

Empowering Inmates Through Aquaculture Training: A Case Study at the Class IIB Gresik Detention Center, Indonesia

Pemberdayaan Warga Binaan melalui Pelatihan Budidaya Ikan: Studi Kasus di Rumah Tahanan Kelas IIB Gresik, Indonesia

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Abstract

*Providing vocational skill training for correctional inmates is a strategic step toward preparing them to live independently and productively after release. One promising sector for developing independence is catfish (*Clarias gariepinus*) aquaculture, owing to its high economic value and manageable cultivation process. This community service program aimed to enhance the technical capacity and self-reliance of inmates at the Class IIB Gresik Detention Center through integrated catfish aquaculture training. The program was conducted over two months with weekly mentoring sessions. The instructional materials covered the fundamental concepts and implementation of Good Aquaculture Practices (GAP), encompassing culture media water treatment, probiotic preparation and application, seed selection, stocking techniques, feed management, and grow-out management. Through a simultaneous approach of practical simulation and field mentoring, inmates actively participated in the complete rearing cycle through to the harvesting stage. The results demonstrated a significant improvement in the participants' understanding and practical competence in applying good aquaculture practices, as evidenced by a successful harvest of 12 fish per kilogram, meeting market standards. This program is expected to serve as a concrete entrepreneurial foundation for inmates upon reintegrating into society while supporting food self-sufficiency within the detention center.*

Keywords: *Aquaculture, catfish, detention center, food security, inmates*

Abstrak

Pembekalan keterampilan vokasional bagi warga binaan pemasyarakatan merupakan langkah strategis untuk mempersiapkan mereka agar mampu hidup mandiri dan produktif pasca-bebas. Salah satu bidang kemandirian yang propektif dikembangkan adalah budidaya ikan lele karena memiliki nilai ekonomis tinggi serta pengelolaan yang terukur. Kegiatan Pengabdian kepada Masyarakat ini bertujuan untuk meningkatkan kapasitas teknis dan kemandirian warga binaan di Rumah Tahanan (Rutan) Kelas IIB Cerme Gresik melalui pelatihan budidaya ikan lele secara terpadu. Program dilaksanakan selama dua bulan dengan frekuensi pendampingan mingguan. Metode pelaksanaan mengombinasikan penyampaian materi pengantar teoretis yang dilanjutkan dengan praktik langsung, mencakup pengolahan air media budidaya,

pembuatan dan aplikasi probiotik, seleksi benih unggul, teknik penebaran, manajemen pakan, hingga tahapan pembesaran. Melalui pendekatan simulasi dan pendampingan lapangan secara simultan, warga binaan terlibat aktif dalam seluruh siklus pemeliharaan hingga tahap pemanenan. Hasil kegiatan menunjukkan peningkatan signifikan pada pemahaman dan kecakapan praktis peserta dalam mengaplikasikan teknik budidaya yang baik, ditunjukkan dengan keberhasilan panen lele yang mencapai bobot standar pasar yaitu 12 ekor/kg. Program ini diharapkan menjadi bekal wirausaha yang konkret bagi warga binaan setelah kembali ke masyarakat sekaligus mendukung kemandirian pangan di lingkungan rutan.

Kata Kunci : budidaya ikan, ikan lele, rumah tahanan, ketahanan pangan, warga binaan

INTRODUCTION

Detention centers serve not only as facilities for sentence execution but also play a pivotal role in rehabilitating inmates to facilitate their reintegration into society through human resource development. This mandate is legally reinforced in Indonesia through Law No. 22 (Undang-undang Republik Indonesia, 2022) on Corrections, which redefines the penal system to prioritize social reintegration and inmate self-reliance, and Ministerial Regulation No. 35 (Kemenkumham RI, 2017) on Correctional Revitalization, which mandates vocational training aligned with economic opportunities. Developing practical skills is critical, as formerly incarcerated individuals frequently face limited employment opportunities, leading to economic instability and an increased risk of reoffending. Comprehensive interventions combining vocational education, skill suitability assessments, and employment assistance have been proven to significantly enhance post-release employment, reduce recidivism, and foster productive livelihood (Connell et al., 2023; McNeeley, 2023; Negi et al., 2026). Furthermore, tailoring vocational programs to inmate readiness and interests increases program suitability and long-term success (George et al., 2025; Ibrahim et al., 2025). Consequently, skill training aligned with local resource potential serves as an effective strategy to transform inmates into self-reliant individuals.

