

STUDY OF SOME ETHNIC TRADITIONAL DAIRY BEVERAGES OF DIFFERENT COUNTRIES

काशी हिन्दू
विश्वविद्यालय



BANARAS HINDU
UNIVERSITY

THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF

Master of Science (Agriculture)

in

**Animal Husbandry and Dairying
(Dairy Technology)**

Supervisor

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Submitted by

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CERTIFICATE

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Through: The Head,
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Dear Sir,

I have great pleasure in forwarding the thesis entitled “**Study of some ethnic Traditional Dairy Beverages of different countries**” submitted by **Miss. Priyanka Rani, I.D. No. 19412AHD007, Enrolment No. 378789**, in partial fulfilment of the requirement for the degree of **Master of Science (Agriculture) in Animal Husbandry & Dairying (Dairy Technology)**, Department of Dairy Science & Food Technology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi.

This is to certify that the work has been carried out solely by **Miss Priyanka Rani** under my supervision and guidance and his findings and data presented herein are genuine and original to the best of my knowledge and belief and no part of the work has been submitted for any other degree or institution.

Thanking you,

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(Dr. V. K. Paswan)
Supervisor

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By
Priyanka Rani

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ACKNOWLEDGEMENT

*I bow my head to **Almighty God**, whose blessings are constantly with me, and with whom I have successfully completed my course work and research work without encountering any obstacles. I bend my head to **Mahadev**, who serves as a spiritual support and motivation for me to pursue a life filled with joy, courage, self-confidence, assisting others, honesty, and a positive outlook.*

*I send flowers of veneration to **Bharat Ratna Mahamana Pandit Madan Mohan Malaviya Ji**, the founder of the Banaras Hindu University and a renowned social reformer, for his values for life, his sacrifices and fight for the cause of humanity's welfare, communal harmony, and general growth.*

*I'd like to take this opportunity to thank my esteemed supervisor, **Dr. V. K. Paswan**, Department of Dairy Science and Food Technology, Institute of Agricultural Science, **Banaras Hindu University**, for his meticulous guidance, indelible inspiration, persistent encouragement, ingenious suggestions, mellifluous nature, and indefatigable attitude. I will always remember his fatherly affection for me during my time as a student under him, which helped me cope with many difficult situations.*

*I am grateful to **Prof. D. C. Rai**, Head, Department of Dairy Science and Food Technology, Institute of Agricultural Sciences, **Banaras Hindu University**, for providing all necessary facilities, as well as for his discerning comments, valuable suggestions, co-operations, and helpful attitude toward me throughout the investigation.*

*I wish to express my heartfelt and advent thanks to the members of my Advisory Committee, **Dr. D.S. Bunkar**, Department of Dairy Science and Food Technology, and **Dr. Tarun Verma**, Department of Dairy Science and Food Technology, for their useful suggestions and kind aid offered during the course of study and research work.*

*I deem it my privilege in expressing my gratefulness to **Dr. R. K. Pandey**, Professor, Department of Dairy Science and Food Technology, and **Dr. O. P. Singh**, Assistant Professor, Department of Economics, Institute of Agricultural Sciences, BanarasHindu University, Varanasi for their timely help.*

*In a more personal sense, I owe my sincere gratitude to my loving and venerable mother **Smt. Nirmala Kumari** and my brother **Rahul Ranjan** for their blessing and exhilaration, which always inspired me to rise against the obstacles and*

face them smilingly, no matter how daunting they may seem. They kept me motivated throughout my academic career, allowing me to achieve the current level of satisfaction.

*I pay my sweet and heartiest thanks to my generous seniors, **Mr. Aman sir, Mr. Pankaj sir, Mr. Udaypratap sir, Miss Yamini ma'am and Miss Saloni ma'am** who displayed profound sense of fraternity with elderly help and valuable suggestions to complete this gigantic task,*

*I acknowledge my heartfelt appreciation to my batchmates **Saniya, Prajasattak, Rajendra, Pratikshya, Shraddha and Akansha** and for their affection, pains and indispensable help, which made my study period in the university cheerful. So, thanks a lot for your belief, encouragement, support and love.*

*My heartfelt appreciation goes out to my friends **Rohit, Surbhi, Gopika, Prachi, Saroj, Anuraj, Arvind, Kajal, and Anjala**, whose invaluable inspiration, care, and encouragement gave me with all the moral support I needed to complete this ambitious task,*

*I am also very thankful to all the non-teaching staff members **Shri Himanshu Rai Sir, Shri Sonkar Sir, Shri Anand Sir, Shri Chandrashekhari Sir** of Department of Dairy Science and Food Technology, Institute of Agricultural Sciences, Banaras Hindu University.*

*Above all, my humble and wholehearted gratitude to **Bhagwan Mahadev** for his blessings.*

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ABBREVIATIONS

AEDA	Aroma Extract Dilution Analysis
AFBDGs	African Food-Based Dietary Guidelines
BAS	Blending-after-sterilization
BBS	Blending-before-sterilization
BFJ	Blended Fruit Juice
CAGR	Compound Annual Growth Rate
CCK	Cholecystokinin
cfu/ml	Colony forming units per millilitres
CFU	Colony-forming Units
CIE	Commission Internationale de l'Éclairage
CMC	Critical Micelle Concentration
DAHD&F	Department of Animal Husbandry, Dairying & Fisheries
DMH	Di-methyl hydrazine
DNA	Deoxyribonucleic acid
EPS	Exopolysaccharides
FAO	Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FCCPs	Fellow of American College of Chest Physicians
FD	Flavour Dilution
GAE	Gallic Acid Equivalents
HDL	High Density Lipoprotein
HRAMS	High-resolution Accurate Mass Spectrometry
IU	International Unit
Kcal	Kilo calorie
LAB	Lactic Acid Bacteria
LACF	Low acid canned food
LDL	Low Density Lipoprotein
LDP	Low Density Polyethylene
LLE	Liquid-liquid Extraction
NDDB	National Dairy Development Board
OAVs	Odour Activity Values
PET	Polyethylene Terephthalate

RH	Relative Humidity
RTD	Ready-to-drink
RTS	Ready-to-serve
SAFE	Solvent-Assisted Flavour Evaporation
SPE	Solid-phase Extraction
SSA	Sub-Saharan African
TP	True Protein
UHT	Ultra-high Temperature
UPR-MSC	University of Puerto Rico Medical Science Campus
WHO	World Health Organization
WPCs	Whey Protein Concentrates

INTRODUCTION

Milk is a natural food source for mammals and an almost ideal food. It has a higher nutritional value since it contains body-building proteins, bone-forming minerals, and health-promoting vitamins, as well as lactose and milk fat, which provide energy. Milk and milk products play a significant role in India's food industry and economy. The economic survey said that milk production in country has increased from 146.3 million tonnes in 2014-15 to 198.4 million tonnes in 2019-20. Compared to 2018-19, it has increased by 5.70% according to the government data. According to a study undertaken by the NDDB on milk demand, the expected demand for milk and milk products in 2030 at an all-India level is 266.5 million metric tonnes. The per capita availability of milk was 407 g/day in 2019-20. India is the world's largest milk producer, with 22% of global production, followed by the USA, China, Pakistan and Brazil. Total milk production in world in 2018-19 was 843.04 million tonnes. (Source: FAOSTAT, 2019). Total milk production in India in 2018-19 was 187.7 million tonnes and per capita availability was 394 gms/day. (Source: Basic Animal Husbandry Statistics, DAHD&F, GOI, 2019). Due to an increase in demand for high-quality, hygienic, and packaged milk and milk products, the country's milk processing capacity has grown over time. Of the total milk processed in the country, 65% to 70% is sold as liquid milk. The remaining is turned into cheese, butter, ghee, ice cream, curd, and other dairy products.

Beverages are liquids made for consumption which may be in the form of stimulants like Tea, Coffee, and milk or as refreshers like Soft Drinks, juices and water. Beverages are consumed by all groups of ages to quench the thirst as social drinks and for health and medicinal values. Non-alcoholic beverages are of various types such as fruit-based drinks, synthetic drinks, sweetened aerated water or carbonated drinks and sometimes non-alcoholic beer, wine etc. Beverages were the first to help people overcome their thirst for fluids. With the rise in economic levels, health consciousness, and culinary enthusiasts, a legion of people have moved away from plain water and milk and into a variety of drinks. As a result of this scenario,

several classic drinks are now available on supermarket shelves, either in RTS (Ready-to-Serve) form or in easy-to-make form. These kinds of beverages emerged as the apple of eye for almost all age groups. The diversification comprises, beverages made from fruits (fruit-based beverages; RTS, nectar, cordial squash), flavoured milk beverages (vanilla, chocolate, strawberry etc) and fermented beverages (cultured buttermilk; sweetened, salted or plain) that has given the wide array of choice to modern consumer to choose product of their choice. These beverages are easily digestible, highly refreshing, thirst quenching, appealing, nutrient-dense, and aid in satiety value fulfilment. Because good nutrition is so important for proper growth and development of the body during childhood, as well as maintaining and protecting the body from infectious and non-communicable diseases in adulthood, such health-packed drinks have far outperformed synthetic and caloric drinks and have received higher consumer ratings.

Consumers' increased health consciousness has prompted the beverage industry to create a wide range of beverages. As modern health-conscious consumers demonstrate an increased desire for meals that can improve well-being and reduce the risk of disease, the worldwide functional beverage market is a developing segment of the food business. Fermented milks, especially yogurt-style products, are the most popular functional beverages with kefir in Western Europe and North America and ymer in Denmark are good examples. Notably, the global functional food and drink market increased 1.5-fold between 2003 and 2010 and is expected to grow a further 22.8% between 2010 and 2014 to be worth V21.7 billion with other estimates predicting the market will reach V65 billion by 2016 (Marsh *et al.*, 2014). Dairy-based produce account for approximately 43% of the functional beverage market and is mainly comprised of fermented products (ÖZER & KIRMACI, 2010a). There are so many traditional dairy beverages from different regions of world.

They are prepared from long times and are remains popular in the countries. Fermented dairy beverages like yoghurt, kefir, lassi, kiselo mlyako, matzoon etc. are ethnic traditional beverages which are made by fermentation of bacteria using starter culture. In such types of beverages, there are use of prebiotics and probiotics which make them functional. They contain probiotics, vitamins, and minerals, all of which

may help to strengthen the immune system and avoid sickness. Yoghurt is one of the world's oldest fermented foods. Combination of two types of probiotic bacteria – *Lactobacillus rhamnosus* and *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *Bulgaricus* for starter culture of Kiselo Mlyako. Kefir is a tangy probiotic beverage created from milk that has been fermented with kefir grains, which are microscopic clusters of bacteria and yeasts. In the Caucasus, Eastern Europe, and the Balkans, it has a centuries-old tradition. Koumiss is a traditional fermented dairy product prepared from mare's milk. Amasi is a traditional fermented milk beverage that tastes a lot like kefir.

Milk based beverages are beverages in which main constituent is milk. And to enhance the flavor of milk other ingredients are used like coffee, chocolate, turmeric (haldi), almond etc. This type of beverages helps in many ways to get rid from diseases. For medicinal purpose, it is also used and to get sweet dishes, this type of beverages is used. Milk based beverages are homemade and flavoured with fruit, ice coffee powder, coffee syrup, vanilla essence etc. Some are served hot as well as some are served cold. Licuados are a Mexican handmade blended beverages made with milk, fruit and usually ice. Coffee milk is a mixture of milk and sweet coffee syrup that was named the official state drink of Rhode Island in 1993. Egg Cream is a frothy combination of chilled milk, chocolate syrup, and seltzer. Despite its name, egg cream does not contain either eggs or cream. Bandung is a popular pink-hued beverage popular in Malaysia, especially among the Malai community. Thandai is a milk-based beverage from North India that contains nuts, seeds, and spices. Haldi doodh, often known as turmeric milk, is a popular Indian beverage during the winter months. Badam doodh is a beverage made from almonds that originated in India.

Plant-based beverages are part of a balanced diet that ensures the health and the vigour of the body. They help with cellular regeneration, detoxification, and the treatment of a variety of ailments, and nutritionists prescribe them for a healthy lifestyle. The use of fruit and vegetable beverages for body detoxification, regeneration, and healing is recommended for two reasons: the first is that the essential part (both for vegetables and fruits) is in their sap, which is obtained in the form of juice; and the second is that the juice of raw vegetables and fruits is

assimilated in the body in about 10–15 minutes and is used almost entirely for feeding and regenerating tissues with minimal digestive effort. Natural fruit and vegetable beverages are delicious, nourishing, and high in vitamins, minerals, and phytonutrients, or natural bioactive compounds that interact favourably with food fibres and other substances. Pomegranates, cranberries, acai, noni, and cherries are among the top five healthiest beverages, according to nutritionists at the University of California (Los Angeles).

Cereal-based fermented beverages are traditional and important dietary basics worldwide; traditional LAB-fermented cereal foods found in various geographic areas, the cereal sources used, and the LAB involved (Bergsveinson *et al.*, 2017). These forms of beverages can naturally contain plant-based functional nutrients, such as fibre, flavonoids, vitamins, minerals, and phenolic compounds, which can inhibit oxidative stress, hyperglycaemia, inflammation, and carcinogenesis (Marsh *et al.*, 2014). Cereals have high potential probiotic carriers because it contains functional compounds such as prebiotics and dietary fibres (Irkin, 2019). Examples of cereal-probiotic commercial products are Proviva (Skane Dairy, Sweden), the first oat-based probiotic beverage where the active probiotic microorganism is *L. plantarum* 299v; and Whole Grain Probiotic Liquid (Grainfields, Australia), a refreshing, effervescent drink containing LAB (*L. acidophilus*, *L. delbrueckii*), and yeasts (*Saccharomyces cerevisiae* var. *bouardii* and *S. cerevisiae*) as well as vitamins, enzymes, and amino acids (Corbo *et al.*, 2014). Probiotic millet milk beverages can be fortified with fruit juices to provide the cell viability above the minimum suggested for a probiotic product (6 log 10 cfu/mL based on a daily dose of 100mL) (Gupta & Kumar, 2016).

Whey beverages are fermented or nonfermented products in which whey is used as an ingredient (Gomes *et al.*, 2013). The use of vegetable fat is permitted in the manufacture of these goods, which must include at least 51 percent milk (Santos *et al.*, 2008). Liquid or reconstituted whey is always utilised in fermented whey beverages, whereas whey protein concentrates (WPCs) are favoured in yoghurts. Using WPCs instead of skim milk powder results in a cost reduction in yogurts (Hugunin *et al.*, 2009). Žinčica is a Slovak dairy beverage made from sheep's milk. It's a sweet and sour beverage made from whey, which is often a byproduct of

bryndza cheese production. Žinčica has a long history, but it was largely prepared and consumed by shepherds in hilly regions until the mid-20th century, when it is still served in a traditional wooden cup known as črpák.

India has captured only 1% of global dairy trade despite being the largest milk producer. However, India is a net exporter of all the dairy products except lactose and lactose syrups. Good potential for Indian casein and milk powders and whey cheeses also exists. According to research conducted by Tetra Pak, seven out of ten biggest markets for flavoured milk are in developing countries, while nations like India will drive massive growth of this product. Flavoured milk is world's second most popular liquid dairy product after white milk and its consumption is forecast to increase in India at a CAGR of 20% during 2015 -2020 (Anon, 2015). At present, flavoured milk dominates the dairy beverages segment contributing 60% (in value) to the branded dairy beverages consumed.

Studying about ethnic and traditional dairy beverages of different countries is that the popular beverages in which some beverages are stuck to one community, some beverages to their own countries while some beverages to their own countries and their neighbouring countries. It is about to know the procedures used in making of products at household level by studying the popular beverages. These traditional beverages are very helpful in giving all the essential nutrients and health benefits. Some traditional beverages are not commercialised all over the world which have many health benefits. Thus, the purpose of this study was to study ethnic traditional dairy beverages of different countries all over the world with following objectives:

- (a) To review some ethnic traditional dairy based beverages of different countries.
- (b) To investigate origin and distribution of these ethnic traditional dairy based beverages.
- (c) To review the health benefits of these ethnic traditional dairy based beverages.



REVIEW OF LITERATURE

2.1 Traditional dairy product beverages

Jiménez-Flores *et al.* (2009) studied on “Beverages based on milk fat globule membrane (MFGM) and other novel concepts for dairy-based functional beverages”. It worked on the chemical, biochemical and nutritional advantages that the authentic buttermilk has over the current beverages. It focused on the current status of the research linking human health to components within buttermilk and butter serum.

Özer & Kirmaci (2010b) studied on “Functional milks and dairy beverages”. This article reviewed recent scientific, technological and commercial developments in the functional dairy-based beverage sector. Consumer attitudes toward healthy foods had shifted dramatically over the last decade, and today, improving consumers' health span through healthy food consumption was more important than simply increasing their life span.

Jalali *et al.* (2015) studied on “Prevalence of *Listeria* species in raw milk and traditional dairy products in Isfahan, Iran”. The findings suggested that *L. monocytogenes* can be found in raw milk and traditional dairy products on the market. Due to a lack of suitable control measures, raw milk with modest heat treatment or its use in traditional meals could cause major health concerns.

Kandyliis *et al.* (2016) studied on “Dairy and non-dairy probiotic beverages”. Research showed the review on the recent advances in the field of probiotic beverages both from dairy and non-dairy origin. Studies about the last decades had concluded that the best substrates for delivery of probiotics are dairy products. After intake, such items, particularly probiotics, had a favourable effect on the host gut microbiota and might be able to prevent a variety of disorders.

