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SILKY STRAWBERRY MILK: A NUTRITIOUS DAIRY INNOVATION FOR STUNTING PREVENTION

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ABSTRACT

Introduction: Stunting, characterized by impaired child growth, results from multiple factors including inadequate nutrition. Fresh cow's milk, rich in essential nutrients, offers a viable solution. Currently, fresh cow's milk products are deposited to BUMDES with a relatively low purchase price and limited consumer market reach. Currently, fresh milk is only stored and sold through the village-owned enterprise (BUMDES), but demand is low due to its smell and taste, as well as the lack of public awareness about the benefits of fresh milk. Therefore, a high-nutrient processed fresh milk product has been developed as an alternative dessert to support the prevention of stunting in children.

Methods: Counseling was conducted on the benefits, processing, and proper storage of fresh milk, as well as a demonstration of making Silky Strawberry Milk. The methods used were lectures and a hands-on demonstration of Silky Strawberry Milk production. The activity was carried out on March 16, 2024, at the Blimbing Village, Kediri Regency. It was attended by 28 participants. Pretest-posttest evaluations confirmed significant improvement in participants' knowledge regarding milk nutrition and processing methods.

Results: Silky Strawberry Milk was distributed to participants. They loved its delicious taste, fresh aroma, and attractive colour. This product is expected to increase milk consumption to prevent stunting through better nutrition.

Conclusion: Silky Strawberry Milk has been well received by the public due to its delicious taste and attractive appearance. This product has the potential to increase milk consumption and prevent stunting through improved child nutrition.

KEYWORDS

fresh cow; nutrition; stunting; silky strawberry milk.

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1. INTRODUCTION

Stunting is one of the nutritional problems experienced by toddlers. Many factors influence the incidence of stunting, including: poor maternal nutritional status during pregnancy, short maternal stature, poor parenting, especially in children's diet, children's nutritional intake, low birth weight, family finances, food security, and so on (Nasution, 2022; Sari R. K., 2022; Fauziah, 2021). The impact of

stunting on children can result in low body composition, especially muscle mass and size, inhibited motor development, physical growth failure, and neurocognitive damage (Wardani, 2021; Perkins, 2017; Sudfeld, 2015; De Onis, 2016). One of the efforts to overcome stunting can be done by revitalizing child nutrition through nurturing livestock products, such as fresh cow's milk (Widya, 2023; Prodyanatasari A. P., 2024a; Zunariyah, 2024;

Pratiwi, 2025). Milk is one of the food ingredients that has a high nutritional content. Milk can be obtained from milking animals, such as goats, cows, horses, and camels. Milk contains important components, including: protein, fat, vitamins, minerals, lactose, enzymes, and microbes. The content contained in milk is good for fulfilling human nutritional needs (Mufid, 2021; Prodyanatasari A. P., 2024c). The microbial content in milk can be probiotic (Østlie, 2003). The high nutrient content of fresh milk results in high growth of microbes in the milk (Guetouache, 2014). The high nutritional content of fresh milk results in high growth and development of microorganisms (Subagyo, 2020; Yusuf, 2021). This results in damage to fresh milk easily if proper handling, storage and processing are not carried out (Hidayah, 2025).

Blimbing Village is one of the villages in Mojo District, Kediri City. The village is located under the slopes of Mount Wilis. The geographical condition of this village is a highland with hills and soil conditions that are prone to landslides (Prodyanatasari A., 2024b). The majority of the villagers' livelihoods are as farmers, breeders, and traders. In livelihoods as farmers, livestock raised by residents include: laying hens, domestic chickens, goats, cows, and dairy cows. Large-scale farmers have relationships with distributors who will distribute the livestock to consumers. As for small-scale farmers, livestock are usually sold to consumers directly, where the range of consumers (buyers) is still Blimbing village residents. For goats and cattle, they are usually sold close to the Sacrifice Day because the selling price is higher than the selling price in other months.

