



DAIRY CONFECTIONERY

Introduction

In countries that have significant Asian populations, there may be a demand for dairy confectionery products (or ‘sweetmeats’). They can be grouped into five categories: dried milk-based products, heat/acid coagulated products, cultured/fermented products, fat-rich products and cereal-based puddings/desserts. This Technical Brief describes the production of two of these products in detail: rasogalla (or rasogolla) and gulab jamun; and it summarises the production of other dairy confectionery products.

Dairy confectionery can be made directly from milk, or alternatively milk that is first made into one of two intermediary products:

- ‘Chhanna’ (or channa, or chhana), which is made by a combination of heat and acid coagulation of the milk (Table 1); or
- ‘khoa’ (or khova, khawa or mawa), which is made by only heating the milk (Table 4).

Chhanna is then used to make rasogalla and sandesh, and khoa is used to make gulab jamun, burfi and other products in Table 3. Details of the methods of preservation are described in Technical Brief: *Dairy processing - an overview*. All types of dairy confectionery can be made at a small scale of production, using non-specialised equipment, and they can be highly profitable where a high demand for these products exists.



Figure 1: A display of dairy confectionery.

(Photo from Alasam at www.flickr.com/photos/alasam/453439969/in/set/72157594271004742/)

Production methods

Intermediary products: chhanna

Stage in process

Stage in process	Notes
Cow's milk	Only fresh milk should be used. Remove cream to produce skimmed milk (see Technical Brief: <i>Pasteurised milk</i>)
Heat	Bring to the boil with regular stirring to prevent milk burning onto the pan.
Cool	To about 80°C.
Mix/acidify	Dissolve citric acid powder in a small amount of water (or use lemon or lime juice) and add slowly with constant slow stirring. Continue until coagulation is complete. Maintain the temperature at 80°C.
Settle/Drain	Allow to settle for 15 minutes. The coagulated milk is hung in a muslin cloth bag for about 2 hours to drain the whey.
Wash	Wash the coagulum under cold running water of drinking quality.
Pack	In vegetable parchment paper or polythene bags
Store	The product has a moderate shelf-life of a few weeks under refrigeration.

Table 1: Production of Chhanna

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Intermediary products: khoa

This product is obtained from cow or buffalo milk by evaporation of moisture from milk in an open pan to give 56 – 70% solids (a five times concentration of the milk). It is used as a base material for a variety of sweetmeats and is classified into 3 types: pindi; dhap and danedar depending upon their uses (Table 2). Legal requirements by the Bureau of Indian Standards state that khoa should contain a maximum of 28% moisture and a minimum of 20% fat.

Type of Khoa	Fat (%)	Total solids (%)	Type of confectionery prepared
Pindi	21–26	67–69	Burfi, doodh peda
Dhap	20–23	56–63	Gulab jamun, pantooa
Danedar	20–25	60–65	Kalakand

Table 2: Types of confectionery prepared from 3 types of Khoa
(From *The technology of traditional milk products in developing countries*)

Milk that has a higher acidity produces granular danedar khoa. Khoa has a uniform whitish colour with a brown tinge, a slightly oily or granular texture, and a rich nutty flavour, and a sweet taste due to the high concentration of the milk sugar lactose (see Technical Brief: *Dairy processing - an overview*). Buffalo milk is preferred for making khoa because it produces a whiter product with a soft, loose body and a smooth granular texture that is needed for high-quality khoa sweetmeats.

A minimum of 4% fat in cow milk and 5% fat in buffalo milk is needed to obtain the required texture in khoa. Lower levels of fat produce undesirable hardness and a coarse texture. Cow milk yields 18% khoa and buffalo milk 20%.

Ingredients

The amounts of ingredients used in rasogalla and gulab jamun are shown in Table 3.

