

Compositional changes in swine manure fibers treated with aqueous ammonia soaking (AAS) resulting in increased methane potential

Jurado, Esperanza; Hansen, Mads A.T.; Gavala, Hariklia N.; Skiadas, Ioannis

Published in:

Poster abstract in the Proceedings of the 13th World Congress on Anaerobic Digestion

Publication date:

2013

Document Version

Accepted author manuscript, peer reviewed version

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Jurado, E., Hansen, M. A. T., Gavala, H. N., & Skiadas, I. (2013). Compositional changes in swine manure fibers treated with aqueous ammonia soaking (AAS) resulting in increased methane potential. In *Poster abstract in the Proceedings of the 13th World Congress on Anaerobic Digestion: Recovering (bio) Resources for the World IWA Publishing*. <http://www.ad13.org/>

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.

Structural and molecular changes in swine manure fibers pretreated with aqueous ammonia soaking (AAS).



Esperanza Jurado^{*1}, Mads A.T Hansen², Hariklia N. Gavala¹, Ioannis V. Skiadas¹,

¹Section for Sustainable Biotechnology, Aalborg University Copenhagen (AAU-Cph)

Web address: www.sustainablebiotechnology.aau.dk, email*: eje@bio.aau.dk

²University of Copenhagen, Danish Centre for Forest, Landscape and Planning, Rolighedsvej 23, DK- 1958 Frederiksberg C.

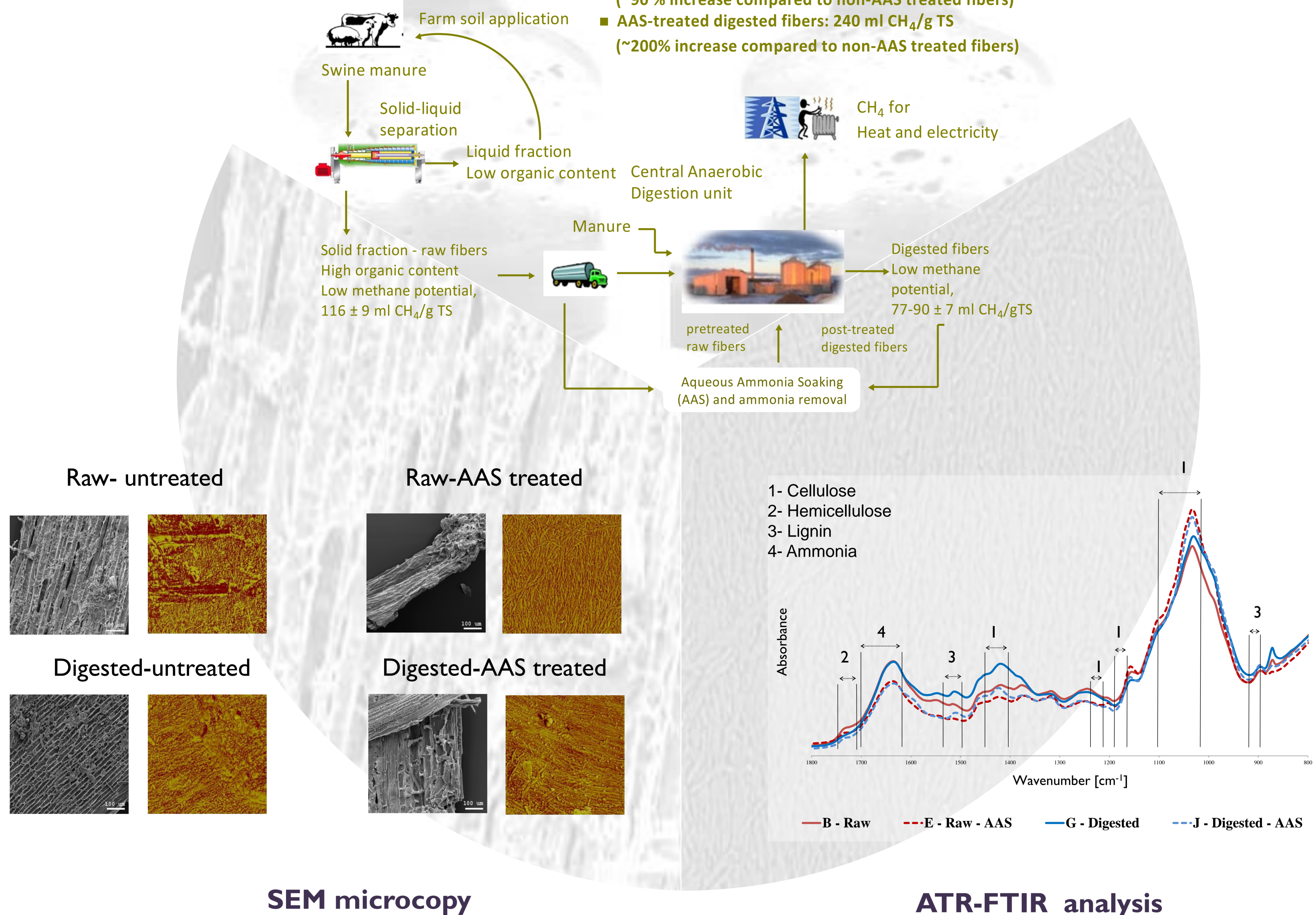
Aqueous ammonia soaking (AAS) as pretreatment

Ammonia is a weak base and has high selectivity toward the lignin reactions, preserving thus the carbohydrates. It cleaves the ether bonds in lignin and the ether and ester bonds between lignin and hemicellulose. **Aqueous ammonia soaking (AAS)** and subsequent ammonia removal has been successfully applied for increasing methane productivity of raw and digested manure fibers (Jurado et al 2013). The present study investigates the structural and molecular changes that AAS had on raw and digested manure fibers.

Process

Methane yield obtained after continuous AD:

- AAS-treated raw fibers : 230 ml CH₄/g TS (~90 % increase compared to non-AAS treated fibers)
- AAS-treated digested fibers: 240 ml CH₄/g TS (~200% increase compared to non-AAS treated fibers)



Conclusion

- AAS increase methane potential using raw and digested manure fibers.
- SEM and AFM images of the same samples showed intact plant tissues and microfibrils and surfaces cleansed of debris, supported by IR spectra that indicated more cellulose had become exposed on the surface.
- delignification is not strictly necessary for increasing methane potential; increasing cellulose accessibility is a larger factor in increasing biogas potential and productivity.

Acknowledgements

The authors wish to thank the EUDP-2008, Energistyrelsen, Copenhagen for the financial support of this work under RETROGAS project.

Reference

E. Jurado, I.V. Skiadas, H.N. Gavala. 2013. Enhanced methane productivity from manure fibers by aqueous ammonia soaking pretreatment. Applied energy, vol. 109, 104-111.