

Development of Probiotic Enriched Frozen Ice Cream Cake

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Abstract

Frozen creamy cake is one of the newest type Bakery product. In this bakery product sour yoghurt was used as an emulsifier instead of egg and it was also used for supplementation of probiotic cultures. The cake was prepared by foaming method of mixing. In the preparation of frozen cream date extract was used as sugar substitute to enrich the cream with mineral and anti oxidant content. The creamy frozen cream was sandwiched between two probiotic cake layer and frozen in a plate freezer at plate temperature of -135°C The fully frozen mass after 45 minutes of freezing was taken out of the freezer and wrapped with aluminum foil and put inside deep freezer to harden the frozen block of cake.

Key words: emulsifier, Stabilizer, Foaming method, over run, Probiotic cultures, Sensory evaluation

1. Introduction

Cake is a form of sweet dessert that is typically baked. Cake is a flour confection made from flour, sugar, and other ingredients. In their oldest forms, cakes were modifications of bread, but cakes now cover a wide range of preparations that can be simple or elaborate, and which share features with desserts such as pastries, meringues, custards, and pies.

Ice cream is a frozen dessert, typically made from milk or cream and flavoured with a sweetener, either sugar or an alternative, and a spice, such as cocoa or vanilla, or with fruit such as strawberries or peaches. It can also be made by whisking a flavored cream base and liquid nitrogen together. Food coloring is sometimes added, in addition to stabilizers. The mixture is cooled below the freezing point of water and stirred to incorporate air spaces and to prevent detectable ice crystals from forming. The result is a smooth, semi-solid foam that is solid at very low temperatures.

Ice-cream cake is a cake that is made partly or entirely out of ice-cream, sometimes decorated with whipped cream, chocolate or confectionery. Ice-cream cake is popularly made with three layers; one layer is cake; the next layer, ice-cream; and the third layer, cake layered over the ice-cream. Ice-cream cakes are made usually by moulding soft ice-cream and cake into shape, using a bowl, special shaped cake tin, or other mould. The origins of the ice cream cake date back all the way to

the 14th century. While there is some scholarly debate over the exact start date of the Renaissance, it is believed to have started in Italy during the 14th century and reached its peak in the 15th century. After blossoming in Italy, the Renaissance then spread through the rest of Europe during the 16th and 17th centuries. No one knows for certain who came up with the ice cream cake or even when it originated. Multiple theories abound about this invention. Some food historians believe the sixteenth century was when the initial versions of the ice cream cake came to be.



Probiotics are a group of live microorganisms that can have salutary effects on the host's health when

properly supplemented or added to food. Probiotics have a variety of effects, including immunity enhancement.² The latter may be achieved by stimulating the phagocytic leukocytes, increasing the secretion of immunoglobulin A (IgA), and affecting the production and activity of enzymes. In the gastrointestinal tract, probiotics help maintain the balance within the digestive tract and improve mucosal immunity. The benefits of probiotics are facilitated through several mechanisms, including the alteration of the flora composition and immuno modulation. There is evidence that lactic acid-producing bacteria, and especially the *Bacillus* species, remain stable in heat and maintain their activity after baking.¹⁶ The stability of these bacteria is facilitated by the presence of heat resistant spores. *Bacillus coagulans* – *B. coagulans* (*Lactobacillus sporogenes*) is a gram-positive, spore-forming, facultative anaerobe, which resists high pressure and temperature, and can function as a probiotic of choice in non-dairy products.

One such probiotic we consume in our daily life is curd. Curd is obtained by coagulating milk in a sequential process called curdling. It can be a final dairy product or the first stage in cheesemaking. The coagulation can be caused by adding rennet, a culture, or any edible acidic substance such as lemon juice or vinegar, and then allowing it to coagulate. The increased acidity causes the milk proteins (casein) to tangle into solid masses, or curds. Milk that has been left to sour (raw milk alone or pasteurized milk with added lactic acid bacteria) will also naturally produce curds, and sour milk cheeses are produced this way.

Curd as an Alternative

Curd is a natural probiotic, the intake of which can be beneficial for the immune system. Some other health benefits of curd include-

Provides stronger immunity: One of the primary curd benefits is the enhancement of immune power. The live active cultures help in fighting disease-causing germs.

Prevents vaginal infections: In women, the benefits of eating curd include inhibition of yeast infection growth. It restores the yeast balance of the vagina due to the *Lactobacillus* bacteria in the curd.

Makes digestion better: Being a probiotic milk product, curd benefits gut health. It also calms down an inflamed or upset stomach.

Helps lose weight: Consuming curd is good for weight loss. It inhibits the growth of steroid hormones or cortisol, thereby controlling the risk of obesity.

