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Training on Domestic Waste Management and Use of Maggots (*Black Soldier Fly* (BSF) Larvae) for Alternative Animal Feeding for Farmer Groups

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Abstrak

Program ini bertujuan untuk memberikan pelatihan kepada Kelompok Tani (Poktan) Setia Kawan Desa Baros agar dapat mengoptimalkan sampah organik dan memproduksi pakan alternatif dari magot (larva BSF). Poktan memelihara hewan ternak namun tidak diimbangi dengan pengetahuan yang cukup, khususnya terkait jenis bahan pakan yang dapat dimanfaatkan untuk memenuhi kebutuhan nutrien harian ternak. Melalui produksi pakan ternak dari magot diharapkan dapat menjadi solusi untuk eskalasi ekonomi peternakan yang berkelanjutan. Program dimulai dari tahap sosialisasi, pelatihan, dan pendampingan dalam proses pemeliharaan BSF dan aplikasinya sebagai alternatif pakan ternak. Mitra terlibat langsung pada seluruh tahapan, yakni dengan memberikan informasi terkini, penentuan titik lokasi pengumpulan sampah organik dan tempat budidaya magot. Setelah dilakukan pelatihan, anggota kelompok tani secara umum telah dapat membedakan jenis sampah organik dan anorganik serta mengetahui prinsip dasar pemanfaatan magot sebagai pakan ternak alternatif.

Kata kunci: Kelompok Tani, Magot, Pakan Alternatif, Sampah Organik

Abstract

This program aims to provide training to the Setia Kawan Farmers Group (Poktan) in Baros Village so that they can optimize organic waste and produce alternative feed from magot (BSF larvae). Poktan raises livestock but this is not accompanied by sufficient knowledge, especially regarding the types of feed ingredients that can be used to meet the daily nutritional needs of livestock. Through the production of animal feed from magot, it is hoped that this can be a solution for the sustainable escalation of the livestock economy. The program starts from the socialization, training and assistance stages in the process of maintaining BSF and its application as an alternative animal feed. Partners are directly involved at all stages, namely by providing the latest information, determining organic waste collection points and maggot cultivation sites. After training, members of farmer groups are generally able to differentiate between organic and inorganic waste and know the basic principles of using maggots as alternative animal feed.

Keywords **:** *Farmer Groups, Magot, Alternative Feed, Organic Waste*

Introduction

Household waste is one of the wastes produced every day by every family. The household waste category generally consists of organic and inorganic waste. The waste problem continues to be an environmental issue in various regions in terms of management and processing. The Director of Waste Reduction, Directorate General of PSLB, KLHK, said that waste management is one of the government's priority programs because the world is facing a triple planetary crisis, namely climate change, biodiversity loss and pollution (PPID 2024). The amount of waste generated in 368 cities/districts throughout Indonesia is 38.4 tons and unmanaged waste will be 14.8 tons in 2023 (SIPN 2024). Improper waste handling will have an impact on environmental pollution in the form of odors and groundwater quality, natural disasters such as floods and the growth of pathogenic microbes in waste. Public awareness about the importance of processing and managing waste is still minimal, especially organic waste which is still very beneficial for the environment if done with the right technology and becomes an economic resource.

The farmer group (poktan) "Setia Kawan" is one of the farmer groups in Baros Village, Baros District, Serang Regency. This group focuses on livestock, especially sheep. It has 30 members and was founded in 2014. During the process of raising the livestock they own, the members of the farmer group have minimal knowledge regarding animal feed, cage management, nutritional needs of livestock at each physiological phase, and the lack of types of feed ingredients that can be used as feed to meet livestock needs. Feed is the most important limiting and determining factor in a livestock business (Amam and Harsita, 2019). Limited forage, especially during the dry season, encourages business actors/breeders to create/adopt technology or knowledge that can help solve this problem. Apart from the problem of availability, forage is a natural food for ruminants which is used as a source of fiber for rumen stability and energy sources, but has disadvantages, namely fluctuations in quality and low protein content (Surbakti et al. 2022). Leguminous forages which have a relatively higher protein content than grass also experience limited production due to the increasingly narrow agricultural land used for growing feed crops (Sutaryo et al. 2019). Farmer who are members of Poktan Setia Kawan only feed grass whose quality and quantity are unknown or only based on availability on the land around where they live. If this continues to be done, it will have a negative impact on the livestock being raised. The possibility that could occur is that the livestock's daily nutrient requirements are not met, thereby affecting body weight gain, immunity and reproduction, as well as the potential for the forage provided to contain toxic compounds that can cause death in livestock. One indicator of feed quality is the protein content in the feed ingredients or ration.

