

ARTICLE INFORMATION

Received: April, 21, 2026

Revised: June, 6, 2026

Available online: June, 7, 2026

at : <https://e-jurnal.iphorr.com/index.php/minh>

The nutritional, microbiological, and bioactive potential of dangke fermented food as a functional food in Indonesia: A literature review

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodikah³,
Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding author: *E-mail: anggorolaangka80@gmail.com

Abstract

Background: Dangke is a traditional fermented dairy product from South Sulawesi, Indonesia, with considerable potential to be developed as a functional food based on local wisdom. Beyond its role as a source of animal protein, dangke contains lactic acid bacteria and bioactive compounds that may confer health benefits. However, scientific evidence regarding its nutritional value, microbiological characteristics, and bioactive potential remains fragmented and has not been systematically synthesized.

Purpose: To identify, synthesize, and critically evaluate various research results related to nutritional composition, microbiological safety, and potential of bioactive compounds in dangke.

Method: This study employed a literature review design by analyzing national and international scientific articles published between 2015 and 2025. Literature searches were conducted using PubMed, Google Scholar, ScienceDirect, and ResearchGate databases. Eligible articles were analyzed narratively through summarizing, synthesizing, comparing, and critically appraising processes to evaluate the nutritional composition, microbiological properties, and bioactive potential of dangke.

Results: A total of 10 relevant studies were included. The findings indicate that dangke contains relatively high protein levels (approximately 14–18%), fat, and essential micronutrients such as vitamin A, vitamin C, zinc, and selenium. Microbiologically, dangke is predominantly composed of lactic acid bacteria, particularly *Lactobacillus plantarum* and *Lactobacillus fermentum*, which exhibit probiotic potential. Fermentation processes produce bioactive peptides associated with antihypercholesterolemic, antihyperglycemic, anti-obesity, antimicrobial, and immunomodulatory effects, primarily supported by experimental animal studies.

Conclusion: Based on available scientific evidence, dangke demonstrates a combination of nutritional value, beneficial microbiological activity, and bioactive potential that supports its role as an Indonesian functional food. Nevertheless, broader application requires standardized production methods, improved food safety practices, and further human clinical studies to strengthen the level of evidence.

Keywords: Bioactive Peptides; Dangke; Evidence-Based Nutrition; Functional Food; Lactic Acid Bacteria.

INTRODUCTION

Indonesian traditional food is one of the strategic assets in supporting food security and diversification of national nutritional sources. Food products based on local wisdom not only play a role as a source of energy and nutrients, but also have the potential to provide additional health benefits if they contain bioactive components and beneficial microorganisms. One of the traditional foods that has begun to be studied in this context is dangke, which is a dairy product typical of Enrekang Regency, South Sulawesi, which is made through the milk coagulation process using papain enzymes from papaya sap (Qalbi, 2022; Sulmiyati, & Said, 2018).

Dangke is traditionally consumed as a source of animal protein by the local people. Some studies show that dangke has a relatively high protein content, ranging from 14–18%, with the main components coming from the casein and *whey* fractions of milk protein (Sulmiyati, & Said, 2018; Sasmita, Djbir, & Yustisia, 2023). In addition to protein, dangke also contains milk fat, minerals such as calcium and phosphorus, and fat-soluble vitamins that play an important role in the body's metabolism and bone health (Maharani, Safitri, Basri, Royani, & Musa, 2024; Komalasari, Afgani, & Melandani, 2025). This nutritional content makes dangke potentially an alternative source of animal protein based on local food, especially for people with limited access to conventional protein sources such as meat, fish, and eggs (Sasmita et al., 2023; Fathiaturrhama, Kusdianawati, & Suharli, 2022).

In addition to nutritional value, dangke also attracts attention from the microbiological aspect. The manufacturing process involving heating milk and natural coagulation allows spontaneous fermentation by lactic acid bacteria (BAL) derived from milk and the processing environment (Nabilah, Listiyowati, & Astuti, 2022; Nur, Hafsan, & Wahdiniar, 2015). Several studies report the presence of *Lactobacillus plantarum* and *Lactobacillus fermentum* species in dangke, which are known to have probiotic potential and play a role in maintaining the balance of the gut microbiota (Nur et al., 2015). However, traditional production processes that have not been standardized also have the potential to increase the

risk of contamination of pathogenic microorganisms if hygiene and sanitation aspects are not implemented properly (Permata, Sari, & Anggraini, 2023; Setiarto, Nur, Romulo, & Herlina, 2025).