Among various practical vocational skills, catfish (*Clarias* sp.) aquaculture offers strong economic prospects and ease of implementation. This commodity is widely cultivated in Indonesia due to its rapid growth rate, high survival rate, tolerance to fluctuating water quality, and adaptability to small-scale land areas with affordable capital requirements. Successful catfish farming relies heavily on Good Aquaculture Practices (GAP), including water quality management, high-quality seed selection, feed management, and the application of probiotics to maintain microbial balance and water stability (Amenyogbe, 2023; Budiantoro et al., 2024; Maziyan et al., 2025). Integrating probiotic formulation and water quality management directly into cultivation practices not only boosts fish growth and health but also minimizes production costs, making aquaculture a highly viable vocational skill for incarcerated individuals (Dewi et al., 2024; Hamdillah et al., 2024). Aquaculture training programs have been widely implemented as community empowerment strategies to build technical skills, self-reliance, and local food security (Indriastuti, 2020; Isyanto et al., 2024; Sulistijanti et al., 2020). Within correctional environments, skill-based rehabilitation programs-ranging from fish farming to alternative feed production-have proven effective in boosting inmates' employability and preparing them for successful

social reintegration (Kurniawan et al., 2021; Muamar & Rohayati, 2025; Safitri et al., 2023; Syafitri et al., 2024). Nevertheless, comprehensive catfish aquaculture training encompassing the full production cycle-ranging from media water treatment, seed selection, and stocking techniques to probiotic formulation, feed management, and harvesting-remains relatively limited, particularly within detention centers in Gresik Regency.

Based on these considerations, the Aquaculture Study Program at Universitas Muhammadiyah Gresik conducted an internal community engagement program focused on catfish aquaculture training for inmates at the Class IIB Cerme Gresik Detention Center. Executed over a two-month period, the program integrated interactive lectures, method demonstrations, hands-on practice, and continuous mentoring. The curriculum was designed to cover these end-to-end aquaculture stages systematically. This initiative aimed to enhance inmates' technical knowledge and skills in catfish aquaculture, empowering them with actionable capabilities to foster post-release economic self-reliance while simultaneously contributing to local food security initiatives within the detention center environment.

METHOD

Time and Location

This program was conducted from April to June 2025 at the Class IIB Gresik Detention Center. The training program involved 15 inmates who were directly selected by the detention center administration based on their readiness and commitment to participate in the entire series of activities. The implementation followed a structured, multi-stage framework that encompassed interactive lectures, demonstrations, hands-on practice, and structured mentoring, all according to a mutually agreed-upon schedule between the community service team and the detention center authorities.

Implementation Stages

The research procedure was divided into four main stages:

1. Problem Identification

The program began with a targeted needs assessment through field observations and consultation with the detention center leadership and correctional staff. Observations focused on evaluating existing facilities, particularly three idle aquaculture ponds that held potential for inmate skill-building programs. These findings were then integrated into strategic discussions with facility administrators to formulate a tailored aquaculture training curriculum based on local needs and resources.

2. Theoretical Training

To establish a foundational understanding of catfish culture before practical activities, an initial theoretical training phase was conducted using interactive lectures combined with open Q&A sessions. Interactive counseling effectively builds baseline knowledge prior to hands-on practice, making it a critical component of human resource capacity-building programs (Mahary et

al., 2024). Delivered by the Aquaculture Study Program team from Universitas Muhammadiyah Gresik, the sessions were supported by presentation slides, training modules, and educational leaflets to facilitate participant learning.

The instructional materials covered the fundamental concepts of catfish aquaculture, the application of Good Aquaculture Practices (GAP), water quality management, probiotic utilization, and feed management. The implementation of GAP was emphasized as a core topic, as it represents the standard farming practice that ensures food safety, fish health, environmental responsibility, and business sustainability (Kepmen, 2007). Furthermore, participants were taught the critical role of water quality management in determining catfish growth and survival rates, alongside the use of probiotics to improve culture media quality, suppress organic matter accumulation, and enhance fish health (Amenyogbe, 2023; Maziyan et al., 2025). Feed management strategies were also presented to optimize feed efficiency and support maximum fish growth.

3. Hands-On Practical Training with Inmates

The practical session was conducted one week after the educational counseling using a learning-by-doing approach, where participants directly applied each step of catfish aquaculture under the guidance of the community service team. This experiential method aimed to enhance the technical skills of participants through direct practice, thereby ensuring optimal comprehension and application of the theoretical concepts previously taught. The practical curriculum encompassed pond preparation, water quality measurement and management, quality seed selection, stocking techniques, probiotic formulation, probiotic application to the culture media, and feed management tailored to each growth phase. Throughout the activities, the team provided direct instructions on proper operating procedures while mentoring participants at each stage to minimize errors and deliver a comprehensive learning experience.

