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Goat Milk Product Diversification through Flavor Innovation: A Case Study at Andaleh Farm, Lima Puluh Kota Regency

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ABSTRACT

The diversification of goat milk products through flavor innovation is a strategic approach to enhancing the competitiveness of local livestock commodities, especially in response to increasing market competition. Goat milk holds significant potential as a premium dairy product; however, its market penetration remains limited due to its distinctive taste and lower consumer familiarity than cow's milk. Introducing innovative and appealing flavor variants represents a promising solution to improve consumer acceptance and broaden market reach. This community service initiative focuses on developing market-oriented goat milk products in collaboration with local farmers at Andaleh Farm, Lima Puluh Kota Regency. The program aims to strengthen farmers' capacity in product innovation and value-added processing by providing training and technical assistance. The expected outcomes include increased product diversity, improved product quality, and enhanced branding strategies. Ultimately, this initiative seeks to stimulate local economic growth by opening new market opportunities, increasing farmer income, and positioning goat milk as a viable and competitive local product within the regional dairy industry.

Keywords: diversification, flavour, innovation, milk's goat

INTRODUCTION

Goat milk is a versatile, nutrient-rich dairy product with numerous potential health benefits and applications. It is widely recognized for its superior nutritional value, easier digestibility, and lower allergenicity compared to cow's milk, making it a suitable alternative for individuals with cow's milk allergies or lactose intolerance (Sun et al., 2024) (Benjamin-van Aalst et al., 2024). According to the (Union, 2018), product innovation refers to introducing a new or significantly improved good or service that differs substantially from a company's previous offerings and has been introduced to the market. The dairy industry offers consumers a broad range of products, with assortments that mirror those found in leading dairy-producing countries in Western Europe. Within this diverse product landscape, innovative dairy products represent a significant share. Commercial goat farming is increasingly viewed as a financially viable enterprise, attracting many farmers and entrepreneurs due to rising consumer demand and promising returns. However, despite its economic potential, goat farming also faces several challenges, including

predator threats and limited access to financial resources. Addressing these challenges through strategic planning and government support can significantly improve the sustainability and success of goat farming, particularly in rural areas (Bhardwaj et al., 2018).

Andaleh farm is one of the dairy goat farms located in Nagari Andaleh. The Andaleh Farm was established in 2021 with an initial population of one head. Since its inception, the proprietor has demonstrated a keen interest in animal husbandry, stemming from his prior experience at SMK Padang Mengatas Animal Husbandry. This interest has guided his academic pursuit, leading him to pursue a higher education in animal husbandry at the university level. The objective of this educational endeavor is to broaden his intellectual horizons and to cultivate his ability to apply the principles of cultivation to various types of livestock. Since 2021, Andaleh Farm has encountered several challenges, including the presence of deceased and ailing goats. It is evident that from 2021 to 2024, seven goats have succumbed to mortality, while a further nine goats have been sold to various buyers, with the ages of the animals being a contributing factor to this decision, as it is based on consumer demand. Presently, the number of goats at Andaleh Farm varies in terms of age, with a total of six goats being present. The farm comprises two dams, one containing a male bovine, and the other containing heifers and a young bull.

One of the primary challenges in marketing goat milk is its intense and distinctive flavor, which many new consumers find unappealing. This sensory barrier limits its acceptance and, in turn, restricts the capacity of small-scale producers—such as those at Andaleh Farm—to expand their market reach and improve their income. Introducing flavored variants of goat milk offers a promising strategy to overcome this limitation by improving taste appeal and aligning the product more closely with consumer preferences. In the context of Andaleh Farm, where pasteurized goat milk is sold in unflavored form to residents, product differentiation through flavor innovation has not yet been explored. This lack of variety contributes to stagnant sales and limits market growth.

All marketing strategies aim to fulfill consumer needs, wants, and preferences (Skapetas & Bampidis, 2016). The concept of agricultural revival refers to a renewed awareness and commitment to the essential role of agriculture in the development process (Pandey & Tewari, 2010). This can include the commercialization of small-scale farming and efforts to reduce income disparities between rural and urban areas. In developing countries, rapid income growth, urbanization, technological advancement, and other contributing factors have led to significant transformations in the food sector. As a result, increasing urban populations drive higher demand for dairy products, including a rise in per capita milk consumption.

