

Study on the treatment of high -concentration pig wastewater with model tanks ⁽¹⁾

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Received: Jun. 2, 2021; Accepted: Jan. 18, 2022

Abstract

The purpose of this study was to investigate the performance of the three-step treatment process in the treatment of high-concentration pig wastewater, using a model tank. Twelve LD pigs with an average weight of 47 to 107 kgs were arranged in individual metabolism cages. Feed and water were provided *ad libitum* during the experimental period. The feces and urine of individual pig were collected daily, weighed separately, and then mixed together. Two concentrations of wastewater were prepared by mixing manure and washing water at ratio of 1:1 (wastewater A) and 1:2.5 (wastewater B) by weight. After solid-liquid separation, the mixture was injected into 6 anaerobic tanks with an effective volume of about 200 L. The hydraulic retention time (HRT) of anaerobic treatment was about 10, 15 and 20 days, respectively. The HRT of aeration treatment for each group was about 1.5 days. Results showed that after the three-step treatment process, chemical oxygen demand (COD), biochemical oxygen demand (BOD), suspended solids (SS), total nitrogen (TN) and total phosphorus (TP) concentrations of wastewater A were 904, 298, 638, 488 and 420 mg/L, respectively, all significantly ($P < 0.001$) higher than wastewater B. The COD, BOD, SS, TN and TP concentrations of the HRT 10-day group after the three-step treatment were 823, 257, 545, 453 and 369 mg/L, respectively, which were higher than the groups of HRT 15-day and HRT 20-day. Except for COD concentration, other water quality of group of HRT 15-day was also significantly higher than that of the HRT 20-day group. The results showed that even after wastewater A has undergone anaerobic treatment for 20 days and aerobic treatment for 1.5 days, the water quality still fails to meet the discharge water standard. On contrary, wastewater B subjected to anaerobic treatment for 10 days and aerobic treatment for about 1.5 days, the water quality meets the discharge standard. In summary, after the three-step treatment of high-concentration pig wastewater, the concentrations of TN and TP were still high. Taking considerations of compliance with law and treatment costs, the wastewater can be reused for irrigation on farmland as a nutrient source for crops.

Key words: Hydraulic retention time, Pig wastewater, Wastewater concentration.

(1) Contribution No. 2695 from Livestock Research Institute, Council of Agriculture, Executive Yuan.

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