Available online at : http://alive.lppm.unand.ac.id/

Andalasian Livestock

ISSN 3063-1912 (Online)

Research Article

Consumption of Pasteurized Whole Milk Challenges in Padang, Indonesia: Insights from Consumers and Business Perspectives

Eli Ratni* and Lendrawati

Department of Animal Production Technology, Faculty of Animal Science, Universitas Andalas, Padang, 25163, Indonesia

*Corresponding author: eratni@ansci.unand.ac.id

License and copyright: Copyright: © 2024 by the authors. Open-access publication under the terms and conditions of the ***Creative Commons Attribution-NonCommercial-ShareAlike (CC BY-NC-SA)*** license

Article history:
Received: 06-01-2024 | Revised: 12-01-2024 | Accepted: 25-01-2024 | Published: 29-01-2024

ABSTRACT

This study investigates the challenges and opportunities surrounding the decline in local pasteurized whole dairy milk consumption in Indonesia, focusing on West Sumatra. Despite potential health benefits, factors such as limited availability, storage challenges, and concerns about taste and product quality have hindered the adoption of whole milk as a mixing ingredient in contemporary beverages. Through a survey of beverage outlets in Padang City and analyzing consumer preferences, this research identifies critical barriers businesses face and proposes interventions to address them. These interventions include improving milk accessibility, providing business educational programs, promoting taste and quality benefits, supporting recipe development, conducting market research, and collaborating with suppliers. By addressing these challenges, businesses can expand consumer choice, stimulate demand, and drive growth in the whole milk-based beverage market, ultimately benefiting local dairy farmers and public health in Indonesia.

Keywords: dairy, livestock business, pasteurization, smallholder, West Sumatra

INTRODUCTION

Whole dairy milk consumption in Indonesia presents a worrying scenario with a significant gap between production and consumption (Novitawati *et al*., 2023). The average milk consumption in Indonesia remains relatively low, with individuals consuming only about 0.5 glasses of milk per week per person (Suryono & Setiawan, 2021). This low consumption rate could be attributed to various factors, such as production levels, import dynamics, health considerations, and cultural preferences. Besides that, the availability of alternative milk sources, such as plant-based milk substitutes, is also an issue (Haas *et al*., 2019). Understanding these factors is crucial for policymakers and stakeholders to address the challenges and opportunities in the dairy industry in Indonesia.

In particular, the growth of livestock businesses in the local whole milk production sector in West Sumatra is currently hampered by several crucial problems. The dominant livestock business is still managed conventionally by small-medium enterprises (SMEs), which also process milk on a small industrial scale. Through analysis of data from the Central Bureau of Statistics (BPS) of West Sumatra Province for 2017-2022 (Figure 1), it was found that local cow's milk consumption has decreased significantly, especially among the productive youth (Ratni *et al*., 2022). The decline in consumption of 377.5 tonnes, or approximately 6,291 kg per month in

DOI: 10.25077/alive.v1.n1.p70-77.2024

the last five years, indicates a deep need for innovative solutions. The decline in local whole dairy milk consumption not only threatens the economy of local farmers but also has an immediate impact on public health and the sustainability of agricultural ecosystems.

