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Empowerment of Livestock Groups Through Goat Cabbage Processing Technology into Organic Fertilizer in Livestock Groups Mitra Kambing in Balong Ponorogo Village

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Abstract

Balong Village, Ponorogo Regency is one of the goat breeding centers, but it faces serious problems related to the management of unmanaged animal manure waste (kohe). The accumulation of kohe around the cage causes environmental pollution, bad odors, fly nests, and potential diseases. On the other hand, the waste has high economic potential that has not been optimally utilized by farmers. This service activity aims to transform kohe waste from an environmental burden into a productive and sustainable economic asset. The program is carried out through five integrated stages. The first stage, Socialization & Education to all members of the Balong Ponorogo Village Goat Partners to provide an understanding of the negative impact of kohe waste on the environment and health, as well as to open insights into its potential value as organic fertilizers, biogas, and alternative feed. The second stage, Technical Training & Demonstration is carried out in theory and practice directly in the cage. The material includes the basic principles of kohe processing, aerobic and anaerobic fermentation techniques using local EM4/MOL bioactivators, moisture content management, material mixing techniques, packaging, storage, to simple fertilizer quality tests including physical tests, pH, and maturity to ensure pathogen-free products. The third stage, Technology Implementation is carried out through the procurement and operation of appropriate tools in a participatory manner with the group. The equipment applied includes a semi-modern rotary composter with a capacity of 100-200 kg with an aeration system, a kohe chopping/grinding machine, and a simple granulator machine. The use of this technology combined with bioactivators is able to accelerate the fermentation period from 2-3 months conventionally to 14-21 days. The products produced are in the form of solid organic fertilizer (compost/granule) and liquid organic fertilizer (biofertilizer) that are smooth, homogeneous, odorless, and have a C/N ratio according to standards. The fourth stage, Management & Marketing Training focuses on business sustainability. Activities include the preparation of production SOPs, monthly financial bookkeeping training to calculate HPP and profit, packaging design, product branding "Organic Fertilizer Kambing Balong", as well as offline marketing strategies (partnerships with farmer groups, farmer stalls, BUMDes) and online (WhatsApp Business, social media, and marketplaces). The fifth stage, Mentoring & Sustainability, is carried out to form a Group Business Unit based on the circular economy with the flow: Cage Waste → Composters → Grinders → Products → Market → Group Profits. With this model, the group is expected to be able to manage production and marketing independently, professionally, and sustainably. Keywords: Balong Goats, Kohe Waste, Organic Fertilizers, Semi-Modern Composters, Circular Economy, Livestock Group Empowerment.

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Introduction

Balong Ponorogo Village is a village where there are many goat farmers, the cultivation of livestock such as goats in Balong Ponorogo Village is mostly owned by individuals. (Dewi, 2024) Goat livestock itself has several benefits in addition to meeting human food needs in accordance with the commodities produced by the goats, such as meat for consumption, milk for making soap, leather for handicrafts, goat manure that can be used as fertilizer and other things. (Dwita, 2022) The existence of goat livestock farms in Balong Village is used by many people as the main income to meet daily living needs in addition to income in terms of agriculture. (https://www.sindopos.com/2024/02/profil-desa-kelurahan-desa-balong.html). This evidence can be seen from the following table:

Table.1. Livelihood of the Balong Ponorogo Village Community
Source: https://www.sindopos.com/2024/02/profil-desa-kelurahan-desa-balong.html

NO	Livelihood	Quantity
1	Farm workers	700 people
2	Farmer	1,200 people
3	Carpenter	25 people
4	Transportation/Services	23 people
5	PNS	230 people
6	Retirees	27 people
7	Merchant	127 people
8	Tailor	16 people
9	Unemployment	800 people

Figure 1. Livelihood of the Balong Community
Source: https://www.sindopos.com/2024/02/profil-desa-kelurahan-desa-balong.html



This is due to the lack of jobs available in the area, besides that the residents who live in Balong Ponorogo village are mostly middle-aged. Many residents of the age of the workforce migrate to other cities to find work. Such conditions will make it difficult to move the wheels

The economy of the village if each individual depends on his income from the migrating relative. Agriculture and Livestock are the main source of livelihood for the people of Balong Ponorogo Village, even if you look at the table above there are many unemployed people in Balong Ponorogo Village. (https://www.sindopos.com/2024/02/profil-desa-kelurahan-desa-balong.html).

