

DEVELOPMENT OF GHEE

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Ghee

In India, preservation of milk and milk products is primarily achieved by heat induced desiccation. Ghee is obtained by clarification of milk fat at high temperature.

- Chemically, ghee is a complex lipid of glycerides (usually mixed), free fatty acids, phospholipids, sterols, sterol esters, fat soluble vitamins, carbonyls, hydrocarbons, carotenoids (only in ghee derived from cow milk), small amounts of charred casein and traces of calcium, phosphorus, iron, etc. It contains not more than 0.370 moisture. Glycerides constitute about 98.70 of the total material. Of the remaining constituents of about 2.70, *sterols* (mostly cholesterol) occur to the extent of about 0.5~.

Preparation

- Ghee is prepared by four methods, namely,
- Desi
- Creamery butter
- Direct cream
- Pre-stratification methods.

COUNTRY OR DESI METHOD

- A large proportion of ghee produced in the country is still made by the desi method on a cottage scale. The curd is churned in an earthenware pot with a wooden churn, and the makkhan (desi butter) obtained is collected till a sufficient amount has been accumulated. Adequate souring takes place in the product before its conversion in to ghee. This product is then heated to evaporate the moisture. The scum is removed with the help of a perforated ladle. The source of fuel is usually cow dung cake or wood, which normally emits smoke.

- Milk fat being susceptible for absorbing flavours, ghee thus prepared in this way normally possesses a smoky flavour. The container used in the preparation is usually an iron karahi. [Ghee](#) prepared in the northern part of the India will be usually having higher moisture content due to under heat treatment while that produced in the southern part is slightly over heated. The over heating and under heating depends upon the individual taste and preferences.
- In developing countries like India, ghee making by traditional process as discussed above is an ancient art and it is still practised in majority of the rural areas. It is a *recipe* to success to convert the curd into makkhan and its final conversion into ghee for the enterprising rural folk.

CREAMERY BUTTER METHOD

- This is the usual method adopted in almost all the organized dairies. Here unsalted creamery butter, otherwise known as ghee or white butter, is used as a raw material. The butter is heated in a ghee boiler provided with an agitator. There may be a provision for a movable, hollow, stainless steel tube centrally bored through the bottom of the pan for emptying the boiler contents when needed.
- To start with the solid mass of butter is heated slowly till the entire lot of butter melts. Afterwards the temperature is raised to more than 90°C. The scum that gathers on the top surface of the liquefied butter is regularly removed by using a ladle. Initially there is a first effervescence along with a crackling sound but the intensity of effervescence decreases with decrease in moisture content in the liquid medium.

- When the moisture content of the butter is drastically reduced, the temperature suddenly shoots up and the temperature of heating has to be controlled at this stage. The final stage of ghee preparation is indicated by the appearance of second effervescence, which is less pronounced than the first one along with browning of curd particles. This stage is further confirmed by appearance of characteristic ghee flavour. Now the final temperature of the liquid mass is increased to 110 – 120°C.

- Higher temperature of heating produces a cooked flavour in the end product. Then the product obtained is cooled and sedimented, filtered through muslin cloth to remove the ghee residue followed by granulation and packaging. The merits for this method are saving in labour, physical exertion and exposure to uncomfortably high temperature and humidity during actual ghee making when compared to the direct cream method.

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DIRECT CREAM METHOD

- In this method, the cream obtained by usual separation of milk, is heated in a ghee boiler, which consists of a stainless steel jacketed pan provided with a manual stirrer. The cream meant for ghee making is taken in the ghee boiler and the heating in the beginning is a controlled one.
- Later the steam pressure in the jacket is raised so that the liquid mass starts boiling with the removal of water vapour from the pan contents at a temperature of over 90°C. The temperature remains constant as long as the moisture is being driven out. The contents are constantly agitated through out the process of conversion of cream in to ghee to prevent scorching.

PRE-STRATIFICATION METHOD

- The disadvantage encountered in the desi method and creamery butter method can be obviated in this method, which relies on the different temperature of heating at different stages.
- When butter is left undisturbed at a temperature of 80 – 85°C for 15 – 30 min, it stratifies into three separate layers, viz. a top layer of floating denatured particles of curd, a middle layer of fat and a bottom layer of butter milk. This separation of three layers is called pre-stratification. The bottom layer which consists of buttermilk has 60-70% solids not fat and more than 80% of moisture originally present in butter. The bottom layer is carefully removed without disturbing the both top and middle layers. Afterwards the temperature of two remaining upper layers consisting of denatured curd and fat is raised to the regular clarifying temperature of 110 – 120°C.

- The advantages claimed for this method include economy in fuel consumption as compared to direct clarification and production of ghee with a reduced acidity and better shelf life.

The three methods of ghee making can be compared as follows.

Characteristics of the method	Desi method	Direct Cream Method	Creamery Butter Method
Adaptability	Cottage scale	Medium scale	Large scale
Percent of fat turnout	85 – 88	93 – 95	96 – 98
Quality of ghee	Fair	Good	Good
Flavour	Excellent	Good	Good
Keeping quality	Poor	Excellent	Good

THANKS