

UTILIZATION OF GOSSE (*Ceratophyllum demersum*) AND CHICKEN MANURE WASTE INTO BRIQUETTES AS AN ALTERNATIVE ENERGY SOURCE

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Abstract

Pangkep Regency is a coastal area with fisheries, agriculture, and livestock commodities. In the cultivation business, especially fisheries commodities, many pond businesses exist in Pangkep. One of the impacts is the rapid growth of Gosse in ponds. Gosse (*Ceratophyllum demersum*) is one of the aquatic plants considered a water weed. At the same time, in livestock commodities, one of the impacts is chicken coop waste in the form of husks mixed with chicken manure. The variety of waste from these commodities can be managed into waste-based economic products. Briquettes are one of the alternative fuels in the form of charcoal, usually made from coconut shells that have been processed into charcoal and then pressed or molded using a machine. Briquettes are one of the innovations that have helped to obtain renewable energy sources. This study utilizes husks and gosse as raw materials for making briquettes. Briquettes are made with two types, namely charcoal, husks, and gosse. Second, briquettes are made of the primary raw materials of husks and gosse. The finished briquettes were subjected to a burning test, the results of which were that briquettes with the primary raw materials of charcoal, rice husks, and Gosse had a longer flame time, which was 50 minutes, with an average weight of 26.2 grams. The briquettes from this study can be used for boiling or as a heat source in brooding phase chicken maintenance.

Keywords: Briquettes, Charcoal, Chicken manure, Gosse, Husks

INTRODUCTION

Indonesia is known as a maritime and agricultural archipelago because the sea dominates its geographical territory and is in the form of an archipelago. In addition, Indonesia has a fairly large land availability, so most of its population works in the agricultural sector. Pangkajene Kepulauan Regency (Pangkep) is one of the regencies in Indonesia that has many small islands and is included as a coastal area. The coastal area is a transition area between land and sea ecosystems that have their own characteristics, so the opening of pond businesses in the Pangkep area is quite high.

According to Utojo and Ratnawati (2013), the area is 10,201 ha and produces 13,098 tons, dominated by milkfish and tiger shrimp.

Several types of aquatic plants are considered weeds or nuisance plants in the cultivation process in ponds because their high growth rate can affect the aquatic ecosystem.

Gosse (*Ceratophyllum demersum*) is one of the aquatic plants considered an aquatic weed because of the ease of the gosses plant to find because rapid and massive growth turns out to cause problems, especially in brackish water ponds, especially in shrimp cultivation, which can disrupt shrimp production, to reduce gosses in ponds removal was carried out manually

Suryadi et al. (2017). Potential for abundance Gosses in ponds is an opportunity that can be used as economic value in the livestock sector; one of them is used as a substitute for animal feed poultry.

The development of the world of animal husbandry, especially poultry farming, is increasing. The increase is marked by increased chicken meat production in 2023, amounting to 3,997,652 tonnes, an increase of 232,079 tonnes from the previous year (BPS, 2024). Besides the increase in chicken meat, there are also negative impacts caused by the Chicken farming business, which mainly comes from chicken coop waste. The number of chicken droppings excreted daily is extensive, with an average head weight of 0.15 kg (Charles and Hariono, 1991). Fontenot et al. (1983) report that the average production of fresh waste from laying hens is 0.06 kg/day/head and a dry matter content of 26%, which can cause smelly gas. To handle chicken farm waste management, The government, in this case, the Department of Agriculture, is aware of this by issuing a ministerial regulation through Minister of Agriculture Decree No. 237/1991 and SK Minister of Agriculture No. 752/1994, which states that livestock businesses with population certain areas need to be equipped with environmental management and monitoring efforts.

The considerable potential of pond waste (gosse) and chicken farming (waste chicken manure) can be optimized as an environmentally friendly energy source like briquettes. Briquettes have economic advantages because they can be produced simply, they have a high calorific value, and the availability of raw materials is abundant in Indonesia, so they can compete with other fuels.

Based on the background that has been described, what is the quality of the briquettes: which is made from raw gosse and chicken manure as a source alternative energy?

This research aims to determine the quality of briquettes made from raw materials for goose and chicken manure.

LITERATURE REVIEW

Gosse (*Ceratophyllum demersum*)

Ceratophyllum demersum has another name, coontail because its shape resembles a raccoon's tail. Included in the Family Ceratophyllaceae, Genus *Ceratophyllum* is a type of submerged aquatic plant (Hidaya et al., 2020). The characteristics of this plant are that it has no roots and leaves resembling a needle, the stem can reach 1-3 m in length, with various sides shoots, and each side has 2-8 segments with leaves 8-40 mm.

The classification of *Ceratophyllum demersum* is as follows:

Kingdom: Plantae

Subkingdom: Tracheobionta

Superdivision: Spermatophyta

Division: Magnoliophyta

Class: Magnoliopsida

Subclass: Magnoliidae

Order: Nymphaeales

Family: Ceratophyllaceae

Genus: *Ceratophyllum*

Species: *Ceratophyllum demersum* L.

