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Farmer-Led Trial on Itik Pinas-*Kayumanggi* Duck Production in Central Luzon, Philippines: Key Insights into Technology Extension

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Abstract

This study examines a farmer-led trial on Itik Pinas-*Kayumanggi* duck production in Central Luzon in the Philippines, highlighting how participatory approaches facilitated the project's evolution from a techno-demonstration into a full technology extension initiative. The project, implemented by Central Luzon State University (CLSU) with funding from the Department of Science and Technology's Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD), distributed 4,576 Itik Pinas (IP) *Kayumanggi* ducks to farmers in Central Luzon (Region III) in the Philippines, with the aim of evaluating the performance of this superior duck breed and enhancing farmer skills. In line with CLSU's commitment to providing high-quality services to its stakeholders, this assessment was specifically conducted to examine the project's implementation processes, outputs, and outcomes to identify key challenges and offer recommendations for optimizing the university's technology transfer initiatives. Data were analyzed descriptively using mean, percentage, range, and frequency distributions, with before-and-after comparisons to assess differences in outcomes. The project yielded 1,244,835 IP-*Kayumanggi* eggs and produced educational materials, including a booklet and four leaflets on best practices in duck farming. Training reached 80% of farmer-cooperators, resulting in improved farm productivity and income, as well as increased technical knowledge on flock management and egg production. Despite these gains, gaps were identified in extension services, particularly in follow-up support and farmer training, which hindered the full realization of the project's potential. The findings offered evidence-based insights into technology transfer initiatives and provided recommendations for enhancing sustainability and impact on agricultural extension programs.

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Introduction

Central Luzon State University (CLSU) is dedicated to becoming a premier institution in agricultural sciences, not just within the Philippines but across Southeast Asia. As a leading higher education institution, CLSU emphasizes the generation, advancement, and dissemination of specialized knowledge and innovative technologies to address critical regional and global issues. At the forefront of its mission are the goals of alleviating poverty, promoting

environmental sustainability, and advancing the principles of sustainable development. The university employs a strategic approach that integrates cutting-edge research, fosters local and international collaborations, and delivers high-quality education to tackle pressing challenges in agriculture, environmental conservation, and socio-economic development. In line with its mission, CLSU is actively engaged in transferring and extending agricultural technologies to its stakeholders to ensure their widespread adoption.

One of its flagship initiatives is a collaborative project with the Department of Science and Technology's Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD). From 2017 to 2021, CLSU spearheaded the evaluation of the Itik Pinas (IP) *Kayumanggi* — a genetically enhanced, crossbred duck — as part of the ITIK for LIFE Program. This program aimed to boost the livelihood (Delgado *et al*., 2003) of duck farmers in Central Luzon (Region III) and contribute to attaining food security. The initiative entailed the distribution of 4,576 IP-*Kayumanggi* ducks to selected farmers in Nueva Ecija, Bulacan, and Pampanga.

To measure the program's success and optimize the use of resources, the university conducted a comprehensive project assessment to evaluate the outcomes of this technology transfer intervention (Cavatassi & Mallia, 2018). The evaluation focused on determining whether the project met its intended outputs and outcomes, assessing improvements in farmers' technical capacities and socio-economic conditions, and identifying gaps in the extension process. This paper presents the assessment's key findings, highlighting successes and challenges while offering recommendations to further enhance CLSU's extension strategies for future technology-transfer initiatives.

Materials and Methods

A. R&D Framework Design

The evaluation of the project involved a conceptualization of an evaluation framework illustrated in Figure 1. This framework served as the project's roadmap for attaining its objectives. The inputs consisted of investments from the funding agency alongside counterpart funds provided by the University. The implementation process covered all activities conducted during the participatory trials—from pre-implementation to execution, monitoring, and evaluation.

Both the expected and actual outputs of the project were validated. Furthermore, the intended and unintended results of the intervention were assessed as outcomes of the extension projects, along with the issues and concerns that arose during project execution.

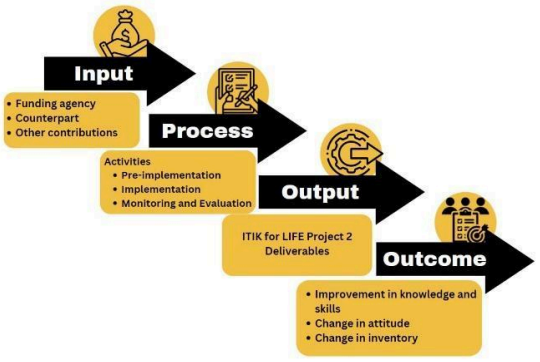

Figure 1. Project Evaluation Framework for IP-*Kayumanggi* Extension and Farmer Participatory Production Trials

B. Locale of the Study

The impact evaluation was conducted in three (3) provinces in Central Luzon (Region III), specifically in Nueva Ecija, Bulacan, and Pampanga. Table 1 shows the covered areas under this assessment.