The high price of protein source feed means that farmers cannot afford to buy or provide it in small quantities (Anwar et al. 2021). These factors cause the need for alternative feed ingredients as sources of animal protein that are cheap, of good quality, do not require large areas of land and can be supplied easily (Nurhayati et al. 2022). Insects are animals that can be used as food and have a high protein content (Jayanegara et al. 2017) with a good and balanced amino acid profile (Sanchez-Muros et al. 2014). In the midst of these conditions, Baros Village has the potential for economic escalation through the production of alternative animal feed from black soldier fly larvae (BSF, *Hermetia illucens*) because of the large amount of organic waste which is a food source for BSF larvae. The use of insects as a food source is a potential solution to overcome the increasingly limited supply of feed, especially as a

source of protein (Sarasi et al. 2022). The advantage of insects compared to other food sources of plant and animal origin is their ability to convert organic waste into their bodies with a very high level of efficiency with low water requirements (Van Huis, 2013). One species of insect that has the potential to be used as food is black soldier fly larvae (BSF, *Hermetia illucens*) due to its easy production system, fast growth speed and high protein content of around 40% (Liland et al. 2017). However, BSF contains chitin which inhibits the process of nutrient utilization in the livestock digestive tract. Therefore, it is necessary to carry out BSF processing and valorization strategies to reduce the negative effects of chitin, namely in the form of fermentation (Siddiqui et al. 2024). As part of community empowerment efforts, the alternative feed production program aims to escalate the economy in Baros Village, especially for members of the Setia Kawan farmer group to gain knowledge; skills and techniques for cultivating and processing BSF larvae which also have a positive impact on the environment. This community service program aims to provide training to the Setia Kawan Farmers Group in Baros Village so that they can produce alternative feed from BSF larvae starting with the ability to sort organic waste which is then used as feed for BSF larvae.

Implementation Method

The farmer group (poktan) "Setia Kawan" has a focus on livestock but has minimal knowledge regarding animal feed, cage management, nutritional needs of livestock at each physiological phase, and a lack of types of feed ingredients that can be used as feed to meet livestock needs. To answer these problems, the proposing team will carry out a community service program with the solution stages offered, including:

1. Socialization

At this stage the proposing team will convey the goals and objectives of the activities to be carried out, as well as the confirmation process regarding the problems and needs of partners that will be resolved with this activity. Apart from that, at this stage observations and hearings will be carried out to determine the partner's level of understanding of the substance of the program to be implemented, such as understanding and knowledge about livestock, productivity, alternative feed and BSF larvae. Ultimately, the partner's level of understanding will determine the strategy to be used when training and implementing the technology.

2. Training

The first stage of the training stage is an explanation of the introduction of BSF larvae and the technology for using them as alternative animal feed. Previously, a pre-test was carried out to measure the partner's level of understanding of the training material. The second stage is a workshop on making alternative feed based on BSF larvae as animal feed. The instructor from the proposing team will give an example and then partners are asked to practice independently. The training stage ends with a post-test, evaluation and discussion.

3. Application of technology

At this stage, the drafting team together with partners will design and work on the creation of facilities and infrastructure for the disposal of organic waste and preparation for cultivating BSF larvae. Partners provide location points and carry out construction of facilities and infrastructure with supervision from the proposing team.

4. Mentoring and evaluation

Periodically and in a planned manner, the proposing team will provide assistance to the independent processes carried out by partners in carrying out the program, including: Evaluations are carried out to record progress and identify problems and

immediately find solutions to problems faced by partners while implementing the program.

5. Program sustainability

Program sustainability will be designed based on the evaluation process that has been carried out. The proposing team has a partner target of being able to pioneer KUB (joint business group) commercialization of BSF larvae products so that the benefits can reach a wider community and as an additional source of income for partners.

