# 59. 中溫厭氣處理養牛廢水之產氣評估

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本研究目的旨在以大型直立式厭氣消化槽，並溫度控制來處理養牛廢水，評估沼氣產量與可行性。直立式厭氣消化槽配置加熱、保溫與感測設備來控制水溫，槽體容積為 100 $m^3$。將固液分離後之養牛廢水，以可程式邏輯控制器控制進水與攪拌。試驗中紀錄進水量、環境溫度、槽內水溫、pH、沼氣產量。定期量測沼氣濃度、進流與出流水水質。結果顯示，全期之進水量為 1,706.8 $m^3$，每日進水量平均為 5.8 ± 0.1 $m^3$。全期的水溫平均為 40.1 ± 2.9°C，pH 值範圍在 6.82 – 7.20。全期之沼氣產量為 4,584.5 $m^3$；平均為 458.5 ± 55.8 $m^3$/month。全期進流廢水 COD、TS 與 VS 之平均去除率分別為 44.0、34.0 與 33.9%，其比沼氣產量與比甲烷產量分別為 0.393 ± 0.025 L/g $VS_{add}$ 與 0.261 ± 0.014 L/g $VS_{add}$。本研究之試驗結果與其他文獻相近，試驗操作數據可供現場應用之參考。

關鍵語：直立式厭氣消化槽、沼氣、養牛廢水、溫度控制

# Study on biogas yield by mesophilic anaerobic treatment of cattle wastewater

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The purpose of the study was to evaluate biogas yield and feasibility by using a temperature-controlled large vertical anaerobic digester to treat cattle wastewater. The anaerobic digestion tank is equipped with heating, insulation, and sensing devices to control the water temperature. The tank volume is 100 $m^3$. The cattle wastewater after solid-liquid separation was used the programmable logic controller to control inflow and agitation. The influent account, ambient temperature, water temperature in the tank, pH, and biogas yield were recorded. The biogas concentration, influent, and effluent water quality were measured regularly. The results showed that the whole and average influent were 1,706.8 $m^3$ and 5.8 ± 0.1 $m^3$, respectively. The average water temperature was 40.1 ± 2.9°C, and the pH ranged from 6.82 – 7.20. The whole and average biogas yields were 4,584.5 $m^3$ and 458.5 ± 52.8 $m^3$/month, respectively. The whole influent wastewater average removal rates of COD, TS, and VS were 44.0, 34.0 and 33.9%, respectively. The specific biogas yield and specific methane yield were 0.393 ± 0.025 L/g $VS_{add}$ and 0.261 ± 0.014 L/g $VS_{add}$, respectively. The results are similar to other literature and the operation data can be used as a reference for field application.

Key Words: Vertical anaerobic digester, Biogas, Cattle wastewater, Temperature controlled