In dairy cows, sales are made in the form of fresh milk. Dairy farmers will milk the cows in the morning. Before milking, the cow must be cleaned by bathing, especially the udder. After that, the cow's udder is wiped and wiped with warm water at a temperature of around 37oC to minimize bacterial contamination, improve hygiene and stimulate the release of milk from the mammary glands (Wiranti, 2022; Sari V. M., 2021; Yusuf, 2021; Wijayanti, 2017). Cow's milk from milking will then be directly deposited by farmers to BUMDES. At BUMDES, cow's milk will be directly sold to buyers without being processed first. Buyers still cover the local area of Blimbing Village. The majority of consumers process fresh milk by boiling to kill bacteria, then storing it at room temperature for a maximum of one day or immediately storing it in the refrigerator. The protein content in fresh milk if not stored properly will decrease significantly (Santoso, 2023; Putri E., 2016). Consumers prefer to buy packaged milk to drink directly compared to fresh milk. This is in accordance with the results of research by Milareva (2023) that in the decision to buy fresh cow's milk, the most considered factors in terms of priorities start from taste, ambience of the place, cleanliness of the place of sale, aroma of milk, number of additional food menus, and price (Milareva, 2023).

In the community service activities carried out, will invite community members to process fresh cow's milk into processed products in the form of Silky Strawberry Milk. This manufacture is carried out with the aim of: (1) processing fresh cow's milk properly and sterile; (2) increasing the consumption of cow's milk to meet nutritional needs: (3) providing alternative flavors that are more attractive to children, (4) increasing the selling value of milk, and (5) providing knowledge and skills to become business actors, (6) reducing unemployment rates and improving income; and (7) becoming an alternative to village MSME businesses.

Cow's milk provides a complete nutritional profile, containing 69 calories per 100 ml with significant vitamin and mineral content. It serves as an excellent source of Riboflavin (159 µg/100 ml) and Vitamin B1 (45 μg/100 ml), while also providing moderate amounts of Vitamin A (21 IU/gram fat) and Vitamin D (0.7 IU/gram fat). The mineral composition includes substantial calcium (0.18%) and phosphorus (0.23%), crucial for bone development, along with trace iron (0.06%). Notably, milk contains 2 mg of ascorbic acid (Vitamin C) per 100 ml and maintains relatively low cholesterol levels (15 mg/100 ml), making it a balanced nutritional option for children's growth and stunting prevention (Navyanti, 2015; Wahyuningsih, 2022; Resnawati, 2020).

The making of Silky Srawberry Milk is an alternative for children who do not like to drink pure fresh milk because there is a fishy taste and aroma in the fresh milk. Silky Srawberry Milk is made with the composition: fresh milk, fresh strawberry fruit, jelly powder, food flavors, food coloring, and sugar which have been adjusted for nutritional content and food safety for consumers, especially for children. This Silky Strawberry Milk Dessert can be used as an alternative to fulfill children's nutrition to prevent stunting in early childhood (Widya, 2023)

Early childhood is a golden period for children's physical, mental, and social development. During this time, children need a complete and balanced nutritional intake to support optimal growth and maintain health. One of the efforts to fulfill nutritional intake in children is by consuming cow's milk. The benefits of consuming cow's milk include stunting, anemia, obesity, infection, allergies, and so on (Pratama, 2023; Sari R. K., 2022). The nutritional content in cow's milk can help improve body immunity, strengthen bones, maintain heart health, support ideal body weight, maintain dental health, improve brain performance, and improve sleep quality (Putri S. A., 2024; Kemdikbud).

