**Milk based fermented food: Dahi**

**Dahi**

Dahi is produced from heat treated milks after inoculation with certain species of lactic acid bacteria added to milk in the form of starter culture. Lactic acid bacteria added multiply, grow and produce lactic acid, acetic acid and carbon dioxide by utilizing lactose present in milk. Some bacteria uses citric acid of milk to produce certain volatile organic compounds mainly diacetyl, which is mainly responsible for flavor of dahi. Judicious combination of acid producing and flavour producing microorganisms in the starter helps in the production of Dahi with a firm body and good flavor.

Dahi or curd is a semi solid product, obtained from pasteurized or boiled milk by souring, using harmless lactic acid or other bacterial cultures. Dahi may contain additional cane sugar. It should have the same minimum percentage of fat and solids-not-fat as the milk from which it is prepared.

**Methods of preparation of Dahi / Production process**

There are two methods – 1. Traditional method

 2. Industrial method of making dahi

1. **Traditional method** - In traditional method of dahi preparation, milk is heated intensively to boil for 5 to 10 min and then it is cooled to room temperature. Cooled milk is added with previous day’s curd stirred and allowed to set undisturbed usually for overnight.

2. **Industrial method of making *dahi***

**Selection of raw material**

Production of cultured/fermented milk demands high quality raw materials with respect to physical, chemical and microbial standards.

**Filtration/clarification**

Fresh raw milk is heated to 35 to 40ºC to aid clarification or filtration process then it is filtered to ensure that, milk is free from extraneous matter.

**Standardization**

Fat is standardized based on type of product ranging from fat free to full fat and SNF level is increased by min. 2% than that of milk. It is common to boost the SNF content of the milk to about 12% with the addition of skim milk powder or condensed skim milk. Increased SNF in turn increases the protein, calcium and other nutrients and resulted with improved body and texture, custard like consistency. Higher milk solids prevent wheying off of the product during storage.

**Homogenization**

The standardized milk is subjected to homogenization after heating to 60ºC to increase the efficiency. Homogenization reduces the cream layer formation during incubation, Single stage homogenization with 175kg/cm2 pressure would be sufficient to improve texture of dahi.

**Heat treatment**

Milk intended for dahi or any other fermented milk product is given severe heat treatment i.e. 90ºC for 10min.

Following are the benefits of high heat treatment

* Denatures and coagulates milk albumin and globulins which enhance the viscosity and produce custard like consistency
* Kills contaminating and competitive microbes
* Development of relatively sterile medium
* Removal of air form the medium more conducive for the growth of culture bacteria
* Effective thermal breakdown of protein releasing peptones and sulfhydryl groups, this in turn provide nutrients to starter bacteria

**Packaging and fermentation**

The heat treated product mix is cooled to 37ºC and it is inoculated with specific dahi culture at the rate of 1 to 1.5%. Starter culture is the most crucial component in the production of high quality fermented milks. Proper selection of culture strains decides the good quality of product. Dairy cultures are available in various forms like freeze dried, liquid and frozen forms. After the product mix is inoculated with dahi culture it is thoroughly mixed and filled into plastic cups, sealed properly to avoid any contamination and spillage of the product. Dahi is packed in food grade polystyrene and polypropylene cups in 100g, 200g and 400g pack sizes. Various packaging machines of upto 400cups/min speed are available to package cultural dairy products in different sizes. The packaged product should be stored at < 5ºC for extended shelf life. Thus packed product is arranged in cases or crates and transferred to incubation room maintained at 37ºC to 42ºC. The product mix is incubated till its pH reaches 4.4 to 4.5 and then it is cooled rapidly to less than 5ºC by exposing the cups to high velocity cold air.

**Storage**

Dahi is normally stored at 4°C- 5°C. Storage area should be maintained clean and tidy to avoid any cross contamination.

**Starter cultures for Dahi (types of microorganisms and preparation of inoculum)**

The inoculum used to initiate fermentation in milk is called **starter**. The type and characteristics of starter organisms used in the production of fermented milk is an important factor that determines the type and characteristics of the final product. Traditionally,the previous day dahi or chhash, containing an unknown mixture of lactic acid bacteria was used as starter culture.

However, to manufacture dahi on large scale with predictable uniform quality, it is desirable to use known mixtures of starters. The organisms commonly found in the inoculums are ***Streptococcus cremoris, Streptococcus lactis, Streptococcus thermophilus,***  ***Lactobacillus acidophilus***, ***L. bulgaricus*** and  ***L. helveticus.***

Surveys have also indicated that in summer dahi Lactobacilli dominate, while in winter, Streptococci dominate. Similarly in southern parts of India, where people are habituated to take sour dahi, lactobacilli and yeast dominate, while in northern parts where mildly sour dahi is preferred, Streptococci predominate.

According to BIS: 9617 (1980), the following cultures shall be used in preparing dahi.

(a) *Streptococcus lactis*, *Streptococcus diacetylactis, Streptococcus cremoris,*singly or in combination, with orwithout *Leuconostoc* species.

(b) Also as above, along with species of Lactobacillus such as *Lactobacillus acidophilus, Lactobacillus bulgaricus*and*L. casei*and*Streptococcus thermophilus.*

References

1. Edward R. Farnworth, Handbook of fermented functional foods, Second edition.
2. J.S. Yadav, Dairy Microbiology, First Edition.