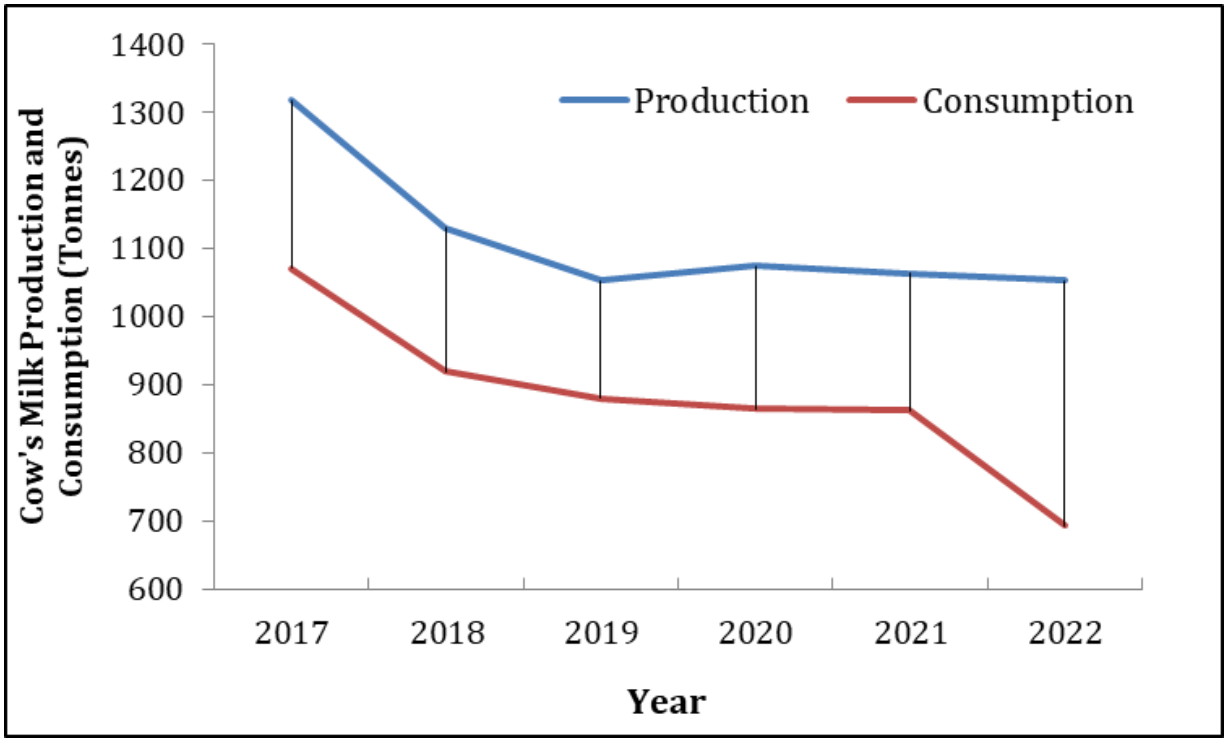


Figure 1. Gap overview of the level of production and consumption of cow's milk in West Sumatra (Data of BPS, figured by authors)

Studies have shown that consumption, production, and inflation levels significantly affect milk imports in Indonesia (Budiani & Sudirman, 2020). Furthermore, the gap between milk production and consumption has led to the need for Indonesia to import raw materials from other milk-producing nations (Novitawati *et al*., 2023). This reliance on imports highlights the challenges faced in meeting the domestic demand for milk in the country.

Interestingly, research has indicated that whole milk consumption may have potential benefits, as observed in studies associating whole milk intake with lower BMI and protection against severe childhood obesity (Vanderhout *et al*., 2020; Beck *et al*., 2017). However, the choice between whole and reduced-fat milk can impact various health parameters, with whole milk consumption leading to increased body weight and caloric intake compared to low-fat milk consumption (Yamin *et al*., 2013). Moreover, the association between whole milk consumption and cardiovascular risk factors has been explored in different populations, with varying results (Sun *et al*., 2014). While some studies suggest that whole milk consumption may improve cardio metabolic profiles by lowering blood pressure and triglyceride levels (Muñoz-Cabrejas *et al*., 2023), others have found a positive association between whole milk consumption and mammographic density (García-Arenzana *et al*., 2013).

