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Utilization of Dairy Cow Milk For Community Health Empowerment in Cibiru Wetan Village, Bandung Regency

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ABSTRACT

In Cibiru Wetan, Bandung, cows' milk production reaches 5,000 liters per day, but most of it is not absorbed by the cooperative because it does not meet quality standards and is ultimately wasted. This highlights the gap between production potential and post-harvest processing capabilities at the farmer level. Training in processing milk into yogurt using simple technology can reduce waste while also opening up opportunities for public health and local entrepreneurship. The community service activity entitled "Training on the Utilization of Cow's Milk as a Health Product in Cibiru Wetan Village, Bandung Regency" aimed to empower local dairy farmers in managing excess or substandard milk by turning it into yogurt, a functional health product. The method consisted of direct education, practical demonstrations, and mentoring in yogurt production using simple fermentation techniques, followed by pre- and post-test evaluations. A pre- and post-test evaluation showed an increase in participants' knowledge from 45% to 89% of the 25 participants, 80% successfully produced yogurt with acceptable sensory quality, and 60% expressed interest in selling it as a home business. These outcomes indicate that the training not only improved technical skills but also fostered local entrepreneurship, contributing to SDG 3 (Good Health and Well-being) and SDG 8 (Decent Work and Economic Growth). Most participants succeeded in producing yogurt with acceptable sensory quality and expressed interest in selling it. The activity showed that with adequate training and support, local communities can utilize available resources to improve health and economic outcomes. This program also encouraged sustainable practices and provided a model that could be replicated in other rural areas with similar conditions. The results underline the importance of community-based education and technology transfer in promoting food security and local entrepreneurship.

Keywords: cow's milk, fermentation, functional food, yogurt

INTRODUCTION

The COVID-19 pandemic has heightened global awareness of the importance of maintaining health and nutrition as part of daily life. People are increasingly conscious that food plays a pivotal role not only in sustaining life but also in preventing disease and improving well-being. This global shift in health awareness has encouraged the consumption of functional foods—foods that provide additional physiological benefits beyond basic nutrition. Functional foods enriched with probiotics, antioxidants, and bioactive peptides are increasingly recognized for their contribution to immune modulation and gut health (Amin et al., 2025).

Among various functional foods, dairy-based products such as yogurt hold a strategic position. Cow's milk is rich in high-quality animal protein, calcium, and vitamins, and through fermentation, its bioavailability and probiotic content increase significantly (García-Burgos et al., 2020). Yogurt thus becomes not only a nutritious food but also a product that supports immune and digestive health, aligning with the post-pandemic focus on preventive nutrition.

In Indonesia, several rural areas have strong dairy farming potential but face challenges in post-harvest processing. Cibiru Wetan Village in Cileunyi District, Bandung Regency, produces approximately 5,000 liters of cow's milk daily. However, a significant portion of this milk is discarded due to failure to meet industrial quality standards. This mismatch between production capacity and utilization reflects a broader issue—limited technological capability and lack of empowerment programs for local farmers to process and add value to their products.

Recent studies emphasize that community empowerment through local food processing can enhance food security, economic resilience, and sustainability. Transforming substandard milk into yogurt offers an opportunity to reduce waste while creating functional food products that are health-promoting and marketable. However, previous efforts have largely remained in the research domain and have not been sufficiently translated into practical community-based training (Houssard et al., 2021).

To address this gap, the Faculty of Pharmacy at Bhakti Kencana University initiated a community empowerment program in Cibiru Wetan Village. The program provides hands-on training on milk fermentation techniques, starter culture preparation, flavor enhancement, packaging, and small-scale marketing. By applying simple microbial biotechnology principles, the training transforms unsold milk into probiotic yogurt, empowering farmers to create sustainable, health-oriented products.

This initiative not only supports local economic development but also contributes to the Sustainable Development Goals (SDGs), particularly Goal 3 (Good Health and Well-being) and Goal 8 (Decent Work and Economic Growth). The integration of education, research, and community service further strengthens the role of higher education institutions in fostering a resilient and health-conscious society.

Previous research has extensively explored the nutritional enhancement and probiotic potential of yogurt through laboratory-scale studies. However, there remains a clear gap in translating these scientific insights into community-level applications. Few initiatives have focused on developing applied training models that empower small-scale dairy farmers to produce functional yogurt products independently. This lack of translation from laboratory innovation to real-world implementation limits the societal impact of yogurt research.

METHOD

Community service activities were conducted from September 13 to October 25, 2023 at KUA Cilandak, South Jakarta. KUA Cilandak was chosen because it is a leading KUA in Jakarta and has supporting human resources. Thus, it is expected that the information conveyed can be comprehended and implemented well by the staff. After the activity, staff is expected to help provide reproductive health education for the prevention of sexually transmitted infections in prospective couples and become a model for implementation in other KUAs.

