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Utilization Of Environmentally-Based Cattle Farming Waste For Composting To Increase Community Income In Ngadirejo Village, Tugumulyo Sub-District, Musi Rawas District

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Abstract. Cattle farm waste, particularly manure and feed residues, represents a highly potential source of organic material that can be processed into compost. When not properly managed, livestock waste becomes a major source of environmental pollution while simultaneously overlooking its economic potential to improve rural community income. This community service activity aimed to address waste management issues in Ngadirejo Village, Tugumulyo Subdistrict, Musi Rawas Regency by transforming organic waste into eco-friendly and economically valuable compost. Cow manure, which previously contributed to environmental degradation, was utilized as compost material through a series of training sessions and technical assistance for local farmers. The methods implemented included participatory and applicative-educational approaches, along with aerobic composting techniques using locally available additives such as rice straw and EM4 (Effective Microorganisms). The results of the activity demonstrated an increase in local knowledge and skills in waste processing, as well as the emergence of new income-generating opportunities through compost sales. In addition to its positive environmental impact, the program contributed to improving farmers' income, reducing dependence on chemical fertilizers, and supporting the achievement of Sustainable Development Goals (SDGs). This initiative proves that simple technologies can be effectively adopted to promote sustainable agriculture and livestock management at the village level.

Keywords: *Compost, Livestock Waste, Sustainable Agriculture, Sdgs, Ngadirejo Village*

INTRODUCTION

Processing cow waste into compost is one solution to support the achievement of Sustainable Development Goals (SDGs), especially in point 12 on Responsible Consumption and Production and point 13 on Climate Action. Cow waste, if not managed properly, can cause environmental pollution due to methane and ammonia gas emissions that contribute to climate change. By converting cow waste into compost, greenhouse gas emissions can be reduced, while creating a more sustainable production system (Sutanto, 2012). In terms of economy and social, processing cow waste into compost can create business opportunities for farmers and the surrounding community. This is in line with SDGs point 8, Decent Work and Economic Growth, which encourages job creation and an environmentally-based circular economy. With innovation in livestock waste management, farmers not only reduce negative impacts on the environment but also gain economic benefits from the sale of compost (Sarwono, 2018), in terms of environment, the use of livestock waste for compost production also supports SDGs point 15, Life on Land, which focuses on preserving terrestrial ecosystems. Compost can increase biodiversity in the soil, improve soil structure, and reduce erosion. In addition, by

reducing dependence on chemical fertilizers, water pollution due to synthetic fertilizer residues can be minimized, so that aquatic ecosystems are also protected (Indriani, 2015). Small-scale people's businesses with simple technology still dominate the livestock sector in several regions of Indonesia, especially in rural areas such as in Musi Rawas Regency, South Sumatra Province. Rural communities usually rely on agriculture and livestock as their main source of income and often make money through livestock businesses (Sodiq & Budiono, 2012). However, the awareness of livestock farmers in general towards cattle waste is still lacking and is not utilized properly, where it is only limited to the use of buying and selling cattle while the utilization of waste has not been utilized optimally which will later get added value economically or financially (Rokhayati, 2023). Organic fertilizer is a fertilizer composed of living matter, such as the decomposition of plant, animal, and human remains that have gone through an engineering process, can be in solid or liquid form and can be enriched with minerals and/or beneficial microbes to enrich nutrients, organic soil materials and improve the physical, chemical and biological properties of the soil. (Suryati and Wahyuni, 2023)

Cattle farm waste, especially manure and leftover feed, is a source of organic material that has high potential to be processed into compost. This waste processing not only reduces environmental pollution but also produces organic fertilizer that is beneficial for agriculture. The process of composting cow dung involves the decomposition of organic matter by microorganisms to produce fertilizer that is rich in nutrients. In addition, compost from cow waste can increase soil fertility and improve soil structure naturally (Sutanto, 2012). Compost from cow dung has a high nutrient content, such as nitrogen (N), phosphorus (P), and potassium (K), which are very beneficial for soil fertility. The use of this compost can increase the organic matter content of the soil, improve soil structure, and increase the soil's capacity to store water and nutrients. In addition, the use of compost as an organic fertilizer can reduce dependence on chemical fertilizers which in the long term can damage the balance of the soil ecosystem (Suhartini, 2020). The process of processing cow waste into compost can also support a sustainable agricultural system. By processing waste into organic fertilizer, farmers can reduce environmental pollution while producing products with economic value. Making compost involves the process of decomposing organic matter by microorganisms, which requires a balance between the carbon and nitrogen ratio (C/N), humidity, and good aeration to produce high-quality compost (Indriani, 2015). In some areas, the application of cow waste composting technology is still relatively minimal. Many farmers are not yet aware of the benefits of compost or still use less environmentally friendly waste disposal methods. Therefore, socialization and training are needed for farmers regarding efficient and economical composting techniques. With broader education, it is hoped that livestock waste can be managed optimally and provide benefits to the agricultural and livestock sectors (Isroi, 2017).