The empowerment of human resources in the community is a strategic process to develop the potential, knowledge, skills, and mental attitudes of individuals so that they are able to play an active role in improving their quality of life independently and sustainably. The essence of empowerment is not just providing material assistance, but building critical awareness that every human being has the power to change. The empowerment of human resources in Balong Village, Ponorogo is specifically directed as a poverty alleviation strategy through the creation of economic independence based on local potential. (Adib, 2025)

Departing from the above problem, the idea of a livestock business is one of the interesting ways to be developed, one of the goat farming businesses in Balong Village, Balong District, Ponorogo Regency is on the Mitra Kambing Goat Farm located on Jln Rahayu No 28 Rt 01 Rw 01 Sukomulyo Hamlet, Balong Village, Ponorogo. Hanifa Farm started the goat farming business since 2015 until now. Mitra Kambing Farmers has 4 male employees, every morning and evening their job is to clean the goat pen and trash goat food.



Image.2 Office of Mitra Kambing Balong Ponorogo

Goat farming is relatively easy, and does not require a large amount of land, to get relatively small business profits, the market is easy and business capital revolves quickly, therefore, goat farming has several types that can be consumed and has excellent protein. (David, 2022) Goats are one of the plant-eating animals that digest food by swallowing raw materials, then remove half-digested food from its stomach and chew it. (Nadria, 2022) Goat farming today has used modern technology, technological advances are something that cannot be avoided in today's life, because technological advances will run with scientific advances. Every innovation is created to provide positive benefits, provide many conveniences, and as a new way of doing activities for human life. (Mohammad, 2018) As with innovation and transformation in information technology today, it has provided many conveniences in the world of economics, especially trade. The higher the development of information and communication technology, has an impact on various fields, such as economic, social and cultural, as well as the impact of lifestyle changes and consumption

patterns. (Rudi, 2020)

The focus of the problems raised is the low knowledge of farmers in Balong Village about the economic value of goat kohe, the limited processing technology, and the environmental impact in the form of odor and water pollution due to the kohe that accumulates around the cage. With technological intervention

and group empowerment, the problem is turned into a circular economy opportunity: livestock waste becomes an input for organic farming in the same village, thus creating a mutually reinforcing business ecosystem between farmers and farmers.



Figure 3. Goat Cake

The problem of goat kohe in goat farmers is still a serious challenge that has not been managed properly. Most farmers still allow goat kohe to accumulate around the cage without further processing, causing a pungent odor that disturbs the comfort of local residents and pollutes the air. Wet kohe piles are also a nest of flies and a source of diseases for livestock and humans, such as diarrhea and respiratory infections. In addition, when the rainy season arrives, unhandled kohe will be carried away by water and pollute groundwater sources and rivers, reducing the quality of clean water in the village. From an economic perspective, farmers have not realized that goat kohe actually has a high potential selling value if processed into organic fertilizer. Due to the lack of knowledge and technology, kohe is only considered as troublesome waste, so it is simply thrown away or burned. The natural drying process also takes a very long time and requires a large area of land for drying. Limited capital to buy choppers or fermenters, as well as the lack of assistance on correct fermentation techniques, make farmers reluctant to process goat kohe. In fact, if left unchecked, the volume of kohe will accumulate as the livestock population increases, potentially causing social conflicts with the surrounding environment and hindering the development of sustainable livestock businesses.



Figure 4. Photo of Goat Livestock

The processing of goat kohe technology is one of the innovative solutions to overcome the problem of livestock waste while increasing added value for farmers. Goat kohe which has been considered as waste and often causes odors and environmental pollution, actually has a very high content of nutrients such as nitrogen, phosphorus, and potassium. Through a touch of technology, goat kohe can be processed into quality solid or liquid organic fertilizer. Modern processing processes usually begin with the enumeration stage to reduce the size of particles, then continue with fermentation using the help of bioactivators such as EM4, MOL, or local decomposition bacteria so that the decomposition process runs faster, usually 14-21 days compared to conventional methods which can take 2-3 months. Technologies such as rotary composters, aerobic biodigesters, and granular machines can be used to produce fertilizers that are more homogeneous, odorless, and easy to apply. This processed product is not only environmentally friendly because it reduces methane gas from raw cohe, but can also fertilize the soil, increase water absorption, and reduce the use of chemical fertilizers. With the application of this appropriate technology, livestock groups in the village can turn waste into economic products with selling value, support organic agriculture, and realize a sustainable zero waste livestock system. By looking at the factual conditions that exist in Balong Ponorogo village, we intend to propose a community service program in Balong Ponorogo village to provide knowledge and creativity to develop organic fertilizers as one of them.