	Rasogalla	Gulab jamun
Ingredients		
Baking powder (g)		7.5
Cardamom powder (g)		15
Chhanna (g)	1000	
Citric acid (g) - for making chhanna from milk	2.5	
Double cream (litres)		0.24
Ghee or oil for frying (litres)		1 - 5
Khoa (g)		1000
Milk - powdered (g)		360
Rose essence	2-3 drops	
Rose water (ml)		30
Sugar (g)	100	1000
Wheat flour (g)		115

Table 3: Ingredients for rasogalla and gulab jamun

Stage in process	Notes
Milk	Milk should be fresh, without any undesirable off-flavours or acid development. Buffalo milk with a minimum of 5% fat is preferred as it yields more khoa with a better texture.
Heat (high)	Boil with continuous stirring to avoid cream separation. Continue boiling until the milk starts to coagulate.
Heat (low)	Once coagulation starts the temperature should be lowered to 85-88 °C. Stir briskly and regularly scrape the milk solids from sides of the pan. The end point is marked by the solid mass leaving the sides and bottom of the pan.
Cool	To room temperature
Press	To form a compact mass
Pack	In parchment paper or polythene bags
Store	The product has a moderate shelf-life of a few weeks under refrigeration

Table 4: Production of Khoa

Chhanna-based Sweets: Rasogolla

Rasogalla is a round, creamy white, succulent sweet made from fresh chhanna and stored in sugar syrup. It has a smooth surface, distinct spongy and springy texture and the flavour of Chhanna. It is formed into balls, cooked and soaked in sugar syrup, and eaten chilled. It is stored and served in sugar syrup.

Stage in process	Notes
Chhanna	Good quality fresh chhanna
Press and mix	Press in a muslin cloth to remove as much whey as possible. Mix in 1 – 4% wheat flour/semolina and knead thoroughly to make a dough having a smooth and pliable consistency
Shape	Take a small quantity of dough to make 1.5 - 2 cm diameter balls, having a smooth surface with no cracks. Slightly flatten them by pressing with fingers. (Option: place a cardamom seed in the centre of each ball, fold and shape into smooth balls). 1 kg of chhanna yields 90 – 100 rasogollas. Keep the balls covered with wet cloths.
Syrup	Prepare sugar syrup by dissolving sugar in water. Heat to dissolve, filter and boil.
Heat	Transfer balls to simmering sugar syrup (e.g. at 80 - 90 °C) and cook for 10-15 minutes on medium heat. On cooking the balls absorb syrup and swell.
Cool/soak	Transfer to a container with water at 30 – 35°C to stabilise the texture improve the colour. After 5 – 10 min, the balls are transferred to sugar syrup. The sugar syrup concentration in the final product is 45 – 50%. This is achieved by dipping the balls first in 35 – 40% sugar syrup for 1 – 2 hours, followed by a second dipping in 58 – 60% sugar syrup. Cool to room temperature
Flavour	Add rose essence
Chill	For 4 -5 hours.

Table 5: Production of rasogalla

The Bureau of Indian Standards has established the following specifications for rasogolla: moisture - 45–55%, milk fat - 5.0%, sucrose - 45.0%, protein - 5.0%. Requirements for the syrup:- concentration of syrup (maximum) 55°Brix (% sugar), bacterial count per g (maximum) - 500, Coliform count per g - Nil. A summary of the production of other chhanna-based sweets including sandesh, chhanna-murki, pantooa, chumchum, khirmohan, rasmalai are given below and details are given in *The technology of traditional milk products in developing countries*.

Gulab jamun

Gulab jamun is made of a dough consisting mainly of milk solids from khoa and wheat flour (sometimes including double cream) in a sugar syrup flavoured with cardamom seeds and rosewater, saffron or honey. It is shaped into round, cylindrical or elliptical shapes and fried to produce a golden to dark brown colour, with a slightly crisp outer surface and soft to firm, cream/white, porous smooth texture inside. It has a flavour of fried milk solids, sugar syrup and added flavours and is stored in sugar syrup.



Figure 2: Rasogalla. (Photo from Roboppy at www.flickr.com/photos/roboppy/109923543/)

Stage in process	Notes
Khoa Mix	Break fresh khoa Sieve flour and baking powder together before adding to khoa. Excess flour gives a leathery and soggy product while insufficient flour results in bursting and disintegration of the product during frying.
Knead	To smooth and soft dough. Mix enough water to make a smooth mixture while kneading to get a homogeneous mixture. Cover the dough with a wet cloth and keep it aside
Mix	Prepare sugar syrup by dissolving sugar in an equal quantity of water and boiling it for 5 minutes. If desired essence can be added.
Shape	Take small quantities of dough and shape them into balls of 2 - 3 cm diameter or oval forms. The balls should be smooth without any cracks on the surface.
Fry	Heat oil in a pan to a depth that will immerse the balls completely during frying, and fry using medium heat. After about 5 minutes, the balls rise slowly to the surface of the oil and they should be gently and constantly agitated to ensure even browning on all sides until they turn golden- to deep-brown. The temperature of frying should be controlled. If the temperature of the oil is too high, the gulab jamuns will break or cook too quickly and have an uncooked hard core.
Transfer	Remove the fried balls from oil using a perforated ladle and immediately transfer them into sugar syrup. The syrup is made by mixing the sugar, water and slightly crushed cardamom pods, rose water or cardamom powder and heating at medium heat for 5-10 minutes until sugar is dissolved. Overheating will caramelize the sugar. After ≈ 2 hours, the fried balls swell in size and become soft as they absorb the syrup.
Store	In syrup in closed glass jars or deep stainless steel containers for at least 12 hours before consumption.