These problems become increasingly complex if they are not handled in an integrated and sustainable manner. Therefore, an environmentally friendly approach is needed to convert waste into useful resources. One environmentally friendly and sustainable solution is the processing of cattle waste into organic compost. Compost produced from cow dung has a high nitrogen, phosphorus, and potassium content, which is very good for improving soil structure and fertility (Indriani & Ramelan, 2021). This environmentally based approach to waste management is in line with the principle of a circular economy, namely the reuse of waste into new useful products, thereby reducing dependence on chemical fertilizers and reducing environmental pollution. In addition, the utilization of waste into compost contributes to reducing greenhouse gas emissions and supports environmentally friendly agricultural practices (Isroi, 2019). Processing cow waste into compost is a strategic step in reducing environmental pollution and increasing agricultural productivity naturally. In addition to providing ecological benefits, this process also contributes to the economy of farmers by providing additional sources of income. Therefore, the development and application of composting technology need

to be continuously encouraged so that it can be widely adopted by the community (Sarwono, 2018). Therefore, this extension activity is expected to be an initial step that has a positive impact on the sustainability of beef cattle farming businesses in Ngadirejo Village, Tugumulyo District, Musi Rawas Regency, as well as encouraging increased welfare and economic income of livestock farmers in the area.

RESEARCH METHODS

The method used in this community service activity is a participatory and educational-applicative approach, which prioritizes the active involvement of the target community in all stages of the activity. This approach aims to build community independence in processing cattle farm waste into compost sustainably.

Preparation Method

In achieving these goals, the implementation of this PkM activity is carried out in several stages in making compost, as follows:

1. Preparation of Materials

- Cow dung is collected and ensured not to be mixed with inorganic materials such as plastic or metal.
- Supporting materials such as straw or rice husks are prepared to help improve the carbon and nitrogen balance.
- Decomposing microorganisms (EM4 or local microbes) are prepared as compost activators.

2. Compost Pile Preparation

- Cow waste is mixed with supporting materials in a ratio of 3:1 (three parts cow manure and one part supporting material).
- This mixture is placed in a pile with a height of about 1–1.5 meters so that the fermentation process runs optimally.
- Decomposing microorganisms are mixed into the material by spraying or sprinkling them evenly.

3. Fermentation Process

- The compost pile is covered with a tarp to maintain humidity and temperature.
- The optimum temperature during fermentation ranges between 50–70°C, which indicates that the microorganisms are working well in decomposing organic matter.
- Stirring is done every 5–7 days to ensure sufficient oxygen supply, speed up the decomposition process, and reduce odor.

4. Monitoring and Settlement

- After 4–8 weeks, mature compost will be blackish brown, have a crumbly texture, and will not have a strong odor.
- If the temperature of the pile has decreased and the compost no longer emits an ammonia odor, then the compost is ready to be used as organic fertilizer.

5. Packaging and Application

- Compost can be packed in sacks or applied directly to agricultural land as organic fertilizer.
- The dosage of compost used depends on the type of plant, usually around 2–5 tons per hectare to increase soil fertility.

RESULTS AND DISCUSSION

Activity Location

This community service activity was carried out in Ngadirejo Village, a village located in Tugumulyo District, Musi Rawas Regency, South Sumatra Province. This village is one of the old transmigration areas that still maintains the richness of Javanese culture in the land of Sumatra. The people of Ngadirejo Village mostly work as farmers and ranchers, with an integrated agricultural system between rice fields, plantations, and household-scale livestock.

