Comparative Analysis on the Biogas Yield for Chicken Droppings and Cow Dung

1Mishack N. Nnaubuchi, 1Ositadinma F. Akubuko, and 2Chijioke M. Amakom*
1Department of Physics, Ebonyi State University, Abakaliki
2Department of Physics, Federal University of Technology, Owerri
*Corresponding Author: E-mail: camamkom@gmail.com phone 08037779552

Abstract

digestion method for 30 days. A set of 3.5 liters capacity glassware with graduated plastic bottles
batch operated and the daily gas yield was measured by the method of water displacement. The
results obtained for the chicken droppings showed biogas production from day 1 and gradually
increased and climaxed at day 6 and started diminishing gradually. For the cow dung, there was no
gas yield until day 6 and the gas production continually increased until day 20, after which the gas
production ceased. The cumulative volume of biogas production from the chicken droppings for
the 30 days period was 1.845 L while that of the cow dung was 0.830 L. Biogas production obtained
from the chicken droppings was more as compared with the cow dung.

Keywords: Biogas, chicken droppings, cow dung, anaerobic digestion.

1.0 Introduction

Biogas production is an effective way for waste
management and the cheapest means of
providing natural gas to both rural and urban
settlers. When properly managed, biogas can
be used not only for cooking but also for
electricity generation. In our society today, there
have been an increasing number of livestock
activities, which has led to increased economic
cultivation of chickens and rearing of cows.
Brings not only economic well-being of both
the rural and urban populace but also some
environmental hazards due to poor management
of the generated wastes from such practices.
Anaerobic digestion has been considered as
waste-to-energy technology, and is widely used
in the treatment of different organic wastes, for
waste, sewage sludge, food waste, animal
manure, etc. (Shehu, Ibn, & Ismail, 2012).

It is well known phenomena that most rural
settlers depend heavily on biomass energy, crop
residues, plant debris, animal dung and wood

for fuel, creating deforestation, flood, soil
erosion etc. Women and children, on whom the
burden of collecting fuel falls, suffer the most
pollution such as smoke in the kitchen (Islam
et al., 2013). Biogas energy provides the rural
population with pollution free, efficient energy
for cooking and at the same time protect them
from diseases by giving them a cleaner
environment (Islam et al., 2013).

One of the pertinent problems facing the world
today is the management of all sources which
endangers the existence of human life
(Oyewole, 2010). Cow dung wastes generated
from feedlot farming has been observed to
increase annually, most of which are disposed
into landfills or are applied to the land without
treatment. Anaerobic digestion provides an
alternative option for energy recovery and waste
treatment (Shehu et al., 2012).

Under mesophilic (37°C) or thermophilic (55°C)
conditions, of which thermophilic conditions
were reported to be more efficient in terms of
organic matter destruction, methane production, and pathogen destruction (Li et al. 2011). These maintain the specific temperatures. The objective of this work is to make a comparative analysis on the biogas yield from cow dung and chicken droppings in uncontrolled ambient conditions.

2.0 Materials and Methods

Collected in a local abattoir and poultry farms respectively. A set of 3.5 liters capacity glassware with graduated plastic bottles prototype biogas digesters was used to investigate the anaerobic digestion. The gas yield was measured by the method of water displacement. 200g of chicken droppings and cow dung were charged into different digesters and diluted 2.8 liters of water respectively to give the correct slurry concentration.

3.0 Results and Discussion

Dung was measured for a period of 30 days in the uncontrolled ambient conditions. The biogas yield for both the cow dung and the chicken droppings are presented in Figures 1 and 2. The cumulative volume of biogas production from the chicken droppings for the 30 days period was 1.845 L while that of the cow dung was 0.830 L.

![Figure 1: Biogas yield for the chicken droppings](image1)

From the result, biogas yield was observed for the chicken droppings from the first day of digestion. The yield continued to grow until the eighth day when a decrease in gas yield was observed and the decrease continued until the 25th day when gas production was observed to be as a result of the unregulated pH and non-interval agitation of the substrates. The low could be as a result of high pH value of 9.38 as measured at the commencement of the experiment. A pH value of between 7.0 to 7.2 has been observed to be the most ideal for optimal biogas yield (Itodo and Kucha, 2012). Gas yield was also observed from the 28th day. This could be as a result that it takes about 30 days for complete digestion of Chicken droppings (Bijman & June, 2014).

There was no gas yield for the Cow dung for the first five days; it was on the sixth day that could be as a result that biogas production rate growth of methanogenic bacteria. The yield until the fourteenth day when an increment was observed. The highest biogas yield on the 7th day was in agreement with the findings of (Shehu et al., 2012). The gas yield continued until the 25th day when the gas yield ceased completely. However, gas yield from the cow dung was observed again on the 29th and 30th days.

![Figure 2: Biogas yield from cow dung](image2)

A graphical plot to compare the gas yield from the chicken droppings and cow dung biogas...
yield is shown Figure 3. From the figure, there was a relatively steady production of biogas, and the droppings initially showed an abrupt increase in biogas production and more gas yield was observed from the chicken droppings.

![Figure 3: Comparison of gas yield from cow dung and chicken droppings.](image)

**4.0 Conclusion**

Biogas yield from chicken droppings was observed to commence from the first day of anaerobic digestion of the chicken droppings while the biogas yield from cow dung started from the sixth day. And it was observed that even in uncontrolled ambient conditions, there was still production of gas from both the chicken droppings and cow dung respectively.

**References**


