Script

YOGURT

The topic yogurt will be discussed under 5 sub sets.

- **First we will discuss about what is yogurt and a brief history of it.**
- **We will also discuss about different types of yogurt commonly available in the market**
- **Then we will discuss about its composition and nutritional value**
- **Further, we will discuss about preparation of homemade yogurt and a commercially available flavoured yogurt**
- **In our last part, we will be discussing about the health benefits of yogurt**
- **Followed by conclusion**

1. INTRODUCTION

In the Indian subcontinent, the words "curd" or "curds" are used to refer to "yogurt". Yogurt or yoghurt is the most popular fermented milk product in the world. It is made by fermenting milk using bacterial cultures. It is a mixture of milk (like whole, reduced-fat, lowfat or nonfat) and cream fermented by a culture of lactic acid bacteria, these bacterial strains convert part of the lactose into lactic acid. The milk coagulates when a sufficient quantity of lactic acid is produced. In the manufacture of yoghurt, two kinds of lactic acid bacteria are generally used with usually unpasteurized milk.

Most commonly used bacteria are *Lactobacillus* spp., such as *L. acidophilus*, *L. bulgaricus* and *L. bifidus*. The bacteria produce lactic acid from lactose in the milk causing the pH to drop to about 4-5 from about 7.0. This drop in pH causes the milk to coagulate. The lactic acid gives yoghurt its sour taste and limits the growth of spoilage bacteria. Yoghurt is also flavoured usually with fruits. In the U.S. yogurt is typically sweeten, but worldwide it is more often used with savory flavors. For cultures where yogurt has been used for thousands of years, it is integrated into all aspects of their food. Yogurt is the base for making many foods including yogurt cheese, condiments, even a yogurt-based soda in the middle east.

A brief history about yogurt is that, Yogurt appears in many ancient texts including ancient Indian scripts, the Bible and also in historic texts. Yogurt originated in Central Asia around 6,000 BC when humans began milking

domesticated animals. Cultured milk products have been eaten since 2,000 BC. Yogurt is thought to have developed in Central Asia and was probably fermented spontaneously, likely by bacteria residing inside goatskin bags. More importantly, yogurt kept longer than fresh milk. The Mongol warrior Genghis Khan is said to have encouraged drinking yogurt made from horse milk called kumis. Mongols of all levels of society consumed the beverage, but it was of particular importance to the warriors. The warriors would take their horse herds with them as they traveled and always have a supply of kumis. Khan is said to have believed it keep warriors healthy and made them brave facing their enemies.

Historical records show in a 16th century Turkish doctor saved the life of King Francis I by treating him with yogurt made from goat's milk. The king suffered from intestinal illness and was apparently cured by yogurt. This brought a new surge in the popularity of yogurt as a health food, though at the time no one understood how the yogurt worked. Turkish immigrants brought yogurt to North America in the 1700s, but it didn't catch on with the general population. The first Industrialized production of yogurt is attributed to Isaac Carasso in 1919 in Barcelona – his company "Danone" was named for his son, "Little Daniel". In 1940s Daniel Carasso, the son of Danone founder started a small yogurt factory in the Bronx, New York – the company is now called Dannon in the United States. Yogurt with fruit on the bottom was first introduced in 1947 by Dannon. Finally, in the 20th century a Russian scientist, Elie Metchnikoff studied the health benefits of fermented milk and determined the bacteria in cultured milk products like yogurt reduced the amount of "bad" bacteria in the gut and increased the "good" bacteria that aided digestion. While yoghurt has been present for many years, it is only recently (within the last 30-40 years) that it has become popular.

Nowadays, yogurt is also used as an ingredient in food preparations to:

- Enhance their flavour: Yogurt has a slightly tart characteristic flavour that comes from a mix of many organic compounds released by the fermentation (lactic acid, acetaldehydes, volatile and non-volatile acids, protein derivatives, etc.).
- It act as a textual ingredients: The addition of yogurt to a recipe adds body and better cohesiveness to cold sauces, vinaigrettes and dips.
- It is also used to reduce the calorie content in some recipes: Substituting sour cream with natural yogurt allows reaching the niche of consumers concerned about the benefits of a low calorie diet.

According to Food and Drug Administrative (FDA) regulations require that all yogurts be made with active cultures. Only those that are not heat-treated, however, retain live active cultures when they reach consumers.

2. TYPES OF YOGURT

Yogurt products come in a wide variety of flavours, forms and textures. Here are the common terms associated with yogurt products available today. Some of the definitions were established by the Food and Drug administration (FDA), while others were determined by the manufacturers.