Table 6: Production of gulab jamun

technical brief

Alternatively, gulab jamun can be made by combining milk powder, flour and butter. A small amount of whole milk is added to make a medium-hard dough.

Mix the milk powder, flour and baking powder. A small amount of thickened cream is used to make dough that is soft but not sticky.

To check the correct texture, one ball is cut and examined for its porosity. If there is insufficient porosity, a small quantity of baking powder dissolved in a small amount of water is added to the dough and remixed. If the balls are too porous, a small quantity of flour is added and the test-frying repeated. The composition of gulab jamun is 10% fat, 6% protein, 42% sugar, and 14% other solids. The Bureau of Indian Standards has the following specifications for gulab jamun: Moisture (maximum) 30%, milk fat (minimum) 8%, protein (minimum) 8%. The concentration of sugar in syrup (minimum) 62.4°Brix.



Figure 3: Gulab jamun
(Photo from Deen at Flickr
www.flickr.com/search/?q=gulab+iamon&m=text)

Other products

Burfi

Khoa is heated and mixed with 25–35% sugar to form a smooth dough. Nuts and flavourings may be added during heating to produce different types of burfi. The mixture is poured into a greased tray, spread uniformly and allowed to cool. It sets into a firm product that is cut into desired shapes and sizes and may be decorated with foil to increase the appeal. It is packed in paperboard cartons with parchment or greaseproof paper.

Chhanna-Murki

This sweet is prepared from Chhanna in ≈ 1 cm cubes coated with sugar. The cubes are cooked in boiling sugar syrup until firm, and after cooling they are coated with sugar, sometimes flavoured and coloured.

Chumchum

A sweet prepared from chhanna, coated with sugar or khoa. Chhanna is kneaded to a uniform dough and rolled into balls. The balls are cooked in boiling 50% sugar syrup until a firm body and close texture are formed. The balls are removed from the syrup and cut into half. The surface is coated with sugar or grated khoa and decorated with edible silver foil.

Kalajamun or Kalajam

Khoa is mixed with 5–6% wheat flour and 0.5% baking powder and kneaded to a smooth dough. It is rolled into balls and deep fried in ghee until the surface is charred to almost black, but the inside remains white. The balls are then soaked in 60% sugar syrup for a few hours and stored or consumed.

Kalakand

This is made from danedar (granular) khoa. Citric acid is added during heating to form well-defined grains. When a semi-solid stage is reached, sugar is mixed in and flavourings and/or nuts may also be added. After 5 min the mixture is transferred to a greased tray to cool and set and is then cut to the required shape and size. The sweet has a light caramel colour, a granular texture and a firm body.

Kheer

Kheer (and similar desserts variously named firni, phirni, payasam, kannada, payasa or phirnee) is made by boiling rice with milk and sugar. It is a thick sweet confectionary that resembles rice pudding and also contains ingredients such as nuts (e.g. almond and pistachio) and spices (e.g. saffron and cardamom) that are soaked overnight and made into fine paste. It may have a wide

range of flavours, including mango, fig or custard apple. In payasam, coconut milk is used instead of milk. Kheer is eaten either warm or chilled.

Khirmohan

A sweet based on chhanna that is processed in a similar way to rasogalla. Chhanna is kneaded with 1–4% wheat flour into a smooth dough, and rolled into balls having a smooth texture without any cracks. After cooking the balls are dipped in concentrated milk and smeared with grated khoa.

Lalmohan.

This is a product similar to gulab jamun but is made from chhanna and is lighter in colour. Chhanna is mixed with 2–3% wheat flour and kneaded into a dough. It is rolled into small balls and deep fried in ghee until light brown. The balls are transferred to a 60% sugar syrup and allowed to soak for a few hours before sale or consumption.