In addition to practical execution, participants were trained to diagnose potential rearing issues on-site, including water quality shifts, appetite decline, and early disease indicators. Conducting these discussions at the ponds enabled inmates to directly connect theoretical concepts to field observations. This participatory training aimed to foster both conceptual understanding and practical technical competencies, empowering inmates with actionable skills for post-release self-reliance. The detailed schedule and components of the practical training are summarized in Table 1.

Tabel 1. Hands-On Aquaculture Training Modules for Inmates

Session	Practical Topics
1	Pond preparation and water quality measurement
2	Seed selection and stocking
3	Probiotic formulation and application
4	Feed management
5	Water quality and fish growth monitoring

6 Cultivation output evaluation

4. Mentoring and Assistance

The mentoring phase was conducted periodically throughout the catfish culture cycle to ensure that all rearing activities were properly executed by the inmates. The community service team carried out routine site visits to provide technical guidance, monitor program progress, and assist participants in resolving operational challenges encountered during the cultivation process. Mentoring activities encompassed water quality monitoring, fish growth and health assessments, feed evaluation, and the oversight of probiotic application in the culture media. Additionally, the team offered direct instruction on corrective measures for water quality fluctuations or early signs of fish health issues. Throughout this phase, participants were encouraged to discuss and consult on field challenges, allowing solutions to be applied immediately.

This hands-on mentoring aims to equip participants with the ability to manage catfish culture independently according to Good Aquaculture Practices (GAP) standards, thereby boosting their confidence as prospective fish farmers. Furthermore, continuous supervision provides a valuable feedback loop for the extension team to confirm that all participants have mastered and successfully applied the training material.

5. Evaluation

A comprehensive evaluation was carried out upon completing the initiative to assess overall goal attainment and measure the participants' technical proficiency in catfish aquaculture. Assessment methods included direct observation of inmate engagement during training sessions, hands-on evaluation of their technical execution, and interactive feedback sessions with both participants and detention center personnel. This approach provided valuable insights into the program's overall effectiveness while pinpointing operational bottlenecks encountered throughout the implementation.

The evaluation framework focused on key technical competencies, including fundamental catfish aquaculture concepts, water quality control, seed selection and stocking, probiotic preparation and usage, feeding regimes, and fish maintenance throughout the rearing period. Furthermore, soft skills were also evaluated, such as participant participation rate, group collaboration, and their readiness to utilize these technical skills as a foundation for post-release self-reliance.

These evaluation outcomes provide a foundation for the team to measure overall program success and formulate strategic recommendations for enhancing future aquaculture-based self-reliance programs at the Class IIB Gresik Detention Center.

6. Data Analyst

The data collected during the community service project were analyzed using a descriptive qualitative approach. The analysis was based on direct observations, documentation, group discussions, and mentoring records collected throughout the catfish farming training. The analyzed data included participant participation levels, comprehension of the materials, technical abilities in catfish culture, and various obstacles encountered during the training and mentoring process. Furthermore, the findings are presented in a descriptive narrative to illustrate the overall achievements of the program and the changes in participants' knowledge and skills following the training.

RESULT AND DISCUSSION

Inmate Problem Identification

Based on discussions with detention center officers (**Figure 1**), the results of the identification showed that the Class IIB Gresik Detention Center houses more than 500 inmates, but had never held fish farming training as part of its skill development program. As a result, the inmates lacked knowledge and skills in catfish cultivation techniques, including water quality management, seed selection, stocking methods, probiotic usage, and feeding management. However, fish farming is a productive activity that is relatively easy to implement, offers economic value, and has the potential to support food security programs within the detention center.



Figure 1. Problem identification discussion with detention center personnel

The results of the identification showed that the Class IIB Gresik Detention Center houses more than 500 inmates, but had never held fish farming training as part of its skill development program. As a result, the inmates lacked knowledge and skills in catfish cultivation techniques, including water quality management, seed selection, stocking methods, probiotic usage, and feeding management. However, fish farming is a productive activity that is relatively easy to implement, offers economic value, and has the potential to support food security programs within the detention center.

These findings served as the basis for designing training materials and methods tailored to the partner's needs. A preliminary needs assessment approach is essential to ensure that the community service program directly addresses partner challenges and improves implementation effectiveness. Conducting structured assessments before vocational training ensures that rehabilitation initiatives align with inmates' readiness and practical institutional requirements (George et al., 2025; Safitri et al., 2023). Furthermore, direct coordination with correctional authorities prior to activity execution is a crucial determinant in finalizing training materials, establishing participant criteria, and structuring effective mentorship strategies (Muamar & Rohayati, 2025; Syafitri et al., 2024). Addressing these skill deficits through targeted vocational programs in correctional settings is vital, as post-release employment barriers often increase the risk of economic vulnerability (Connell et al., 2023). Introducing structured aquaculture training, such as catfish farming, provides a scalable, low-capital framework that equips inmates with adaptable entrepreneurship skills suitable for post-release self-reliance (Budiantoro et al., 2024; Indriastuti, 2020). Therefore, the problem identification results in this study formed the foundation for designing extension materials, joint practical sessions, and catfish farming mentoring throughout the program.

