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Review Article

# THE REVIEW ON KURUT: MANUFACTURING AND PREFERENCE STRATEGIES

Seval Sevgi KIRDAR[1,2], Zeynep KARAKAYA[2]

## Abstract

Kurut is a traditional food made from fermented milk products, primarily produced in Central Asia and Anatolia. The main raw materials used are yogurt or buttermilk. Through processes of straining, salting, and drying, kurut is transformed into a low-moisture product with a long shelf life. This nutritious food is high in protein and minerals, particularly calcium. Its low water activity makes it resistant to microbial spoilage, which has contributed to its status as a staple food in nomadic societies.

Kurut production is prevalent in Central Asia, including countries such as Kazakhstan, Kyrgyzstan, Uzbekistan, and Turkmenistan, as well as in Iran, Afghanistan, and the eastern and southeastern regions of Anatolia. In Turkey, it is produced in areas such as Erzurum, Kars, Van, and Ağrı, often under different names and using various methods.

Although production techniques can vary by region, they typically involve churning yogurt to create buttermilk, separating the butter, straining the remaining mixture, salting it, and then drying it into small pieces. In general, kurut has a firm texture and a salty, sour taste. It is commonly used in soups and sauces or eaten directly. Beyond being a significant element of traditional culinary culture, kurut continues to be valued today as a functional and natural food.

**Keywords:** Fermented Milk Products, Kurut, Production Techniques, Functional Food

TÜBİTAK ULAKBİM

[1]Burdur Mehmet Akif Ersoy University Burdur Food, Agriculture and Livestock Vocational Higher Education School Food Processing Department , Burdur, TURKEY
[2]Burdur Mehmet Akif Ersoy University Healt Sciences Institute, Burdur, TURKEY

*Corresponding Author: Seval Sevgi KIRDAR
Burdur Mehmet Akif Ersoy University
Burdur Food, Agriculture and Livestock Vocational Higher Education School Food
Department of Food Processing, Milk and Dairy Products Programme,
15030 İstiklal Campus, Burdur/Turkey
Phone: +90 2482132274
Email: skirdar@mehmetakif.edu.tr

## Introduction

Drying is a primary method frequently utilized in food preservation. This method is utilized for food preservation and is also essential in the manufacturing processes of specific products. The drying process impedes or halts the growth of spoilage-inducing bacteria by removing moisture; hence, it extends shelf life due to reduced water content and negates the necessity for specific storage conditions. Freeze-drying, spray drying, microwave drying, centrifugation, ultrafiltration, and vacuum thickening are the most prominent drying methods. Of these methods, solar drying of food is the most cost-effective and uncomplicated, requiring the least labor and equipment for preservation. The drying process is employed in the dairy sector for the production of traditional products such as kishk, tarhana, and kurut, which consist of milk powder, yogurt powder, and other grain-yogurt combinations [41,47].

Various methods have been used to preserve yogurt, including salting, cooking, removing water to increase dry matter content, heating, and preventing contact with air during storage. Yogurt, one of our most important fermented dairy products, has been traditionally produced since ancient times by thickening it through straining and cooking or by kneading it with salt and drying it in the sun. These regionally produced products, due to their high protein content, play an important role in meeting the animal protein needs of the local population as well as providing additional income for families. As a result of these preservation methods, different traditional yogurt products known by names such as Torba Yogurt, Tulum Yogurt, Labneh, Pesküten, Kurut, Kishk, Keş, Labneh Anbaris, and Chanklich have been produced. However, these products are not well-known in most regions, and in the areas where they are recognized, they are losing relevance, leading to a decrease in both their production and consumption[39].

Kurut is a durable type of yogurt, but it differs from regular yogurt in that it has a longer shelf life and is made using both full-fat and skimmed milk and ayran. Kurut is a delicious dairy product, usually produced in villages and towns during periods of abundant milk production. It has a tart taste and, when diluted, has a thick, yogurt-like consistency. In the Kars region, it is generally consumed with soups, dumplings, and some local dishes. Because kurut is prepared in small pieces, it is easier and more economical to consume. Prepared by softening the milk in hot water and then crushing it, the fat content of kurut varies according to personal taste, and in some regions it is also made from skimmed milk. The advantage of making it from full-fat milk without separating the cream is that kurut dissolves easily in water, leaves a rich flavor in the mouth, and does not darken during sun-drying. If properly stored, kurut can last for several years [15,27].

In the pastoral-based culinary culture of Central Asian Turks, milk and dairy products hold a critical place. In Central Asian culture, Turks would dry yogurt to make it last longer before consumption. Drying, in an era when many methods were scarce, allowed these perishable and non-durable foods to be preserved healthily and hygienically for a longer period. Foods made from milk or yogurt that were dried and consumed using this method were called "kurut." Kurut generally refers to dried yogurt made from sheep's milk. It is prepared from fat-free yogurt or buttermilk from which the fat has been removed. Kurut continues to be made in the Southeastern and Eastern Anatolia regions and is consumed with soups, dumplings, and some regional dishes. In the Erzurum region, it is also called pestikan. Similarly, the tradition of making dairy products like "keş," which is

obtained by boiling yogurt after the fat has been removed, adding salt, straining, and drying, still continues [12,14,19, 31,37,40,41].

