

Butyric acid fermentation from pretreated and hydrolyzed wheat straw by *C.tyrobutyricum*

Baroi, George Nabin; Westermann, Peter; Gavala, Hariklia N.

Publication date:
2013

Document Version
Accepted author manuscript, peer reviewed version

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Baroi, G. N., Westermann, P., & Gavala, H. N. (2013). *Butyric acid fermentation from pretreated and hydrolyzed wheat straw by C.tyrobutyricum*. Poster presented at International Conference on Industrial biotechnology – meeting the challenges, Lund, Sweden.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

Butyric acid fermentation from pretreated and hydrolyzed wheat straw by *C.tyrobutyricum*

Baroi, G.N., Westermann P., Gavala H.N.*

Aalborg University Copenhagen (AAU-Cph), Department of Biotechnology, Chemistry and Environmental Engineering, A C Meyers Vænge 15, DK 2450 Copenhagen SV Denmark.
*hng@bio.aau.dk

Background

Butyric acid and its esters are used as food supplements, artificial flavours, solvent and even its potential beneficial effects in intestinal and extra intestinal diseases and sickle cell disease have been reported. It can be used for production of bio-plastics (e.g. cellulose acetate

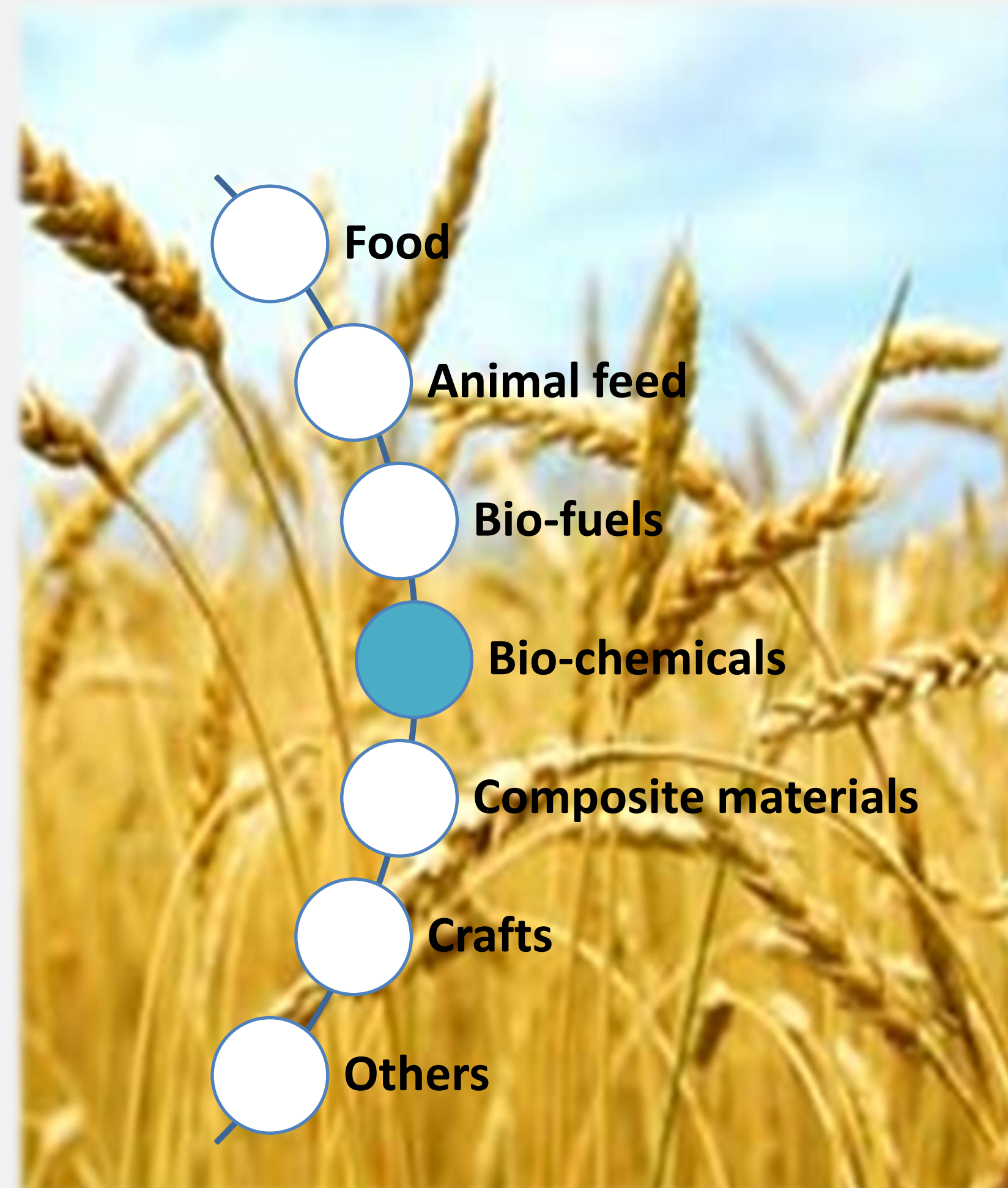
butyrate). Another potential use of butyric acid is to produce butanol via catalytic hydrogenation. The demand of the butyric acid is approximately 50,000 ton/year.