Controls high blood pressure: The magnesium content in curd is ideal for reducing high blood pressure. The nutritional value of curds is the prime reason for its popularity. 100 grams of curd contains:

- About 98 calories
- Around 3.4 grams of carbohydrate
- Approximately 4.3 grams of fat
- 11 grams of protein
- 364 mg of sodium
- 104 mg of potassium
- Apart from that, curd also offers calcium, magnesium, Vitamin A, D, and B-12 as well.
- Dates are often associated with dessert; their natural sweetness and rich flavor are indeed decadent. But this nutritious fruit can offer some pretty impressive health benefits. Here are seven ways dates can protect your health and simple ways to incorporate this super fruit into meals, snacks, drinks, and treats.
- Dates are basically tropical fruits that are grown on date palm trees. It's scientifically known as *Phoenix Dactylifera* and is one of the healthiest fruits in the world. Dates are categorized as dry fruits and have been an important part of West Asian heritage.
- Dates have high natural sugar content. The dry fruit version of dates is richer in calories than the fresh fruit. The high-calorie content in dates has led to their popularity as they provide energy throughout the day. Nutraceutical is a wide term that describes/portrays any product derived from sustenance sources with Other health benefits besides the essential dietary value found in foods. Probiotics are the live Microorganisms which are beneficial to the host. These have shown a significant potential therapeutic The addition of date syrup (Dibis) as a substitution of sugar in the ice cream Manufacturing was replaced by 20, 40, 60 and 100%. Of sugar by date extract The effect of these replacements on the titratable acidity, pH, total solids, specific gravity, weight per gallon, viscosity in the ice cream mixes and the specific gravity, weight per gallon, overrun and melting rate as well as the sensory evaluation of the resultant ice cream were evaluated.

2. Materials and Methodology:

RAW MATERIALS FOR THE PRODUCT

In Cake

- **Flour** holds the structure of the cake. Wheat flour contains proteins that interact with each other when mixed with water, forming gluten. It is this elastic gluten framework which stretches to contain the expanding leavening

gases during rising. The protein content of a flour affects the strength of a dough.

- **Baking soda** used as a leavening agent.
- **Baking powder** is used to increase the volume and lighten the texture of baked goods. It works by releasing carbon dioxide gas into a batter or dough through an acid–base reaction, causing bubbles in the wet mixture to expand and thus leavening the mixture thereby leading to make the cake softer.
- **Sugar** - The first and most obvious role of sugar in baking is that it adds sweetness and flavor. Because of the way sugar caramelizes when heated, sugar also promotes browning of baked goods. Sugar has hygroscopic properties, meaning that it grabs and holds onto moisture. Because sugar holds onto moisture. Because sugar holds onto water, it provides structure for gas expansion in the oven, promoting lift and rise in baked goods.
- **Butter**- Butter plays a critical role in the leavening cakes. The role of butter is not just to give a delicious flavor but also to give richness and structure to the cake. The butter in baked goods makes them retain moisture, keeping them tender and soft which gives a buttery mouthfeel to the cake.
- **Oil**- biggest function of oil in most baking recipes is to keeps the cake moist. It basically captures the gases that are released from the interaction of the baking powder and baking soda, and slows down gluten formation to keep certain baked goods tender and fluffy in textures.
- **Margarine**- The function of shortening & margarine in baking is to give tenderness to the baked product. Without it a dough of flour and water is tough when baked. It coats the flour particles, so that they do not stick together, thus provides tenderness, improved texture, better eating quality, and also increases the nutritive value of foods.
- **Milk** - The purpose of milk in baking may depend on your recipe. In general, milk serves as a liquid to moisten your dry ingredients, dissolve sugar and activate gluten. This not only improves the texture of your baked good,

but also hydrates your proteins and starches as well as your leavening agents, which initiates the chemical reactions that change the structure and texture of your batter or dough.

- **Curd** - Curd contains lactic acid, which helps to break down the gluten in the flour, resulting in a tender and moist texture. Additionally, curd contains proteins that aid in browning and caramelization, which is essential for creating a crusty exterior on baked goods.

One of the main reasons why curd is used in baking is to enhance the texture of the final product. The acidity in the curd helps to tenderize the gluten in the flour, resulting in a soft and tender texture. This is particularly beneficial in recipes that call for a dense and moist texture, such as pound cakes

When combined with baking soda or baking powder, curd produces carbon dioxide gas, which causes the batter or dough to rise. This is particularly useful in recipes that require a light and fluffy texture,

- **Water** has several functions in cake preparation. It helps in gluten formation, dissolves sugar, and helps chemical reactions of leavening by baking powder. The liquids regulate the batter consistency, and control batter temperature. Water also acts as a leavening agent, creating vapour pressure when the internal temperature reaches 2080F during baking.

- **Cocoa powder**

- Flavor: imparts a rich sweet chocolate flavor.
- Color: provides a brownish to reddish color.
- Water absorption: provides a higher water absorption than an equal weight of flour.
- Bulking agent: allows for the use of a reduced amount of flour.
- Pleasant mouthfeel: especially high fat cocoa powders.
- Nutrition: due to high levels of dietary fiber,

proteins, vitamins, minerals and several polyphenolic compounds.