## Names of Kurut Used in Different Dialects

Kurut is a dairy product obtained by straining and drying buttermilk and yogurt and is consumed with pleasure in the Silk Road and Anatolian geography. It is also a dairy product that can be preserved for a long time without spoiling under suitable conditions. "Kurut" is a Turkish word, and its root comes from the word "to dry." It was recorded as "grut" by ambassadors who came from Europe to Central Asia in the thirteenth century. According to some sources, the word "kurut" means "winter provisions" or "war provisions." According to old sources, it is said that in the Middle Ages, Turks made kurut, a dairy product similar to cheese, from yogurt and buttermilk. It has different names depending on the country where it is found. It is known as "kurut" in Kyrgyzstan, the People's Republic of China, and Russia; "kurt" in Kazakhstan; "kashk" in Iran; "aaruul" in Mongolia; "kishk" in Lebanon; "kushuk" in Iraq; "jubjub" in Syria; "kort" in Tajikistan; and "kurut and keş" in Turkey. The Yörük people call Kurut "keş," and the Turkmen people call it "gurt." [8,30,33].

One of the oldest written records regarding kurut is the Divanü Lügat-it-Türk, compiled by Mahmud al-Kashgari in the 11th century. Mahmud al-Kashgari mentions kurut in several places in this work. Besides Divanü Lügat-it-Türk, there are other written sources that mention the Turks' consumption of kurut. For example, European ambassadors who traveled to Turkestan in the 13th century recorded it as "grut" in their books. In Turkish sources from the Khwarazmian period, it is referred to as "kuru peynir" (dry cheese), in the Mamluk Turks of Egypt as "kara-kurut" (black-dry), and at the beginning of the Seljuk era as "kurutluğ kişi" (person with dryness), meaning "someone who has driedness". In the Middle Ages, it is known that Turks gave the name "kurut" to cheese made from yogurt or buttermilk. Scholars who conducted extensive research in Turkestan, such as Pallas, Timkovski, and Radlof, have attributed two meanings to kurut: "skimmed milk" and "war provisions" [50].

Russian historian and foremost expert on the history of Russian and Central Asian cuisine, and the author of numerous culinary books, William Pokhlyobkin, devoted a book on Central Asian cuisine where he carefully recorded a recipe for making qurt in his book National Cuisines of Our Peoples. Today, the dish called kurut is made and consumed in Turkey, the Turkic republics, and Turkic communities, and although there are minor differences, the same name is used. While it is expressed as kurut in Turkey, in other Turkic states and communities, the Kyrgyz pronounce it as "kurut," the Kazakhs as "kurt," the Turkmens as "gurt," the Uzbeks as "qurt," the Tatars as "kort", the Altai Turks as "kurut", the Kumandins as "kurut", the Bashkirs as "korot," and the Nogais as "kurt".The Mongols of the Imperial period not only prepared and used qurt in the same way as the recent Kirghiz-Kazakh, but gave the product the same name, grut.[50].

## Kurut production in World

### *Kyrgyzstan*

Kurut, made using traditional methods, is produced in almost all regions of Kyrgyzstan. It is usually made by farming families during the summer months when milk is abundant. Some produce kurut for their own consumption, while others produce it for sale. A few local industrial companies also produce this popular dairy product. The size, color, and variety of the

kurut offered for sale vary. There are types of kurut produced using fruit, peppers, dill, and various spices, and smoked [49]..

Kurut is a popular snack, a type of dried yogurt or hard cheese traditionally produced in Kyrgyz cuisine during the summer months (Fig. 1). Also well known in Turkey, it is known by various names such as Akçakatik, kes and Pestigen [22,24,26,29] and Lu Lao or Gan Lao (Mongolian-style dry cheese) in China [52]. Produced as a nutritional preservation agent for cow's or sheep's milk and increasingly used as a tourist product, Kurut is made from Süzme, which is then shaped into small balls or other shapes and is dried in the sun or a shaded place for 5–7 days. For the production of Kurut, two types of Süzmo ¨ are used: raw and cooked. Chob¨ og¨ o ¨ is usually added to the cooked Süzmo, ¨ which is rich in protein and brown in color. If desired, salt (1%–3%) and cream (5%–10%) can be added before shaping to obtain a brittle consistency and a greasy taste. Kurut has a long shelf life due to its high acidity (pH range from 3.72 to 3.85) and low moisture content of 15%–17%. Therefore, kurut can be stored for years at ambient temperature without spoilage and loss of nutritional value. Kurut can be consumed as a snack or softened and dissolved by placing it in lukewarm water until the desired consistency is obtained. Before serving, diluted Kurut should be heated to a boiling temperature and served with a spoonful of ghee as a warm dish in cold weather. Nowadays, kurut is used for banquets as a light snack for small official receptions with ethnic drinks such as chalap, zharma, bozo, and koumiss. The nutritional value of Kyrgyz Kurut, according to manufacturers' data, is as follows: fats—4 g, carbohydrates—22.7 g, proteins—54.2 g, and 300 kcal of energy per 100 g of the product [42].

