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The Utilization of Coffee Husk Waste as Animal Feed and Organic Fertilizer in Banyuanyar Village, Ampel District, Boyolali Regency.

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ABSTRACT

The purpose of this community service is to utilize discarded coffee husk waste into fertilizer and animal feed so that it can be reused by the community in Banyuanyar Village, Ampel District, Boyolali Regency. The method used is training for the Berkah Kopi farmer group to make fertilizer and animal feed in a simple and feasible way by utilizing bacteria and machine technology to simplify the process. The results are organic animal feed and fertilizer that can be used by the community themselves. The recommendation submitted by the PKM team is that animal feed already has high protein especially by utilizing coffee husk so it is safe to use as livestock feed and the fertilizer made is also safe because it is all from livestock and agricultural waste so it is safe to use as fertilizer for coffee plantations.

Kata Kunci : Coffe Husk Waste, Animal Feed, Fertilizer, Fermentation

1. Introduction

Banyuanyar Village as a Tourism Village KAMPUS KOPI (Milk and Coffee Village) presents Nature and Environmental Education tourism based on Agriculture, Animal Husbandry (Agro Eco Edu Tourism) and Traditional Culture in the sense that the Village has extraordinary natural potential that needs to be preserved and developed and utilized appropriately without changing the essence of the rural area. Tourism Village KAMPUS KOPI (Milk and Coffee Village) aims to empower existing human resources and

natural resources so that the existence of the Tourism Village can be known and recognized by the wider community so that it can be attractive for tourists who just come to enjoy the rural atmosphere in the area on its website. The geographical conditions of the village support the development of the largest dairy farm in Boyolali and were recorded in 2023 as many as 1,065 cows with a daily average of 5,325 liters of cow's milk produced. There are 3 (three) main commodities from plantations and livestock which are still superior to date, namely Cow's Milk, Coffee, and Ginger. These three commodities play a vital role for the village community due to their function and role in the organic sustainability chain.

Cow manure is used as fertilizer for coffee and ginger plantations, and weeds are used as animal feed. Diversified coffee, milk, and ginger products have been developed by the Farmers' Group and Women's Farmers' Group. The village cultivates 44.32 hectares of coffee plantations. The coffee varieties available consist of 95% robusta coffee, 4% arabica coffee, and 1% jackfruit coffee, or Barendo, a village specialty (now rare) (Banyuanyar Village, Boyolali Regency, 2023).

Coffee plantations are widely distributed throughout the village area. Several farmer groups manage them. One farmer group, Berkah Kopi, has over 30 members and manages approximately 6-7 hectares of land. The farmer group, hereinafter abbreviated as Poktan, was established in 2020 with Village Head Decree No. 141/03 A/Year 2020 and the chairman Mr. Giman. On 1 hectare of coffee plants, it can produce 1.5 – 2 tons of wet coffee, the results of discussions with Mr. Giman during the main harvest can produce around 84 – 90 tons per year and can be seen in figure 1. One of the wastes produced is coffee skin waste, which is organic agricultural waste. In the process of peeling 100 kg of coffee, 56.8 kg of coffee beans and 43.2 kg of coffee skin and flesh are produced (Supeno, Erwan, and Ernawati 2018). The emergence of a new impact is that coffee skin as unprocessed waste piles up in the yard and in the cow shed, while the cattle are given makeshift feed in figure 1.

Figure 1. Coffee skin waste produced and the village environment

This community service activity is intended for economically productive communities, under the name of the Berkah Kopi farmer group, which will then act as partners. Its business sectors are plantations and livestock (cattle). Coffee beans are sold per kg for Rp. 39,000 to Rp. 40,000. Coffee husks are usually sold for Rp. 1,000 per kg. Coffee fertilization currently uses subsidized fertilizers. This productive business urgently

needs to be developed utilizing the waste produced, namely coffee husks. Coffee husks have been made into (Rahmat 2022) and wine with a low alcohol content. In terms of management, the group actively holds meetings and always strives to develop its business, but from a management perspective, it is not well managed. To reduce waste produced, it is sold, but this does not significantly reduce the amount of waste produced. Waste is simply piled up in yards and behind livestock pens. If waste is stored for too long, it can cause new problems, namely environmental pollution and health problems (Rahmat 2022). Research results (Aswanto et al. 2023) and (Dotami and Sriati 2024) and discussions with potential partners on processing coffee husks into organic fertilizer (Nurazizah and Darsiharjo 2018), (Khairunnisa and Nur'aini 2020), and fermented feed (Daning and Karunia 2018) will be conducted at the Berkah Kopi farmer group. The farmer group is willing to provide space, time, and other facilities so that existing waste can be reused.

The goal of implementing PKM activities is to increase partners' knowledge and skills in management, technology utilization, organic fertilizer processing, and nutritious fermented feed. Related to the SDGs, IKU, Asta Cita, and the RIRN focus area, **SDG 9 (Industry, Innovation, and Infrastructure)** targets robust infrastructure development, product innovation, and sustainable coffee industry development. **SDG 12 (Responsible Consumption and Production)** addresses appropriate resource utilization and waste management.

2. Method

The implementation method used to implement the solutions proposed by the community service team will be implemented in a phased manner. The phased activities are used to explain the steps taken by the PKM/ community service team to partners. These activities are planned for July–August 2025.

Activity Stages

The activity stages are outlined in steps and explained in the table below.

