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# Microbiological Study on Commercial Preparation Of Yogurts

**Gudepu Renuka [1,*], D. Sucharitha [2]**

1. Assistant Professor, Department of Microbiology, Pingle Govt. College for Women, Waddepally, Warangal, Telangana, India.

2. B. Sc. Graduate, Department of Microbiology, Pingle Govt. College for Women, Waddepally, Warangal, Telangana, India.

*. Corresponding Author
G. Renuka
Email: renumanduva@gmail.com
Cell Phone: +91 - 9849263336

**Abstract**

As a result of the rise in vegetarianism, health trends and ethical concerns, plant-based fermented beverages are gaining in popularity. Yogurt's lactic starter, Streptococcus thermophilus, is a vital part of the process. Galactose negative (Gal) S. thermophilus strains can only digest the glucose part of lactose and eject the galactose. In yoghurt, free galactose builds up due to a metabolic flaw like this. However, despite the wide variations in yoghurt eating patterns among countries, the overall consumption rate is still quite low. Only 6% of the population in the United States and Brazil drink yoghurt on a daily basis. Because of the high levels of protein and calcium it contains, yoghurt is an important part of a healthy diet. It also contains beneficial bacteria called probiotics, which may have a variety of health advantages.

**Keyword**

Yogurt, Microbiology , fermentation , thermophiles , galactose

**Introduction**

Fermented dairy products like yoghurt, which may be made with a range of flavours and fruits, are among the most popular. There are a variety of yoghurts on the market, including liquid, set, frozen, and stirred yoghurt. "Active cultures" in yoghurt make it a low-fat, calcium-rich food. Your immune system will benefit from the protein and probiotics in yoghurt. Your digestive system will benefit from the probiotics in yoghurt. Your memory will benefit from the probiotics in yoghurt. Canned pears, bran, and chicken soup have all been crammed into one yoghurt. [1]

Products that undergo considerable metabolic modifications due to microbial action are consumed around the world. There are many varieties of yoghurt available, the most popular of which is frozen liquid yoghurt. When making yoghurt, consistency in quality is key, and this can be achieved through the use of a variety of processing procedures, such as the proper selection of starter cultures, heat treatment, inoculation and incubation temperatures, preservation, handling, and propagation. Streptococcus thermophilus and Lactobacillus bulgaricus are the most commonly employed inoculating materials in modern dairy operations. When these microorganisms live together, they provide good flavour and scent in the yoghurt they produce. [2]

Yogurt has been linked to a wide range of health advantages for millennia. According to Indian Ayurvedic medicine, which dates back to 6000 BCE, yoghurt eating is good for your health. Yogurt has been used for a wide range of ailments, from digestive disorders to sunburn recovery. Even as a medicine in the early 20th century, it was marketed in pharmacies. [3] Yogurt is now being marketed as a "probiotic" food that is good for you. "Probiotic" foods like yoghurt, which contain beneficial bacteria, have long been known to be beneficial to health, and new studies suggest that yoghurt may have similar benefits for the digestive system and the immune system.

Preserved in liquid, freeze-dried, and frozen form, commercial starter cultures are used to make yoghurt for commercial use. Lactose to lactic acid fermentation by bacteria provides a preservation effect on the food, while at the same time improving its nutritional content and digestibility. [4] L. bulgaricus and S. thermophilus were combined in this work in order to establish a starter culture capable of producing the same quality yoghurt as commercial starter cultures imported from abroad.

**Classification of yogurt**

Based on the physical characteristics of the yoghurt, there are four classifications. The fat content (full-fat, reduced-fat, and low-fat) and the technique of manufacture and the physical structure of the coagulum are commonly used to categorise yoghurts (set or stirred yogurts). Figure 1[5] shows this strategy.

