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# Implementation of Food Safety for Processed Goat Milk Products Based on Hygiene and Sanitation at Ainuna Farm Dairy Milk

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## ABSTRACT

Goat milk products, such as pasteurized and iced varieties, are widely consumed and provide an alternative to cow's milk as an animal protein source. Goat milk products' food safety, however, is a critical concern that requires attention to personal hygiene and sanitation throughout processing. The purpose of this community service project was to identify and assess the food safety procedures used by one of the MSMEs that produce dairy milk at Ainuna Farm. The methods used in this community service included a survey of the Ainuna Farm Dairy Milk MSME, interviews with the business owner, and education about food safety. The results showed that several habits, such as not wearing gloves, masks, or head coverings, still did not adhere to hygienic and sanitation requirements. The method of open cooling raises the possibility of contamination. The goat's milk satisfied quality standards, although it was overly flavored and colored. Sources of contamination may arise from unsanitary processing environments, including flooring, ventilation, walls, windows, and doors. To guarantee the safety of the finished product, processing equipment still needed to be improved in terms of more stringent cleanliness. Outreach initiatives were therefore carried out to raise awareness of the value of food safety and cleanliness in the production area as well as information about the processing of goat milk. The goal of this community outreach was to raise owner and staff knowledge from 83.33% to 100%. This project successfully raised awareness of the value of food safety and cleanliness, and also offered suggestions for enhancing the processing method to produce safer and more hygienic goat milks for consumers.

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## INTRODUCTION

Food safety is crucial for MSMEs engaged in the production of processed food and beverages. The implementation of food safety involves efforts to shield products from physical, chemical, and biological contaminants that could harm or jeopardy customers' health (Latifasari et al., 2025; Putri et al., 2024). In the food production process, food safety, including sanitation and hygiene, is crucial, even for relatively simple products such as goat milk items. By incorporating food safety principles into their production systems, SMEs can guarantee that consumers are protected from health hazards that increase from consuming contaminated food. In addition to shielding customers from health hazards brought on by consuming contaminated food, food safety also helps to preserve the company's viability and reputation (Lestari, 2020; Putri et al., 2024). Since MSMEs frequently contribute significantly to the local food supply, it is essential to comprehend and put into practice proper food safety practices in order to reduce risks that could endanger the community (Palupi et al., 2023; Wahongan et al., 2021). One application of food safety is a hygiene and sanitation process during the manufacturing of food products (Njatrijani, 2021). Hygiene itself is an effort to maintain the cleanliness of the subject, whereas sanitation is the supply of equipment and facilities to support hygiene activities (Cahyani et al., 2022). Furthermore, implementing Good Manufacturing Practices (GMP) for processed food in MSMEs serves as a starting point for small and medium-sized firms (SMEs) and established major industries seeking distribution permit certification. These permissions apply to the Indonesian Home Industry Food Production Permit (P-IRT), as well as Halal and BPOM certifications. Good Manufacturing Practices (GMP) for processed food is a guideline that regulates how to implement good, safe, quality-assured food production and fulfills food safety requirements (Latifasari et al., 2023).

The processed goat's milk products known as pasteurized and iced are created by heating goat's milk to a specific temperature and then combining it with additional ingredients, including sugar, sweeteners, and flavorings. Ainuna Farm Dairy Milk is a goat's milk processing facility located in Pamijen Village, Sokaraja, Banyumas (Agustia et al., 2024). Production at the Ainuna Farm Dairy Milk MSME is carried out by the owner, Mr. Ahmad Natsir Tsalatsa, assisted by his wife and one employee. Goat milk and iced goat milk are produced in the owner's kitchen using basic tools such as a gas stove and a saucepan for boiling the milk. Despite being packaged in food-grade, heat-resistant packaging, the product is susceptible to food safety hazards during the manufacturing and marketing phases of goat milk due to a lack of space, equipment, and processing techniques.

In order to reduce the possibility of hazardous food contamination, this community service aimed to educate the MSME company owners of Ainuna Farm Dairy Milk on the value of hygiene in goat milk production. Hopefully, by participating in this outreach program, MSME owners and staff will learn more about the importance of hygiene and sanitation in the processed food industry.

