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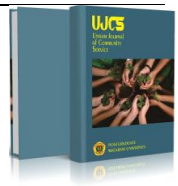

Application of Fermentation Technology Using Catfish Waste and Banana Stems in Muscovy Duck Feed to Strengthen Fitria Farm's Poultry Farming Business

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Abstract: Small-scale duck farming operations face challenges posed by high feed costs and low utilization of local organic waste, which has the potential to serve as an alternative feed ingredient. This Student Creativity Program (PKM) aims to apply fermentation technology to catfish waste and banana stems as innovative feed ingredients in duck rations to improve the efficiency of the farming operations at Fitria Farm. Activities were carried out through a participatory approach that included identifying partner needs, formulating rations based on fermented waste, training in fermentation technology, implementing feed administration, and evaluating production performance and business economics. Catfish waste was utilized as a protein source, while banana stems were fermented to improve fiber digestibility and nutrient content. The fermentation process utilized local microorganism bioactivators (MOL) over a specific period to produce feed of higher quality. Implementation results show that the use of fermented feed is able to improve feed palatability, feed conversion efficiency, and body weight gain in entog, as well as reduce feed costs compared to conventional feed. In addition, this activity enhances partners' knowledge and skills in processing agricultural and fishery waste into economically valuable feed. Conclusion the technology for fermenting catfish waste and banana stems has the potential to serve as a model for sustainable feed innovation that supports the strengthening of local-resource-based duck farming operations.

Keywords: Fermentation, Catfish Waste, Banana Stems, Duck Feed, Livestock Empowerment.

Introduction

The technology for fermenting catfish waste and banana stems has the potential to serve as a model for sustainable feed innovation. Fitria Farm is a small-scale livestock business specializing in the farming of entog as an alternative source of animal protein with steadily increasing economic value. Entog offers the advantages of strong adaptability to tropical environments, relatively good feed conversion efficiency, and stable market demand. However, the development of the entog industry at the smallholder level still faces various challenges, particularly regarding the provision of high-quality, sustainable, and economical feed (Association of Official Analytical Chemists, 2016).

The main challenge facing Fitria Farm is its high reliance on commercial feed made from imported raw materials, which directly drives up production costs. This situation results in low profit margins and makes the business vulnerable to fluctuations in feed prices. On the other hand, there is an abundance of local waste available near the partner's location, such as catfish waste from fishing activities and banana stems from the agricultural sector, which have not yet been optimally utilized as livestock feed ingredients (Mulyono et al., 2014).

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Catfish waste has potential as a source of animal protein and essential amino acids, while banana stems contain fiber and structural carbohydrates that can be utilized as an energy source after processing. However, the partners' limited knowledge and skills in processing and fermentation technologies have prevented these two materials from being effectively utilized. Furthermore, the use of feed ingredients without proper treatment risks reducing palatability, digestibility, and production performance in catfish (NRC, 1994).

Another issue identified is the lack of a feed management system based on local resources that is integrated with the principles of sustainability and the circular economy. Fisheries and agricultural waste, which should be processed into production inputs, instead has the potential to become a source of environmental pollution. Therefore, science- and technology-based interventions are needed to address feed-related issues while simultaneously improving business efficiency and environmental sustainability at Fitria Farm (Suparjo, 2017).

This community service activity aims to implement an innovative duck feed formulation based on catfish waste and fermented banana stems at Fitria Farm as a solution to the feed-related challenges faced by our partners. Specifically, the objectives of this activity are:

1. To enhance partners' capacity to process catfish waste and banana stems using fermentation technology as raw materials for duck feed.
2. To develop an alternative feed formulation that is nutritionally sound, safe, and economical to support duck productivity.
3. To reduce feed production costs and improve the efficiency of the duck farming business at Fitria Farm.
4. To promote the sustainable utilization of local waste as part of implementing the circular economy concept at the smallholder farmer level.

This Community Engagement (PkM) activity is closely linked to several national development goals and strategic policies. In the context of the Sustainable Development Goals (SDGs), this activity supports:

1. SDG 2 (Zero Hunger) through the sustainable increase in animal protein production (Winarno, 2008).
2. SDG 8 (Decent Work and Economic Growth) by strengthening smallholder livestock enterprises (Widodo and Prabowo, 2019).
3. SDG 12 (Responsible Consumption and Production) by utilizing waste as a productive resource (Yulistiani and Puastuti, 2013).
4. SDG 13 (Climate Action) by reducing organic waste that has the potential to pollute the environment (Haryanto and Thalib, 2009).