### *Kurut with Fruit*

This type of kurut production is generally carried out in the Batken region of Kyrgyzstan. The Batken region is famous for its apricots, and they are used in kurut production. The aforementioned dried apricot, while initially consumed only in this region, later spread throughout the country and has become a beloved food today. However, there is no industrial production of fruit-based dried apricot yet. In the production of fruit-based dried apricot, first the apricot kernel is separated, and then apricot puree is obtained. Then the apricot puree is strained and mixed with the resulting strained yogurt and boiled. After this process, the dried apricot is shaped and left in the sun to dry [49].

### *Dried Apricot with Red Pepper*

Dried apricot with powdered red pepper is known as another type of dried apricot. During the production of dried apricot, red pepper powder is added during the addition of salt and curd. After the mixture is homogenized, it is divided into small pieces, shaped, and left to dry in the sun. Red pepper is emphasized as having effects such as giving the kurut a different taste and color, as well as preserving its nutrients[49].

### *Kurut with Chobogo*

"Chobogo" is the brown sediment that forms when cream is boiled and the fat is separated. Adding chobogo to kurut enhances its flavor and color. This practice has been traditionally observed among the Kyrgyz people from the past to the present [49].(Figure 1).

### *Kurut Made by Applying the Smoking Technique*

"In this technique, kurut made using the traditional method is first dried in the sun." Then, the product is subjected to a

smoking process. After the process, kurut has a special taste, color, smell, and aroma due to smoking [49].

In a study conducted in Bishkek, Kyrgyzstan, the physicochemical properties of dried fruit samples obtained from public markets and produced under controlled conditions were examined. According to the results, the average dry matter, ash, and salt percentages of the samples obtained from the markets were found to be 84.46%, 12.02%, and 12.51%, respectively. The average dry matter, ash, and salt levels of dried fruit partially produced under laboratory conditions were determined to be 82.42%, 12.52%, and 8.58%, respectively [21].

Like other Turkic peoples, Kyrgyz people consider kurut their national dish. In fact, in 2024, a government postage stamp featured an image of kurut. In daily life, kurut is also traded in markets, supermarkets, and kiosks.

## Kazakhstan

Kurut (qurt) is also made from cow, sheep, and goat's milk in the summer months. After clarification, raw milk is heated to 90–100°C°C for about 15–20 minutes, and then cooled again to 40–45 °C Fermentation is induced in the fresh milk by the addition of a carefully preserved yogurt from an earlier preparation (2–3%). After the production of yogurt, the milk is churned into butter and ayran. A soured milk also used as a beverage, using wooden or leather churns. The ayran is then boiled to 90–100 °C for about 10 min until a white coagulum floats on the surface. When this coagulum is boiling in the pot, the bottom of the pot must be stirred with a wooden stick to prevent burning. When the boiling process is complete, the white coagulum is transferred into a qurt cloth. It is pressed in the cloth until the desired level of solidity is attained. The qurt is then salted up to 2–3% by weight with dry salt and transferred to cotton bags. The bags are hung from a platform in a warm room for 2–3 days. The bags are occasionally turned over to achieve a homogeneous dryness. Qurt wiquart up to 60 to 70% total solids content can be maintained. The qurt is shaped into a round or oval form, each with a weight of 30–40 g, and dried in the sun for 10–15 days. (Fig.3)At the end of this period, the product obtained is the curd quartcurd as such and can be stored at ambient temperature for more than a year. It is used for soup production in winter and as a beverage, after beverage reconstitution with lukewarm water, obeverage afterwater or as a starter culture for yogurt manufacture. Boiled soured milk from cows can also be used. It is strained and formed into small balls that are left to dry in the sun. This kind of qurt is eaten as a snack by itself, water or itself or with tea, or it can be diluted in broth or porridge. Because of considerations of flavor and texture, an itself or texture and traditions of preparation, qurt can also be made by mixing in fruits such as strawberries, raspberries texture and raspberries,and blackberries. Sometimes, with the mixture of green leaves, such as mint, dill, basil, or red pepper raspberries,pepper,which give specific flavor. Addition of beet or carrot juice can give some reddish color; then it is dried in the sun. Nowadays on the open market, you can see chocolate coveredpepper,-covered qurt, coveredyogurt, caramel-covered yogurt, yogurt, and even yogurt with nuts and sunflower seeds [7,36,53].

The modern industrial production of qurt in Kazakhstan has partly taken over and adapted some of the traditional methods and names. For example: Fresh qurt, foam qurt, hot qurt, tube or squeezed (syqpa) qurt, pebble (maltatas) qurt, puree qurt, white pebble qurt, powder qurt, butter qurt. All of the mentioned products are soured by lactic acid bacteria but some, in

addition, undergo an alcoholic (yeast) fermentation:

Fresh qurt is made from cheese curd, which is not dried, but left half-tender. It serves as a good meal for those who cannot eat firm, dried qurts; it is considered safe for the elderly and it is a very nutritious food.

Foam qurt is floating on the surface of boiling qurt. This food is full of nutrition, and is recommended for children and elderly people. It is a custom for rural children visiting a qurt boiling home to lick the fresh qurt foam.

Hot qurt is a mix boiling qurt with butter. It is a healthy drink for breakfast. It is the best treatment for patients suffering from lung disease and the cold. Immunity from disease is indispensable in the kitchen too.

Butter qurt is a similar but less concentrated product, and may be unsweetened or sweetened; if the latter, it resembles sweetened condensed milk in texture [36].