Table 1. Implementation sites for the assessment

No.	Barangay	Municipality	Province
1	San Juan	San Jose City	Nueva Ecija
2	Plaridel	Llanera	Nueva Ecija
3	Sibul, Caaninaplahan	Talavera	Nueva Ecija
4	Villa Quizon, Sapang Cawayan, Cabisuculan	Science City of Muñoz	Nueva Ecija
5	Bahay Pare, Manga, Vizal San Pablo, Dulong Ilog	Candaba	Pampanga
6	Pinaod	San Ildefonso	Bulacan
7	San Roque	San Rafael	Bulacan

C. Respondents of the Study

Twenty (20) duck farmers in Region III served as the respondents of the impact evaluation. Ten (10) duck farmers were categorized as beneficiaries, while the other ten (10) were non-beneficiaries. Beneficiaries are duck farmers who became part of the participatory production trial under the Itik for Life Project 2 and received IP-*Kayumanggi* ducklings. On the other hand, non-beneficiaries are duck farmers from beneficiaries near barangays/cities who did not receive the intervention.

D. Data Source and Collection

Data were collected from primary and secondary sources. Preliminary data were collected through key informant interviews with project implementers and

surveys of randomly selected respondents and project beneficiaries, using structured questionnaires. Relevant secondary data obtained from the project proponents, which include a copy of the terminal report, project proposal, list of beneficiaries, data on the number of IP-*Kayumanggi* ducklings received by each farmer, and copies of project output, such as booklets and leaflets developed were also evaluated as part of the assessment. The project inputs, implementation processes, and outputs were obtained from these documents. A set of survey questionnaires was prepared to collect the required data for the assessment. It was pre-tested with the duck farmers of Cabisuculan, Science City of Munoz, and Caaninaplahan, Talavera, and was finalized before the actual gathering of data.

The assessment team facilitated data collection by conducting field visits to the selected duck egg farmer respondents. The project's beneficiaries were retraced based on the records provided, and field visits were done based on the farmers' availability. The primary data, which included the basic socio-demographic profile of the respondents, their production cost (such as farm inputs and other expenses), sales (quantity of fresh eggs and culls) were obtained. Moreover, 10 duck farmers from nearby barangays were also interviewed using the same structured questionnaire.

Figure 2. Itik Farm located at Bahay Pare, Candaba, Pampanga

E. Data Analysis

The collected data were analyzed descriptively using mean, percentage, range, and frequency distributions. The before—and—after scenarios were compared by comparing the difference of the obtained values. The data collected from the non-beneficiary respondents served as the study's counterfactual. This before–after comparison with a non-beneficiary counterfactual follows standard causal attribution strategies for impact evaluation (Rogers, 2014). The project was also assessed using descriptive and comparative analysis to determine its relevance, effectiveness, efficiency, and timeliness (Table 2) following standard development evaluation criteria (IFAD, 2015).

Table 2. Indicators used in assessing the performance of the project

Indicators	Analysis
Relevance	Conformity with the needs of the duck farmers. Attributes how the project addressed the problems and issues encountered by the duck farmers.
Effectiveness	Attainment of the project objectives
Efficiency	Duck farmer's satisfaction with the project's implementation
Timeliness	Timely execution and management of project activities

Results and Discussion

A. Project Background

In 2016, the Itik Pinas (IP) program introduced a genetically advanced breeder duck resulting from selective breeding of the Philippine mallard or Pateros duck. This initiative was led by DOST-PCAARRD in collaboration with the National Swine and Poultry Research and Development Center (BAI-NSPRDC). The goal was to improve the genetic quality of local duck populations.

The IP lineage consists of three genetic clusters, including two pure breeder strains, IP-Itim and IP-Khaki, and a terminal hybrid layer type, IP-*Kayumanggi*, obtained from crossing IP-Itim females with IP-Khaki males. The hybrid IP-*Kayumanggi* has shown improved egg production capabilities, exceeding traditional “mongrel” ducks with an average annual yield of 266 eggs. In addition, the eggs of the IP-*Kayumanggi* consistently weigh an average of 65 grams and demonstrate reliable egg-laying performance. The newly developed breed of Philippine mallard ducks addresses the issues of low and inconsistent egg production and product quality observed in the local mallard ducks in the country (Parungao, 2017).

