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Healthful heritage: A training on omega-3 fortified traditional noodles ("Mie Lethek") in Caturharjo, Bantul, Yogyakarta

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ABSTRACT

The Chemical Engineering Department of Universitas Ahmad Dahlan (UAD) conducted a Community Service Program (PKM) aimed at enhancing the quality of Mie Lethek, a traditional noodle dish, through omega-3 fortification. This initiative addressed the increasing demand for healthy food while preserving local culinary heritage. The program, conducted in Caturharjo, Bantul, involved 27 participants, including local vendors and members of the Family Welfare Empowerment (PKK) team. Activities included a presentation on omega-3 benefits, practical demonstrations of omega-3 fortification, and distribution of fortified noodle samples. Surveys revealed over 80% of participants gained new insights and expressed interest in adopting the innovation. Nutritional fortification improved product quality, particularly in increasing omega-3 content. This initiative highlights the potential for Mie Lethek to compete in the health food market and contribute to the local economy, demonstrating a scalable model for fortifying traditional foods with functional nutrients.

KEYWORDS
Traditional Food
Mie lethek
Omega-3
Training

1. Introduction

Mie Lethek is a traditional noodle from Bantul, Yogyakarta, that has been passed down for generations as part of Indonesia's rich culinary heritage. Literally, Mie Lethek carries the literal meaning of 'dull noodles,' originating from the Javanese language, referring to the noodles' brownish physical appearance. Interestingly, this dull color does not connote a deficiency but a positive identity that distinguishes it from other noodles. Made from tapioca flour, Mie Lethek has a distinct brownish color and chewy texture. Its production still follows traditional methods, reflecting local wisdom and cultural values that have been preserved by the community. However, with changing consumer preferences and the growing demand for healthier food options, Mie Lethek needs to evolve to remain relevant and competitive in today's market.

One of the main challenges faced by the home industry of Mie Lethek is the lack of added nutritional value, making it less appealing to modern consumers who are increasingly conscious of their dietary choices. Additionally, the dominance of instant and ready-to-eat food products with health claims has intensified market competition. Therefore, innovation is essential to enhance the competitiveness of Mie Lethek, both in terms of quality and health benefits.

As a response to this challenge, this community service program aims to enhance the nutritional value of Mie Lethek through omega-3 fortification. Omega-3 is an essential fatty acid known for its numerous health benefits, including supporting brain function, maintaining heart health, and reducing inflammation [1]. By incorporating omega-3 into Mie Lethek, this initiative seeks to position the product as a healthier food option while preserving its traditional essence and production methods.

The program was conducted in Caturharjo, Pandak, Bantul, one of the central production areas of Mie Lethek. The activities involved local small-scale producers and members of the Family Welfare

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Empowerment (PKK) group, who are actively engaged in the local culinary industry. Through training sessions and hands-on workshops, participants were introduced to the concept of omega-3 fortification and its application in Mie Lethek production. Additionally, the program included education on the health benefits of omega-3, processing techniques to maintain product quality, and marketing strategies to attract modern consumers.

This initiative aims not only to improve the nutritional quality of Mie Lethek but also to support the economic sustainability of local small and medium enterprises (SMEs). By increasing the product's added value, small-scale producers can expand their market reach, particularly among consumers who prioritize healthy eating. Furthermore, this program provides the local community with valuable insights into the importance of innovation in traditional food products to ensure their continued market competitiveness.

By adopting a community-based approach, this program is expected to inspire other small businesses to enhance their traditional products with science-based innovations. As a result, this initiative contributes not only to public health through the promotion of nutritious food but also to the preservation of local culinary heritage, which holds significant historical and economic value.

Furthemore, as a foundation for future development, the success of this program can serve as a model for other regions seeking to improve the competitiveness of traditional food products through innovative approaches. By integrating scientific advancements, food technology, and community participation, this omega-3 fortification initiative for Mie Lethek demonstrates how traditional food can evolve without losing its cultural identity while simultaneously generating economic and health benefits for the wider community.

In addition, omega-3 is an essential fatty acid that plays a crucial role in supporting human health and bodily functions [2], [3]. Omega-3, especially the docosahexaenoic acid (DHA) component, is known for various health benefits, primarily found in fish, some types of seeds, and nuts [4]. Health benefits of omega-3 include reducing the risk of heart disease [5], supporting brain function [6]–[8], anti-inflammatory properties [9], and eye health [10]. Incorporating omega-3 into culinary products, like noodles, offers an innovative way to enhance the nutritional value of everyday foods. This is particularly important considering the trend of consumer preference for fast or convenient foods. Noodles enriched with omega-3 not only maintain the convenience and taste that many people love but also add significant health benefits, such as increasing omega-3 intake and providing a healthy food alternative [11]. Furthermore, with the brand "Omega-3 Noodles," it is expected that this product can target a wider market. Therefore, omega-3 enriched noodle products are attractive to various groups, including parents who want to provide healthy food for their children, health-conscious adults, and athletes who need optimal nutrition.