## Iran

In Iran, nomads and villagers engaged in the small and large livestock farming process of turning cow, sheep, and goat milk into dried milk using primitive methods. The dried milk produced by nomads, generally living in the north and northwest of Iran, is consumed by the Azeri Turks living in the same region. Along with traditional liquid dried milk and industrial liquid dried milk, dried milk holds a significant share in Iranian dairy production and is widely used by the public in the preparation of various dishes [43].

Kashk (also called qurt, kurut or gurt) drained yougurt balls in Vakil Bazaar, main bazaar of Shiraz Shiraz city, capital of Fars Province in Iran (Figure 4). Kashk is a fermented dairy product used across Iran and parts of the Caucasus and Central Asia, known for its tangy, savory character and creamy consistency when reconstituted. In Iranian cooking, it serves as both an ingredient and a garnish, lending richness and depth to stews, soups, and vegetable dishes. The word *kashk* is Persian, and its preparation is part of a broader tradition of preserving milk in regions where refrigeration was historically limited. References to kashk stretch back many centuries, with early Persian texts describing it as a way to extend the shelf life of yogurt or buttermilk [44].

Nomadic herders in Iran and neighboring lands relied on kashk as a portable, nutrient-dense food that could be stored for months in dried form. Over time, it evolved from a simple sustenance to an essential culinary component in dishes like ash reshteh and kashk-e bademjan.The preparation begins by straining yogurt, whey, or buttermilk to remove excess liquid, concentrating the solids into a thick paste. This mixture is then lightly salted and fermented to develop its distinct sour flavor. Once properly thickened, it can be dried into small balls or thin sheets and kept for later use. To prepare it for cooking, the dried kashk is soaked in warm water and blended until smooth, forming a creamy sauce that can be spooned into food or drizzled on top. Fresh kashk is also produced commercially and sold in jars with a consistency similar to sour cream. It is often heated gently and mixed into hearty stews such as khoresh kadoo, or combined with fried onions, garlic, and mint to finish dishes like ash-e jo. In kashk-e bademjan, it balances the richness of fried eggplant and adds a slight tang that complements the dish’s spices. Some cooks prefer to sprinkle crushed dried kashk over breads or flatbreads before baking to impart a savory edge. Today, kashk remains a staple in Iranian kitchens and is commonly found in

grocery shops and bazaars in both dried and liquid forms. [4].

In another study conducted in Iran, when the physico-chemical values of the samples were examined, the pH value, titratable acidity (in terms of lactic acid), moisture, fat, non-fat dry matter, protein, salt, and ash percentages were determined as 4.27, 1.40%, 14.21%, 9.17%, 76.62%, 51.74%, 9.77%, and 12.25%, respectively [43].

In another study conducted in Iran, the pH and water activity values in traditional dried meat samples were 4.74±0.56 and 0.598±6.67, respectively; the acidity percentage (% in terms of lactic acid) was 1.80±0.40; The percentages of salt, fat, protein, ash, and moisture in the samples produced using the traditional method were determined as 9.63±1.89%, 12.53±1.24%, 50.74±2.20%, 11.47±1.86%, and 19.56±3.39%, respectively; while in the liquid dry samples produced using the traditional method, the pH and water activity values were 4.47±0.20 and 0.975±0.69, respectively; the acidity rate (% as lactic acid) was 1.79±0.21; and the percentages of salt, fat, protein, ash, and moisture were 2.42±0.36%, 2.19±0.40%, 12.99±0.71%, 3.68±0.51%, and 81.14±1.05%, respectively [34].

## China

Kurut production in China utilizes milk from different animal sources, including sheep, goats, cows, and yaks. The choice of milk depends on regional ecology and livestock availability. From a food engineering standpoint, milk composition significantly influences the texture, acidity, and yield of the final product (Table.1).

The production process begins with thermal treatment of raw milk through boiling to ensure microbial safety. After cooling to fermentation temperature, a starter culture—traditionally derived from previously fermented yoğurt is added. Fermentation typically lasts 24–48 hours, resulting in a sour yogurt with reduced pH. Following fermentation, the yogurt is churned to separate butterfat. The removal of butter reduces lipid content and enhances product stability. The remaining buttermilk is gently heated to promote protein coagulation. The coagulated mass is transferred to cloth bags and drained to remove whey, yielding a concentrated curd. Salt is incorporated into the curd to improve flavor and preservation. The salted curd is shaped into small units to increase surface area and ensure uniform drying. Drying is performed under natural environmental conditions, either in direct sunlight or shaded, ventilated spaces, until the moisture content reaches a level that inhibits microbial growth. In China, kurut is consumed in multiple forms. It may be eaten directly as a snack, rehydrated in hot water to prepare soups or beverages, or used as a flavoring agent in traditional dishes. Its high protein and mineral content make it a valuable nutritional supplement, particularly in regions with limited access to fresh foods [45].

The composition of dried fruit (kurut) produced in the Silk Road region can vary. In this context, it is reported that the physico-chemical properties of dried fruit, mostly produced from yogurt and buttermilk in the People's Republic of China, change in parallel with its origin [45]. Within this scope, the pH values of dried fruit obtained from three different regions (Hainan, Haixi, and Haibei) offered for consumption in China were determined as 4.3±0.7, 3.9±0.2, and 4.0±0.3, respectively. Furthermore, it is stated that dried fruit produced at low pH and low ambient temperatures is more susceptible to contamination[45].