Farah *et al.* (2017) studied on “Analysis of yoghurts’, whey-based beverages and fermented milks’ labels and differences on their sensory profiles and acceptance”. The labels of yoghurts, fermented milks, and whey-based beverages that were examined provided the main descriptions of the items, but when consumers come into contact with beverage labels, majority of them are unable to distinguish between them and tend to designate all products as yoghurts. As a result, regardless of the major descriptions of the products, the packages and labels were highly similar to one another, which might generate confusion among consumers while making a purchase decision.

Akal *et al.* (2019) studied on “Technology of Dairy-Based Beverages”. This review envisaged that in the near future dairy-based health beverages will gain more popularity than ever before. In this regard, efforts would be made to develop dairy-based beverages that had been shown to have beneficial health effects. This would eventually lead to collaborative efforts between food scientists, technologists, and health scientists.

Mohamadi Sani *et al.* (2019) studied on “Traditional Beverages in Different countries: Milk-Based Beverages”. This research showed that milk and dairy products have always had a special position in the food basket around the world for their high nutritional value. This led to the wide variety of various products from different countries, which in turn have led to an ever increasing in milk consumption in these countries.

Wolf *et al.* (2020) worked on “Beverage milk consumption patterns in the US: Who is substituting from dairy to plant-based beverages?” This research used a survey of 995 US households to explore how dairy milk and plant-based beverage substitutes were consumed. Increased consumption of plant-based beverages had compounded long-term patterns of decreased beverage milk consumption in recent years.

2.1.1 Fermented Dairy-based Beverages

Gadaga (1999a) studied on “A review of traditional fermented foods and beverages of Zimbabwe”. This article reviewed the available information regarding traditional fermented foods in Zimbabwe and made recommendations for potential research areas. Zimbabwe produces a variety of traditional fermented foods and beverages at the household level.

Köksoy & Kılıç (2003) studied on “Effects of water and salt level on rheological properties of ayran, a Turkish yoghurt drink”. The effects of various quantities of water and salt on the rheological characteristics and serum separation of traditionally made ayran during storage were examined in this study.

McMaster *et al.* (2005) studied on “Use of traditional African fermented beverages as delivery vehicles for *Bifidobacterium lactis* DSM10140”. This research showed that a microencapsulation delivery system for *Bifidobacterium lactis*, two existing traditional fermented foods, amasi and mahewu, were used to test a prospective probiotic suitable for usage by the rural people of South Africa. Gellan/xanthan microcapsules containing viable *B. lactis* were tested and introduced to pasteurised beverages under simulated physiological settings.

Aloys & Angeline (2009) studied on “Traditional fermented foods and beverages in Burundi”. The objective of this review is to document the methods by which these Burundian foods and beverages are produced and to devise scientific means to improve their quality and optimize their production methods. Burundi produces a variety of traditional fermented foods and beverages at the household level.

Burger (2010) studied on “Amasi’s sweet success”. This study described about amasi. Amasi had since outgrown its reputation as a traditional dairy meal that could only be found brewing in calabashes in South Africa's most rural areas. Although it had its roots in the culinary traditions of our local tribes, it is now a full-fledged commercial dairy product available in any supermarket, spaza shop, or corner café.

Kabak & Dobson (2011) studied on “An introduction to the traditional fermented foods and beverages of Turkey”. This article focused to describe the traditional fermented foods and beverages of Turkey. Fermented foods and beverages, whether of plant or animal origin, were a staple of many people's diets around the world.

Magalhães *et al.* (2011) studied on “Comparative study of the biochemical changes and volatile compound formations during the production of novel whey-based kefir beverages and traditional milk kefir”. The research was although less lactose utilisation during the production of cheese-whey-based beverages than during traditional kefir grain cultivation in milk, no significant differences were found between samples at the end of the fermentations when considering final ethanol content, pH, lactic acid and acetic acid concentrations, as well as major volatile faeces.

Altay *et al.* (2013a) studied on “A review on traditional Turkish fermented non-alcoholic beverages: Microbiota, fermentation process and quality characteristics”. The variations in qualities of traditional fermented beverages were affected from several factors such as utilization of different raw materials, manufacturing methods, natural microbiota and fermentation conditions.

Chaves-López *et al.* (2014) studied on “Traditional fermented foods and beverages from a Microbiological and Nutritional Perspective: The Colombian Heritage”. This review was the 1st collection of scientific and technical data on the quality and safety of various typical Colombian beverages and foods. In this study, they had analyzed both beneficial and detrimental effects of these products, but most of all, they had pointed out the missing data and therefore future research needs.

Ishii *et al.* (2014) studied on “Study on production and properties of Kumiss of herders in Mongolian Dry Steppe”. This research focused on the quality of Kumiss, which was influenced significantly by elements affecting the quality of horse milk, such as the grass consumed by horses, as well as the habitat and microclimate conditions of the herders' residence (temperature).

Yerlikaya (2014) studied on “Starter cultures used in probiotic dairy product preparation and popular probiotic dairy drinks”. In this article, probiotic bacteria and functional dairy products that were produced by using probiotic bacteria are discussed. Probiotic bacteria were found in dairy products that were made using a variety of fermentation methods, including lactic acid fermentation and starter cultures, and had a variety of textures and aromas.

Erkaya *et al.* (2015) studied on “Effect of thermosonication on physicochemical, microbiological and sensorial characteristics of ayran during storage”. The study's goal was to see if thermosonication could increase the shelf life of ayran, an acidic milk drink. The impact of thermosonication at various temperatures and times on the physicochemical, microbiological, and sensory qualities of ayran during storage was studied.

Zarei Yam (2015) studied on “Isolation and Identification of yeasts and lactic acid bacteria from local traditional fermented camel milk, Chal”. It was discovered that chal includes a wide diversity of lactic acid bacteria, however lactobacillus was the most prevalent type when compared to other species.

Akgun *et al.* (2016) studied on “Effect of reduced fat content on the physicochemical and microbiological properties of buffalo milk yoghurt”. The goal of this study was to see how low-fat buffalo milk affected the textural, chemical, and microbiological aspects of plain buffalo yoghurt after storage at 4 degrees Celsius. On the first, tenth, and twentieth days after manufacturing, four yoghurt samples with varied fat ratios (1.5–6 g/100 g) were analysed.

Aladjadjyan *et al.* (2016) studied on “Traditional Bulgarian Dairy Food”. In this study, traditional Bulgarian dairy food was described. Other well-known Bulgarian traditional dairy products are described in the chapter, such as katyk or krotmach (krutmach, kurtmach), a particular national dairy product with a salty-sour taste that is traditionally prepared in Bulgaria. Bulgarian white cheese sirene is a type of feta cheese that can only be made in Bulgaria, and kashkaval is Bulgaria's traditional yellow cheese. Tarator is a traditional Bulgarian milk food that is similar to

a cold soup made with yoghurt and cucumber (dill, garlic, walnuts, and sunflower oil are sometimes added).

Kumari *et al.* (2016) studied on “Probiotic attributes of indigenous *Lactobacillus* spp. Isolated from traditional fermented foods and beverages of north-western Himalayas using in vitro screening and principal component analysis”. The study was demonstrated the capacity of two *Lactobacillus* isolates as a promising candidate for probiotic applications. Due to their excellent endurance to diverse conditions in the GIT environment in comparison to the commercial probiotic strain, the experiment gave a preliminary selection of these two prospective isolates, *L. brevis* PLA2 and *L. paracasei* PLA8, which might be employed as probiotics.

Mokoena *et al.* (2016) studied on “Perspectives on the probiotic potential of lactic acid bacteria from African traditional fermented foods and beverages”. The purpose of this review was to present an overview of recent discoveries in probiotic LAB applications around the world, with a focus on the appropriateness of African fermented foods and drinks as a viable source of new probiotics.

Chaitali Chakraborty & Bandyopadhyay (2017) studied on “Development and Characterization of Biocolour (Beta Vulgaris) Enriched Low Calorie Lassi”. The lassi had been supplemented with betalain powder, which gave it a crimson colour, to improve its physical appeal. In this study, an effort was made to lower the calories in lassi by utilising sucralose, a zero-calorie sweetener that was 600 times sweeter than sucrose.

Dertli & Çon (2017) studied on “Microbial diversity of traditional kefir grains and their role on kefir aroma”. This study deal about the microflora presents in Turkish Kefir grains and their interaction with the aromatic properties of kefir. The microbial flora of four kefir grains obtained from different parts of Turkey was identified using a pyrosequencing technique, and the volatile chemicals in kefir samples made with these grains were measured.

McGuire (2017) studied on “Cultural histories of Kumiss: tuberculosis, heritage and national health in post-Soviet Kazakhstan”. In the nineteenth century, European doctors began to credit kumiss (fermented mare’s milk) for the apparent absence of tuberculosis among the nomads of the Eurasian steppe. Praise for the drink's medicinal abilities was woven together with idealised pictures of the nomadic pastoralists whose creation it was as European and American medical publications published articles on the "kumiss cure" and Russian doctors opened kumiss sanatoria.

Mojarab & Aghbashlo (2017) studied on “Application of exergy analysis to the dairy industry: A case study of yoghurt drink production plant”. The goal of this study was to do a complete exergy analysis of an industrial-scale yoghurt drink producing plant using real-world data. This research was carried out to determine the thermodynamic inefficiencies of all plant subcomponents in order to determine the breakthrough points for additional energy savings.

Rosa *et al.* (2017) studied on “Milk Kefir: nutritional, microbiological and health benefits”. This study focused on the nutritional and microbiological composition of kefir and presented relevant finding associated with the beneficial effects of kefir on human and animal health. The nutritional value of kefir varied depending on the type of milk used, the microbial makeup of the grains used, fermentation time/temperature, and storage conditions. Kefir had piqued the scientific community's interest due to its multiple health benefits.

Soleymanzadeh *et al.* (2017) studied on “Incidence of Virulence determinants and antibiotic resistance in lactic acid bacteria from Iranian traditional fermented camel milk (Chal)”. Lactic acid bacteria, such as lactobacilli, enterococci, leuconostoc, and weissella species, were isolated from Iranian traditional fermented camel milk (Chal) and tested for virulence determinants (gelE, efaAfm, efaAfs, ace, espfs, cylM, cylA, and cylB), antibiotic sensitivity, and pathogenicity Polymerase chain reaction was used to detect the frequency of virulence genes, and the disc diffusion method was used to test antibiotic susceptibility.

Chawla *et al.* (2018) studied on “Fortification of lassi with vitamin a using natural vegetable powders”. Vitamin A deficiency control was a realizable goal required to address through combination of interventions. Among these, fortification of commonly eatable foods had great potential to help realize this goal. Such foods, on the other hand, might be taken across a narrow range of intakes, so that they provided valuable protection against vitamin

Gul *et al.* (2018) studied on “Rheological, textural, colour and sensorial properties of kefir produced with buffalo milk using kefir grains and starter culture: A comparison with cows’ milk kefir”. The goal of this research was to examine the rheological, textural, colour, and sensory qualities of kefir samples made from buffalo or cow milk utilising two alternative microbial fermentation sources: kefir grains and starter cultures.

Mattiello *et al.* (2018) studied on “Typical dairy products in Africa from local animal resources”. The goal of this study was to identify the most common African dairy products, with a particular emphasis on conventional manufacturing procedures that make use of indigenous animal resources. Fresh cheese, ripened cheese, fermented milk, butter, and dairy by-products were divided into five groups to achieve this goal, based on their nature and production method.

Mule *et al.* (2018) studied on “Low fat lassi prepared by in operation of lemon grass (*Cymbopogon citratus* L.) extract”. The lassi was made from buffalo skim milk with varying quantities of lemon grass extract in this investigation. As a result of the findings, it was determined that lemon grass extract may be successfully used to make herbal lassi. 5 percent lemon grass extract could be used to make the best lassi. The flavouring had no discernible effect on the lassi's composition.

Temerbayeva *et al.* (2018) studied on “Development of Yoghurt from Combination of Goat and Cow milk”. This study described the technology of yoghurt preparation from goat and cow milk in combination ratio of 100:0, 70:30, 50:50, 30:70 and 0:100. The formulation of yoghurt included the mixture of goat and cow

milk, pectin LM-106AS and YM-115-L, prebiotic lactitol and *Bifidobacterium* and *Lactobacillus* ferments.

Velikova *et al.* (2018a) studied on “Microbial diversity and health-promoting properties of the traditional Bulgarian yoghurt”. Bulgarian yogurt was usually associated with good health and longevity. The goal of this research was to determine the present microbiological content of homemade Bulgarian yoghurt.

Anal (2019) studied on “Quality ingredients and safety concerns for traditional fermented foods and beverages from Asia: A review”. This review showed that Asia was well-known for its exotic traditionally fermented food and beverage products produced using a wide range of raw materials, microorganisms and fermentation processes.

Hati *et al.* (2019a) studied on “Technological advancement of functional fermented dairy beverages”. Studies showed that fermentation was considered as a primitive form of bio-preservation that was common to almost all the regions of the world. With traditional milk-fermented products enjoying success in many markets commercially, there was also a simultaneous interest that was increasing interest in the area of functional beverages from a scientific, consumer, and commercial perspective as well.

Irkin (2019) studied on “Natural fermented beverages”. Sugar and sweeteners in beverages were being limited in order to reduce obesity and promote health. Fermented dairy beverages and non-dairy beverages were in high demand in many countries as an alternative to carbonated artificial beverages. Kefir, kumiss, yakult, viili, whey-based drinks, and ayran are examples of fermented milk beverage items that had the potential to deliver beneficial bacteria that were naturally present in the GIT. Many probiotic bacteria and prebiotics could be found in fermented milk beverages on the market. This chapter was gone over the health advantages and characteristics of fermented milk and fermented non-dairy products natural beverages.

Makwana & Hati (2019) studied on “Fermented beverages and their health benefits”. Fermented meals and beverages were some of the first processed foods that humans ate. The fermentation process was used to handle a wide range of dairy, meats and fish, cereal grains, legumes, fruits, and vegetables, as well as their by-products. Fermented foods like yoghurt and cultured milk, wine and beer, sauerkraut and kimchi gained value due to improved shelf life, safety, and organoleptic qualities.

Maurya & Aggarwal (2019) studied on “Fabrication of nano-structured lipid carrier for encapsulation of vitamin D3 for fortification of ‘Lassi’; A milk-based beverage”. The work was designed to encapsulate Vit D in nano structured lipid carrier. A phase inversion based cold water titration method was adopted for preparation of NLC-formulation.

Nancheva (2019) studied on “Bacillus bulgaricus: The Breeding of National Pride”. This chapter was a case study of Bulgarian food nationalism, focusing on yoghurt (kiselo mlyako), which explored the nationalisation of a staple product that has been produced and consumed for millennia in and around the Balkan region. The purpose of this chapter was to investigate the process of nationalisation, demonstrating that the Bulgarization of yoghurt is linked to certain economic, political, and cultural agendas that cannot be pursued unless yoghurt is viewed as ethno-nationally authentic.

Rezazadeh-Bari *et al.* (2019) studied on “Numerical optimization of probiotic Ayran production based on whey containing transglutaminase and Aloe vera gel”. The goal of this research was to improve the probiotic Ayran's functional characteristics.

Sarhir *et al.* (2019) studied on “Characterization of Ayran Aroma Active Compounds by Solvent-Assisted Flavor Evaporation (SAFE) with Gas Chromatography-Mass Spectrometry-Olfactometry (GC-MS-O) and Aroma Extract Dilution Analysis (AEDA)”. The aroma compounds of ayran were isolated using SAFE resulting in a more representative extract of ayran odour compared to liquid–liquid extraction (LLE), solid-phase extraction (SPE), and simultaneous distillation–extraction (SDE).

Turkmen *et al.* (2019) studied on “Probiotic dairy-based beverages: A review”. This review primarily focused on the technology of commercially available milk-based probiotic beverages including acidophilus milk, bifidum milk, acidophilus-yeast milk, acidophilin, etc.

Akkoyun & Arslan (2020) studied on “The impact of quinoa flour on some properties of Ayran”. The physical, chemical, microbiological, and sensory qualities of ayran made from quinoa flour at various ratios were examined in this study. The impact of quinoa addition and storage time on pH, titration acidity, serum separation, L values, and microbe counts was statistically significant (p.05.)

Albuquerque *et al.* (2020) studied on “Macronutrient composition of street food in central Asia: Bishkek, Kyrgyzstan”. According to the findings of this study, the significant availability of street food in Bishkek emphasises its importance to the city's inhabitants. Snacks, foods, and beverages from the past coexist with more modern items. The differences in calories, macronutrients, and lipid profile between homemade and manufactured products reflected different cooking methods and ingredients. It was necessary to create policies that promote the availability of healthful foods and ingredients.

Mabrouk & Effat (2020) studied on “Production of High Nutritional Set Yoghurt Fortified with Quinoa Flour and Probiotics”. The purpose of this research was planned to develop novel set yoghurt supplemented with quinoa flour and probiotics. The results showed that the pH values reversed the acidic trend and steadily fell as the storage duration was extended. It was suggested that quinoa flour could be fortified into yoghurt without causing any problems, and that it had enough promise for future dairy applications.