Partner participation starts from the socialization stage where partners are involved in determining program goals and objectives, as well as evaluating the needs and potential of the community. Furthermore, partners will be involved in implementing training, such as providing information and advice about field conditions, assisting in determining location points for making fermented BFS, as well as participating in training on making fermented BSF, its maintenance and application as an alternative animal feed. Partners will also be involved in applying technology in maintaining BSF, formulating animal feed based on fermented BSF, monitoring the fermented BSF-based feeding process and evaluating livestock productivity before and after being given alternative feed. At the end of the program, partners are also expected to be able to produce their own fermented BSF-based feed using the resources they have.

Evaluation of program implementation is carried out periodically at each stage of program implementation to monitor progress and identify problems or obstacles encountered. This evaluation was carried out by holding meetings between the service team and partners, as well as conducting surveys and observations in the field. Apart from that, evaluation is also carried out through measuring the performance indicators set out in the IKU. After the activities are completed, an evaluation of the program's sustainability is carried out to ensure that the program's impact can continue and be beneficial in the long term. Evaluation of program sustainability is carried out by measuring performance indicators and impacts that have been achieved, as well as identifying factors that can influence program sustainability. Apart from that, measurements were also carried out on program beneficiaries and partners to obtain feedback on program sustainability. The results of the program sustainability evaluation will be the basis for making decisions about continued activities or program development in the future.

Result and Discussion

The first counseling with the theme "Introduction to Organic and Inorganic Waste" was held on September 3, 2024 at the residence of the RT head and member of the Setia Kawan Poktan. According to (Adzim et al. 2023) organic and inorganic waste comes from different sources. Organic waste is processed into compost, while inorganic waste is processed into craft products. The series of events includes opening, remarks, pretest filling, materials, questions and answers, group photos. This inaugural activity was attended by Baros Village officials, agricultural extension workers and members of the Poktan. The material presented is types of waste and examples, the differences between organic and inorganic waste, and the benefits of waste sorting.

Figure 1. Extension activity "Introduction to Organic and Inorganic Waste"

The second activity was the socialization "Introducing Magot: Potential Alternative Feed" which was held on September 10, 2024 at the house of the RT Head and member of Poktan Setia Kawan. The series of events includes opening, remarks, pretest filling, materials, questions and answers, group photos. This inaugural activity was attended by agricultural instructors and members of the Poktan. The material presented is the definition of magots (BSF larvae), their life cycle, food, their potential as alternative feed and the benefits of magots for livestock and the environment.

Figure 2. Extension activity "Introducing Maggots: Potential Alternative Feed"

Poktan members play an active role in discussion activities and completing the pretest. The outreach material was welcomed enthusiastically by the entire audience. Poktan members' knowledge increased after the presentation of the material. This is proven by the fact that Poktan members are able to separate organic and inorganic waste.

Figure 3. Sorting household waste by Poktan members

Poktan members were instructed to start sorting waste in their respective homes and dispose of the waste in the places provided. The team facilitates this by providing rubbish bins with "organic" and "inorganic" labels and different colors, green

for organic waste and red for inorganic waste. Poktan members are required to report the progress of the project to the poktan secretary and then forward it to the team and extension workers. Evaluation of activity results will be carried out on September 13, 2024.

Figure 4. Review of the results of waste sorting carried out by members of the Setia Kawan Farmers Group

The pretest was attended by 23 members of Poktan member. Based on the pretest results, 11 people (48%) answered "Yes" in terms of knowing the difference between organic and inorganic waste. However, when given examples of several types of waste, the members did not fully answer the correct types of organic and inorganic waste. Apart from that, only 7 members (30%) answered correctly regarding the benefits of sorting inorganic waste. The most common answer regarding the benefits of sorting inorganic waste chosen by Poktan members was "makes it difficult for officers". This illustrates that sorting inorganic waste is still considered a burden and difficult to do.