Aquatic plants are various types of aquatic plants that inhabit an aquatic ecosystem. Some types of aquatic plants are considered weeds or nuisance plants because their high growth rate affects aquatic ecosystems. The existence of aquatic plants that live with this will both increase water

productivity, and the role of aquatic plants essential is as a primary producer, as a habitat for biota such as fish, sanctuary fish, a place to attach various animals and plants or algae (Ummi Suraya, 2019). Aquatic plants can be helpful for local biota waters because aquatic plants can maintain water quality (Kurniawan, 2012).

Chicken Manure

Broiler chickens are reared using litter as bedding for the cage. Litter is the base for livestock cages, especially for poultry. Litter material can be sawdust, straw pieces, or husks. The base of this cage is made with a thickness of 10 – 20 cm, and it is often turned back and forth during use. After mixing with feces, the fermentation process can occur and produce vitamin B12, which is beneficial for chickens, but because of the content, the high nitrogen content of the litter is often a source of ammonia gas emissions, which can cause various health problems for broilers. (Srigandono, 1996).

Waste from chicken farming businesses mainly involves chicken droppings, unpleasant odors, and wastewater. Wastewater comes from washing chicken feed and water containers and other domestic needs. Chicken manure consists of feed residue and undigested cellulose fiber. Dirt Chicken contains protein, carbohydrates, fat, and other organic compounds. Protein in chicken manure is a source of nitrogen and other inorganic nitrogen (Rachmawati, 2000). Many chicken droppings are released daily, averaging 0.15 kg per chicken (Charles and Hariono, 1991). Fontenot *et al.* (1983) reported that the average production of fresh waste from laying hens is 0.06 kg/day/head, and the ingredient content is dry as much as 26%, which can cause smelly gas. That smell comes from high contents of ammonia gas and hydrogen sulfide gas (H₂S), dimethyl sulfide, carbon disulfide, and mercaptan. Compounds that cause odor can quickly form in anaerobic conditions, such as piles of wet manure. This compound can be smelled easily, even in a minimal concentration. For H₂S, the level is 0.47 mg/l or, in part, per concentration million (ppm) in the air, which is the concentration limit that can still be smelled rotten. For ammonia, the lowest level that the smell can detect is 5 ppm. Higher concentrations of ammonia in the air can cause eye irritation and respiratory tract disorders in humans and animals (Charles and Hariono, 1991).

Utilizing chicken manure waste as raw material for making compost is an alternative technology that can be applied and has positive prospects. The compost can be used as fertilizer for agricultural land and land forestry and can also overcome the problem of chicken farm waste. Selling chicken manure compost can also improve community welfare (Depari *et al.* 2014).

Briquettes

Briquettes are an alternative fuel in the form of charcoal. They are usually made from coconut shells that have been processed into charcoal and then pressed or printed using a machine. Briquettes are an innovation that allows renewable energy sources to be obtained.

Alternative energy can be produced from simple, appropriate technology and suitable for rural areas, such as briquettes, by utilizing waste biomass such as coconut shells, rice husks, and wood sawdust. In line with that, various considerations for utilizing coconut shells, powder teak wood saws, and rice husks are important, considering that these wastes are not yet available and not utilized optimally (Jamilatun, 2012).

Jamilatun said again that good-quality briquettes include properties such as a smooth texture, not easily broken, hard, safe for humans and the environment, and good ignition properties. Characteristics of this ignition include easy ignition, long ignition time, no soot, little smoke and

disappearance quickly, and sufficient calorific value. How long it stays on will affect quality and efficiency combustion, the longer it burns with a constant flame the better.

In principle, briquetting is the compaction of material to be converted into certain shape. Charcoal briquettes can be made in two ways, namely by making the charcoal is then crushed and then made into briquettes, or by forming briquettes by compressing and charring. Raw materials for making briquettes good charcoal is charcoal particles that have a size of 40-60 mesh. Size particles that are too large will be difficult to adhere to, thus affecting the constancy of the applied pressure.

The process of making charcoal briquettes requires gluing to bind the charcoal particles so that they become compact. Adhesive materials such as starch, dextrin, and flour tapioca are good for making charcoal briquettes because they produce charcoal briquettes that do not smoke at the moment and are burning long-lasting. Compression pressure is applied to create contact between the surface of the material being bonded and the adhesive material. After the ingredients are mixed, pressure begins to be applied so that the adhesive is still in a liquid state and will begin to flow toward the surface of the material.

RESEARCH METHOD

Location and Time of Research

This research was conducted at the Animal Husbandry Department of the Pangkep State Polytechnic of Agriculture on 29th August 2024.

Research Materials

The research material used was Gosse (*Ceratophyllum demersum*), Chicken coop waste consists of husks mixed with chicken feces, charcoal, tapioca flour, water, basin, briquette press, oven, digital scale and disk mill.

Research Methods

The research method used is an experimental method, namely manufacturing briquettes with two treatments, namely using charcoal and without using charcoal. The way to make it is: Making adhesive glue: 75 grams of tapioca flour mixed with 1 liter of water while heating until the flour thickens.

Manufacturing raw materials:

Gosse: dried in the sun and then floured using a disk mill.