Furthermore, the dangke fermentation process has the potential to produce bioactive compounds and peptides through the hydrolysis of milk protein. Several experimental studies have shown that dangke consumption is associated with decreased levels of total cholesterol and triglycerides, improved blood glucose regulation, and weight loss in animal models with metabolic disorders (Sasmita et al., 2023; Sasmita, 2023; Kamali, Safitri, Pratama, Bamahry, & Itami, 2025). The effect is thought to be related to the activity of lactic acid bacteria and bioactive peptides that play a role in modulating lipid and glucose metabolism, although most of the available evidence still comes from in vivo studies in experimental animals.

In the context of functional food, dangke has characteristics that are in line with the definition of functional food, namely food that in addition to meeting basic nutritional needs also provides specific health benefits (Suciati, & Safitri, 2021). Several literature reviews report that dangke has potential probiotic, antihypercholesterolemic, antihyperglycemia, antimicrobial, and immunomodulatory activity (Setiarto et al., 2025; Ahyar, Hardjo, & Kadir, 2023). However, the level of evidence for such clinical benefits still varies and has not been fully supported by clinical trials in humans.

Although various studies on dangke have been conducted, scientific studies that systematically integrate aspects of nutritional value, microbiological characteristics, and bioactive potential of dangke are still limited. The information that exists tends to be spread across various publications with different focuses. Therefore, a comprehensive and evidence-based literature review is needed to summarize and analyze scientific findings related to the field.

The purpose of this literature review is to identify, synthesize, and critically evaluate various research results related to nutritional composition, microbiological safety, and potential of bioactive compounds in dangke. In addition, the study also aims

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodiqah³, Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding authoe: *E-mail: anggorolaangka80@gmail.com

The nutritional, microbiological, and bioactive potential of dangke fermented food as a functional food in Indonesia:
A literature review

to highlight the research gaps that still exist as well as opportunities for further development. The main emphasis in this study lies in the integration of these three aspects as a scientific basis in supporting the development, standardization, and utilization of dangke as a safe, quality, and sustainable Indonesian functional food.

RESEARCH METHOD

This study uses an observational design with a literature review approach, which is a secondary research method to identify, evaluate, and synthesize relevant scientific findings related to nutritional value, microbiological characteristics, and bioactive potential of dangke as a functional food. This approach was chosen because it was able to provide a comprehensive overview of the available scientific evidence and identify consistent patterns of findings and gaps in research that still exist (Hoshino, Fukui, Hida, & Obama, 2021).

The data sources used are secondary data obtained from national and international scientific publications, including original research articles, reviews, and scientific reports available in full text. Literature search was carried out systematically through several online databases, namely PubMed, Google Scholar, ScienceDirect, and ResearchGate, with a publication year range of 2015–2025. The selection of the period aims to obtain scientific evidence that is relatively up-to-date and relevant to the latest developments in the study of dairy-based functional foods.

The literature search strategy uses a combination of keywords in Indonesian and English, including "dangke" "local food", "nutrition", "microbiology", "bioactive potential", "nutrition", and "functional food". Keyword combination keywords are tailored to the characteristics of each database to maximize the sensitivity and specificity of search results. The

literature selection process was carried out in stages, starting from the screening of titles and abstracts, followed by a full-text review to assess the suitability of the topic, the quality of the methodology, and the completeness of the reported data. After going through the screening stage, 10 relevant literature to the research topic was obtained.

Articles that met the inclusion criteria were then analyzed using a narrative approach. The analysis is carried out through several stages, namely *summarizing* to summarize the main findings of each study, *synthesizing* to integrate the results between studies, *comparing* to identify similarities in findings, *contrasting* to examine differences in results or methodological approaches, and critically appraising to assess the limitations and strength of the available evidence. This approach is widely used in the review of the health and nutrition literature to produce critical and evidence-based interpretations.

The variables analyzed in this study include dangke as an independent variable, as well as nutritional content, microbiological characteristics, and bioactive potential as dependent variables. Data related to nutritional content were evaluated based on the results of proximate and micronutrient analysis reported in the literature, while microbiological aspects were analyzed through the identification of the type and number of microorganisms, especially lactic acid bacteria. Bioactive potential was assessed based on reports of biological activity such as antihypercholesterolemia, antihyperglycemia, probiotic, and antimicrobial effects, taking into account the level of evidence of each study, especially the differences between animal experimental studies and observational or clinical studies in humans (Sasmita et al., 2023; Setiarto et al., 2025; Sasmita, 2023; Ahmad, Kadir, Malaka, Ilhamuddin, Soraya, & Hardjo, 2023).