- **GMS**- GMS Powder (Glycerol Monostearate) is a food additive used as a thickening, emulsifying, and anti-caking and preservative agent. GMS is used to add body to dessert like ice-crème and whipped crème. It can also be

used as preservatives or as a protective coating. GMS is largely used in baking preparations to add “body” to the food. It is somewhat responsible for giving ice cream and whipped cream their smooth texture. It is sometimes used as an antistaling agent in bread

Role of ingredients in ice cream

- **Guar gum powder** is valued in ice cream production for a number of reasons, not the least of which is its ability as a stabilizer to enhance its thickness and the perception of creaminess.

A high milk fat content and small ice crystal size are most often linked to the successful impression of a smooth and creamy consistency.

Ice cream generally contains seven categories of ingredients: milk fat; milk solids; sweeteners; stabilizers; emulsifiers; water and flavors.

Stabilization is vital to the production process because the greater the increase in viscosity, the smoother the ice cream's texture and resistance to melting will be.

Viscosity concerns thickness, with heavier liquids, such as honey, having higher viscosity levels than water. Stabilizers also provide a slow and uniform meltdown, enhance whip ability and help to reduce fat content.

Guar gum also reduces the growth of ice and lactose crystals that can occur during storage periods. Ice crystal size is a critical factor in the development of ice cream, and they should always be small in size, about (0.001 cm). Larger crystals can result in coarser textures.

Guar gum also corrects one of the biggest problems with ice cream storage, which concerns shrinkage. This refers to the loss of volume in ice cream before any of it can be removed from the container.

- **Milk**

Milk proteins contribute three important structural functions to ice cream. They emulsify the fat phase during homogenization to produce a stable emulsion in the mix state. Their subsequent interaction with emulsifiers

during the ageing process reduces the adsorbed protein level, thus producing a fat emulsion that is able to partially coalesce in the whipped and frozen ice cream and produce desirable fat structure. Proteins present in the serum phase of the mix during whipping contribute to the development of an air bubble interface that is capable of maintaining small and stable air bubbles. Unadsorbed proteins also increase mix viscosity, particularly in the unfrozen serum phase after cryo-concentration, which leads to enhanced body and texture and reduced rates of ice recrystallization. There are many protein ingredients available, from the traditional sources of milk solids-not-fat to the isolated and modified casein-based or whey-protein based ingredients, and it is essential for product developers to utilize the appropriate sources of proteins to deliver the functional attributes needed for their specific products.

- **Full cream**

Heavy cream works well to give vanilla ice cream a rich flavor but may take away from the flavor of other ingredients when adding flavoring

The whole milk and heavy cream used in ice cream formulations contribute fat, which is responsible for improving density and developing a smooth texture, along with giving the finished product overall richness.

- **Date syrup**

Date syrup contains proteins, natural sugars, minerals, and vitamins such as vitamin B3, B2, B1, B5, A1, and C. You won't be needing multi-vitamins anymore if you consume date syrup. Date syrup contains natural sugars such as glucose, sucrose, and fructose.

- **GMS**

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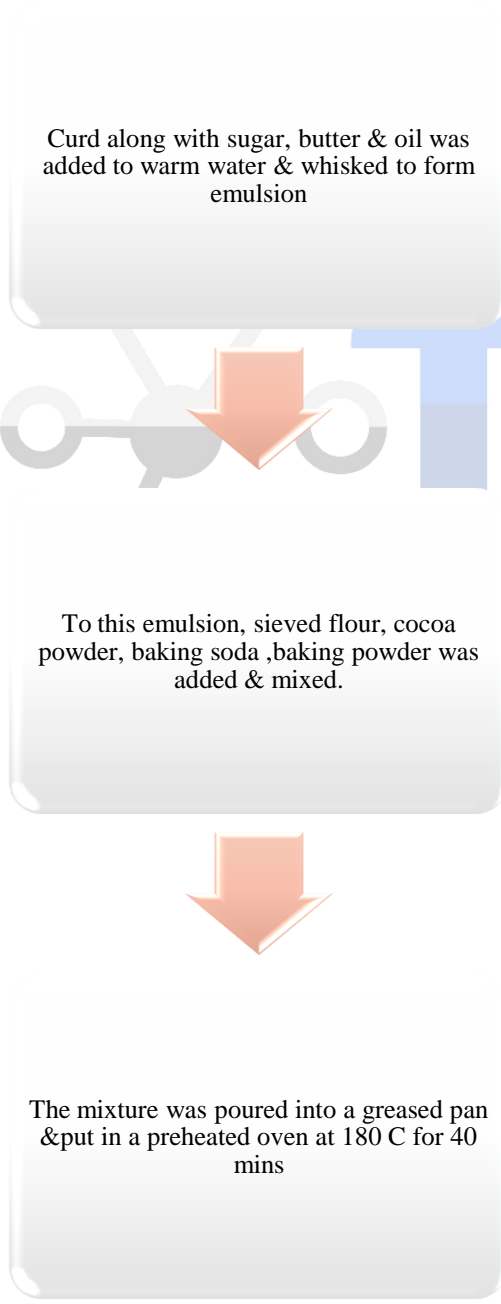
3. Flowsheet of Process