Theoretical Training

The extension activity served as the initial stage of the catfish farming training program (**Figure 2**), aiming to enhance the inmates' fundamental knowledge prior to participating in the practical sessions. The extension was conducted interactively through presentations, discussions, and question-and-answer sessions, enabling participants to understand the basic principles of catfish farming while providing opportunities to raise questions and discuss issues related to aquaculture practices. A total of 15 inmates participated in the activity and demonstrated a high level of enthusiasm throughout the session, as reflected by their active engagement in discussions and the numerous questions they asked regarding catfish farming techniques.



Figure 2. Extension Session on Catfish Farming

The training materials covered the fundamental principles of catfish farming, the implementation of Good Aquaculture Practices (GAP), water quality management, probiotic application, the selection of high-quality fingerlings, and feed management. The session on Good Aquaculture Practices (GAP) was intended to equip participants with knowledge of farming techniques that produce healthy and safe fish while promoting environmental sustainability (Kepmen, 2007). In addition, water quality management and probiotic application were emphasized because these are critical factors influencing the growth, health, and survival of catfish. According to Amenyogbe (2023), the use of probiotics in aquaculture improves water quality, enhances feed utilization efficiency, and suppresses the proliferation of pathogenic microorganisms. Furthermore, proper probiotic administration directly optimizes culture media parameters and accelerates fish growth performance (Maziyan et al., 2025). Similarly, Mahary et al. (2024) reported that extension programs on the implementation of Good Aquaculture Practices (GAP) significantly improve participants' understanding of water quality management, the use of high-quality seed, feed management, and sanitation throughout the aquaculture production process.

Throughout the extension activity, the inmates demonstrated a strong interest in learning catfish farming techniques as an alternative vocational skill that could be developed after completing their rehabilitation program. The discussions covered not only the technical aspects of catfish farming but also managerial strategies and business opportunities associated with catfish production as a potential source of income (Budiantoro et al., 2024). The active interaction between the instructors and the inmates indicated that an interactive extension approach effectively enhanced participant engagement and learning receptivity in correctional social programs (Ibrahim et al., 2025). These findings are consistent with those of Dewi et al. (2024), who reported that extension programs combined with interactive discussions improved participants' understanding of water quality management and probiotic application in catfish farming. Therefore, the extension activity served as a crucial preparatory stage, providing the inmates with the fundamental knowledge required before engaging in hands-on catfish farming practices.

Hands-on Training with Inmates

Following the extension activity, the inmates participated in hands-on catfish farming practices at the aquaculture facility of the Class IIB Cerme Gresik Detention Center, which included a practical session on probiotic preparation (**Figure 3**). The practical training was conducted using an experiential learning-by-doing approach, in which participants not only observed the farming procedures but also actively engaged in every stage of catfish culture under the direct supervision of the community service team. This approach was adopted to enable the inmates to apply the theoretical knowledge acquired during the extension session in a real farming environment, thereby facilitating the development of technical skills through direct practical experience.



Figure 3. Hands-on Probiotic Preparation

The practical training encompassed pond preparation, water quality conditioning, the selection of healthy and uniform catfish fingerlings, stocking methods, probiotic preparation, probiotic application to the culture medium, and feed administration according to the nutritional requirements of the fish. Throughout the session, the community service team provided step-by-step guidance on proper technical execution, including strategies for minimizing fish stress during stocking, calculating appropriate probiotic dosages, and managing efficient feeding practices. The active involvement of the inmates across all stages reflected their strong enthusiasm for acquiring aquaculture competencies as valuable vocational skills to support their self-reliance and livelihoods upon release (Connell et al., 2023; Kurniawan et al., 2021).

The practical training also served as an effective experiential platform, enabling inmates to connect theoretical concepts with real-world aquaculture practices. Through direct hands-on experience, participants gained a deeper practical understanding of the critical role of water quality management, probiotic administration, and feed optimization in promoting catfish growth and survival. These findings are consistent with those of Dewi et al. (2024), who reported that field-based practical training combined with direct mentoring significantly improved participants' technical skills in water quality management and probiotic application. Furthermore, integrated hands-on training focusing on probiotic preparation and application directly enhances aquaculture management skills while improving fish growth performance and environmental health (Amenyogbe, 2023; Hamdillah et al., 2024; Maziyan et al., 2025). Similarly, Mahary et al. (2024) demonstrated that implementing Good Aquaculture Practices (GAP) through direct practical sessions is significantly more effective than theoretical instruction alone, as it empowers participants to execute each production stage in accordance with established standard operating procedures.