Figure 3. IP-*Kayumanggi* ducks

The ITIK for LIFE Project 2 (2017-2021), spearheaded by CLSU, aimed to validate the egg-laying performance and egg quality of IP-*Kayumanggi* under commercial conditions in Region III (Julian *et al*., 2022), a prominent duck-producing area. The project aimed to establish breed standards and encourage the adoption of IP-*Kayumanggi* among local farmers to enhance duck egg production.

The technology trial with its starter and technical assistance component as an institutional support transformed the project into an extension program anticipated to yield outcomes and insights that can create impact, along with the emergence of scalable frameworks for sustainable duck farming.

B. Project Input

CLSU's College of Agriculture received a Php 6.35 million grant from the DOST-PCAARRD for the project that lasted three years and six months. The project's detailed financial breakdown is provided in Table 3.

In addition to the grant, the university allocated Php 503,500.80 from its internal budget as counterpart funding. This amount was strategically used to cover personnel salaries during the project's critical phases in the second and third years, ensuring the retention of key staff and smooth project execution.

Table 3. Budget allocation and utilization of the IP-*Kayumanggi* Project.

Year	Counterpart	DOST-GIA
Year 1	168,000.00	2,181,774.00
Year 2	181,250.40	2,923,879.25
Year 3	181,250.40	3,722,125.50
		193,649.23*
Total	503,500.80	6,348,392.79
Utilization		**96.95%**

**Unexpended budget during Year 3 implementation*

As a significant part of its commitment, CLSU set aside a 1,200-square-meter land area to develop the Itik Farm. This decision not only addressed the project's operational needs but also emphasized the university's investment in sustainable research infrastructure. This development was part of a broader strategy to enhance the CLSU research station's capabilities. The initial rehabilitation and equipment procurement were funded under DOST-PCAARRD's ITIK for LIFE Project 1 and subsequently integrated into Project 2 (the project being assessed), creating a more efficient operational model built on previous investments for better research outcomes. In addition, basic electrical and water utilities were also part of the agency's direct and in-kind contribution in support of the project implementation.

An analysis of financial resource utilization has revealed that 96.95% of the allocated funds were efficiently directed toward project objectives. This efficient utilization reflects the high standards of fiscal management and operational efficiency standards of the implementers. It also demonstrates effective collaboration between implementing and funding agencies, setting a standard for managing government-funded research projects in the agricultural sector.

C. Project Process

1. Pre-Implementation

a. Selection of Farmer-Cooperators

Before the IP-*Kayumanggi* commercialization trial, it was essential to carefully select farmer-cooperators. This step was crucial in identifying the duck growers who would serve as partners in ensuring that the trial's objectives could be met with precision and reliability, thereby maximizing the potential for successful outcomes.

A selection criterion was established, focusing on the farmers' experience and ability to manage 300-layer ducks. Existing farm practices and systems were also taken into consideration. Twelve duck farmers from Region III (Nueva Ecija, Bulacan, and Pampanga) were chosen based on a preliminary survey conducted by project implementors. These provinces are significant duck producers, with Central Luzon contributing 30.7% of the total duck production as of the third quarter of 2023 (PSA, 2023). The selected farmers met the criteria and agreed to participate in the performance trial of IP-*Kayumanggi*. A Memorandum of Agreement (MOA) was established between the farmer-cooperators and the implementing agency, outlining the roles and responsibilities of each party. Before the implementation of the participatory trials and capacity-building activities, the project team conducted orientation and engagement with community members to ensure active participation and shared understanding of the IP-*Kayumanggi* technology. Activities focused on social preparation and community organizing to build stakeholder commitment and ownership, which are essential components of effective rural development interventions (Mula & Sevilla, 2020). The farmers were responsible for raising the IP-*Kayumanggi* ducklings, with project implementers conducting field visits to monitor growth and laying performance, which was evaluated over a year.

b. *Socio-Demographic Profile of Respondents*

A survey was conducted among project beneficiaries, involving ten farmer-cooperators from Region III and a comparison group of ten duck farmers from nearby barangays who did not receive the intervention. Among the respondents, 90% were male, and

10% were female, indicating male dominance in duck farming. The average age was 55 years for beneficiaries and 53 years for non-beneficiaries, with most belonging to the older adult age group. The average household size was five members for beneficiaries and four for non-beneficiaries. These gendered and household-based livelihood patterns reflect the multiple productive and reproductive roles described in the Moser Gender Analysis Framework (Ludgate, 2016). A majority of the respondents were farm owners whose primary source of income was *itik* (local name referring to native mallard duck) farming. The employment status showed that 30% were employed, 70% were self-employed. In terms of educational attainment, 40% of beneficiaries completed secondary education, while 60% of non-beneficiaries finished college.

