# BUTTERMILK

The topic Buttermilk will be discussed under 5 subunits such as

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- 4. MANUFACTURING OF BUTTERMILK
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#### **1. INTRODUCTION:**

Buttermilk is a kind of tart-tasting dairy drink, basically a by-product of the process making butter from the milk cream. Usually, the tartness in taste is due to the presence of lactic acid. The texture of buttermilk is thicker than the regular plain milk but its not heavy like cream. Also it contains less fat than plain milk. Some kind of fermented dairy drinks are also referred as buttermilk and it is commonly used in warm weather regions where regular plain milk gets sour easily. 'Chaach', majjiga, 'mattha' or 'chasee' are some of the names for Indian buttermilk normally known as 'Traditional buttermilk'.

Various buttermilk recipes are quite popular in cuisines worldwide and it is not only served as a beverage but also added as a dairy ingredient to make buttermilk dishes. Lassi, kadhi, buttermilk waffle and buttermilk oat rolls are some of the well-linked buttermilk dishes across the globe.

Households of ancient farmers were the place of origin of buttermilk. In olden times, it was believed that no edible product should be wasted or thrown away. Hence, while churning the butter from the cream, buttermilk was left as a residual and ladies of the house used this liquid as a refreshing drink. American and Indian farmers used to make buttermilk in their houses.

The exact origin of buttermilk date backs to Nomads. Pastoralists were actually nomads who during their travels used to carry sour milk and who discoursed that after it had been shaken for a few hours on horse/donkey or camel back, it would separate into two phases. One of them after separation was actually the forerunner of butter. It should be noted that the technology for butter making is almost universal. It seems that it drives from acidified milk production which is probably the most ancient type of processing.

Only recently, bio buttermilk drinks were also produced in Estonia. They contained buttermilk, fatless milk and an additional substance of which the content was up to 14%. The name bio buttermilk was used due to the fact that probiotic bacteria were used during fermentation. The additional substances were aloe vera, blood orange or grapefruit. Compared with ordinary buttermilk, the bio buttermilk drinks contained more carbohydrates (mostly due to their higher content of glycose, fructose and sucrose). Due to the higher carbohydrate content, bio buttermilk drinks contained more calories compared with ordinary buttermilk.

The energy value of fermented buttermilk is determined by the carbohydrates and proteins in its composition. Due to their comparatively modest quantity the calorific value of fermented

buttermilk is rather low. If you drink 200 grams of buttermilk, you get only around 56–70 calories of food energy.

## 2. COMPOSITION OF BUTTERMILK

The ingredients are skim milk, low-fat milk, cream, condensed skim milk, nonfat dry milk, culture, and salt. The addition of 0.20-0.25% sodium citrate to milk provides a precursor to enhance flavour production by the culture. Milk fat level ranges from 0.5 to 1.8%, and a minimum titratable acidity of 0.5% calculated as lactic acid. Characteristic flavour ingredients, nutritive carbohydrate sweeteners, stabilizers, and colouring, which do not simulate the colour of milk fat, may also be used. A minimum of 2000 International Units of vitamin A and 400 International Units of vitamin D per 0.95 litre of buttermilk may be added. The standards also define the products obtained from milk of various fat concentrations. Buttermilk contains not less than 3.25% milk fat, while low-fat buttermilk contains between 0.5 and 2.0 per cent milk fat. The milk solids-not-fat level is kept to 8.25% by using any milk-derived ingredient. However, this ingredient should not decrease the protein: milk solids-not-fat ratio and the protein efficiency ratio of the resulting mixture.

**Macronutrients in buttermilk:** Water content in buttermilk at its highest is 91–92%. High water content allows the use of buttermilk both for maintaining the water balance of the human body and as a quick thirst quencher. As the water content of buttermilk is mainly bound to proteins, it is absorbed from the intestines slowly enough that this drink is better than any type of water, either ordinary or flavoured. The dry matter in buttermilk (8–9%) contains macronutrients (milk proteins, carbohydrates, lipids) and micronutrients (mineral substances, vitamins). The **carbohydrate** content of buttermilk on sale in our stores is between 4.3–4.5%. The majority of it comprises lactose or milk sugar, and to some extent glycose and lactose that are generated during the cleavage of lactose. And this provides another added value.

Due to the presence of living bacteria in the product it should be stored at a cold temperature. In the warm, the vital functions of lactic acid bacteria accelerate and they convert more milk sugar into lactic acid. As a result, the taste of the product becomes sourer than may be acceptable to the palate of many people. The content of other nutrients, such as proteins and fats, in the bio-buttermilk drinks, on the contrary, was the same as in the ordinary buttermilk. The biological value of buttermilk fats is also in the fact that they contain the phospholipids, mainly lecithin, that are necessary for the human organism. Milk lecithin is mainly concentrated in the membranes of fat globules. When making butter, the membranes of the fat globules are destroyed; by conjoining the milk fats butter is formed and the majority of lecithin, together with milk sugar, stays in buttermilk. The human body needs lecithin for several purposes: in the composition of cell membranes, for normal brain function, and for replenishing the supplies of choline or vitamin B4. Often it is advised to use lecithin preparations but it is easier, more natural and cheaper to eat food products rich in lecithin that also provide a certain amount of other necessary phospholipids.

