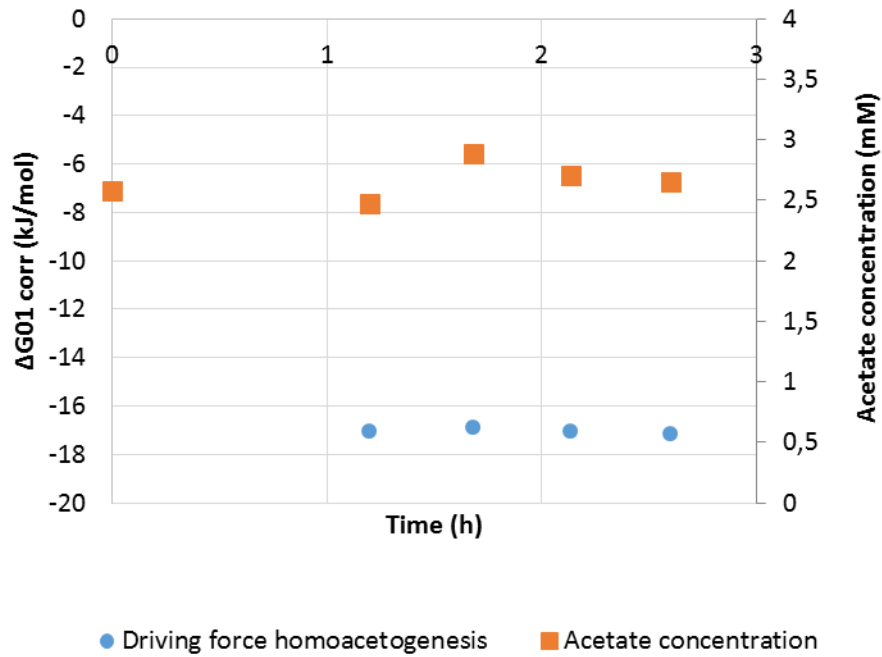


Figure S5: Thermodynamic analysis and acetate concentration during the batch experiment with H₂ and CO₂ in the complex medium enrichment

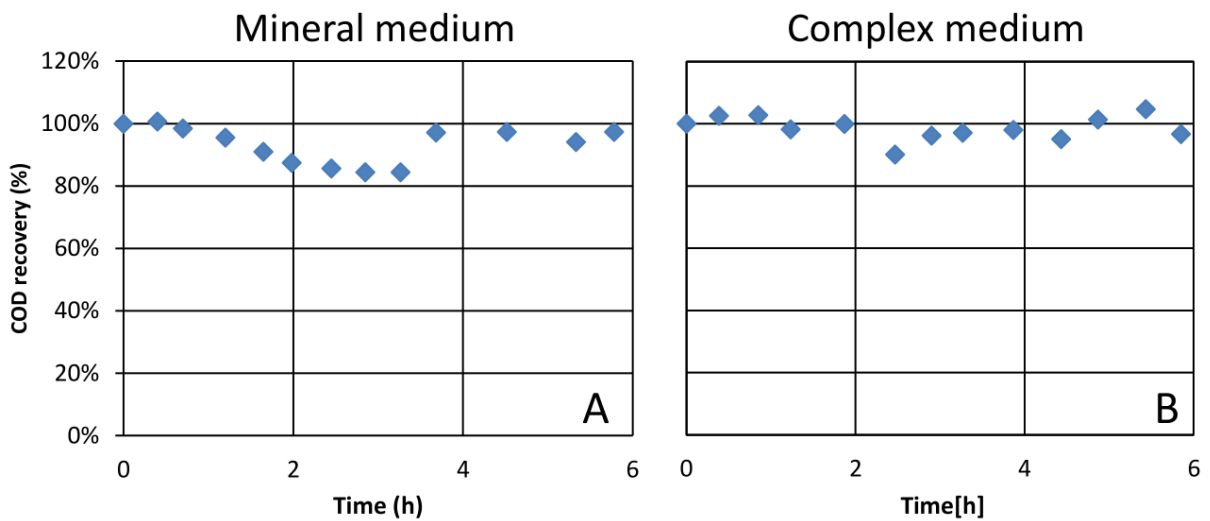


Figure S6: COD recovery during the SBR cycle displayed in figure 2 for mineral medium (A) and complex medium (B) using the elemental metabolite matrix listed in table S3. The measured carbon, nitrogen and COD content of tryptone was used to incorporate tryptone in the balancing of the complex medium enrichment. The measured values were $0.4399 \text{ g}_{\text{TOC}} \text{ g}_{\text{tryptone}}^{-1}$, $0.1293 \text{ g}_{\text{N}} \text{ g}_{\text{tryptone}}^{-1}$ and $1.2345 \text{ g}_{\text{COD}} \text{ g}_{\text{tryptone}}^{-1}$.