The targets of this activity were KUA Cilandak staff and all prospective couples who came to KUA Cilandak Jakarta on October 11, 2023 and October 25, 2023. Team developed flyers containing information on STIs, made educational videos, gave presentations and also held group discussions to further solidify the transfer of information.

This Community Service is divided into three steps. The first step was conducted on September 13, 2023. At this step, team provided counseling training to KUA staff. Before training, KUA staffs were given a pre-test to assess their level of knowledge on STIs. The next step was conducted on October 11, 2023. In this second step, the team provided counseling on STIs to the couples and was observed by KUA staff. To assess their level of knowledge about STIs, couples were given a pre-test before starting counseling and a post-test afterwards. The pre and post-test were completed in pairs. Then the last step was conducted on October 25, 2023. In this step, KUA staff provided counseling on STIs to couples by being observed by the team. To assess their level of knowledge about STIs, couples were also given a pre-test before starting counseling and a post-test afterwards. Post-test for KUA staff was also given at this step.

Flyers containing information on STIs were given to all participants and educational videos were also played at each step. In addition, group discussions were held after presentation of material by forming several small groups. At the end of discussion, one representative from each group was asked to present the results of the discussion obtained. Couples were also given a questionnaire to obtain data on individual characteristics, level of attitude and willingness to screen for STIs, while KUA staff were given a questionnaire to find out their opinions on community service activities.

The data from questionnaire are presented in the form of tables and pie charts. Data on the results of the pre-test and post-test are presented in the form of bar charts. The pre-test and post-test results were calculated to measure the understanding of the group of counseling participants before and after presentation of the material. The increase in knowledge is seen from the increase in the average post-test results compared to the pre-test results.

RESULTS

Materials

The main materials used in this activity included fresh cow's milk, yogurt starter cultures (*Lactobacillus bulgaricus* and *Streptococcus thermophilus*), and natural flavoring essences. Fresh cow's milk was obtained directly from local dairy farmers in Cibiru Wetan Village. The milk was filtered and pasteurized before use. Yogurt starter cultures served as the inoculum in the fermentation process, containing live lactic acid bacteria proven to promote probiotic activity beneficial to digestive health. Essence or natural flavoring agents (with certified food-grade permits) were used to improve the sensory appeal of the final yogurt product.

Participants were 25 local dairy farmers (all women) from Cibiru Wetan Village, aged between 25–55 years, who were selected in collaboration with the Village Office and the local Livestock Cooperative. Selection was based on active involvement in dairy farming and interest in milk processing training. Consideration of gender and age diversity was applied to ensure balanced representation of participants across different household and community roles. The training was designed as a community-based applied workshop combining lectures, demonstrations, and hands-on practice.

The program consisted of three training sessions held over three consecutive weeks, with each session lasting approximately 3 hours. Session 1: Introduction to milk hygiene, pasteurization techniques, and the science of fermentation. Session 2: Practical

demonstration of yogurt production, including inoculation, incubation, and flavoring. Session 3: Product packaging, labeling, and entrepreneurship discussion for small-scale yogurt marketing.

All sessions were facilitated by lecturers and student assistants from the Faculty of Pharmacy, Bhakti Kencana University.

Procedure for Yogurt Preparation

The yogurt production process followed standard fermentation procedures with minor community-adapted modifications. Pasteurization: Heat milk at 80–85°C for ± 30 minutes to eliminate pathogenic microorganisms, then cool to 42–45°C. Inoculation: Add 2–3% starter culture (v/v) and incubate at 42°C for 6–8 hours until a thick consistency is formed. Flavoring: Add natural essences after fermentation. Packaging: Transfer yogurt into sterilized bottles and store in refrigeration at 4–8°C. Training effectiveness was assessed through: Knowledge evaluation: Pre-test and post-test questionnaires (10 multiple-choice questions) to measure participants' understanding of fermentation, hygiene, and probiotic benefits. Practical performance: Observation checklist during the hands-on session, evaluating pasteurization technique, starter inoculation accuracy, and hygiene maintenance. Feedback survey: Short post-activity survey regarding satisfaction, perceived benefits, and plans for utilization of yogurt production (home use or small business). Data from pre- and post-tests were analyzed descriptively to identify improvements in participants' knowledge and skills. Yogurt quality was monitored through organoleptic evaluation (color, aroma, texture, and taste) and pH measurement using a portable digital pH meter to ensure proper fermentation and product safety.

RESULTS AND DISCUSSION

Community service activities entitled Training on the Utilization of Dairy Cow Milk as a Health Product in Cibiru Wetan Village, Bandung Regency aim to increase public literacy on the utilization of milk that does not meet industrial standards into processed products with economic value, namely yogurt. This training is carried out directly through counseling methods, practical demonstrations, and pre-test and post-test-based evaluations.