- Curd along with sugar, butter & oil was added to warm water & whisked to form emulsion

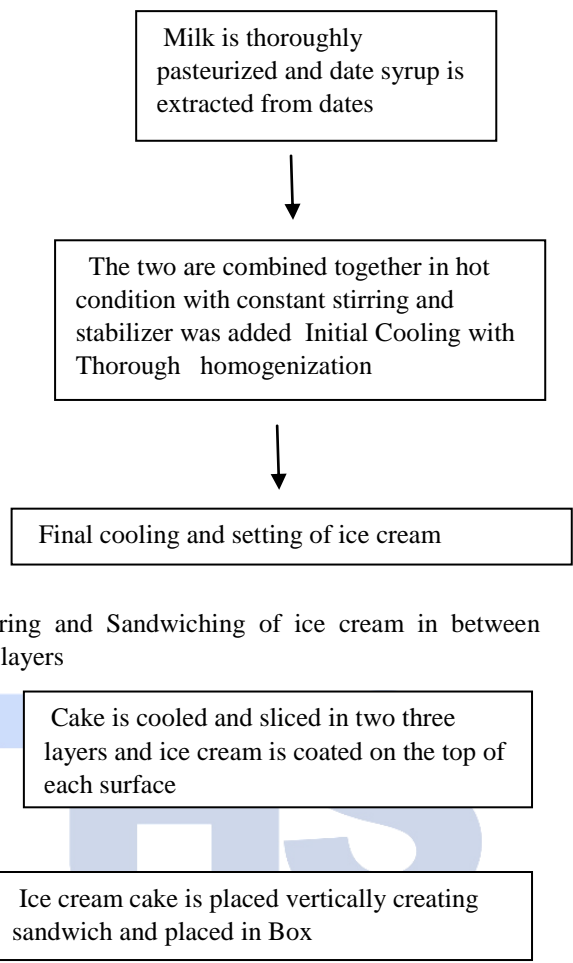
Flowsheet of Process

- **For cake**

- Flowsheet of cake making process



- **For Ice Cream**



Chocolate Cake and Ice cream the two major ingredient having the following composition

Chocolate Cake	Date ice cream
Flour and sugar	Full cream milk
Curd and water	Full fat cream
Cocoa powder	Butter
Butter and oil	Dates
Baking soda and Baking powder	GMS as emulsifier and alginate as stabilizer

1. Ingredients such as baking powder (4gm), baking soda (2gm), cocoa powder (40gm) were mixed.
2. Mixture of hot water (50ml) and sugar (50gm) and mixture of butter margarine and oil (20, 20, 40) was added to it.
3. Curd (30gm) was added.
4. Finally the flour (100gm) was added the batter was mixed thoroughly.

5. The mould was greased with butter and butter paper was placed, the batter was poured to the mould and kept in 5 mins preheated microwave oven at 170°C for 45 minutes.
1. Milk (500ml) was pastuerized at 70 degree c, for 30 minutes, butter(20gm) and guar gum(10gm) was added and stirred .
2. Milk was allowed to cool down .
3. Dates(120gm) were macerated into the mixtures, after removing them from their seeds, water was added, the paste was transferred to a muslin cloth and place in boiling water, the syrup from the paste was allowed to mix with the water and consistent boiling of syrup to make it consistent . the date syrup was added to the pastuerized milk and stirred thoroughly.
4. Fresh cream(250ml) was added to the milk and then homogenized.The mixture was kept in refrigerator for some time and then again was homogenized.This process was performed repeatedly till maximum consistency was achieved. Finally the mixture was poured to the mould and kept in minus 20 °C for 2 days.



Fig.3- Ice cream using date Syrup



Fig.4 – Frozen probiotic cake layers.



Fig. 1–Vertical view of thick layer ice cream cake



Fig. 2- Horizontal view of thin layer ice cream

4. EQUIPMENTS REQUIRED: -

The equipments used for the preparation of probiotic enriched frozen ice cream cake include:

4.1 Digital Balance

A digital balance is used to weigh ingredients in a laboratory. When a weight is applied to the digital balance, an electronic circuit generates a current which is then converted into a digital readout on the display. It works with the use of a strain gauge load cell. If you see the analog scales, it uses springs to indicate the weight of the object, while digital scales convert the force of a weight to an electric signal.