## METHODS

This activity was conducted at a small-scale goat milk producer, Ainuna Farm Dairy Milk, located in Pamijen Sokaraja Village, Banyumas Regency. The objective of this activity was to assess the current situation of the goat milk producer regarding food safety. This involved conducting field observations and surveys, conducting interviews, and providing solutions (Darmawan & Maryati, 2023; Dewi et al., 2019; Nurul Asya et al., 2023). Aspects examined include personal hygiene, food hygiene, raw material quality, processing room layout, sanitation, water quality, and waste management. These were collected through interviews using an interview guide and observations using a checklist. Data validity in this study


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was assessed using triangulation methods. These included source, method, and time. Figure 1 shows the steps of activity implementation.

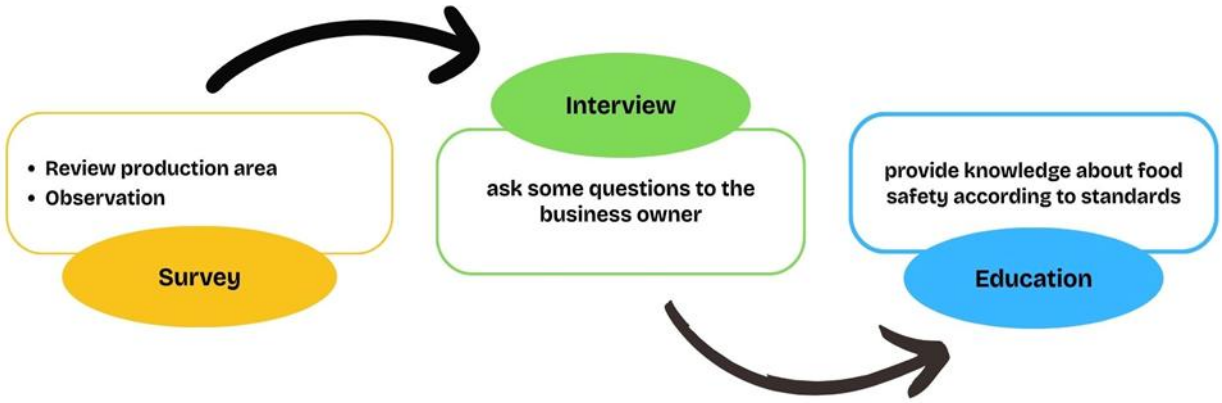


**FIGURE 1**. Steps of community service implementation

Figure 1 depicts the phases of activity implementation, which comprised a survey to observe the circumstances, state, and procedures at the Ainuna Farm Dairy Milk MSME. The business owner was interviewed and discussed the application of sanitation and hygiene elements that had previously been used in the production process (Erawati & Rahardityа, 2024). Furthermore, the discussion results will be used to conduct socialization activities as well as the next discussions about things that need to be improved or things that are already good and should be maintained. A documentation session marked the end of the program.

## RESULT AND DISCUSSION

This community service activity began with a survey and continued with outreach, aimed to raise awareness and education among goat milk processing companies. In Table 1, the findings from the observation and interview stages are displayed.

**TABLE 1**. Goat Milk Processing in Pamijen Sokaraja Village, Banyumas Regency: Findings from Observations and Interviews

| No. | Parameter | The actual situation | Desired situations |
|---|---|---|---|
| 1. | Personal Hygiene | • Employees did not wear head covers, physical contamination from hair falling out during production was possible.<br>• Some workers had long nails, which might serve as a haven for bacteria and pathogens.<br>• Cross-contamination occurred because workers did not wear gloves throughout processing. | • Use of head covering.<br>• Nail hygiene.<br>• Use of gloves and masks. |