Chicken Coop Manure: Husks mixed with chicken feces are burned first and then floured using a disk mill.

Charcoal: floured using a disk mill.

Briquette Making: Briquettes with charcoal (B1)

1. The main raw material is 25 grams of gosse mixed with 25 grams of roasted husks.
2. Then mix again with 50 grams of charcoal.
3. Stir until evenly mixed, then add adhesive glue (1:1) with raw materials.
4. Stir well until the ingredients come together.
5. Briquette printing is carried out.
6. The briquettes are heated in the oven
7. Briquettes are finished and can be packaged.

Briquettes without charcoal (B2)

1. The main raw material is 50 grams of gosse mixed with 50 grams of roasted husks.
2. Stir until evenly mixed, then add adhesive glue (1:1) with raw materials.
3. Stir well until the ingredients come together.
4. Briquette printing is carried out.
5. Briquettes are heated in the oven
6. Briquettes are finished and can be packaged.

The finished briquettes are burned to find out how long they last briquettes can smolder, and the percentage (%) amount of ash.

A. Data Analysis

The data obtained will be analyzed statistically using Descriptive and Completely Randomized Design (CRD). Differences in adding fermented feed aquatic plant gosse is determined by statistical models.

$$Y_{ij} = \mu + \alpha_i + e_{ij}$$

Explanation:

Y_{ij} = Observations on the i-th treatment of the j-th replication

μ = General average

α_i = Influence of action/factor

e_{ij} = Experimental error for the ith treatment in the j-th replication

To determine the effect of treatment on the measured variables, data the results obtained were tested using analysis of variance (ANOVA) with the help of SPSS software. If the treatment shows a real effect, then continue with the test of multiple regions (Duncan) to determine differences between treatments.

RESULTS AND DISCUSSION

Research Data Results

After the briquettes have been oven-dried, they will be weighed again. Look at the lost water content. Data can be seen in Table 1

Indicator	Sample							
	Charcoal + Husk + Gosse (B1)				Husk + Gosse (B2)			
	1	2	3	Avg.	1	2	3	Avg.
Initial weight (gr)	35	35	35	35	35	35	35	35
Final weight (after dried)(gr)	26	27.1	25.5	26.2	26.2	27.1	28.4	27.23
Moisture content(%)	-	-	-	25	-	-	-	22.2
Burning time (minute)				50				0*
Ash content	-	-	-	15%	-	-	-	>15%

Noted: *not burnt out

Table. 1 shows data from several indicators related to the quality of briquettes used. There are 2 types of briquettes made, namely briquettes with raw material charcoal + husk + gosse and briquettes with raw material husk + gosse. The weights of both briquettes B1 and briquettes B2 weigh 35g when printed. After printing, the briquettes are dried using an oven at 80° C for 16 hours to remove water content. Based on the relevant national standards and standard specifications for biomass pellets, the maximum water content contained in biomass for household and industrial needs, respectively, is 10% and 12%. When compared with Table 1. The two briquettes produced are still far from national standards for household and industrial needs.

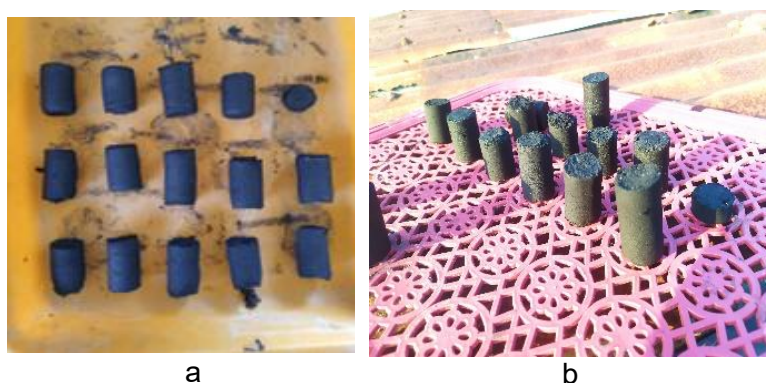


Figure 1. B1 Briquettes (a); B2 Briquettes (b)

Based on the burning time indicators, B1 briquettes are better than B2 briquettes, with an average total burning time of 50 minutes, whereas for B2 briquettes, it is not possible the time is known because the fire produced by the B2 briquettes goes out in the middle to observe before all the briquettes burn to ash. This can be caused by the absence of charcoal or substances that can make the briquettes burn longer, plus the presence of Gosse, which can contribute to the ash content quite high, namely 36% (Harifuddin et al., 2015). The high ash content in this research sample could be caused by the high mineral content contained in Gosse, which is a type of aquatic plant. Mutmainnah et al. (2018) explained that many water plants contain a number of essential minerals (potassium, phosphorus, magnesium, calcium, sodium, chlorine, sulfur, etc.).

CONCLUSION

Briquettes with the main raw materials of charcoal, husks, and gosse are still better than briquettes with husk and gosse as raw materials but still do not meet national standards for household and industrial needs. Briquettes, with the main raw materials being charcoal, husks, and gosse can still be used in an industry that is even smaller in scope

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