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Feed production techniques using local raw materials for mud crab farmers in Madak Belek Hamlet, Sekotong District

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Abstract

This community service activity focused on developing feed production techniques using local raw materials for mud crab farmers in Madak Belek Hamlet, Sekotong District. The main challenge faced by farmers is the high cost of commercial feed, which reduces profit margins. In fact, the area is rich in underutilized nutrient-rich local resources such as trash fish and seafood processing by-products. A participatory approach was applied, including observation, socialization, demonstration, hands-on training, and evaluation. The training emphasized feed formulation and the application of 5% wheat gluten as a binder, which had been proven in preliminary studies to enhance feed stability in water. The results showed an improvement in participants' knowledge and skills in processing local ingredients into quality feed. The expected impacts include reducing dependence on commercial feed, lowering production costs, and improving the efficiency and sustainability of mud crab farming. For further optimization, feed performance testing on crab growth and economic feasibility analysis are required.

Keywords: Independent Feed, Local Raw Materials, Mud Crab, Wheat Gluten, Community Empowerment.

Abstrak

Kegiatan pengabdian masyarakat ini berfokus pada teknik pembuatan pakan berbahan baku lokal untuk pembudidaya kepiting bakau di Dusun Madak Belek, Kecamatan Sekotong. Tantangan utama yang dihadapi pembudidaya adalah tingginya biaya pakan komersial yang menekan margin keuntungan. Padahal, wilayah tersebut kaya akan bahan baku lokal bernutrisi seperti ikan rucah dan limbah olahan laut yang belum dimanfaatkan secara optimal. Metode yang digunakan bersifat partisipatif, meliputi observasi, sosialisasi, demonstrasi, pendampingan praktik langsung, dan evaluasi. Pelatihan difokuskan pada formulasi pakan dan penggunaan bahan pengikat wheat gluten 5% yang terbukti mampu meningkatkan kestabilan pakan dalam air berdasarkan penelitian pendahuluan. Hasil kegiatan menunjukkan peningkatan pengetahuan dan keterampilan peserta dalam mengolah bahan lokal menjadi pakan bermutu. Dampak yang diharapkan adalah penurunan ketergantungan pada pakan komersial, pengurangan biaya produksi, serta peningkatan efisiensi dan keberlanjutan usaha budidaya kepiting bakau. Untuk optimalisasi lebih lanjut, diperlukan uji performa pakan terhadap pertumbuhan kepiting dan analisis kelayakan ekonominya.

Kata kunci: Pakan Mandiri, Bahan Baku Lokal, Kepiting Bakau, *Wheat Gluten*, Pemberdayaan Masyarakat.

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1. Introduction

Madak Belek Hamlet, Sekotong District, West Lombok, is one of the coastal areas with significant fisheries potential, particularly in mud crab (Scylla sp.) aquaculture(Aslamyah et al., 2022; Diamahesa et al., 2023; Diamahesa, Andriyono, et al., 2024). Mud crab farming has become a primary livelihood for part of the community and plays a crucial role in supporting the local economy and food security of coastal households (Aslamyah et al., 2022; Nivas et al., 2023). However, farming practices still face challenges, especially the high cost of commercial feed, which is disproportionate to the fluctuating market price of harvested products. This situation reduces farmers' profit margins, decreases business efficiency, and threatens the long-term sustainability of aquaculture enterprises (Das et al., 2020; Nivas et al., 2023).

Field observations indicate that limited access to and high prices of manufactured feed have driven farmers to seek alternative feed sources (Das et al., 2020; Kamal et al., 2022). In fact, various nutrient-rich local raw materials are available in the Sekotong area, including trash fish, small swimming crabs, freshwater snails, and other seafood by-products, which are underutilized and often sold at low prices or discarded. Recent studies confirm that the use of local raw materials in feed formulation can reduce production costs without compromising mud crab growth or survival (Das et al., 2020; Diamahesa, Abidin, et al., 2025; Diamahesa, Muahiddah, et al., 2025; Kamal et al., 2022).

Communities engaged in mud crab farming, particularly Scylla serrata, often have limited knowledge and skills in processing local resources into high-quality feed. Most training programs emphasize aquaculture techniques and the use of natural feed, while the formulation of artificial feed based on local protein sources and the application of eco-friendly binders have rarely been addressed in depth. In fact, proper feed formulation not only improves nutritional composition but also enhances growth and ensures feed stability in water (Alam et al., 2024; K & Vadher, 2020; Lahiri et al., 2021).

