

Study of biomass briquettes made from human feces

M.Fiza L, Irvan, and Ahmad Shalihin

Faculty of Engineering University of Sumatera Utara, Jl. Alma mater Campus
USU Medan 20155

*solinx93@gmail.com

Abstract. Problems faced by urban terrain are the lack of knowledge about the processing of fecal droppings. Revenues are only based on the results of the processing into fertilizer tin ja still less to be the right solution. Solutions that can be offered is the processing of waste into bio-coal briquettes using basic ingredients that keep piling up feces in the city. The purpose of this study is to introduce the public or partners Community Partnership Program (CRP) on the processing of bio-coal briquettes made from feces as an alternative solution to the problems faced by the community, and an alternative business potential that can be developed by government companies that deal with this water. The method applied in overcoming these problems is through counselling, training with demonstrations of bio-charcoal briquette processing, as well as coaching and mentoring into a product ready for market. The event was held on 12-14 May 2019 in the eastern city terrain sub district field. The activities consist of participatory extension coupled with the demonstration of processed briquettes of goat manure and pecan shells as well as packaging and testing the quality of the briquettes.

1. Introduction

One type is the large proportion of waste liquid waste, namely domestic liquid waste (LCD) that flowed into a ditch. Kiely (1998) mentioned that this waste does not include rainwater; also called urban wastewater (urban waste water) or a mixture of the LCD with industrial liquid waste (industrial waste water). Medan city grow and develop in the direction of the metropolis, the liquid waste is also growing rapidly, so it's very urgent LCD processing before discharge into the receiving environment. The following statistical data regarding the collection of waste / feces increased in 4 periods in Figure 1.

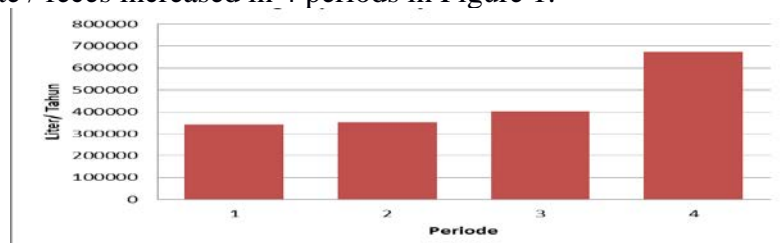


Figure 1.Data Collection Feces During the fourth period

At this time (since 1995) of the city of Medan has a LCD processing unit operated by PDAM Tirtanadi field called Fir waste water treatment plant (WWTP fir, Medan). During four consecutive periods of stool collected from several customers who recorded constantly increasing. Institutionally, waste water management in the city of Medan performed by the

Regional Water Company (PDAM) Tirtanadi and Development Department of the city of Medan. The two agencies cooperate and coordinate in technical disposal and waste water treatment are supported by local regulations Provincial Government of North Sumatra (Pempropsum) and the City Government (Government) Medan.

Regional Water Company (PDAM) Medan Tirtanadi Field began to worry about the build-up of waste in the form of feces. Efforts to treat fecal start planned in the largest city on the island of Sumatra this. One of the planned waste treatment Tirtanadi taps are changing the sludge into fertilizer or briquettes (solid fuel). PDAM Medan Tirtanadi already thought to process (feces) into fertilizer and briquettes. CityField already have a sewerage treatment plant (waste treatment plant) which has been inaugurated since January 2018.

Concern of a pile of sludge is considered a powerful reason to process them into the latest innovations. The population of the city of Medan now number around 2.5 million. If the next ten years will be buried Medan feces if not done anything, so we need new ways to innovate on the stool. The obstacles faced by PDAM Tirtanadi are a question of legalization. Until now, no Regional Regulation (Perda) associated with such innovations. Even so, taps Tirtanadi optimistic will soon be given the legalization related processing. In addition to the problem of sludge management, taps Tirtanadi also found another problem created fecal matter shelter residents. Septic tanks are made citizens often contaminate groundwater supplies. Here is

Raw material utilization technology development related to alternative fuel sources are constantly made to solve the problems of energy resource that is currently happening. One alternative forms of fuel are developed today are briquettes. Briquette is an alternative fuel that resembles charcoal and has a higher density. Briquette is a simple alternative, either in the manufacturing process or in terms of the raw materials used, so that the briquettes have a huge potential to be developed.