Lawton *et al.* (2021) studied on “Lactose utilization by *Brettanomyces clausenii* expands potential for valorization of dairy by-products to functional beverages through fermentation”. Consumer interest in functional beverages had lately increased, resulting in market expansion. Alternative microorganisms such as

lactic and acetic acid bacteria, as well as non-Saccharomyces yeasts, are frequently used to make acetic acid-containing fermented beverages like kombucha.

2.1.2 Milk Based Beverages

Becker *et al.* (2005) studied on “Deactivation of riboflavin triplet-excited state by phenolic antioxidants: mechanism behind protective effects in photooxidation of milk-based beverages”. The plant polyphenols found in various flavourings used in milk-based beverages were found to be effective quenchers of the triplet riboflavin responsible for light-induced off-flavors in this study.

Sabliov *et al.* (2008a) studied on “Continuous microwave processing of peanut beverages”. This study looked into the viability of using continuous microwave heating to sterilise peanut beverages as an alternative to using a standard ultrahigh temperature (UHT) system. Peanut Punch (Nestle Trinidad and Tobago Ltd., Port of Spain, Trinidad and Tobago) and Jamaican Irish Moss Peanut Drink (sold by Eve Sales Co., Bronx, NY) had their dielectric characteristics tested.

Malbaša *et al.* (2009) studied on “Milk-based beverages obtained by Kombucha application”. The application of different Kombucha starters to the production of milk-based beverages was the subject of this research. Three substrates were used to grow the local Kombucha culture: sweetened black and green tea, as well as topinambur.

Dai *et al.* (2013) studied on “Dietary factors and risk of Kidney stone: A case-control study in Southern China”. The aim of this study was to investigate the dietary risk factors for kidney stones in southern China. The results confirmed that specific diet can affect stone formation in the Chinese population, and varied risk factors were found for different genders.

Afeiche *et al.* (2018) studied on “Many infants and young children are not complaint with Mexican and International complementary feeding recommendations for milk and other beverages”. Breastfeeding rates among Mexican newborns must be

improved in order to satisfy Mexican and international requirements, according to this study.

Chaudhary *et al.* (2018) studied on “Prospects of Indian traditional fermented food as functional food”. According to this study, practically every community in India has rituals that revolve on fermented food, which was thought to be a good way to introduce probiotics to humans. In Indian regional food as well as tribal cuisine, fermented fish paste, fermented soybeans, and pantabhat or pakhalabhat are common.

Chawla *et al.* (2018) studied on “Characterization of market samples of milk beverage: Thandai”. Thandai is an Indian traditional dairy-based beverage that has been undocumented until now. A market study of commercial liquid thandai concentrate was conducted. There were significant disparities in quality across all five samples, as well as differences and challenges in the manufacture of these concentrates.

Cheng *et al.* (2018) studied on “Hunter versus CIE color measurement systems for analysis of milk-based beverages”. Our goal was to compare the sensitivity of Hunter and International Commission on Illumination (CIE) techniques for measuring whiteness, red/green, and blue/yellow colour of milk-based beverages over a range of compositions at two distinct observer angles (2 and 10°).

Ikeda *et al.* (2018) studied on “Effects of manufacturing processing conditions on retronasal-aroma odorants from a milk coffee drink”. The effects of manufacturing processing circumstances on retronasal-aroma (RA) odorants were examined using gas chromatography-olfactometry and a RA simulator to produce a ready-to-drink (RTD) milk coffee that keeps the original coffee flavour (RAS).

Uma *et al.* (2018) studied on “Comparison of salivary pH changes after of two sweetened Malaysian local drinks among individuals with low caries experience: A pilot study”. The milk-based chocolate drink and sirap bandung, according to this study, create a significant decline in salivary pH in people with little caries experience and fluoride exposure.

Cheng *et al.* (2019) studied on “Effects of milk fat, casein and serum protein concentrations on sensory properties of milk-based beverages”. Our goal was to see how systematically controlled variations in milk fat, true protein, casein, and serum protein concentrations affected the sensory colour, flavour, and texture aspects of milk-based beverages, as well as instrumental colour and viscosity and milk fat globule size distribution.

Kölpin & Hellwig (2019) studied on “Quantitation of Methionine sulfoxide in milk and milk-based beverages – Minimizing artificial oxidation by anaerobic enzymatic hydrolysis”. Flavor changes might result from protein oxidation in milk products due to reactions at methionine residues. The degree of methionine oxidation in milk and milk products, however, was unknown. The researchers used HILIC-ESI-MS/MS to develop a method for quantifying methionine, methionine sulfoxide, and methionine sulfone utilising a stable isotope dilution assay.

Brodock *et al.* (2021) studied on “Difference in preferred fat level, sweetener type and amount of added sugar in chocolate milk in a choice task relate to physical activity and orthorexia”. In this study, they discovered consistent evidence of three distinct customer segments for dark chocolate milk in two discrete choice experiments with overlapping but different populations.

Fernandes *et al.* (2021) studied on “A food pyramid for sub-Saharan Africa. Health protection with Mushroom Nutraceuticals”. Traditional eating has been linked to positive health outcomes and sustainability in Sub-Saharan Africa, despite poverty, chronic hunger, and food insecurity. There is a scarcity of health research on the nutritional quality of African diets. Traditional African cuisine is distinguished by its abundance of herbs and spices, fermented foods and beverages, and use of healthy and whole ingredients.

2.1.3 Plant-based beverages

Kiselova *et al.* (2006) studied on “Correlation between the InVitro antioxidant activity and polyphenol content of aqueous extracts from Bulgarian herbs”. In contrast

to mate, black tea, honeybush, and rooibos foreign species, the water phase antioxidant activity of extracts from 23 Bulgarian medicinal plants was examined in relation to their polyphenol content. A positive association was discovered between antioxidant activity and polyphenol concentration, implying that the antioxidant potential of aqueous plant extracts is attributed to polyphenols to a large extent.

Bandyopadhyay *et al.* (2008) studied on “Effect of beet and honey on quality improvement and carotene retention in a carrot fortified milk product”. The addition of beet and honey to the carrot fortified milk product was very efficient in retarding acidity and free fatty acid growth, pH lowering, and carotene degradation, according to the results of the studies.

Agbor *et al.* (2011) studied on “Antioxidant capacity of some plants foods and beverages consumed in the eastern region of Nigeria”. The antioxidant potentials of several plants, foods, and beverages consumed in Nigeria's Eastern Region were investigated. The findings of this study could aid customers in making decisions based on the antioxidant capability of the samples examined.

Tovar *et al.* (2015) studied on “Nutrition and physical activity environments of home-based child care: What Hispanic providers have to say”. It was discovered that while FCCPs recognise the benefits of healthy food and physical activity, there is a need to address the specific hurdles they confront and operationalize some of their knowledge into everyday activities. This research will help to inform the creation of a culturally relevant, multicomponent intervention for ethnically varied FCCPs to improve their home's food and PA environments, which should improve the dietary, PA, and ST behaviours of the 2- to 5-year-old children they care for.

Gordon (2017a) studied on “Case study: Improving the quality and viability of a traditional beverage – Irish Moss”. The case study of a small beverage manufacturer producing and exporting traditional seaweed beverages, as well as the measures employed over a 14-year period to solve quality and other technical concerns in order to expand market access, was presented in this paper.

Faggi & Vidal (2019) studied on “Uses and perceived benefits of two Latin-American linear parks”. Two linear parks in the cities of Buenos Aires (Argentina) and Palmira (Colombia) were compared and contrasted in terms of their use, significance, and benefit. The major motivations for accessing the park were investigated using a conceptual model that was tested with park visitors. The key conclusion was that the linear parks investigated were mostly used for commuting, but they also served a variety of other purposes. This opened the door to a variety of recommendations for design, management, quality, and other relevant aspects.

Manoharan *et al.* (2020a) studied on “Development, standardization, quality evaluation and shelf-life studies of indigenous beverage – Jigarthanda”. The paper details the research conducted to identify and standardise the traditional beverage Jigarthanda, which was native to the Indian state of Tamil Nadu and hails from the Madurai district. The research examined the formulation and selection of almond gum, basil seeds, and sherbet concentration levels for Jigarthanda production.

Mateos-Aparicio (2021) studied on “Plant-based by-products”. This chapter summarised the various techniques of valuing plant-based by-products, including some that were extremely promising, others that were fascinating, but few that were sustainable and cost-effective at an industrial scale. Research and industry should work together to develop long-term solutions that adhere to the circular economy's principles.

Tsoupras *et al.* (2021) studied on “Beneficial Anti-platelet and anti-inflammatory properties of Irish apple juice and cider bioactives”. This was the first study to show that Irish apple juice and its fermented product, Real Irish cider, contain bioactive PL components that have potent antiplatelet activity against the inflammatory and thrombotic mediator PAF as well as the well-known platelet agonist ADP.

2.1.4 Whey Based Beverages

Jeličić *et al.* (2008) studied on “Whey-based beverages-a new generation of dairy products”. This research shows an overview of whey, its composition, characteristics, and structure. It also discussed about whey- based beverages and its production. Non-alcoholic whey beverages were also discussed with different additives, extracts and other aromatizing agents used. It was showed that whey beverages are suitable for wide range of consumers - from children to the oldest ones.

Jelen (2009) studied on “Whey-based functional beverages”. This study looked at three types of sweet or acid whey-based beverages: fruit juice, unfermented or fermented dairy, and carbonated thirst-quenching beverages. Specialised drinks and formulas based on whey protein were discussed only briefly.

Shukla *et al.* (2010) studied on “Probiotic Characterization of Lactobacilli and Yeast strains isolated from Whey beverage and Therapeutic potential of Lactobacillus yoghurt in Murine Giardiasis”. It had been found from the study that the isolated lactobacilli and yeast strains fulfil the probiotic characteristics and could be used as functional foods for human health.

Shraddha & Nalawade (2015) studied on “Whey based beverage: Its functionality, formulations, health benefits and applications”. For today's busy consumers, ready-to-drink beverages provide convenience and mobility. While the carbonation category includes both refrigerated and shelf-stable beverages, shelf-stable goods are in higher demand because to their ease of distribution and storage. Because of their outstanding nutritional characteristics, bland flavour, ease of digestion, and special functioning in beverage systems, whey proteins are frequently the preferred source for ready-to-drink protein beverages.

Skryplonek *et al.* (2019) studied on “Probiotic fermented beverages based on acid whey”. The goal of this study was to assess the quality of acid whey fermented beverages. The finest sensory qualities were found in beverage La2, which was created from whey, milk, condensed milk, and *L. acidophilus*. The probiotic bacteria

thrived in the whey beverages we created, with counts above 8 log cfu/mL during the storage period, well beyond the minimum therapeutic dose.

Chizhayeva *et al.* (2020) studied on “Impact of probiotics and their metabolites in enhancement the functional properties of whey-based beverages”. The impact of whey and probiotic starter microorganisms on intestinal microbiota correction was discussed in this article. The potential for improving the functional qualities and stability of whey-based beverages was discussed.

2.1.5 Cereal-Based Beverages

Ripari (2019) studied on “Techno-Functional Role of Exopolysaccharides in Cereal-based, Yogurt-like Beverages”. Exopolysaccharides (EPSs) played a technical and functional role in cereal-based, yogurt-like beverages, according to this review. EPSs were produced by a variety of microbes as a means of growing, sticking to solid surfaces, and surviving in harsh environments. EPSs played technical and functional roles in a variety of foods and beverages. The goal of this review was to provide a summary of what was currently known about exopolysaccharides produced by lactic acid bacteria and their presence in cereal-based, yogurt-like beverages.

Fernandes *et al.* (2021b) studied on “Mushroom nutrition as Preventative healthcare in Sub-Saharan Africa”. Traditional Sub-Saharan African (SSA) cuisine was distinguished by its abundance of indigenous foods and ingredients, herbs and spices, fermented dishes and beverages, and healthy and whole components. The value of traditional African meals and components was discussed in this article, emphasising the significance of developing food-based dietary guidelines for each country. The focus of this review was on the potential of mushrooms, particularly some underutilised in Sub-Saharan Africa, as one of the continent's greatest untapped resources for feeding and providing income for Africa's growing population, and as a way to protect Sub-Saharan Africans from the negative effects of an unhealthy fashionable diet.

2.2 Health benefits

Wojcik *et al.* (2001) studied on “Comparison of carbohydrate and milk-based beverages on muscle damage and glycogen following exercise”. Following eccentric resistance exercise, this study looked at the effects of carbohydrate (CHO), milk-based carbohydrate-protein (CHO-PRO), and placebo (P) beverages on glycogen resynthesis, muscle injury, inflammation, and muscle function.

Jamaly (2011) studied on “Probiotic Potential of Lactobacillus strains Isolated from Known Popular Traditional Moroccan Dairy Products”. The results of research showed All of the strains examined tolerated acidic stomach conditions (pH 2.0 and pH 3.0), with 10 of them being bile resistant.

Rodríguez-Roque *et al.* (2014a) studied on “In vitro bioaccessibility of health-related compounds as affected by the formulation of fruit juice- and milk-based beverages”. The goal of this study was to see how the beverage composition affected the in vitro digestibility and bioaccessibility of phenolic compounds, vitamin C, and carotenoids, as well as antioxidant activity in milk, blended fruit juice (BFJ), and a mix of both (BFJ–MB).

Yamanaka *et al.* (2019) studied on “Hypouricaemic effects of yoghurt containing Lactobacillus gasseri PA-3 in patients with hyperuricaemia and/or gout: A randomised, double-blind, placebo-controlled study”. In this study, they investigated whether PA-3 was capable of decreasing SUA levels in patients with hyperuricaemia and/or gout. SAU levels are improved by PA-3-containing yoghurt, even in individuals with hyperuricaemia and/or gout, according to the findings of this study.

Nazhand *et al.* (2020) studied on “Ready to use Therapeutical Beverages: Focus on functional beverages containing probiotics, prebiotics and synbiotics”. This research showed that both dairy and non-dairy beverages have a globalized demand for potential health benefits. New probiotic strains with the ability to develop and adapt to gastrointestinal conditions, as well as strong therapeutic ability, can address some of these products' disadvantages by researching various components of these goods.

MATERIALS AND METHODS

For the study of traditional dairy beverages, the methodology which was followed for collection of information has been explained under following mentioned headings.

1. Selection of different categories of traditional dairy beverages.
2. Selection of different ethnic traditional dairy beverages under different categories.
3. Collection of information on the selected ethnic beverages.
4. Presentation of data and information.
5. Classification and Tabulation of data and information on traditional dairy beverages.

3.1 Selection of different categories of traditional dairy beverages

There are many traditional dairy beverages which are made of different products and many ingredients are used in it. Traditional dairy beverages are categorized into four i.e., Fermented traditional dairy beverages, Milk-based traditional dairy beverages, Plant-dairy traditional beverages and Whey-based traditional beverages. Under this, they are sub-categorized.

3.2 Selection of different ethnic traditional dairy beverages under different categories

Under sub-categorized of traditional dairy beverages, there are many different products. Under fermented dairy-based beverages- Kefir, Lassi, Aryan, Ryazhenka, Kumis, Kiselo Mlyako etc. Under milk-based beverages- Licuado, Chocolate Caliente, Coffee Milk, Bandung, Cocio etc. Under plant-based beverages- Cholado, Milkis, Morir Sonando, Mango Mastani, Alouda, Suutei Tsai etc. And under whey-based beverages, Zincia products is present. During sub-categorizing, there are some points which are considered like popularity of products, nutritive aspects of product, ingredients used in product and type of product.

3.3 Collection of information on the selected ethnic beverages

Collecting information about different traditional dairy beverages are getting mainly from google scholars. Through google scholars, there are many articles, journals and books are present which help in collecting information about traditional dairy beverages. There are some books which are online present also helps in gathering information about traditional dairy beverages. Also taking information from previous thesis.

Some books are:

- i. “Quality attributes of yoghurt and functional dairy products” by Ozer and Kirmaci (2010)
- ii. “Milk-based Beverages: Volume 9: The Science of Beverages” by Grumezescu and Holban (2019)
- iii. “Probiotic dairy beverages: microbiology and technology” by Gurakan, Cebeci and Ozer (2009)
- iv. “Traditional foods” by Kristbergsson and Oliveira (2016)

3.4 Presentation of data and information.

After collecting information, arrange all the information and data in same pattern under following outlines:

- i. Categorizing the traditional beverage products.
- ii. Origin and distribution of traditional dairy beverage.
- iii. Ingredients used in traditional beverage and its composition
- iv. Procedures used in making of traditional dairy beverages
- v. Nutritional aspects are also included.
- vi. Health benefits of traditional dairy beverages.
- vii. Pictures of different traditional dairy beverages.