The digital weighing balance was utilized in the project for measuring the ingredients utilized, as well as during the quality control examinations.



Fig5.- labelled representation of laboratory digital balance

4.2 Mixer Grinder

Mixer Grinder is an electronic kitchen equipment that is used to mix and grind various food items. Instruments designed to mix varying amount of liquids ranging from just a few milliliters up to multiple gallons. Laboratory mixers are one of the most useful instruments that are widely used to get a homogenous mixture from one or more than one ingredient.

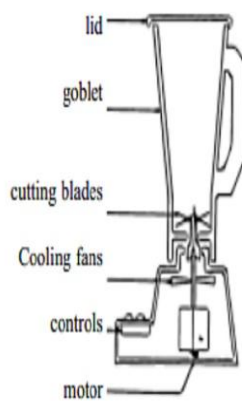


Fig. : Blender

Fig.6 –Labelled diagram of mixer grinder/ blender

In the project, the mixer-grinder is purposed for the powdering of sugar as well for the homogenization purpose.

4.3 Baking Oven

The oven sets and maintains the proper conditions of heat flux, humidity, and temperature to carry out the baking process and the removal of moisture from the products. Laboratory ovens heat the material through the convection method. The material is placed in a separate chamber rather than the main chamber. It prevents altering the material but the heat is strong enough to dry it or cure it. Laboratory ovens provide uniform temperature and precise temperature control for heating, baking.

In the project, baking oven was utilized for the purpose of baking of cakes.



Fig7.- Pictorial representation of baking oven

4.4 Ice cream Maker

Ice cream maker is a electric models that use an outside refrigeration system to cool down the freezing bowl and churning paddle. It generally produce larger batches of ice cream than non-compressors due to their higher volume capacity freezers. The compressor ice cream makers are also known for their ability to churn quickly without freezing the ingredients first. All you have to do is add in your ingredients, set up, and let the unit work its magic. It is the fast freezing method that has made this type of ice cream maker very popular. This means that one can save on time and energy costs.

The compressor ice cream makers are fully automated in their processes with no need for you to do anything at all. Once you have added your ingredients, set up the settings, and turned on the unit, it will churn quickly. The ice cream maker comes with a manual hand crank and double insulation to reduce noise as well as condensation.

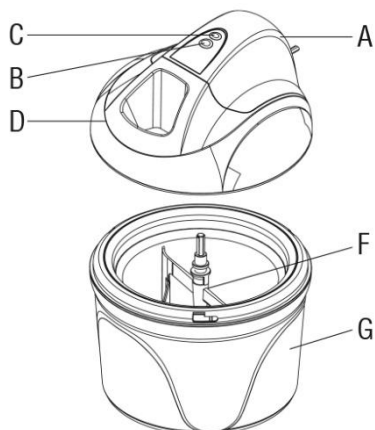


Fig.8 –Pictorial diagram of Ice Cream Maker

4.5 Ice cream Chilling unit

A chiller is a machine that removes heat from a liquid via a vapor-compression or absorption refrigeration cycle. This liquid can then be circulated through a heat exchanger to cool equipment, or another process stream. A chiller can be regarded a cooling system that cools materials down by removing heat from a liquid via a vapor-compression or absorption refrigeration cycle. The liquid gets circulated through a heat exchanger to cool equipment. In a chiller system, there is always a liquid working as a refrigerant going through the heat exchanger in order to transfer the heat energy. When the heat gets absorbed by the liquid, materials get chilled.



Fig9- Pictorial representation of Chilling Unit

It was used for the storage of the ice cream and final product.

4.6 Hot air oven

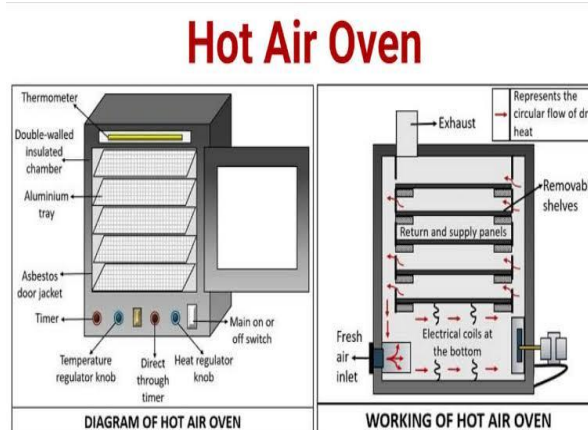


Fig10. –Labelled diagram of hot air oven

A hot air oven is a laboratory appliance that is used to dry, sterilize, or heat materials. It works by circulating hot air inside the oven chamber to evenly distribute heat to the materials being processed. The primary function of a hot air oven is to remove moisture from the material; as a result, it is employed in applications such as curing, drying, baking, annealing, Measurement of mixed liquor suspended solids (MLSS), and even storage of certain products at constant Temperature. It was used to determine the moisture content of the cake.