Several studies highlight the importance of systematic approaches in feed formulation using binders such as Carboxymethyl Cellulose (CMC), Gracilaria flour, and wheat gluten. These binders have been shown to improve nutritional quality while providing functional benefits in terms of feed stability in aquatic environments. Feeds formulated with appropriate proportions of plant- and animal-based protein sources can also meet the protein requirements of mud crabs, which range between 35–55% (Gabito & Baltar, 2023; K & Vadher, 2020). Moreover, the use of natural binders can enhance palatability and feed efficiency, ultimately improving crab growth performance (Hadijah et al., 2021; Sukardi et al., 2024). Other studies further emphasize that feed with a balanced protein and fatty acid profile positively affects crab growth and reproduction, offering superior alternatives compared to simply formulated diets (Gencer & Vitorino, 2023).

Nevertheless, limitations in artificial feed formulation at the community level remain evident. A lack of technical knowledge regarding the utilization of local raw materials and eco-friendly binders (such as CMC, Gracilaria flour, and wheat gluten) has resulted

in suboptimal feed quality. Existing training remains focused on conventional aquaculture and natural feeding practices, meaning that the nutritional value of locally formulated feeds has not been fully optimized for crab utilization (Diamahesa, Abidin, et al., 2025; Diamahesa, Muahiddah, et al., 2025).

Considering these opportunities and challenges, this community service program was designed to empower mud crab farmers through training in processing local raw materials into high-quality feed. The program applied a participatory approach to strengthen farmers' capacity, reduce dependence on commercial feed and trash fish, and promote greater efficiency and sustainability in mud crab aquaculture in Madak Belek Hamlet.

2. Method

This community service activity was conducted on July 19, 2025. The applied method combined a participatory approach with practical training tailored to the needs of the local community. The workflow of the program consisted of several stages as follows:

a. Observation and Needs Assessment
   The service team conducted site surveys and interviews with farmers to identify key challenges, the potential of local raw materials, and obstacles in independent feed production. This stage was crucial for mapping relevant training strategies (Diamahesa, Alim, et al., 2024; Sofieyudin, 2024).

b. Socialization and Theory
   Participants were introduced to the concept of independent feed, the importance of balanced nutrition for crab growth, and the advantages of utilizing local raw materials. This brief session aimed to build participants' initial understanding and motivation (Putri et al., 2024; Sumsanto et al., 2025).

c. Demonstration and Hands-on Practice
   The team demonstrated the feed-making process step by step, including the preparation and processing of local raw materials, mixing, molding/forming, and drying. All procedures were carried out transparently and involved the participants directly, ensuring immediate skill transfer (Khairul Samuki et al., 2024; Mulyani et al., 2025; Putri et al., 2024).

d. Participant Mentoring
   Participants were actively guided and supported in practicing the learned techniques, both individually and in groups. Facilitators provided feedback and assisted in solving problems encountered during field practice (Lestari et al., 2024).

e. Evaluation
   Training outcomes were assessed using pre-test and post-test methods to measure improvements in participants' knowledge and skills before and after the program. In addition, an open discussion was held as a forum for feedback and evaluation of the implementation process.

The application of this method followed a participatory and practice-based community service model, which has been proven effective in enhancing farmers'

knowledge, skills, and independence in local feed innovation, as well as in reducing production costs (Khatimah et al., 2023; Mulyani et al., 2023; Putri et al., 2024).

3. Results

The community service activity conducted in Cendi Manik Village, in collaboration with mud crab farmers, was a continuation of previous research and outreach programs focusing on the development of artificial feed to support sustainable aquaculture. Based on field observations and partner needs assessment, the main challenges faced by farmers were limited access to high-quality feed and the high price of available commercial feed. These conditions resulted in increased production costs and reduced farming efficiency.

Findings from earlier studies revealed that one of the technical constraints in artificial feed production was the low binding capacity of pellets, which caused the feed to disintegrate easily in water. This problem was disadvantageous for farmers since unstable feed dissolves rapidly before being consumed, leading to higher waste and lower feed efficiency. Research results indicated that the application of 5% CMC could serve as an effective binder, producing feed with a stability rate of 99.45% at 30 minutes and 96.99% at 240 minutes (Diamahesa, et al., 2025). While these findings are important, in this community service activity, 5% wheat gluten was applied as the binder. The decision was based on internal research (unpublished data), which suggested that wheat gluten at concentrations of 3–5% not only maintained feed stability but also promoted better crab growth compared to CMC at the same concentration.