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodiqah³, Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding author: *E-mail: anggorolaangka80@gmail.com

RESEARCH RESULTS

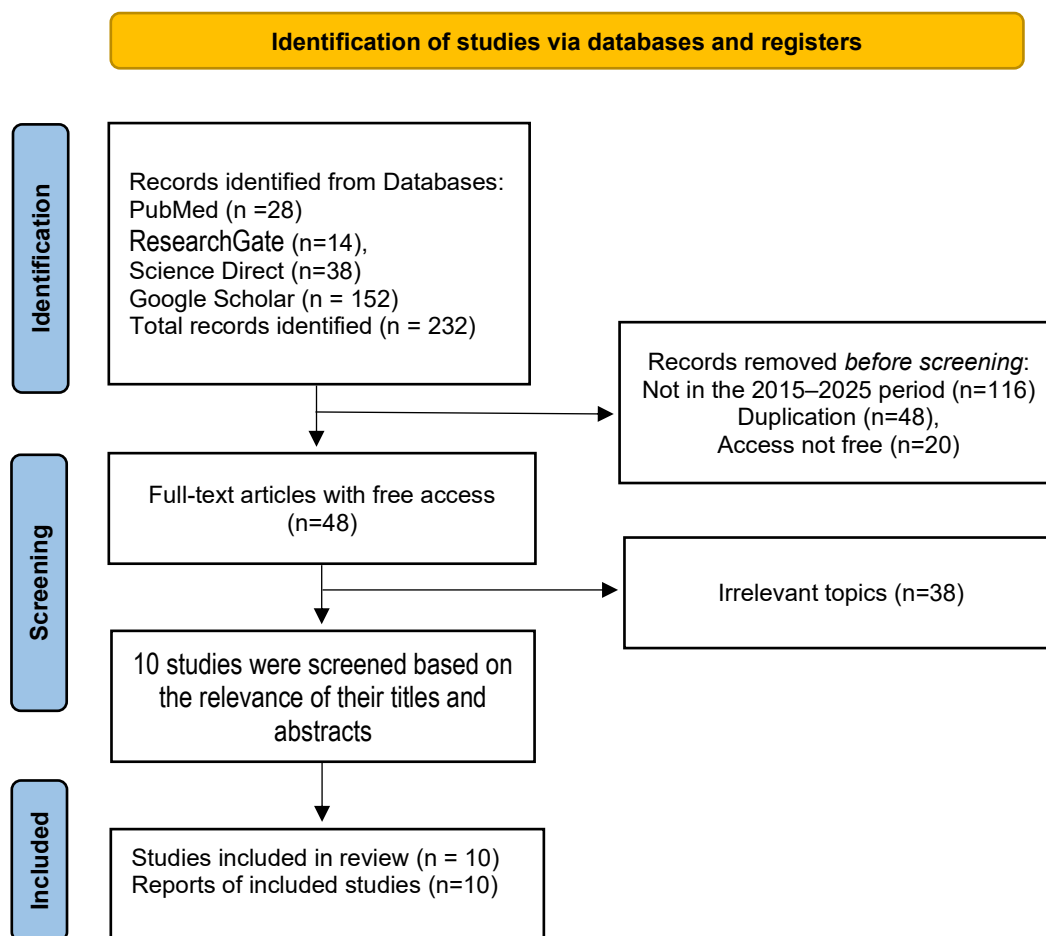


Figure PRISMA Flow Diagram

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodiqah³, Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding authoe: *E-mail: anggorolaangka80@gmail.com

The nutritional, microbiological, and bioactive potential of dangke fermented food as a functional food in Indonesia:
A literature review