4.7 Texture Analyzer

A Texture Analyzer is a texture measurement system that moves in either an up or down direction to compress or stretch a sample. The travelling arm is fitted with a load cell and records the force response of the sample to the deformation that is imposed on it. Used to evaluate properties such as compression, coating thickness, abrasion surface resistance and tension testing. Texture Analysis

Texture analysis plays a crucial role in sensory evaluation and the development of new food products. It refers to the property of food that is associated with the tactile sensations experienced through touch or by the mouth.

Texture analysis involves the assessment of specific areas within an image based on their texture properties. Its objective is to measure the inherent qualities conveyed by terms like rough, smooth, silky, or bumpy

by considering the spatial changes in pixel intensities. Consequently, roughness or bumpiness pertains to the fluctuations observed in the intensity values or gray levels of the image.

Mechanical texture analysis in food testing involves standard tests like compression, tension, and flexure to assess attributes such as hardness, crispiness, crunchiness, softness, springiness, and tackiness. These measurements have been found to strongly correlate with sensory attributes associated with textural quality when compared to evaluations by trained human sensory panels.

4.8 SENSORY EVALUATION

Sensory assessment is a scientific field covering all techniques for eliciting, measuring, analyzing, and interpreting human reactions to food characteristics perceived by the five senses: taste, smell, touch, sight, and hearing. Taste and smell are two senses that have piqued researchers' curiosity, particularly related to ingestive behaviour.

Sensory assessment is a necessary method in the following five categories of problems:

- Development of new products
- Cost-cutting measures
- Increasing the level of quality
- Product acceptability
- Quality assurance and control

The sensory evaluation focuses on objective measurements of product sensory properties and subjective responses to physical products and interpretation of consumer response through product understanding.



Fig11.- Laboratory Texture Analyzer

4.9 Water Bath

Water bath is laboratory equipment made from a container filled with heated water. It is used to incubate samples in water at a constant temperature over a long period of time. A laboratory water bath is used to heat samples in the lab. Some applications include maintaining cell lines or heating flammable chemicals that might combust if exposed to open flame. A water bath generally consists of a heating unit, a stainless steel chamber that holds the water and samples, and a control interface.



Fig.12– Labeled diagram of water Bath

4.10 _Kjeldahl Apparatus

Kjeldahl Apparatus is used to determine organic nitrogen (N₂) and protein contents in chemical substance. This estimation is done by Kjeldahl digestion method. The method involves the conversion of nitrogen into ammonium sulfate by digestion with sulfuric acid; later it alkalinizes the solution and finally determines the ammonia obtained by the distillation process.



Fig.12 – Pictorial representation of laboratory Kjeldahl Apparatus

5. RESULTS:

A business strives to maintain or improve product quality through quality control (QC) procedures. Units are tested to see if they meet the requirements of the finished product as part of quality control. There are a number of methods for measuring quality, and the quality control that is used in a business is highly dependent on the product or industry.

The food business utilizes quality control techniques to guarantee clients don't become ill from their items. Safe measures that can be used to prevent customers from receiving products that are defective or damaged are created through quality control.

ANALYSIS	CONTROL RESULT	TRIAL RESULT
MOISTURE	14%	16.1%
ASH CONTENT	0.5%	0.9%
FAT	19.79gm	15gm
PROTEIN	8.6 gm	14.78 gm

The Oven Loss was calculated and found to be 11.5% MBRT Test exhibited very good results after hours of observation

Plate Count Test might describe the microbial quality more accurately.



Fig13. Moisture Analysis



Fig14. MBRT analysis

The following table shows the consumer feedback which was followed up by sensory evaluation test via hedonic scale of 1 to 9 amongst different age groups. It was observed that the older generation had a greater affinity towards the ice cream whereas the younger ones preferred the cake more.

PERSO N	AP PE A R A N C E	CO LO R	TAST E	AR OM A	M O U T H F E E L	OVER ALL
Student 1	8	8	7	8	9	8
Teacher 1	8	9	9	8	9	9
Student 2	9	8	8	7	8	8
Teacher 2	8	8	9	9	8	9
Student 3	8	8	8	7	9	8
Teacher 3	8	8	9	8	9	8
Student 4	9	7	8	8	8	8
Teacher 4	8	8	8	9	8	8

Student 5	8	8	7	8	9	8
Teacher 5	8	9	9	8	9	9
Student 6	9	9	8	8	8	8
Student 7	8	8	9	9	8	9
Student 8	9	7	9	9	8	8

TEXTURE ANALYSIS REPORT:

The following graph was obtained on analyzing the texture of the frozen cake using texture Analyzer. Since, the cake was frozen, the structure was hard as comparison to cake with egg stored in normal room temperature which has sponginess within. So, there's a gradual fall in the pressure after a point, as shown in the graph and thereby the cake showing hardness in texture in the frozen condition. As the soft batter was used for the formation of the cake, it withstand a maximum pressure and after that instantaneous fall of pressure.

