Biogas Plant

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Abstract - A biogas plant is modern energy source and is suitable to the necessities of the future. With the appropriate application of the digestion technology, the development of economically feasible biogas digesters systems is not beyond the capability of Trinidad and Tobago’s small poultry farms. The central purpose of the study is to outline if any, the conditions under which biogas digesters would be feasible for small poultry farmers in the Caribbean country of Trinidad and Tobago. The production of biogas by anaerobic digestion of organic waste is a mature expertise that may present tangible benefits to poultry producers. Biogas technology can alleviate many grave problems in the developing countries, such as rural energy scarcity, low agriculture yield, and poor public health. In addition through the utilization of biogas technology toxic farm waste can be properly handled through anaerobic digestion; generation of natural fertilizers and ultimately lead to an increase in output and income. From analysis it will become apparent that farmers using digesters systems have greater earnings or benefits than those farmers who do not resulting in the preservation and increase viability of the poultry industry in Trinidad and Tobago.

Keywords - Biogas

1. Introduction

The success of the plant depends upon the construction. In this paper the construction process of biogas is shown.

Site Selection

a) Sunny place
b) Water source within 20 minutes.
c) Kitchen as close as possible.
d) About 10m. away from the well.
e) Adequate space for making compost pit.

Layout

a) Fix the place for inlet, digester, outlet and compost pit.
b) Use lime or ash for making layout.
c) Dig pit as per the measurement and layout.

Soling

Soling of the digester floor should be in the stable and compact floor. Pour concrete on top of stone or brick layer placed properly.

Round Wall

a) Place ½ inch GI pipe vertically at the centre.
b) Place another pipe horizontally and tie them up.
Pipe Line Construction

Process of Plastering Dome

- It should be cleaned with water and wire brush, once we remove mud from the dome.
- Apply a layer of cement water solution.
- plaster 10 mm thick with 1:2 cement sand ratio.
- plaster 5 mm thick with 1:1 cement sand ratio on the next day.
- Mix 1:5 portion of paint with 20 portion of cement and apply inside the dome.
- Mix 1 portion of acrylic plastic emulsion paint with 2 portion of cement and apply inside the dome with the help of brush.

Water Drain Pit Construction

- It should be placed at the lowest level of the pipe line.
- The wall of the drain pit should be 40 cm x 40 cm. (inside) and 50 cm. depth.
- The wall should be about 5 cm. above the ground level.
- The water drain should be placed 30 cm. below the ground level.
- The cover of the pit should be 66 cm. x 66 cm.

Pipe Line Construction

Table 1: Measurement of Different Size of Biogas Plants

<table>
<thead>
<tr>
<th>No</th>
<th>Size of Plant (m)</th>
<th>Plant size in Cubic meter</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>15</th>
<th>20</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1 Bricks/Stone (Pc)</td>
<td>1200</td>
<td>1400</td>
<td>1700</td>
<td>2000</td>
<td>2400</td>
<td>2800</td>
<td></td>
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<tr>
<td>2</td>
<td>2 Sand (bag)</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>110</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3 Pebbles (bag)</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4 Rod Stone (kg)</td>
<td>10.5</td>
<td>10.5</td>
<td>13.5</td>
<td>13.5</td>
<td>18</td>
<td>44</td>
<td></td>
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<tr>
<td>5</td>
<td>5 Cement (kg)</td>
<td>11</td>
<td>13</td>
<td>16</td>
<td>19</td>
<td>27</td>
<td>34</td>
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<tr>
<td></td>
<td>Terai (bricks)</td>
<td>12</td>
<td>14</td>
<td>18</td>
<td>21</td>
<td>30</td>
<td>37</td>
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<td></td>
<td>Hills (stone)</td>
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<td>14</td>
<td>18</td>
<td>21</td>
<td>30</td>
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Table 2: Construction Materials Need for Different Size of The Plant

<table>
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<tr>
<th>Particulars</th>
<th>Plant size in cubic meter</th>
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<th>6</th>
<th>8</th>
<th>10</th>
<th>15</th>
<th>20</th>
</tr>
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<td>44</td>
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<tr>
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<tr>
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<td>18</td>
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<td>30</td>
<td>37</td>
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Table 3: Daily Feeding

<table>
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<tr>
<th>Size (cu.m.)</th>
<th>Initial dung (kg)</th>
<th>Daily feeding (kg)</th>
<th>Daily water (litre)</th>
<th>No of cattle</th>
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<td>4</td>
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<td>5</td>
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<td>5500</td>
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</tr>
<tr>
<td>6</td>
<td>20</td>
<td>7200</td>
<td>120</td>
<td>150</td>
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</table>

Quality Biogas Plant

1. Daily feeding with the right quality of dung and water.
2. Is constructed as per the drawing given.
3. There should not be any leakage through pipe line.
4. Adequate top filling on the dome.
5. Pipe line 1 feet below the ground level.
6. Adequate gas production and the user satisfied with the plant.

2. Advantages

1. Renewable source is use
2. Simple construction
3. Minimum maintenance
4. Skilled labor is not required
5. Easy to operate

3. Disadvantages

1. Huge amount Of cow dung is required.

4. Conclusion

1. Business can be done on this project

References

10. Fautahber, “Design of service systems with priority reservation,”

Note: All the measurements are given in Centimeter

1) Inlet, outlet and turret should be in straight line.
2) Toilet pipe should be placed as close as possible with the inlet pipe.
3) The floor of the digester should be in stable and compact ground.
4) The cement sand ratio for making wall should be 1:4.
5) The inside digester wall should be plastered with 1:3 cement sand ratio concrete.
6) The floor of the digester should be as close as the pit wall.
7) All the brick wall should be compacted with mud externally.
8) While making mud dome appropriate size of the template should be used.
9) For concreting dome, the ratio should be 1:3:3. Should not use concrete more than two hours.
10) Dome should be protected from sun and needs about 6 days for setting. The plastering of the dome is very important. The gobar gas is not competed unless, these is no top filling, no slab on outlet and no compost pit.

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Top Filling of the Dome

In order to protect the dome from cold and get more gas, the dome should be covered with mud (40 cm. high.)

Stove

1. A should be in a convenient place.
2. B should be cleaned every day.
3. C Air adjusting hole should be easily opened.
4. Rubber hose pipe should be changed if it is damaged.
5. Bricks/sand: First class brick.
6. With proper shape.
7. Stone should not be too soft.

Quality Construction Materials

1. Cement- High quality Portland cement should not be used if moist or with lumps.
2. Sand- Should not use poor quality sand. If it has more than 3% impurities, it should be washed with clean water and use.
3. Sand- Should not use dirty water.
4. Aggregate- Should be of the right size (0.5 – 2.5 cm.).
5. Should be cleaned.
7. With proper shape.
8. Stone should not be too soft.

Process of Plastering Dome

- It should be cleaned with water and wire brush, once we remove mud from the dome.
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