The average gross monthly income was Php 155,000 for beneficiaries and Php 45,400 for non-beneficiaries. Experience in duck farming was a key selection criterion, with most beneficiaries having over ten years of experience while non-beneficiaries had less than ten years. Family influence was a common factor in their decision to pursue duck farming, which is widely adopted in their area. The average farm size for beneficiaries was 16,549.1 sqm, compared to 1,328 sqm for non-beneficiaries, with some farmers also engaged in other livestock and crop production.

2. Implementation

Capacity Building and Preparation of Facilities, Equipment, and Supplies

The project started by organizing training sessions and seminars at CLSU or on the beneficiaries' farms to improve the knowledge and skills of duck farmers in Itik-Pinas management. While appropriate production practices were discussed, farmers were not required to strictly follow the prescribed management practices during implementation.

The necessary equipment, facilities, and supplies were prepared. The IP-*Kayumanggi* eggs used for the commercialization trial were provided by a certified multiplier farm identified by the proponents. The brooding process took place at the university's established itik farm and research station. The crucial brooding period, providing early care, lasted for three to four weeks. During this process, a low mortality rate of only 2.66% was observed, likely due to the proximity of the research station to the duckling supplier and the effective management practices employed. The ducklings were brooded in flat deck cages, initially fed minimally for the first three days, followed by ad-libitum feeding of commercial feeds until they reached four weeks of age.

Quality checks were conducted upon hatching to ensure the health of the ducklings, with only about 5% showing impurities, but were still included in the distribution. A total of 4,576 IP-*Kayumanggi* ducklings were raised and distributed in two batches, with each farmer receiving 280 to 400 ducklings. The distribution was staggered due to the limited capacity of the university's duck research station. Prior to the distribution of IP-*Kayumanggi* ducklings and starter set, farmer cooperators were briefed on proper management practices for IP-*Kayumanggi* production. They were instructed to maintain detailed records, including egg count, mortality rates, feed consumption, and other key observations.

Monitoring forms were provided to facilitate tracking of the progress of the commercialization trial. In addition, the project provided starter feeds to the farmers before distributing the ducklings. The project provided starter feeds to the farmers before distributing the ducklings. All beneficiaries confirmed receiving the starter set, and some even reported receiving additional feed assistance during the growing and laying periods. Farmers who lived closer to the implementing agency received more feed assistance compared to those in Bulacan and Pampanga. The majority of the beneficiaries (60%) expressed that the starter set "greatly helped" during the project implementation.

The commercial trial took place from July 2018 to March 2019. Before distribution, thorough coordination with farmer-cooperators was ensured, as they were required to provide appropriate shelters, feeders, and waterers. To minimize transportation stress, the ducklings received electrolytes before travel, were placed in spacious plastic crates, and transported at night to reduce heat stress. The distribution process was completed within a day per batch, resulting in minimal mortalities during travel, which was significantly lower compared to those occurring under the farmers' management.

3. Monitoring & Evaluation

a. *Growing Period*

The IP-*Kayumanggi* farm trials were closely monitored through biweekly field visits by project proponents and research assistants. The farming systems were recorded and categorized based on housing and feeding practices. Most farms used a semi-confinement system with restricted feeding of commercial feeds, allowing ducks to graze outdoors during the day and be confined at night, receiving minimal commercial feeds to reduce expenses. Farmers filled out monitoring forms documenting daily mortality and feed consumption, and the project team regularly assessed the ducks' condition. Additionally, the body weight of 10% of the bird population on each farm was recorded during each monitoring period.

Farmers received technical assistance when necessary, and any issues encountered during implementation were promptly addressed.

b. *Laying Period*

During the laying period, most farmer-cooperators adopted a complete confinement system coupled with ad libitum feeding of commercial feeds. This system provided the highest egg production rates, making it the most effective approach for raising IP-*Kayumanggi* based on the implementer's data. Egg quality and components were also evaluated during this stage. Every two weeks, 30 eggs were collected and purchased from the farmer-cooperators. Monitoring forms, which included records of daily egg collection, mortality, and feed consumption, were also gathered. The monitoring period lasted one year and concluded once all necessary data had been collected for evaluation.

Figure 4. Harvested eggs from a farmer cooperators' farms

D. Project Outputs

The deliverables generated by the project were validated as an essential component of the assessment process. The enumerated outputs of the commercialization trial are as follows:

1. Products

A total of 4,576 IP-*Kayumanggi* ducklings were distributed to selected farmer-beneficiaries in Region III, representing 17.32% of the total number of IP ducklings provided to all farmer-cooperators of the Itik for Life program across different regions of the country. This distribution provided the basis for assessing adoption and productivity outcomes. In total, the project also produced 1,244,835 IP-*Kayumanggi* eggs.

