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DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

BACHELOR OF SCIENCE IN WATER RESOURCES ENGINEERING

ANALYSIS OF BIOGAS POTENTIAL FROM SLAUGHTERHOUSE WASTE.

Case Study: Lira Municipality

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REPORT RESEARCH PROJECT SUBMITTED TO BUSITEMA UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS LEADING TO THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN WATER RESOURCES ENGINEERING

ABSTRUCT

Production of biogas through anaerobic digestion of organic waste materials provides an alternative environmental friendly renewable energy. In this study, biogas production from slaughterhouse waste in four mix ratios and one other mix for inoculum were evaluated under ambient temperature conditions (25-28°C) using batch digesters

Cattle paunch has been reported to be one of the slaughterhouse waste that require proper management /treatment and a major abattoir waste volume –wise in LM abattoir .Cattle paunch are waste that have posed environment hazards due to poor management and disposal strategies in most municipal slaughterhouses

In all treatments, total solid and volatile solid, percent of moisture content, pH and carbon to nitrogen ratio were measured before digestion. The daily biogas production was also measured by water displacement method where the biogas was measured through brine solution displacement.

Assessment of cumulative biogas and methane production showed that the substrate mix ratio of E contain containing 10 % cow dung, 70% paunch manure and 20% slaughterhouse wastewater was superior to others. Other overall results of this study indicate that the increase in biogas yield and reduction in volatile solid and total solid can be significantly enhanced when paunch manure is co-digested with animal dung. Around the first 2-3 days, biogas production rate was very slow due to the lag phase of microbial growth in all the digesters

Standard procedure of the portable gas analyzer GA2000 was used and test of two runs were made with each run taking approximately 20 minutes. The readings for gases were recorded at two minute interval.

DECLARATION

I **EKWAR ISAAC** do declare that this project report hereby submitted in partial fulfillment of the requirement for the degree of Bachelor science in water resources engineering at Busitema University is my own work and has not been submitted by any other person for an award of any degree at any other institution of higher learning.

Signed.....

Date.....29th/MAY/2017

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APPROVAL

This is to certify that this report was compiled by **EKWAR ISAAC,** registration number **BU/UP/2013/273** on the account of the project research for the award of a Bachelor's Degree in Water Resources Engineering at Busitema University.

Approved by;

Mrs. NABATEREGA RESTY

Signature.....Date.....

(MAIN SUPERVISOR)

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LIST OF ACRONYMS AND ABBREVIATIONS

AD:.....Anaerobic Digestion

BMP:..... Bio-chemical Methane Potential

BOW:.....Biodegradable Organic Waste

C/N:.....Carbon to Nitrogen Ratio

CD:.....Cow Dung

EPA:..... Environmental Protection Agency

FS:.....Fixed Solids

g/L:.....Grams per Littre

GHG:.....Greenhouse gas

GMP:..... Good Manufacturing Practices

Ino:.....Inoculum

LM:.....Lira Municipality

LMSH:.....Lira Municipality Slaughterhouse

mg/L:.....milligrams per Littre

NEMA:..... National Environment Management Authority

PM:.....Paunch Manure

SH:.....Slaughterhouse

SHW:..... Slaughterhouse Waste Water

SHWW:.....Slaughterhouse wastewater

Sub:.....Substrate

TS:..... Total Solids

VFA:..... Volatile Fatty Acids

VS:.....Volatile Solids

CHAPTER ONE: INTRODUCTION

1.1 Background

Energy is one of the most important factors for human development (Dincer, 2000) and to global economic growth. The most fascinating features of any civilized communities are the abundant availability of energy for domestic, agricultural and industrial purposes (Baki, 2004).

Biochemical processes, such as anaerobic digestion, can produce clean energy in the form of biogas which can be converted to power. This increases the economic efficiency of production enterprises and contributes to the generation of environmentally friendly energy. Within a series of processes, slaughterhouses produce large amounts of different solid wastes and wastewaters (GTZ, 2001). These wastes create lots of discomforts such as elevation of excessive coughing, typhoid, fever, respiratory pollution, global warming etc. in the communities in which the slaughter houses operate and it's outskirts.

Due to the growing demand of meat in the world (Vinnari, 2008), the amount of organic solid wastes from meat producing industries is increasing every day

Lira Municipality (LM) has one slaughterhouse which is located in Railways division operating at 100 outputs instead of the 60 installed capacity.

During the production of meat for human consumption a number of by-products are being produced such as paunch, fat and, grease, undigested food, diluted blood, suspended material, urine, loose meat, soluble proteins, excrement and manure

All these wastes end up in an open place and nearby water bodies as the case with LM. Currently, there is no organized system for disposal of both solid and liquid waste generated in LM slaughterhouse. Largely the solid waste in general is collected and dumped or disposed of in open which is unhygienic. Likewise the liquid waste too is disposed directly into existing stream thus negatively impacting the environment

Approximately, between 20 – 50 % of the weight of the animal is not suitable for human consumption (FAO, 2000). Organic solid wastes from meat producing industries are considered

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