In terms of Higher Education Key Performance Indicators (KPIs), this activity contributes to:

1. KPI 2, namely students gaining off-campus learning experiences through direct involvement in Community Engagement (PkM) activities (Suryani and Sumarno, 2016).
2. KPI 3, where faculty members engage in off-campus activities by applying research findings and academic knowledge (Pamungkas and Anggraeni, 2018).
3. KPI 5, the commercialization of research and innovation outcomes to address real-world problems in the community (Hardini, 2012).

This initiative is also aligned with the Asta Cita, particularly in strengthening food self-sufficiency and an economy based on local potential, as well as developing high-quality and competitive human resources. The application of feed fermentation technology using local waste represents a tangible innovation that supports national food security.

Within the framework of the National Research Master Plan (RIRN), this initiative supports the Food and Agriculture focus area, particularly the sub-focuses on livestock feed innovation, the utilization of biomass and waste, and the development of sustainable livestock production systems.

Based on an analysis of the partners' situation, the primary issue addressed in this Community Service (PkM) activity is the low utilization of catfish waste and banana stems as feed ingredients for entog due to limited knowledge and processing technology, which results in high feed costs and suboptimal livestock productivity. Through the application of fermentation technology and technical assistance to the partners, this activity is expected to provide an applicable, sustainable solution that can be replicated in other small-scale duck farms.

The general public living near the Fitria Farm site has largely not been actively involved in productive economic activities, particularly those based on the utilization of local resources. The availability of organic waste, such as catfish waste and banana stems, in the surrounding area has not been optimally managed; as a result, it tends to be discarded and has the potential to cause environmental pollution and public health hazards. This situation reflects the community's low awareness and capacity to manage waste as a valuable resource.

Additionally, the community's limited knowledge regarding simple processing technologies—particularly the fermentation of organic materials—has hindered the development of opportunities to utilize waste for supporting food security and socio-economic activities. The community also lacks adequate access to practical, replicable best practices for integrated waste management that can be applied at the household or community level.

Another priority issue is the limited number of educational and participatory community activities aimed at raising environmental awareness, promoting food self-sufficiency, and fostering community harmony. The lack of integration between livestock farming activities and the surrounding social environment means that the benefits of livestock farming have not yet been widely felt by the general public (Rasyaf, 2011).

Given these conditions, the priority issue addressed in this Community Service (PkM) activity is the low utilization of local organic waste as a productive resource and a medium for social education for the general public, which limits improvements in well-being, environmental awareness, and community-based food security.

The solution offered through this Community Service (PkM) activity is the implementation of an educational program and community mentoring on the utilization of catfish waste and fermented banana stems as part of the feed support system for entog at Fitria Farm. This activity includes outreach, basic training, and community involvement in the waste processing and maintenance of the environment surrounding the farm (Murni et al., 2018).

This program is designed as an inclusive community social activity that is easy to understand and can be applied by the general public without requiring significant capital. Thus, the community can play an active role in maintaining environmental cleanliness, supporting the availability of local livestock feed, and strengthening social ties between farmers and nearby residents (Astuti & Wiryawan, 2014).

From a social perspective, this program promotes greater public awareness of the importance of waste management, environmental cleanliness, and community harmony. Community involvement in joint activities also strengthens social cohesion and the spirit of mutual cooperation (FAO, 2013). From an economic perspective, the utilization of local waste contributes to cost efficiency in livestock production, which indirectly impacts business stability and opportunities for related economic activities. Broadly speaking, this program supports improvements in environmental quality, local food security, and community well-being based on the sustainable utilization of local resources.

The solutions proposed in this Community Service (PkM) initiative are designed to address the needs of the general public who are not yet economically productive through a social, educational, and participatory approach based on the utilization of local resources. The solution approach focuses not only on the technical aspects of livestock farming but also on strengthening the community's social capacity, improving environmental quality, and enhancing sustainable indirect economic benefits.

1. Educational Approach and Community Awareness Raising

   The primary solution offered is to increase public understanding and awareness of the importance of managing local organic waste—specifically catfish waste and banana stems—as valuable resources. Educational activities are conducted through outreach, group discussions, and hands-on training (learning by doing) that is easily understood by the general public (Kementerian Pertanian RI, 2020).