Informative materials including a booklet and leaflets on duck management were developed to support knowledge dissemination and evaluate their impact on farmer practices. The leaflets covered topics such as Duck Housing (*Pabahay ng Itik*), Growing Ducks (*Pag-aalaga ng Palakihing Itik*), Caring for Breeding Ducks (*Pag-aalaga ng Paitlugin na Itik*), and Rearing Ducklings (Pag-aalaga ng Seho). Moreover, the project contributed to academic research by supporting a student in developing a thesis titled "Effects of Partially Replacing Commercial Feeds with Varying Levels of Madre de Agua (Trichantera gigantea) on Growth Performance of Mallard Ducks."

This study offers valuable insights into alternative feeding strategies, potentially reducing costs and promoting sustainability in duck farming. These materials not only disseminate crucial technological advancements but also serve as essential references and guides for duck farmers and other stakeholders in the Itik Pinas community, facilitating improved duck farming practices and outcomes.

2. People and Services

The project capacitated 12 duck farmers by providing comprehensive training and hands-on experience in Itik Pinas-*Kayumanggi* production, providing a foundation to assess changes in their knowledge, skills, and management practices. The implementing agency also extended technical assistance to a wide range of stakeholders through a series of seminars and training sessions focused on Itik Pinas production. This comprehensive approach ensured that knowledge and skills were disseminated effectively, benefiting not only the participating farmers but the broader community as well.

3. Partnership

For the Region III participatory trial, twelve (12) Memoranda of Agreement (MOA) were formed between the implementing agency and selected farmer cooperators. The agreement details each party's roles and responsibilities in the project's conduct to ensure the successful execution and completion of the project.

E. Project Outcomes

Upon the successful completion of the project, a comprehensive assessment was conducted to quantify and document the range of intended and unintended outcomes that emerged as a result of the various interventions and deliverables implemented throughout the project's duration. The assessment revealed a series of significant outcomes attributable to the project.

1. Improvement in Knowledge and Skills

The project aimed to improve the knowledge and skills of farmer cooperators and other stakeholders in

IP-*Kayumanggi* production. Based on the survey, eight out of the ten farmer cooperators participated in the training, while two could not recall attending it. However, these two farmers were informed about the project's details and the management of IP-*Kayumanggi* before implementation. Despite not attending formal training, all farmers, including the two who missed it, had prior experience raising mallard ducks and were familiar with the management practices discussed in the training.

The training was well-received by the farmers, with 80% who found it beneficial for improving their knowledge and skills in duck raising, especially in managing IP-*Kayumanggi.* All farmers indicated that they were able to apply the knowledge gained in their farming practices, which was crucial for the success of the project. Moreover, 60% of the respondents shared the knowledge and skills they acquired with other duck farmers in their community, contributing to the dissemination of information and technology. These patterns of training uptake and knowledge diffusion mirror the core impact indicators of Philippine community extension programs (Salazar, 2020; Llenares & Deocaris, 2018). Such community-level diffusion of skills is a key indicator of inclusive and gender-responsive impact in agricultural interventions (Peletz & Hanna, 2019).

For half (50%) of the respondents, this project was their first experience in managing Itik Pinas. They appreciated the opportunity to learn new skills and knowledge, which they believed could enhance their duck farming capabilities. Although some farmers were initially hesitant to fully adopt the new technology, the intervention provided valuable insights into the potential benefits of IP-*Kayumanggi* production and sparked discussions on areas that may require further improvement.

2. Changes in Attitude

The project influenced farmers' perceptions of IP-*Kayumanggi* farming, as reported by the participating farmers. Beneficiaries rated statements regarding the intervention on a scale from 1 (do not agree) to 4 (extremely agree), with an average mean score of 3.39, corresponding to a "moderately agree" descriptive rating. Their involvement in the project resulted in a positive shift in their views on IP-*Kayumanggi* farming, boosting their confidence and motivation to participate in its production. Most of the farmer-cooperators recognized the potential of venturing into duck farming with this innovative breed of mallard duck, showing keen interest in setting up their own IP-*Kayumanggi* farms in the future. This enthusiasm demonstrates the perceived promise of IP-*Kayumanggi* farming as a profitable agricultural venture.

However, despite the overall positive feedback, some farmers also expressed dissatisfaction with the technology. They highlighted specific areas that, in their view, needed further improvement to fully meet their expectations. This feedback emphasizes the importance of ongoing development and refinement in the technology to ensure that it can fulfill its full potential and meet all user needs.

3. Changes in Inventory

The project resulted in changes to the duck inventory, particularly for the participating farms. The distribution of IP-*Kayumanggi* ducklings increased the flock size on each farm. Although the number of IP-*Kayumanggi* ducks received by each farmer was relatively small compared to their existing mallard ducks, it still provided an additional source of income.

