ATBEST

Temperature effect on trace element (Se/W) requirements for biogas production

Luka Šafarič, S. Shakeri Yekta, B.H. Svensson, A. Björn

QUESTOR CENTRE

LINKÖPING UNIVERSITY

Funded by the European Union

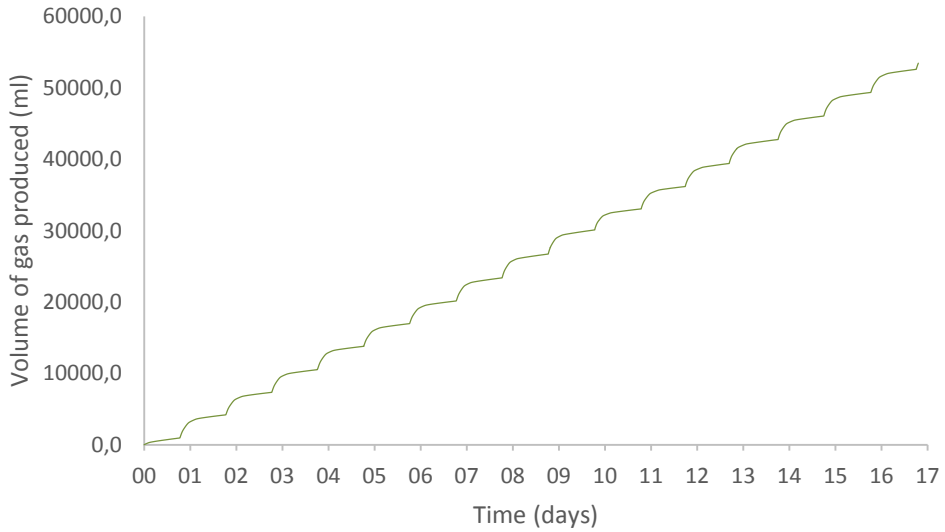
Introduction

- TE crucial for stable reactor operation
- Optimal concentrations difficult to predict
- Not enough information available on some TE