Table Description of Selected Articles

(Author, Year) (Country)	Purpose	Method	Results
(Sasmita et al., 2023) (Indonesia)	This study aimed to evaluate the effect of dangke on hypercholesterolemia and hypertriglyceridemia in model mice induced with propyltiourasil (PTU) and a high-fat diet.	In vivo testing, dangke intervention and simvastatin were administered for 14 days after hyperlipidemia induction. Total cholesterol and serum triglyceride levels were analyzed and compared with the normal control group (n=6).	1. Dangke contains fermented bioactive peptides that play a role in lowering cholesterol and triglyceride levels. 2. The lactic acid bacteria (probiotics) in the pandake help modulate the gut microbiota and reduce cholesterol absorption. 3. The bioactive compound in the form of fermented lactic acid works synergistically to reduce blood lipid levels in hyperlipidemia mice. Dangke has the potential to be a functional food with health benefits, especially in the management of cholesterol and triglycerides.
(Windyasmara & Wicaksono, 2025) (Indonesia)	To determine the effect of adding lime extract to cow's milk dangke cheese on chemical quality (moisture content, pH, yield) and physical quality (texture).	The study used five treatments with the addition of lime extract as much as 0 ml, 0.5 ml, 1 ml, 1.5 ml, and 2 ml.	1. The addition of lime extract to dangke cheese affects the moisture content, pH, yield, and texture, which are related to the stability and nutritional quality of the product. 2. Changes in pH and moisture content can affect the activity of microbes in the soil, especially lactic acid bacteria that play a role in in fermentation and probiotic potential. 3. Lime extract contains bioactive compounds such as flavonoids and citric acid that can provide a natural preservation effect while increasing the functional value of dangke as a healthy food. Thus, the addition of lime extract not only improves the physical and chemical properties of the dangke, but can also increase the bioactive potential and shelf life of the product.

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodikah³, Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding authoe: *E-mail: anggorolaangka80@gmail.com

DOI: <https://doi.org/10.33024/minh.v9i3.3034>

The nutritional, microbiological, and bioactive potential of dangke fermented food as a functional food in Indonesia:
A literature review

(Author, Year) (Country)	Purpose	Method	Results
(Umarella et al., 2023) (Indonesia)	Knowing the macronutrient content of traditional dangke foods.	The study used a descriptive design by examining the content of carbohydrates, fats, proteins, crude fiber, and water in dangke samples in the laboratory.	The macronutrient content in dangke is as follows: 1. Carbohydrates: 4.70% 2. Fat: 13.32% 3. Protein: 14.02% 4. Crude fiber: 9.72% 5. Water: 47.94% The highest value was found in the moisture content (47.94%), followed by protein (14.02%) and fat (13.32%).
(Dirayanti et al., 2025) (Indonesia)	Investigating the potential use of whey dangke and <i>Lactobacillus plantarum</i> bacteria as substrates in microbial fuel cells (MFCs) for generate bioelectricity.	Dangke whey, which is rich in lactose and nutrients, is used as a source of carbon in MFCs with varying concentrations whey (20%, 80%, dan 100%) and stirring speed (90, 120, and 150 rpm). Voltage output measurements are carried out to determine optimal conditions.	1. Whey dangke contains lactose and nutrients that act as a substrate for microorganisms, especially <i>Lactobacillus plantarum</i> , which actively break down lactose and produce acid. 2. This microbial activity shows the bioactive potential of whey dangke in supporting the biological processes that produce bioelectricity in MFC. 3. The breakdown of lactose and acid production by microorganisms is not only important for fermentation, but also contributes to the conversion of energy in the form of electricity, so whey dangke plays the role of an environmentally friendly renewable energy source. The use of whey dangke as a substrate in MFC also indicates the bioactive added value of dairy product waste, which has not been optimally utilized so far.

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodikah³, Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding authoe: *E-mail: anggorolaangka80@gmail.com

The nutritional, microbiological, and bioactive potential of dangke fermented food as a functional food in Indonesia:
A literature review

