

Efficacy and reliability of wastewater treatment technology in small meat plants

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ABSTRACT

Due to the growing scale of food production, the volume of wastewater generated by the food industry has been increasing dramatically. This type of wastewater usually contains high loads of contaminants whose levels exceed several times the respective levels in domestic wastewater. The requirement of wastewater treatment is also imposed on the meat industry. Plants of a similar profile, dealing with slaughter, were selected for the study. Three plants were selected – abattoirs slaughtering poultry or pigs and cattle. Each of them is equipped with a wastewater treatment plant operating in two treatment stages: physicochemical and biological treatment. Analyses were conducted over 1 y on 12 samples collected from raw, pre-treated, and treated wastewater. Based on the results, treatment efficacy and biological treatability of the wastewater were assessed. Causes for exceedance of standard requirements applicable for treated wastewater were discussed. Reliability of wastewater treatment plant operations was analyzed using the Weibull distribution model. The efficiency of removing organic compounds expressed as biochemical oxygen demand (BOD_5) and chemical oxygen demand (COD) was determined in the range from 81% to 99%, and biogenic compounds from 37% to 79% (N_{tot}), and from 83% to 98% (P_{tot}). The operation of the tested wastewater treatment plants was found to be completely reliable in terms of removal of organic compounds such as BOD_5 and COD (100% for plants 1 and 2, and 80% and 91% for plants 3, respectively), phosphorus and suspended solids (100% for all plants). Nitrogen was removed with reliability of approximately 40%.

Keywords: Industrial wastewater; Meat industry; Biological treatability; Reliability

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