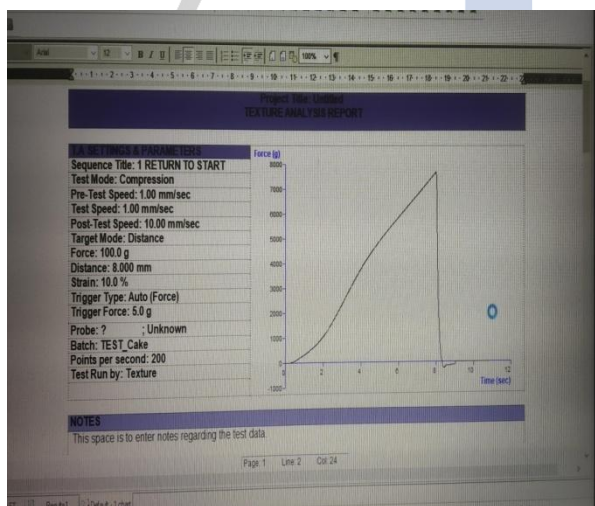


Fig14. Graph of texture of cake

PACKAGING

Since, the product probiotic enriched frozen ice cream cake falls under the category of frozen food product. So,

The most popular options for frozen food packaging often includes but is not limited to cardboard, metal cans, paperboard, wax coated paper and other flexible packaging supplies. One of the most popular forms of frozen food packaging is Polyethylene (PE) shrink film which is able to resist temperatures all the way down to -40 degrees.

Here are some features of frozen food packaging materials:

- Protection from spoilage and off coloring
- Easy to fill
- Easy to seal
- Easy to store
- Moisture blocking and resistant
- Made of FDA food-grade substrates
- Strong
- Doesn't become brittle and crack at low temperatures
- Resists grease, oil, and water

Different frozen food packaging include :-

- Shrink Film
- Wax Coated Cardboard
- Glass
- Aluminum
- Flexible Bags
- Lidding Films
- High barrier thermoforming film
- IQF polyethylene
- Skin film

Ice cream cake boxes designed for packing and to easily remove the pastry from the box. These boxes are produced with an opening to easily remove pastry from box without causing any damage. Boxes are also used for optimum protection during delivery and transportation from the bakery to the consumer.

Packaging based on transparent and metallized polypropylene films offers high protection for the coating – the thin layer of aluminum foil provides good insulation from the environment, greatly improving shelf life and design options.

Oriented transparent polypropylene film (good barrier properties against water vapours, high transparency)

Oriented metallized polypropylene foil (good protection against moisture, reflects sunlight)

A single-layer laminate. Oriented transparent polypropylene film is used to emphasize the attractiveness of the product.

Oriented transparent polypropylene film (good barrier properties against water vapours, high transparency)

For the outer layer

Corrugated fiberboard is a material consisting of a fluted corrugated sheet and one or two flat linerboards. It is made on “flute lamination machines” or “corrugators” and is used for making cardboard boxes. The corrugated medium sheet and the linerboard(s) are made of kraft containerboard, a paperboard material usually over 0.01 inches (0.25 mm) thick. Corrugated fiberboard is sometimes called corrugated cardboard, although cardboard might be any heavy paper-pulp based board.

Fiberboard Boxes, Cartons and Containers Paperboard is a paper-like material, usually over ten “mills” (0.010 inch) in thickness. Some types of paperboard (corrugating medium and linerboard) are used in the construction of corrugated fiberboard. Other types of paperboard are used in the manufacture of cartons, set-up boxes, partitions and other products.

Hi-density Polyethylene, or HDPE, is a popular choice for both containers and lids. It is flexible, strong and impact resistant, and can be formulated to withstand cold temperatures very well. It is lightweight, which can be a consideration when shipping costs are considered.

Plastic tubs are available for packaging ice cream cakes, ranging in size from a few ounces for single serve portions, to several gallons for use in ice cream shops. These tubs are dimensionally stable, and work well with automated filling equipment. They can be printed in any number of ways: during the molding process; as they are going down the assembly line at the container manufacturer’s facility; or at the ice cream manufacturer’s facility, either with direct printing, or with a label applied during filling.

6. CONCLUSION

Baking industry is the most stable in the food manufacturing industries.

Frozen eggless cake with sugar batter method is prepared so that there will be minimum chance for gluten network development. Cakes are relatively higher both in sugar and shortening. A complex emulsion and foam system with appreciable amount of incorporated air into small bubble into the batter. Using the curd and baking powder give a good aeration to the batter. The acidity in curd results in a soft and tender texture. The lactic acid in the curd helps to keep the baked goods moist and tender. Additionally, curd contains proteins which is essential for creating a crusty exterior on baked goods. Adding hot water in the batter gives a soft texture after it has been baked.

