

PRODUCTION OF TURKISH DELIGHT (LOKUM) WITH ITS ADDITIVES AND QUALITY

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In this study, a brief evaluation will be made on Turkish delight (lokum) that is a starch jelly a traditional Turkish food product and has importance for the Turkey. The functions of the main ingredients such as sugar, starch and water on the overall lokum quality will be discussed. Then production problems and some additives have been used in lokum production will be indicated. Additionally many variety of color and odor additives, dried fruits are used in Lokum production. Synthetic color and odor additives are imported and have to be convenient to "Food Additives Regulation". These type of food additives are used with respect to consumer's desires. Coconut, peanut, pistachio, almond and etc. are used nuts in Lokum production. The origin of Lokum dates back to the time of the Ottoman. Beginning of production of lokum is estimated at 14th and 15th century and its production is reached today's form at 19th century. In 19th century lokum was brought to England by a English tourist, then it called "Turkish delight" in Europe and "Lokoum" in France and Balkans, lokumania in Greece and in Cyprus, and then lokum took place in international candy literature. Lokum is produced by mixing of sugar, corn starch and watering certain fraction and fruits or nuts are added to the mixture. This mixture is heated for certain time at certain temperature in open vessel or steam jacketed tank with agitator. Heating time changes 1 to 2 hours according to vessel's type. Hot lokum fluid is dripped in wooden table or steel tray, which some starch is on, with lower edges, after sprinkling some starch lokum are cut as small particles. Powder sugar is added on this lokum particles and they are stored and sold.

Keywords: Acid, sugar, lokum, modified starch, confectionary, Turkish delight

THE HISTORY AND INVENTION OF LOKUM

An old Turkish aphorism tells one to "eat sweetly and speak sweetly". The origin of Lokum dates back to the time of the Ottoman. Beginning of production of lokum is estimated at 14th and 15th century and its production is reached today's form at 19th century. Lokum is produced by mixing of sugar, corn starch and watering certain fraction and fruits or nuts are added to the mixture. This mixture is heated for certain time at certain temperature in open vessel or steam jacketed tank with agitator. Hot lokum fluid is dripped in wooden table or steel tray with lower edges, after sprinkling some starch lokum are cut as small particles [1].

Lokum is a sugar based jelly-like confection containing starch with the gel former. Sweets have always been an important component of Turkish cuisine. According to legend, Turkish Delight, one of the oldest and most delectable sweets in the world, was created some 500 years ago when a Turkish sultan asked his confectioner to produce something sweet to keep on his family and friends. An instant success, this soft chewy, gel-like treat, which is covered in powdered sugar and has a lightly sweet vanilla flavor, remains virtually unchanged and has been putting smiles on faces ever since. Sugar is the only sweetening agent have been using to produce Lokum [2].

Turkish delight was unveiled to the west in the 19th century. During his travels to Istanbul, an unknown British traveler became very fond of the Turkish delicacies, purchased cases of lokoum and he shipped them to Britain under the name Turkish delight. Today, Lokum remains the sweet of choice in many Turkish homes. Enjoyed worldwide, the subtle flavors of Lokum are known to compliment coffee and sweeten the breath at the end of a meal [3]. Picasso used to eat Turkish Delight on a daily basis for concentration on his work while Winston Churchill and Napoleon's favorite Turkish Delight was with pistachio filling [2]. Pure natural sugar, fresh natural water and natural fruit flavors are some of the ingredients used to create our many varieties of Lokum [4]. Though enjoyed worldwide, lokum is especially familiar in Turkish, Armenian, Greek, Balkan, and Middle Eastern cuisines. It is also popular in Romania, where it is known as rahat, being taken from Turkey during the Ottoman rule. It is called taranslit in Armenia, rahat-lokum in Bosnian and in

some Arab countries, lokum in France and Balkans, lokumania in Greek and cyprus, and then lokoum took place in international candy literature [5; 6]. In the United States, lokum is not especially common, although there are exceptions. One major commercial producer in the Northwestern U.S. is Liberty Orchards, founded by Armenian immigrants, which markets the candy under the name "Aplets and Cotlets" and "Fruit Delights." It is also the basic foundation of the Big Turk chocolate bar (commonly found in Canada). Another North American company is the Bayco is the manufacturer of authentic Lokum in North America. Pure natural sugar, water from the pristine mountains of British Columbia and natural fruit flavours are some of the ingredients used to create Bayco's many varieties of lokum. Today, lokum remains the sweet of choice in many Turkish homes [7].

In 1776, during the reign of Sultan Abdul Hamid I, Hadji Bekir, a fully apprenticed confectioner, arrived in Istanbul from a small town in Anatolia. Bekir set up in a little shop in the center of the city, and quickly won fame and fortune among the people. Fashionable ladies began giving Lokum to their friends in special lace handkerchiefs [7]. Lokum is often flavored with rosewater or lemon, the former giving it a characteristic pale pink color. It has a soft, sticky consistency, and is often packaged and eaten in small cubes that are dusted with icing sugar to prevent sticking. Some recipes include small nut pieces, usually pistachio, hazelnut or walnuts. Since 1984, Lokum is made from a traditional Turkish recipe that has been passed down through generations.

THE RAW MATERIALS IN LOKUM PRODUCTION

Lokum is made from starch and sugar. A main ingredient is rosewater, although some are made with lemon. Some recipes include small nut pieces, usually pistachio, hazelnut or almonds. This dessert is highly valued by children. Either raw materials or ingredients used by manufacturers of Lokum are sugar, corn starch, natural flavors, cream of tartar, and natural/artificial colors. An ingredient for rose flavoured lokum is rose water [8, 9].