In another study, the total dry matter, fat, protein, and ash content of yak milk decoction were determined to be

14.8±1.21 g/100 ml, 5.57±0.43 g/100 ml, 5.66±0.36 g/100 ml, and 0.953±0.078 g/100 ml, respectively, while the calcium, phosphorus, magnesium, potassium, sodium, and zinc levels were found to be 162±5.47 g/100 ml, 153±13.6 g/100 ml, 157±5.32 g/100 ml, 1421±17.8 g/100 ml, 296±14.3 g/100 ml, and 6.16±0.874 g/100 ml, respectively [51].

Metagenomic analyses conducted in China have revealed a rich microbial ecology in the dried product. Lactobacillus, Streptococcus, Enterococcus, and Weissella species were reported to be dominant, along with a diverse range of yeasts and molds. This microbial diversity is considered a significant factor determining both the fermentation dynamics and functional properties of the product[32].

## Uzbekistan

Kurt, a dried yogurt ball produced from fermented milk, handcrafted, and left to dry in the sun, is one of the most iconic traditional foods. Pastoral societies particularly prize this food product, rich in protein, for its long shelf life and ease of transport. Likewise, pickled carrots, cabbage, and cucumbers are commonplace in Uzbekistan's cuisine, as they are made using natural fermentation processes that improve the flavor and the probiotic value.[10].

In Uzbekistan, among the Uzbek Turks, kurut is known as a unique dairy product with a rich taste and shelf life, dating back to ancient times. It is said that in ancient times, cattle breeders produced it during their migrations to the highlands from spring to autumn, and trade caravans produced it to preserve dairy products and benefit from this durable food during their long journeys. The method of obtaining this product among the Uzbeks is similar to that of other Turkic tribes mentioned above. Strained yogurt and salt are the basic ingredients, and various spices are added to the different types. Although it comes in various shapes and sizes, the classic version is round, prepared in a size and type similar to marbles, and dried in the sun. Uzbek nomads, pilgrims, travelers, and merchants have used this product, which is easy to prepare, does not spoil in cold or heat, does not require a very special storage environment, is light and takes up little space, and is nutritious, as a food item for centuries. According to them, freshly made kurut is a little softer, it can crumble, but over time its moisture evaporates and it hardens and can be stored for seven or eight years. In Uzbekistan, kurut is consumed directly, but when needed or to enrich the menu, it can be turned into a thick and nutritious soup, eaten as a sandwich with bread, added to salads instead of cheese and salt, dissolved in water and turned into a drink, and used to suppress nausea during travel. Nowadays, in the large markets of important cities in Uzbekistan, there are separate sections where only dairy products are sold, and kurut is definitely sold there. It is possible to buy it by the piece or by the kilogram. It is also sold in the same way in some shops and kiosks in the city. Nowadays, those engaged in animal husbandry produce kurut from the milk they obtain, as well as mass and packaged production in factories [4].

Central Asian markets like the Chorsu Bazaar in Tashkent, Uzbekistan, showcase the vast array of qurt available: softer “new” qurt; rock-hard “stone” qurt, which may have been dried for years; light brown smoked qurt, which is recommended to be paired with beer; qurt with red pepper, coriander, dill, mint, or basil; and shapes ranging from tiny spheres to apple-sized balls (Figure 5).

## Türkiye

Anatolia is a region that has hosted various cultures and civilizations throughout history. In this respect, it possesses a rich cultural and civilizational heritage in every aspect. The cultural structure born from its unique geographical, ecological, and climatic characteristics has been enriched with new cultural riches by the values and differences added by the interactions resulting from historical migrations. One of these migrations, and the most important, is the Turkish migration from Turkestan to Anatolia. With these migrations, the influence of Turkish-Islamic culture intensified in Anatolia, and Turkish tribes brought their own culinary cultures and eating habits, along with various cultural values, especially their dairy and meat products, to this geography. This interaction and cultural transfer is still evident today, and this issue has given rise to the culinary culture extending from Turkestan to Anatolia. Within this culinary culture, "kurut," a dairy product, is still consumed in Anatolia. Migrations, new geographies, long and arduous journeys have made it necessary to preserve products and make them consumable for a long time, and since one of the best methods to increase the durability of products is the drying method, "drying" has gained great importance and value. It is still produced in different parts of Anatolia.

In the local production of kurut, yogurt is left to cool where it is stored. It is then strained by placing it in cloth bags. The straining process takes 10-20 days. The thoroughly strained yogurt is placed in large containers, cream and salt are added, and it is kneaded. The kneading process continues for several days. Following this, the strained yogurt, which has reached the desired consistency, is divided into pieces of 20-60 grams, shaped by hand, placed on clean cloths, and left to dry in the sun on terraces or a flat surface for 1-2 weeks until it is completely dry. After drying, it is stored in a cool and dry place [12]. 1 kg of kurut is obtained from 16-17 kg of yoğurt [15].

In another method of producing dried yogurt, after yogurt production, the buttermilk is churned to remove the fat, the remaining buttermilk is heated to curdle, and then strained through cloth bags. Salt is added to the resulting curd, shaped by hand, and left to dry in the sun for 10-15 days. The resulting dried yogurt is stored in a cool place for use during the winter months [17].