Before the project, eight farmers raised local mallard ducks, while two raised IP-*Kayumanggi*, with an average flock size of 5,775 and 5,500 heads, respectively, during the project, each farmer-cooperator received 280 to 400 heads of IP-*Kayumanggi*, which were added to their existing flock. However, during the assessment, it was found that four farmers were no longer raising mallard ducks due to financial difficulties caused by animal disease outbreaks. Only one farmer continued raising IP-*Kayumanggi*, as most preferred to stick with their local mallard ducks.

ECONOMIC ANALYSIS ON VENTURING INTO IP-*KAYUMANGGI* PRODUCTION

The assessment examined how adopting IP-*Kayumanggi* production impacted farmers' incomes compared to their income using native duck breeds and methods. This income comparison was undertaken against the backdrop of national duck egg production trends and market conditions in the Philippines (PSA, 2020). The analysis used data on farm production, sales, and expenses from participating farmers, including revenue from egg sales, culled birds, and empty feed bags, as well as a breakdown of expenses such as fixed costs, variable costs, and labor expenses.

The study found varying economic results among farmers who adopted the IP-*Kayumanggi* production method. The financial performance of IP-*Kayumanggi* and Local Mallard Duck (LMD) was evaluated over three phases, as depicted in Figure 5. Prior to implementation, both groups demonstrated strong sales, with IP-*Kayumanggi* earning ₱2,680.87 and LMD ₱1,757.52, resulting in positive net incomes of ₱612.35 and ₱267.52, respectively. During the commercialization trial,

IP-*Kayumanggi*'s sales decreased to ₱1,770.00, and expenses increased significantly to ₱1,863.94, resulting in a net loss of ₱93.94. On the other hand, LMD maintained sales at ₱1,757.52 with stable expenses, leading to a positive net income of ₱329.57. After the trial, or during the assessment phase, both groups were able to increase their sales, with IP-*Kayumanggi* generating ₱3,269.54 and LMD ₱2,629.40. Despite higher expenses, IP-*Kayumanggi* achieved a net income of ₱737.18, while LMD recorded ₱124.17.

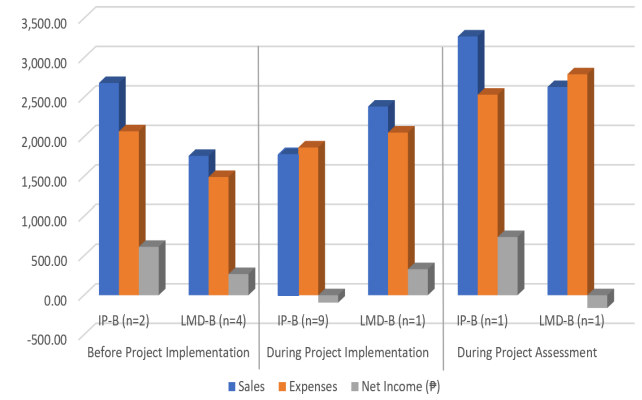

Figure 5. Cost and return analysis for duck production per chick

Despite facing financial challenges, farmer cooperators who achieved positive net income highlighted the potential profitability of using the technology, particularly when managed effectively. However, after the project, only one out of the ten farmer cooperators continued with IP-*Kayumanggi* production, indicating varying economic viability for individual farmers. It's important to acknowledge that the presented data may be influenced by farmers' recollections and incomplete farm records, which could impact the reliability of the analysis.

Figure 6. Salted eggs produced from IP-*Kayumanggi*

The study also explored the potential for higher returns through processing duck eggs into value-added products like salted eggs and balut – a traditional Filipino street food eaten from the shell with a partially developed duck embryo (Figure 6). Although these products offered promising earnings, many farmers preferred selling fresh eggs due to the additional labor involved in processing.

Another assessment finding highlights the difference in marketing strategies of duck farmers. Large-scale farmers sell their products directly to buyers, while smallholders focus on local sales, impacting both income and market reach. This disparity underscores the impact of operational scale on farmers' strategies and economic results.

ISSUES AND CONCERNS AFFECTING SUSTAINABILITY

Out of the ten farmer-beneficiaries, six are still involved in duck farming. However, only one farmer continues to use the IP-*Kayumanggi* breed, as most prefer local mallard ducks. The reluctance to widely adopt the IP-*Kayumanggi* breed can be attributed to the high costs of acquiring ready-to-lay (RTL) IP breeds and the observation that their egg production rates are comparable to those of local ducks. Moreover, the claims about the production benefits of using IP technology, specifically the use of the IP-*Kayumanggi* breed, are met with skepticism by the farmers. Nevertheless, the one farmer who continues using the IP breed argues for its superior performance, provided the ducks are sourced from reputable multiplier farms. He credits his success to thorough research and expertise in feed formulation. On the other hand, four beneficiaries have given up duck farming altogether due to financial difficulties and the impact of bird flu outbreaks. These individuals have subsequently switched to other agricultural or business ventures.