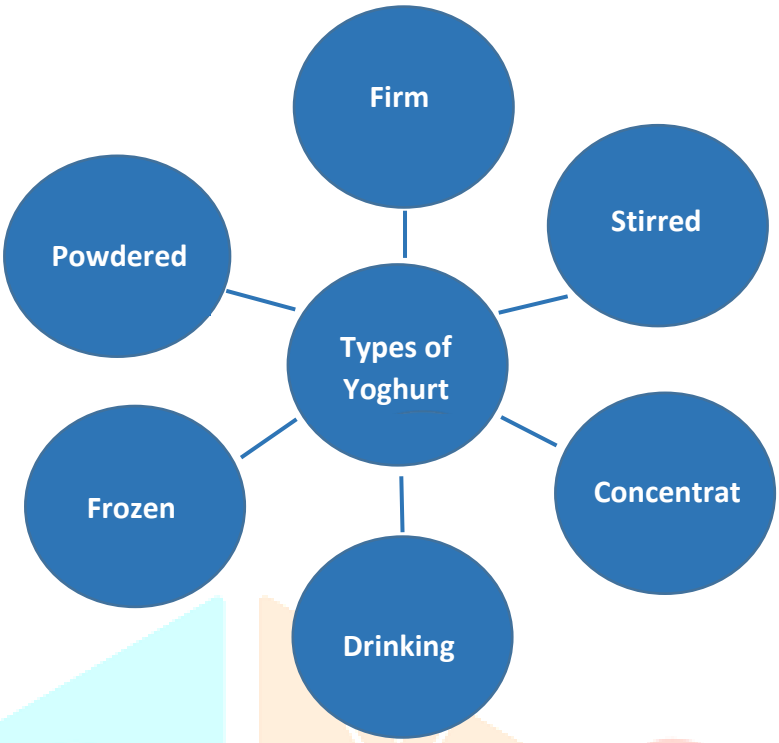


Fig. 1 Classification of yoghurt

In a retail container, set yoghurt is generated when milk is fermented, and the yoghurt produced is a continuous, semisolid mass. The coagulum is formed from milk, and the gel structure is disrupted before cooling and packaging in the case of stirred yoghurt. Stirred yoghurt with a low viscosity is what fluid yoghurt is. There are several procedures involved in the production of these two varieties of yoghurt (Fig. 2): standardising milk (fat and protein content), homogenising milk, heating the milk, fermentation the milk, and finally preserving the yoghurt. [6]

The process of making yoghurt at a factory is divided into three stages.

- The mixing, homogenization, heat treatment, chilling, and dehydration of the mixture;
- After the mix has been inoculated, the fermentation process begins.

  It is possible to evaluate at least four different varieties of yoghurt whose production is shown in fig 2[7] in terms of harvesting, processing, and packing