The food and beverage (F&B) business in Padang City, the capital of West Sumatra, has increased since the COVID-19 pandemic. The beverage outlets most sought after by consumers are those that provide open spaces directly connected to nature in an effort to minimize virus transmission in public locations. An increase has yet to match the number of beverage outlets in the supply of beverages made from whole milk from dairy cattle. Most of the generation in that city consumes various beverage products at the productive age stage, equivalent to high school

and university students. Businesses serve beverage products with various flavors, mixtures of ingredients and toppings. The concern raised by the research team is that if the millennial generation is now less introduced to pure milk-based drinks, not only will the level of preference be low, but the generation will never know the existence of pure milk products. A related consequence is that the level of milk consumption is declining among Padang city residents, which will contribute to lowering the national milk consumption level. Decreased milk consumption leads to a build-up of production at dairy cattle or goat farms. It will weaken the dairy cattle industry and related upstream industries.

The authors conducted a consumer opinion survey of beverage outlets in Padang City by providing a structured questionnaire to answer the research topic. Ten outlets and ten customers for each contemporary drink were selected as a purposive sampling method. The targeted finding of this research activity is a picture of public interest in the knowledge of whole milk products mixed in beverages in Padang city, which is related to the percentage of consumption of these products compared to various other drinks. The results of this research contribute to the strategies to be set in applying science and technology to develop livestock businesses in West Sumatra.

MATERIAL AND METHODS

This study utilized survey methodology to investigate consumer preferences for contemporary beverages using pasteurized whole milk in Padang City, West Sumatra. A structured questionnaire was administered, complemented by in-person interviews with customers, owners, and staff members of beverage companies in 10 locations. A total of 140 respondents aged 17 years and above, capable of making purchasing decisions for personal consumption, participated in the study.

Quality assessments of contemporary beverage offerings were conducted on two variants: a blend of pasteurized whole milk sourced from local dairy farmers in Padang Panjang City and a beverage containing ultra-high temperature (UHT) milk typically obtained from supermarkets in Padang City, both located in West Sumatra. The proportion of whole and UHT milk in each beverage variant remained consistent. The selection criteria for the beverages tested were based on the top five menu items commonly offered to consumers. A comprehensive evaluation covering physical, flavor, and aroma attributes was conducted on 100 milk-based drinks.

This study used a descriptive research design with a quantitative approach. Data collected through surveys were then statistically analyzed using descriptive quantitative research methodology. The primary purpose of this descriptive research is to provide a detailed description and insight into consumer responses (Sugiyono, 2013).

RESULTS AND DISCUSSION

A survey was conducted in ten contemporary beverage outlets in Padang City; the names of the top five milk-based menus offered to consumers were listed. In contemporary beverages, many options abound, each offering its unique blend and flavor profile. Among the diverse range of choices, several variants emerge based on their composition and taste similarities. Notably, a selection of latte-based beverages graces the menu, including Coffee Lattes, Cappuccino, Moccachino, Mocha Lattes, Caramel Lattes, Hazelnut Lattes, Vanilla Lattes, Taro Lattes, and Ice Coffee Lattes. A series of clearly named milk coffee variants were featured, such as Coffee Milk Brown, Milk Coffee, Banana Milk Coffee, Strong Milk Coffee, and Caramel Milk Coffee. For

 DOI: 10.25077/alive.v1.n1.p70-77.2024

enthusiasts of chocolate-infused delights, options like Red Velvet, Milky Caravan, Caramel Chocolate, Chocolate Milk, and Oreo Chocolate are sure to tantalize the taste buds. Adding a touch of uniqueness are matcha-flavored selections like Matcha Latte and Matcha Milk. In essence, this array of beverages presents an array of tempting choices for aficionados of contemporary refreshments.

Table 1 presents the consumer response to beverage products made from whole milk, with a total sample size of 140 respondents. The table delineates various parameters related to the products' physical form, taste, and smell, along with the corresponding frequencies and percentages.