The project faced several challenges, including delays in gathering data, the complexity of assessing economic impacts due to the farmers' diverse management practices, and the burden of high feed costs. Additionally, the farmers encountered issues related to commitment, suboptimal egg production, and constraints on available pasture land. Some participants highlighted the labor-intensive nature and high costs of raising IP ducks.

RECOMMENDATIONS TO ENHANCE ADOPTION AS PERCEIVED BY FARMERS

To enhance the adoption of agricultural innovations that are primarily aimed at benefiting farmers, it is crucial to integrate feedback from farmer collaborators. This approach ensures that the technology is refined and made more applicable to their needs. The project has gathered specific suggestions from these farmer cooperators to improve the adoption of IP-*Kayumanggi* in the region. These suggestions are aimed at making the

technology more user-friendly, practical, and effective for the local farming community:

1. Additional Assistance. Farmer advises that more assistance should be provided to them as farmer-cooperators of the study, as they can not afford to shoulder most of the expenses. During the project's implementation, most farmers raised local mallard ducks. The IP-*Kayumanggi* was introduced with the existing ducks on each farm. Based on the monthly income of the farmer-cooperators, most can sustain the project; however, as people in the business, they are also weighing the benefits against the expenses from the project.
2. Continue the program to increase the acceptance of Itik Pinas among duck farmers. Many farmers still need convincing of the claims about its production performance. Farmers suggest that similar projects should be conducted with more participants to encourage more farmers to adopt the technology
3. Improve the genetics of IP Duck. Farmers propose enhancing the genetics of the Itik Pinas duck by introducing genes from other duck breeds from different countries. Many farmers are skeptical about the Itik Pinas because they believe it is similar to the local mallard ducks and that its performance has not been improved using genes from foreign breeds.
4. Involve stakeholders in the program development. Farmers suggested that they should be consulted before conducting studies regarding mallard ducks. Since most of them have been in the duck industry for many years, including them in the planning might also improve project implementation.

RECOMMENDATIONS TO ENHANCE TECHNOLOGY TRANSFER

The study also outlines key strategies to enhance the extension of technology, drawing on the insights gained from this assessment. These strategies are designed to not only encourage the initial uptake of technology but also to ensure its continued use and integration into existing systems and practices:

1. The stakeholders' involvement in planning different projects and programs could help enhance the implementation of university extension activities. Stakeholders' insights could make extension services more suitable to target audiences' needs. This would allow adjustments to be made and needed improvements to be addressed. Furthermore, it could result in a smooth implementation and minimize future problems.
2. Ensure the stakeholders' total commitment to the project or program. This will guarantee that the resources provided to stakeholders will result in benefits. It is important to improve the selection criteria for identifying beneficiaries. Implementing a needs-based assessment and conducting baseline surveys are critical steps. These methods evaluate the potential of beneficiaries to sustain and fully utilize the benefits over time, ensuring a long-lasting positive impact from the project or program.
3. Enhance farmers' leadership skills through leadership development training. This will help improve farmers' competencies in managing their farm enterprises. Farmers also significantly influence others in their community. Sharing their knowledge and skills with others could increase the awareness and adoption decisions of community members.
4. Provide farm record management training. Educating farmers about the importance of proper record-keeping can help them plan and make more effective farm decisions.
5. Conduct intensive training on alternative resource management and utilization. Improve farmers' knowledge of alternative feed management. Teach them the advantages of incorporating other local alternative feeds, which could lessen feed expenses and increase income.
6. Collecting farmers' feedback could improve extension activities. It would help determine the issues and concerns encountered and formulate alternative approaches that could address the identified problems.
7. Assessing farmer skills and knowledge after the project implementation could help monitor the intervention's impact.
8. The stakeholders should be instilled with the practice of giving back to the community. Farmers' involvement in the community could help increase other people's awareness of the technology.

Conclusion

The project successfully demonstrated the IP-*Kayumanggi* technology, offering local commercial mallard duck farmers an alternative to boost their income. Despite its success, the adoption of this technology varied among farmers due to differences in farming practices, which in turn affected their financial outcomes. Notably, while some farmers achieved higher revenues, others faced financial setbacks. These losses were primarily attributed to

two factors: the low egg production rates of the IP-*Kayumanggi* and the substantial costs associated with high feed consumption.