Flavor enhancement, therefore, represents a valuable entry point for product innovation. By offering goat milk in more palatable and diverse options, the farm can attract a broader consumer base, boost sales, and increase the motivation of farmers to pursue value-added processing. This initiative addresses sensory acceptance and supports the broader goal of economic sustainability for goat farmers in Nagari Andaleh. Structured training and community-based engagement are essential to this approach, providing farmers with the knowledge and skills to innovate and respond to market demands.

Goat farming in Lima Puluh Kota Regency supports rural livelihoods, with goat milk and meat as key economic commodities. However, the full potential of this sector remains underutilized. Empowering farmers through product diversification, notably by introducing flavored goat milk, is a strategic effort to increase competitiveness in both local and regional markets. This innovation is expected to catalyze improving product quality, expanding market access, and ultimately enhancing the economic resilience of the local farming community.

Based on the problem identification, It was determined that training and socialization initiatives should be implemented at Andaleh Farm, focusing on adding flavor variations to pasteurized goat milk. The development of various flavor variations in pasteurized goat milk is expected to be a product choice preferred by consumers and can expand market appeal.

METHOD

Community This community service activity carried out a method of diversifying the addition of flavors to pasteurized goat milk.

1. Preliminary Survey and Needs Assessment

An initial survey and focused group discussions were conducted with farmers at Andaleh Farm to assess the challenges in marketing goat milk and to identify potential flavor preferences among the local community. This step helped determine suitable flavorings that align with local tastes and consumer expectations.

2. Flavor Formulation and Development

Several flavor variants—such as chocolate, strawberry, and Macha—were selected based on the survey results. Food-grade flavor additives approved by the Indonesian Food and Drug Authority (BPOM) were used. Each variant was formulated by adding specific concentrations (e.g., 1–2%) of flavoring agents into freshly pasteurized goat milk. The milk was pasteurized at 72°C for 15 seconds using the low-temperature short-time (LTST) method.

3. Training and Demonstration for Farmers

A hands-on training session focused on good manufacturing practices (GMP), hygienic handling, pasteurization procedures, and flavor mixing techniques. Farmers were also introduced to safe food additive usage and labeling requirements.

4. Sensory Evaluation and Feedback Collection

The local community performed organoleptic tests. Attributes assessed included taste, aroma, texture, and overall acceptability. The feedback was analyzed to identify the preferred flavors and fine-tune the product formulation.

5. Packaging and Branding Strategy

The final stage involved a short workshop on basic product packaging and branding, including labeling flavored goat milk with nutritional information and best-before dates, to improve market appeal and consumer trust

RESULTS AND DISCUSSION

This Community service activities are carried out at Andaleh Farm. The location of the subject is in Nagari Andaleh, Luak District, Lima Pulu Kota Regency. The activity under discussion involves the preparation of pasteurized goat milk products, as well as the preparation of ingredients and the provision of flavor variants to pasteurized goat milk.

The present community service has positively impacted farmers on Andaleh Farm. It has been instrumental in identifying solutions to the issues they are confronted with. The impact of the service is twofold. Firstly, it provides farmers with knowledge about goat milk processing. Secondly, it facilitates the pasteurization of goat milk, extending its shelf-life and enhancing its flavor, thus improving its quality.

Furthermore, rancid goat milk fat, characterized by fatty acids such as capric, caprylic and caproic, can be reduced. Following the opinion of (Nugraha et al., 2014), the aroma and taste of rancidity in goat's milk are pronounced. Caprylic and lauric acids are the most

prevalent types of fatty acids in goat milk and are hypothesized to contribute to the aroma and rancid taste of the milk. The sensory characteristics of a product play a crucial role in shaping consumer purchasing decisions. Qualitative and quantitative analyses are valuable in uncovering the elements that influence consumer preferences, offering essential insights for refining product development and boosting the commercial success of new and existing products (Raz et al., 2008).