Table 1. Consumer response to beverage products made from whole milk (n=140)

Parameter	Category	f (%)
Physical form of the product	Milk fat did not blend well with other ingredients	93
	Color of beverage product is not attractive	88
	Product viscosity reduced	87
	Foam volume reduced	72
	Milk mixed well	7
Product taste and smell	Less sweetness	100
	More tasty	100
	Similar flavor	12
	Fishy-smelling	33

Under the parameter of the product's physical form, most respondents (93%) expressed dissatisfaction with the milk fat not blending well with other ingredients. Additionally, 88% of respondents found the color of the beverage product to be unappealing, while 87% noted a reduction in product viscosity. Moreover, 72% of respondents observed decreased foam volume, while only a tiny percentage (7%) reported that the milk mixed well. Regarding product taste and smell, all respondents (100%) preferred less sweetness and found the beverages tastier. However, only 12% of respondents perceived a similarity in flavor between a blend of whole and UHT milk, while a notable proportion (33%) detected a fishy smell in the products.

Research indicates that UHT milk contains higher concentrations of certain compounds like dimethyl sulfide, ketones, and aldehydes than raw and pasteurized milk samples (Vázquez-Landaverde *et al*., 2005). Additionally, UHT milk has been found to have significantly higher concentrations of certain off-flavor compounds than pasteurized milk (Vázquez-Landaverde *et al*., 2005). Regarding consumer preferences, previous research has indicated differences in liking between pasteurized and UHT milk, with pasteurized milk generally being preferred over UHT milk in sensory evaluations (Chen *et al*., 1996). However, despite differences in taste perception, UHT milk and pasteurized milk have been found to have similar nutritional compositions, including milk fat content, protein, and essential minerals (Liem *et al*., 2016). Nevertheless, further research is needed to investigate what causes the differences in mixing and color in contemporary drinks in outlets.

Furthermore, the analysis of reasons for businesses' reluctance to utilize pasteurized whole milk as a mixing ingredient in contemporary beverages revealed several noteworthy findings in Table 2. The majority of respondents indicated that the pricing of whole milk was similar to that

of UHT milk, with some noting that whole milk was slightly cheaper. It suggests that price may be a minor deterrent for businesses considering whole milk. Limited availability emerged as a primary concern among businesses. The challenge in sourcing pasteurized whole milk may hinder its adoption as a mixing ingredient despite its potential cost advantages.

Respondents highlighted additional efforts required for the presentation and storage of whole milk, along with its storage and processing challenges. However, the longer shelf life of whole milk compared to UHT milk may offer some advantages regarding inventory management and product longevity. Cole *et al*. (2021) stated that milk pasteurization ensures the safety of fluid milk by killing pathogens known to occur in milk. It prolongs shelf life by destroying undesirable enzymes and reducing the number of viable spoilage microorganisms.

Table 2. Identifying reasons for businesses' reluctance to use whole milk as a mixing ingredient in contemporary beverages (n=40)

Parameter	Reason
Price	Similar pricing
	Slightly cheaper
Difficulty in obtaining whole milk	Limited availability
Limitations in storage and processing	Requires additional effort for presentation and storage
	Challenges in storage and processing
	Longer shelf life
Effect on taste and product quality	Reduced sweetness
	Blander taste compared to UHT milk
	Alters texture and flavor
	Difficult to blend with other ingredients
Preference for UHT Milk	Fear of altering established recipes
	Lack of previous experience
	Preference for UHT milk after trial

Several factors related to taste and product quality was identified as potential drawbacks of using whole milk. These include reduced sweetness, blander taste compared to UHT milk, alterations in texture and flavor, and difficulties in blending with other ingredients. These considerations may influence businesses' decisions regarding mixing ingredients to maintain desired flavor profiles and product consistency. Sulistyaningsih (2014) concluded that the product attributes influencing consumers' purchases are taste attributes and flavor variants. Fear of altering established recipes, lack of previous experience, and a preference for UHT milk even after trial emerged as significant factors influencing businesses' decisions. This preference may stem from familiarity with UHT milk, ease of procurement, and perceived consistency in product quality.

Overall, while whole milk presents some cost advantages and potential benefits regarding shelf life, its limited availability, storage challenges, and perceived effects on taste and product quality may outweigh these advantages for businesses. Preferences for UHT milk, driven by concerns about recipe alteration and ease of procurement, further contribute to the reluctance to use whole milk as a mixing ingredient in contemporary beverages. These findings underscore the importance of considering various factors, including availability, storage requirements, taste

considerations, and market preferences when making decisions regarding mixing ingredients in the beverage industry.