There are slight regional variations in the production of kurut. In Van province and its surroundings, yogurt is churned to remove the fat, and the remaining buttermilk is heated to curdle it, then strained through cloth bags. The resulting curd is pressed, and salt is added. To improve the flavor, fresh cream or butter is sometimes added and kneaded. Then, it is shaped by hand into round or oval shapes weighing approximately 30-40 grams and left to dry in the sun for 10-15 days. The weight of the kurut pieces varies in shape and size, generally between 30-100 g. To obtain one kilogram of kurut, approximately 15-17 kg of yogurt is required. Thus, the yield is approximately 6%. Kurut prepared according to hygienic rules is dull white, while those prepared under unsuitable conditions are brownish. Kurut with a high fat content is yellowish [27].

One example from Anatolia is from the Bitlis region. In the field study conducted by Şimşek and Yeşil here, a person who participated in the interview gave the following recipe for kurut: “They shake the buttermilk, we roll it into balls and dry it, in the winter we take out its buttermilk and kurut, we say to it. We serve it on meals with gebol and stuffed with oil.” Regarding its preparation, it is made by boiling the remaining part after straining the buttermilk, from which butter has been extracted by churning, adding salt and

bringing it to the desired consistency, and then drying it in the sun. In Bitlis, it is also called keşk/şijir. It is rich in protein and contains significant amounts of calcium, potassium and phosphorus with the lactic bacteria formed during drying, and is more nutritious than raw milk or yogurt. Having a cheesy smell and a sour taste,kurut is eaten directly by the local people, or it is dissolved in water and added to dishes, grated pieces are added to noodles or cooked with other ingredients [46].

Eralp[18] and Gülümser [20] described the production of kurut as follows: The buttermilk, which is a byproduct of butter production from yogurt, is heated in large cauldrons. In some places, a small amount of salt is added during heating. Due to the heat treatment, the buttermilk coagulates. Then the cauldron is removed from the fire and left to stand; the curd settles, and a clear green liquid collects at the top. This liquid is poured off, and the curds at the bottom are filled into cloth bags and hung to drain. In this way, the salt of the sediment, from which a significant portion of the water has been removed, is adjusted, and by applying weight on a flat surface, as much of the remaining water as possible is removed. The sediment, after the water has been thoroughly drained, is emptied from the bags and kneaded. After it has reached the desired consistency, the salt of the sediment is checked again, and if necessary, salt is added. It is then shaped into triangular pieces, usually weighing 30-40 grams. The shape and size of the pieces vary between regions and producers. The clot, formed into pieces of the desired size and shape, is spread on wood, paper, or cloth to dry. Drying is usually done in the sun. The mixture is turned over to speed up the drying process. It is reported that drying becomes easier as the fat content decreases.

In the Kars region, the local creamy dried yogurt is made from full-fat milk. In traditional production, the milk is milked, completely strained, and then subjected to heat treatment at 80-85°C. After cooling to the fermentation temperature, it is fermented with yogurt left over from the previous day. It is incubated for 2-3 hours, and after yogurt production, it is strained in linen bags. The straining process continues for an average of 10-20 days. The strained yogurt is placed in large containers, salt is added, and it is kneaded. When it reaches the desired consistency, it is divided into pieces of 20-60 g, shaped by hand, and left in the sun for 1-2 weeks until dry. The dried yogurt is stored in a cool place [12].

Similarly, kurut is made in the Elazığ and Bingöl regions. In the Erzurum region, kurut is mostly made by thickening the buttermilk, which is the result of churning cream. This is because butter is mostly obtained from cream in that region. The resulting buttermilk is allowed to settle over a low heat. Some producers add rennet to the buttermilk during this process. It is stated that this makes the settling process faster. Then, the resulting curd is strained through cloth bags. This curd is salted, kneaded, and shaped. The shape of kurut varies from region to region.

The consumption of kurut in the Eastern and Southeastern Anatolian regions is varied. It can be consumed directly or softened by placing it in hot water before consumption. Because it is prepared in small pieces, it is easy and economical to consume. After being ground into powder by pounding or grating it in a mortar, it is used in Turkish culinary culture in the preparation of soups, dumplings, pasta, and some regional dishes; it is consumed as a beverage by adding water; and it is also used in the fermentation of milk [41].

The kurut mentioned above is found in Erzurum, Kars, Sivas, Elazığ, Bingöl, Siirt, Hakkari, Van and their surroundings in Eastern and Southeastern Anatolia; however, examples can also be seen in Bayburt, Gümüşhane, Ordu, Giresun, and

Trabzon provinces in the Black Sea region. In the Central and Western Anatolian regions, examples are found in places such as Ankara, Bolu, and Gerede, and in the Aegean and Mediterranean Regions, it is known in and around centers such as Antalya, Anamur, and Aydın. In the regions of Ankara, Çankırı, Siirt, Bayburt, Hakkâri, and Gümüşhane, small and large flat lumps of dried yogurt are produced; in the Bolu and Gerede regions, regular rectangles; in the Sivas region, top-shaped, quince-shaped, and pear-shaped; and in Giresun, shapes resembling onion heads. In Anamur and its surroundings, there is a dairy product similar to dried yogurt called "yaş keş," made by boiling yogurt or buttermilk. Dried keş is obtained by spreading this dairy product on a clean cloth and drying it in the sun until it turns yellow, or by placing it in cloth bags, pressing it, removing excess water, and then leaving it to dry in the sun. This dairy product, which is more yellowish and crumbly than dried yogurt, has its own unique taste and smell. However, considering its raw materials, production, and consumption, it can be considered a type of dried yoğurt [16].