The economic analysis revealed that most of the farmer cooperators incurred losses from the project. One critical issue was the varying amounts of feed consumed by the ducks across different farms. It is important to highlight that most farmers depend on commercial feeds, which are a major expense in poultry production. Consequently, providing the ducks with more feed than necessary not only increased farm expenses but also reduced profitability.The challenges outlined can be effectively mitigated by following the IP-*Kayumanggi* production strategies developed by the innovators of this technology.

By implementing best practices for Itik Pinas production, such as adopting recommended farming techniques and optimizing feed consumption, farmers can significantly reduce operational costs while increasing their income. This approach not only enhances the economic viability of the technology but also makes it more attractive to a broader range of farmers, encouraging widespread adoption and ultimately leading to improved productivity and sustainability in farming practices.

Ethical Statement

The study was conducted in accordance with ethical guidelines for research involving human participants. All farmer participants provided informed consent prior to participating in interviews and surveys. No personal identifiers are reported, and all data are treated confidentially to ensure the privacy and rights of the participants.

Conflict of Interest Statement

The authors declare no conflict of interest related to the conduct and publication of this research. All procedures followed were in accordance with institutional and ethical standards, and there were no financial or personal relationships that could have influenced the outcomes of this study.

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Declaration of Generative AI and AI-Assisted Technologies

This work was prepared entirely by the author(s) without the use of generative AI or AI-assisted technologies.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions

MCMF: Supervision, Project Administration, Writing - Review & Editing; **JRGF:** Methodology, Supervision, Project Administration, Writing - Review & Editing; **MEMO:** Conceptualization, Supervision, Writing - Review & Editing; **HKGH:** Investigation, Writing - Review & Editing;, Visualization; **JNP:** Formal Analysis, Financial Analysis, Data Curation; **JMS:** Investigation, Data Curation; **JTG:** Investigation, Data Curation; **SMFC:** Technical Review.

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References

Cavatassi, R., & Mallia, P. (2018). *Impact assessment report: Livestock and Pasture Development Project.* IFAD, Rome, Italy. https://share.google/PbE4P0ZkjFuCHuCIj

Delgado, C. L., Narrod, C. A., & Tiongco, M. M. (2003). *Implications of the scaling up of livestock production in a group of fast-growing developing countries. In Livestock and livelihoods.* International Food Policy Research Institute. https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/94714

International Fund for Agricultural Development. (2015). *Evaluation manual* (2nd ed.). International Fund for Agricultural Development. https://www.ifad.org/en/web/knowledge/-/publication/evaluation-manual-second-edition

Julian, J. K., Velasco, V. V., & Mendoza, J. R. (2022). *Project 2 – Evaluation of the production performance and egg quality of IP-Kayumanggi in selected duck egg producing regions*

of the Philippines [Unpublished manuscript]. Department of Animal Science, College of Agriculture, Central Luzon State University, Science City of Muñoz, Philippines.

Ludgate, N. (2016). *Moser gender analysis framework (Info sheet: Common gender analysis tools).* INGENAES. https://ingenaes.illinois.edu/wp-content/uploads/ING-Info-Sheet-2016_09-3-Moser-Triple-Role-Framework-Ludgate.pdf

Llenares, I. I., & Deocaris, C. C. (2018). Measuring the impact of a community extension program in the Philippines. *Malaysian Journal of Learning and Instruction*, *15*(1), 35–55.

Mula, M. G., & Sevilla, I. K. M. (2020). *Special Area for Agricultural Development (SAAD) program.* SAAD National Program Management Office.

Parungao, A. R. M. (2017). *Itik Pinas: Development, promotion, and utilization in building rural enterprises.* Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development – Department of Science and Technology. https://pcaarrd.dost.gov.ph/index.php/quick-information-dispatch-qid-articles/itik-pinas-development-promotion-and-utilization-in-building-rural-enterprises

Peletz, N., & Hanna, K. (2019). *Gender analysis and impact assessment: Canadian and international experiences.* Canadian International Resources and Development Institute. https://cirdi.ca/resource/gender-analysis-and-impact-assessment-canadian-and-international-experiences

Philippine Statistics Authority. (2020). *Duck egg situation report, January to March 2020 (Special release No. 2020-138).* https://psa.gov.ph/content/duck-egg-situation-report-january-march-2020

Philippine Statistics Authority. (2023). *Duck situation report, July to September 2023.* https://psa.gov.ph/content/duck-situation-report-july-september-2023.

PSA (2020). Special Release: *Duck Egg Situation Report January to March 2020.* Reference No. 2020-138.

Rogers, P. (2014). *Overview: Strategies for causal attribution (Methodological Briefs: Impact Evaluation 6).* UNICEF Office of Research.

Salazar, T. B. (2020). An impact study of the community extension programs in a state college in the Philippines. *Anthropologist*, *29*(1–3), 112–120. https://doi.org/10.31901/24566322.2020/29.1-3.1129