Based on the findings from the research, several interventions could be considered:

1. Addressing availability issues: Given that limited availability was identified as a primary concern among businesses, efforts could be made to improve the accessibility of whole milk. It might involve establishing better supply chains or incentivizing local dairy farmers to produce more whole milk.
2. Educational programs: Businesses could benefit from educational programs or workshops that provide information and training on the handling, storing, and processing of whole milk. By addressing concerns related to presentation and storage, businesses may become more inclined to incorporate whole milk into their beverage offerings.
3. Promotion of taste and quality: There may be opportunities to promote the unique taste and quality benefits of beverages made with whole milk. Educating consumers about the potential flavor enhancements and health benefits of whole milk could increase demand and incentivize businesses to utilize it as a mixing ingredient.
4. Recipe development: Encouraging experimentation with recipes that incorporate whole milk could help businesses overcome their fear of altering established recipes. Providing resources and support for recipe development and testing may help businesses identify new and innovative ways to incorporate whole milk into their beverage offerings.
5. Market research: Further market research to understand consumer preferences and trends regarding whole milk-based beverages could provide valuable insights for businesses. This information could help businesses tailor their offerings to meet consumer demand and capitalize on emerging market opportunities.
6. Collaboration with suppliers: Collaboration with suppliers of whole milk could help businesses overcome some of the challenges associated with storage and processing. By working closely with suppliers to address logistical issues and ensure product quality, businesses may feel more confident incorporating whole milk into their beverage offerings.

Addressing the challenges identified in the research through targeted interventions could help businesses overcome barriers to using whole milk as a mixing ingredient in contemporary beverages. By increasing accessibility, providing education and support, and promoting the taste and quality benefits of whole milk, businesses may be more inclined to incorporate it into their beverage offerings, ultimately expanding consumer choice and driving growth in the market.

CONCLUSION

The decline in local whole dairy milk consumption in Indonesia, particularly in West Sumatra, presents significant challenges for farmers and public health. Despite potential health benefits associated with whole milk consumption, factors such as limited availability, storage challenges, and concerns about taste and product quality have hindered its adoption as a mixing ingredient in contemporary beverages. Businesses face barriers ranging from sourcing difficulties to fear of recipe alteration, contributing to a preference for UHT milk. Addressing these challenges requires multifaceted interventions, including efforts to improve milk accessibility, educational programs for businesses, promotion of taste and quality benefits, recipe development support, market research, and collaboration with suppliers. These interventions aim to overcome barriers, stimulate demand, and ultimately expand consumer choice, driving growth in the whole milk-based beverage market while supporting local dairy farmers and enhancing public health.

REFERENCES

Badan Pusat Statistik. (2023). https://bps.go.id/

Beck, A., Heyman, M., Chao, C., & Wojcicki, J. (2017). Full fat milk consumption protects against severe childhood obesity in Latinos. *Preventive Medicine Reports, 8*, 1-5. https://doi.org/10.1016/j.pmedr.2017.07.005

Budiani, N. and Sudirman, I. (2020). Analysis of effect of consumption, production, and inflation levels on the import of milk in Indonesia. *International Journal of Education and Social Science Research, 03*(01), 143-149. https://doi.org/10.37500/ijessr.2020.3012

Chen, A., Resurreccion, A., & Paguio, L. (1996). Age appropriate hedonic scales to measure food preferences of young children. *Journal of Sensory Studies, 11*(2), 141-163. https://doi.org/10.1111/j.1745-459x.1996.tb00038.x

Cole, S., A. Goetze, L. Meunier-Goddik. (2021). Pasteurization Milk. Encyclopedia of Dairy Sciences (Third edition). Academic Press: Oxford. https://doi.org/10.1016/B978-0-12-818766-1.00142-2