The nutritious noodle market, including noodles enriched with omega-3, has shown significant growth in recent years [12]. This growth is driven by increasing consumer awareness of the importance of a balanced diet and demand for healthier fast food alternatives. Factors influencing the nutritious noodle market outlook among consumers include health and nutrition awareness trends, product innovations offering health benefits, a diverse target market from children to adults, and environmental awareness [10]. The nutritious noodle market continues to expand, driven by health awareness trends and product innovation, promising significant growth potential for producers focused on health and sustainability. Therefore, efforts to enhance the brand of noodle culinary products by improving nutritional value, such as the addition of omega-3, offer significant health benefits to consumers. Hence, efforts to socialize the addition of omega-3 to Mie Lethek need to be undertaken so that the sustainability of the Mie Lethek market can compete with modern cuisine."

This initiative makes a significant contribution to the development of traditional food by introducing omega-3 fortification for *Mie Lethek*, a traditional noodle product from Bantul, Yogyakarta. The novelty lies in integrating the preservation of local cultural heritage with modern food technology to create a product that retains its traditional authenticity while offering additional health benefits. The implications of this research include enhancing the economic value of small and medium enterprises involved in *Mie Lethek* production and improving the competitiveness of local products in the rapidly growing healthy food market, both nationally and internationally.

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Moreover, this initiative serves as a model for innovating other traditional culinary products to meet market demands for nutritious food in the post-pandemic era. As public awareness of the importance of healthy eating continues to rise, omega-3 fortification presents a strategic opportunity to expand *Mie Lethek*'s market segment and generate positive economic impacts for the local community.

The novelty of this article lies in its multidisciplinary approach, integrating omega-3 fortification technology into *Mie Lethek*, a process that has been largely unexplored at a local scale in Indonesia. Beyond improving nutritional value, the study emphasizes the sustainability of raw materials by utilizing marine microalgae as the source of omega-3 [13], [14]. Additionally, this research fills a knowledge gap regarding how traditional food products can be adapted to meet modern consumer needs without losing their uniqueness. This approach highlights *Mie Lethek* as a model traditional food product capable of competing in the functional food market, offering new perspectives for traditional culinary industries to innovate and thrive.

2. Method

This community service program aimed to enhance the nutritional value of Mie Lethek through omega-3 fortification. The program was carried out in Kalurahan Caturharjo, Pandak, Bantul, Yogyakarta, involving local small-scale producers and members of the Family Welfare Empowerment (PKK) group. A total of 27 participants, primarily women aged between 50 and 60 years, attended the activities. These included training sessions, hands-on demonstrations, and discussions.

2.1. Preparation Phase

The preparation phase included collaboration with local leaders and PKK members to coordinate participant involvement and venue arrangements. Information materials on omega-3 benefits and fortification techniques were prepared to ensure clarity and engagement during the training.

2.2. Training Activities

The training program began with a presentation on the health benefits of omega-3, particularly its role in cardiovascular health, brain function, and inflammation reduction. This was followed by a practical demonstration of incorporating omega-3 into *Mie Lethek* production. Omega-3 was derived from marine microalgae oil, chosen for its high DHA content and compatibility with food products. The trend of non-fish omega-3 is increasing due to concerns over contaminants, its sustainable source, environmental friendliness, and independence from climate conditions that make fishing challenging [15]–[18]. Additionally, marine microalgae offer advantages as a non-fish source, making it suitable for vegans and vegetarians, with high lipid content, and being free from heavy metals and microplastics [19]–[21]. One of the prominent marine microalgae species is *Aurantiochytrium*, which has been studied in previous research [13], [14].

2.3. Hands-on Demonstration

Participants were guided through the process of fortifying Mie Lethek with omega-3. This involved mixing specific doses of omega-3 oil with the dough to ensure even distribution. Quality assurance steps, such as maintaining temperature and handling procedures, were emphasized to preserve the nutritional properties of omega-3.