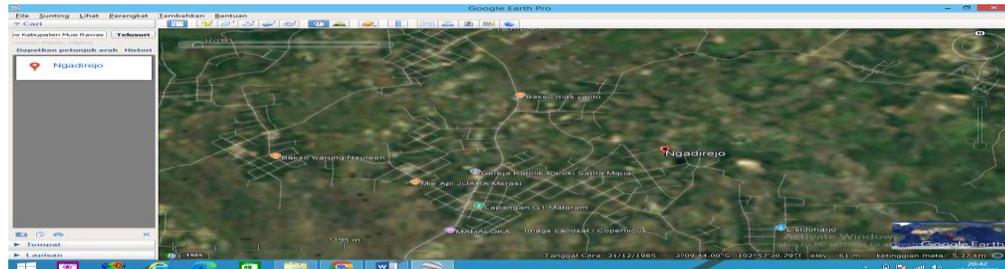


Figure 1. Village Location

Geographically, Ngadirejo Village is located at an altitude of around 600 meters above sea level (masl), with a relatively flat area, suitable for agriculture and livestock. The village area is divided into 7 hamlets, with a compact social structure and strong mutual cooperation. This village has fairly good basic infrastructure, including adequate road access to the sub-district and district centers. Cattle farming activities are an important part of the economic activities of residents, but so far have not been balanced with optimal waste management. Cow dung produced in large quantities is often not used productively, causing environmental problems as well as wasting economic potential. This location was chosen as a place to carry out activities for several strategic reasons, namely:

1. Potential for Ruminant Livestock Development
2. Availability of sufficient quantities of cattle waste,
3. The potential of a community that is open to innovation and training,
4. Support from the village government for activities based on community empowerment and environmental management.



Figure 2. Activity Location

With a supportive geographical background, where Ngadirejo Village is one of the base areas for cattle development, Setiawan et al (2023) stated that the base areas for beef cattle

development are in three villages in Tugu Mulyo District, namely Y Ngadirejo Village (3.81), Q2. Wonorejo (3.26) and V. Surodadi (1.65) from the results of the LQ value calculation, where the sector with a value of more than or equal to 1 (≥ 1), then the sector is a base sector. Ngadirejo Village is one of the villages that has abundant local resources and is supported by a strong desire from the community to increase income through the agricultural and livestock sectors.

Potential of Cattle Farm Waste as Compost Raw Material

Ngadirejo Village in Tugumulyo District is an agricultural area that has many household-scale cattle breeders. Cattle waste is one of the problems for breeders in Ngadirejo Village. The majority of the population in the village work as farmers/breeders, in addition to cultivating food crops, the community also raises cattle. The amount of waste or manure produced by cattle each day is around 12% of body weight and one cow is estimated to be able to produce solid waste of around 8-10 kg per day, with the number of active breeders and average ownership of 3-5 cows per breeder. the potential for livestock waste produced can reach hundreds of kilograms per day. Livestock waste produced from livestock business activities has the potential to be processed into organic fertilizer so that it can be used to support agricultural and plantation businesses in the surrounding environment.



Figure 3. Waste Potential

This livestock activity produces organic waste, especially cow dung, in quite large quantities every day. So far, most of this waste has been simply thrown away or used traditionally as fertilizer, without going through a proper processing process. Cow dung actually contains macronutrients such as nitrogen (N), phosphorus (P), and potassium (K) which are beneficial for soil fertility. If processed into compost through a proper decomposition process, this waste can become a product that has economic value and is environmentally friendly.

Cattle farm waste, especially manure, is one of the main contributors to pollution in livestock centers if not managed properly. Accumulation of manure around the pen can cause a pungent odor due to ammonia gas, as well as pollute groundwater and surface water through rainwater runoff. In addition, rotting organic waste is also a medium for the development of flies and pathogenic microorganisms that can harm human and livestock health (Susilowati et al., 2018). By implementing the composting method, waste that was previously a source of pollution is now processed into useful products. The composting process reduces pathogen content, stabilizes organic matter, and suppresses the production of greenhouse gases such as methane (CH_4) and ammonia (NH_3). The resulting compost is odorless, does not pollute water, and is safe for use in agriculture.

Composting Techniques Applied

This community service activity (PkM) applies a simple composting method that can be done by the community independently, using static aeration techniques or manual turning. The main material used is cow dung, mixed with additional materials such as straw, husks, and microbial activators (EM4).



Figure 4. Compost Processing

Conventional (Aerobic) Composting applied in this PkM, this technique was chosen as the initial method because it is easy to apply, does not require large costs, and can be managed independently by farmers. The composting process takes place through aerobic decomposition (with oxygen), where decomposing microorganisms break down organic matter into stable compost. The main ingredient in the form of cow dung is mixed with dry materials such as straw and husks to maintain the ideal carbon-nitrogen (C/N) ratio. The application of this technique gives positive results. Farmers are able to process waste that was previously a source of pollution into useful and economically valuable materials. The time required is relatively short (around 3-4 weeks), and the compost produced is good enough to be used as fertilizer for horticultural and rice plants. From the educational aspect, PkM using this method provides a basic introduction to the community regarding the basic principles of organic waste management, fermentation, and the importance of protecting the environment. This activity also strengthens the understanding of farmers regarding the sustainable agricultural cycle.