   The educational materials focus on fundamental issues such as environmental hygiene, organic waste reduction, community well-being, and the connection between a clean environment and health and quality of life. Through this approach, the community is expected not only to benefit from these initiatives but also to develop a collective awareness of the need to protect the environment and support productive activities in their area (Kementerian PPN/Bappenas, 2020).
2. Implementation of Simple and Inclusive Appropriate Technology

   The next solution is the implementation of appropriate technology in the form of catfish and banana stem waste fermentation, which is simple, inexpensive, and replicable. This technology does not require complex equipment or specialized expertise, so it can be implemented by the general public on a household or community scale (Sudaryanto & Rusastra, 2016).

   Waste fermentation serves to improve material quality, reduce odors, extend shelf life, and make the products safer and more environmentally friendly. The fermented products are utilized as part of the feed support system for broiler chickens at Fitria Farm, while also serving as an educational tool for the community regarding beneficial waste processing. Thus, waste that was previously an environmental problem can be transformed into a shared solution (Lestari & Santoso, 2019).
3. Strengthening the Community's Social Role in Livestock Activities

   This Community Engagement (PkM) initiative also offers solutions through the active involvement of the local community in social activities integrated with livestock farming. The community is encouraged to participate in waste collection, processing, and monitoring the cleanliness and order of the environment surrounding Fitria Farm.

   This involvement is voluntary and based on mutual cooperation, thereby strengthening social ties between farmers and the community. Through this mechanism, the farm does not stand as a separate

entity but becomes part of a mutually supportive social ecosystem. This situation contributes to increased community harmony and minimizes the potential for social conflict arising from livestock farming activities (Sugiyono, 2019).

4. Integration of Social, Environmental, and Food Security Initiatives
   Solutions to these challenges are designed in an integrated manner by linking social, environmental, and local food security aspects. The use of organic waste as a feed supplement contributes to increased efficiency in livestock operations, which indirectly ensures the sustainability of animal protein production for the surrounding community.
   Additionally, this initiative encourages the community to understand the interconnection between environmental management and food availability. A clean and well-managed environment supports livestock health, product quality, and food safety. Consequently, the program's benefits are felt not only by livestock partners but also by the broader community as consumers and as part of the local food system.
5. Ongoing Mentoring and Social Capacity Building
   The solutions offered go beyond one-way training sessions and are complemented by ongoing mentoring. The PkM team acts as facilitators who support the community and partners in implementing solutions, conducting simple evaluations, and making continuous improvements. This mentoring is essential to ensure that changes in behavior and waste management practices are sustained over time.
   Social capacity building is carried out through the formation of small groups or community communication forums that serve as platforms for sharing experiences and collaborative learning. These forums are expected to maintain the program's sustainability after the PkM activities conclude, as well as serve as a means for replicating best practices in the surrounding community.
6. Contribution to the Socioeconomic Impact on the Wider Community
   Socially, the implemented solutions have increased public awareness of environmental issues, strengthened a culture of mutual cooperation, and created a cleaner, healthier, and more orderly environment. The community benefits from improved knowledge, basic skills, and a sense of ownership regarding collective activities.
   From an economic perspective, although the target community is not directly aimed at becoming a productive group, this program provides indirect economic impacts through livestock cost efficiency, opportunities for derivative economic activities, and the stability of partner businesses. In the long term, these conditions open opportunities for the development of more productive and sustainable community-based economic activities.

With a comprehensive, participatory, and community-needs-based approach, this Community Service (PkM) initiative is expected to deliver tangible, sustainable benefits that align with local social, economic, and environmental development goals.

Method

This methodology for implementing Community Service (PKM) activities is designed to address the challenges faced by economically underprivileged communities through an educational, participatory, and appropriate technology-based approach. The methods employed are practical, easily replicable, and emphasize the active involvement of the community and Fitria Farm as a center for social and environmental learning.