Product innovation in the food sector can be directed toward enhancing health benefits by increasing the functional properties of dairy products. For instance, incorporating milk-derived ingredients with added probiotics or postbiotics may improve brain function and overall immune support. The inclusion of plant-based elements also holds significant promise in this regard (Górska-Warsewicz et al., 2019; Śmigiel & Kowalik, 2020; Baranowska, 2022). Functional foods are characterized by the enrichment of bioactive components, such as added dietary fiber, higher levels of probiotics or prebiotics, live lactic acid bacteria cultures, essential minerals, or phytochemicals (Olędzki & Hristova, 2017). A study by (Gutkowska et al., 2015) revealed that consumers tend to be more receptive to food innovations that reduce potentially harmful nutrients rather than fortifying products with additional health-promoting substances.

The solutions of this service are:

1. The primary solution is processing milk drinks with various flavors and colors

The manufacturing process for these products is relatively simple and can be conducted in a domestic kitchen using conventional utensils. The ingredients include milk, various natural flavors and colors from fruits, creamer or fruit juice, flavors, and sugar. The manufacturing process commences with boiling the milk until it is cooked, at which point it is cooled. In the subsequent stage of the process, the flavors are prepared. The cooled milk is then mixed with the flavors, colors, creamer, flavors, and sugar to taste. The mixture is stirred until it is evenly distributed. The final product is then poured into the prepared packaging. This innovation is expected to result in a greater public appreciation of milk, thereby facilitating its commercialization and the establishment of a domestic industry, or even a modern industry. These flavored milk products are enriched with various flavors and natural colorants to enhance the taste and the visual appearance, thus differentiating them from traditional milk, which generally has a neutral taste and color. A selection of flavors is available, including chocolate, matcha and strawberry. To illustrate this point, the flavor of chocolate will be dark brown, strawberry will be pink, and Macha will be a deep green.

2. The second solution was the implementation of training on packaging and labeling.

The resource person explained that the initial packaging could take the form of simple bottles bearing stickers displaying children's cartoon characters to attract attention, particularly concerning the marketing of milk products. This objective is to enhance the appeal and market value of the products. It was also posited that the products be presented in various packaging sizes (Ambarsari et al., 2013). The label on the package should include the following information: flavor, nutritional content, storage method and product benefits. (Benjamin-van Aalst et al., 2024).

a) Pasteurized Goat's Milk Products



Figure 1. Pasteurized goat's milk manufacturing flavoring of pasteurized goat's milk

b) Flavoring of pasteurized goat's milk



Figure 2. Flavor variation of pasteurized goat milk



Figure 3. Photo of the service activity

Figures 1, 2, and 3, illustrate the training session on the production of pasteurized goat milk with flavor variants conducted at Andaleh Farm. During this session, local farmers actively participated in the hands-on process, which included milk pasteurization, flavor addition, and product packaging. The primary objective of this training was to enhance the farmers' skills in dairy product diversification, aiming to increase the market

appeal of goat milk through sensory innovation. The high engagement and enthusiasm demonstrated by the participants reflects their interest in adopting these techniques to improve their home-based dairy businesses. This activity is expected to be a foundation for more competitive and sustainable small-scale dairy enterprises in rural areas.

According to research by (Rybowska and Gromowska, 2022), the dairy market continues to evolve with an expanding range of products that often incorporate innovative elements. Their study indicates that consumers of milk and dairy-based products generally display a positive attitude toward innovation, recognizing its importance in advancing the dairy industry. Many respondents associated innovative products with unique formulations, improved packaging, and health-enhancing properties. These consumers noticed new products on store shelves and expressed a willingness to purchase and even pay a premium for them.

CONCLUSION

Community service activities have been successfully carried out at Andaleh Farm, focusing on producing pasteurized goat milk and developing various flavor variants. These activities ran smoothly and enhanced the farmers' knowledge and practical skills in milk processing. As a result, farmers created flavored goat milk products that were more appealing in taste and visual presentation, increasing their marketability. Importantly, this initiative lays the groundwork for long-term community empowerment through product innovation and value addition. By equipping farmers with the necessary competencies and tools, the program fosters greater self-reliance and opens opportunities for income diversification. Furthermore, the approach demonstrated in this project can be replicated in other rural areas with similar resources and challenges. Introducing new product lines and continuous mentoring can enhance the sustainability and scalability of this initiative, ultimately contributing to the resilience of local agribusinesses and rural economies

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