(Author, Year) (Country)	Purpose	Method	Results
(Setiarto et al., 2025) (Indonesia)	Provide a comprehensive overview of the data, including history, philosophy, production methods, microbiology, nutritional value, health benefits, safety aspects, and shelf life, and identify future development challenges and directions.	A comprehensive literature review that integrates various researches related to dangke from the aspects of culture, production, microbiology, and nutrition.	1. Dangke is a traditional cheese from South Sulawesi that is made by coagulation of milk using papain enzymes from papaya sap, followed by spontaneous fermentation by lactic acid bacteria (LAB). 2. The dangke microbiota mostly consists of LABs that have the potential to be probiotics with functional benefits such as antimicrobial, antioxidant, antihypertensive, antihyperglycemic, antihypercholesterolemic, and help with anemia. 3. Dangke production faces obstacles such as unstandardized methods, uncontrolled fermentation, poor hygiene practices, and short shelf life, thus posing risks to product quality and safety.
(Maharani et al., 2024) (Indonesia)	Analyze the micronutrient content found in dangke.	The study used an observational descriptive design with a micronutrient content analysis test.	The content of micronutrients in dangke is as follows: 1. Vitamin C: 0,001988% 2. Vitamin A: 0,00613% 3. Mineral selenium: 0,00000174% 4. Mineral zinc: 0,002729% Vitamin A had the highest levels among the micronutrients tested.
(Nur et al., 2025) (Indonesia)	Identifying the potential of probiotics from lactic acid bacteria (LAB) contained in dangke, a traditional food from buffalo milk in Curio District, Enrekang.	LAB isolation was carried out using de Man Rogosa Sharpe's (MRS) selective media so that.	1. The discovery of <i>Lactobacillus plantarum</i> and <i>Lactobacillus fermentum</i> in the pandake shows the existence of lactic acid bacteria (LAB) which have the potential to be probiotics. 2. This LAB plays an important role in improving digestive health, helping to maintain the balance of the intestinal microbiota, and providing positive effects such as antimicrobial and immunomodulation.

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodikah³, Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding author: *E-mail: anggorolaangka80@gmail.com

The nutritional, microbiological, and bioactive potential of dangke fermented food as a functional food in Indonesia:
A literature review

(Author, Year) (Country)	Purpose	Method	Results
			3.The existence of these probiotics adds to the bioactive value of dangke as a functional food, which is not only a source of nutrition but also supports health through microbiological mechanisms. With the potential of this probiotic, dangke can be further developed as a product that provides wider health benefits for consumers.
(Ahmad et al., 2023) (Indonesia)	Assessing the effect of dangke consumption on body weight, fasting blood glucose levels, and total cholesterol in rats fed a high-fat and fructose (HFFD) diet.	The research uses experimental laboratory design. A total of 24 Sprague–Dawley mice (100–200 g) were divided into 6 groups (4 each).	1.Weight loss in the dangke group is related to the content of lactic acid bacteria (LAB) which can modulate the gut microbiota and increase energy metabolism. 2.Decreased fasting blood glucose levels indicate the role of dangke bioactive peptides that have the potential to increase insulin sensitivity and inhibit carbohydrate absorption. 3.The decrease in total cholesterol was associated with the activity of LAB in assimilating cholesterol and modifying lipid metabolism in the gastrointestinal tract. Kombinasi LAB dan peptida bioaktif menjadikan dangke as a functional food that has the potential to prevent obesity and metabolic disorders due to a high-fat and high-fructose diet.
(Ahyar et al., 2023) (Indonesia)	Examining the various health benefits of dangke based on the results of published research.	This study is a literature study with article search through an electronic database.	1.Dangke has a positive effect on health. 2.Dangke contains various types of lactic acid bacteria that have the potential to be probiotics. 3.Dangke has anti-cholesterol and antibacterial activities, including the ability to inhibit the growth of pathogenic bacteria such as <i>Escherichia coli</i> and <i>Staphylococcus aureus</i> .

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodiqah³, Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding authoe: *E-mail: anggorolaangka80@gmail.com

The nutritional, microbiological, and bioactive potential of dangke fermented food as a functional food in Indonesia:
A literature review

(Author, Year) (Country)	Purpose	Method	Results
(Kamali et al., 2025) (Indonesia)	To determine the effect of dangke administration on Body Mass Index (Lee Index) in obese male white rats of the Sprague Dawley strain.	The research used a true experimental laboratory design with a pre-post-test with control group design.	4. Consumption of dangke can increase calcium and phosphate levels in saliva and support the remineralization of tooth enamel because it has the main content of cow's milk. Dangke contributes to improving the nutritional status of children and can significantly increase hemoglobin levels in pregnant women in the second trimester with anemia. 1. The decrease in the Lee Index in the treatment group showed the role of lactic acid bacteria (probiotics) in the gut that are able to modulate the gut microbiota and fat metabolism. 2. The dangke fermentation process produces bioactive peptides that have the potential to improve energy regulation and inhibit the accumulation of fat tissue. 3. Similar weight loss effects at low and high doses indicate that the bioactive activity of dangke is efficient at certain doses, without a sharp dose-response effect. These results confirm the potential of dangke as a functional fermented food that can be used as a nutritional intervention to help control obesity.