Paneer

Paneer is a traditional white cottage cheese with a slightly spongy texture and a sweet-acidic-nutty flavour. Paneer snacks can be smoked, grilled or fried (see Technical Brief: *Cheesemaking*).

Pantooa

A sweet, based on chhanna that is similar to gulab jamun and is prepared in the same way.

Peda

Peda (or doodh peda) is prepared using khoa as the base material mixed with sugar and flavourings. It is whitish yellow in colour and has a coarse grainy texture. Kesar (saffron) peda contains saffron for added flavour and colour. Peda is usually packed in paperboard cartons with a parchment paper of grease proof paper liner.

Raita

Raita is a yogurt-like product that is used as an accompaniment to meals (see Technical Brief: *Soured milk and yoghurt*).

Rasmalai

A sweet based on chhanna - the balls are processed like rasogolla and subsequently stored in milk that is thickened to a quarter of its volume by heating, with added sugar.

Sandesh

Sandesh is a fudge-type confectionary made from chhanna with a sweet, firm body and a smooth texture. Chhanna (30 – 45%) and sugar are kneaded together and heated in a shallow pan after adding colour and flavour. The heated product is placed directly into moulds to give the required shape or alternatively it is cooled on a tray to set and cut or moulded into the required shapes. Sandesh made from old chhanna has a longer shelf-life than the type made from fresh chhanna, which is softer and more expensive. Nalin sandesh is prepared from date jaggery (raw sugar) and is considered a delicacy that commands a higher price in some countries.

Shrikhand

Shrikhand is a semi-solid, creamy textured, sweet-tangy, fermented dairy dessert, similar to yoghurt. It is made from strained yogurt (see Technical Brief: *Soured milk and yoghurt*). The yoghurt is hung in a muslin bag until most of the water has drained (\approx 5 hours), to produce a thick and creamy texture. Soured cream may also be added at this stage. Other ingredients, including dried and fresh fruit (e.g. mango), sugar, cardamom powder and saffron strands (mixed with a little milk to absorb the flavour and colour of the saffron) are mixed into the yoghurt and it is chilled for 3 hours before consumption, garnished with chopped nuts and saffron strands. Shrikhand is eaten as either a side-dish with bread or as a dessert.

Quality assurance

The quality of milk and the processing conditions that are used for making dairy confectionery should be standardised so that consistent quality products are made each time. This involves control of factors in the process that affect the quality or safety of the product. These are known as ‘control points’ and are the points at which checks and measurements should be made (Table 7).

HACCP¹

The specific potential hazards in making dairy confectionery are food poisoning bacteria from the raw milk, poor hygiene and sanitation during processing, and incorrect processing conditions. Other hazards that are common to all types of food processing (including contamination of foods by insects, glass etc.) are prevented by correct quality assurance, including the design and operation of the processing facilities, staff training in hygiene and production methods, and correct cleaning and maintenance procedures.

Hygiene

Technical Brief: *Dairy processing - an overview* gives details of hygiene and sanitation, the design of a dairy and the use of correct cleaning procedures. Hygiene requirements are also described in Technical Brief: *Hygiene and safety rules in food processing*.

Avoiding spoilage

Unclean equipment, contaminated milk, poor hygiene of production staff, and incorrect processing and storage conditions will each cause spoilage of dairy confectionery. All equipment should be thoroughly cleaned after use and checked before production starts again. The temperature and time of heating milk should be monitored and controlled to ensure that it is not over- or under-heated.

Raw material control

The milk used for dairy confectionery production should be fresh, good quality and free from dirt and excessive contamination by bacteria. Older milk may impart an unpleasant flavour to the final product. Technical Brief: *Dairy processing - an overview* gives details of the methods needed to ensure that good quality milk is used.

Process control

A process control schedule should be prepared for each product. Table 3 is an example of a process control schedule for rasogalla production.

Stage in process	Activity	Process control points
Chhanna		
Mix	Add flour and mix to smooth dough	Check weights of ingredients and uniform dough
Divide/shape	Make 2 cm balls of dough	Check for uniform sized balls
Prepare syrup	Mix sugar and water and heat	Check weight sugar
Heat	Heat balls in syrup	Check temperature and time of heating
Cool	In water to 30 - 35°C for 5 - 10 min.	Check time and temperature of cooling to ensure that products are properly cooled
Soak	In sugar syrup	Check sugar concentration (see text) and time of soaking
Chill	For 4 - 5 hours and display	Check time of chilling

Table 7: Process control points in rasogalla production

¹ Hazard Analysis Critical Control Point

The temperature and time of heating and cooling the milk should be controlled. Over-heating and slow cooling causes changes to the flavour, colour and nutritional value of the milk, whereas under-heating may lead to survival of undesirable micro-organisms, causing spoilage of the product.