The main **bottlenecks of commercialization** of biological production of acids (in overall) are:

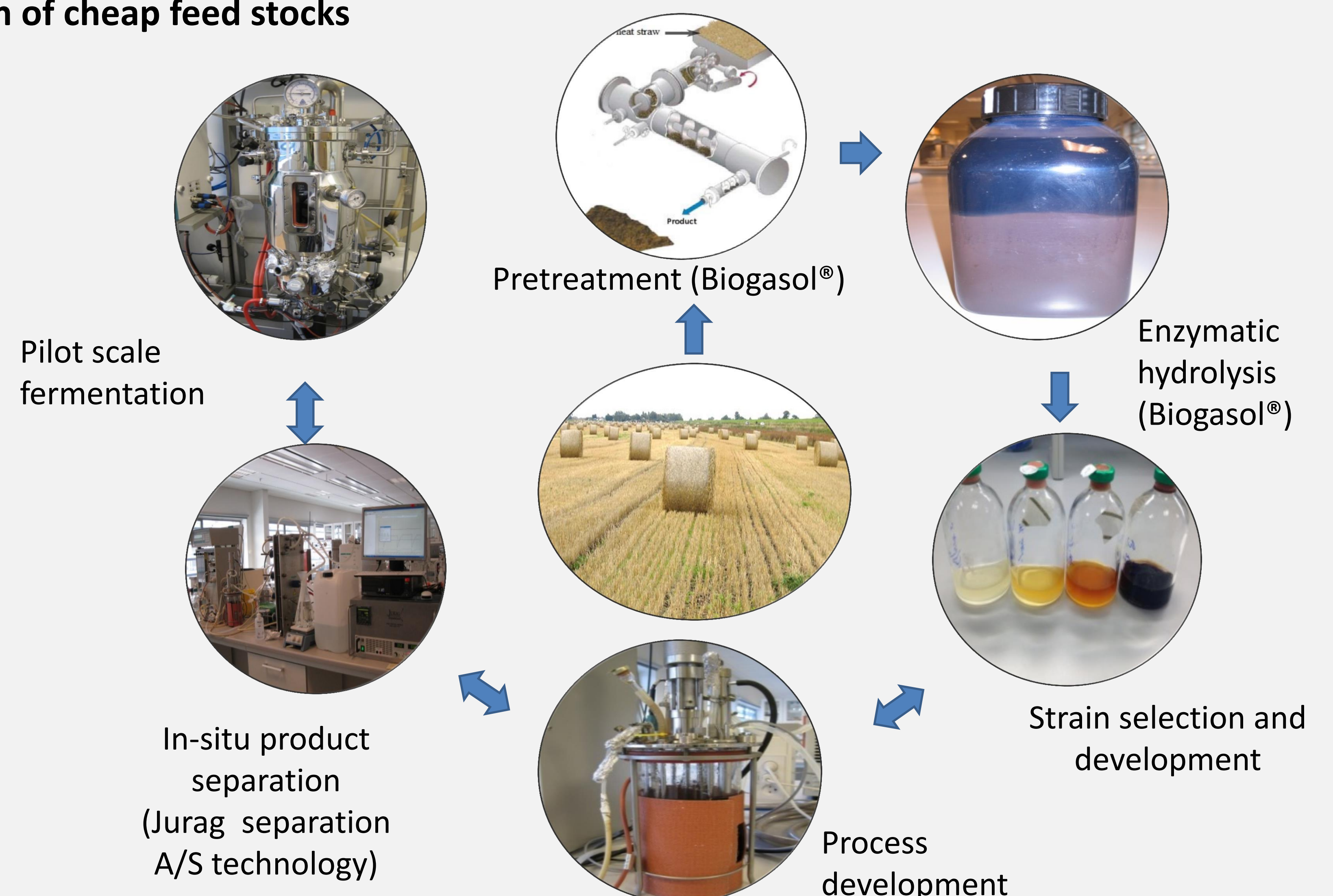
(1) utilization of cheap feed stocks

(2) Proper strain selection &/or improvement
(3) Process development.

Within SUPRABIO, we aim to develop a process for cost-efficient biological production of butyric acid from wheat straw.