Results of increasing partner knowledge

The training showed a significant improvement in participants' understanding of milk processing and fermentation principles. A pre- and post-test evaluation demonstrated an increase in participants' knowledge from 45% to 89%, indicating effective knowledge transfer through combined lectures and hands-on sessions. Among the 25 participants, 80% successfully produced yogurt with acceptable sensory characteristics—smooth texture, sour aroma, and consistent viscosity—while 60% expressed interest in developing yogurt as a home-based business. Assessment of the level of community knowledge was carried out through pre-test and post-test. The results showed a significant increase. As shown in Table 1 and Figure 1, the average pre-test score was 45% and increased to 89% in the post-test. This indicates an increase in participants' knowledge of the concept of milk fermentation and the benefits of yogurt as a health product. To measure the impact of the training on participants' understanding of milk fermentation, a pre-test and post-test design was implemented. The test consisted of ten multiple-choice questions assessing participants' comprehension of milk hygiene, fermentation principles, and probiotic benefits. Descriptive analysis showed that the mean pre-test score was $45.2 \pm 9.8\%$, while the mean post-test score increased to $89.1 \pm 6.4\%$ ($n = 25$). To statistically validate this improvement, a paired-sample t-test was performed using SPSS version 26. The results indicated a significant difference between pre- and post-test scores ($t(24) = 14.72$, $p <$

0.001), confirming that the training produced a meaningful enhancement in participants' knowledge.

Table 1. Average score of participants' knowledge before and after training

Type of Test	Average Score (%)
Pre-test	45%
Post-test	89



Figure 1. Education regarding health products

As explained by (Jakob, n.d.), understanding the role of *Lactobacillus* and *Streptococcus* in fermentation is very important to ensure the success of yogurt production and the benefits of probiotics. Therefore, this increase in knowledge confirms that educational activities have a significant impact on community readiness to adopt simple food-based technology. According to Rogers' Diffusion of Innovation Theory (2003), successful adoption of new technology depends on five key attributes: relative advantage, compatibility, complexity, trialability, and observability. The yogurt-making innovation demonstrated a clear relative advantage by converting unsold milk into a marketable health product. However, its complexity—in maintaining optimal temperature and hygiene—and the economic barrier of starter procurement posed challenges to broader adoption. Continuous mentorship and simplified starter preparation techniques could enhance trialability and sustainability among local farmers.

From a broader perspective, this program contributes to the food security framework by strengthening food utilization and access dimensions (Septanti et al., 2020). By enabling local communities to process milk into nutrient-rich yogurt, the program not only reduces post-harvest losses but also diversifies dietary sources of protein and probiotics. Empowering rural farmers through simple biotechnological training thus aligns with both health resilience and economic empowerment, echoing the Sustainable Development Goals (SDGs) 3 (Good Health and Well-being) and 8 (Decent Work and Economic Growth).

A total of 25 participants were grouped into 5 groups and succeeded in producing yogurt with results that met basic standards: thick texture, sour aroma typical of fermentation, and acceptable taste. Figure 2 shows the process of making yogurt by residents.



Figure 2. Yogurt-making process

This success proves that a simple fermentation method can be implemented effectively at the household level. Fermentation was carried out at a temperature of 42°C for ± 8 hours, which is the optimal condition for the growth of starter bacteria. However, there were 3 participants who reported less than satisfactory results such as yogurt that was too runny or smelled rancid. This is likely due to unstable temperature incubation, lack of cleanliness of the equipment, or an inactive starter.

After the activity, a short survey was conducted regarding the planned utilization of the training product. As many as 60% of respondents stated that they were interested in selling yogurt as a home business, while the rest chose personal consumption. This shows that the activity not only increases technical capacity but also fosters local entrepreneurial spirit. Diversification of local food products is an effective strategy to increase the income of rural communities. This is also in line with the study of Yuanta et al. (2023) which states that local yogurt processing has the potential to provide added value up than selling raw milk.

The findings of this study are consistent with other community empowerment initiatives in Indonesia and abroad that integrate science-based training with local food resource utilization. For instance, Sani et al. (2023) implemented milk fermentation training among smallholder farmers in East Java, reporting a 40% increase in product diversification and local income. Participatory training in local food processing significantly improved household food security and women's economic participation. Comparable results were also reported in Thailand and the Philippines, where community-based dairy processing projects successfully transformed surplus milk into yogurt and cheese, reducing post-harvest losses and enhancing rural entrepreneurship.

CONCLUSION

This community service activity has succeeded in helping residents of Cibiru Wetan Village to utilize previously unused cow's milk to make healthy and marketable yogurt. To ensure long-term sustainability, collaboration with local cooperatives and small-medium enterprises (SMEs) is essential. The Livestock Cooperative of Cibiru Wetan and nearby micro-scale dairy product businesses can serve as potential partners for distributing and marketing the yogurt products. Such partnerships would enable participants to access wider markets, ensure product standardization, and reduce dependence on short-term university facilitation.

The success of this yogurt training program still depends on external support from universities, local government, and cooperatives. Continuous assistance is needed to maintain product quality, ensure the availability of starter cultures, and support marketing access. Without this support, community motivation and production consistency may decrease.

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