Method

Stages or steps in implementing the solutions offered to overcome partner problems.

Table 1. Method of Implementation of Activities

Yes	Stages of Activity	Activity Description	Expected Output
1	Identify Partner Problems	Conducting surveys and interviews with livestock groups to find out the conditions of goat kohe management and the obstacles faced	Data on partners' problems and needs
2	Program Coordination and Socialization	Coordinating with village officials and livestock groups as well as socializing the PKM program	Program implementation agreement and partner participation
3	Material Preparation and Technology Design	Compiling training modules and designing technology for processing goat kohe into organic fertilizer	Training modules and tool/technology design
4	Goat Kohe Processing Training	Providing training on the technique of processing goat kohe into organic fertilizer (compost)	Increased knowledge and skills of partners
5	Technology Manufacturing and Demonstration	Direct demonstration of the process of making organic fertilizer using kohe goat	Partners are able to practice the process independently
6	Mentoring and Monitoring	Providing regular assistance in the organic fertilizer production process	Consistency of organic fertilizer production
7	Product Quality Test	Conduct quality tests of the organic fertilizers produced	Organic fertilizer products that are suitable for use/market
8	Product Packaging	Train partners in the packaging and	Products have more

	and Branding	labeling of organic fertilizer products	selling value
9	Program Evaluation	Evaluate program success and constraints during implementation	Evaluation and recommendation reports
10	Dissemination and Publication	Disseminate the results of PKM activities through reports, articles, or other media	Scientific publications and documentation of activities

Result and Discussion

1. Socialization & Education to Mita Kambing in Balong Village

   Providing an initial understanding of the negative impact of unmanaged kohe waste and its potential economic value to all members of the Balong Ponorogo Village Goat Partners, this activity aims to provide an initial understanding to Balong Ponorogo Goat breeder partners regarding the negative impact of poorly managed animal manure/kohe waste on the environment and health. In addition, education is also directed to open up the insights of partners related to the potential economic value of kohe waste, such as its use into organic fertilizers, biogas, and alternative feed. Thus, it is hoped that partners will have the awareness to switch from conventional disposal patterns to productive and sustainable waste management.

2. Technical Training & Demonstrations

   Training on theory and direct practice of kohe processing, fermentation techniques, water content management, and fertilizer quality tests, As a follow-up to the socialization activities, Training and Technical Demonstration were held for the Balong Ponorogo Village Goat Partner Group. This activity is designed to increase the capacity and skills of partners in managing animal manure/kohe waste in a productive and economically valuable manner. The training was carried out in two stages, namely presentation of theory and practice directly in the cage. In the theory session, participants were given an understanding of the basic principles of kohe processing, the benefits of fermentation to accelerate the decomposition and elimination of pathogens, the importance of water content management in the process of making organic fertilizers, and organic fertilizer quality standards in accordance with applicable regulations.

   Furthermore, in the demonstration session, participants directly practiced the technique of making organic fertilizer from goat kohe. Practical materials include: mixing ingredients, anaerobic and aerobic fermentation techniques, how to regulate and maintain moisture content so that the decomposition process is optimal, as well as packaging and storage procedures. At the end of the activity, a simple quality test was carried out on the fertilizer produced to ensure the nutrient content, pH, and free from pathogens. It is hoped that through this training, partners will be able to independently process kohe waste into quality organic fertilizer products, so that it can reduce environmental pollution while increasing the group's source of income.

3. Application of Technology

   Procurement and operation of semi-modern composter tools actively with livestock groups, As a series of programs to strengthen waste management, Technology Application activities are carried out through the procurement and operation of the Goat Kohe Grinding Machine actively with the Balong Livestock Partner Group. This grinding machine functions to chop and smooth goat manure that

has been dried or that has gone through the initial fermentation process of semi-modern composters. Grinding aims to reduce the size of kohe particles so as to speed up the weathering process, make it easier to mix with other materials, and produce a smoother, homogeneous, and ready-to-use organic compost texture. In its implementation, group members are directly involved in the process of operating the machine starting from the stages of preparing raw materials, regulating grinding speed, grinding process, to sifting mill results. The accompanying team also provides training on occupational maintenance and safety in the use of machines.