3.5 Classification and Tabulation of data and information on traditional dairy beverages

Table 3.1. List of Fermented Dairy-based Beverages

S.No.	Products	Type of Milk	Origin	Microorganisms used
1.	Yoghurt	Cow's milk	Bulgaria, Europe	<i>L. acidophilus</i> <i>L. delbrueckii</i> ssp. <i>bulgaricus</i> <i>S. thermophilus</i> <i>L. bulgaricus</i>
2.	Kefir	Sheep's/cow's/goat's/ mixed milk	Europe and Russia	<i>S. lactis</i> <i>Leuconostoc</i> sp. <i>Saccharomyces</i> <i>Micrococc</i>
3.	Lassi	Buffalo/goat	India	<i>L. acidophilus</i> <i>S. thermophiles</i>
4.	Ayran	Ewe/goat/cow	Iran, Asia	<i>S. thermophilus</i> <i>L. delbrueckii</i> subsp. <i>Bulgaricus</i>
5.	Ryazhenka	Cow's milk	Ukraine, Europe	<i>S. thermophilus</i>
6.	Koumiss	Mare's/camel's/ass's milk	Mongolia, Asia	<i>L. helveticus</i> , <i>L. casei</i> , <i>L. plantarum</i> , <i>L.</i> <i>delbrueckii</i> , <i>E. durans</i> , <i>Lc. lactis</i> , and <i>Lc.</i> <i>mesenteroides</i>
7.	Kiselo Mlyako	Cow's/ Buffalo's/ Goat's/ Sheep's milk	Bulgaria, Europe	<i>Lactobacillus</i> <i>delbrueckii</i> subsp. <i>bulgaricus</i> and <i>Streptococcus</i> <i>thermophilus</i>
8.	Amasi	Bovine	South Africa, Africa	<i>Lactobacillus</i> <i>delbrueckii</i> , <i>Streptococcus spp.</i> <i>amahewu</i>
9.	Viili	Cow's milk, buffalo milk	Finland, Sweden, Europe	<i>L. lactis</i> subsp. <i>Lactis</i> <i>L. lactis</i> subsp. <i>cremoris</i> <i>Geotrichum candidum</i>
10.	Chal	Camel's milk	Turkmenistan, Asia	<i>L. plantarum</i> <i>L. kefiri</i> <i>L. gasseri</i> <i>L. paracasei</i> <i>Leuconostoc lactis</i> <i>Weissella cibaria</i> <i>Enterococcus faecium</i>

S.No.	Products	Type of Milk	Origin	Microorganisms used
11.	Chalap	Cow's milk, buffalo milk	Kyrgyzstan, Uzbekistan, Asia	Lactic acid bacteria
12.	Dhau	Buffalo's milk	Nepal, Asia	Not known
13.	Matzoon	Cow's/ Buffalo's/ Goat's/ Sheep's milk	Armenia, Europe	<i>L. acidophilus</i>
14.	Tahn	Cow's/ Buffalo's/ Goat's/ Sheep's milk	Armenia, Europe	<i>L. acidophilus</i>
15.	Prescinseua	Cow's milk, buffalo milk	Metropolitan City of Genoa, Italy	-
16.	Pokot Ash Yoghurt	Cow's/goat's milk	Kepenguria, Kenya	-
17.	Leite Azedo	Cow's milk		-

Table 3.2: List of selected Milk-Based Beverages

S.No.	Product	Origin	Other Ingredients
1.	Licualdo	Mexico, North America	Fruits and spices
2.	Chocolate Caliente	Spain, Europe	Dark chocolate and corn starch
3.	Coffee Milk	Rhode Island, USA	Coffee syrup
4.	Bandung	Malaysia, Asia	Rose syrup
5.	Cocio	Esjerg, Denmark	Cocoa
6.	Egg cream	New York City, USA	Carbonated water and flavoured syrup
7.	Thandai	Rajasthan, Uttar Pradesh, India	Almonds, Fennel seed, Khus-khus, Pepper, Cardamon, Saffron
8.	Haldi Doodh Badam Doodh	India	Turmeric Almonds
9.	Leche Merengada	Spain, Europe	Whipped egg whites
10.	Coffee Cabinet	Rhode Island, USA	Syrup and Ice-cream
11.	Milkis	South Korea, Asia	Carbonated water, corn syrup and fruit flavoured
12.	Cacolac	Gironde, France	Lot-et-Garonne and Cocoa
13.	Soda Gembira	Indonesia, Asia	Cherryade and Soda water
14.	Egg Soda	Vietnam, Asia	Egg yolks and Soda water

Table 3.3: List of Plant-fruit based Beverages

S.No.	Product	Origin	Plant-fruits used
1.	Cholado	Valle del Cauca department of Colombia	Fruits like strawberries, bananas, kiwi, papaya, pineapple and passion fruit(maracuya), and Colombian blackberries (mora)
2.	Morir Sonando	Dominica Republic of North America	Orange juice and cane sugar
3.	Mango Mastani	Pune, India	Mangoes and dry fruits
4.	Alouda	Mauritius, Africa	Basil seeds and Agar jelly
5.	Suutei Tsai	Mongolia, Asia	Tea leaves
6.	Jigarthand	Madurai, India	Almond gum (badam pisin), nannari syrup (nannari sarbath) made from sarsaparilla root
7.	Irish Moss	Jamaica, North America	Algae (<i>Chondrus crispus</i>)
8.	Peanut Punch	Jamaica, North America	Peanut Butter
9.	Gajar ka Doodh	India, Asia	Carrot
10	Leche con Platano	Chile, South America	Bananas

Table 3.4: List of selected Whey-based Beverages

S.No.	Product	Origin	Types of Milk
1.	Zincica	Czech Republic, Poland, Europe	Sheep's Milk

Table 3.5: List of selected Cereal-based Beverages

S.No.	Product	Origin	Cereals
1.	Akasan	Haiti, America	Corn flour
2.	Boeber	Cape Town, South Africa	Sago and Vermicelli
3.	Pinolillo	Nicaragua, Central America	Roasted Maize
4.	Batido De Trigo	Cuba, North America	Puffed Wheat

RESULTS AND DISCUSSION

The results obtained during study of traditional dairy beverages and relevant information about different traditional dairy beverages in scientific literature under subsequent headings and sub-headings.

4.1 Fermented Dairy-based Beverages

4.1.1 Yoghurt

- Origin of yoghurt is Bulgaria, Europe.
- Ingredients used is milk and strains of microbes. Some of the most prevalent beneficial probiotic microorganisms have been identified as Bifidobacteria species, *Lactobacillus acidophilus*, *Lactobacillus plantarum*, *Lactobacillus reuteri*, *Lactobacillus rhamnosus*, *Lactobacillus salivarius*, and *Saccharomyces boulardii* (Parvez et al., 2006; Shah, 2007). The ingredients of yoghurt can have several effects (protection, neutral, or harmful) on probiotic viability. As a result, probiotic bacteria's compatibility with various food components plays a significant part in their survivability (Tripathi & Giri, 2014).



Figure No. 4.1

Source: wallflowerkitchen.com

- Nutritional Values of yoghurt

Table 4.1. Nutritional Content of Yoghurt

Nutrients	Quantity
Energy	61 kcal
Moisture	87.90%
Total Solid	12.1%
Protein	3.37 g
Fat	3.25 g
Cholesterol	13 mg
Ash	1.023 g

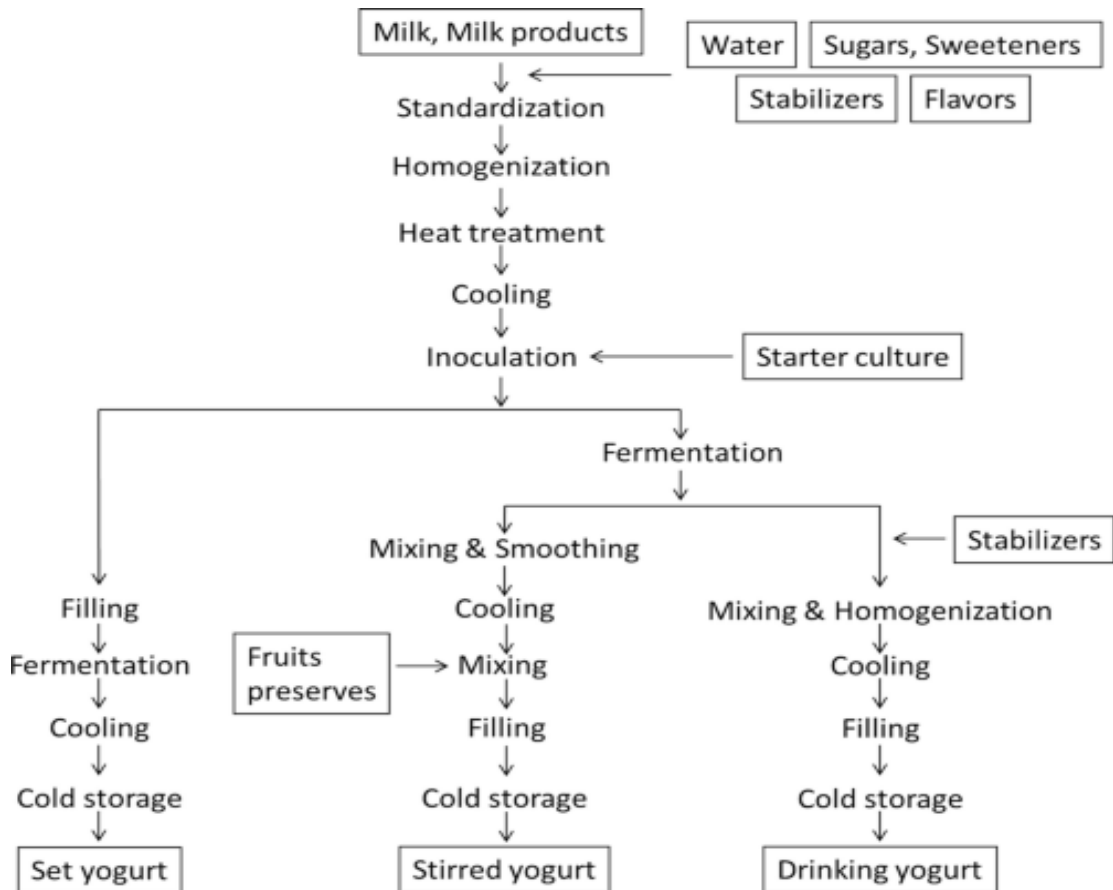


Fig. Manufacturing process of yogurt

Source: (Chandan, 2017).

Figure No. 4.2

Source: Nagaoka (2019)

- Yoghurt can cause probiotic effects such as improvement in digestive system health, serum cholesterol reduction, lactose tolerance was enhanced, immunological function was improved, irritable bowel symptoms were controlled, and anticarcinogenic characteristics were discovered.

4.1.2 KEFIR

- Origin of Kefir is Russia and Europe.
- Kefir is a tangy probiotic beverage created from milk that has been fermented with kefir grains, which are microscopic clusters of bacteria and yeasts. It is a slightly effervescent beverage with a consistency of a thin yogurt and a mildly acidic flavor. Kefir is produced by fermentative activity of “kefir grains” which contain a diverse range of inherent lactic acid bacteria, yeast, and sometimes acetic acid bacteria in a polysaccharide matrix of semi-hard granules. When kefir grains are put to milk and incubated at 25°C for 22 hours, bacteria in the grains continue to



Figure No. 4.3

Source: kalonasupernatural.com

multiply to proliferate in milk with the production of the lactic acid and other flavor compounds causing physicochemical changes (Güzel-Seydim *et al.*, 2000). The resultant product, kefir, is a self-carbonated, refreshing fermented milk drink which has a unique flavor due to a mixture of lactic acid, carbon dioxide, acetaldehyde, acetoin, slight alcohol, and other fermentation flavor products (Guzel-Seydim *et al.*, 2000). One feature of kefir that differs from other fermented milk products is that kefir grains are recovered after

fermentation. The biomass of kefir grains slowly increases during the process of kefir fermentation (Gorek & Tramek, 2007; Güzel-Seydim *et al.*, 2000).

- Commercially produced kefir and kefir-based products are now internationally available. Although it is mostly enjoyed as a drink, kefir can also be used in cooking and baking, typically as a replacement for milk, yogurt, or buttermilk.
- Kefir can be produced with ewe's, goat's, or buffalo's milk, but cow's milk is the most common option nowadays. Although it is not known when and where kefir first appeared, it is mostly thought to have originated in the Caucasus Mountains at the border of Europe and Asia. It has a centuries-old tradition in the Caucasus, Eastern Europe, and the Balkans.
- The consumption of kefir has often been related to a variety of health properties. They are:
 - i. Antimicrobial properties
 - ii. Anticarcinogenic properties
 - iii. Improving gastrointestinal system
 - iv. Cholesterol lowering effects
 - v. Probiotic and prebiotic properties
 - vi. Improving lactose tolerance
 - vii. Improving immune system
- It is believed that it boosts the immune system, and that is especially beneficial for digestion. The growing knowledge regarding gut microbiota and its role in improving immunity and overall health is expected to drive the growth of the market. New product developments focused on emerging trends such as organic, lactose-free (for lactose-intolerant consumers), and in the coming years, flavoured beverages are predicted to promote the kefir industry's growth.
- Chemical composition

Table 4.2: Nutritional content of Kefir

Nutrients	Quantity
Moisture	89-90% ^[a]
Lipid	0.2% ^[b]
Protein	3.0% ^[c]
Sugar	6.0% ^[d]
Lactic acid	0.52% ^[e]
Total solids	10-11% ^[f]
Alcohol	0.48% ^[g]
CO ₂	1.98g/l ^[h]
Ash	0.7% ^[i]

Source: [a, b, c, d, e, i] - (Sarkar, 2007) ;

[f] - (Harun KESENKAŞ, 2011); [g, h] - (Arslan, 2015)

4.1.3 LASSI

- Lassi is a delicious traditional cultured milk beverage that dates back to the Palaeolithic and Neolithic periods in India (Mathur 1991). Lassi is a ready-to-drink summer beverage that plays an important role in Indian cuisine (Tiwari, 1998). Origin of lassi is Punjab, India.



Figure No. 4.4

Source: yourhungerstop.com

- Main ingredient used in making of lassi is curd which is mixed with sugar or salt to make it sweet or salty respectively depending on regional tastes. It is also flavoured by adding fresh herbs, different spices, fruits and floral essences. Also, ice cubes are added according to season. It's a thick, creamy-white liquid with a rich, sweet fragrance and a slight acidic taste (Behare *et al.*, 2010). Pasteurized standardised milk or half skim milk is grown with lactic and aroma/flavor-producing microbes to make lassi. Even under ideal conditions, the production of fermented dairy products like lassi is still somewhat unpredictable due to

the potential of phage infections and antibiotic contamination of the milk supply.

Flow diagram of Lassi

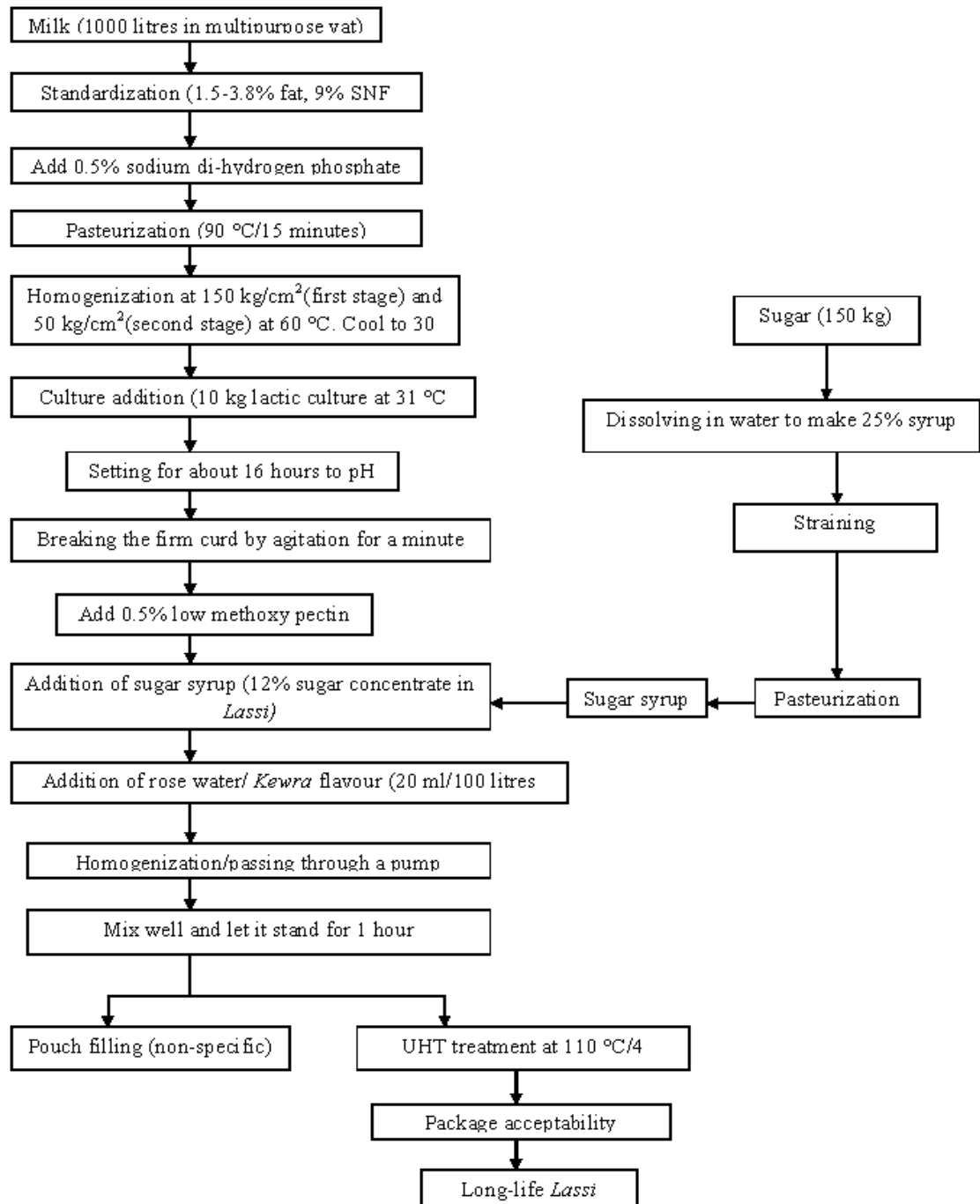


Figure No. 4.5

Source: (Rasane *et al.*, 2017)

- The high labour needs for starting care and propagation are another issue related with their utilisation. As a result, chemical and/or biological acidification processes have been developed to replace starters in acidified dairy product production. Direct acidification eliminates the need for starter culture, as well as the costs that come with it. Incorporating paneer whey (an acid-coagulated traditional Indian food) into a hugely popular product like lassi prepared by direct acidification will provide a win-win situation: maximum whey uses and product value enhancement. Saxena (2005) produced a direct acidified whey-based lassi-like beverage in which the system was stabilised by the addition of hydrocolloids, and the pH of the product was changed by the addition of commercial food grade acids. According to the sensory panellists, sensory testing of such a product demonstrated a lack of consistency. In terms of consistency, the goal was to bring a whey-based lassi-like beverage up to par with lassi manufactured from standardised milk dahi. This could be performed by thickening whey-based beverages with various thickening agents to help increase their viscosity. Existing evidence from animal and human trials all point to fermented dairy products having a mild cholesterol-lowering effect (St-Onge *et al.*, 2000). However, there is no fermentation in the lassi-like beverage made from directly acidified whey.
- According to studies, dietary fibre helps to lower total cholesterol and LDL levels in blood plasma (Rodríguez-Roque *et al.*, 2014b). There is a need to boost dietary fibre consumption because it has been linked to a number of health benefits (Ohr, 2004). Increased eating of high-fibre foods is a conventional strategy to do this. Adding fibre to foods that do not traditionally contain dietary fibre but are increasingly used in today's diet could be an innovative strategy. Because consumers are becoming more interested in ready-to-eat foods and functional beverages, an attempt has been made to use acid whey (paneer whey) to make a direct acidified lassi-like beverage with optimal added ingredients such as hydrocolloids and dietary fibre, thus adding value to product.