Stages of Activity Implementation

The implementation of PKM activities is carried out in stages and systematically as follows:

a. Preparation and Coordination Stage
   The initial phase involves internal coordination within the PkM team and communication with Fitria Farm partners as well as representatives of the surrounding community. This activity aims to agree on needs, the scope of activities, the roles of each party, and the implementation timeline. During this phase, an initial assessment is also conducted of the potential of catfish waste and banana stems, the social conditions of the community, and the readiness of supporting facilities.
b. Program Outreach Phase
   Outreach activities are conducted among the general public in the vicinity of the project site to provide an understanding of the program's objectives, benefits, and implementation mechanisms. These activities emphasize the importance of waste management, environmental hygiene, and the community's role in supporting social initiatives integrated with livestock farming. This phase aims to build awareness and foster participation from the outset.
c. Basic Education and Training Phase
   During this phase, simple education and training on organic waste management and easily applicable fermentation technologies are provided. Materials are delivered practically through live demonstrations, interactive discussions, and hands-on practice. The training focuses on introducing fermentation principles, material safety, and the

environmental and social benefits of waste utilization.

d. Implementation and Mentoring Phase
   The implementation phase involves the direct application of processed catfish waste and fermented banana stems as part of the feed support system for entog at Fitria Farm. The community is actively involved in the processes of collection, processing, and maintaining environmental cleanliness. The PkM team provides intensive mentoring to ensure activities proceed according to objectives.
e. Monitoring, Evaluation, and Reflection Phase
   Monitoring and evaluation are conducted periodically to assess community involvement, the functionality of the applied technology, and changes in social and environmental behavior. The evaluation was conducted in a participatory manner through discussions and reflections with partners and the community. The results of the evaluation serve as the basis for improvements and recommendations for the program's sustainability.

Approaches Methods, and the Application of Technology and Innovation

The approach used in this activity is a community-based participatory approach, where the general public is positioned as the subject of the activity, not merely as beneficiaries. This approach is combined with the learning by doing method to enhance the community's understanding and practical skills.

The applied technology and innovation involve simple fermentation technology based on catfish waste and banana stems. This innovation is appropriate, environmentally friendly, and suitable for the socio-economic conditions of the community. Fermentation serves to improve the quality of materials, reduce odor and pollution potential, and produce safe and beneficial products as part of the livestock feed system.

The application of technology is not only focused on the end result, but also on the social learning process. Thus, technology serves as an educational tool to raise environmental awareness, promote local food security, and integrate livestock activities with the social life of the community.

Concrete Steps to Address the Issue of Economically Unproductive Partners

To address the challenges faced by the general public who are not yet economically productive, the concrete steps taken include:

a. Enhancing Social and Environmental Awareness, through education on the impact of waste on public health, well-being, and quality of life.
b. Active Engagement in Social Activities, by involving the community in the collection and processing of waste through cooperative efforts.
c. Providing Basic Skills, in the form of simple waste management and fermentation techniques that can be applied in their respective environments.
d. Strengthening the Social Function of the Farm, establishing Fitria Farm as a learning center and a model of good environmental management practices.
e. Ongoing Mentoring, to ensure behavioral change and the sustainability of activities after the PkM program concludes.

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e. Ongoing Mentoring, to ensure behavioral change and the sustainability of activities after the PkM program ends.

Overview of Technology and Innovation

The technology and innovation to be implemented with the target partners in this Community Service (PkM) activity is a simple fermentation technology based on catfish waste and banana stems as feed supplements for entog. This technology is designed as an appropriate technology that is easy for the general public to apply, environmentally friendly, low-cost, and can be replicated according to the partners' needs.

Technology Form and Design

The technology takes the form of small- to medium-scale fermentation units that utilize closed containers such as plastic drums or barrels made of high-density

polyethylene (HDPE). The fermentation containers are cylindrical with tight-fitting lids to maintain anaerobic conditions. Additionally, simple tools such as knives or manual choppers are used for chopping banana stems, along with mixing buckets and simple digital scales.

Dimensions and Technical Specifications

Each fermentation unit has a volume capacity of 50–100 liters, adjusted according to the availability of raw materials and the partner's needs. Key specifications include:

- Fermentation vessel: HDPE plastic drum, corrosion-resistant and easy to clean;
- Drum dimensions: diameter ±40–50 cm, height ±60–80 cm;
- Sealing system: screw cap or clamp to maintain anaerobic conditions;
- Chopping tool: manual chopper or stainless steel blade;
- Fermentation materials: catfish waste, chopped banana stems, additional carbohydrate sources (optional), and local microbial starter.