2.4. Survey and Feedback Collection

A structured questionnaire was distributed to participants to evaluate their understanding of omega-3 benefits and interest in adopting fortified Mie Lethek. Participants were asked about their prior knowledge of omega-3, its health benefits, and their willingness to incorporate it into daily meals.

2.5. Data Analysis

Feedback from participants was analyzed to assess the effectiveness of the training. The survey indicated that 80% of participants gained new knowledge about omega-3, and 90% expressed interest in adopting the innovation. Additionally, the hands-on demonstrations were highly appreciated, though some participants suggested extending the duration of practical sessions in future activities.

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2.6. Evaluation and Follow-up

The program concluded with the distribution of fortified Mie Lethek samples to participants and a discussion on potential strategies for scaling up production. Follow-up sessions were proposed to provide ongoing technical support and explore market opportunities for omega-3 fortified Mie Lethek.

3. Results and Discussion

This activity was conducted on February 27, 2024. The venue was the hall of the Caturharjo Village Office, Pandak, Bantul, DI Yogyakarta. The implementation of the activity encompassed several phases, including preparation, a welcoming session with the staff of the Kalurahan Office and the PKK Kalurahan mobilization team, a presentation on the benefits of omega-3 in culinary products for health, a question-and-answer session, and the distribution of high-concentration omega-3 product samples to participants. Fig. 1 illustrates the camaraderie between the UAD PKM team and the outreach participants.

Fig. 1. A photograph of PKK team dan PKM team of UAD

This community service activity was officially inaugurated by the Chairwoman of the PKK Kalurahan, Mrs. Hj. Siti Wakhidah S.E., along with the Head of Caturharjo Village, Mr. H. Wasdiyanto S.Si. The event was attended by members of the PKK Caturharjo working group and micro, small, and medium enterprise (MSME) operators in Caturharjo Village. The service team from the UAD Chemical Engineering Study Program participated, with a total of 27 members of the PKK Kalurahan Mobilization Team in attendance, Mie lethek show in Fig. 2.

Fig. 2. One of Mie Lethek product and a sample of omega-3 product originated from marine mikroalga created by chemical engineering team of UAD

Fig. 3 illustrates the age distribution of the respondents, offering a comprehensive representation of the demographic composition across various age groups involved in the study.

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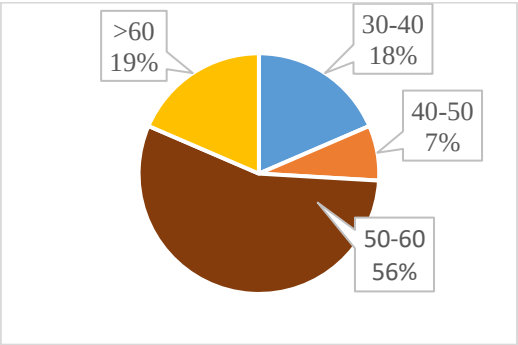

Fig. 3. Demographic data of age of the participants

Table 1 indicate that the majority of participants were women aged between 50 – 60 years with high school or equivalent education levels.

Table 1. Education background of participants

Education	Number
SMA(senior high scholl)/ or equivalent	22
S1 (bachelor academic level)	4
S2 (master level)	1
S3 (PhD level)	0
Total	27

Table 2 presents the findings from a questionnaire administered to participants regarding the educational program on omega-3. A minority of the participants (3 out of 27 respondents) were already aware of or had heard about omega-3 prior to the lecture, while the majority (24 out of 27 respondents) were not. Before the training, a considerable portion of participants (11 out of 27 respondents) were cognizant of the benefits of omega-3 for the body, and 16 out of 27 respondents were unaware of its advantages. Prior to the training, only a small fraction of the attendees (4 out of 27 respondents) had consumed foods containing omega-3, whereas the remaining majority (23 out of 27 respondents) had not. Two individuals who expressed dissatisfaction did so on the grounds that the duration of the presentation, which was only one hour followed by a 30-minute question-and-answer session, was insufficient. Additionally, one person felt less satisfied due to the need for practical demonstrations on the use of omega-3 in culinary products in subsequent educational sessions.