- Mango lassi, sweet lassi, salted lassi, bhang lassi, mint lassi, and other varieties of lassi are available. Mango lassi is one of the most popular lassi flavours, made with fresh mango and yoghurt (dahi). Cardamom, water, and sugar are popular ingredients. Combine all of the ingredients in a blender until the drink is creamy and frothy. Mango lassi should be served chilled at all times. This sweet mango lassi is the most popular variation on the menus of Indian restaurants outside of India, among a range of lassis.
- The sweet lassi is sweetened. It contains sugar, yoghurt (curd), and generally some fruit or flavourings like as saffron or cardamom, in addition to sugar. Sweet lassi is a popular drink after a meal or simply as a pleasant drink, especially on hot summer days. Aside from conventional variants, mango lassi has recently become one of the most popular sweet lassi flavours.
- Salted lassi is a savoury lassi made with dahi (yoghurt), salt, and usually roasted cumin powder. Pepper and other spices are usually used, and it is occasionally diluted with water. To make the dish, combine all of the ingredients in a mixing bowl until they are well blended and foamy. This lassi is one of the most popular in India, and it's customarily served in a clay cup known as a kulhar.
- Bhang lassi is a cannabis-laced type of lassi. It's a traditional drink made by crushing the cannabis plant into a paste (bhang), which is then mixed with yoghurt, spices, and sometimes nuts. Bhang lassi comes in a variety of flavours, and it was particularly popular in the 1970s. It is traditionally connected with the Indian states of Rajasthan and Uttar Pradesh. It is often linked to Hinduism and is mentioned in ancient Hindu literature. One of the most well-known stories claims that it saved Shiva from poisoning.
- Mint lassi is a light and pleasant lassi with a hint of mint. It's commonly served as a savoury (salted) lassi, and it's made with yoghurt, salt, and a handful of fresh mint leaves in its most basic form. Other herbs, such as cilantro, or spices, such as cumin or black pepper, are optional.

4.1.4 Ayran

- Origin of ayran is Iran. But it is also popular in neighbour countries viz., Azerbaijan, Armenia, Afghanistan, Lebanon, and Turkey where it has been promoted as a

national drink. It is known by a variety of names in various countries, including aryan in Bulgaria, ariani/ayrání in Greece, doogh in Iran and Afghanistan, shinna in Iraq, dew/do in Syria, Lebanon,



Figure No. 4.6

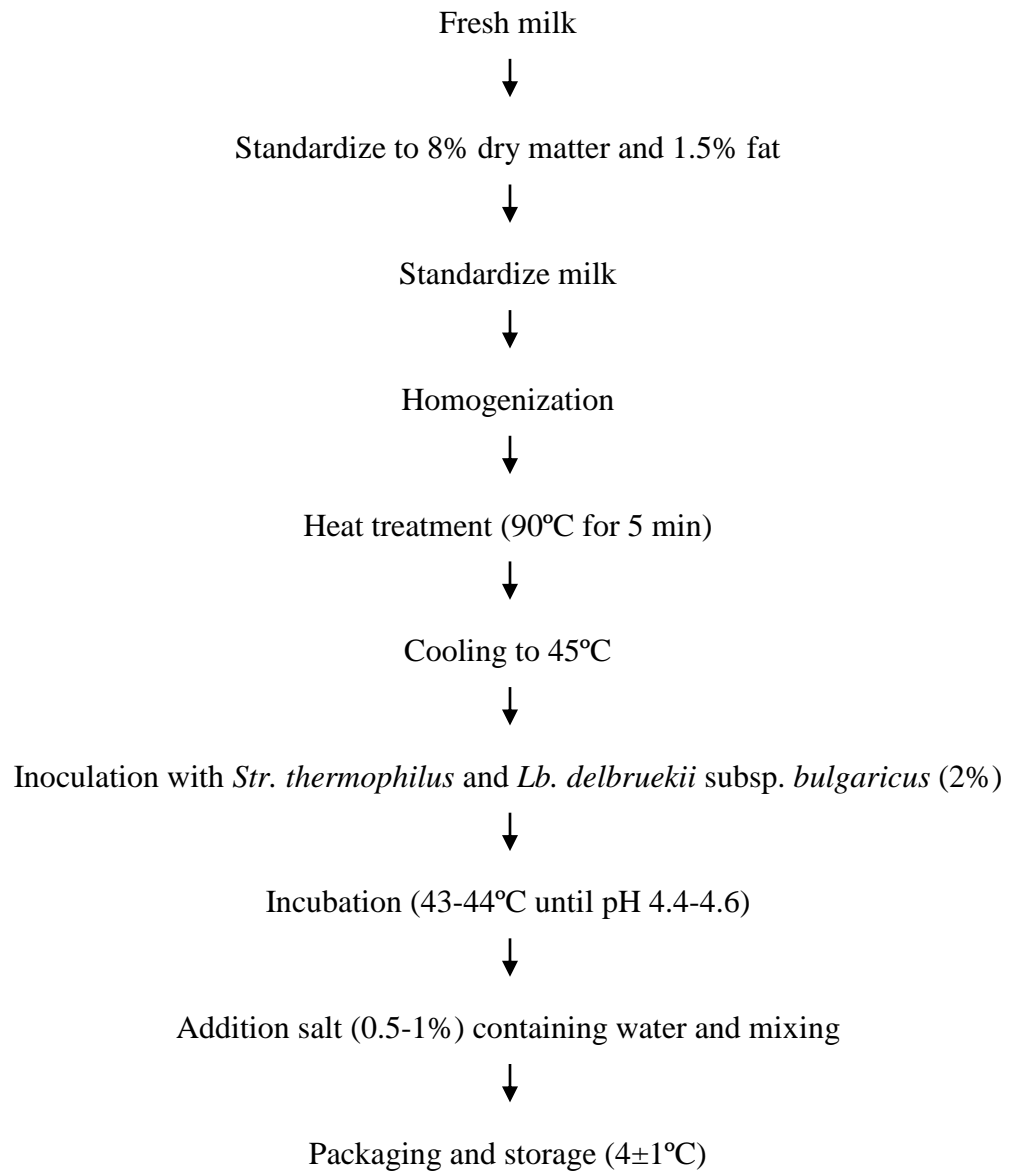
Source: dreamstime.com

Kazakhstan,

Kyrgyzstan, and across the Caucasus, eyran in Azerbaijan, tahna in Armenia, and dawé in the Assyrian/Chaldean region.

- Main ingredients used for making it traditionally are yoghurt, water and salt. The composition of ayran varies and is dependent on the type of milk used, the efficiency of fat removal and the dilution rate. It is different from other fermented milk beverages in that it is a salt-containing yoghurt drink without any added fruit flavouring(Koksoy & Kilic, 2004). Ayran is traditionally blended by hand until it reaches a frothy consistency and creates foam. Because it is a typical summer drink, ayran is usually chilled and served in a tall glass as an accompaniment to numerous street food dishes. Ewe's milk yoghurt is used to make the ultimate ayran, which is best served chilled. Microorganisms present in it are *S. thermophilus* and *L. delbrueckii* subsp. *Bulgaricus*.

- **Flow chart of Ayran:**



- It contains a wide range of health benefits and nutrients, including proteins and essential amino acids, short-chain fatty acids, vitamins (primarily riboflavin and vitamin B5), and most minerals (including calcium, copper, iron, magnesium, potassium, phosphorus, sodium, and zinc) in a low-energy beverage. Milk and fermented dairy beverages, such as kefir, koumiss, and ayran, are known to increase satiety, which helps to regulate food consumption and, if present, obesity-related metabolic problems. This effect is measured by elevated plasma concentrations of a few components such amino acids, glucose-dependent insulintropic polypeptide, glucagon-like peptide-1,

and cholecystokinin (CCK) (Luhovyy *et al.*, 2007). Ayran is a highly regarded drink with a high vitamin and calcium content that is easily digestible. It is true that the functional characteristics of ayran can be developed. Inulin as a prebiotic and *L. acidophilus* and *Bifidobacterium* sp. as probiotic microorganisms can be used to make ayran(Altay *et al.*, 2013b). In a different study, Ayran production was included with *Str. thermophilus* and *L. bulgaricus*, as well as *L. helveticus*, *L. fermentum*, and *L. paracasei*. These extra cultures are said to enable for rapid acidification and substantial proteolysis(Macori & Cotter, 2018).

- Composition of ayran according to Yaygin (1999):

Table 4.3: Nutritional content of Ayran

Nutrient	Quantity (%)
Water	94%
Total Solids	5%
Fat	1.2%
Protein	1.7%
Salt	0.7%
Ash	1%

4.1.5 Ryazhenka

- Origin of Ryazhenka is Ukraine, Europe. It is popular throughout Ukraine, Belarus and Russia. It is also known as fermented baked milk.
- Ingredients used in making of Ryazhenka are milk and sour cream. Procedure for making is as follow-
 - Pour the milk into a pot and heat until the milk reaches 100°C for 6 hrs.
 - Add sour cream to milk cover it and left it for 10 hrs.
 - Then put it in the refrigerator to cool.
- Once prepared, Ryazhenka has a thick and creamy texture, sweet flavour and a milky yellowish colour. The prolonged heating increases the concentration of useful components in milk, since some liquid is evaporated from it. It differs

in fat content; it is criteria determines the quality of the product. It has a taste of baked milk and a cream colour with a brownish hue.

- It is rich in protein – an indispensable source of energy. The drink includes complex carbohydrates and fats according to the specific variety. It has beta-carotene, B-group vitamins (thiamine, pyridoxine, riboflavin, pantothenic acid,



Figure No. 4.7

Source: pinterest.com

nicotinic acid, folic acid, and others). It is not deprived of vitamin PP, tocopherol, ascorbic acid. Of the minerals, phosphorus, potassium, sodium, calcium, iron, and magnesium are considered the most valuable.

- Health benefits of Ryazhenka are:
 - i. It helps in osteoporosis, hypertension and atherosclerosis.
 - ii. It strengthens the immune system.
 - iii. It improves the digestibility of food, increases metabolism and promotes weight loss.
 - iv. It often treats headaches and migraines.

4.1.6 KOUMISS

- Origin of koumiss is Mongolia, Asia. Overtime it has spread throughout Central Asia. Koumiss (Mongolian: airag) is an example of a slightly alcoholic fermented milk beverage which is made from mares' milk, and

consumed in Central Asia. It is manufactured under a variety of names including kımız, airag, kumys, kumis in Turkey, Mongolia, Kazakhstan, Kyrgyzstan, and in some regions of Russia (DANOVA *et al.*, 2005).



Figure No. 4.8

Source: truefoodfact.com

- Ingredients are milk and starter culture. Mare's milk is used for making koumiss. To prepare koumiss:
 - Mares' milk is heated at 90°C for 5-10 min.
 - Cool it to 26-28°C and add starter culture at an inoculum of 10-30% to give an initial acidity of 0.45% lactic acid.
 - Then incubate it.
- There have been some studies describing the involvement of various microorganisms in koumiss fermentation and three groups have been reported to be involved. These are lactobacilli such as *Lb. delbrueckii* subsp. *bulgaricus* (Akuzawa & Suroño, 2003), *Lb. salivarius*, *Lb. buchneri*, *Lb. plantarum* (DANOVA *et al.*, 2005; Wang *et al.*, 2008), *Lb. casei*, *Lb. helveticus*, *Lb. fermentum* (Wang *et al.*, 2008; Ya *et al.*, 2008), lactose fermenting yeasts such as *Saccharomyces lactis*, *Torula koumiss* (Tamime *et al.*, 1999), *Kluyveromyces lactis* (Akuzawa & Suroño, 2003), and non-lactose fermenting yeast such as *Saccharomyces unisporus* (Montanari & Grazia, 1997).
- Koumiss is milky-grey in color, lightly and naturally carbonated, and has a sharp alcoholic and acidic taste. The fermentation process and the type of product obtained is similar to kefir, but is produced from a liquid starter

culture in contrast to the solid “kefir grains.” The main fermentation metabolites are lactic acid (0.7–1.8%), ethanol (0.6–2.5%), and carbon dioxide (0.5–0.9%) (Tamime *et al.*, 1999). Carbon dioxide imparts the frothy appearance to the product and contributes to the flavor (Suroño & Hosono, 2003). The alcohol content in koumiss is slightly higher than in kefir, because the lactose content in mares’ milk is higher than in cows’ milk that is fermented into kefir.

- Composition of koumiss

Table No. 4.4 – Nutritional content of Koumiss

Nutrient	Quantity
Total Solids	10.6%-11.3%
Protein	1.7-1.9%
Lipid	0.6-1.3%
Lactose	3.5-4.3%
Ash	0.4-0.5%
Specific gravity	1.03
pH	3.8-4.0

Source: (KINIK *et al.*, 2000)

- Mares’ milk has been recognized as an important nutritional resource, which is beneficial to the elderly, to convalescents, and to infants (Marconi & Panfili, 1998). Benefits of koumiss are mainly associated with the initial flora of LAB, which also have effects on aroma, texture, and acidity of this product (Yang *et al.*, 2016). Koumiss can be concerned as a good source of potential probiotics, especially cholesterol-lowering probiotics. Further, it is suggested to evaluate the potential hypocholesterolaemia and antioxidative properties of the lactobacilli from the koumiss and the koumiss product in vivo and determine their functional effects in vivo to optimize a theoretical basis for developing new hypocholesterolaemia or antioxidative nutraceuticals (Guo *et al.*, 2015).

4.1.7 KISELO MLYAKO

- Origin of kiselo mlyako is Bulgaria, Europe. Bulgarian yoghurt is another name for it.

- It contains live bacteria. Two starter bacteria are *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus* (Hao *et al.*, 2011; Liu *et al.*, 2009). The *Streptococcus thermophilus* bacteria first takes action, creating the ideal habitat for *Lactobacillus bulgaricus*, which then multiplies and gradually converts the milk into yoghurt. Kiselo mlyako is made primarily of starting culture and milk. Bulgarian yoghurt is typically made from cow's milk, but it can also be made from buffalo, goat, or sheep's milk, and it must include at least 10⁷ viable colony-forming units (CFU) of symbiotic starters per gramme product, according to the FAO/WHO criteria (1984) (Velikova *et al.*, 2018b).



Figure No. 4.9

Source: findbgfood.com

- The following are descriptions of both artisanal and industrial yoghurt producing technologies. Raw milk is filtered to eliminate solid particles, then homogenised and pasteurised at 93–95°C for 3–5 seconds before cooling to 45–50°C. The raw milk is then injected with a starting culture containing *L. bulgaricus* and *S. thermophilus* in a 1:2 to 1:5 ratio. The starter culture is 0.5 to 2% of the raw milk. The inoculated, still liquid and warm milk is spilt in sterile vessels or packages, usually from 150 g to 1 kg. The packages are capped immediately after filling and incubated in a warm place or thermal chamber at 42–45 °C for 2.5–4.0 h. LAB quickly multiply and reach 10⁷–10⁸ CFU/g (*L. bulgaricus*) and 10⁸–10⁹ CFU/g (*S. thermophilus*). LAB ferment the lactose to lactic acid, which binds calcium ions (Ca²⁺) from casein in milk, thus obtaining its coagulation. The temperature during fermentation should be steady, and there should be no vibrations, in order to produce high-

quality yoghurt. The final product is cooled to 6–12 °C and could be stored for up to 21 days (Petrova *et al.*, 2021).