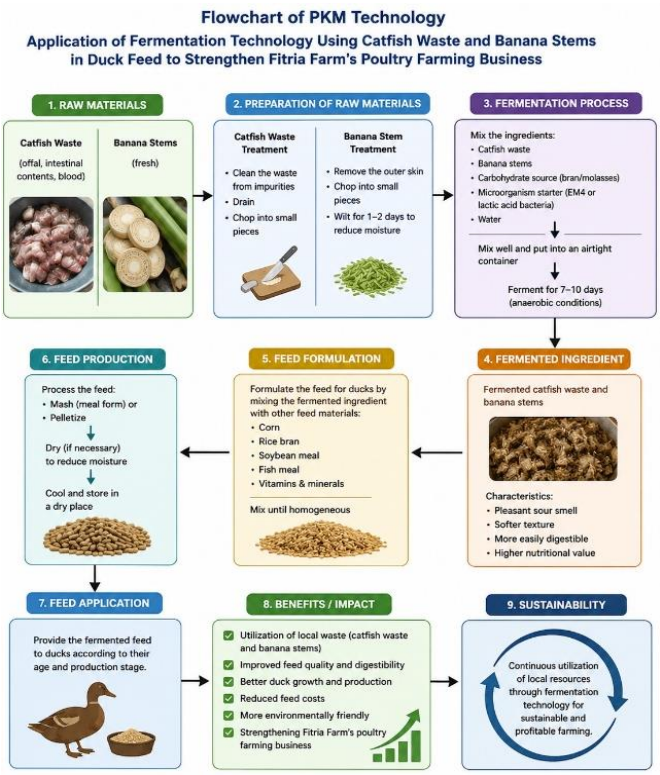

Figure 1. Flowchart PKM Technology

Uses and Functions of the Technology

This fermentation technology serves to:

- Improve the nutritional quality of feed ingredients, particularly digestibility and palatability;
- Reduce odors and the potential for environmental pollution from organic waste;
- Extend the shelf life of feed ingredients, making them more efficient;
- Provide safe and valuable supplementary ingredients for duck feed.

In addition to its technical functions, this technology also serves as a tool for social education for the community regarding waste management and the application of circular economy principles.

Utilization and Implementation Capacity

Each fermentation unit can process approximately 30–50 kg of raw material per fermentation cycle, with a processing time of approximately 7–14 days, depending on environmental conditions. In one month, a single unit can produce enough fermented feed to support the rations of 20–30 ducks, depending on the formulation and feeding rate.

This technology is flexible, and its capacity can be scaled up by adding more fermentation units without significant design changes. Thus, partners can adjust the scale of utilization according to their needs and capabilities. The Value of Innovation and Technological Excellence

The innovative value of this technology lies in the integration of local fishery and agricultural waste into a single, simple fermentation system that is practical and community-oriented. This technology not only improves the efficiency of waste utilization but also strengthens the role of livestock farming as a hub for community learning and empowerment. Through this approach, the technology is expected to have a sustainable impact on partners and the surrounding community.

Result and Discussion

Pretest Results

The PKM activity began with the administration of a pretest to the training participants, consisting of business owners and workers at Fitria Farm. The pretest aimed to assess the participants' initial level of knowledge regarding the use of catfish waste and banana stems as alternative feed ingredients, fermentation techniques, and ration management for entog poultry.

The pretest results indicated that the majority of participants did not yet understand the technical aspects of feed fermentation. Participants' knowledge was largely limited to the use of commercial feed and agricultural waste fed directly without any processing. Seventy percent of participants were unaware of the benefits of fermentation in improving feed digestibility, while 65% did not understand balanced ration formulation.

The low pretest scores indicate a need to enhance farmers' knowledge and skills in utilizing local resources as alternative feed ingredients. This situation served as the basis for conducting extension activities and field demonstrations (Widianingrum et al., 2025).

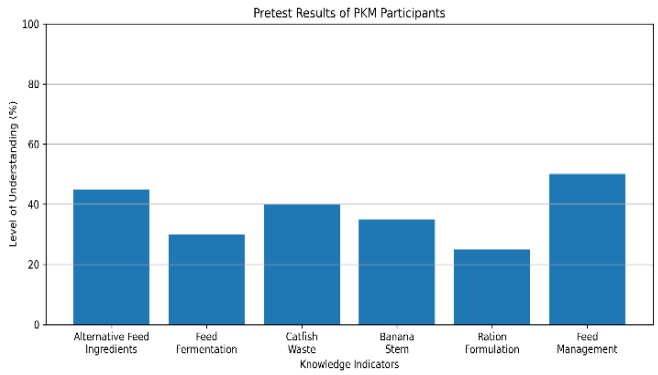

Figure 2. Pretest Results Chart

Implementation of Extension Activities

Extension activities were conducted through lectures, interactive discussions, and hands-on practice. The topics covered include (Harti et al., 2025):

a. The potential of catfish waste as a protein source in feed.
b. The potential of banana stems as a source of fiber and energy.
c. Feed material fermentation technology using bioactivators.
d. Formulation techniques for catfish feed based on fermented waste.
e. Feed cost-efficiency strategies for smallholder aquaculture operations.