2. MATERIAL AND METHODS

The licensing stage begins with the process of submitting a permit for the Community Service (PkM) activity to the Head of Blimbing Village. This activity is designed to provide education about the benefits and nutritional content of fresh cow's milk, as well as a demonstration of its processing into a nutritious product called "Silky Strawberry Milk" - an innovation that can be an alternative to improve

children's nutrition and prevent stunting. After going through the consultation process, the PkM team successfully obtained approval with an agreed implementation schedule, namely on Saturday, March 16, 2024 at 08.00-11.00 WIB at the Blimbing Village Hall. This timing was deliberately chosen by considering the villagers' schedules, especially to accommodate the availability of time for PKK mothers as the main target group of this program.

The Actuvity preparation stage includes compiling educational materials and product trials. The PkM team developed digital presentation media covering three main materials: (1) analysis of the nutritional content of fresh cow's milk, (2) hygienic and proper processing techniques, and (3) optimal storage methods to maintain milk quality. In parallel, a series of "Silky Strawberry Milk" formulation trials were conducted to determine the ideal composition that meets organoleptic standards (taste and aroma) while maintaining maximum nutritional value from fresh milk raw materials.

The Activity implementation stage is divided into two main series of activities. The opening begins with the team's greeting and measurement of participants' enthusiasm level, then continues with administration of a pretest to assess initial understanding of the nutritional content, processing techniques, and storage procedures of fresh cow's milk. The first session was the delivery of educational material through interactive lecture methods assisted by digital presentation media, which included a comprehensive study of the nutritional value of milk and its processing principles. In the second session, participants were actively involved in the demonstration of making "Silky Strawberry Milk" from the preparation process to finishing. The processed products were then distributed in small cup packaging for organoleptic testing, where participants were asked to provide evaluations through after taste sheets covering sensory aspects (taste, aroma) and product acceptance level.

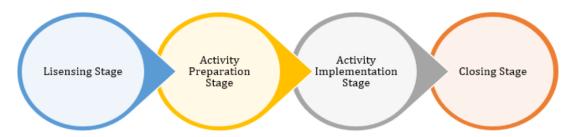


Figure 1. Stages of Implementing PkM Activities

In the fourth stage, Closing stage. This stage is the final part of the activity carried out through the distribution of posttest sheets to all participants. This evaluation instrument is designed to measure the increase in participants' understanding after participating in the entire series of activities, as well as to assess the effectiveness of the program comprehensively. The data obtained from the posttest were then analyzed and compared with the pretest results to measure the level of achievement of educational objectives and the success of knowledge transfer that had been carried out.

RESULTS 3.

The Community Service (PkM) activities carried out in March 2024 in Blimbing Village, Mojo District, Kediri Regency were attended by 28 participants who were mothers of Blimbing Village residents by inviting their children. This PkM raised the topic of processing fresh cow's milk into Silky Strawberry Milk products, which are high nutritional desserts as an effort to fulfill the nutrition of stunting-free



Figure 2. Education on The Benefits, Processing and Proper Storage of Milk

children. Based on the above background, the PkM team invites residents to process fresh milk into attractive products with delicious flavors. This PkM activity was carried out in several stages, namely: (1) Licensing stage, (2) activity preparation stage, (3) activity implementation stage, and (4) closing stage. The licensing stage was carried out by coordinating with the Blimbing village, the preparation stage was carried out by preparing educational materials and materials for the implementation of activities, and at the implementation stage the following results were obtained.

The concluding stage involved distributing the prepared Silky Strawberry Milk to participants. After receiving the Silky Strawberry Milk, participants were asked to share their opinions about the product as both an appreciation gesture and a final evaluation medium. In this phase, participants not only received the training output product but were also invited to provide comprehensive feedback regarding its sensory aspects (taste, aroma, texture) and potential for daily adoption. The team systematically collected



Figure 3. Tools and Materials Needed in Making Silky Strawberry Milk

feedback through a product aftertaste evaluation sheet - a structured assessment form containing rating scales and comment sections, enabling comprehensive qualitative and quantitative analysis. This process simultaneously served as validation for the quality and community acceptance of this innovative product, particularly among the program participants.

