

Accepted Manuscript

An innovative intermittent-vacuum assisted thermophilic anaerobic digestion process for effective animal manure utilization and treatment

Renchuan Zhang, Erik Anderson, Min Addy, Xiangyuan Deng, Fayal Kabir, Qian Lu, Yiwei Ma, Yanling Cheng, Yuhuan Liu, Paul Chen, Roger Ruan

PII: S0960-8524(17)31385-8

DOI: <http://dx.doi.org/10.1016/j.biortech.2017.08.080>

Reference: BITE 18689

To appear in: *Bioresource Technology*

Received Date: 5 July 2017

Revised Date: 11 August 2017

Accepted Date: 14 August 2017

Please cite this article as: Zhang, R., Anderson, E., Addy, M., Deng, X., Kabir, F., Lu, Q., Ma, Y., Cheng, Y., Liu, Y., Chen, P., Ruan, R., An innovative intermittent-vacuum assisted thermophilic anaerobic digestion process for effective animal manure utilization and treatment, *Bioresource Technology* (2017), doi: <http://dx.doi.org/10.1016/j.biortech.2017.08.080>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



**An innovative intermittent-vacuum assisted thermophilic anaerobic digestion
process for effective animal manure utilization and treatment**

Renchuan Zhang, Erik Anderson, Min Addy, Xiangyuan Deng, Fayal Kabir, Qian Lu, Yiwei Ma, Yanling Cheng, Yuhuan Liu, Paul Chen, Roger Ruan*

Center for Biorefining, and Department of Bioproducts and Biosystems

Engineering, University of Minnesota

St. Paul, Minnesota, USA

*** Distinguished Guest Professor, Nanchang University, and Professor, University
of Minnesota, ruanx001@umn.edu**

Abstract

Intermittent -vacuum stripping (IVS) was developed as a pretreatment for thermophilic anaerobic digestion (TAD) to improve methanogenesis and hydrolysis activity through preventing free ammonia and hydrogen sulfide (H_2S) inhibition from liquid swine manure (LSM). Over 98% of ammonia and 38% organic nitrogen were removed in 60 minutes from 55 °C to 85 °C with vacuum pressure (from 100.63 ± 3.79 mmHg to 360.91 ± 7.39 mmHg) at initial pH 10.0 by IVS. Thermophilic methanogenesis and hydrolysis activity of pretreated LSM increased 52.25% (from $11.56 \pm 1.75\%$ to $17.60 \pm 0.49\%$) in 25 days and 40% (from 10 days to 6 days) in bio-methane potential assay. Over 80% H_2S and total nitrogen were removed by IVS assistance, while around 70% nitrogen was recycled as ammonium sulfate. Therefore, IVS-TAD combination could be an effective strategy to improve TAD efficiency, whose elution is more easily utilized in algae cultivation and/or hydroponic system.

Download English Version:

<https://daneshyari.com/en/article/4996564>

Download Persian Version:

<https://daneshyari.com/article/4996564>

[Daneshyari.com](https://daneshyari.com)