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| No. | Parameter | The actual situation | Desired situations |
|---|---|---|---|
| 2. | Food Hygiene | • Goat milk was kept on shelves that are provided in the same location as the producing area.<br>• The freezer holds the goat milk ice, producing results.<br>• No detergent was used to wash the equipment.<br>• Goat and bird pens were adjacent to the producing area. | • The product storage area should be separate or not in the same place as the production area.<br>• It was correct to maintain goat's milk ice at freezing temperatures.<br>• Equipment should be washed regularly using detergent.<br>• In an environment where cleanliness and hygiene are important to prevent exposure to bacteria or microbes in goat's milk products. |
| 3. | Raw Material Quality | • The composition of pasteurized goat's milk and the ice was fresh goat's milk, granulated sugar, pandan leaves, and flavorings (chocolate and strawberry paste).<br>• The products utilized fresh goat milk that was milked on the same day it was produced.<br>• All raw materials used in the production of goat milk were safe and suitable for consumption, and there are no elements added that are harmful to consumer health. | • Already appropriate |
| 4. | Processing Room Layout | • One-stop production and processing facility<br>• The room is narrow and too crowded<br>• There were no suitable facilities for the preparation, processing, and distribution of tofu products. | • Preparation, processin,g and packaging areas should be located in separate areas.<br>• If the processing space is little, make it more orderly; otherwise, it should be larger. |
| 5. | Sanitation | • The floor of the room is tiled, although it is not very clean.<br>• The manufacturing area had two windows, brick walls, wood doors, and visible cobwebs, but the ventilation was sufficient. | The production room must be kept clean regularly. Windows and ventilation were routinely cleaned. |


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| No. | Parameter | The actual situation | Desired situations |
|---|---|---|---|
| 6. | Water quality | • This processed goat milk was produced with the regional water company, which satisfies safety regulations.<br>• Before usage, the water is collected in a storage tank. | Already suitable |
| 7. | Waste management | • Only liquid waste from washing equipment was produced during the production of goat milk products (goat milk and goat milk ice), and this trash was dumped down the drain. | Already appropriate |

## Personal Hygiene

In the goat milk processing process, employee personal hygiene plays a crucial role in preventing contamination and maintaining product quality. Personal hygiene must be practiced before, during, and after work (Pebrianti, 2023). Employees must take a shower and put on clean clothes before beginning work. In order to avoid hair loss that could contaminate the goat's milk products, head covers are also required. Hands must be thoroughly cleaned with soap and water both before and after handling food. This attempts to reduce the transmission of pathogens and illnesses (Baringbing et al., 2023). Fingernails and toenails should be kept short and clean. Gloves are mandatory to prevent cross-contamination, especially for workers with wounds on their hands. Masks are also crucial to prevent contamination from the mouth and nose from entering the food. Increased training on food hygiene and sanitation for all food handlers is also necessary to promote awareness of the significance of putting these practices into practice (Baringbing et al., 2023).

## Food Hygiene

Every day, goat milk was produced and distributed on the same day. Goat milk was pasteurized after being cooked to a temperature of 70°C. The milk was chilled before bottling. An important step in preserving the quality and safety of the product was the use of frigid temperatures during the packing process. Nevertheless, it was found that the only way to chill pasteurized goat milk was to let it air cool in an open container at a room temperature of 25 to 30°C. As a result, numerous flies were seen landing on the products. Flies suggest possible microbial contamination, which could endanger consumer health even though the package complied with distribution regulations (Pisestyani et al., 2021). Owners are advised to pay more attention to safety during the product cooling process, such as using a display case or special storage room to prevent flies and other insects from approaching the product (Navyanti & Adriyani, 2016). The cleanliness of goat milk production tools and equipment should also be maintained. Tools and equipment should be cleaned regularly with running water and dish soap or disinfectant to eliminate germs and bacteria (Makhfirah & Hadi, 2024). Daily completion of this comprehensive cleaning was necessary to guarantee equipment hygiene.


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## Raw Material Quality

Fresh goat milk, granulated sugar, pandan leaves, and flavorings (strawberry and chocolate paste) were the ingredients of pasteurized goat milk, goat milk ice, and goat milk ice cream, among other processed goat milk products. This product is shown in Figure 2. The goat's milk utilized was fresh goat's milk expressed on the same day as production, and it came from goats grown at Ainuna Farm Dairy Milk. Pasteurized milk is made by boiling it at the pasteurization temperature (70-75°C) without adding any other ingredients. In order to eliminate pathogens, prolong the milk's shelf life, and preserve its quality, this pasteurization temperature must be attained (Zainarayati & Santia, 2023). In the meantime, pasteurized goat's milk was combined with granulated sugar, pandan leaves, and flavoring paste (strawberry and chocolate paste) to create goat's milk ice. As a food additive, the Mohler brand of flavoring paste indicates the safe ingredients and displays the halal mark of the product. Every raw ingredient used to produce goat's milk was safe to consume and devoid of any substances that might be harmful to customers' health.