Table 1. Stages of Activity Implementation

Field	Activities Carried Out	Stages of activity implementation
Production	Training and assistance in processing nutritious fermented feed	**Socialization** The PKM team conducted outreach on the benefits of organic feed made from coffee husks for livestock. Partners agreed to provide time, space, and materials for the training. **Implementation:** **Training** The PKM team and partners conducted training on making fermented coffee husk waste feed at the partner's location. Training was also conducted in a laboratory in collaboration with CV Pendawa Kencana. **Production** **Mentoring and Evaluation** 1. The PKM team provides mentoring in the use of nutritious fermented feed. 2. The PKM team evaluates the use of feed for livestock two weeks later.

Field	Activities Carried Out	Stages of activity implementation
Produksi	Pelatihan dan pendampingan pengolahan pupuk organik	**Sosialisasi** Tim PKM, melakukan sosialisasi manfaat pupuk dari kulit kopi dan kohe ternak. Mitra sepakat menyediakan waktu, tempat, bahan baku untuk pelatihan **Pelaksanaan :** **Pelatihan** Tim PKM bersama mitra melakukan pelatihan pembuatan pupuk dari limbah kulit kopi di lokasi mitra. Pelatihan juga dilakukan di laboratorium kerjasama dengan CV Pendawa Kencana **Penerapan teknologi** Mitra sepakat menggunakan media aktivator bakteri **Pendampingan dan Evaluasi** 1. Tim PKM melakukan pendampingan dalam pemanfaatan pupuk untuk tanaman kopi 2. Tim PKM melakukan evaluasi penggunaan pupuk 2 minggu kemudian

3. Results and Discussion

The processing of coffee skin into animal feed is presented in the table below.

Table 2. Stages of processing coffee skin into animal feed and organic fertilizer

Numb.	Implementation Stages	Time	Place
1	Socialization	Held July 11 and 12, 2025	CV Pendawa Kencana
2	Implementation of Animal Feed Production Training	Held August 7, 2025	Head of the Coffee Blessing Group: Mr. Giman
	The PKM team provided tarpaulins, drums, and watering cans. Partners provided materials such as 40 kg of coffee husks, 15 kg of cassava pulp, 10 kg of rice bran, 20 kg of palm pulp, 15 kg of palm pulp (total 100 kg), and 1 kg of premix.	Steps: 1. Prepare 40 kg of coffee husks, 15 kg of cassava pulp, 10 kg of rice bran, 20 kg of palm pulp, 15 kg of palm pulp (total 100 kg), and 1 kg of premix. 2. Prepare 10 ml of activator solution (bacteria) dissolved in 10 liters of water and 1 liter of molasses. 3. Mix all ingredients together and create layers. Once the ingredients are used up, stir until evenly distributed. Pour in the activator solution. 4. Add the mixture to the drum, gradually compacting it and filling it. Then, close the lid. 5. Wait 15 days.	 
3	Application of technology	Utilizing bacteria to decompose waste faster and make it more edible. Utilizing a grass chopper	

Numb.	Implementation Stages	Time	Place
4	Mentoring and Evaluation	1. After the activity is completed, the PKM team will evaluate the implementation 15 days later. **Indicators of success:** **The feed emits a distinctive odor, similar to fermented cassava.**	
5	Socialization	Implemented July 12, 2025	CV Pendawa Kencana
6	Organic Fertilizer Production Training Implementation	Implemented August 8, 2025	Head of the Coffee Blessing Group: Mr. Giman
	The partners prepared 450 kg of coffee husks, 30 kg of cow dung, 2 kg of dolomite lime, and 1 liter of molasses. The PKM team prepared a tarpaulin and 300 ml of bacterial activator mixed with 45 liters of water.	Steps 1. Prepare a tarp for the base. 2. Mix the coffee husks and cocoons, then add straw (as needed), stirring by hand (wearing gloves). 3. Once thoroughly mixed, sprinkle with activator until evenly distributed. The mixture is layered and sprinkled with activator again to form a mound. 4. Finally, cover with a tarp. 5. Wait 7 days for the steam to release. Then, air dry for a while until the fertilizer is ready for use. 6. To grind the fermented fertilizer, place it in a shredder. 7. If it is not smooth enough, sift it until the grains are as fine as sand.	  
7	Technology Implementation	Utilizing bacteria for faster and finer decomposition. Utilizing grass choppers	
8	Mentoring and Evaluation	1. After the activity was completed, the PKM team conducted an evaluation of the activity six days later. 2. On day six, the fertilizer began to warm, and efforts were made to open the tarp and stir it to distribute the heat evenly. **Indicators of success:** **The fertilizer felt soft in the hands and had no odor.**	

In principle, the process for making organic fertilizer from coffee husks, grass, and other plants is the same. This also applies to fertilizers made from 100% cohesion (animal manure), which require the assistance of machine technology to grind them down for easier decomposition (Juli Rachmawatie, Rachmawati Dewi, and Rosana Dewi 2019) and (Dewi et al. 2024).

4. Conclusion

The PKM team concluded by demonstrating the importance of teamwork and enthusiasm among members in learning from the training activities on utilizing coffee husk and animal manure waste. This minimized the group's waste, specifically coffee husks. If sold as waste, coffee husks could only generate additional income of Rp 500 per kg. The group also practiced making organic feed and fertilizer from coffee husk waste, a common ingredient in Banyuanyar Village, a predominantly coffee farming community.

Suggestions for this community service include the importance of village leaders, specifically the Village Head and his staff, in assisting the community in utilizing the training results and promoting processed waste products on their website. Utilizing processed waste for fertilizer can reduce dependence on government-subsidized fertilizers.

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