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodiqah³, Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding author: *E-mail: anggorolaangka80@gmail.com

DOI: <https://doi.org/10.33024/minh.v9i3.3034>

DISCUSSION

Dangke is a traditional dairy-based food product that has unique characteristics because the processing process involves natural coagulation using papain enzymes and spontaneous fermentation. Based on the results of the literature review, dangke not only plays a role as a local food source, but also shows potential as a functional food through a combination of nutritional content, microbiological activity, and bioactive compounds produced during the processing and fermentation process (Setiarto et al., 2025).

Nutritional Content of Dangke

The results of the study show that dangke has a relatively balanced macronutrient content with the dominance of protein and fat. Descriptive research by Umarella et al. reported that dangke contains about 14.02% protein, 13.32% fat, 9.72% crude fiber, with a moisture content of almost 50% (Umarella, Bamahry, Polanunu, Safitri, & Pramono, 2023). This protein content is in line with other research reports that dangke protein ranges from 14–18%, depending on the type of milk and processing method (Sulmiyati & Said, 2018; Sasmita et al., 2023). Milk protein has high biological and digestibility value, so dangke has the potential to be an efficient alternative source of animal protein, especially in areas with limited access to meat and fish. In addition, the carbohydrate content in dangke is generally relatively low, ranging from 1–3%, which is mostly derived from milk lactose that is not fully fermented during the processing process (Fathiaturrehma et al., 2022; Jannah & Haris, 2023).

In addition to macronutrients, dangke also contains important micronutrients. Maharani et al. reported the presence of vitamin A, vitamin C, selenium, and zinc in dangke, with vitamin A as the dominant component (Maharani et al., 2024). In addition, dangke also contains important minerals such as calcium and phosphorus which are generally found in the form of calcium phosphate as part of the structure of milk casein. This mineral plays an important role in the formation and maintenance of healthy bones and teeth. Vitamin A plays a role in vision function, immunity, and cell differentiation, while selenium and zinc contribute to the antioxidant

system and immune regulation. Although the level of these micronutrients is relatively small, its contribution is still relevant if dangke is consumed regularly as part of the community's diet (Maharani et al., 2024; Komalasari et al., 2025).

Aspects of Dangke Microbiology

Dangke is a milk fermentation product that contains lactic acid bacteria (BAL) as the dominant microorganism. Isolation of BAL by Nur et al. identified the presence of *Lactobacillus plantarum* and *Lactobacillus fermentum*, which are known to have probiotic potential (Nue et al., 2015). BAL plays a role in improving the balance of the intestinal microbiota, strengthening the intestinal barrier, and inhibiting the growth of pathogenic microorganisms through the production of lactic acid and antimicrobial compounds (Nabilah et al., 2022; Suciati, & Safitri, 2021).

However, the microbiological characteristics of dangke are greatly influenced by traditional production methods that have not been standardized. Setiarto et al. assert that uncontrolled fermentation and suboptimal hygiene practices can increase the risk of pathogenic microbial contamination and shorten the shelf life of products (Setiarto et al., 2025). This shows that although dangke has probiotic potential, the food safety aspect remains a critical factor in its development as a functional food.

Dangke's Bioactive Potential

The dangke fermentation process allows the formation of bioactive peptides through the hydrolysis of milk proteins. Several experimental studies have shown that dangke bioactive peptides are associated with improvements in metabolic parameters. Research by Djabir et al. showed that the administration of dangke in hyperlipidemia rats was able to significantly lower total cholesterol and triglyceride levels, which was attributed to the activity of lactic acid bacteria and bioactive peptides derived from the hydrolysis of fermented milk proteins (especially casein) (Sasmita et al., 2023; Sasmita, 2023).

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodikah³, Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding author: *E-mail: anggorolaangka80@gmail.com

The nutritional, microbiological, and bioactive potential of dangke fermented food as a functional food in Indonesia:
A literature review

In addition to the hypolipidemic effects, Ahmad et al.'s study reported that the consumption of dangke in rats on a diet high in fat and fructose could reduce body weight, fasting blood glucose levels, and total cholesterol (Ahmad et al., 2023). This effect is thought to be related to modulation of the gut microbiota, increased insulin sensitivity, as well as inhibition of nutrient uptake in the gastrointestinal tract by the activity of BAL and bioactive peptides (Ahmad et al., 2023; Kamali et al., 2025). However, it should be emphasized that most of this evidence still comes from in vivo studies in animals, so generalizations to humans should be made with caution.