García-Arenzana, N., Navarrete-Muñoz, E., Lope, V., Moreo, P., Vidal, C., Laso-Pablos, S., … & Pollán, M. (2013). Calorie intake, olive oil consumption and mammographic density among spanish women. *International Journal of Cancer, 134*(8), 1916-1925. https://doi.org/10.1002/ijc.28513

Haas, R., Schnepps, A., Pichler, A., & Meixner, O. (2019). Cow milk versus plant-based milk substitutes: a comparison of product image and motivational structure of consumption. *Sustainability, 11*(18), 5046. https://doi.org/10.3390/su11185046

Liem, D., Bolhuis, D., Hu, X., & Keast, R. (2016). Short communication: influence of labeling on australian and chinese consumers' liking of milk with short (pasteurized) and long (uht) shelf life. *Journal of Dairy Science, 99*(3), 1747-1754. https://doi.org/10.3168/jds.2015-10516

Muñoz-Cabrejas, A., Laclaustra, M., Guallar-Castillón, P., Sánchez-Recio, R., Jarauta, E., Casasnovas, J., … & Moreno-Franco, B. (2023). Association of beverage consumption with subclinical atherosclerosis in a spanish working population. *Scientific Reports, 13*(1). https://doi.org/10.1038/s41598-023-33456-w

Novitawati, M., Windiana, L., & Ariadi, B. (2023). Assessing the viability of establishing a dairy milk business in the village unit cooperative of gandusari district, blitar regency: a feasibility analysis. *Agriecobis Journal of Agricultural Socioeconomics and Business, 6*(01), 88-97. https://doi.org/10.22219/agriecobis.v6i01.24741

Ratni, E., Lendrawati, V. Setyaka, Arief. (2022). Animo Masyarakat terhadap Konsumsi Susu Murni sebagai Dasar Pemilihan Strategi Produksi Susu Sapi Perah di Kota Padang. Laporan Penelitian. Universitas Andalas: Padang.

Sugiyono. 2013. Metode Pedidikan Pendekatan Kuantitatif, Kulitatif, dan R&D. Bandung: Alfabeta.

Sulistyaningsih, D. 2014. Perilaku Konsumen Terhadap Produk Susu Murni Pasteurisasi MomoMilk. Tesis. IPB University. Bogor.

Sun, Y., Jiang, C., Cheng, K., Zhang, W., Leung, G., Lam, T., ... & Schooling, C. (2014). Milk consumption and cardiovascular risk factors in older chinese: the guangzhou biobank cohort study. *Plos One, 9*(1), e84813. https://doi.org/10.1371/journal.pone.0084813

Suryono, S. and Setiawan, B. (2021). The effects of milk consumption on blood calcium concentration and bone density of adolescents boys. *Indonesian Food Science and Technology Journal, 5*(1), 12-16. https://doi.org/10.22437/ifstj.v5i1.14653

Vanderhout, S., Aglipay, M., Torabi, N., Jüni, P., Costa, B., Birken, C., ... & Maguire, J. (2020). Whole milk compared with reduced-fat milk and childhood overweight: a systematic review and meta-analysis. *American Journal of Clinical Nutrition, 111*(2), 266-279. https://doi.org/10.1093/ajcn/nqz276

Yamin, H., Barnea, M., Genzer, Y., Chapnik, N., & Froy, O. (2013). Long-term commercial cow's milk consumption and its effects on metabolic parameters associated with obesity in young mice. *Molecular Nutrition & Food Research, 58*(5), 1061-1068. https://doi.org/10.1002/mnfr.201300650

Vázquez-Landaverde, P., Velázquez, G., Torres, J., & Qian, M. (2005). Quantitative determination of thermally derived off-flavor compounds in milk using solid-phase microextraction and gas chromatography. *Journal of Dairy Science, 88*(11), 3764-3772. https://doi.org/10.3168/jds.s0022-0302(05)73062-9