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ENERGETIC POTENTIAL OF PIGGERY EFFLUENT BY ANAEROBIC DIGESTION

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Abstract

The sector of pig farming in Portugal is looking for sustainable and practical solutions to overcome existing environmental problems caused by very polluting discharges of effluents in rivers and wastewater treatment plants. The anaerobic digestion (AD) is a suitable process used to treat an organic effluent and, simultaneously, provide the agricultural and energetic valorisation of the substrate. The main objective of this work was to evaluate the energetic potential of a piggery effluent, collected in a pig farm with 9,000 animals, estimated in a volume of 900-1,170 m³ d⁻¹. Anaerobic digestion assays were carried out in batch mode, under anaerobic and mesophilic conditions. Both tested conditions, either piggery effluent (PE) or inoculated piggery effluent (PE+I), showed the ability to remove the organic matter although the highest removal values were obtained in the reactors digesting PE. The obtained biogas yields were similar in both PE and PE+I assays. The highest methane yields provided by PE experiment were obtained in terms of substrate volume and amount of solids: 8.6 m³/m³ and 0.39 m³ CH₄/kg VS_{in}. A very good quality of biogas was obtained since the biomethane total content from PE digestion was higher than 70%. These results indicate that the valorisation of this effluent by AD does not need any inoculation to convert the respective organic matter into methane-enriched biogas under anaerobiosis. Therefore, a simpler and faster start-up AD phase has been achieved to valorise the Valorgado piggery effluent, lowering the OPEX costs in a further deployment of an industrial AD unit and contributing to integration of existing agro-food and agro-industrial units in new biorefineries.

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