Exploitation of wheat plant

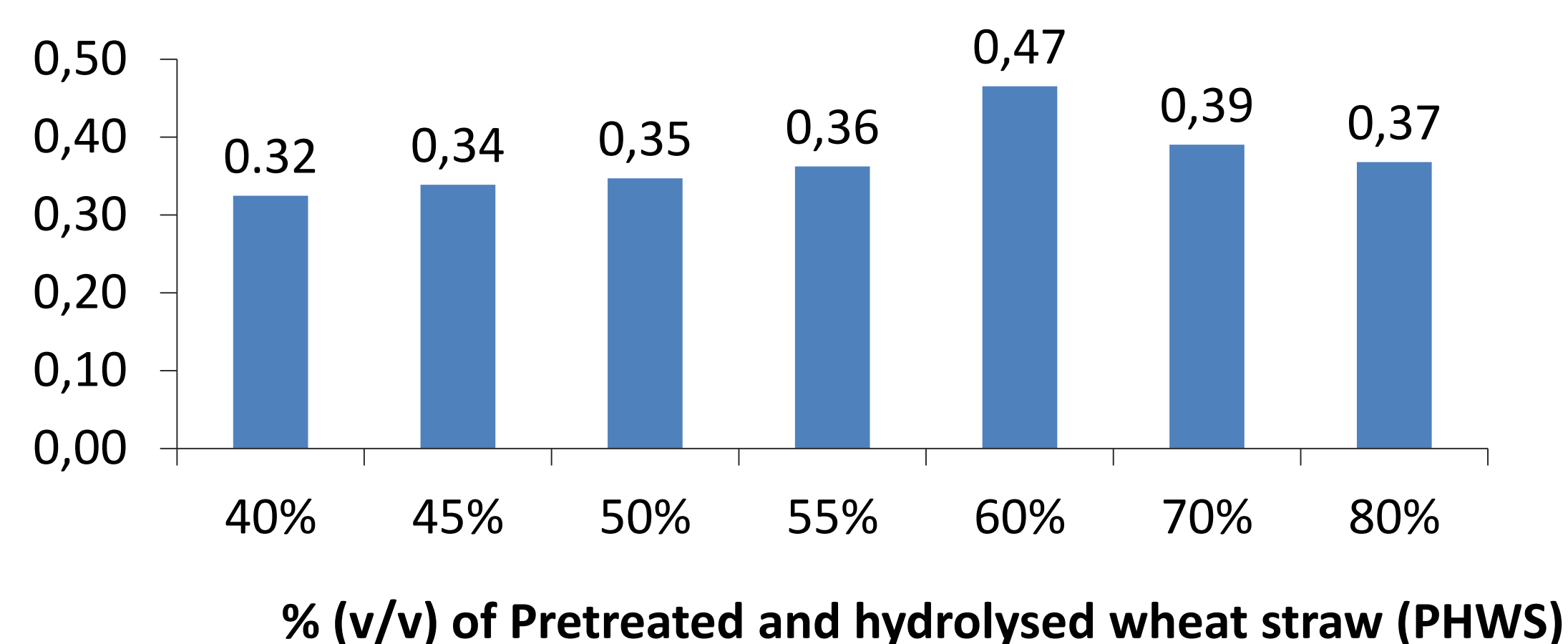


Process scheme of butyric acid production from wheat straw