**FIGURE 2**. Goat's milk ice in various flavors

## Lay-out of Processing Room

Interviews regarding the design and layout of the food processing area revealed several aspects that did not meet hygiene and sanitation principles. The production area was too small and there were no separate areas for preparation, processing, packaging, and storage, increasing the risk of cross-contamination. Although ventilation was considered adequate, dust and dirt were still visible. Room lighting was quite enough but might be enhanced. The materials used to construct the walls and floors should be easily cleaned and disinfected. However, gaps can potentially increase contamination. Handwashing facilities are available, but they are not optimal or proper. The lack of soap and waste bins for hand towels needs to be addressed immediately. According to Dewi et al. (2019), an unsuitable layout in a production area results in lower productivity, higher expenses, increased hazards to occupational safety, production delays, and lower-quality products. The manufacturing area for processing goat milk is displayed in Figure 3.


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**FIGURE 3**. Room for goat milk preparation and productionRoom for goat milk preparation and production

## Sanitation

The Ainuna Farm Dairy Milk had implemented good basic sanitation measures. This was evident in the routine cleaning of its premises and equipment. However, several aspects still need improvement to achieve optimal sanitation. These improvements included:

- Clean equipment and rooms regularly with disinfectants. In addition to routine cleaning, disinfectants can help eradicate bacteria.
- Optimize processing area design to minimize cross-contamination. This can be achieved by separating preparation, processing, packaging, and storage areas.

Through the implementation of these sanitation improvement initiatives, the Ainuna Farm Dairy Milk MSME may enhance the safety and quality of its goat milk products, safeguard the health of its customers, and strengthen the business image.

## Water Quality and Waste Management

This goat milk product is made using regional water company that passed safety requirements. Water was gathered in a reservoir before being utilized. It was exclusively used to wash production equipment under the tap. The goat milk products (pasteurized goat milk and goat milk ice) were produced from complete goat milk without added water. To prevent contamination, the water used to wash the equipment is directed through a closed drain system. In the homes industry, proper wastewater treatment will enhance environmental quality by preserving clean water, increase industrial sustainability by encouraging more responsible behaviour and minimising adverse environmental effects, and improve health by lowering disease.

## Impact of Community Service Program

The owners and staff of the Ainuna Farm Dairy Milk participated in a socialization training about the importance of hygiene and sanitation in food processing. This stage included direct education on both existing and required aspects. The topic of education emphasized the importance of implementing hygiene in every MSME production line, beginning with recommendations to wash hands before handling raw materials and carrying out the production process, using masks and aprons for protection,


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and separating raw materials from finished products to prevent cross-contamination. This socialization was delivered by the service team, which is presented in Figure 4. Figure 5 compares the understanding of Ainuna Farm Dairy Milk employees and business owners before and after the socialization on the significance of sanitation and hygiene in the production of processed foods.