QUESTOR CENTRE
ATBEST
LINKÖPING UNIVERSITY
Funded by the European Union

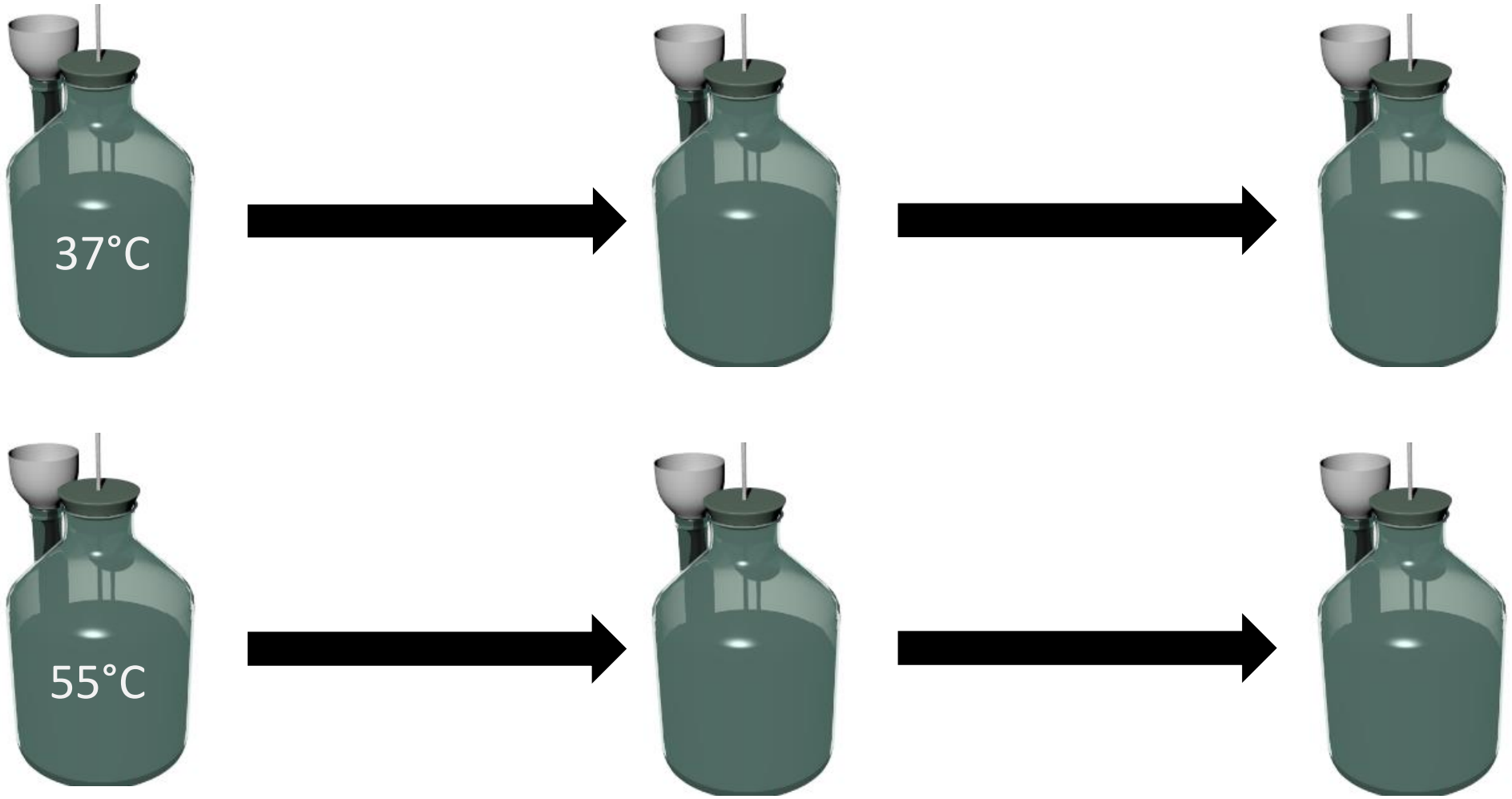
Reactors

- Fed by chemically defined medium (essential nutrients and simple soluble carbon sources)
- Initial TE concentrations of 0.32, 0.13, 0.36, 0.07, and 0.08 nM for Co, Ni, Mo, Se and W respectively
- OLR: 1.34 g VS l^{-1} d^{-1} , HRT: 30 days