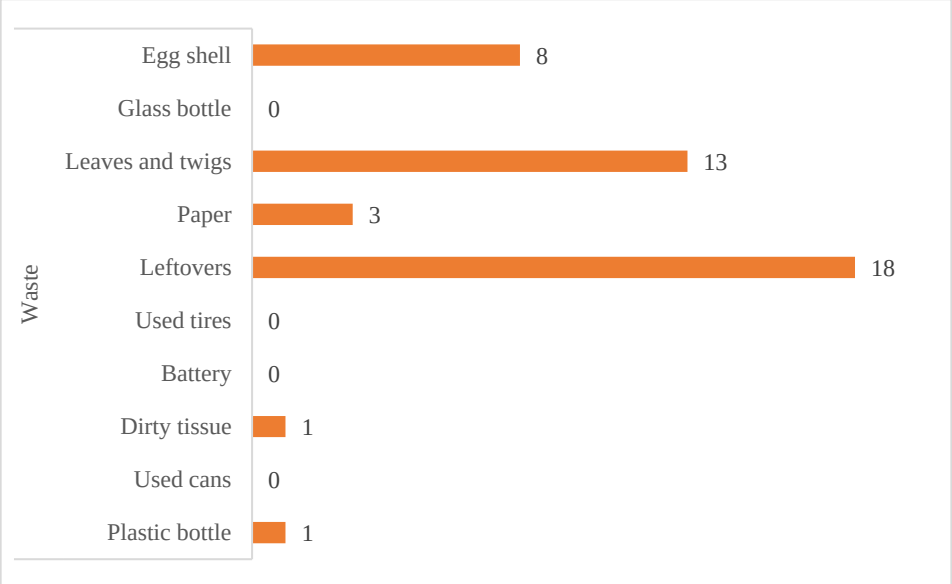

Figure 5. Number of respondents' answers about organic waste

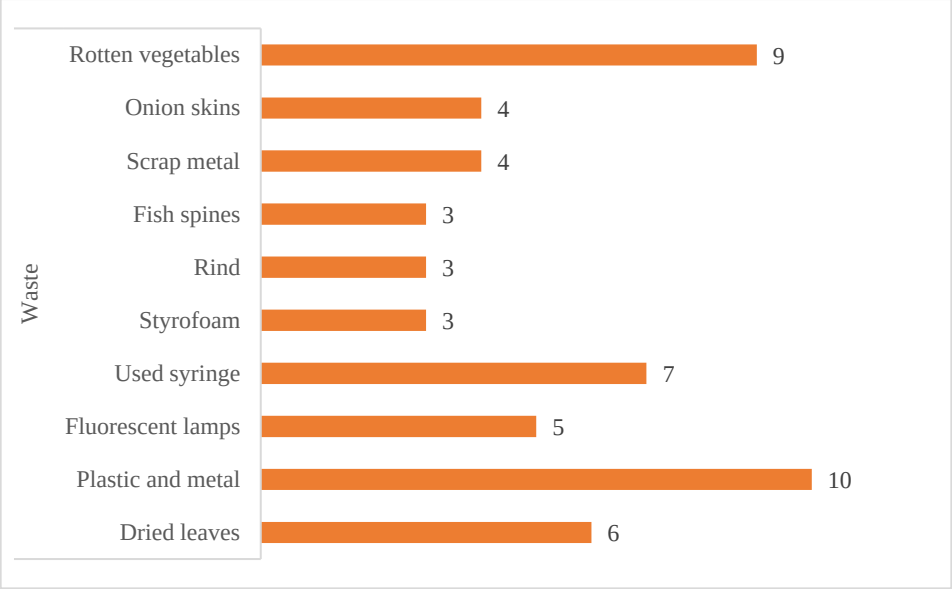

Figure 6. Number of respondents' answers about inorganic waste

The counseling about maggots as an alternative animal feed had pretest results with details of 14 members (61%) knowing the shape of magots by answering "Yes". However, this figure is not followed by breeders' knowledge about using maggots as feed. A total of 16 members (70%) did not know the benefits of magots as animal feed and 13 members (57%) did not know the function of magots in supporting the reduction of organic waste and being environmentally friendly. In general, Poktan members still need to increase their knowledge and abilities to recognize and optimize the potential of maggots (BSF larvae) as an alternative high-protein animal feed.

Conclusion

Members of the Setia Friends Farmers Group have generally been able to differentiate examples of waste based on their type and application at home. A total of 61% of members are aware of the form of BSF larvae, but 70% do not know the potential of BSF larvae as animal feed. It is hoped that farmer group members can sustainably prepare feed for BSF larvae from household organic waste and carry out BSF cultivation using appropriate methods.

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