Figure 1. Initial Observation During Community Service Activities

The implementation of the program was carried out in several stages. The first stage involved a socialization activity with mud crab farmers, held at a local resident's house (Figures 1). The purpose of this session was to provide insights into the importance of feed quality in supporting farming success and to introduce previous research findings. Farmers were encouraged to understand the concept of binder application in feed formulation and the benefits of utilizing local raw materials and simple technologies.

The second stage consisted of training and hands-on practice in feed production (Figure 2). During this session, farmers were actively engaged in every process, including raw material preparation, weighing according to formulation, mixing, pellet formation, and drying. By involving farmers directly, the activity not only served as a knowledge transfer but also developed practical skills that can be independently applied in the future.

Figure 2. Raw Materials and Process of Mud Crab Feed Production

The results of the activity showed an improvement in farmers' knowledge of feed production techniques and their understanding of the role of binders in enhancing feed quality. In addition, the farmers were able to observe firsthand the differences in texture and stability of feed formulated with wheat gluten. This experience increased their confidence to begin independently producing alternative feed using locally available materials (Figure 3).

Figure 3. Drying Process of Mud Crab Feed

The benefits derived from this community service program extended beyond technical aspects to include economic and environmental impacts. Economically, the ability to produce feed independently reduces dependence on relatively expensive commercial feed, thereby lowering production costs. Environmentally, the use of more stable feed minimizes organic waste released into the aquatic system, helping to

maintain pond water quality. Collectively, these benefits are expected to improve the productivity and sustainability of mud crab farming in Empol Hamlet, Cendi Manik Village, Sekotong Regency, West Lombok, West Nusa Tenggara, Indonesia.

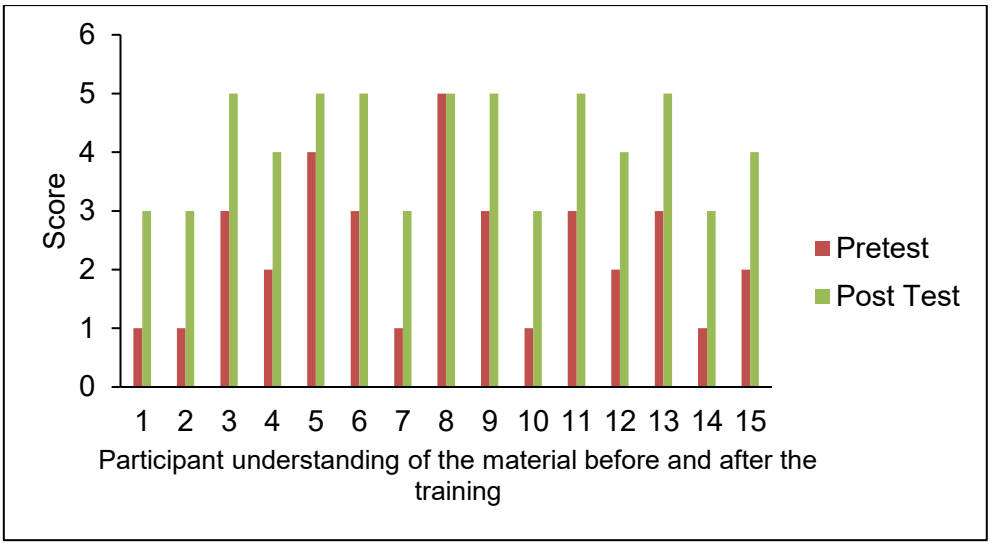

Figure 4 Participants Understanding of The Material Before And After The Training

The results presented in Figure 4 show a clear improvement in the participants' understanding of the material after the training, as indicated by the difference between the pretest and post-test scores. Overall, the post-test scores (green bars) are consistently higher than the pretest scores (red bars) across all 15 questions. This demonstrates that the learning intervention had a positive effect on the knowledge and comprehension of the aquaculture farmers.

Before the training, the pretest scores ranged mostly between 1 and 3, indicating a relatively low level of prior understanding of the material. This suggests that the farmers had limited exposure to or familiarity with the topics presented. After the training, the post-test scores increased significantly, with most scores reaching 4 to 5. This upward shift implies that the participants were able to grasp the concepts effectively through the instructional sessions.