There are different types of yogurt:

- **Regular yogurt:** It is made from whole milk has at least 3.25 percent milk fat.
- **Lowfat yogurt:** It is made from lowfat milk or part-skimmed milk and has between 0.5 and 2 percent milk fat.
- **Nonfat yogurt:** It is made from skim milk and contains less than 0.5 percent of milk fat.
- **Lite(light)yogurt:** It is with one third less calories or 50% reduction in fat than regular yogurt.
- **Swiss or custard:** In this yogurt type, fruit and yogurt are mixed together for individual servings. To ensure firmness, a stabiliser, such as a gelatine, may be added. These products are also referred to as “blended” yogurt.
- **Frozen yogurt:** Frozen yogurt is made by fermenting pasteurized milk which can include skim and powdered skim milk, pasteurized milk-icecream mix, cream, and sugar, plus stabilizers or other ingredients needed for desired consistency. This frozen yogurt mix can then be blended with fruit or other ingredients and then frozen. However, the freezing process does not kill any significant amount of the cultures. In fact, during the freezing process the cultures go into a dormant state, but when eaten and returned to a warm temperature within the body, they again become active and capable of providing all the benefits of cultures in a frozen yogurt product.
- **Liquid or drinkable yogurt:** This is with a more liquid consistency, this drinkable yogurt is made from fermented milk with added sugar and fruit or fruit-flavoured syrups and is intended as a nutritional alternative to carbonated beverages.
- **Firm yogurt:** With a more or less firm consistency, this type of yogurt is fermented right in the container and then cooled. If it is flavoured with natural or artificial products that are normally placed in the bottom of the container.

- **Spun yogurt:** With a smooth and homogenous consistency, this type of yogurt, often containing added pieces of fruit or jams, is mixed after fermentation and cooling.
- **Healthy yogurt:** It contains certain bacterial strains that are referred to as "probiotics". When these living organisms are transported through the human body, they provide certain health benefits in humans by creating a better balance in the intestinal flora.

3. COMPOSITION AND NUTRITION VALUE

The composition standards stipulate that yogurt must contain not less than 0.8% lactic acid, not less than 9.5% non-fat milk solids and not less than 3.0% protein. It may also contain some ingredients that come from milk (either whole or skim milk powder, or concentrated evaporated milk). Further, fruits, fruit juices or extracts, jams, sweeteners, may be added but not exceeding 2.0% of texturizing agents such as stabilizers, gelling, thickening or emulsifying agents. In the case of yogurt with added fruit, fruit juices or extracts or jams, a preservative not exceeding 50 ppm. By definition, a "fat-free" food must contain less than 0.5 g of fat per portion.

The microbiological standards specify that a good quality yogurt must have a maximum of 10 coliforms per gram and 100 yeasts or moulds per gram.

Table 1: Typical composition of Yogurt

	Product (100 g)	
	2% natural yogurt	Fat-free natural yogurt
Proteins	4.5 g	4.6 g
Glucides	4.9 g	5.3 g
Fats	2.1 g	<0.5 g
Calcium	132 mg	138 mg
pH	4.3 - 4.4	4.2 - 4.3
Energy	57 kcal	42 kcal

Nutritional value: Yogurt is nutritionally rich in protein, calcium, vitamin D, riboflavin, vitamin B6, and vitamin B12. Lactose-intolerant individuals may tolerate yogurt better than other dairy products due to the conversion of lactose to the sugars glucose and galactose, and due to the fermentation of lactose to lactic acid carried out by the bacteria present in the yogurt. Yogurt contains varying amounts of fat. This is because fat in the cow’s milk vary depending on their type.

4. PREPARATION OF YOGURT

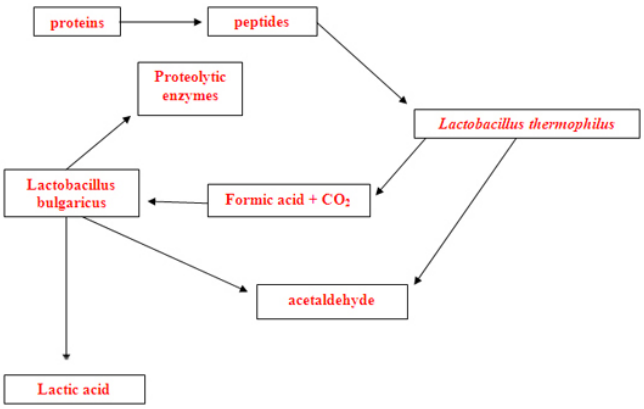
Early preparation of yogurt is thought to be an accidental process. People discovered when milk was left in a warm place, it thickened and developed a tart flavor. It is believed that the milk was stored in goatskin bags made from stomachs. These contained bacteria which curdled the milk when left in a warm place, essentially making yogurt. Not only did the milk keep longer as yogurt, it is believed people preferred the taste and continued the practice.