Table 2. Result of questionnaire from participants

No	Questions	Do not understand	Understood/ willing/ interested in/ master/ satisfied	Total
1	I understand of the various benefits of Omega-3 for the body.	0	27	27
2	I am willing to provide food containing Omega-3 for my family.	0	27	27
3	I am interested in trying Mie lethek enriched with Omega-3.	0	27	27
4	The presenter's explanation about Omega-3 captured my interest.	0	27	27
5	The presenter demonstrated mastery of the subject matter and issues related to Omega-3.	2	27	27
6	The timing for the presentation of the material was appropriate.	(too short and need additional time) – 2	23	27
7	I am satisfied with this UAD Community Service activity	Not satisfied - 2	25	27

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Based on the questionnaire data provided to the members of the PKK Kalurahan team of Caturharjo, Pandak, Bantul regarding the workshop on omega-3 enriched 'mie lethek' (a traditional noodle), the results indicated that the program received a positive response from the community. Awareness of the benefits of omega-3 was already partially known or heard before the lecture. This reveals a significant information gap regarding omega-3 among the participants, which the educational session aimed to bridge. Afterward, participants felt that the activity was highly beneficial for increasing awareness of omega-3 and knowledge about its health benefits.

Before the lecture, only a small subset of participants (4 out of 27 respondents) regularly consumed foods rich in omega-3, while the vast majority had not. This indicates a significant opportunity to enhance the intake of omega-3 among participants through fortified food products, such as omega-3 enriched 'mie lethek.

From this analysis, it can be concluded that the educational program on mie lethek enriched with Omega-3 is highly relevant and needed by the mothers in the PKK Kalurahan team of Caturharjo. This program not only increases awareness and knowledge about Omega-3 and its health benefits but also opens opportunities to introduce healthy food alternatives containing Omega-3, such as mie lethek, into their daily diet [22]. This initiative is expected to encourage positive changes in dietary choices and enhance health awareness within the community.

Scientifically, there has been considerable research advocating the urgency of adding or fortifying omega-3 in food products [23]–[25]. For instance, Meyer et al. (2003) highlighted the importance of regular omega-3 consumption and recommended its addition to food products [25]. Several food product proposals would benefit from the addition of omega-3 as an essential fatty acid [26]. Thus, the potential of omega-3 enriched mie products, especially in the context of local noodle products, will provide a competitive advantage. Furthermore, this advantage serves as significant capital for in-depth market analysis on consumer preference dynamics, challenges, and opportunities.

Currently, consumers are increasingly aware of the health and nutritional quality of the food they consume. This trend aligns with previous studies stating that post-COVID-19 pandemic, consumers are more conscientious in selecting quality food products to support body resilience [11], [27]–[30]. There is a rising tendency to seek food products that are not only practical and delicious but also offer health benefits. Nutrient-enriched products, such as those containing omega-3, appeal to a wide demographic, including young families, health-conscious adults, and the elderly population requiring specific nutrients to support their health [10], [31].

The noodle market, particularly in Indonesia, has experienced significant growth and is a part of the highly competitive fast-food industry. Conventional noodle products face challenges in differentiating themselves in this crowded market. Adding omega-3 to local noodles offers not only a clear product differentiation but also meets consumer needs for healthier fast-food options.

Additionally, the results of this educational program also provide an outline of business opportunities for the community. With the growing awareness of the importance of good nutritional intake, omega-3 enriched noodles have the potential to meet market demands for healthy foods that are also convenient and quick to prepare. Moreover, omega-3 enriched noodles are still a novel concept and can thus be positioned within the functional food category, offering specific health benefits, a category that continues to show strong growth . Furthermore, the advantage of mie lethek using local ingredients in the production of omega-3 enriched noodles can enhance consumer acceptance and support the local economy, emphasizing sustainability and ethical production practices.

4. Conclusion

Community service activities through the addition of omega-3 to the traditional Mie Lethek noodles have demonstrated significant positive impacts, not only in enhancing the nutritional value and health benefits of this local culinary product but also in making a meaningful contribution to the local economy. This innovation has successfully introduced a new approach to Mie Lethek production, which not only preserves local wisdom but also meets consumer demand for healthier food products. Thus, the addition of omega-3 has opened up new market opportunities, enhanced product competitiveness, and indirectly supported the sustainability and economic growth of the local community. This initiative proves that the integration between nutritional innovation and the preservation of traditional culinary practices can go

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hand in hand, bringing dual benefits for public health and the local economy, and offering a model that can be adapted by other traditional culinary products in responding to challenges and opportunities in the modern era. The omega-3 fortification of Mie Lethek demonstrates a significant potential to enhance the nutritional value of this traditional food while preserving its cultural heritage. This innovation has shown to be highly relevant for improving public health and meeting consumer demand for healthier food options. The implementation of omega-3 fortification can be easily adopted by other small-scale producers or community groups, as the method utilizes readily available ingredients and straightforward processing techniques that do not require advanced technological support.

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