4. DISCUSSION

The Community Service (PkM) activities carried out in March 2024 in Blimbing Village, Mojo District, Kediri Regency were attended by 28 participants who were mothers of Blimbing Village residents by inviting their children. This PkM raises the topic of processing fresh cow's milk into Silky Strawberry Milk dessert products, which are high nutritional desserts as an effort to fulfill the nutrition of stuntingfree children. The topic raised in this PkM activity is based on conditions in the field where fresh cow's milk produced by farmers in Blimbing Village is still limited to being sold in the form of raw and unprocessed pure milk and at a relatively cheaper price. In addition, consumer demand for fresh milk in Blimbing Village is still low. One of the influencing factors is the fishy smell and taste of fresh cow's milk, so children are less fond of drinking fresh cow's milk and prefer packaged milk to drink directly because it has an appetizing taste and aroma. However, it should be noted that direct-drink packaged milk contains food additives that are not recommended for children, so consumption should be supervised. In addition, direct-drink packaged milk contains preservatives that are not good for children's health.

Based on the above background, the PkM team invited residents to process fresh milk into attractive products with delicious flavors. This PkM activity was carried out through several stages:

Licensing Stage

At this stage, team representatives conducted licensing related to the implementation of activities to the head of Blimbing village. Licensing activities were

carried out in February 2024. At this stage, the village head gave permission to carry out PkM activities and suggested that the implementation take place at the Village Hall and invite villagers, especially PKK mothers with the activity time being held in the morning, at 11.00 WIB. The choice of time is based on the busyness and activities of the residents, because at the specified time, the participants who are the target of the activity have returned from the fields / fields / gardens and the time to pick up school children. This is also supportive, because the place for implementing activities is right next to the school.

Activity Preparation Stage

After the PkM team had obtained permission to carry out activities from the Village Head, the PkM team then prepared activities, including: (1) making educational materials about milk, (2) processing and good storage and purchasing ingredients to make Silky Strawberry Milk; and (3) preparing equipment to make Silky Strawberry Milk.

Activity Implementation Phase

This stage was carried out in March 2024 at the Blimbing Village Hall, Mojo District, Kediri Regency. At this stage it is divided into two sessions, namely: The first session was education about the benefits, processing, and storage of good milk. In session one, it was carried out using the lecture method and utilizing power point media. Prior to session one, participants were invited to share their knowledge about temperature and experience in processing, consuming, and storing milk. Based on this information sharing, it was found that 72% of participants prefer to drink diamond milk directly because it is considered more practical and has a delicious taste and aroma, while 38% of participants like to drink fresh milk because the nutrients contained in it are still fresh, the nutrients have not been damaged and there is no addition of preservatives in it. For participants who like fresh cow's milk, 82% process fresh milk by only boiling it over low heat until it boils, then waiting for it to cool

and consumed immediately and 18% are processed by adding fruit flavors to remove the fishy aroma of the milk. On fresh milk storage, information was obtained that 72% of participants store milk in the refrigerator and 28% in the freezer. After the sharing session was deemed sufficient, the education phase on the benefits, processing, and storage of milk began as shown in Figure 1. At the end of this session, questions and answers and discussions were held with the participants to find out their understanding of good milk processing and storage without damaging the content contained in milk. The end of the question and answer session signaled that session one had been completed and continued to the next session, the second session.

The second session was a demonstration of making Silky Srawberry Milk. This session began by showing the tools and materials needed in making Silky Srawberry Milk. The tools needed include: stove, pot, vegetable spoon, measuring spoon, glass, and bottle. The materials needed to make Silky Srawberry Milk include: fresh cow's milk, jelly powder (any brand), sugar, flavorings and food coloring as shown in Figure 2. After showing the necessary tools and materials, the next step was to demonstrate the making of Silky Srawberry Milk, with the following steps: Blend the strawberries finely and set aside; Boil fresh milk over low heat while stirring gently; Dissolve the jelly powder in a glass filled with water and stir until it dissolves homogeneously, then add it to the milk that is being heated and stir until well mixed; Stir gently the mixture of fresh milk and jelly until it boils and turn off the stove drain to warm temperature; Transfer the silky strawbery milk to the prepared container.