Keş is a Turkish dairy product produced and consumed in Anatolia, Black Sea and the Mediterranean regions of Turkey. Keş is produced by small family businesses and in small commercial dairy processing plants. Keş is a dried dairy product originally brought from Central Asia to Turkey. Keş cheese is made from yogurt whose fat has been separated and is known as “Keşk”, “Keşük”, “Kis” or “Çökelek”. This type of cheese is also known as “Kurut” (dried yogurt) in some provinces because it is produced by means of air-drying. This product is consumed directly or added to soups or pasta [11,29]. Burdur Keş can be classified as a hard cheese. The taste of Keş is slightly sour and puckery. It is generally consumed with thin dough bread. Keş is widely produced around Burdur in the Mediterranean Region. Cheese production methods differ on a regional basis. Sheep milk, goat milk and cow’s milk can be used as raw material. Keş production occurs during the summer and winter[29].

In Bolu and its surrounding areas, the word "keş" is more commonly used for dried cheese. The word keş can be expressed with names such as "keşk, kesük, kiş, kurut, sürk, çökelek" in different regions. When prepared using traditional methods; skimmed milk is boiled and, after being cooled to a suitable temperature, yogurt is added. Then it is strained by placing it in straining bags made of special cloth, salt is added to the strained product, and it is dried by giving it different shapes. In Bolu and its surroundings, various types such as fried keş, pasta keş, and side keş are made. Their shape, fat content, and drying times differ from each other. The milk or strained yogurt used in the making of fried keş has a higher fat content than others, and its drying time is shorter than others. The fried cheese is cut or sliced into 0.5 cm thick pieces and placed in a non-oiled pan,after frying both sides, it is ready to be consumed in a short time. After this process, different aroma and flavor compounds emerge in the cheese [35].

Keş, produced in Ordu and its surrounding region, is a dried yogurt-like product made from the remaining part (buttermilk) after the fat has been removed from yogurt. A small amount of salt (0.5%) is added to the buttermilk, heated to curdle it, and the resulting curd is thoroughly drained. Then, 1-5% salt is added, kneaded, placed in cloth bags, and pressed to remove the excess water. After being pressed for a few days, it is kneaded again. Following this stage, the curd is placed in cloth bags, weights are placed on top, and it is left to dry in the shade(tarakçı).

The average (mg/kg) calcium levels in kurut samples collected from Elazığ were determined to be 13968.52, phosphorus

1060.47, magnesium 432.42, sodium 9782.45, potassium 7012.45, copper 2.44, zinc 9.66, manganese 1.25, iron 6.57, chromium 0.09, and aluminum 1.07[38].

In a study that determined the regional production techniques of fresh keş, yellow keş, leather keş, gök keş, and dried keş produced by the Yörük people of the Anamur region, as well as the compositional characteristics of fresh keş, yellow keş, and dried keş; the pH values of fresh, yellow, and dried keş were determined as 3.54, 4.65, and 4.56, respectively; the titratable acidity values (% as lactic acid) were 2.68%, 1.87%, and 6.03%; the dry matter percentages were 34.96%, 57.37%, and 89.58%; the fat percentages were 3.0%, 8.7%, and 4.4%; the protein percentages were 27.18%, 29.80%, and 73.44%; and the salt percentages were 0.93%, 4.70%, and 2.54%.[25].

In a study that determined the characteristics of 22 dried fruit samples produced in homes in Van and Şırnak provinces and purchased between January and April, the average pH value was found to be 4.28, titratable acidity degree %12.04 ºSH, dry matter content %86.86, protein content %53.41, protein content in dry matter %61.45, fat content %8.44, fat content in dry matter %9.71, salt content %10.44, and salt content in dry matter %12.01. [23].

In a study involving 50 kurut samples randomly sampled from Kars and its surroundings, the pH was determined to be 4.2, acidity (lactic acid) 2.9%, moisture 12.1%, fat 45.9%, protein 25.5%, salt 6.7%, and ash 10.0%.[26].

In the study conducted by Aydemir [6] on 43 dried animal samples collected from Erzurum and Bingöl provinces, the average moisture, ash, salt, acidity (% lactic acid), fat, protein percentages and pH values were determined to be 13.38±3.63%, 11.89±4.55%, 10.15±2.71%, 1.84±0.58%, 15.48±8.02%, 49.67±12.02% and 4.09±0.38%, respectively. Mineral analysis revealed that the average sodium, magnesium, aluminum, chlorine, potassium, calcium, iron, and copper percentages of the samples were 18.87±4.00%, 0.31±0.11%, 0.07±0.06%, 56.42±3.41%, 8.33±2.60%, 7.03±2.22%, 0.19±0.18%, and 0.02±0.02%, respectively.