**FIGURE 4**. The team of Community Service and Ainuna Daily Milk Farm Owner

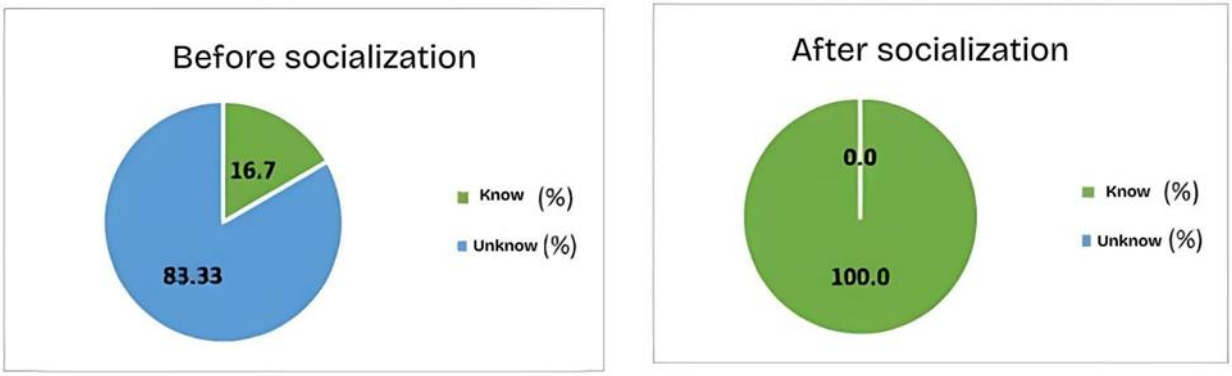


**FIGURE 5**. Knowledge enhancement both prior to and following socialization

Figure 5 showed an increase in knowledge among goat milk processing business owners before and after the outreach program. Public awareness about the importance of implementing hygiene had risen since the first time around, when 83.33% of workers were aware of its relevance, while 16.7% were not. After that, employee knowledge reached 100% after the outreach program. The findings align with the research conducted by Putri et al. (2024), which indicated an enhancement in knowledge and awareness following the dissemination of information on the significance of hygiene and food safety in the production areas of goat milk products. In order to guarantee that food products are free from dangerous substances and generate high-quality this indicates that business partners recognize the seriousness of hygiene standards in every food production process. However, this data has limitations because it's possible that survey respondents gave very subjective responses or didn't completely comprehend the questions.

## Nutrition Facts

Nutrition facts on food labels are a key focus for consumers when they try to figure out the nutritional value of a product and calculate their daily dietary requirements. Although not all processed foods are yet required to have nutritional information on their labels, several companies are taking advantage of


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this to improve the value of their goods. Here are some more details regarding the nutritional content of goat milk ice cream and pasteurized goat milk made by the Ainuna Farm Dairy Milk:

## NUTRITION FACTS OF PASTEURIZED GOAT MILK

| | | |
|---|---|---|
| **Serving size** | | |
| **Servings per pack (200 mL)** | | |
| **AMOUNT PER SERVING** | | |
| **Total energy** | | **111.44 kcal** |
| **Energy from fat** | | 41.76 kcal |
| | | **% Daily value*** |
| **Total fat** | **4.64 g** | **6.62%** |
| **Protein** | **8.82 g** | **14.70%** |
| **Total Carbohydrate** | **8.60 g** | **3.12%** |
| **Sugar** | **9.12 g** | |

**% Daily Value (DV) according to energy requirement 2150 kcal.*
*You may have higher or lower energy needs.*

**NUTRITION FACTS OF ICED GOAT MILK**

| | | |
|---|---|---|
| **Serving size** | | |
| **Servings per pack (200 mL)** | | |
| **AMOUNT PER SERVING** | | |
| **Total energy** | | **97.86 kcal** |
| **Energy from fat** | | 39.78 kcal |
| | | **% Daily value*** |
| **Total fat** | **4.42 g** | **6.32%** |
| **Protein** | **10.34 g** | **17.24%** |
| **Total Carbohydrate** | **4.18 g** | **1.52%** |
| **Sugar** | **9.96 g** | |

**% Daily Value (DV) according to energy requirement 2150 kcal.*
*You may have higher or lower energy needs.*

## CONCLUSION

Based on the activities conducted, a number of suboptimal personal hygiene behaviours were discovered, including the failure to wear gloves, masks, or head coverings when handling food. The processing space, which was adjacent to restrooms or toilets, was not hygienic. Customers were at greater risk of physical and microbiological contamination as a result of this behavior. Nevertheless, the Ainuna Farm Dairy Milk MSME identified several favorable food hygiene features, including the proprietor's dedication to appropriate heating and refrigerated packaging. In addition, the owner was committed to maintaining raw material quality, ensuring ingredients are fresh and undamaged, and utilizing food additives that match industry requirements. Furthermore, following the outreach initiatives, there was a 100% enhancement in knowledge about the seriousness of hygiene standards. This community service activity had an influence on raising awareness of the importance of cleanliness and food safety, as well as making recommendations for improving the goat milk production process.


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