During the extension activity, participants demonstrated high enthusiasm, evidenced by active discussions regarding feeding challenges and opportunities for waste processing. The presentation of materials was conducted using presentation slides, leaflets, and hands-on demonstrations.

The extension program not only enhanced participants' theoretical knowledge but also strengthened their practical understanding in selecting locally available feed ingredients that are easily accessible and have high economic value.

Demonstration Plot Implementation

The demonstration plot was conducted as a direct implementation of the technology for fermenting catfish waste and banana stems in quail feed at Fitria Farm. The demonstration plot stages included (Widianingrum et al., 2021):

a. Preparation of raw materials, including catfish waste, chopped banana stems, rice bran, molasses, and a bioactivator.

Figure 3. Choped Banana Stems

b. Mixing the ingredients according to the formulation.

Figure 4. Mixing Raw Material

c. Fermentation process for 7–14 days under anaerobic conditions.

Figure 5. Fermentation of Ration

d. Testing the aroma, texture, and quality of the fermented product.
e. Application to duck feed.

Figure 6. Application to Muscovy duck feed

The fermented product exhibited softer texture, a fresh, tangy aroma, and was free of mold. The fermented feed was well-accepted by the ducks, as evidenced by increased feed intake.

Figure 7. Choped Banana Stems

During the demonstration plot, a comparison was made between a group of ducks receiving conventional feed and a group receiving fermented feed. Observations showed that the treatment group exhibited better growth performance.

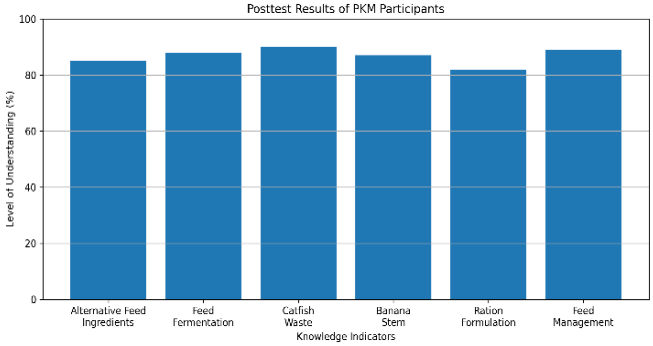

Figure 8. Posttest Results Chart

These results indicate that fermentation can improve the nutritional quality of feed ingredients and enhance feed utilization efficiency.

Post-Test Results

The post-test was conducted after the entire series of training sessions and demonstration plots had been completed. The objective was to assess the participants' increased knowledge and skills following the program.

The post-test results showed a significant improvement compared to the pre-test. Participants began to understand the benefits of fermentation, feed production techniques, and waste-based ration formulation.

The increase in scores indicates that practice-based extension methods are effective in enhancing farmers' capabilities.

Activity Evaluation

Activity evaluation was conducted through field observations, interviews, and an assessment of the program's success. Overall, the PKM activity was deemed successful because it enhanced the partners' understanding and provided practical alternative feed technologies.

Some evaluation results include:

a. Partners are able to independently practice fermentation techniques.
b. Catfish waste and banana stems, which were previously unused, now have economic value.
c. Feed costs have decreased because some ingredients come from local waste.
d. Partners have shown interest in continuing the use of fermentation technology sustainably.
e. Increased livestock productivity has a positive impact on the farming business.

Challenges encountered during implementation included limited access to banana stem shredders and the need for ongoing guidance in feed formulation. However, these challenges can be addressed through strengthened partnerships and further training.

Overall, the PKM activities have had a positive impact on enhancing farmers' capacity, business efficiency, and the sustainable utilization of local organic waste. The implementation of fermentation technology at Fitria Farm has the potential to serve as a model for the development of entog farming based on alternative feed innovations.

Conclusion

The PKM activity, which utilized fermentation technology for catfish waste and banana stems in duck feed at Fitria Farm, successfully enhanced partners' knowledge, skills, and capacity in managing alternative

feed based on local waste. Pretest results indicated that participants' initial understanding of fermentation technology and feed formulation was still relatively low. Following the implementation of training sessions, fermentation practices, and demonstration plots, posttest results showed a significant improvement across all knowledge indicators.