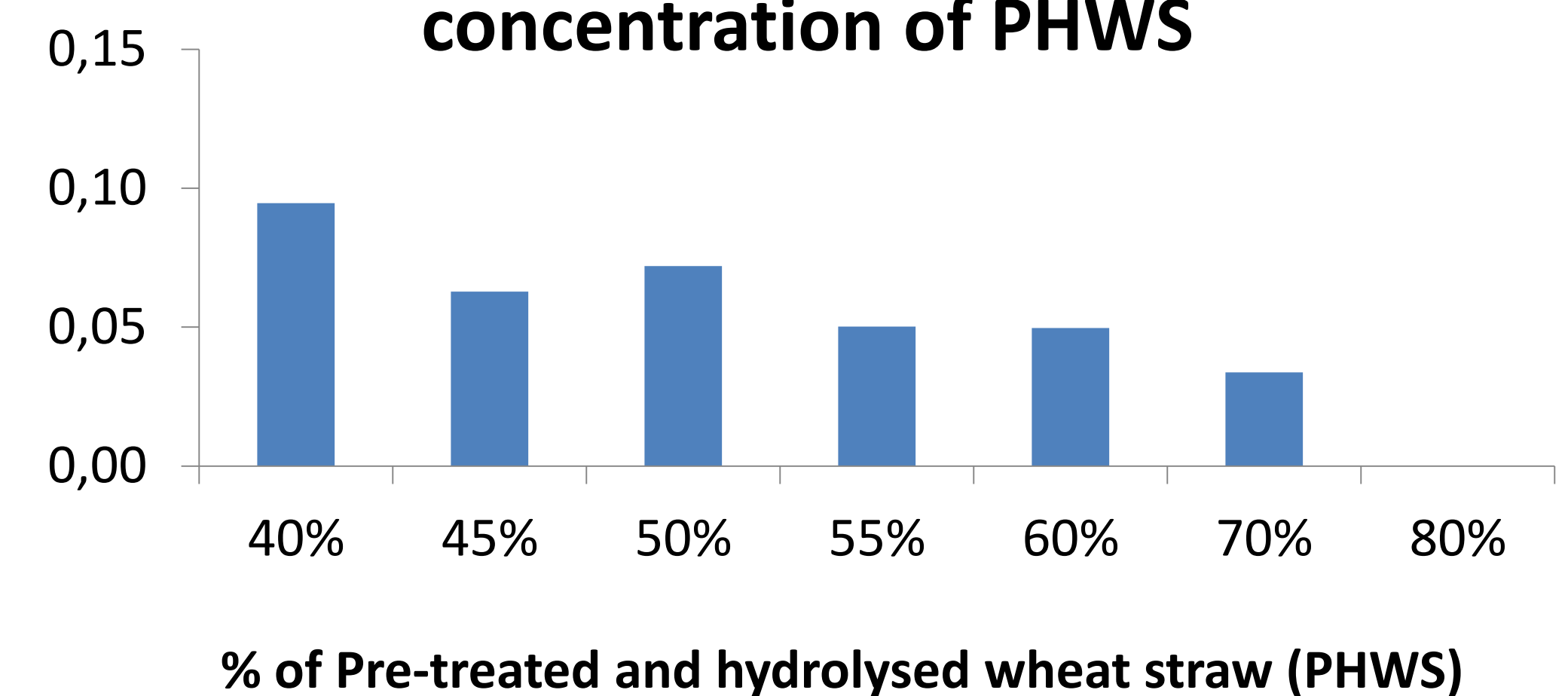
Key Outcomes

Strain development

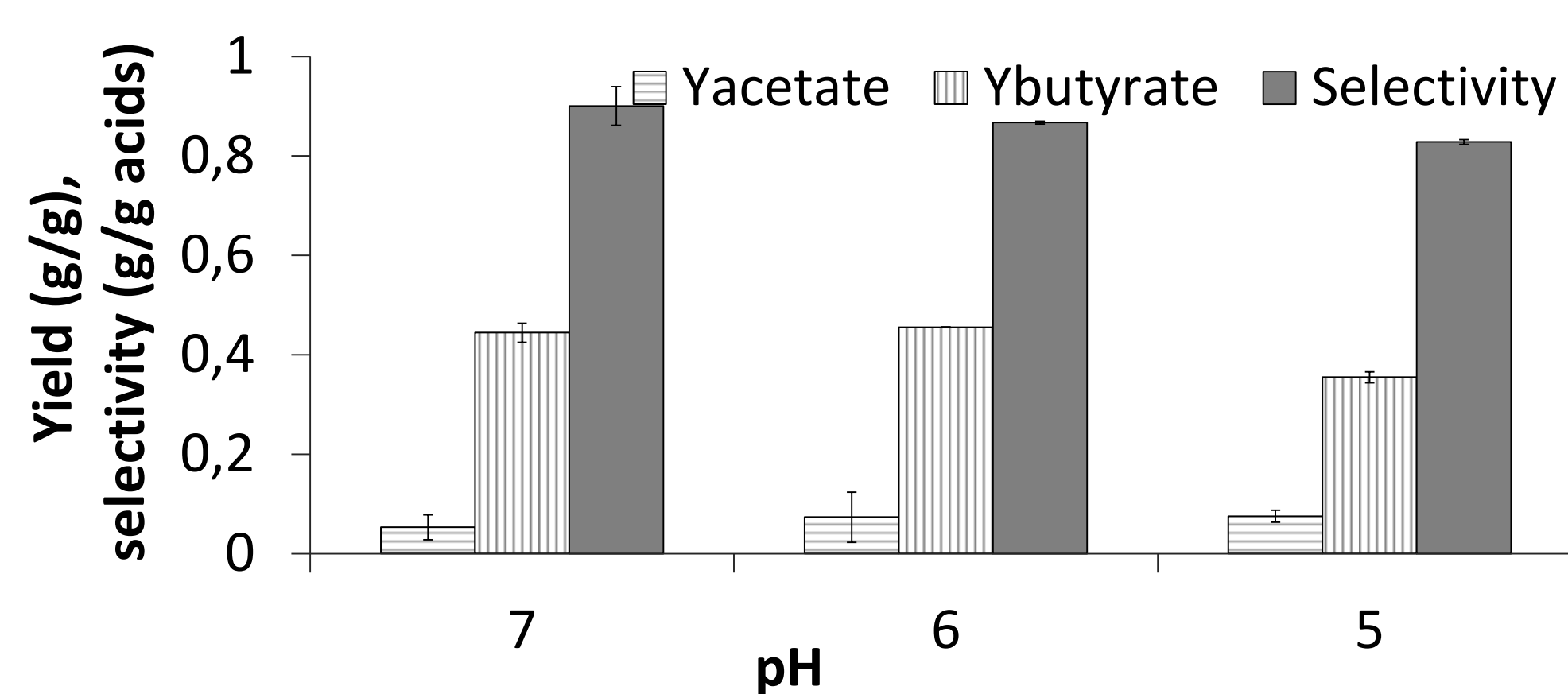
Butyric acid yield (g/g sugars) in