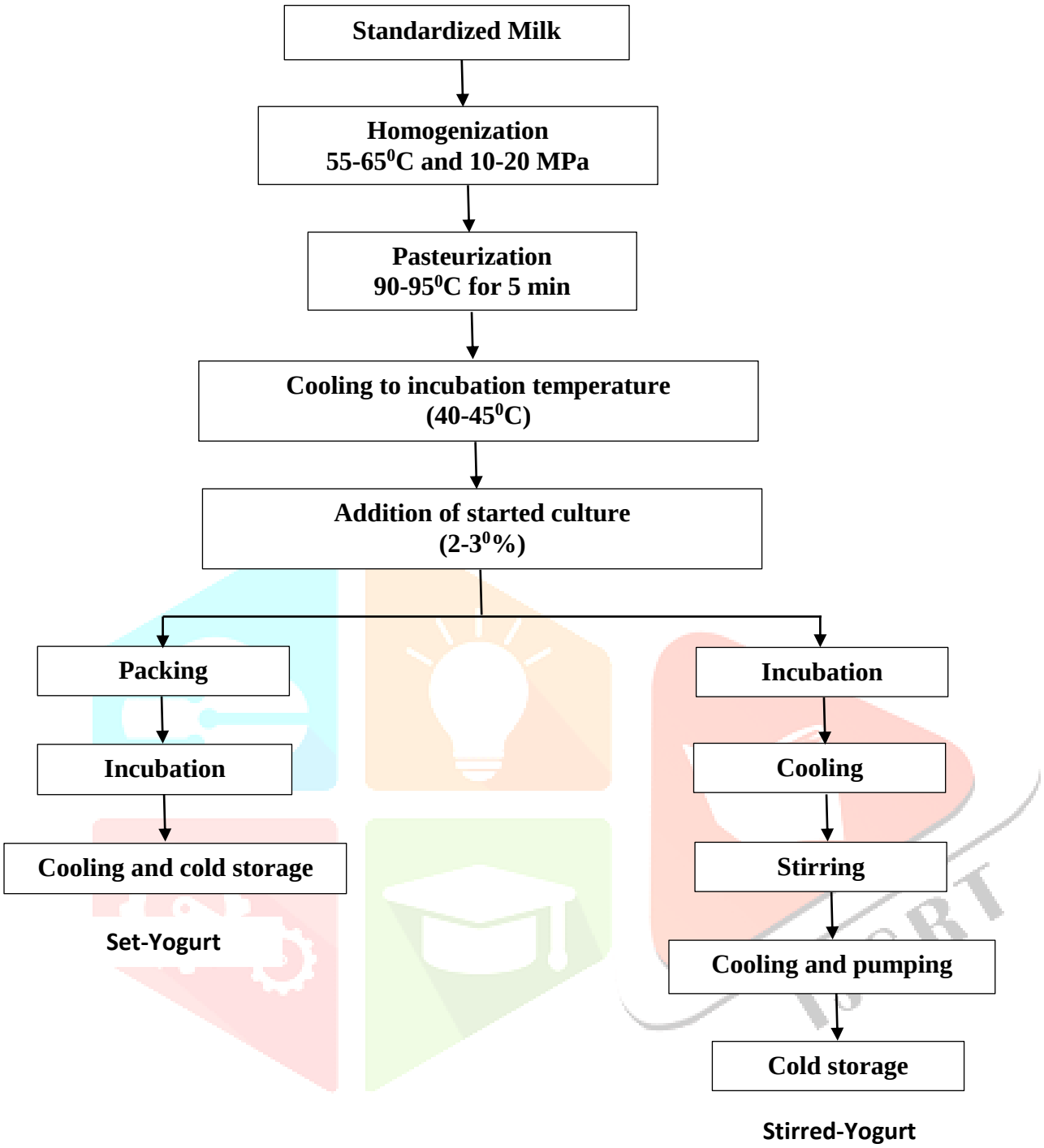


Fig.2 Main processing steps in the manufacture of set and stirred yogurt

**Biochemical and Physicochemical changes during lactic acid fermentation:**

Several beneficial changes to yoghurt are brought about by the growth of lactic acid bacteria in milk. In addition to changing the product's texture and nutritional value, lactic acid, exopolysaccharides, and aroma compounds are formed during this process. [8]

**Flavour Compound Production:**

Lactic acid, an acidic component in yoghurt, gives the yoghurt its distinctive flavour. Sulphur-containing molecules, carbonyl compounds (acidic and esters), alcohols, heterocyclic compounds (and a few others) make up the yoghurt scent. To give yoghurt its distinctive flavour, acetaldehyde is a key flavouring element. Pyruvate decomposition and acetyle coenzyme are the two most common methods of producing acetaldehyde. [9]

**Review of Literature**

Lactose and galactose are sugars found in food that galactosemia, a hereditary condition of carbohydrate metabolism, affects the body's capacity to process. Galactosemia is a metabolic disorder in which the enzyme responsible for turning galactose into glucose is insufficient. Jaundice, kidney problems, eye problems like cataracts, mental retardation, and even death may result if galactoseemia is not addressed (Berry et al. 2001[10]; Goodman et al. 2002[11]).

S. thermophilus and L. delbrueckii subsp. bulgaricus ferment milk to produce yoghurt, one of the most popular fermented milk products in South Asia. A good source of calcium and phosphorus, it is better for your digestion than milk (Adolfsson et al. 2004) [12] and can aid with digestive problems.

It is vital to measure syneresis because high levels of whey separation in set-type yoghurts are regarded a quality flaw. Incubation at temperatures above 80 ° c for 30 min, for example, or excessive heating during the preparation of milk can cause it to appear, disturbances while the gel is still weak, production of lactic acid in low amounts and low total solids content (Lee & Lucey, 2004)[13].

Semi-fluid milk product made from fresh whole or skimmed milk that has been boiled and concentrated by the removal of water. The fermentation is caused by adding culture bacteria, and a thickening agent is lactic acid bacteria (LAB) (Adams and Moss, 1995) [14].

**Objectives**

- To study what is mean by yogurt and classification of yogurt
- To study microbiological characteristic of yogurt
- To study major component of yogurt
- To study processing steps of yogurt manufacturing

**Research Methodology**

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them. It is necessary for the researcher to know not only the research methods/techniques but also the methodology. The data used for preparing this paper are secondary in nature which are collected from the various published resources. The data derived for preparing this paper are from various relevant websites

**Result and Discussion**

**Microbiological Characteristics of Yoghurt**

The lactic acid bacteria S.thermophilus and L. Delbrueckii subp. Bulgaricus, both of which are thermophilic, are responsible for the fermentation of yoghurt. No spores exist and the DNA concentration is below 55% G+C, making them a gram-positive, anaerobic, aerotolerant pathogen. Between 42 and 500 degrees Celsius, but not above 100 degrees Celsius, they can grow. Subspecies Bulgaricus of L. Delbrueckii grows as ovoit cells, but S. thermophilus is a straight chain of rods Glucose is predominantly fermented to lactic acid, and galactose is unmetabolized, resulting in homo-fermentative metabolism. [15]