The composting process is carried out in several stages:

- **Collection and mixing of materials** : cow dung is mixed with other organic materials in a certain ratio.
- **Fermentation** : the ingredients are mixed and covered for fermentation for 21–30 days.
- **Turning the material** : done every 5–7 days to maintain air circulation and even out decomposition.
- **Ripening** : the compost is ready to use after the pungent odor has disappeared and the texture resembles loose soil.

With the training and assistance provided, the community began to understand the basic principles of composting and how to maintain the quality of compost to meet standards.

Economic Impact: Compost as a New Source of Income

One of the important achievements of this program is the creation of new business opportunities based on compost production. The compost produced is not only used by farmers themselves to reduce dependence on chemical fertilizers, but also begins to be sold to local markets and other farmer groups around the Tugumulyo area. Simple calculations show that one group of farmers can produce ± 150 kg of compost each month. With a selling price of IDR 1,000 per kilogram, the additional income obtained can reach IDR 150,000–IDR 300,000 per month per farmer, depending on the scale of production. Although not yet large, this is a promising initial step towards improving community welfare.

The use of compost also helps farmers reduce their dependence on chemical fertilizers, the prices of which tend to fluctuate and are expensive. By using their own compost, farmers can reduce production costs by 20–40%, especially in the food crop and horticulture sectors. This efficiency has a direct impact on increasing agricultural profit margins, so that farmers' incomes increase even though the selling price of the harvest does not change. Composting is now not only a solution for waste management, but has developed into productive economic units based on the environment that are relevant to the principles of sustainable development (SDGs), especially the goals: SDGs 1 (No Poverty), SDGs 2 (No Hunger) and SDGs 12 (Responsible Consumption and Production). With increasing awareness of the importance of organic farming, market demand for compost is also increasing, especially from vegetable farmers, gardeners, to urban farming in nearby cities. This provides a broad market prospect for compost products from Ngadirejo Village.

CONCLUSION

This community service activity has successfully demonstrated that cattle farm waste that was previously a source of pollution can be converted into a product of economic value in the form of organic compost. Through training, mentoring, and the application of simple technology, the people of Ngadirejo Village now have the knowledge and skills to process livestock waste into compost that is useful for the agricultural sector that has potential income and provides environmentally friendly livestock education.

LITERATURE

- Indriani, L., and Ramelan, AH 2021. *Utilization of Organic Waste into Compost as a Solution for Sustainable Waste Management*. Journal of Community Service, 5(2), 101–108.
- Indriani, R. 2015. *Organic Waste Processing Techniques into Compost*. Jakarta: Penebar Swadaya.
- Isroi. 2017. *Microbiology in Composting*. Yogyakarta: Gadjah Mada University Press.
- Isroi. 2019. *Vermicomposting: Environmentally Friendly Technology for Organic Waste Management*. Agricultural Research and Development Center.
- Rokhyati, UA 2023. *Community Empowerment of Cattle Waste as Biogas and Organic Fertilizer in Bube Baru Village, Suwawa District, Bone Bolango Regency*. PARADIGMA: Journal of Community Service, 1(1). <https://jopa.unwiku.ac.id/index.php/paradigma/article/view/>
- Sarwono, B. 2018. *Sustainable Livestock Waste Processing Technology*. Bogor: IPB Press.
- Setiawan BD, Nofrida H, Jati PZ, Adlan ZU, Agustina SD 2023. *Potential for beef cattle development with location quation analysis in Tugumulyo District, Musi Rawas Regency*. Livestock Stock. Vol. 5 (1), 51-57. DOI: <https://doi.org/10.36355/sptr.v5i1>
- Sodiq, A., and Budiono, A. 2012. *Analysis of Household Livestock Business Income*. Journal of Animal Science, 12(2), 1-10
- Suhartini, E. 2020. *Utilization of Livestock Waste for Sustainable Agriculture*. Bandung: Pustaka Agribisnis.

- Suryati, N., & Wahyuni, N. 2022. Farming Business Efficiency Through the Utilization of Livestock Waste for Making Compost Fertilizer. *Masda Journal*, 1(2), 121–124. <https://doi.org/10.58328/jm.v1i2.94>
- Susilowati, SH, Prabowo, S., & Lestari, DA (2018). *Environmental Impacts of Cattle Farming and Its Management Alternatives* . *Journal of Environmental Science*, 16(1), 15–22.
- Sutanto, R. (2012). *Organic Fertilizer and Biological Fertilizer* . Yogyakarta: Kanisius.