Technical Assistance

Based on the mentoring outcomes, the inmates demonstrated a high level of enthusiasm throughout the program (**Figure 4**). This was reflected in their active participation in observing pond conditions, asking questions, and engaging in discussions with the community service team regarding appropriate catfish farming techniques. Such a participatory approach provided the inmates with opportunities to gain hands-on learning experiences, thereby enhancing their understanding of the training materials. These findings are consistent with those of Dewi et al. (2024), who reported that mentoring on water quality management and probiotic application in catfish farming increased farmers' participation and improved their capacity to manage water quality, monitor fish growth, and apply probiotics appropriately.



Figure 4. Mentoring Activities with Inmates at the Catfish Culture Ponds

Throughout the mentoring process, the community service team also emphasized the importance of implementing Good Aquaculture Practices (GAP), particularly in maintaining water quality, using healthy fingerlings, applying efficient feeding strategies, and utilizing probiotics to support fish growth and health. Continuous mentoring enabled the inmates to receive immediate feedback on each stage of the aquaculture process, allowing technical errors to be identified and corrected promptly. Mahary et al. (2024) reported that training accompanied by continuous mentoring significantly improved farmers' knowledge and technical skills in implementing the principles of Good Aquaculture Practices (GAP), particularly in the areas of water quality management, sanitation, seed quality, feed management, and fish health.

In addition, the technical assistance focused on the practical preparation and application of probiotics as a key effort to maintain water quality stability during catfish culture. Hamdillah et al. (2024) explained that participatory mentoring in probiotic preparation enhances practical skills in utilizing local probiotics to decompose organic matter, improve culture media quality, and boost catfish culture productivity. Similar findings were highlighted by Amenyogbe (2023) and Maziyan et al. (2025), who stated that continuous monitoring and probiotic-based water quality management effectively optimize environmental conditions, control pathogen growth, and significantly enhance catfish survival and growth rates.

Evaluation

During the fish rearing phase, partial mortality occurred among the catfish fingerlings, likely triggered by heavy rainfall and unpredictable weather conditions. These weather changes caused fluctuations in water quality parameters-particularly temperature, pH, and dissolved oxygen concentration-thereby increasing stress levels in the fingerlings during the early culture phase. Water quality shifts caused by heavy rainfall can elevate ammonia toxicity and disrupt the ecological balance of the culture environment, negatively affecting catfish health and survival (Dewi et al., 2024). Furthermore, Amenयोगbe (2023) explained that water quality stability is a primary factor in successful aquaculture, emphasizing that continuous water management and probiotic application are necessary to minimize fish mortality risks driven by environmental fluctuations.



Figure 5. Evaluation of Catfish Aquaculture Results with Inmates

Despite partial fingerling mortality, the surviving fish successfully grew to market size—suitable for local consumption (pecel lele) averaging 12 fish per kg at harvest (**Figure 5**). This outcome demonstrates that the culture techniques implemented during the program effectively supported fish growth to an economically viable size. Mahary et al. (2024) stated that applying Good Aquaculture Practices (GAP), which encompass water quality management, quality seed selection, appropriate feeding regimes, and fish health control, plays a vital role in enhancing catfish farming success. Consequently, the training and mentoring program not only improved the inmates' technical knowledge and skills but also yielded consumable fish production that directly supports internal food security initiatives and practical skills development within the Class IIB Gresik Detention Center (Isyanto et al., 2024; Sulistijanti et al., 2020).

CONCLUSION

The community service program at the Class IIB Gresik Detention Center successfully enhanced the inmates' knowledge and skills in catfish aquaculture. Delivered through a learning-by-doing approach, the program guided participants through theoretical extension, hands-on practice, and continuous technical assistance. The inmates mastered core Good Aquaculture Practices (GAP), including water quality management, stocking techniques, feed optimization, and probiotic preparation. Despite environmental challenges caused by weather fluctuations during the rearing phase, the initiative yielded consumable, market-sized catfish averaging 12 fish per kilogram. This outcome directly supported internal food security initiatives within the facility. Ultimately, the program not only generated tangible aquaculture yields but also equipped justice-involved individuals with valuable vocational competencies and an entrepreneurial mindset essential for achieving self-reliance and successful social reintegration upon their release.

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