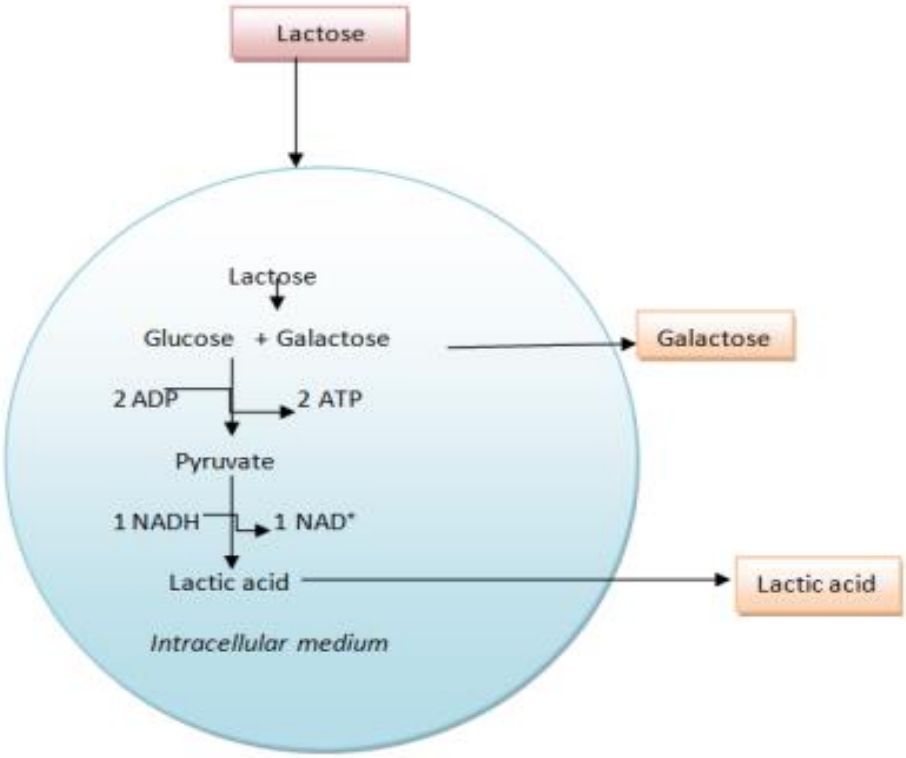


Fig. 3 metabolic reactions involved in homo-fermentative metabolism in yoghurt bacteria

The major components of yoghurt are in the following table:

| **Components%** | **Traditional yoghurt** |
|---|---|
| Fat | 5.54 |
| Protein | 4.64 |
| Total solids | 15.82 |
| Lactose | 4.1 |

Table 1 chemical composition of plain yoghurt.

It is a semisolid fermented milk product that is made by draining out some of the whey from the yogurt. In the end, the final product contains more solids and less lactose than conventional yoghurt (Table 2) [16]

| **Composition** | **Full-fat** | **Low-fat** |
|---|---|---|
| Total solids | 22.0 | 14.3 |
| Protein | 4.9 | 9.9 |
| Fat | 10.1 | 0.2 |
| Carbohydrate | 6.0 | 3.5 |
| Ash | 1.0 | 0.6 |

Table 2 chemical compositions (g 100g -1) of industrial full and low-fat strained yogurt; Nutrional value of plain yoghurt per 100g is as shown below

| | |
|---|---|
| Energy | 61 Kcal |
| Total fat | 3.3 g |
| Saturated fat | 2.1 g |
| Polyunsaturated fat | 0.1 g |
| Monounsaturated fat | 0.9 g |
| Cholesterol | 13 mg |
| Sodium | 46 mg |
| Potassium | 155 mg |
| Total Carbohydrates | 4.7 g |
| Dietary fiber | 0 g |
| Sugars | 4.7 g |
| Protein | 3.5 g |
| Vitamin A | 2% |
| Vitamin | 0.8% |
| Calcium | 9.3% |
| Iron | 0.3% |
| | (% of daily value) |

Table 3 nutritional value of yoghurt per 100g

**Conclusion**

In the human diet for thousands of years, yogurt has been promoted as a healthy food, which is why it's an ancient food. Yogurt is a fantastic source of highly bioavailable protein, calcium, and probiotics, all of which can contribute to a healthy lifestyle. Those who eat less yoghurt are missing out on this chance. Yogurt isn't a dessert or a snack, but rather a dairy product that may be eaten with any meal. Lactose intolerance is prevalent in Asian, African American, and American Indian communities, making it especially vital for these groups to consume dairy products.

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