Sugar: Sugar is the one of the most important raw material in Lokum production. Honey and pekmez were used as sweeteners, flour was used to hold water and make texture in candy production began at 16th in Turkey. After producing in European factories at the end of 18th, sugar was begun to use in Lokum production [10, 11].

Starch: Starch is the major component of grains and a common ingredient used in the food industry. Understanding the relationship between the structure of starch and rheological properties will improve the ability to manipulate texture and could result in identification and development of lines and mutants of starch with abilities to resist breakdown and retro gradation. Starch used in lokum production as a basic raw material has important quality criterions. Starch found by a German scientist in 1811, used in lokum production instead of flour. And with appropriate sugar-starch mix lokum production was done in today's taste of it. When starch is mixed with water and heated, it gelatinizes [12].

Acid. Acid used in Lokum production during cooking to prevent crystallization by changing sucrose to invert sugar. Citric and tartaric acid are used in Lokum production in Turkey. Manufacturers often determine acid amount to be added by themselves. Researches were made on usage of tartaric and citric acid in Lokum production trials. At the end of the researches, using 5g tartaric acid results the best quality Lokum. Lokum made with 3g citric acid took place in second. Neither reducing tartaric acid amount to 3g nor increasing citric acid amount to 5g will arise the quality. Taking into consideration of acids used in Lokum production shows citric acid amount should always be lower than tartaric acid [9].

Water: In lokum production, water is the one of the most important raw material effecting quality after sugar. Especially soft water increases quality, on the contrary water with high lime content destroys the structure of lokum. Some lokum manufacturers think that using more water will increase quality [8 ;13].

LOKUM PRODUCTION PROCESS IN TURKEY

Preparing sugar syrup and starch milk: First of all, syrup is made from sugar with enough water to melt it. Then starch is mixed with remaining water. Practically, this mix is called as starch milk. Starch milk is added to boiling sugar syrup. In this step of boiling acid is added to invert sugar [13]. Pistachio is most popular nut-based product. Only the highest quality imported pistachios, lightly roasted to bring out their full flavor, and finely desiccated coconut are used to create this very popular line.

Cooking: Once the water has boiled the sugar is added and the solution is boiled for an hour, stirred continuously by an electric paddle. Next the starch is added, and the mixture brought back to the boil, for another five to six hours until it is smooth and shiny. The mixture is allowed to cool for a while, before the various flavors are added. There are twenty four to choose from including cherry, lemon, almond and chocolate, as well as the traditional rose flavor. The rose flavoring is made by the villagers at this time of year by boiling handfuls of fragrant rose petals and Collecting the condensed moisture. After the flavorings have been carefully added, the mixture is poured into large wooden trays to set. About five hours later it is ready to be cut into squares, liberally dusted with icing sugar and packed into small boxes lined with greaseproof paper ready for selling. Lokum production process is given [3].



Picture: Some chrome nickel vessels used in Lokum cooking [3, 11]

Lokum, which is the best example of Turkish palate and is a well-known product, is produced by open vessel or pressure cooking [14]. In open vessel cooking, cooking is done in 2-2,5 hours at 125 °C. In pressure cooking, cooking time is reduced to 30-40 minutes, which may be accepted as economic. Moreover, in pressure cooking amount of water, acid and acid modified starch is lowered [13]. Cooking time changes 1,5 to 2,5 hr. with respect to vessel capacity. Cooking is checked by examining Lokum dough by hand after cooling it. Reducing cooking time is the one important problem of Lokum production. In practice, cooking time in open vessel is very long and depends on amount of Lokum dough. To achieve economic cooking, i.e. cooking in short time, this process should be done in pressure cooking [8].

Pouring & Shaping: Cooked Lokum is poured to molds after adding required additives. Wooden and stainless steel molds are used to shape Lokum. Used molds change with respect to type of Lokum and cutting type. Lokum's thickness should be 5 cm and 1,5-2,5 cm according to the cutting type; by hand and machine respectively. In one study, molds and metal pans are used for shaping. As a result of study, pouring Lokum dough to greasy metal pan may prevent crust forming. On the other hand, humidity of natural starch used to shape Lokum in wooden pans, is determined as another factor affecting crusting [8; 13].

Cooling: Lokum is cooled in room conditions for 24hr. after pouring. Recently cooling may be done in 3-4 hours with water cooling systems. In all companies do not use any special process to fasten cooling. Some Lokum experts believe that waiting for cooling in room temperature causes high quality products. On the contrary if any effect on cooling may lower quality. There is not any scientific basis for this claim [13].

Cutting: Cooled Lokum is put on cutting tables. In our country, cutting of Lokum is done by hand or machine. Sugar powder or coconut is found on table. Different types of knives are used in hand cutting. There are three steps in hand cutting whether the knife's type. These steps are cutting to halve the lokum's length, width and thickness. In companies having high capacity, cutting is done by both hand and machine.



Picture: Automatic lokum cutting machine [11]

Lokum manufacturers pay attention cutting of lokum which will be expected. Purchasing countries want lokum in standard sizes. Especially countries are very sensitive to this issue, in which lokum is sold one by one like France. On the other hand, selling lokum with packages certain package weight should be provided to countries in which lokum is sold in packages. Therefore development in cutting machines of lokum to standardize lokum sizes. Hygienic production and mechanization in candy production result European Standards in lokum production. To mechanize, automatic lokum cutting machines are invented and presented to lokum manufacturers.

Packaging: Cut Lokum's are fitted in boxes in desired weight and transported to storage rooms to sell. Generally, Lokum which is sold in our country is packed in 5kg. wooden boxes. To prevent stick Lokum to box polyethylene, greasy and waxy paper are used. Every row is separated from each other by packaging materials. Some companies packages Lokum in $\frac{1}{4}$ - 1 kg for both consumers in abroad and in our country. In these types of Lokums are sorted with only one row [13].

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