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Evaluation of GHG emission reduction potential and investigation of the methane emission factor of standardized baseline methods for pig husbandry in Taiwan (1)

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Abstract

The Taiwan EPA has launched the greenhouse gas (GHG) offset projects to facilitate the reduction of GHG emissions. However, it is difficult to promote the GHG offset project for biogas recovery destruction and/or reuse in the pig husbandry. One of the reasons is cost-intensive and time-consuming during the project development. Thus, the study was aimed at investigating the GHG reduction potential of the domestic pig husbandry and developing a simple evaluation guideline of the GHG reduction potential based on the principles of the standardized baseline methodology. The domestic methane emission factor based on the manure management was evaluated using the UN small-scale clean development mechanism (CDM) methodology AMS.III.H. and the ideal gas equation, respectively. Experiments were conducted in three pig farms located in Changhua, Yunlin, and Pingtung. It was found that the Changhua pig farm had the highest potential of the GHG emission reduction, which was estimated to be 14,000 ± 4280 t CO_2e/year. The methane emission factor of Changhua, Yunlin, and Pingtung was determined to be 305 ± 93.1, 352 ± 169, and 122 ± 34.5 kg CO_2e/head/year, respectively. The overall COD removal efficiency of anaerobic digesters must be greater than 80% and a LV value (the product of COD values and wastewater flow rates) must be in the range of 100-300 g/head/day were proposed as the essential criteria to justify the availability of the data of the piggery wastewater. As a result, the domestic methane emission factor was recommended to be 346 ± 32.2 kg CO_2e/head/year, which is consistent with that determined by Su and Chen (2018) where the factor was 14.4 kgCH_4/head/year, corresponding to 360 kg CO_2e/head/year.

Key words: Piggery wastewater, Greenhouse gas (GHG) offset project, Methane emission factor, Biogas, Standardized baselines.

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