- Bulgarian yoghurt is white, with a hint of yellow. A fat layer could be evident on its surface. The product's coagulum is dense, slippery, and smooth. The coagulum may break and discharge clear, somewhat yellowish, and opalescent milk serum when tilted. When raw milk from buffaloes or sheep is utilised, the yoghurt might be either homogenous and creamy or gritty.
- The organic acids and antibacterial compounds produced by the starting cultures are responsible for the majority of yogurt's health benefits. The strains have antimicrobial effects against pathogens in the gastrointestinal tract (Miteva *et al.*, 1998), alleviate lactose intolerance and diarrhea (Astrup, 2014; Veiga *et al.*, 2015), stimulate the immune system (Makino *et al.*, 2016), prevent colon cancer and produce bioactive peptides that can control the blood pressure.

4.1.8 Amasi

- Origin of amasi is South Africa, Africa.
- Amasi is produced by leaving fresh milk to ferment naturally at ambient temperature in earthen-ware pots or any other suitable containers (Feresu, 1992; Feresu & Muzondo, 1989; Mutukumira, 1995). The microorganisms inherent in the milk, the container and the surrounding air are assumed to ferment the milk within 1-3 days depending on the ambient temperature (Feresu & Muzondo, 1989; Mutukumira, 1995; Simango, 1997). It is common practice to sometimes speed up the fermentation by back-



Figure No. 4.10

Source: ulwaziprogramme.org

slopping fresh milk with remains of a previous batch of sour milk (Gadaga, 1999b).

- Procedure followed in making Amasi:
 - Add Amasi starter culture into a clean glass jar.
 - Add milk into the jar.
 - Stir the mixture well.
 - Cover the mixture with a muslin cloth.
 - Store it at the room temperature approx. 20-25°C.
 - Left it for 12-24 hrs, it will be set like gelatin and easily stretch when lifted with a spoon.
 - When it is set, cover with a tight-fitting lid and refrigerate for 6-7 hrs.
- Despite the fact that different strains of amasi are taken around the world today, they all appear to provide similar advantages to the African variety. The type of container in which amasi is fermented, the length of the fermentation period, the type of dairy utilised to manufacture amasi, and the type of bacteria "starter" employed all influence the strain of amasi. These characteristics influence how amasi tastes and looks, as well as how concentrated it is with probiotics, much as they do with probiotic yoghurt. As a result, the process of fermentation has a role in determining how beneficial amasi is to your health.
- It has a thick, creamy texture and a tangy, milky flavour, with some comparing it to a cross between yoghurt and cottage cheese. It can be consumed on its own or with honey and fruit for a sweeter taste. It tastes a lot like Kefir.
- Amasi has been a nutritional staple for most South Africans for hundreds of years, but it has only recently gained popularity as probiotic foods have gained greater attention and praise for their gut-healing and immune-boosting properties. Amasi is high in protein, calcium, iron, and magnesium, in addition to probiotic bacteria.

4.1.9 Viili

- Origin of viili is Finland, Sweden, Europe.

- Viili is a traditional Finnish fermented milk product created in the summer as a technique of preserving extra milk without curds from Nordic countries. It is thought to have originated in Sweden, but is now found in Finland, where it is widely regarded as a



Figure No. 4.11

Source: happykombucha.co.uk

national treasure. Piima, pitkapiima, and viilipiima are Finnish products, as are lngfil and tatmjolk from Sweden, taette from Norway, ymer from Denmark, and skyr from Iceland (Hati *et al.*, 2019b).

- Viili is a product made by fermenting milk with strains of *Lactobacillus lactis* subsp. *lactis* and *Lactobacillus lactis* subsp. *cremoris*, resulting in the release of EPSs. *Geotrichum candidum*, a filamentous fungus species with mould and yeast qualities that develops on the product surface and forms a velvety coating comparable to that of Camembert and Brie cheeses, is characteristic of Viili. *G. candidum* uses lactate to reduce the acidity of the product, giving it the distinctive mouldy odour of Viili (Kahala *et al.*, 2008).
- The traditional Northern fermented milk product "Viili" is made by fermenting milk at 18–20°C for roughly 20 hours with a starter containing both mesophilic LAB and *Geotrichum candidum* mould strains. Procedures are as follow-
 - Spread the prepared viili around the bottom and half way up sides of the large bowl.
 - Fill the bowl with milk on the spread viili.

- Left it at 65-75°C for 24 hrs for fermenting.
- After 24 hrs, it will set as jelly.
- All of these goods have a thick, sticky consistency with considerable stretchiness, as well as a delicate and sweet flavour. In Finland, this domestic fermented milk is commonly taken for breakfast and is also a popular snack among youngsters and the elderly. The product can be eaten on its own or with cereal, muesli, or fruit. Mixing viili with cinnamon and sugar is a traditional way of eating it. According to a new study, a synergistic interaction exists between *L. delbrueckii* and *G. candidum*, and thus these two species could be used as a starter in the production of "Termoviili," a novel form of fermented milk product with possible new sensory and nutritional qualities (Alatossava *et al.*, 2013).
- The slime-forming *Lc. lactis* subsp. *cremoris* produces phosphate-containing EPS, which gives it its distinctive stickiness. Viili EPS is said to have antioxidant, anti-inflammatory, anti-carcinogenic, anti-aging, and immunomodulatory properties (Luo & Deng, 2016).

4.1.10 Chal

- Origin of chal is Turkmenistan, Asia.

- Chal is a traditional sparkling beverage originating from Turkmenistan and Kazakhstan. It is traditionally produced using spontaneous fermentation in Turkman Sahra, Golestan province, Iran. Chal and Chal-like products are known under



Figure No. 4.12

Source: tasteatlas.com

different names in other countries such as Shubat in Kazakhstan and Turkmenistan in central Asia. It is produced by fermentation of camel milk by LAB as well as yeast (Lorenzen *et al.*, 2011; Soleymanzadeh *et al.*, 2016).

Chal is typically prepared by fermentation of camel milk, by adding the previously fermented acidic milk as inoculums, in earthenware jug for 1 or 2 days depending on the season of the production in Iran. Local producers use spontaneous fermentation of milk that results in variable product quality. Accordingly, using lactic acid bacteria (LAB) strains to improve fermentation under controlled conditions is an important step in producing camel fermented milk (Moslehisad *et al.*, 2013). Starter culture which are used are *L. plantarum*, *L. kefiri*, *L.gasseri*, *L. paracasei*, *Leuconostoc lactis*, *Weissella cibaria*, *Enterococcus faecium* (Soleymanzadeh *et al.*, 2017).

- The drink is light, frothy, and refreshing, and it is beloved due to its low caloric content and the presence of iron, magnesium, calcium, and zinc. In Kazakhstan and Turkmenistan, chal is known as shubat, and it is typically consumed in summer. Because it remains fresh only for a day, it is recommended to drink it immediately after it has been prepared.
- Chal is reputed to possess virucidal and virus inhibiting properties not found in fresh camel or cow milk, both in its liquid and lyophilized form — a characteristic which is (reputedly) unaffected by shelf life.

4.1.11 Chalap

- Origin of chalap is Kyrgyzstan, Uzbekistan, Asia. It is typically found in rural areas.
- It is made with a combination of still or carbonated water, salt, and qatiq – a fermented milk product of a thick consistency (Singh *et al.*, 2018). Chalap is considered an acquired taste by many Westerners, with some describing its flavour as liquefied, pungent, salty, smoked cheese. The beverage is usually consumed during summer as a refreshment.



Figure No. 4.13

Source: dreamstime.com

4.1.12 Dhau

- Origin of dhau is Nepal, Asia. It is a traditional dessert at numerous Newar festivities in the Kathmandu valley. Juju dhau, also known as king yoghurt, is a popular dhau kind created in the city of Bhaktapur.
- It is made by boiling buffalo milk and leave it to ferment in clay pots or plastic cups. It has a rich flavour and a distinct, creamy texture that is thick enough to not fall off when the pot is turned upside down. It is served in both bhoj and samiya baji. The paun, or a soup-like substance prepared from Lapsi fruit, comes next.
- It is served as an important item for digestion.



Figure No. 4.14

Source: tasteatlas.com

4.1.13 Matzoon

- Origin of matzoon is Armenia, Europe.
- Following are procedures to make matzoon (Tietze, 2002):
 - Add two tablespoons of bakers' yeast to half a litre of milk.
 - Then store it at around a 37°C temperature and let until it is curdled.
 - Keep it in the refrigerator when fermentation is finished.
- It is used like yoghurt and



Figure No. 4.15

Source: tasteatlas.com

mixed with fruit or malt as well as for cooking. The culture can be kept for a long time in the refrigerator at 4°C.

- It has the following beneficial properties: it improves and increases hunger, normalises bowel function, accelerates digestion, tones the body, lowers cholesterol and sugar levels, protects against the formation of kidney stones, lowers weight, and protects against cardio-vascular illnesses. For making these productions are used leaven with combined or bioactive natural microorganisms of different seasonings and various spices. Kumys, tan, and matzoon are used to support diabetic nutrition and normal daily activities. These dairy products can purify and rejuvenate the organism (Tronko *et al.*, 2017)

4.1.14 Tahn

- Tahn is an Armenian dairy drink created by blending plain yoghurt (matzoon) with cold water, salt, and occasionally chopped herbs, sliced green onions, and cucumbers. Blend the ingredients until smooth, adding more water or yoghurt as needed to achieve the desired consistency.
- Tahn is a chilled and delicious drink that Armenians drink to alleviate their thirst during the summer heat. Fresh parsley or mint leaves are used as a garnish or added to the drink for flavour. This savory Middle Eastern beverage resembles Turkish ayran, Indian lassi or majjiga, and Persian kefir or doogh.
- In Armenia, they traditionally serve tahn in ceramic mugs as the ceramic helps the beverage remain cold for longer periods of time.



Figure No. 4.16

Source: tasteatlas.com

4.1.15 Prescinseua

- Origin of Prescinseu is Metropolitan City of Genoa, Italy.
- It is also called quagliata. It is a traditional dairy product from the Italian province of Genoa. Prescinsêua is coagulated milk with a texture midway between yoghurt and ricotta with a pleasant, gently sour flavour. It is named after presù, which means rennet in Genovese dialect.
- It can be enjoyed on its own or used in the preparation of many traditional delicacies such as *torta pasqualina*, *barbagiuai*, or *pansoti*.
- It was previously obtained by processing whey, but now it is obtained directly from whole milk. 2 litres of milk are let to rest for 48 hours in a saucepan. After that, 500ml of such milk is heated to 40-50°C in another pot, and rennet is added (about 5g). The two milk pots are connected and set aside for another four hours.



Figure No. 4.18

Source: konkonsahgh.com

4.1.16 Pokot Ash Yoghurt

- Communities in the villages of Tarsoi, Tartur, Lition, and Chaunet in Kenya's West Pokot district traditionally produced an unusual food product: yogurt made with milk from cows (crosses between local breeds and zebù) or goats, mixed with the ash of the *Ozoroa insignis*, locally known as the Kromwa tree. Ash yogurt, also known as *mala ya kienyeji* or *kamabele kambou* in local dialect, was once a mainstay in the Pokot community's diet and one of the primary meals for herdsman hunting for pasture. Yogurt production has decreased significantly as livestock rearing has become less common and milk has become scarcer. Furthermore, the community has lost its sense of

pride in its traditional food culture. Today, just a few families create yoghurt for their personal consumption. Surplus is only available on rare occasions and is sold at local markets.



Figure No. 4.17

Source: tasteatlas.com

- Raw milk is used to make ash yoghurt, which has a thick but fluid viscosity. Cow and goat milk are not blended, but are processed separately to

generate two types of yoghurt. Cow's milk yoghurt is for men, whereas goat's milk yoghurt is for women and children. It has a strong flavour and is known for its nutritious content. The flavour changes depending on how long the fermentation takes. The cows are pasture-fed and milked twice a day by hand. The milk is collected in a calabash, a traditional container constructed from pumpkin and gourd types, and let to sit for three days. To construct a gourd container, the hard skin is hollowed out, dried, and smoked over cromwo wood, which is also used to generate ash. The gourd is closed and stirred with frequent movements once the whey has been drained. When the yoghurt is finished, the ash is added, which gives it disinfectant characteristics, a distinct aromatic flavour, and a distinctive brilliant grey appearance (Anonymous, 2016).

- Procedures are:
 - Milk is collected in a calabash and stand it for at least 3 days.
 - Then, whey is drained out, closed the gourd and then agitate it.
 - When yoghurt is ready then ash is added.

4.2.17 Leite Azedo

- Origin of Leite Azedo is Namibe province of Angola.

- To produce this traditional milk product, village women collect fresh milk in hupas, which are gourds that have been sliced open and hollowed out but not washed. After allowing the milk to ferment for many hours, it is forcefully churned for roughly half an hour.



Figure No. 4.19

Source: shutterstock-image72

- This milk product is not sold commercially and is typically made for personal consumption. Soured milk can be drunk on its own or used to make traditional dishes such as maïne or manhini, which is made by combining soured milk, funje (a cornmeal porridge), and dried beef or mutton(Coucelo, 2011).
- The indigenous Mucubal people also make a traditional sun protection cream by mixing the layer of thicker cream (obtained from the milk's surface) with a reddish rock powder. Unfortunately, the threatened survival of cattle as a result of climate change has resulted in a considerably reduced supply of milk, putting this traditional milk product at risk of extinction (Anonymous, 2021).

4.2 Milk-based beverages

4.2.1 Licuado

- Origin of licuado is Mexico, North America. This drink is popular throughout Latin America, where it is also known as Batido.
- Ingredients used in making of Licuado are milk, fresh fruit and ice. It is blended milk and fruit similar to smoothies but not as thick. Blend all the ingredients for 1 minute until frothy. Serve with sprinkle of cinnamon on top. It also



Figure No. 4.20

Source: pinterest.com

contains nuts, honey and spices like vanilla, cloves or cinnamon while in some variety's fruits can be replaced with chocolate.

- It is used as breakfast food and also as an energy drink which is used while exercise and running due to its nutritive value.
- Nutrition:

Table No. 4.5: Nutritional content of Licuado

Nutrients	Quantity
Calories	302Kcal
Carbohydrates	50g
Protein	9g
Fat	9g
Sodium	104mg
Sugar	45g

4.2.2 Chocolate caliente

- Origin of chocolate caliente is Spain, Europe. Hot chocolate became a drink of choice of the Spanish aristocracy sometime in the 17th century, and when chocolate and cocoa became more available, it became a staple throughout the country. Although hot chocolate is a well-known beverage around the world, this Spanish version is distinguished by its creamy and thick consistency.



Figure No. 4.21

Source: thespruce.com

- It is usually made with dark chocolate or cocoa powder, milk, sugar and corn starch – which is used to achieve the typical dense texture of the drink. Cinnamon and grated nutmeg can be added as flavourings if desired. This sort of hot chocolate is typically offered as a dessert accompaniment, with a cup of hot chocolate and freshly fried Spanish churros being the most traditional combo. It should always be served hot, and the pastry is supposed to be dipped in the drink.

- It is used "to combat bouts of rage and unpleasant moods," as well as lowering the risk of heart disease and improving blood flow significantly after drinking.

4.2.3 Coffee milk

- Origin of coffee milk is Rhode Island, USA. It is the official state drink.



Figure No. 4.22

Source: newengland.com

- It is a combination of milk and sweet coffee syrup. Autocrat Syrup is the brand which is commonly used – consisting of coffee extract, colourings and corn syrup. Coffee syrup

is a sweetened coffee concentrate and key ingredient in the coffee milk. The syrup is prepared by straining water and sugar through coffee grounds.

- Nutrients:

Table No. 4.6: Nutritional content of Coffee Milk

Nutrients	Quantity
energy	133 kcal
Fat	5g
Cholesterol	18mg
Sodium	122mg
Carbohydrate	15g
Protein	8g

4.2.4 Bandung

- Origin of bandung is Malaysia, Asia. It is a popular Malaysian pink-hued beverage that is especially beloved by the Malai community.

- It is combination of milk and rose syrup and depending on where it has been bought, bandung can be made with condensed milk, fresh, evaporated milk or any combination of the three. It is typically served over ice and it is especially popular at weddings or during Iftar in the month of Ramadan.



Figure No. 4.23

Source: myspicykitchen.net

- Popular versions of the drink include the addition of grass jelly, sparkling water, carbonated sodas such as ice cream and even milo powder. It is also served as street food.

4.2.5 Cocio

- Origin of cocio is Esbjerg, Denmark. It is a classic Danish chocolate milk that has been produced since 1951 and was originally invented by Anker Palleesen in Esbjerg.
- Milk, cocoa, and sugar are used to make cocio. It contains no preservatives or additives and is naturally low in fat. Cocio is sterilised after bottling, giving it a two-year shelf life and eliminating the need for refrigeration. This innovative procedure is what gives the milk its deep chocolate flavour while keeping the fat percentage under 2%.



Figure No. 4.24

Source: pepper.ph

- The drink comes in basic and dark flavours, as well as lighter Cocio One and Cocio Energy options. Despite the fact that it is now available in cans, the

characteristic glass bottle remains a solid favourite, and the traditional pølser hot dog is the recommended pairing option.

- As same as Cocio another beverage called Pucko which is originated from Sweden. Its main ingredients are milk chocolate and sugar.