different concentration of PHWS



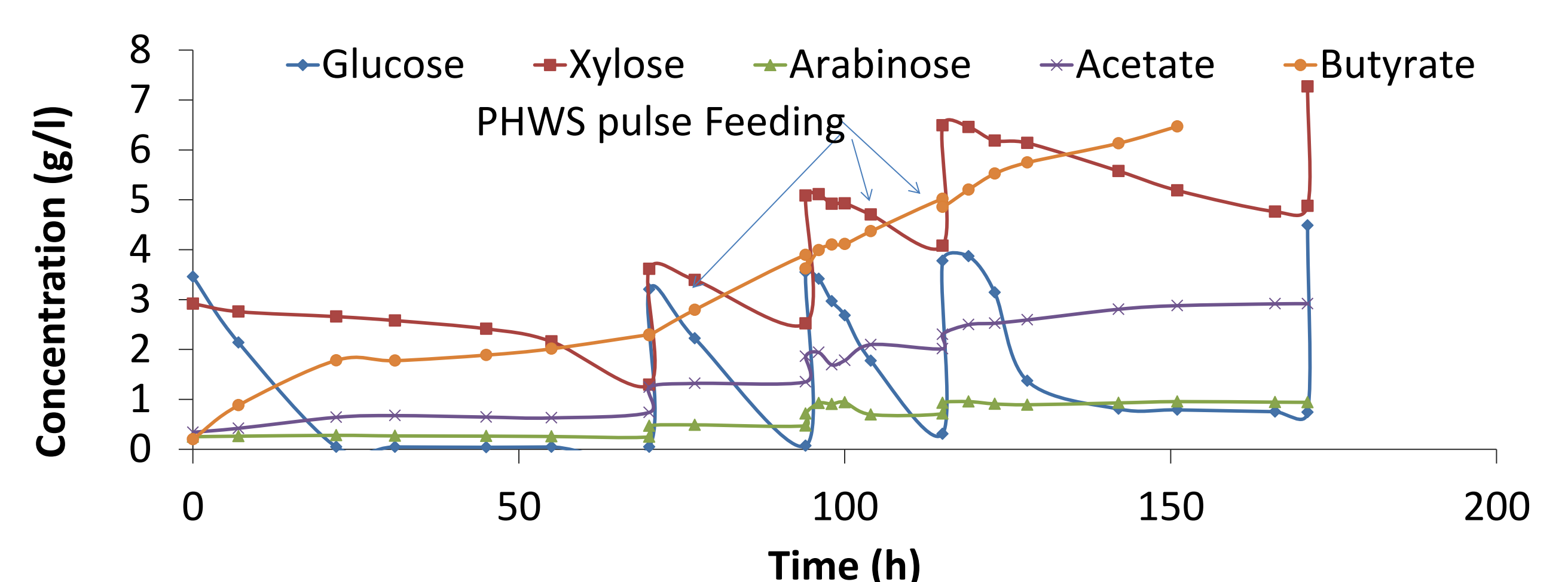
Acetic acid yield (g/g sugars) in different concentration of PHWS