In addition, several literature reviews reported antimicrobial and immunomodulatory activity in the area. Ahyar et al. mentioned that dangke has the ability to inhibit the growth of pathogenic bacteria such as *Escherichia coli* and *Staphylococcus aureus*, as well as potentially improve nutritional status and hemoglobin in certain groups (Ahyar et al., 2023). However, the level of clinical evidence for such benefits is still limited and requires confirmation through controlled clinical trials in humans.

Dangke as Indonesia's Functional Food

Based on the definition of functional food, dangke meets several main criteria, namely containing essential nutrients, beneficial microorganisms, and bioactive compounds that provide physiological benefits beyond basic nutritional functions (Suciati, & Safitri, 2021). The results of the literature review show that dangke has the potential as a functional food based on local wisdom, especially in supporting metabolic and digestive health (Setiarto et al., 2025; Ahyar et al., 2023).

However, the development of dangke as a large-scale functional food still faces challenges, including variations in product quality, short shelf life, and food safety risks due to traditional production processes (Permata et al., 2023; Setiarto et al., 2025). Therefore, standardization of production processes, fermentation control, and improved hygiene and sanitation are needed to ensure that the health benefits of dangke can be obtained safely and consistently.

CONCLUSION

This literature review shows that dangke is a traditional Indonesian dairy product with valuable nutritional content, especially protein and fat, as well as relatively low amounts of carbohydrates derived from lactose. In addition, dangke also contains essential micronutrients such as vitamin A, vitamin C, selenium, and zinc that contribute to metabolic function and nutritional status of the body. From a microbiological aspect, dangke contains the dominant lactic acid bacteria, especially *Lactobacillus plantarum* and *Lactobacillus fermentum*, which have probiotic potential and play a role in modulating the gastrointestinal microbiota, although the microbiological characteristics and safety of the product are greatly influenced by traditional production methods that have not been standardized. The process of fermentation produces bioactive compounds and peptides that are associated with antihypercholesterolemia, antihyperglycemia, antiobesity, and antimicrobial and immunomodulatory activities, but most of the evidence for these benefits still comes from experimental animal studies and literature reviews, so clinical evidence in humans is still limited. Overall, dangke has the potential as a functional food based on local Indonesian wisdom, but its development and widespread use require standardization of production processes, improvement of food safety, and follow-up research in the form of controlled clinical trials on humans to strengthen the basis of scientific evidence.

REFERENCES

- Ahmad, A., Kadir, S., Malaka, R., Ilhamuddin, I., Soraya, G. V., & Hardjo, M. (2023). Effect of Dangke consumption on body weight, blood glucose, and total cholesterol in rats subjected to high-fat and fructose diet. *Gaceta Médica de Caracas*, 131.
- Ahyar, A., Hardjo, M., & Kadir, S. (2023). Development of the potential of traditional cheese dangke of Enrekang Regency in the health sector: Literature review. *Biology and Medicine*, 15(1), 1–5.

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodiqah³, Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding author: *E-mail: anggorolaangka80@gmail.com

The nutritional, microbiological, and bioactive potential of dangke fermented food as a functional food in Indonesia:
A literature review