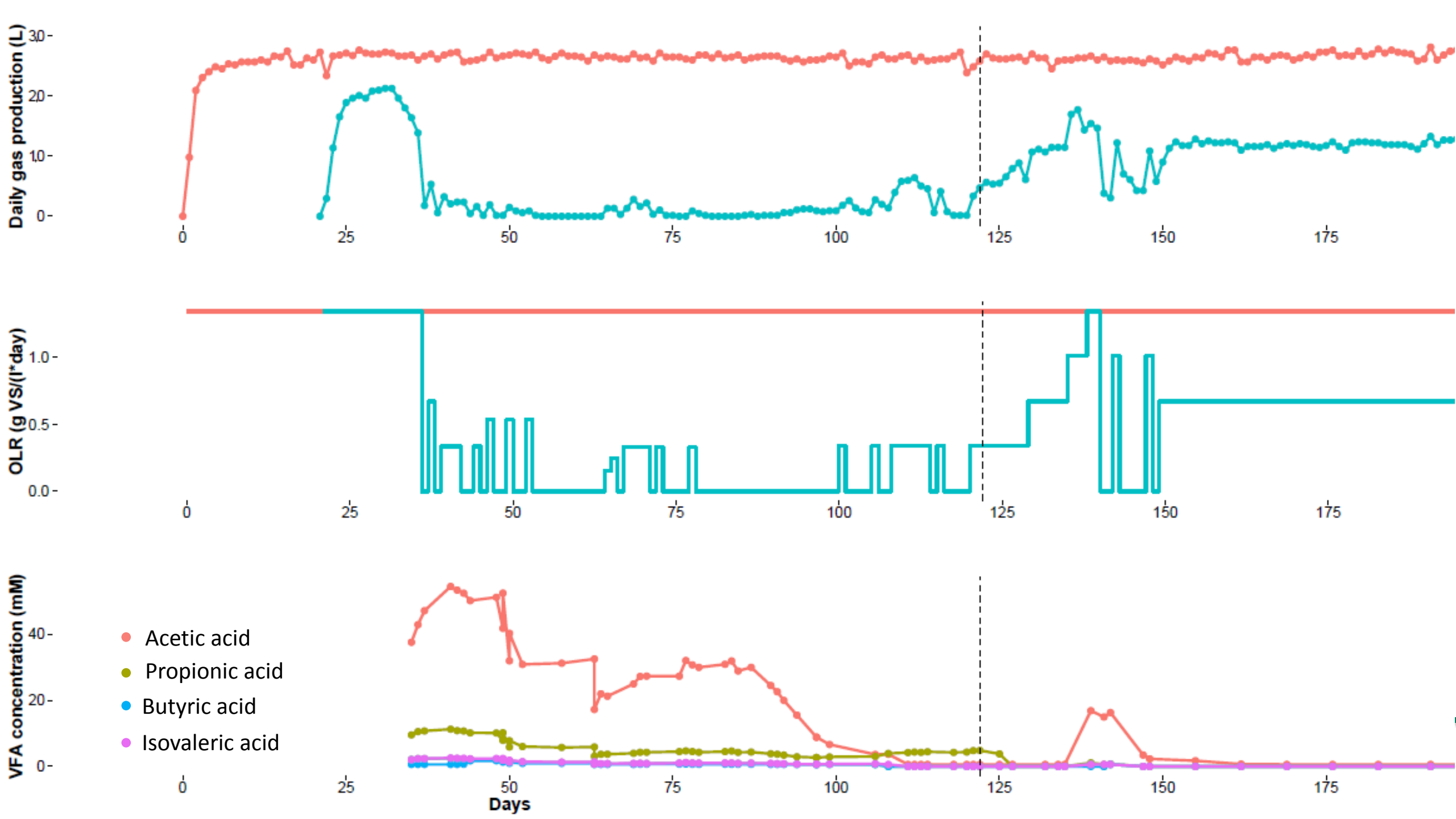


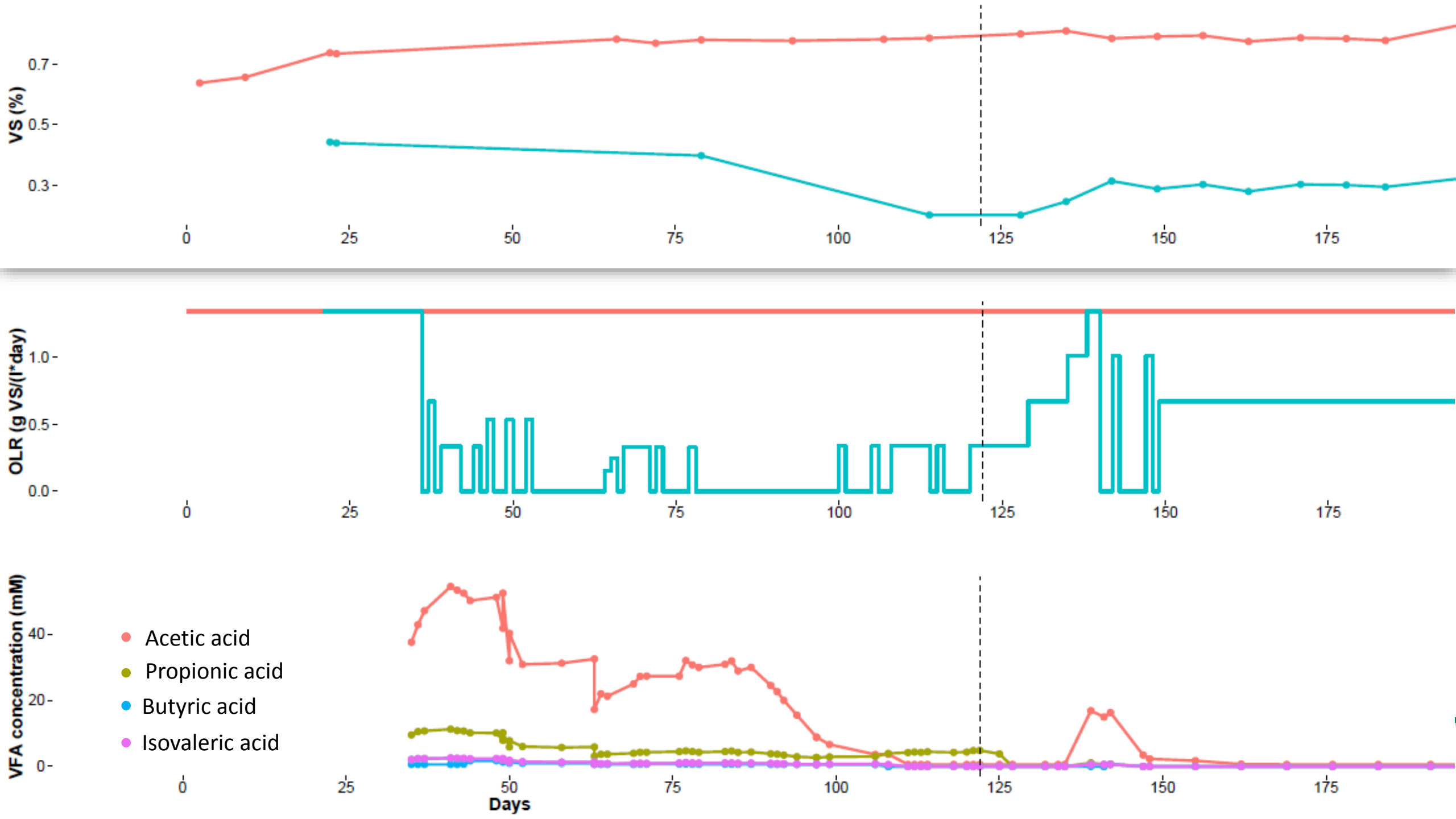
Funded by the European Union

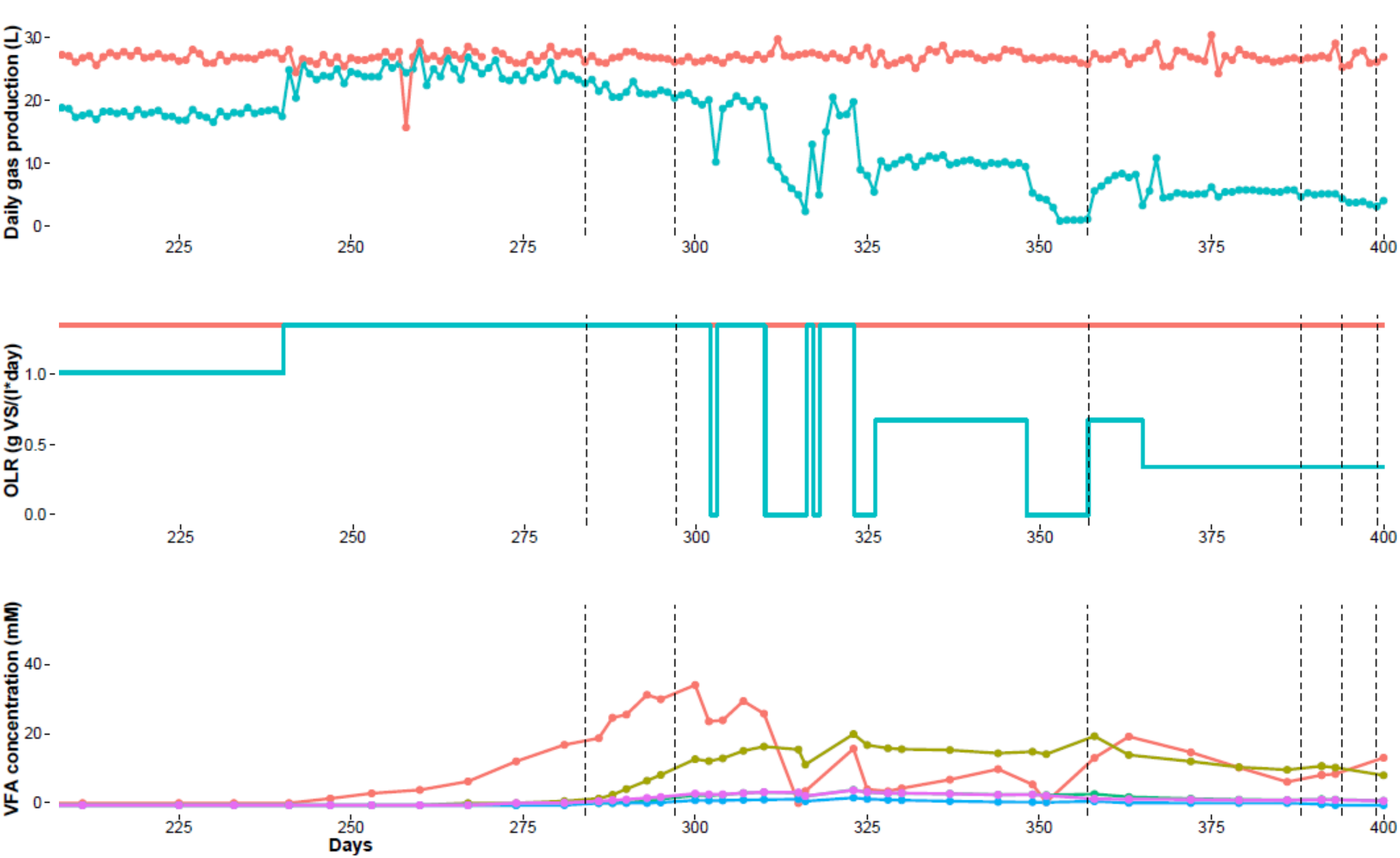
Experimental plan:



QUESTOR CENTRE
ATBEST
LINKÖPING UNIVERSITY
Funded by the European Union


Daily gas production (L)
30
20
10
0
0
25
50
75
100
125
150
175
OLR (g VS/(l*day)
1.0
0.5
0.0
0
25
50
75
100
125
150
175
VFA concentration (mM)
40
20
0
Acetic acid
Propionic acid
Butyric acid
Isovaleric acid
0
25
50
75
100
125
150
175
Days


VS (%)
0.7
0.5
0.3
0
25
50
75
100
125
150
175
OLR (g VS/(l*day)
1.0
0.5
0.0
VFA concentration (mM)
40
20
0
Acetic acid
Propionic acid
Butyric acid
Isovaleric acid
Days


Daily gas production (L)
30
20
10
0
225
250
275
300
325
350
375
400
OLR (g VS/(l*day)
1.0
0.5
0.0
VFA concentration (mM)
40
20
0
Days

Conclusion

- Lack of Se/W primarily inhibits propionate oxidation
- Thermophilic systems can require higher amounts of Se and/or W
- Differences likely due to speciation difference and/or microbial community structure

QUESTOR CENTRE
ATBEST
LINKÖPING UNIVERSITY
Funded by the European Union

ATBEST

Thanks for listening

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n. 316838

Project coordinated by the QUESTOR Centre
at Queen's University Belfast
www.qub.ac.uk/questor