The largest improvements can be seen in items 5, 8, and 11, where the scores increased from 2–3 in the pretest to 5 in the post-test. These items likely represented topics that were particularly emphasized or well understood during the workshop. Conversely, a few items such as 7 and 10 still showed modest gains, suggesting that these areas may require further clarification or reinforcement in future training programs.

In general, the pattern of results indicates that the extension or training program successfully enhanced the farmers' knowledge and comprehension of the subject matter. This finding underscores the importance of continuous education and capacity-building programs in improving aquaculture management practices. A follow-up evaluation could be conducted to determine the long-term retention of knowledge and whether the improved understanding translates into practical application in the field.

Looking forward, this initiative still offers room for further development. A key step is conducting field performance trials to directly assess the effects of wheat gluten-based feed on crab growth, feed conversion ratio, and survival rate. In addition, a feasibility analysis is required to evaluate the economic advantages of independent feed production compared to commercial feed use. With such additional data, the application of artificial feed technology can be further optimized and potentially replicated in other aquaculture areas facing similar challenges.

The community service program conducted in Cendi Manik Village is expected to generate several long-term impacts that contribute to the sustainability of aquaculture development at both local and regional levels.

a. Strengthened Farmer Independence and Capacity Building
   The direct involvement of farmers in all stages of feed formulation and production has fostered a strong sense of ownership and self-reliance. Over time, this empowerment is anticipated to create a group of skilled local practitioners capable of producing artificial feed independently without external assistance. This independence not only enhances technical competence but also promotes local innovation, encouraging farmers to adapt and improve feed formulations according to their environmental and biological conditions.

b. Sustainable Economic Growth in Rural Aquaculture Communities
   The reduction in dependence on commercial feeds significantly decreases production costs, allowing for higher profit margins and better financial stability for small-scale farmers. In the long term, this economic efficiency may encourage more residents to participate in mud crab aquaculture, thereby expanding local employment opportunities and stimulating the village's economic growth. The establishment of local feed production units could even evolve into small-scale enterprises, promoting rural entrepreneurship.

c. Environmental Sustainability and Resource Efficiency
   The application of stable, wheat gluten-based feed reduces feed disintegration and organic waste accumulation in pond water. This improvement contributes to better water quality and decreases the environmental footprint of aquaculture practices. Over an extended period, these practices help maintain ecosystem balance, reduce the frequency of water exchange, and lower the risk of disease outbreaks associated with poor water quality.

d. Replication and Policy Implications
   The successful implementation in Cendi Manik Village provides a replicable model that can be adopted in other coastal communities facing similar constraints in feed availability and cost. With continued collaboration between universities, local governments, and farmer groups, the innovation has the potential to influence regional aquaculture development policies, particularly those emphasizing self-sufficiency and the use of local resources.

e. Integration of Research and Community Development
The program demonstrates a practical model of integrating academic research outcomes into real-world applications. This synergy between research and community engagement strengthens the role of universities in contributing to sustainable rural development. Over time, such initiatives are expected to lead to a continuous cycle of applied research, innovation, and community empowerment, reinforcing the knowledge-based economy in the aquaculture sector.

4. Conclusion

The community service program on feed production techniques using local raw materials for mud crab farmers in Madak Belek Hamlet was successfully implemented and achieved its objectives. Through a participatory approach combining theoretical socialization and hands-on practice, farmers' capacity was enhanced in terms of knowledge and skills to formulate high-quality independent feed by utilizing local resources such as trash fish. Unlike previous socialization activities that primarily focused on cultivation management and general farming techniques, this program is conducted to apply 5% wheat gluten as a binder provided a practical solution to the problem of feed stability in water. This activity generated not only technical impacts but also economic benefits by reducing dependence on commercial feed and lowering production costs, as well as environmental benefits through the reduction of organic waste. To ensure sustainability, further feed performance trials and continuous mentoring are necessary to optimize the adoption of this technology, thereby improving the competitiveness and sustainability of community-based mud crab aquaculture.