4.2.6 Egg cream

- Origin of egg cream is New York city, USA. Although its origin is not entirely clear, the drink is almost exclusively associated with New York. It is believed that it first appeared sometime in the early 1900s, among the eastern European Jews who settled in New York. The drink was incredibly popular until ice cream parlors and soda fountains—where it was mostly made—started to dwindle.
- Ingredients in making egg cream are milk, carbonated water and flavoured syrup (typically chocolate or vanilla).

Procedures are as follow:

- Pour syrup into the glass.
- Add milk and lightly stir it with spoon.
- Then stream soda water into the glass and mix the other ingredients.
- Mainly, the glass is left with 2/3 liquid and 1/3 foamy head.

- As its name, it doesn't include eggs nor cream. It's a frothy mix of cooled milk, chocolate syrup, and seltzer water. The egg



Figure No. 4.25

Source: feastofstarlight.com

cream is nearly always served from a fountain. Although various attempts to bottle it have been made, none have been quite successful, as the refreshing taste and distinctive head necessitate mixing the components just before drinking.

4.2.7 Thandai

- Origin of thandai is Rajasthan, Uttar Pradesh, India. It is especially popular in Rajasthan and also in few other northern states of India, during the festive season.
- It is a drink prepared with a mixture of almonds, fennel seeds, khus khus, pepper, cardamom, saffron, milk and sugar and is served chilled, with some other optional ingredients.
- Additionally, this famous dry nut cum milk-based beverage is often mixed with 'bhang' (edible form of

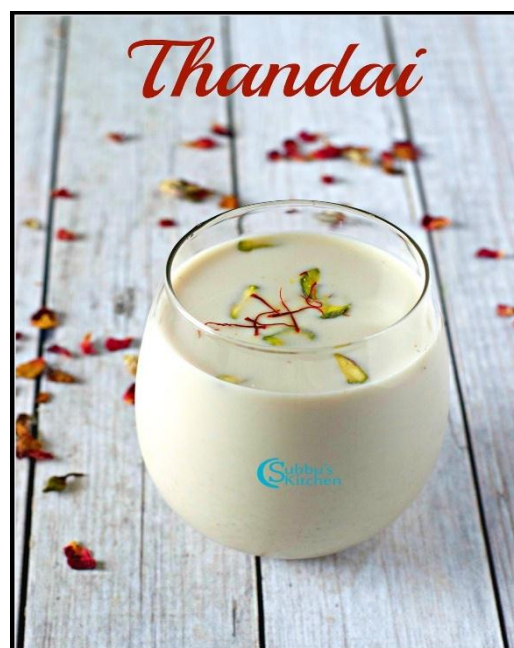


Figure No. 4.26

Source: pinterest.com

Cannabis sativa, also known as Hemp plant) to make an intoxicating drink and is historically prepared as a sacrifice to Lord Shiva during the Mahashivaratri festival in India. Thandai is a popular dish in North India, especially during the summer. This thirst-quencher is delicious, cold, and extremely refreshing (R., Chawla *et al.*, 2018).

- Thandai shows to be a nutrient-dense pabulum that energises the body with its wholesome demeanour, the result of dietary macro and micro nutrients derived from nuts and milk (Kaur *et al.*, 2020).

4.2.8 Haldi Doodh and Badam Doodh

- Origin of these two drinks is India.
- Haldi doodh or turmeric milk is especially popular during the cold winter months. Badam doodh is mostly enjoyed on special occasions such as religious ceremonies or weddings.



Figure No. 4.27

Source: shobhapink.blogspot.com



Figure No. 4.28

Source: ikneadtoeat.com

- The basic version of haldi doodh is prepared by simply combining turmeric with heated milk, but it can be elevated with the addition of spices such as cardamon, black pepper, ginger, cloves and all spices along with ingredients such as honey and coconut oil (Chaudhary et al., 2018).
- Badam doodh id made with almond paste consisting of grinded almonds which is combined with warm milk, su gar and spices. Flavorings like as cardamon and s affron are commonly used, but rosewater may also be used in some varieties. It's delicious warm or cold, with slivered almonds, rose petals, or saffron strands on top.
- Haldi doodh provides several health benefits, including increased immunity, liver detoxification, improved digestion, weight loss, and muscle pain relief. Be it warm or cold badam milk, it is an extremely healthy and delicious drink that provides energy and rejuvenates the body.
- Nutritional composition of Badam doodh:

Table No. 4.7: Nutritional content of Badam doodh

Nutrients	Quantity
Energy	226cal
Fat	13g
Cholesterol	25mg

Sodium	107mg
Potassium	400mg
Carbohydrates	18g
Fibre	1g
Sugar	17g
Protein	10g
Vitamin A	405IU
Calcium	309mg
Iron	04mg

Source: (Swasthi, 2021)

4.2.9 Leche merengada

- Origin of Leche merengada is Spain, Europe.
- Ingredients used in making of Leche merengada are milk and whipped egg whites. Procedures are as follow (Anonymous, 2021):
 - The milk is heated and often flavoured with lemon zest.
 - Then combine before it is chilled and combined with whipped egg whites.
 - It is then semi-frozen and the final result is a refreshing combination.
- It has a texture similar to a milkshake or a slushie, while some versions sometimes resemble ice creams. It is a sweet and chilled Spanish drink. This classic delicacy is generally made at home, but it's also popular in ice cream shops. It's commonly served in tall glasses, with ground cinnamon strewn on top.



Figure No. 4.29

Source: danzadefogones.com

4.2.10 Coffee Cabinet

- Origin of coffee cabinet is Rhode Island, USA.
- Procedures for making Coffee cabinet are as follow (Pooley, 2021):
 - Place the milk and syrup in a blender and blend to mix thoroughly, about 10 seconds.
 - Pulse the ice cream multiple times to start breaking it up.
 - Using a flexible spatula, crush the mixture down onto the blender blade with the blender motor turned off.
 - Continue pulsing, stopping, and mashing for 30 to 90 seconds, or until the mixture is fully blended, thick, and moves smoothly in the blender jar.
 - Pour into a chilled glass or glasses and serve at once.
- It can be found throughout Rhode Island and south-eastern Massachusetts in the United States of America. Coffee and beverages are taken very seriously in this town, so much so that coffee milk (coffee cabinet without the ice cream) was proclaimed the state drink in 1993. Although many Rhode Island coffee shops still serve them, getting an original cabinet has been increasingly difficult in recent years.



4.2.11 Milkis

- Origin of milkis is South Korea of Asia.
- Ingredients used in making of milkis are carbonated water, corn syrup, sugar and milk. It is also flavored with mango, bananas, peach, orange, strawberry, apple or melon.



Figure No. 4.31

Source: walmart.ca

- It is made by Lotte Chilsung, which first marketed the beverage in 1989 under the name Milk and Yogurt Soda (Peter, 2015).

4.2.12 Cacolac

- Origin of cacolac is Gironde of France.

- The classic Bordeaux drink combines fresh milk from Lot-et-Garonne, cocoa and sugar. It was first made in 1952, and the original secret recipe is still used today. The drink was first sold from the back of the vans that were driving across the country



Source: tasteatlas.com

and was originally exclusively sold in glass bottles (Tim, 2012).

- It was soon widely accessible in supermarkets, and the firm began to offer can and carton packaging. Apart from the classic flavor, Cacolac also comes in hazelnut-praline and caramel variety. It is now readily distributed all around the country.

4.2.13 Soda Gembira

- Origin of Soda gembira is Indonesia of Asia. "Happy soda" is the meaning of the drink's name.
- Ingredients used in making of Soda gembira are coco pandan syrup, condensed milk and carbonated water. Procedures of making it are (Goh, 2020):

-
-

- Fill a glass halfway with condensed milk.
- When ready to drink, pour the cherryade and soda water. Serve immediately while it's still fizzy.
- It is traditional Indonesian non-alcoholic beverage. It has typically pink colour. This sweet and creamy drink is most often consumed hot summer days.



Figure No. 4.33

Source: blogspot.com

4.2.14 Egg Soda

- Origin of egg soda is Vietnam of Asia.
- It's made up of egg yolks, sweetened condensed milk, and soda water. Following steps are used to make egg soda (Han, 2012):

- Place sweetened condensed milk and egg yolk in the bottom of a glass. Fill glass with club soda and stir vigorously until combined.
- Pour over ice and serve. Sometimes, the carbonation may curdle the eggs slightly.



Figure No. 4.34

Source: meatlovessalt.com

- It is creamy and lightly fizzy beverage. It is usually served over ice and preferably in tall glass.

4.3 Plant-fruit based beverages

4.3.1 Cholado

- Origin of cholado is Valle del Cauca department of Colombia. It is also known as raspao.
- Ingredients used in making valle del cauca are fresh fruits such as strawberries, bananas, kiwi, papaya, pineapple and passion fruit(maracuya), milk, sweet syrup and Colombian blackberries (mora). Following are the procedures (Dinho, 2021):



Figure No. 4.35

Source: pinterest.jp

- Dice all fruit to bite size. Refrigerate until to serve.
 - To make the syrups: Combine water, fruit pulp and sugar in a small saucepan. Over medium-high heat, bring the mixture to a boil.
 - Cook the mixture until the sugar has dissolved and the sauce has thickened. Let the syrup cool in the refrigerator before using.
 - Then ready to assemble: Crush the ice in a blender or food processor.
 - Set plastic cups or other serving glasses on a work surface. Add about half cup of crushed iced, drizzle passion fruit syrup and berry syrup over ice. Add some condensed milk on top.
 - Place one pile of fruit on top of the ice. Drizzle more condensed milk on top of the fruit. Garnish with shredded coconut and a cherry.
- It has the perfect balance of flavours and textures. It's tangy, sweet, creamy, crunchy and fruity. It is typically served cold and in a tall glass.

4.3.2 Morir Sonando

- Origin of Morir Sonando is Dominican Republic of North America.
- Ingredients used in making of Morir Sonando are orange juice, cane sugar, milk and crushed ice. Procedures of making of Morir Sonando are (Carter & Marissa, 2019):



Figure No.- 4.36

Source: dominicancooking.com

- Juice the oranges.
 - Add the ice to a pitcher. Pour the evaporated milk, sugar and vanilla over the ice and stir well to combine.
 - Add the orange juice and stir until combined and slightly frothy.
 - Garnish with an orange wheel and serve immediately.
- Despite the simplicity of the components, care must be taken to ensure that they are well combined without curdling the milk. It is recommended that mixing the orange juice with sugar first, so when the ice melts, the drink will not be too watery.
 - The name of this drink means die dreaming, because it supposedly makes sleepy. Overtime, the drink evolved, so there are variations with added vanilla, oatmeal, lemon juice or alcohol.

- Nutrition:

Table No. 4.8: Nutritional content of Morir Sonando

Nutrients	Quantity
Energy	253kcal
Carbohydrates	44g
Proteins	6g
Fat	6g
Cholesterol	18mg
Sodium	80mg
Potassium	428mg
Vitamin A	482IU
Vitamin C	47mg

Source: (Vanessa, 2021)

4.3.3 Mango Mastani

- Origin of Mango Mastani is Pune of India.
- Main ingredients of mango mastani are mangoes and chilled milk. Procedures of making of mango mastani are:
 - Prepare a thick mango milkshake by blending of mango cubes.
 - Add chilled milk and scoop of vanilla ice cream.
 - Blend to a thick mango milkshake.
 - Top with vanilla ice cream, dry fruits, cherry and tutti frutti.
- It is a thick milkshake with ice cream. It is available in a variety of flavors like chocolate mastani, dry fruits mastani, kesar pista, pine apple, vanilla, orange, rose etc (Amit, 2019)



Figure No. 4.37

Source: Veg Recipes of India

- **Nutrition**

Table No. 4.9: Nutritional content of Mango Mastani

Nutrients	Quantity
Energy	988kcal
Carbohydrates	115g
Protein	24g
Fat	51g
Cholesterol	141mg
Sodium	323mg
Potassium	1372mg
Vitamin A	3730IU
Vitamin C	71mg

Source: (Hebbar, 2020)

4.3.4 Alouda

- Origin of alouda is Mauritius of Africa.
- Main ingredients used in making of Alouda are basil seeds, agar jelly, milk and vanilla. Following are steps of making of alouda (Priya, 2018):

- Soak the basil seeds in enough water.
- Bring a cup of water to boil, add the agar agar sticks and cook until they get well dissolved.
- Transfer this to a plate and let it cool completely. Once cooled, break the agar agar with a fork as small pieces, keep aside.
- Bring boil the milk, sweetened condensed milk as bit thick milk.
- Let it completely arrange it in fridge.
- While serving, drop a tablespoon of rose syrup or strawberry syrup to a tall glass.
- Top it with chilled sweetened milk, drop a generous amount of agar agar and top it with basil seeds.



Figure No. 4.38

Source: Pinterest

- It's sweet, but cool and refreshing, and the agar agar and basil seeds give it a "slimey-chewy" texture that makes it feel like a mini meal. It has numerous health benefits like helps in digestion problems.

4.3.5 Suutei tsai

- Origin of Suutei tsai is Mongolia of Asia.
- Ingredients of making Suutei tsai are tea leaves, milk, salt and water. Procedures are as follow:

- Put the tea and water in a sauce pan and bring to a boil.
- Add the milk and bring it back to a boil.
- Use a ladle to lift the liquid and let it spill back into the pot as opposed to stirring.
- Season to taste with salt and strain into a teapot.
- With the meal, serve in tiny bowls.

- Nutrition:



Figure No. 4.39

Source: medmunch.com

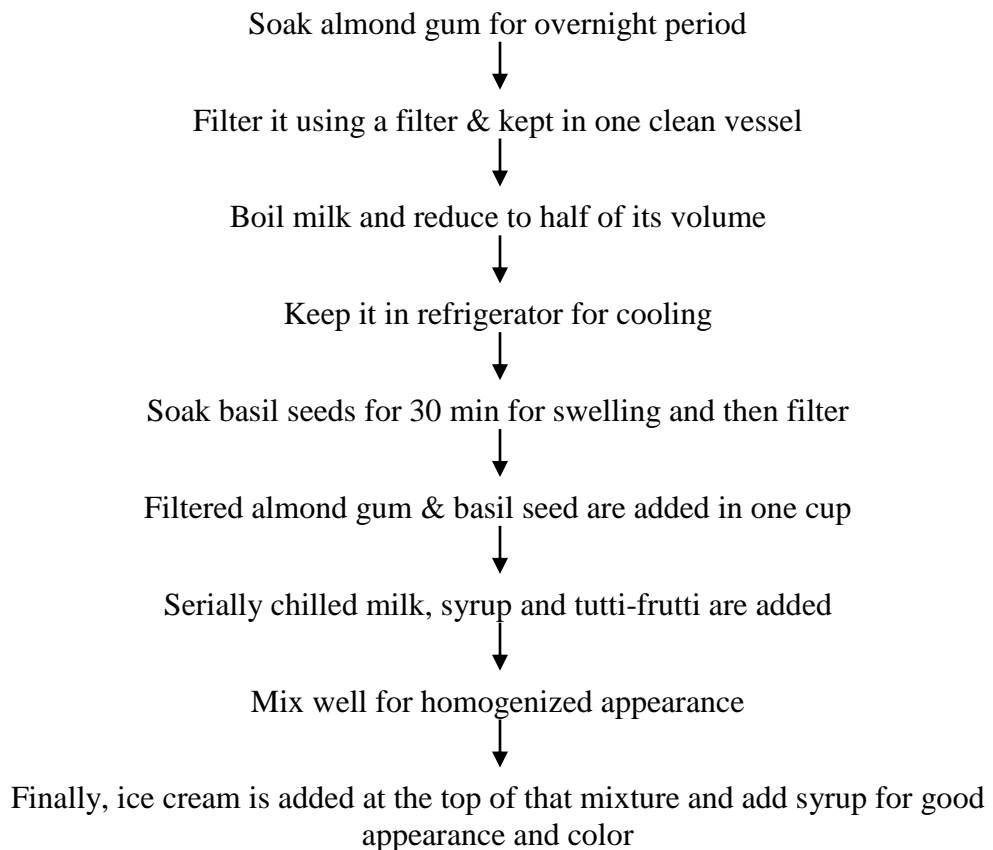
Table 4.1- Nutritional content of Suutei Tsai

Nutrients	Quantity
Energy	74kcal
Carbohydrates	6g
Protein	4g
Fat	4g
Cholesterol	12mg
Sodium	58mg
Potassium	161mg
Vitamin A	198IU
Calcium	141mg

Source: (Darlene, 2017)

4.3.6 Jigarthand

- Origin of jigarthand is Madurai of India.
- Ingredients used in making of jigarthand are almond gum (badam pisin), nannari syrup (nannari sarbath) made from sarsaparilla root, evaporated milk, regular milk, sugar and ice cream. Flow chart for the preparation of Jigarthand(Manoharan et al., 2020b)



- Sometimes agar-agar is added instead of almond gum. The process of making jigarthand is time-consuming and though it can be made at home, the drink is usually sold from pushcarts and street stalls across the city. It is a very good natural body coolant and can help easily glide through the scorching heat during Summer.



Figure No. 4.40

Source: cookclickndevour.com

4.3.7 Irish Moss

- Origin of Irish moss is Jamaica of North America.
- It is made with the eponymous algae officially named *Chondrus crispus*. The moss is rinsed and then boiled with milk and other spices to make the beverage.
- Irish Moss is high in Carrageenan (55%) as well as 10% protein, 15% minerals and is also very rich in iodine and sulfur at significant levels(Gordon, 2017b). As a result, the substance has been transformed into a drink that can help



Figure No. 4.41

Source: jcskitchen.com

your immune system.

