



Pretreatment of poultry waste anaerobic digested effluents by chitosan flocculation for *Chlorella pyrenoidosa* growth and pollutants removal

Yu Wu^{a,b}, Mengzi Wang^b, Hong Zhang^a, Wei Cao^{b,*}, Zhidan Liu^b, Haifeng Lu^b

^aInstitute of Food Science and Technology, Chinese Academy of Agricultural Sciences/Key Laboratory of Agro-Products Processing, Ministry of Agriculture, Beijing 100193, P. R. China, emails: iriswu_1982@163.com (Y. Wu), zhang.h07@hotmail.com (H. Zhang)

^bKey Laboratory of Agricultural Engineering in Structure and Environment, Ministry of Agriculture, China Agricultural University, P.O. Box 67, Beijing 100083, P. R. China, Tel. +8610 62737569; Fax: +8610 62737570; emails: caowei@cau.edu.cn (W. Cao), iriswu_1982@163.com (Y. Wu), mengzi87@163.com (M. Wang), zdliu@cau.edu.cn (Z. Liu), hfcauedu@163.com (H. Lu)

Received 15 February 2016; Accepted 14 August 2016

ABSTRACT

Poultry waste anaerobic digested effluents are biorefractory for microalgal cultivation. Hence, proper pretreatment is required to improve the conditions of digested effluent and enable the microalgal cultivation. This study evaluated the efficiency of nutrient removal in the digested effluents by pretreatment of chitosan flocculation and determined the potential of pretreated effluents to cultivate *Chlorella pyrenoidosa*. Approximately 82.1% of chemical oxygen demand, 91.6% of turbidity, and 99.3% of color in the digested effluents (without pH adjustment) were removed by chitosan flocculation (dissolved in hydrochloric acid) at an optimum chitosan concentration of 1.65 g/L. The maximum biomass production of 0.719 g/L and chlorophyll-a content of 13.71 mg/L were obtained from *C. pyrenoidosa* Y3 cultured for 20 d in the flocculated effluent at the optimum chitosan concentration. NH₄-N in the pretreated effluent decreased significantly by 77.2%. However, total phosphorus was reduced by algae to a certain extent (19.5%). Overall, the results indicate that chitosan flocculation is a feasible pretreatment to improve decontamination and algal biomass yield.

Keywords: Microalgae; Poultry anaerobic digested effluents; Nutrient removal; Chitosan; Flocculation

* Corresponding author.