The demonstration plot results showed that the use of fermented feed increased feed intake, duck weight gain, and feed conversion efficiency compared to conventional feed. Additionally, the utilization of catfish waste and banana stems provided economic value through reduced feed costs and the optimization of local resources that had previously not been fully utilized.

Overall, this program has had a positive impact on strengthening Fitria Farm's poultry business, from technical, economic, and environmental sustainability perspectives. Fermentation technology based on local organic waste has the potential to be developed as an applicable and sustainable model for alternative feed innovation in small-scale duck farming operations.

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References

Association of Official Analytical Chemists. (2016). Methods of analysis 20th ed.

Astuti, T., & Wiryawan, K. G. (2014). Fermentasi pakan dan aplikasinya pada ternak unggas. *Media Peternakan*, 37(1), 45–52.

FAO. (2013). Poultry development review. Food and Agriculture Organization of the United Nations.

Hardini, D. (2012). Pengaruh pakan fermentasi terhadap performa unggas lokal. *Jurnal Ilmu Ternak*, 12(1), 21–27.

Harti, A. O. R., Nalibratawati, R., Falahudin, M. A., Munandar, A. N., & Fatmawati, S. (2025). Towards Environmentally Friendly Agriculture: Assisting Farmers in the Use of Organic and Biological Fertilizers. *Unram Journal of Community Service*, *6*(3), 523-528.

Haryanto, B., & Thalib, A. (2009). Fermentasi bahan pakan berserat untuk meningkatkan kecernaan ternak unggas. *Jurnal Ilmu Ternak dan Veteriner*, 14(2), 121–129.

Kementerian Pertanian RI. (2020). Pedoman teknis pakan ternak unggas. *Direktorat Jenderal Peternakan dan Kesehatan Hewan*.

Kementerian PPN/Bappenas. (2020). Peta jalan SDGs Indonesia. Bappenas.

Lestari, E., & Santoso, B. (2019). Teknologi tepat guna dalam pengabdian kepada masyarakat bidang peternakan. *Jurnal Pengabdian Masyarakat*, 4(1), 15–22.

Mulyono, R. H., & Sarwono, B. (2014). Entog: Agribisnis dan pengembangannya. Penebar Swadaya.

Murni, R., Akmal, & Okrisandi, Y. (2018). Pemanfaatan limbah ikan sebagai sumber protein pakan. *Jurnal Agripet*, 18(2), 123–130.

NRC. (1994). Nutrient requirements of poultry (9th rev. ed.). National Academies Press.

Pamungkas, D., & Anggraeni, A. (2018). Pakan alternatif berbasis limbah pertanian untuk unggas lokal. *In Prosiding Seminar Nasional Peternakan*. IPB.

Rasyaf, M. (2011). Beternak itik dan entog. Penebar Swadaya.

Sudaryanto, T., & Rusastra, I. W. (2016). Pemberdayaan peternak rakyat dan penguatan ekonomi lokal. *Forum Penelitian Agro Ekonomi*, 34(2), 79–92.

Sugiyono. (2019). Metode penelitian pendidikan: Pendekatan kuantitatif, kualitatif, dan R&D. Alfabeta.

Suparjo. (2017). Ilmu nutrisi dan pakan ternak unggas. Universitas Jambi Press.

Suryani, E., & Sumarno. (2016). Potensi batang pisang sebagai bahan pakan alternatif. *Buletin Peternakan*, 40(3), 215–222.

Widianingrum, D., Imanudin, O., & Kholik, A. (2021). Aplikasi pemanfaatan limbah jambu biji menjadi mol sebagai bioaktivator pengolahan sampah organik di desa panyingkiran. *BERNAS: Jurnal Pengabdian Kepada Masyarakat*, *2*(4), 982-988.

Widianingrum, D., Umyati, S., & Imanudin, O. (2025). Application of Red Guava Waste MOL as a Bioactivator in Dairy Goat Feed. *Unram Journal of Community Service*, *6*(3), 536-542.

Widodo, W., & Prabowo, A. (2019). Teknologi pakan fermentasi. UB Press.

Winarno, F. G. (2008). Kimia pangan dan gizi. Gramedia Pustaka Utama.

Yulistiani, D., & Puastuti, W. (2013). Pemanfaatan limbah perikanan sebagai pakan ternak. Wartazoa, 23(2), 63–70.