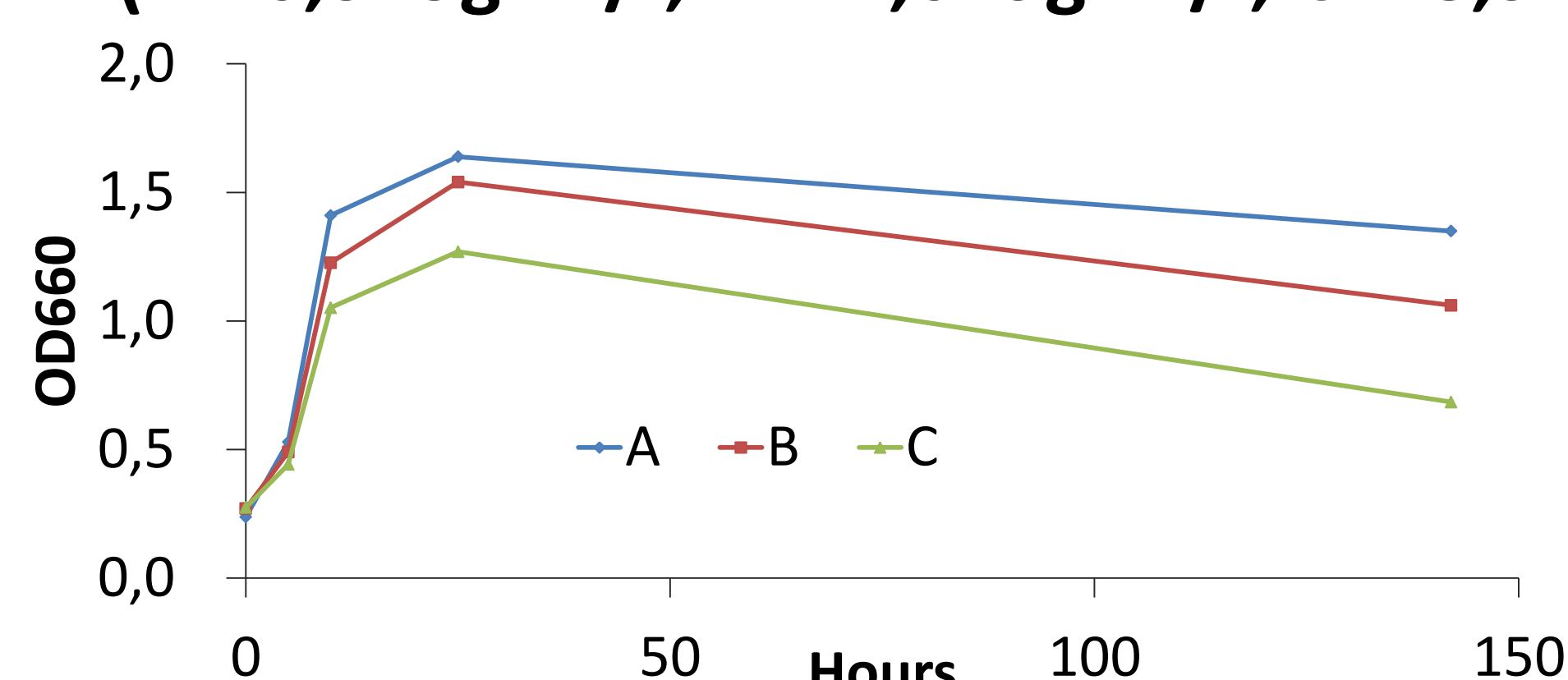
Yields and selectivity under different pH