Product control

The main quality factors for dairy confectionery are the colour, taste and texture. These factors depend on the types and amounts of added ingredients and the processing conditions that are used. These should be standardised for each batch of product.

Packaging and storage control

The products require protection against dust and insects during distribution and retail display. Metal trays, glass display cabinets, covered glass jars or ceramic bowls are each used and these are suitable provided proper hygiene and cleaning are observed. Products should be stored in a cool place away from sunlight.

Summary

Dairy confectionery products are low-risk products that can easily be made at a small scale. They often have a high demand and a wide range of different products can be produced.

Equipment required

- Mixer (electric or manual). Typically a small planetary mixer (used to mix dough or cake batter) is suitable.
- Frying equipment (a deep pan preferably made from stainless steel, but aluminium is acceptable and a heat source).
- Thermometer (0-300 °C) for checking product and refrigerator temperatures (preferably an electronic thermometer).
- Scales (e.g. 0-10 kg +/- 2 g) for weighing ingredients.

Optional

- Meatball-portioning machines and deep-fat fryer to make gulab jamuns
- Refrigerator.
- Refractometer for measuring sugar concentrations

Equipment suppliers

Note: This is a selective list of suppliers and does not imply Practical Action endorsement or promotion.

Equipment for small-scale production of dairy confectionery is likely to be available from shops or agents in large towns and the capital city.

The website www.smalldairy.com/dairy%20resources.html also lists equipment suppliers, laboratory supplies, books and contacts for small dairy processing.

A list of Indian confectionery manufacturers and equipment suppliers is given at http://dir.indiamart.com/indianexporters/ag_conf1.html

Refractometers

Mettler-Toledo Ltd., 64 Boston Road, Beaumont Leys Leicester, LE4 1AW, UK, Tel: +44 (0) 116 235 7070, e-mail via website at <http://uk.mt.com/contact>

Index Instruments Ltd., Bury Road Industrial Estate, Ramsey, Cambridgeshire, PE26 1NF, UK, Tel: + 44 (0) 1487 814313, E-mail: sales@indexinstruments.com , Website:

www.indexinstruments.com

Essences and food flavourings

These ingredients should be food grade and are available in large cities from supermarkets or bakery suppliers.

References and further reading

References

- [Dairy Processing](#) Practical Action Technical Brief
- [Basic Rules of Hygiene, Sanitation and Safety in Food Processing](#) Practical Action Technical Brief
- [Pasteurised Milk](#) Practical Action Technical Brief
- [Soured Milk and Yoghurt](#) Practical Action Technical Brief
- *The technology of traditional milk products in developing countries*, Technical Bulletin #85, Food and Agriculture Organization of the United Nations, Rome, 1990, available at www.fao.org/docrep/003/T0251E/T0251E05.htm

Further reading

- [Appropriate Food Packaging: Materials and methods for small businesses](#) Fellows, P., Axtell, B., Practical Action Publishing, 1993.
- *Dairy India* Yearbook, Gupta, P.R., at yearbook@vsnl.com or see www.indiadairy.com.
- *Authentic Indian dairy desserts: India's incredible spread of many-splendored sweets provides innovative new product ideas for product developers. Desserts, dips and confectionery varieties can be expanded by integrating traditional processes with modern technologies*, Gupta, P.R., Prepared Foods, June, 2005, available at http://findarticles.com/p/articles/mi_m3289/is_6_174/ai_n14697304?tag=artBody;coll
- *Technology of Indian Milk Products*, Aneja, R.P., Mathur, B.N. Chandan, R.C. and Banerjee, A. K. Publisher: P.R. Gupta, Dairy India Yearbook, A-25 Priyadarshini Vihar, New Delhi 110092, India, Tel: +91-11 22543326, 22045681; Websites: www.IndianMilkProducts.com , www.PreparedFoods.com , www.idpfoods.com/idp.htm
- [Traditional Foods: Processing for profit](#) Fellows, P.J., (Ed.), Practical Action Publishing, 1997.

This document was produced by Peter Fellows for Practical Action in August 2008.

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