Worldwide cow's milk is most commonly used to make yogurt, but it can be made from the milk of buffalo, goats, sheep, horses, camels and yaks. In U.S. yogurt is typically produced using two bacterial cultures *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. Sometimes *L. acidophilus* or a lactose-fermenting yeast is also added. These bacteria cultures are thermophilic, means they are active and thrive their life at higher temperatures. Once the bacteria are added to the warm milk, they start to consume the milk sugars and begin fermentation, much like yeast in bread. Yogurt made with these active bacterial cultures produces lactase, the enzyme that allows humans to digest lactose. Consequently, yogurt can often be tolerated by people who are lactose intolerant.

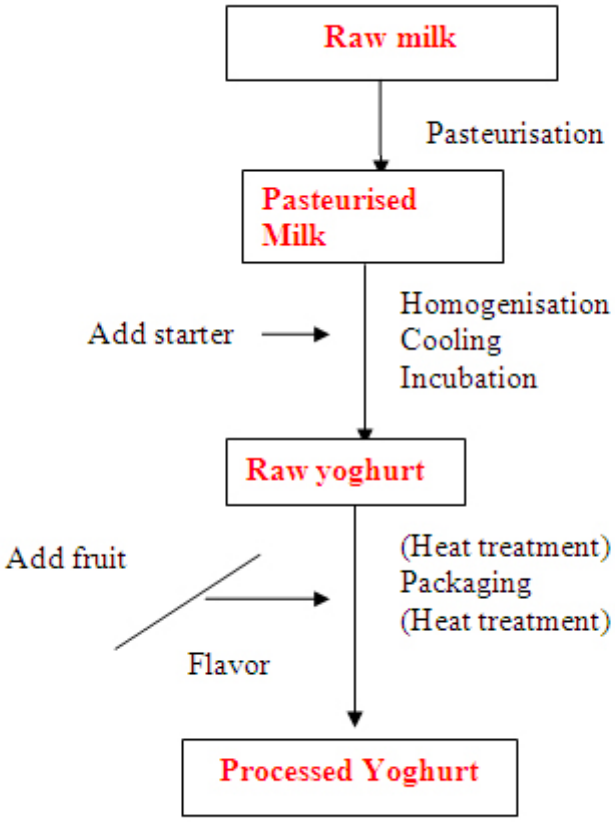
Homemade yogurt preparation method is slowly heating milk until almost boiling, then cooling it down. Heating the milk kills native bacteria which can compete with the introduced cultures. Heating the milk alters the structure of the milk protein, casein, a key to thick, firm yogurt. The slow heating process also results in evaporation and concentrates the milk, further helping the yogurt to thicken. Many yogurt manufacturers simulate this evaporation step by adding powdered milk or other thickeners. Two species of bacteria *L. bulgaricus* and *S. thermophilus* in approximately equal proportions, are used to make yoghurt. Commercial producers pasteurize and homogenize the milk before adding the starter. After stirring, the mixture is then incubated for 3-6 hours at 40-45 ^{o}C.

At this temperature the two bacteria have a mutually stimulating effect on one another. Proteolytic enzymes from *L. bulgaricus* break down milk proteins into peptides. These stimulate the growth of *S. thermophilus* which, in turn, produce formic acid and carbon dioxide, growth stimulants for *L. bulgaricus*. As the incubation proceeds, *L. bulgaricus* converts the lactose to lactic acid and the pH falls to 4.2-4.4 which leads to the coagulation of proteins by lactic acid and the thickening of the yoghurt. Further processing involves the addition of flavour, colour, fruit pulp and heat treatment to kill off any unwanted bacteria.

Metabolic products of bacteria are also used in yoghurt making are: Proteins, peptides, proteolytic enzymes, formic acid, carbon di oxide, lactic acids and acetaldehyde**.**



Stages in the manufacture of processed yoghurt



General materials required for a commercial production of flavoured yogurt are as follows:

- 1 liter homogenized pasteurized milk (milk type is optional)

- 30 grams skim milk powder (SMP)
- 100 grams refined sugar or brown sugar
- 80 ml starter culture bacteria from natural yoghurt

Preparation of Starter Culture

Take 3% skim milk powder in distilled water, yoghurt and incubate at 43 to 46 ^{o}C for 3 to 4 hours till set. In order to prepare flavored yoghurt add 200 grams of cooked pineapple pieces or strawberries.