## Use in Turkish Gastronomy

The most important characteristic of kurut is that, if stored under suitable conditions, it can last for several years without spoiling. In Kars province, kurut is generally consumed with soups, dumplings, and some regional dishes. In winter months, it is also consumed by adding it to soups prepared with chickpeas, bulgur, and lentils [1]. In the past, many houses had a stone for crushing kurut, and kurut was crushed on these stones. The wooden one was called "tepir." It is known that it is still produced and used in food in Central Asian Turkic Republics such as Kyrgyzstan and Tatarstan.

There are regional dishes from the Eastern Anatolia region that use dried wheat. The most well-known among these are keledoş, sengeser, hangel, and ayran aşı [9].

“Keledoş” is a regional dish from the Ağrı, Bitlis, Van, or Muş regions of Turkey. Its preparation varies depending on the region. Made with or without chili, the main ingredient is wheat. Chickpeas and cracked wheat are boiled in a pot, and green lentils are added near the end of cooking. After cooking, white beetroot and roasted meat are added. The ingredients are cooked thoroughly during the 10-15 minute boiling period, and crushed dried wheat is added to the boiling pot. It is cooked until it reaches a pudding-like consistency. After cooking, butter is added on top, and it is served in this way [16].

“Sengeser" is a dish from the Van and Hakkari regions. Lentils are boiled in a pot, strained, and set aside. In a deep bowl, dried yogurt is whisked until it is thinner than yogurt. Onions are sautéed and then cooked over low heat with the addition of salt and tomato paste. The previously boiled lentils and dried yogurt are added to the soup, boiled again, and served [16].

Kurut is used as a sauce in the dumplings known as "hangel" from the Kars, Artvin, and Ardahan regions, and in the yogurt soup known as "ayran aşı" from the Erzurum region. Hangel is the most important dish of the Terekeme-Karapapak Turks. It is made to serve when an important guest arrives. It is very common in the Kars region. In Sivas, it is also made in Terekeme villages under the name "Hıngel." There are several different forms. The most common one is made with empty dough sheets. The dough is unleavened. Each unrolled ball of dough is called a "pazı," and it is about the size of two palms. The biggest characteristic of the dough is that it is rolled out firmly. When preparing the dough, one egg is cracked for each portion and kneaded with some salted water to a firm consistency. The prepared dough is rested for a while, rolled out thinly like phyllo dough, and cut into squares. After being boiled in boiling water, it is drained and placed on a tray. Garlic hangel sauce and butter with small pieces of onion sautéed in it are poured over it and served. For the hangel sauce, about a handful of dried yogurt is melted to prepare a yogurt sauce. Dried yogurt gives hangel a different and unique flavor [16].

## Sensory Characteristics and Preference Options

It is stated that kurut has a sour taste. When mixed with water, it acquires a viscous consistency similar to yogurt. In their research, Gürbüz et al. [21] reported that kurut samples collected from the market were saltier than the kurut they experimentally produced. In another study conducted in Kyrgyzstan, the frequency of kurut consumption and taste perception among young people aged 14–18 was investigated by administering a survey to the participants. A total of 7251 school students participated in the study, 3031 (41.8%) of whom were male students and 4220 (58.2%) were female students. While 35% of the students preferred homemade kurut, the rest stated that they preferred commercial kurut. The study found that students consumed dried apricots at least 1-2 times a week, particularly enjoying their salty and sour taste. However, the study experimentally determined that the average salt content of homemade dried apricots was twice as high as that of commercially sold dried apricots, and it was reported that consuming large amounts of salt at a young age may be harmful to kidney problems and overall health [24,30].

## Conclusion

The history of kurut, a dish produced by the Turks, goes back a long time. The Huns, Göktürks, Uyghurs, and other Turkic states and communities knew and consumed kurut. Moreover, it has been a part of the nutritional culture passed down from ancient times to the present day, maintaining its importance and value in every era, and becoming an element of shared cultural heritage. Many elements of Turkish culture have been passed down through generations and to different geographies, transcending time and space. Although time and place may differ, the same values have continued to live on in the daily lives, beliefs, traditions, and customs of the same societies, and continue to do so today.Kurut is a traditional dairy product with high nutritional value, and with a unique taste and aroma. Chemical composition and therefore sensorial properties of qurt samples are significantly different due to

the ingredients used and the ayran, skim milk and other things added as starters, different manufacturing, packaging, and ripening conditions, etc.

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**Table.1. Comparison Between Chinese And Central Asian Kurut**

| Aspect | China(Xinjiang) | Central Asian |
|---|---|---|
| Production scale | Household-based, artisanal | Household-based,some semi-industrial |
| Milk Sources | Sheep,goat,cow,yak | Primarly sheep and cow |
| Drying method | Sun or ventilated shade | Mostly sun-driying |
| Shape | Balls, discs,cones | Balls, cubes |
| Culturel role | Ethnic minority food heritage | National and regional staple |
| Industrialization | Very limited | Slightly more developed |

Figure. 1. Kyrgyz kurut's on the market


Figure 2. Three different postage stamps were created in Kyrgyzstan using the image of "Kurut". (Anonim, 2025a)

Figure.3 Qurt in Kazakhstan in Local Market

Figure. 4. Kashsk

**Fıgure.5.** Uzbek Kuruts in Tashkent Market

Figure 6 Burdur Keş

**Pasta keş**

**Katık keşi**

**Fried keş**

Figure.7.Bolu Keş varieties

Figure.8. Keledoş

Figure.9. Serenger

Figure.10. Hangel