Briquette is a material form of powder or pieces - small pieces of compressed using a press machine with adhesive so mixed into a solid form. Briquette production process is one of the efforts to process the sludge into briquettes. Briquetting is done in order to take advantage of dirt / feces as the raw materials used to replace renewable fuels. But the fact the field briquettes produced are still far from appropriate standards, seen from the briquettes were cracked, broken and damaged (see Figure 1.1) so it is necessary to analyze the quality of the briquettes should be generated by testing the briquettes quality standards by using experimental methods of design. Here is a visual disability of briquettes that can be seen in Figure 2.

Figure 2. Type Briquette

Through roduction and quality testing briquettes researchers are expected to know the process of briquetting feces, and can determine the quality briquettes with the right ratio between water, raw materials and adhesive materials used and the resulting energy / new fuel quality. Comparison of the composition of briquettes building blocks of the stool (feces), then

the characteristic values obtained from each composition of briquettes and compared with SNI shown in Table 1.

Table 1. Based on ISO Quality Standards Briquette

Parameter	SNI No. 1/6235/2000
Water content (%)	≤ 8
Abu levels (%)	≤ 8
Carbon Content (%)	≥ 77
Calorific Value (Cal / g)	≥ 5000

Based on the above table it can be seen that when compared with some of the chemical properties of briquettes was still included in the ISO standard. In proper standard rules for briquettes that can be seen from the water content was appropriate according to SNI No. 1/6235/2000 is $\leq 8\%$, and ash content of $\leq 8\%$. After that the carbon content of $\geq 77\%$ and a calorific value that is appropriate according to SNI No. 1/6235/2000 is ≥ 5000 cal / g. These parameters that can be used as reference standards for briquetting stool (feces).

2. How to Produce Briquette Feces

The process of making briquettes Fecal quite complicated, but not too difficult to put into practice. A simple process that can be done is as follows:

1. Preparing materials

At this stage, the material will be used briquettes should be materials that contain cellulose that is strong and methane (CH_4) which is sufficient to initiate combustion. In this process, the material - material not required constituent materials such as gravel are separated to obtain the main ingredient is good.

2. Separating fine and coarse material with the separator Fine Screen.

3. Prepare the flour and dilute with water so that it becomes dough like mush as an adhesive (glue)

4. Mix the starch with starch glue charcoal with a ratio (1: 9) so that it becomes a sticky substance. Furthermore, the material stirred up so that all the ingredients are well blended and sticky enough.

5. Materials that have sticky then printed on printer tool.

6. This stool drying briquettes in 2- 3 days to really dry.

7. Briquettes are ready to be used as fuel.

Figure 3. tersajikan of pengelolah for the manufacture of feces and flow diagram process is complete.

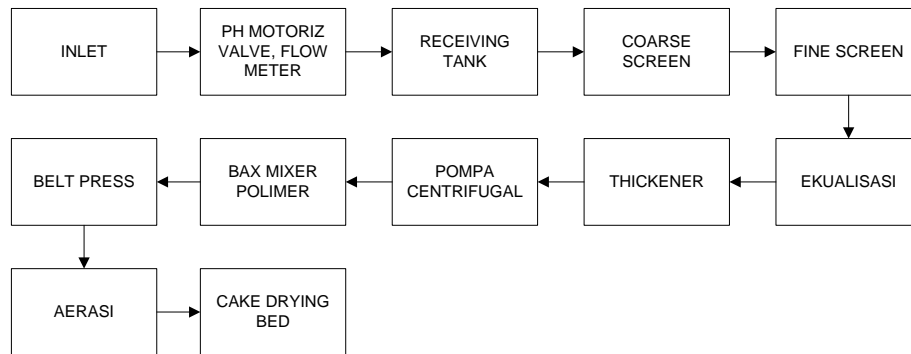


Figure 3. Process Briquettes Feces

The mechanism of the process of briquetting by weighing the material that has been determined, considering adhesive, mixing the raw materials and adhesives, weighing dough, molding, pressing and drying temperature and time specified. Figure 4 shows the flow diagram of the process of making the stool (feces).

