**Buttermilk (Chach)-** Buttermilk is a low fat, drinkable dairy product with a fresh and acidic flavor.

Drinking of butter milk after churning dahi in to country butter is a very common habit in India. This product has most of the fermented milk solids except fat which goes in butter. It also has mixed lactic acid bacteria, especially Lactococci and Leuconostocs, which gives it a typical diacetyl flavour.

Manufacturing cultured butter milk on industrial scale involve selection of good quality raw material, standard cultures and optimized process of fermentation, packaging and storage.

True buttermilk is the fluid remaining after cream is churned into butter. If butter is made from sweet cream, its buttermilk has approximately the same composition as skim milk. Cultured butter milk is prepared by souring true butter milk or more commonly, skim milk with a butter starter culture that produces a desirable flavor and aroma.

**Inoculum preparation**

In general, skimmed milk is used as a base for buttermilk production. This milk must be of a high microbiological quality and not contain any antibiotics or disinfectants. For the best flavor it is recommended to use milk with a fat content of at least 1 to 1.8%.

For the preparation of inoculums, skimmed milk are pasteurized at 90°C for 2 to 5 minutes, cooled to a temperature of 22.2°C and 23.3°C and pumped to the fermentation tank. Milk is inoculated with mesophilic starter consists of the lactic acid bacteria Lactococcus lactis ssp. lactis, Lactococcus lactis ssp. cremoris and Leuconostoc mesenteroides ssp. cremoris. The milk is allowed to ferment, and after 12 to 15 hours the pH is measured until a pH of 4.6 is reached.

**Types of microorganisms**

Mesophilic starter consists of the lactic acid bacteria Lactococcus lactis ssp. lactis, Lactococcus lactis ssp. cremoris and Leuconostoc mesenteroides ssp. cremoris.

**Buttermilk production step**

For buttermilk production the following step are important

1. Raw material
2. Transport
3. Standardization
4. Homogenizations
5. Pasteurization
6. Cooling
7. Fermentation
8. Filling
9. Preservation
10. **Raw materials**

In general, skimmed milk is used as a base for buttermilk production. This milk must be of a high microbiological quality and not contain any antibiotics or disinfectants. For the best flavor it is recommended to use milk with a fat content of at least 1 to 1.8%.

The flavor of the buttermilk is, to a large extent, determined by the diacetyl production of the lactic acid bacteria. To stimulate the diacetyl production by the lactic acid bacteria, often 0.10% w/w of sodium citrate is added. To prevent syneresis, stabilizers can be added, like modified starch or carrageenan.

1. **Transport**

Before the milk, used in the production of buttermilk, is pumped to the storage tanks, the following things have to be checked:

* Directly aerobic colony count;
* Presence of antibiotics;
* Sediment;
* Sensory quality;
* Temperature.

When the milk is stored in storage tanks, its acidity is checked regularly.

1. **Standardization**

The milk is standardized on non-fat solids (at least 9%). Before the milk is pasteurized, 0.1 to 0.2% salt is added, to obtain the desired flavor.

1. **Homogenization**

Before the standardized milk is pasteurized, it is homogenized under high pressure (125 bar), at a temperature of about 49°C, creating small fat globules, which prevent the fat from floating.

1. **Pasteurization**

In order to reduce the bacterial count and increase the viscosity, through denaturation of whey proteins, the homogenized milk is pasteurized at 90°C for 2 to 5 minutes.

1. **Cooling**

After pasteurization step, the milk is cooled to a temperature of between 22.2 and 23.3°C and pumped to the fermentation tank. Here, the milk is inoculated with about 1 to 3% of a mesophilic starter. This so-called mesophilic starter consists of the lactic acid bacteria Lactococcus lactis ssp. lactis, Lactococcus lactis ssp. cremoris and Leuconostoc mesenteroides ssp. cremoris. The first-mentioned lactic acid bacteria are responsible for producing lactic acid from lactose, while the latter produces the aroma. It is very important these lactic acid bacteria are well-balanced. A maximum of 20% of the bacteria can be of the aroma producing kind.

1. **Fermentation**

After adding the mesophilic starter, the mixture is stirred for about 15 to 30 minutes, depending on the type of tank and its agitators, at a high speed. After which, the milk is allowed to ferment, and after 12 to 15 hours the pH is measured until a pH of 4.6 is reached. At this pH level, casein sinks to the bottom of the tank, making the mixture curdle. The milk is then left to rest for about 1 to 2 hours, this will lead to the desired taste and aroma.

1. **Cooling**

After the buttermilk is fermented sufficiently, the buttermilk has to be cooled rapidly. In order to prevent post-contamination and to terminate the production of acid. This rapid cooling starts with the circulation of ice water between the outer layers of the fermentation tank, for about 10 to 15 minutes. Next, the whole is stirred at a high speed until the product has become smooth. Then, the stirring speed is reduced and the buttermilk is stirred until it is cooled down to 17°C.

1. **Filling**

For the filling process to start, stirring should be stopped, preventing air from entering the buttermilk. Any air could may lead to syneresis.

The cooled buttermilk is pumped to the filling machine and filled into bottles or cardboard packs.

**X. Preservation**

When the buttermilk has been bottled, it must be stored at 4°C. If kept at this temperature, the buttermilk will have a shelf life up 2 to 3 weeks.

Reference

<https://www.safefoodfactory.com/en/knowledge/38-buttermilk/>