- Dirayanti, D., Natsir, H., & Arif, A. R. (2025). Harnessing dangke whey as a sustainable nutrient source for *Lactobacillus plantarum* in microbial fuel cells for bioelectricity generation. *Indonesian Journal of Chemistry*, 25(6), 1830–1843.
- Fathiaturrahma, N., Kusdianawati, K., & Suharli, L. (2022). Dangke Hasil Olahan dari Susu Kuda Liar Sumbawa, Susu Sapi Sumbawa, dan Susu Kerbau Sumbawa. *Anoa: Journal of Animal Husbandry*, 1(2), 88-97.
- Hoshino, N., Fukui, Y., Hida, K., & Obama, K. (2021). Similarities and differences between study designs in short-and long-term outcomes of laparoscopic versus open low anterior resection for rectal cancer: a systematic review and meta-analysis of randomized, case-matched, and cohort studies. *Annals of Gastroenterological Surgery*, 5(2), 183-193.
- Jannah, N. H., & Haris, M. I. (2023). Analisis Mutu Organoleptik Dangke dengan Penerapan Aspek Keamanan Pangan Pengolahannya di Kecamatan Cendana Kabupaten Enrekang. *Jurnal Peternakan Lingkungan Tropis*, 6(1), 37-43.
- Kamali, A. S. K., Safitri, A., Pratama, A. A., Bamahry, A. R., & Itami, D. F. (2025). The Effect Of Dangke Feeding On Body Mass Index In Male White Rats (*Rattus Norvegicus*) With Obesity From The Sprague Dawley Strain. *AVERROUS: Jurnal Kedokteran dan Kesehatan Malikussaleh*, 55-67.
- Komalasari, H., Afgani, C. A., & Melandani, A. (2025). Karakterisasi dan Pemetaan Profil Fisikokimia Dangke Susu Kuda Liar Khas Nusa Tenggara Barat: Characterization and Mapping of the Physicochemical Properties of Wild Horse Milk Dangke from West Nusa Tenggara. *Jurnal Teknologi Dan Mutu Pangan*, 3(2), 80-87.
- Maharani, A. P. S. D., Safitri, A., Basri, R. P. L., Royani, I., & Musa, I. M. (2024). Analisis Kandungan Mikronutrien pada Dangke. *Fakumi Medical Journal: Jurnal Mahasiswa Kedokteran*, 4(2), 127-133.
- Nabilah, F. N., Listiyowati, S., & Astuti, R. I. (2022). Diversitas Pangan Fermentasi Berbasis-Susu di Indonesia dan Kandungan Gizinya. *Indonesian Journal of Agricultural Sciences/Jurnal Ilmu Pertanian Indonesia*, 27(4).
- Nur, F., Hafsan, H., & Wahdiniar, A. (2015). Isolasi bakteri asam laktat berpotensi probiotik pada dangke, makanan tradisional dari susu kerbau di Curio Kabupaten Enrekang. *Biogenesis: Jurnal Ilmiah Biologi*, 3(1), 60-65.
- Permata, D. A., Sari, R. M., & Anggraini, T. (2023). Produksi dangke dengan koagulan papain kasar dan sari kunyit sebagai pewarna alami. *Jurnal Teknologi Pertanian Andalas*. 26(2): 254–261.
- Qalbi, H. A. (2022). *Analisis Usaha Dangke Susu Sapi Perah Di Dusun Panette, Desa Lebang, Kecamatan Cendana, Kabupaten Enrekang*. Skripsi Universitas Bosowa.
- Sasmita, S. (2023). *Efek pemberian dangke asal Enrekang terhadap kadar glukosa dan kolesterol darah tikus pemodelan diabetes melitus dan hiperkolesterolemia* [Tesis magister, Universitas Hasanuddin]. Repository Universitas Hasanuddin.
- Sasmita, S., Djbir, Y. Y., & Yustisia, I. (2023). Efek pemberian dangke terhadap kadar kolesterol dan trigliserida darah tikus pemodelan hiperkolesterolemia dan hipertrigliseridemia. *Majalah Farmasi dan Farmakologi*. 27(2):43-46.
- Setiarto, R. H. B., Nur, N., Romulo, A., & Herlina, V. T. (2025). Dangke: unveiling Indonesian traditional fermented cheese from Enrekang, South Sulawesi. *Journal of Ethnic Foods*, 12(1), 16.
- Suciati, F., & Safitri, L. S. (2021). Pangan Fungsional Berbasis Susu dan Produk Turunannya. *Journal of Sustainable Research In Management of Agroindustry (SURIMI)*, 1(1), 13-19.
- Sulmiyati, S., & Said, N. S. (2018). Karakteristik dangke susu kerbau dengan penambahan crude papain kering. *Agritech*, 38(3), 345-352.
- Umarella, S., Bamahry, A. R., Polanunu, N. F. A., Safitri, A., & Pramono, S. D. (2023). Analisis Kandungan Makronutrien Makanan Tradisional Dangke. *Fakumi Medical Journal: Jurnal Mahasiswa Kedokteran*, 3(11), 829-835.
- Windyasmara, L., & Wicaksono, A. (2025). Chemical quality of dangke cheese from cow's milk with lime coagulant: Kualitas kimia keju dangke dari susu sapi dengan koagulan ekstrak jeruk nipis. *Agrisaintifika: Jurnal Ilmu-Ilmu Pertanian*, 9(1), 1–9.

Anggoro La Angka^{1*}, Aryanti R. Bamahry², Dian Fahmi Utami², Yani Sodikah³, Abdul Mubdi Ardiansar Arifuddin Karim⁴

¹Program Studi Profesi Dokter Fakultas Kedokteran Universitas Muslim Indonesia

²Departemen Ilmu Gizi Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Ilmu Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Muslim Indonesia

Corresponding author: *E-mail: anggorolaangka80@gmail.com