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References

Alam, M. R., Siddiqui, P. J. A., Hassan, S., Zafer, M., Khan, M. A., & Soomro, H. (2024). A Comparative Study of the Natural and Formulated Feeds to Promote Crab Aquaculture Industry in Pakistan. *Journal Advances of Nutrition Science and Technology*, *4*(3–4), 77–84. https://doi.org/10.15228/anst.2024.v04.i03-4.p09

Aslamyah, S., Fujaya, Y., Rukminasari, N., Hidayani, A. A., Darwis, M., & Achdiat, M. (2022). Utilization of Feed and Growth Performance of Mud Crabs: The Effect of Herbal Extracts as Functional Feed Additives. *Israeli Journal of Aquaculture - Bamidgeh*, *74*. https://doi.org/10.46989/001c.32548

Das, K. P., Mondal, S., & Asif, A. A. (2020). Growth and Economic Performance of Different Supplementary Feed on Female Mud Crab (Scylla Olivacea) Fattening in Plastic Box. *Asian Journal of Medical and Biological Research*, *5*(4), 303–315. https://doi.org/10.3329/ajmbr.v5i4.45269

Diamahesa, W. A., Abidin, Z., Lestari, D. P., Alim, S., Rahmadani, T. B. C., & Mutiara, N. L. (2025). Effectiveness of Different Binders in Improving Feed Stability and Survival Rate of Mud Crab (Scylla sp.) Fed Trash Fish-Based Diet. *Jurnal Biologi*

Tropis, *25*(3), 4303–4310. https://doi.org/10.29303/jbt.v25i3.9896

Diamahesa, W. A., Alim, S., Asri, Y., Diamahesa, W. A., Dwiyanti, S., & Muahiddah, N. (2024). *Pelatihan Pembuatan Pakan Pellet Moist Untuk Budidaya Lobster Di Dusun*.

Diamahesa, W. A., Andriyono, S., Sahidu, A. M., Amin, M., Setyono, B. D. H., Affandi, R. I., Panosa, A. E., Diniaeiwisan, D., & Muahiddah, N. (2024). Sosialisasi Pembuatan Pakan Kepiting Berbahan Dasar Ikan Rucah di Dusun Madak Belek, Kecamatan Sekotong, Lombok Barat. *Jurnal Pengabdian Magister Pendidikan IPA*, *7*(2), 393–397. https://doi.org/10.29303/jpmpi.v7i2.7619

Diamahesa, W. A., Andriyono, S., Sahidu, A. M., Amin, M., Setyono, B. D. H., Affandi, R. I., Panosa, A. E., Diniariwisan, D., & Muahiddah, N. (2023). Sosialisasi Teknik Pembuatan Tepung Ikan pada Pembudidaya Kepiting Bakau di Dusun Madak Belek, Desa Cendi Manik, Kecamatan Sekotong, Lombok Barat. *Jurnal Pengabdian Magister Pendidikan IPA*, *6*(4), 1092–1096.

Diamahesa, W. A., Muahiddah, N., & Putri Lestari, D. (2025). Peran Binder Dalam Formulasi Pakan Untuk Budidaya Kepiting Bakau (Scylla Spp.): Kajian Bahan Sintetis, Alami, Dan Inovatif Berbasis Lingkungan. *Journal of Fish Nutrition*, *5*(1), 45–54. https://doi.org/10.29303/jfn.v5i1.7420

Gabito, P. P., & Baltar, C. C. (2023). Evaluating Different Diets on the Growth Performance of Mud Crab (Scylla Serrata). *Can Tho University Journal of Science*, *15*(1), 58–63. https://doi.org/10.22144/ctu.jen.2023.007

Gencer, Ö., & Vitorino, H. A. (2023). Effect of Diet on Growth Performance of First Crab Stage Callinectes Sapidus Rathbun, 1896 (Brachyura: Portunidae): A Comparison of Three Different Regimens. *Animals*, *13*(7), 1242. https://doi.org/10.3390/ani13071242

Hadijah, S., Agustono, & Lokapirnasari, W. P. (2021). Addition of Crude Fish Oil (CFO) in Feed Toward Fat and Energy Retention of Mud Crab (Scylla Serrata). *Iop Conference Series Earth and Environmental Science*, *679*(1), 12051. https://doi.org/10.1088/1755-1315/679/1/012051

K, S. M. A., & Vadher, K. H. (2020). Evaluation of the Nutritional Quality of Selected Dietary Ingredients for Mud Crab Scylla Serrata of Suarashtra Region in Gujarat, India. *Journal of Applied and Natural Science*, *12*(3), 287–290. https://doi.org/10.31018/jans.v12i3.2243

