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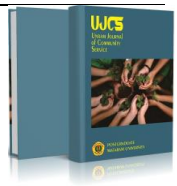

Bioconversion of Organic Waste into Maggots as a Substitute for Chicken and Fish Feed at The Trisula Jaya Farmers Group in Tangerang to Support Sustainable Food Security

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Abstract: Feed is a crucial requirement in the livestock sector, whether for cattle, fish, chickens, or birds. Frequently rising feed prices make it difficult for farmers to meet their livestock's needs. This also presents a problem for the Trisula Jaya Farmer Group, which focuses on chicken and catfish farming. On the other hand, organic waste production in the community is increasing. Considering these two issues, the Trisula Jaya Farmer Group conducted community service activities to meet the need for animal feed by converting organic waste into animal feed. The community service methods implemented included the use of organic waste shredding machines, drying machines, flouring machines, and temperature and humidity monitoring systems using IoT technology. In addition to implementing organic waste processing technology into maggots, processing maggots into animal feed, using temperature and humidity monitoring systems using IoT technology, training was also conducted on how to operate organic waste processing machines, maggot processing, and using temperature and humidity monitoring systems using IoT technology. Based on the results of the application of technology to process organic waste into maggots and convert them into animal feed using a temperature and humidity monitoring system using IoT technology, the maggots processing has been significantly helpful for the Trisula Jaya Farmer Group in providing feed for the livestock they cultivate.

Keywords: Animal Feed, Maggots, Farmer, Food Security, IoT.

Introduction

Tangerang Regency is one of the regions experiencing rapid population growth and residential development. With a population of over 3.4 million by 2025, it is the most populous region in Banten Province (Bolang, 2025). . This community service activity was carried out by the Trisula Jaya Farmers Group, located in Kampung Pinang, Tigaraksa. The Trisula Jaya Farmers Group is an active farming group engaged in chicken and catfish farming. Based on an interview with the head of the Trisula Jaya Farmers Group, Mr. Iim Indrajaya, the feed requirement for each catfish pond is approximately Rp 1,025,000. Similarly, chicken farming also faces the same problem regarding feed. Fish feed is the most important component in fish farming, including catfish. Feed requirements during cultivation account for approximately 70% of the operational costs (Nurhasyan & Basir, 2018).

Based on this information, a site survey was conducted. The survey revealed a significant amount of scattered household waste within the Trisula Jaya Farmers Group. This waste consists of both organic and inorganic waste. Waste is an increasingly complex and pressing environmental problem, particularly in rural and suburban areas such as Kampung Pinang. This is due to Kampung Pinang's relative proximity to the Tangerang Regency government center and its good accessibility to industrial and residential areas, making the area attractive to migrants from various regions, particularly from rural areas in Banten and West Java.

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The environmental conditions of the Trisula Farmers Group are shown in Figure 1.

Figure 1. Environmental conditions around the Trisula Jaya Farmers Group

In 2024, the Trisula Jaya Farmers Group cultivated maggots using organic household waste from their neighborhood. Maggots have a special advantage over other feed ingredients because they contain complete nutrients for both fish and chickens. Maggot production is quick and easy, allowing them to be sustainably supplied to meet fish feed needs (Ahmad & Sulistyowati, 2021; Mabruroh et al., 2022; Nurhayati et al., 2022). The bioconversion process with maggots is lasts for 4-27 days. The BSF maggot cycle consists of adult larvae-prepupa-pupa-adult larvae. One cycle lasts for 41 days (Putri et al., 2023). However, during this maggot cultivation process, the Trisula Jaya Farmers Group faced several challenges, including a lack of technical knowledge and limited facilities and equipment. The initial conditions for maggots cultivation are shown in Figure 2.

Figure 2. Initial conditions for maggots cultivation

Therefore, the goal of this community service activity is to improve the knowledge and skills of partners in maggots cultivation, processing maggots as a substitute for chicken and catfish feed. Maggots can convert waste and reduce waste mass by 52-56%, making them a solution to waste reduction (Kusuma Purnamasari et al., 2021; Salman et al., 2020). Thereby reducing pollution, pathogenic bacteria, and odors. They can control the housefly population by reducing the opportunity for houseflies to ovipate, thus making maggots beneficial in improving the environment (Winandika et al., 2024). Maggots contain 40-50% protein and 29-32% fat (Sholahuddin et al., 2021).