Closing stage by distributing Silky Strawberry Milk that has been made to participants. After obtaining Silky Srawberry Milk, participants were asked their opinions about the Silky Srawberry Milk that was made. Each activity participant was given a sample of Silky Srawberry Milk that had been made to taste, then asked for their opinion regarding the Silky Srawberry Milk. In Figure 3, the children look enthusiastic when enjoying the Silky Strawberry Milk that was distributed. Based on the opinions given by the participants, Silky Strawberry Milk has a delicious and fresh taste, an appetizing aroma, and a physical appearance with an attractive color. In addition, because the ingredients used are good quality ingredients, Silky Strawberry Milk can be used as an alternative milk product for children who do not like to drink fresh milk. This can be seen from the response of the kindergarten students who joined their mother during the PkM activity. The children really liked the Silky Srawberry Milk that was distributed, and there were even some children who asked for more Silky Srawberry Milk. This Silky Srawberry Milk product can be used as an alternative business to increase community income by packaging and marketing Silky Srawberry Milk through offline and online media.

Processing fresh cow's milk into innovative products, such as silky strawberry milk, is not merely about enhancing flavor variety but also serves as a tangible solution to address nutritional and economic challenges at the community level. This initiative stems from the awareness that fresh cow's milk is rich in protein, calcium, and vitamins—nutrients essential for preventing stunting and supporting children's growth and development. However, obstacles such as short shelf life, children's lack of interest in plain milk, and limited market access often prevent fresh milk from being utilized optimally. This is where milk processing innovation plays a role by transforming fresh milk into more appealing products, thereby increasing children's enthusiasm for consuming it. For example, sweet and smooth-textured silky strawberry milk can serve as a nutritious alternative to low-nutrient packaged snacks. Additionally, product diversification extends milk's shelf life, ensuring continued access to its nutritional benefits even when fresh supplies are limited.

The connection to the community multidimensional. First, from a health perspective, this program supports the efforts of posyandu (integrated health posts) or community health centers in promoting balanced nutrition campaigns, especially for families at risk of stunting. Second, economically, milk processing training empowers homemakers or dairy farmers to create marketable products, whether as a side business or a small-tomedium enterprise (SME). Collaborating with local groups, such as dairy cooperatives or posyandu, strengthens marketing and distribution networks while fostering a sense of collective ownership over the program.

Ultimately, this milk processing innovation is not just about simple technology but about how communities can become self-reliant in meeting their nutritional needs while creating economic opportunities. When children grow healthier due to adequate nutrient intake and communities gain additional income, the impact multiplies: a stunting-free generation and a more prosperous society.

5. CONCLUSION

Community Service (PkM) activities in making Silky Strawberry Milk to increase the selling value of milk and efforts to fulfill nutrition for stunting-free children can increase knowledge of proper and sterile processing of fresh cow's milk; increase consumption of cow's milk to meet nutritional needs, especially in children: (3) provide alternative flavors that are more attractive to children, (4) increase the selling value of milk, and (5) provide knowledge and skills to become business actors and MSMEs. Processing fresh cow's milk into Silky Strawberry Milk is very easy and affordable. The Silky Strawberry Milk made has a delicious taste, appetizing aroma, attractive color, so it is favored by children. Silky Strawberry Milk can be an alternative dessert to increase children's nutrition as an effort to prevent stunting. This activity can be expanded by providing training on processing fresh cow's milk into various innovative products, such as

yoghurt, cheese, pasteurised milk, or ice cream. To strengthen the impact of the programme, collaboration can be carried out with local MSMEs and Posyandu in an effort to improve child nutrition and develop dairy-based businesses.

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