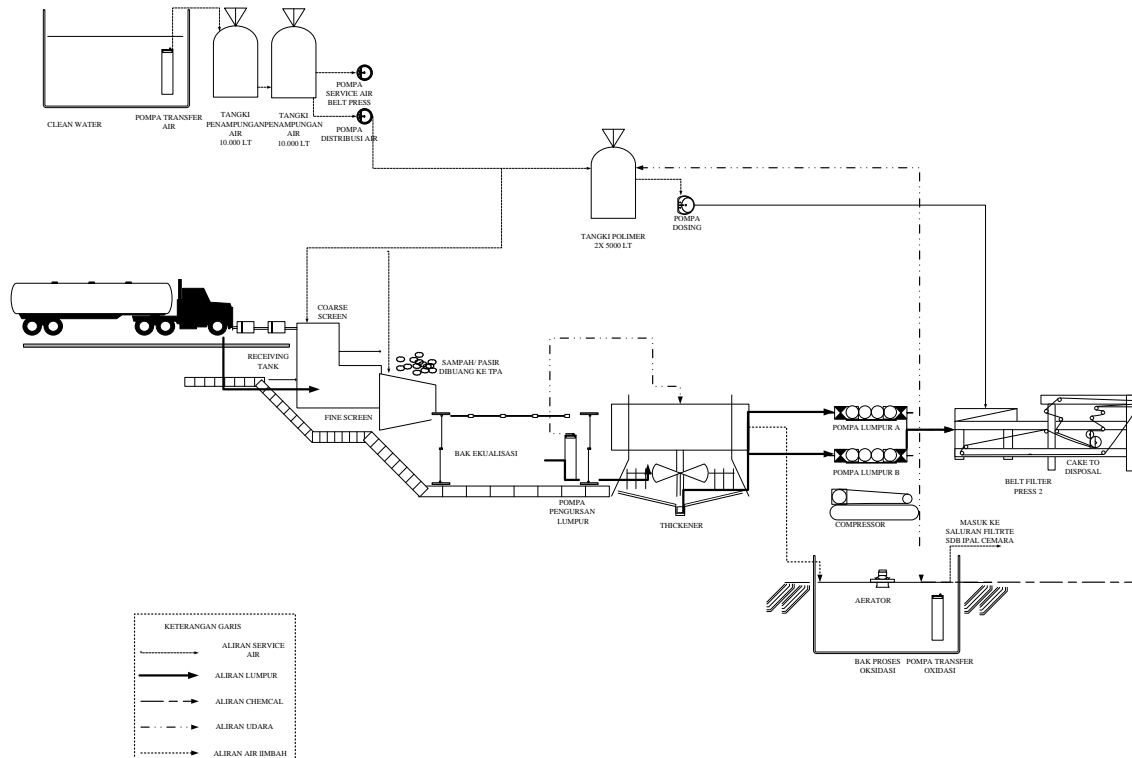


Figure 4. Process Flow Diagram

3. Conclusion

This research will still be the initial basis to produce briquettes quality utilization of human feces that has been dried and processed by means of glued, dried, molded and shaped so as to briquettes that are safe, environmentally friendly, meet the criteria of briquette quality and can certainly be used as an alternative fuel ,

The percentage of water content can be calculated from the percentage of water content is inversely proportional to the amount of heat generated value. Briquettes Briquette is a good low water content so that the calorific value and high combustion power.

Long burning time is calculated when the briquettes briquettes are burned to heat water to boiling water wait until the briquettes cease fire lit and briquettes to ash and calculate how long it lit briquettes during the combustion process.

The calorific value of a biomass fuel is the amount of heat energy (kJ) which can be released at any one unit weight of fuel (kg) that when burned out perfectly, briquettes perfect is if the entire content of the elements carbon (C) in briquette reacted with oxygen into carbon dioxide (CO₂).

Based on experimental data obtained by testing to determine whether a significant difference between the treatment given to the duration of heating briquettes. Where the treatment given is a comparison of raw materials and adhesives, pressure jack and drying time.

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