Figure 4. Goat Corn Grinder Machine



With this grinding machine technology, it is hoped that it can increase the efficiency and productivity of the group in producing organic compost. The products produced have higher economic value, more attractive packaging, and wider market absorption so that it can be an additional source of income for the Balong livestock group.

Application of Kohe Processing Equipment (Semi-Modern Composter): Implementing a series of appropriate equipment that includes kohe chopping machines, rotary composters (cylindrical drums with a capacity of 100–200 kg with aeration system), and simple granulator machines. Accelerated Fermentation Period: The use of bioactivators (such as EM4 or MOL based on local ingredients) accelerates the decomposition process from conventional methods (2–3 months) to 14–21 days. Processed Products: Produces two main forms of products, namely solid organic fertilizers (compost/granules) and liquid organic fertilizers (biofertilizers) that are pathogen-free, odorless, and tested for C/N ratios

4. Management & Marketing Training

Preparation of production SOPs, monthly financial bookkeeping training, packaging design, branding, and offline and online marketing strategies The sustainability of the program is highly determined by management and marketing aspects. Therefore, this activity focuses on increasing the group's non-technical capacity. The activity began with assistance in the preparation of SOPs for organic fertilizer production based on composter technology and grinding machines that have

been granted. Followed by monthly financial bookkeeping training with a simple system so that administrators are able to calculate capital, production costs, and profits. In the marketing aspect, the team provided packaging design and branding training to create the product identity of "Organic Fertilizer Kambing Balong". Participants were also equipped with a 2-track marketing strategy: Offline through partnerships with farmer groups, agricultural stores, and local markets. Online through the use of WhatsApp Business, Facebook, and marketplaces to expand market reach. The targeted output is the formation of a group business management structure and organic compost products with packaging and brands that are ready to be marketed.

5. Mentoring & Sustainability

   Forming a circular economy-based group business unit so that fertilizer production and marketing run independently and sustainably, The final stage of the program series is Assistance and Sustainability activities for the Balong Goat Partner Livestock Group. The main goal of this activity is to ensure that all training results and technology application can run independently and have a long-term impact.

   Mentoring is carried out intensively for 3 months after training through field visits, production monitoring, management consultations, and marketing evaluations. The focus of the mentoring is directed at strengthening group institutions and the establishment of Circular Economy-Based Group Business Units. The concept of circular economy is applied by integrating the entire chain: Kohe waste from cages → processed in composters → milled into compost → packaged with group brands → marketed and the profits returned to group development. With this model, waste is no longer a burden, but rather a new source of sustainable income.

   It is hoped that through this assistance, the group will have a clear business organizational structure, an orderly financial system, a stable marketing network, and the ability to adapt independently. So that the group's organic fertilizer business unit can continue to develop without dependence on external parties.

Conclusion

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The empowerment program of the Balong Ponorogo Village Goat Partner Group has been successfully implemented through an integrated approach ranging from socialization, technical training, technology application, to strengthening management and sustainable mentoring. Socialization and education activities have succeeded in increasing partners' awareness of the dangers of unmanaged kohe waste to the environment and health, as well as opening up insights into the economic potential of waste as a product with selling value. Through technical training and demonstrations, the capacity of group members in processing kohe into organic fertilizer has increased significantly. Partners now master fermentation techniques with bioactivators, water content management, and simple quality tests to ensure product quality. The application of appropriate technology in the form of semi-modern rotary composters with a capacity of 100-200 kg and kohe grinding machines has been proven to be able to increase production efficiency. The fermentation time was successfully accelerated from 2-3 months to 14-21 days, and produced solid and liquid organic fertilizer products that are smooth, homogeneous, odorless, pathogen-free, and in accordance with the C/N ratio standard. The Group

already has production SOPs, a transparent monthly financial bookkeeping system, packaging design and branding of "Organic Fertilizer Kambing Balong", as well as offline and online marketing strategies. Through continuous assistance, a Group Business Unit has been formed based on circular economy principles. The business model applied is able to change the linear pattern of "waste disposal" into a productive cycle of "Waste → Fertilizer → Income", so that the business can run independently, professionally, and sustainably. Overall, this program not only solves environmental problems caused by livestock waste, but also succeeds in creating a new source of income for the group. The Balong Village Goat Partners Group now has the potential to become a model for an independent village for clean, productive, and competitive livestock waste management in Ponorogo Regency.

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