Kamal, D., Uddin, M. F., & Khatun, M. M. (2022). Production, Marketing And Transportation Of Mud Crab (Scylla Olivacea): A Study On Khulna Region Of Bangladesh. *Khulna University Studies*, 1–10. https://doi.org/10.53808/kus.2013.11and12.0833-l

Khairul Samuki, Afrizal Hendri, Fazril Saputra, Sufal Diansyah, & Alfis Syahril. (2024). Pelatihan Pembuatan Pakan Berbasis Bahan Baku Lokal pada Kelompok Budidaya Ikan di Kabupaten Aceh Singkil. *Jurnal Pengabdian Masyarakat: Darma Bakti Teuku Umar*, *6*(1), 82–93.

Khatimah, H., Utami, D. S., Pransiska, P., & Faradila, P. A. (2023). *Pengelolaan Lingkungan Pesisir Melalui Gerakan Bersih Pantai.pdf*. *02*(September), 91–99.

Lahiri, T., Nazrul, K. M. S., Rahman, M. A., Saha, D., Egna, H., Wahab, M. A., & Mamun, A. (2021). Boom and Bust: Soft-shell Mud Crab Farming in South-east

Coastal Bangladesh. *Aquaculture Research*, *52*(10), 5056–5068. https://doi.org/10.1111/are.15377

Laily Fitriani Mulyani, Alis Mukhlis, Muhammad Marzuki, Nunik Cokrowati, & Wastu Ayu Diamahesa. (2023). Pemberdayaan Masyarakat Nelayan Di Desa Pringgabaya, Lombok Timur: "Pengembangan Pengelolaan Gurita Secara Berkelanjutan." *Jurnal SIAR ILMUWAN TANI*, *4*(2), 220–225. https://doi.org/10.29303/jsit.v4i2.116

Lestari, D. P., Lumbessy, S. Y., Abidin, Z., Diamahesa, W. A., & Rahmadani, T. B. C. (2024). Sosialisasi Penerapan Biosecurity Dalam Budidaya Udang Vaname (Litopenaeus Vannamei) di Desa Kuranji Dalang, Lombok Barat. *Jurnal Gema Ngabdi*, *6*(1), 63–67. https://doi.org/10.29303/jgn.v6i1.400

Mulyani, L. F., Dwiyanti, S., Asri, Y., Rahmadani, T. B. C., Diniariwisan, D., & Diamahesa, W. A. (2025). *OPTIMALISASI PROGRAM PELEPASAN TUKIK MELALUI*. *2*(1), 26–34.

Nivas, N., Kaippilly, D., & Gopalakrishnan, A. (2023). Efficacy of Different Wet Feeds on the Growth Performance of Mud Crab <i>Scylla Serrata</I> During Fattening in Cages. *North American Journal of Aquaculture*, *86*(1), 17–25. https://doi.org/10.1002/naaq.10304

Putri, D. S., Miranti, S., Wulandari, R., Bakkara, O. R., Muzahar, M., Yulianto, T., Irawan, H., & Raza'i, T. S. (2024). Pemberdayaan Kelompok Pembudidaya Ikan Melalui Pelatihan Pembuatan Pakan Berbasis Bahan Baku Lokal. *Jurnal Abmas Negeri (JAGRI)*, *5*(2), 461–468. https://doi.org/10.36590/jagri.v5i2.1143

Sofieyudin, R. (2024). *Penyuluhan pembuatan pakan fermentasi untuk ternak ruminansia*. *1*(1), 60–70.

Sukardi, R. W., Saade, E., Zainuddin, & Abustang. (2024). Utilization of gutter in fattening Mangrove Crabs, Scylla olivacea consuming GEL feed containing various shrimp paste origins as attractant with vertical crab house systems and RAS. *IOP Conference Series: Earth and Environmental Science*, *1410*(1), 012022. https://doi.org/10.1088/1755-1315/1410/1/012022

Sumsanto, M., Setyono, B. D. H., Asri, Y., Diniarti, N., Marzuki, M., Affandi, R. I., Diniariwisan, D., Diamahesa, W. A., & Rahmadani, T. B. C. (2025). Aplikasi Pengunaan Jaring Insang Sebagai Penunjang Dalam Memenuhi Ketersediaan Pakan Pada Budidaya Lobster Di Teluk Ekas. *Jurnal Pepadu*, *6*(2), 220–226. https://doi.org/10.29303/pepadu.v6i2.7198