The output targets to be achieved in this community service are: 1) Submitting products in the form of an organic waste shredding machine, a maggot drying machine, a maggots flour machine, and a temperature and humidity monitoring device for maggot media; 2) Partners and the community will gain knowledge about the correct method of maggots cultivation; 3) Partners and members have the skills to operate and maintain the machines that have been handed over.

Method

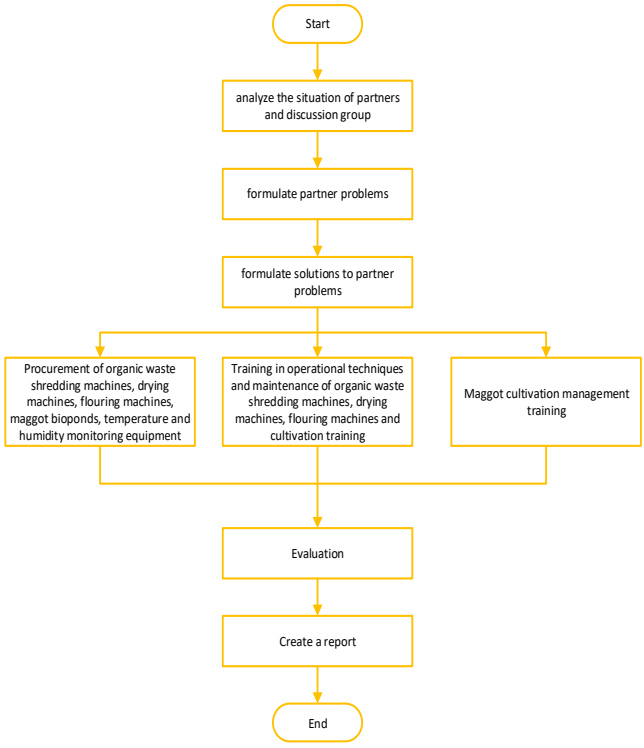

Figure 3. Flowchart of community service implementation

The stages of community service implementation, as shown in Figure 1, can be explained as follows:

1. Identification of Partner Problems and Needs
   Identify partner needs according to the planned

maggots production capacity, organic waste volume, and production efficiency.
2. Machine and Technology Design After obtaining detailed information on the partner's profile and challenges, the next step is technological modification, namely the development of a processing machine, starting with the design of production capacity and machine construction.
3. Machine Operational Testing After machine construction is complete, operational testing is carried out. This is done to determine the reliability of the machine.
4. Operational Assistance This assistance activity is carried out through guidance, consultation, monitoring, and evaluation of technology transfer.
5. Technology Training for Partners This technology training includes training in the operational techniques and maintenance of organic waste shredding machines, maggot drying machines, and maggots flouring machines, training on maggots cultivation, and training on the use of maggots temperature and humidity monitoring systems.

This community service activity is conducted using several methods, including:
1. Lecture and feedback method
2. Problem/case-based learning method
3. Technology transfer method

Result and Discussion

This community service activity began with a speech from the head of the community service, Mr. Nur Rohmat, followed by a speech from the Head of Tigaraksa, Mr. Eko Suyanto, then continued with a speech from the Trisula Jaya Farmers Group represented by Mr. Jeje. After the speech, it continued with knowledge sharing regarding how to process organic waste into maggots, handing over equipment that supports maggots cultivation and maggots processing. The speech and knowledge sharing activities are shown in Figure 4.

Figure 4. Speech and knowledge sharing activities related to maggots cultivation

After knowledge sharing activity, training was conducted on how to use and maintain organic waste shredding machines, drying machines, flouring machines, and temperature and humidity monitoring devices. The training activity atmosphere is shown in Figure 5.

Figure 5. Training activities related to machine use

From this training activity, 80% of the members of the Trisula Jaya Farmers Group were able to understand the working principles of the machines and monitoring tools. After the training, the handover of the tools from the service team to the head of the Trisula Jaya Farmers Group, Mr. Iim, included: an organic waste shredder, a maggots dryer, a maggots flour machine, and a temperature and humidity monitoring device using IoT technology. Such as shown in Figure 6.

Figure 6. Handover of equipment to the Trisula Jaya Farmers Group

This community service activity ended with a group photo of the Tigaraksa Village Head, the head and members of the Trisula Jaya Farmers Group, lecturers and students

Figure 7. Final activity

Conclusion

Based on what has been explained in the results and discussion section, it can be concluded that properly managed organic waste can be used as animal feed and reduce feed costs. The training provided was well-received by 80% of participants. A temperature and humidity monitoring system using IoT makes it easier for farmers to monitor the condition of the media used in maggots cultivation.

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