**Micronutrients in Buttermilk:** The content of calcium and phosphorus compounds in buttermilk is more or less similar to that of cow's milk. Buttermilk is a very good source of potassium. A glass of buttermilk gives a nice amount of magnesium too. Buttermilk contains more water-soluble vitamins than the fat-soluble ones. This is due to the specific composition of buttermilk, as depending on the manufacturing technology it contains rather a small amount of

milk fats. During fermentation, buttermilk is enriched with various B-group vitamins. This dairy product is a substantial source of the vitamin B2 that is suitable for the human organism. The vitamin B12 in the buttermilk helps in synthesizing the fatty and amino acids, in addition to fighting anemia, stress and promoting growth of nerve cells. B12 is also responsible for converting glucose into energy. The potassium and riboflavin in the buttermilk lowers blood pressure while the calcium improves bone health.

## **3. TYPES OF BUTTER MILK:**

**Traditional/Churn Butter milk:** The liquid left over from making butter is known as traditional <u>buttermilk</u>. Traditional <u>buttermilk</u> is very low in fat (since most of the fat went to making the butter). It can be consumed as a beverage (try it with fresh ground pepper) or added to recipes in place of water for a nutritional boost.

**Cultured buttermilk:** Most modern buttermilk is cultured buttermilk, made from low-fat or skim milk and has less than 2 percent fat and sometimes none. It is prepared from skim or low-fat milk by fermentation with bacteria that produces lactic acid. The resulting product is thicker than traditional butter milk but is similar to it in other respects. Its correct name in many jurisdictions is "cultured low-fat milk" or "cultured nonfat milk." Cultured buttermilk is generally what is called for in recipes. It is also the type of buttermilk you find in the store or you can make your own using a <u>Cultured Buttermilk Starter</u>. Cultured buttermilk is very similar to <u>yogurt</u> in the sense that it is cultured using live beneficial bacteria. Cultured buttermilk can be consumed as a thick and creamy beverage or used in cooking.

**Acidified Buttermilk:** Acidified buttermilk is a related product made by adding a food-grade acid (such as lemon juice) to milk. It can be produced by mixing 1 tablespoon of vinegar or lemon juice with 1 cup of milk and letting it sit until it curdles, about 10 minutes. Any level of fat content for the milk ingredient may be used, but whole milk is usually used for baking. In the process which is used to produce <u>paneer</u> such acidification is done in the presence of heat.

## 4. MANUFACTURING OF BUTTERMILK:

**Traditional Method:** The liquid leftover from making butter is known as traditional buttermilk. Traditional buttermilk is very low in fat (since most of the fat went to making the butter). It can be consumed as a beverage (try it with fresh ground pepper) or added to recipes in place of water for a nutritional boost. The flowchart indicates different steps in the traditional method for the preparation of buttermilk. Churn buttermilk is the fluid remaining when the fat is removed by churning cream into butter. It was formerly drunk as a beverage, but today it is mostly condensed or dried for use in the baking and frozen desserts industry. Despite its name, it is not high in fat. Churn buttermilk is the watery end-product of butter making but it has been replaced as a beverage by cultured butter milk.

Add a bacterial starter of 6 to 8 ounces/180-235ml of active fresh cultured buttermilk to a clean quart jar.



### Flowchart for the Traditional method of Buttermilk preparation

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The starting ingredient for buttermilk is skim or low-fat milk. The milk is pasteurized at  $82^{\circ}$  to  $88^{\circ}$  C ( $180^{\circ}$  to  $190^{\circ}$  F) for 30 minutes, or at  $90^{\circ}$  C ( $195^{\circ}$  F) for two to three minutes. This heating process is done to destroy all naturally occurring bacteria and to denature the protein in order to minimize wheying off (separation of liquid from solids).

The milk is then cooled to  $22^{\circ}$  C ( $72^{\circ}$  F), and starter cultures of desirable bacteria, such as *Streptococcus lactis, S. cremoris, Leuconostoc citrovorum*, and *L. dextranicum*, are added to

develop buttermilk's acidity and unique flavour. These organisms may be used singly or in combination to obtain the desired flavour.

The ripening process takes about 12 to 14 hours (overnight). At the correct stage of acid and flavour, the product is gently stirred to break the curd, and it is cooled to  $7.2^{\circ}$  C ( $45^{\circ}$  F) in order to halt fermentation. It is then packaged and refrigerated.



FIG. 16.4. Flow sheet diagram for the manufacture of cultured buttermilk.

### **5. BIOLOGICAL IMPORTANCE HEALTH BENEFITS:**

**Biological importance:** Buttermilk is either a fresh or fermented by-product of butter making. Fermented buttermilk has been highly valued and consumed in India over the ages. As it is biologically a very valuable food in terms of health compared toother fermented milk drinks, buttermilk has undeservedly been in the background nowadays.