General Procedure

i. Take a clean and sterilized beaker and add Skimmed milk powder and sugar. Dissolve the Skimmed milk powder and sugar in the milk. Heat it to 90 ^{o}C by placing the beaker in a Hot water bath maintained at 90 ^{o}C. Keep the beaker with the ingredients at this temperature for 10 minutes.
ii. After 10 minutes, cool it to 50 ^{o}C by placing it in a ice water bath.
iii. Meanwhile place the cooked pineapple/strawberries into the fermentation jar (2L beaker).
iv. Now add the starter culture to the milk. Shake it well and get rid of lumps before adding to the milk.
v. Transfer the inoculated milk into the beaker or jar containing the cooked pineapple/strawberry pieces and then cover.
vi. Incubate the milk for about 4 hours at 43 to 46 ^{o}C until thick and set. The clotting of the milk indicates the bacteria utilized the sugars and underwent fermentation.
vii. Chill for at least 1-2 hours and then it is ready to serve.

5. HEALTH BENEFITS OF YOGURT

Yogurt is easier to digest than milk: Any people who cannot tolerate milk, either because of a protein allergy or lactose intolerance, can enjoy yogurt. The culturing process makes yogurt more digestible than milk. The live active cultures create lactase, the enzyme lactose-intolerant people lack, and another enzyme contained in some yogurts (beta-galactosidase) also helps improve lactose absorption in lactase-deficient persons. Bacterial enzymes created by the culturing process, partially digest the milk protein casein, making it easier to absorb and less allergenic. In a pediatric practice, it is observed that children who cannot tolerate milk can often eat yogurt without any intestinal upset. Culturing of yogurt increases the absorption of calcium and B-vitamins. The lactic acid in the yogurt aids in the digestion of the milk calcium, making it easier to absorb. The culturing process has already broken down the milk sugar

lactose into glucose and galactose, two sugars that are easily absorbed by lactose-intolerant persons.

Yogurt contributes to colon health: yogurt contains lactobacteria, intestines-friendly bacterial cultures that foster a healthy colon, and even lower the risk of colon cancer. Lactobacteria, especially acidophilus, promotes the growth of healthy bacteria in the colon and reduces the conversion of bile into carcinogenic bile acids. The more of these intestines-friendly bacteria that are present in colon, the lower the chance of colon diseases.

Yogurt is a rich source of calcium: Calcium a mineral that contributes to colon health and decreases the risk of colon cancer. Calcium discourages excess growth of the cells lining the colon, which can place a person at high risk for colon cancer. Calcium also binds cancer- producing bile acids and keeps them from irritating the colon wall.

Yogurt aids healing after intestinal infections: Some viral and allergic gastrointestinal disorders injure the lining of the intestines, especially the cells that produce lactase. This results in temporary lactose malabsorption problems. This is why children often cannot tolerate milk for a month or two after an intestinal infection. Yogurt, however, because it contains less lactose and more lactase, is usually well-tolerated by healing intestines and is a popular "healing food" for diarrhea.

Yogurt can decrease yeast infections: Research has shown that eating 200 grams of yogurt that contains live and active cultures daily reduces the amount of yeast colonies in the vagina and decreases the incidence of vaginal yeast infections.

Yogurt is an excellent source of protein: Plain yogurt contains around 10 to 14 grams of protein per 200 grams, which amounts to twenty percent of the daily protein requirement for most persons. In fact, 200 g of yogurt that contains live and active cultures, contains 20 percent more protein than the same volume of milk (10 grams versus 8 grams). Besides being a rich source of proteins, the culturing of the milk proteins during fermentation makes these proteins easier to digest.

Yogurt can lower cholesterol: There are a few studies that have shown that yogurt can reduce the blood cholesterol. This may be because the live cultures in yogurt can assimilate the cholesterol or because yogurt binds bile acids, (which has also been shown to lower cholesterol), or both. we can take a health tip about yogurt cultures from cultures who consume a lot of yogurt, such as the

Bulgarians who are noted for their longer lifespan and remain in good health well into old age.

Yogurt can boost immunity. Researchers who studied 68 people who ate two cups of live culture yogurt daily for three months found that these persons produced higher levels of immunity boosting interferon. The bacterial cultures in yogurt have also been shown to stimulate infection-fighting white cells in the bloodstream. Some studies have shown yogurt cultures to contain a factor that has anti-tumor effects in experimental animals.

Yogurt is considered as a component of the DASH (Dietary Approaches to Stop Hypertension)**:** Yogurt is a component of the DASH diet designed to reduce the risk of high blood pressure. This diet, which includes three servings a day of low-fat and fat-free milk, yogurt and cheese, and 8 to 10 servings of fruits and vegetables, has also been shown to reduce risk of heart disease and stroke.

Conclusion: Yogurt is a food produced by bacterial fermentation of milk, it contains some bacterial cultures that make it unique. Yogurt spread from Central Asia to the Middle East and Europe and the U.S. Today, it is known and consumed in almost all parts of the world. Yogurt is often included on healthy food lists that too for a good reason. Yogurt is highly nutritious and is an excellent source of protein, calcium and potassium. It provides numerous vitamins and minerals and is relatively low in calories.