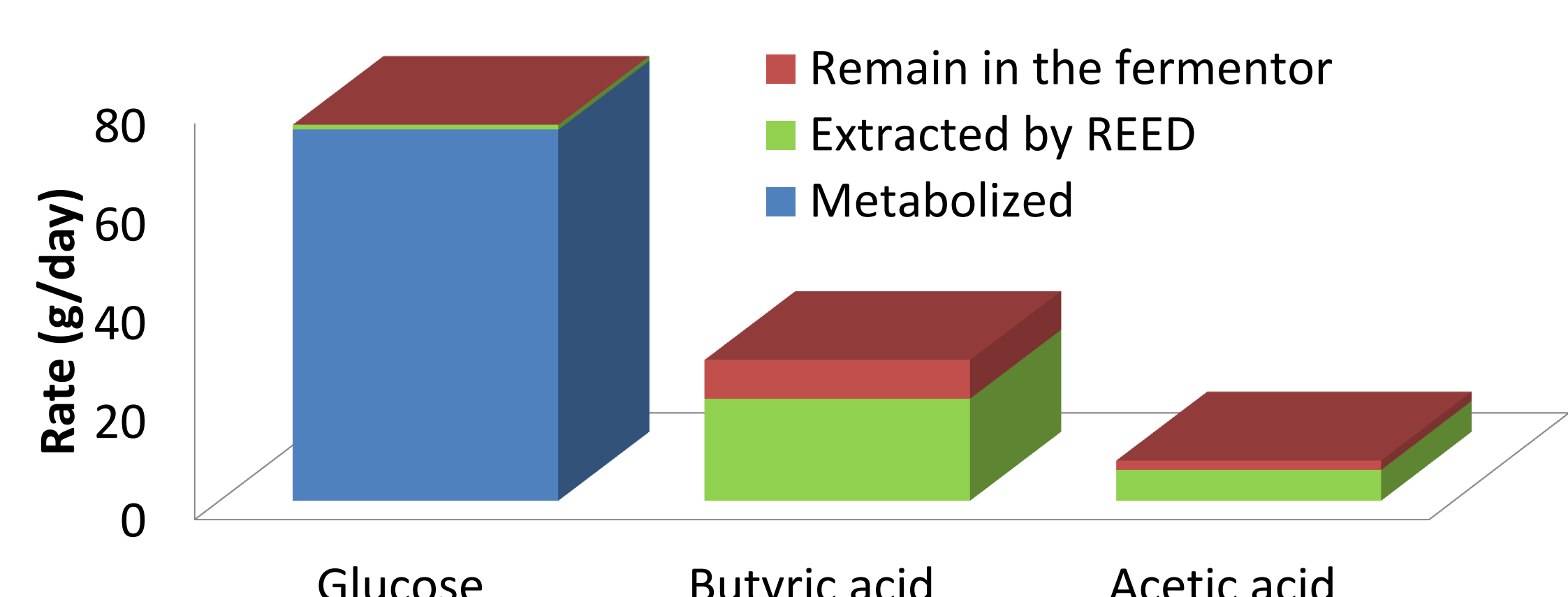
Simultaneous uptake of glucose and xylose in PHWS



Growth inhibition from K⁺ ion concentrations (A= 6,315gK⁺/l; B=12,629gK⁺/l; C=18,944gK⁺/l)



Continuous in-situ separation of butyric acid



Conclusion

The developed strain (*C. tyrobutyricum*) could grow in up to 80% PHWS with higher yield (> 4,4 g/g) and selectivity (>90%). The developed process **increased the productivity over 200%**, most probably by decreasing inhibitory effects.

Acknowledgement

The authors wish to thank the Commission of the European Communities for the financial support of this work under SUPRABIO project (FP7-cooperation project no 241640).