- Buttermilk is a superb food product. If drinking buttermilk isn't enough to stave off hunger, mixed it with kama (a traditional Estonian meal containing milled rye, wheat, barley and peas) to get a versatile, useful and easy meal.
- Fermented buttermilk is perfect as the main component in the cold soups that are very popular during the warm season.
- > Even today, buttermilk is used in the composition of various doughs and batters, especially when raising agents are added to them.

- Due to the interaction of the organic acids in buttermilk and raising agents the separating gases make the pastry fluffy. Liquid buttermilk is a suitable component in pastry and baked curd dishes.
- Buttermilk can be used at home as a high quality starter for fermenting milk. Consumers have only to add about 5-10% of fermented buttermilk to milk, mix them well and let it ferment at room temperature. The bacteria in the starter of the fermented buttermilk ensure a high quality result both in terms of texture and taste.
- The organic acids (mainly lactic acid) in buttermilk are used for various culinary and cosmetic applications. The mild acid environment of buttermilk is very good for marinating meat and as a base of mild marinades.
- Lactic acid has also a skin peeling effect so buttermilk can be used in cosmetic skin care products.
- Buttermilk and garlic are considered to be a universal medication against colds in Ireland. In many countries, buttermilk is thought to be a good means of easing stomach disorders after the excessive consumption of alcohol.
- Due to the special biochemical composition of buttermilk, buttermilk powder the concentrate of dry matter in buttermilk has wide application in food industry.
- Buttermilk powder is often used in whipped creams, mainly due to its lecithin and protein content. Specifically, lecithin has twin characteristics – part of its molecule binds well with water, the other part with fats, so it is a good emulsifier, binding the two phases in creams into one whole, and building bridges between them on the molecular level.
- The success of lecithin as an emulsifier is proven by its use as a food additive (E322). The proteins of buttermilk powder play a role in creams as well – they stabilize whipped preparations by encapsulating microquantities of air in them. And of course, using a relatively fatless buttermilk powder in creams serves another purpose – it reduces their calorific value.

On certain occasions, buttermilk powder is also added to fermented mixed milk drinks; its purpose then is to improve the nutritional and biochemical characteristics of the product.

**Health benefits:** Buttermilk prepared in the traditional way is considered beneficial to health as it contains <u>probiotic</u> microbes and is sometimes referred to as "Grandma's probiotic". It is also soothing to stomach and skin.

The fat content of buttermilk is far lower than that of milk or curd as fat is removed during churning. The probiotic nature of buttermilk is purported to be beneficial to the gut and improve immunity when taken regularly. One cup of whole milk contains 157 calories and 8.9 grams of fat whereas one cup of buttermilk contains 99 calories and 2.2 grams of fat. Buttermilk contains vitamins, potassium, calcium, and traces of phosphorus.

In some countries, such as India, it is a favorite traditional drink during summer as it is soothing to the stomach and alleviates minor stomach upsets. In India, flavoring ingredients such as asafoetida, coriander leaves, ginger, curry leaves and sea salt are mixed with buttermilk to enhance its digestion-aiding properties. Buttermilk is highly recommended as one the best home remedies for certain ailments like piles, diarrhoea, jaundice and dysfunctions of liver and spleen. Some of the other health benefits of buttermilk are listed below.

- Sunburn: Mixing <sup>1</sup>/<sub>2</sub> cup of buttermilk with <sup>1</sup>/<sub>2</sub> cup of tomato juice and apply over sunburn. Wash it off after an hour for a cool feeling. It also takes out the sting of the sunburn showing visible reduction in the redness of the skin.
- **Dehydration:** Adding 1 tsp of ginger extract to 1 cup of buttermilk and drink it for instant relief from dehydration.
- **Dark spots:** Dry and powder orange peel. Mix this with buttermilk to make a fine paste. Apply it to the face and wash it off when try to get rid of ugly dark spots.
- Acidity: Drinking plenty of buttermilk is known to help in cases of severe acidity and indigestion.
- **Hemorrhoids:** Adding a cup of buttermilk to rice and banana and consuming it twice a day is known to provide quick relief from hemorrhoids.
- **Diarrhea:** A glass of buttermilk sweetened with sugar or honey stops vomiting and diarrhea in small children effectively.
- **Digestive tract disorders:** Mix equal amounts of dry powdered ginger, black pepper and rock salt. Add this to a glass of buttermilk and consume every day to get relief from all ailments of digestive tract.

**CONCLUSON:** Buttermilk is one of the widely used diet article in daily life. It maintains good health and aids to fight germs and bacteria as it has acid. It is easy to digest. This traditional thrist-quenching refreshing drink with high therapeutic and nutritional properties is appetizing, cooling, rejunuvating, soothing and serves as an excellent antidote to sunstrokes during Indian peak summer times. It tones the small intenstine, very light on the stomach and easy to digest unlike other dairy products like cheese and paneer. Thus buttermilk with multi value added health benefits could be considered best source as healthy diet drink.