- Irish Moss is also used as a thickening and stabilizing agent for ice cream and processed foods. That is why the drink has a thick almost viscous consistency. It's a wonderful gelatin substitute for vegetarian and vegan recipes and drinks (Anonumous, 2020)
- Cinnamon, vanilla, and nutmeg are popular spices. The drink comes in a variety of flavours, including condensed milk, oats, and peanuts. The latter is a variation on a similar Jamaican drink known as peanut punch(SABLIOV et al., 2008b)
- It is available at bars and roadside stands and it also comes in a canned version.

4.3.8 Peanut Punch

- Origin of peanut punch is Jamaica of North America.
- Ingredients are peanut butter, water, vanilla essence, condensed milk, honey, nutmeg and cinnamon. Following are steps of making peanut punch (Rainford, 2021):



Figure No. 4.42

Source: recipefairy.com

- Place the peanut butter and half the water in a blender and blend.
 - Gradually add the remaining water while continuing blending.
 - Thoroughly blend until the mixture is liquefied.
 - Using a sieve, strain the mixture into a jug by pouring a little bit at a time.
 - Combine the vanilla extract, condensed milk, cinnamon, nutmeg, and honey in a mixing bowl.
 - Mix thoroughly and serve cold.
- It has a lot of protein. Many Jamaicans consider it to be an aphrodisiac. It is commonly sold by street vendors who may use various secret ingredients like Irish Moss to stake their claim of having the best peanut punch (Murphy, 2011).
 - Health benefits of Peanut punch are:
 - Lowers cholesterol levels
 - Helps in weight loss
 - Reduces risk of heart diseases
 - Helps boost memory.

4.3.9 Gajar ka doodh

- Origin of gajar ka doodh is India of Asia.
- Ingredients used in making of gajar ka doodh are fresh carrots, milk, evaporated unsweetened milk(kova), sugar, infused with a hint of cinnamon, clove and grinded cardamom and saffron. Following are procedures (Aparna, 2017):

- Steam the carrots, cool and puree.

- Grind the cashew nuts and almonds to a smooth paste.

- Bring the milk to a boil with the clove and cinnamon stick. Reduce heat and boil the milk for atleast 10 min. Add the sugar and stir till it's completely dissolved.



Figure No.- 4.43

Source: tasteatlas.com

- Add the carrot paste to the milk mixture, combine well and let it cook for 3-4 mins.

- Add the nuts paste, kova and cardamom powder and combine well. Turn off heat after 2min and cool completely.

- Blend the cooled mixture till it get smooth consistency.

- Garnish with toasted almonds silvers or pista.

- Carrot milk is nutritious because of the presence of carrots. Carrots are rich in many nutrients such as vitamins (A, D, B, E, C and K) and minerals (calcium, potassium, phosphorus, sodium and iron)(Daneshi et al., 2013). Because of its antioxidant activity and ability to act as a provitamin A, β -carotene is found in high concentration in carrots and can be considered one of the most important micronutrients. (Knockaert et al., 2012)

4.3.10 Leche con Platano

- Origin of leche con platano is Chile, South America.
- It is a milkshake. Ingredients used in making it are milk, sugar and ripe bananas and sometimes with the addition of whipping cream. To make it, combine all of the ingredients in a blender until smooth and frothy.



Figure No. 4.44

Source: chicureohoy.cl

- This drink is especially popular at children's parties and birthdays. It is rich in fiber, calcium and potassium which is essential for good health. It is also rich in protein which can help in supplement all the essential amino acids (Heidemeyer, 2015).

4.4 Whey-based Beverages

4.4.1 Zincica

- Origin of zincica is Slovakia, Czech Republic and Poland of Europe.
- It is made from sheep's milk. It has a long tradition, but until the mid-20th century, it was mostly prepared and enjoyed by shepherds in the mountainous regions, where it is still traditionally served in a traditional served in a traditional wooden cup known as črpák.
- Following are the health benefits (Anonymous, 2021):
 - Natural moisturizer



Figure No. 4.45

Source: nikos.sk

- Adds brightness to skin,
 - Applying it to the skin can help ease the pain of sunburn,
 - Brightens skin tone,
 - Rich in Lactic acid and
 - Gives glowing and flawless skin.
- It's also popular in the Czech Republic, where it's known as žinčice, and Poland, where it's known as tyca. Although žinčice is now commercially available, only the kinds classified as žinčice salancka are made using traditional recipes and procedures.

4.5 Cereal-based Beverages

4.5.1 Akasan

- Origin of akasan is Haiti of America.
- Ingredients used in making of akasan are corn flour, evaporated milk and spices. Corn flour, sugar, evaporated milk, cinnamon, and star anise are used in most variants, while some versions utilise soaked, cooked, and mashed corn



Figure No. 4.46

Source: thatgirlcookshealthy.com

kernels, as well as spices like vanilla or nutmeg. Following are the procedures:

- In a heavy-bottomed saucepan bring half the water, salt, cinnamon and star anise pods to a boil.
- In a bowl, combine the corn flour and the remaining water into a paste
- Slowly pour the batter into the pot of boiling liquid, whisking constantly to avoid lumps.

- Reduce the heat to medium and cook for 5 mins, stirring constantly.
- Remove the star anise and add the vanilla and evaporated milk.
- Mix well the serve lukewarm or cool.
- It can also vary in consistency from thick to frothier and drinking versions. It is commonly homemade but pre-made versions are often sold by street vendors.
- Nutritional Composition:

Table 4.11- Nutritional content of Akasan

Nutrients	Quantity
Energy	265 calories
Fat	6g
Cholesterol	25mg
Sodium	390mg
Potassium	258mg
Carbohydrates	45g
Protein	6g

Source: (Dadoun, 2021)

4.5.2 Boeber

- Origin of boeber is Cape town of South Africa. It was originally made by Cape Malays, whose ancestors came from Indonesia, East Africa and India.
- Ingredients used in making of boeber are sugar, milk, vermicelli, sago and flavorings such as cinnamon, rose water, star anise and cardomon. Procedures are as follows (Ezeokoli, 2021)



Figure No. 4.47

Source: timeslive.co.za

- Put sago in the warm water for about 30 mins.
- In a deep saucepan, melt the butter, then add the crushed vermicelli, coconut, and almonds and sauté until golden brown.

- Boil the sago and milk in a pan, stir and set aside for 12 mins.
 - Add the coconut milk, the vermicelli mixture, cardamon, rosewater, milk and sugar and gently simmer over a low heat for 10 mins, stir till it thickens.
 - Remove the pan from the heat and add the vanilla extract.
 - Serve warm with roasted almonds on top.
- It is traditionally served on the 15th night of the Ramadan in order to celebrate the middle of the fast. The flavour is extremely rich and sweet.

4.5.3 Pinolillo

- Origin of Pinolillo is Nicaragua of Central America.
- Its main ingredient is white and roasted maize, and its second distinctive element is cocoa, which was once one of Nicaragua's currencies. Following are the procedure(Bebida, 2018):

- In a comalito, put toast the white corn. Move it without being required.
- In a casserole, toast the cocoa. This is roasted faster so there must always keep an eye on it so that it does not burn.
- Once both elements are toasted, let it rest for about 20 minutes.
- Then put to peel the cocoa, to do it exert pressure in the seeds, so that they fall the shell.



Figure No. 4.48

Source: recetas-nicaragua.com

- In a corduroy, place our corn and add the following ingredients: chiapa pepper, cloves, cinnamon to taste, and roasted and peeled chocolate.
- Once it is made this integration proceed to stir and send to grind it fine.
- Once ground will be powdered and proceed to serve with water or milk and a little ice.
- Also called pinol or pinole, pinolillo is enjoyed both hot, much like hot cocoa, and cold, like iced coffee or horchata. Pinolillo has a somewhat gritty texture and can be served sweetened or unsweetened, however when not sweetened, it can have a mildly bitter taste.
- Pinolillo is high in antioxidants and vitamins, and it's recently gained popularity in other nations, including the United States, due to its capacity to aid in weight loss and promote satiety, as well as a variety of other health advantages (Piperata *et al.*, 2020).

4.5.4 Batido De Trigo

- Origin of batido de trigo is Cuba, North America.
- It is a Cuban milkshake. Ingredients used in making of Batido de trigo are whole milk, puffed wheat cereal, a generous amount of sugar and a pinch of salt. To prepare it, all ingredients are simply blended together and add a scoop of ice cream to make it creamier and richer.
- This sweet afternoon delicacy is often served with Cuban sandwiches, pastelitos, or croquetas.
- Nutrition (Silva, 2021):



Figure No. 4.49

Source: [pinterest.com](https://www.pinterest.com)

Table 4.12: Nutritional content of Batido De Trigo

Nutrients	Quantity
Energy	481kcal
Carbohydrates	80g
Protein	12g
Fat	13g
Cholesterol	45mg
Vitamin A	555IU
Vitamin C	2mg
Calcium	450mg
Iron	1mg

SUMMARY AND CONCLUSION

Milk is a natural food source for mammals and an almost ideal food. It has a higher nutritional value since it contains body-building proteins, bone-forming minerals, and health-promoting vitamins, as well as lactose and milk fat, which provide energy. Milk and milk products play a significant role in India's food industry and economy. The economic survey said that milk production in country has increased from 146.3 million tonnes in 2014-15 to 198.4 million tonnes in 2019-20. Compared to 2018-19, it has increased by 5.70% according to the government data. According to a study undertaken by the NDDB on milk demand, the expected demand for milk and milk products in 2030 at an all-India level is 266.5 million metric tonnes. The per capita availability of milk was 407 g/day in 2019-20. India is the world's largest milk producer, with 22% of global production, followed by the USA, China, Pakistan and Brazil. Total milk production in world in 2018-19 was 843.04 million tonnes. (Source: FAOSTAT, 2019). Total milk production in India in 2018-19 was 187.7 million tonnes and per capita availability was 394 gms/day. (Source: Basic Animal Husbandry Statistics, DAHD&F, GOI, 2019). Due to an increase in demand for high-quality, hygienic, and packaged milk and milk products, the country's milk processing capacity has grown over time. Of the total milk processed in the country, 65% to 70% is sold as liquid milk. The remaining is turned into cheese, butter, ghee, ice cream, curd, and other dairy products.

Summary and conclusion

In this context the present research work was planned as to review the characteristics of ethnic traditional dairy beverages and their origin, distribution and health benefits. Most of the dairy beverages are made at household level and because of this there is no specific quantity or amount of ingredients or temperature is fixed. Some of them are made at industrial level. Some traditional dairy beverages are made by one community at popular within their community only. Some traditional dairy

beverages are popular in their own country while some of them are popular in their country and neighbour country. Some traditional beverages are stuck to festive season only. Most traditional beverages are fermented dairy beverages and milk-based beverages.

Traditional dairy beverages are mainly made by those ingredients which are mostly available in their local. Microorganisms like bacteria and yeast group are associated with traditional fermented dairy-based beverage which have potential in maintaining health and prevent diseases. They are more nutritious so that human body get essential nutrients. They play an important role in the diet of people in many parts of the world. Milk used in making of traditional dairy beverages are cow's milk, buffalo's milk, mare's milk, camel's milk etc. which are mainly available in local areas. In comparison between traditional dairy beverages, there are more health benefits of traditional fermented beverages than others traditional dairy beverages.

There are so many traditional dairy beverages from different countries. Traditional dairy beverages are divided into five categories viz., Fermented Dairy-based beverage, Milk-based beverage, Whey-based beverage, plant-fruit based beverage and cereal-based beverage. Nutritional composition of traditional dairy beverages is varying from product to product. More energy content in milk-based beverages than others traditional dairy beverages. Fermented dairy beverages are using starter cultures which help in fermenting. Fermented dairy beverages are using milk from different milch animals like cow, buffalo, mare, camel, sheep etc. while other traditional dairy beverages are not using specific species' milk. In most fermented dairy beverages, specific starter cultures are used while few of them are using unknown starter. Some fermented dairy beverages used specific pot for fermentation. Yoghurt- Most popular fermented product.

Kefir grains are used in product which contains a mixture of bacteria and yeasts. Lassi is used as refreshment and summer drinks. Ewe's milk yoghurt is used to make ultimate ayran. Ryazhenka is also called fermented baked milk. Mare's milk is used for making of Koumiss. Kiselo Mlyako is also called Bulgarian yoghurt. It contains specific starter culture. Amasi is some comparing between yoghurt and

cottage cheese. Villi is created to preserve extra milk in summer. Bacteria and yeast both are present in it. Camel's milk is used for making of chal. Chalap is described as liquefied, pungent, salty and smoked cheese. Dhau is a traditional dessert at numerous Newar festivities in the Kathmandu valley of Nepal. Matzoon has many health benefits like improves and increase the appetite, accelerate digestion, reduce the level of cholesterol etc. In tahn starter culture used for making than is matzoon starter culture. In the process of making of Prescinseua, rennet is used. Pokot Ash Yoghurt- Communities in the village of Tarsoi, Tartur, Lition and Chaunet in Kenya's West Pokot district traditionally produce it. Leite Azedo is also produced by women of community of Namibe province of Angola.

Milk based beverages are mainly used as refreshment, energy drink, dessert or summer drinks. Most of them are popular in Europe and America continents. Mainly ingredients used in making of milk-based beverages are cocoa, chocolate powder, dark chocolate etc. Different forms of milk like condensed milk, evaporated milk etc. are used in making of milk-based beverages. They have numerous health benefits. They are also flavoured with fruits, vanilla, spices, rose syrup etc. They are smooth and good in consistency. Many of the beverages are secretly made long time ago, because of these procedures are not accurately followed.

Licuado is used as energy drink and breakfast food. Chocolate Caliente is used to fight against anger, reduce the risk of heart disease etc. In coffee milk, important ingredients used in making of it is coffee syrup. Bandung is mainly made during Iftar in the month of Ramadan and beloved by the Malai community. Cocio is a classic Danish chocolate milk. Egg cream- As the name suggest, there is no use of egg in this product. Batido De Trigo is a Cuban milkshake. Puffed wheat cereal is used in making. Thandai is popular because it is used in festive season (Mahashivratri). Haldi Doodh and Badam doodh are good for health. They are highly nutritious. Leche merengada, Whipped egg whites are used in making. Coffee Cabinet is named as State Drink. Milkis- Most popular beverage in South Korea. It is non-alcoholic beverage. Cacolac is classic Bordeaux beverage. Soda Gembira- Meaning of this

name is happy soda and it is traditional Indonesian non-alcoholic beverage. It has typically pink colour. Egg Soda is famous Vietnamese beverage.

Plant-fruit based beverages have many nutritional benefits as in them many different types of fruits, agar-agar, basil seeds etc. are present which make them more nutritious and healthier. And by mixing some other ingredients like dry fruits, vanilla essence, cherry etc. makes them attractive for all ages of people. Leche con Platano is rich in fiber, calcium and potassium. Cholado is also known as Raspao. Morir Sonando is made from orange juice and cane sugar. Mango mastani is made by mango. Alouda has numerous health benefits like helps in digestion problems. Suutei Tsai is made of tea leaves, milk and salt. Basil seed is used in making of Jigarhand. Algae is used in making of Irish Moss. It is high in protein. Peanut punch is high in protein. It has many health benefits.

Whey based beverages have many health benefits. Probiotics are present in whey-based beverages. They are flavoured to make them tasty. Cereal-based beverages are used cereal which give more carbohydrates to the human. Along which cereals other ingredients are used to make them enriched. Vanilla, chocolates, spices such as cinnamon, cardamon etc are used for flavouring. For festival purpose, some of them are used. Boeber is traditionally served on the 15th night of Ranadan. Pinolillo is loaded with antioxidants and vitamins.

Conclusion

Because of their great nutritional value, milk and dairy products have historically held a distinctive place in the global food basket. As a result, a wide variety of products from many countries have become available, leading to an increase in milk consumption in these countries. At the household level, several different traditional dairy beverages are made. The presence of unknown microorganisms makes it difficult to manage the fermentation process and results in products of varying quality. There is no specific temperature and quantity of ingredients at household level which makes the variation in making of products. During study, it has been revealed that there is paucity and some non-availability of

data related to production, chemical composition and nutritional composition so, there is need of more research of traditional dairy beverages in future. Fermented dairy products are currently being employed as a key component of a wide range of products. However, other dairy products have been introduced utilising various technologies or alternative products have been offered from other sources due to various sensitivities caused by milk consumption. Another key issue with dairy products is microbiological safety and quality, which has led to the use of various preservatives. With the increased diversity of dairy products, enrichment appears to be a major concern. This can be accomplished by limiting the negative impacts of various processes while optimising their nutritional value, as well as providing products with improved functional qualities by incorporating helpful probiotics and substituting natural preservatives for chemical preservatives.

Future Study

With traditional dairy beverage products presently enjoying success in many markets commercially, there is also a simultaneous interest that is increasing interest in the area of functional beverages from a scientific, consumer, and commercial perspective as well. There is a movement in the modern consumers' selection of foods that offer health, social, and environmental benefits overall. It has basically encouraged the dairy beverage industry to develop novel dairy products and market strategies for proper commercialization. And with the availability and improvements in technology, and from the consumers' continued increasing interest in functional dairy beverage it can be very well stated that the overall outlook for dairy beverages is more promising than ever in near future. There are also needs of more research on traditional dairy beverages in future.

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