Ice-Cream mixture is sandwiched between frozen cake layer with upper and lower coating of the frozen creamed mixture. Ice-cream is one of the most popular dairy frozen dairy products. First step in the

manufacture of ice cream is prepare ice cream mixture. This involved assembling of various ingredients. In order to produce good ice cream both dairy and non dairy ingredients must be selected and combined to form the desired body, texture and desired flavor. Date Syrup has caramel like sweet taste because of date paste. Dates have rich content of essential nutrients which include carbohydrates, salts, minerals, dietary fiber, vitamins, fatty acids, amino acids and protein. Nutritional value of dates is due to their high sugar content, potassium, calcium, magnesium and iron as well as vitamins and Niacin but is less in calories as compared to sugar.

In ice-cream Homogenization and Pasteurization are the CCP for the ice-cream formulation. Aging is also a very important OPRP steps in the development of proper texture and control the coarseness of ice crystals formation. The freezing ice-cream mixture was sandwiched between two cake layers with top and bottom coating. The material is packed in shrink wrap packing and followed by packaging by aluminum foil.

Whole material is subjected to freezing under deep freezer at – 20 degrees centigrade.

The final product was subjected to sensory analysis and individual quality control tests were performed for the cake and creamy parts like textural analysis, oven spring, oven loss. Time was done to evaluate the microbial quality of the frozen cream and it’s over run and final fat content was determined by Garber’s method. The final frozen creamed probiotic enriched cake had shown very good sensory appeal with extremely high shelf life high MBRT time value and very good mouthfeel and texture

COST ANALYSIS:

Whenever a new product is formulated or planned to be released in the market, its cost analysis must be conducted. The overall cost of the product must be such that it is attractive to customers in the market as well as viable for the manufacturer. Also a part of the cost must be allocated towards future research and development of the product so that it can keep up with the ever changing customer likings and the demands of the food industry.

A more in-depth evaluation of the direct and indirect costs that influence the final price of a product or service is known as cost analysis, and it is a more involved process. After employing either of these strategies and identifying costs, it may be necessary to negotiate for the best price.

Thus, realizing item cost is critical to their prosperity since they need to deal with their expenses to be productive. Companies are able to examine the project's financial and other important factors, such as opportunity costs, with the assistance of the analysis. A lot of businesses base their pricing on an estimate of how much a unit will cost them. The pricing is a choice; cost is a formula. The most significant factor in determining a company's success or failure is probably pricing.

Sl. No.	INGREDIENTS	ORIGINIAL COST (RS/KG)	QUANTITY REQUIRED	COST INCURRED AS PER REQD. QUANTITY(RS.)
1.	Flour (Maida)	40/KG	100gm	4
2.	Sugar	52/KG	150gm	7.8
3.	Curd	72/KG	50gm	3.6
4.	Milk	74/L	250ml	16
5.	Cream	200/L	100ml	20
6.	Dates	300/KG	100gm	30
7.	Butter	500/KG	50gm	25
8.	Vegetable Oil	100/L	40ml	4
9.	Cocoa Powder	600/KG	60gm	36
10.	Baking Soda	200/KG	10gm	2
11.	Baking Powder	200/KG	5gm	1
	TOTAL			150 for 300gm

The average amount of product produced per batch was 300g

Therefore Cost per 100g of product = 50/-

No cost was incurred on water,guargum.

NOTE: The cost has been calculated only on the basis of raw materials excluding energy and labor cost. Thus, the total amount required to prepare the product incurs a cost of Rs 100 (excluding energy, labor cost, R&D and Marketing cost) per 100gm

Money saving advantage investigation is a technique for weighing up a choice as unbiasedly as could be expected. It involves adding up the advantages of a project, investment, or course of action and contrasting these advantages with their costs. A cost-benefit analysis in its most basic form has already been carried out if you have ever taken a piece of paper and drawn a line down the middle, listing the benefits of a proposed action on one side and the drawbacks on the other.

As far as business navigation, you can utilize the system to examine a wide assortment of circumstances:

- to determine whether a capital expenditure is worthwhile.
- to choose whether to hire new staff.
- to ascertain the viability of a project or operational change.
- to establish a standard against which to compare projects.
- to compare and contrast various marketing initiatives.

FUTURE SCOPE AND CHALLENGES

Food sustainability has become so important nowadays not only in order to ensure all raw materials are converted into food for consumption, but also to recycle leftover food for gastronomy. The innovative product created from leftover or unfinished food is a good alternative to throwing away food by-products.

The Ice Cream Cake market has been steadily growing in recent years and is expected to continue growing in the coming years. Ice cream cakes are a popular frozen dessert made by combining layers of cake and ice cream. The rising popularity of frozen desserts is one of the primary drivers of the Ice Cream Cake market

The incorporation of probiotic bacteria into ice cream is highly advantageous as per future studies. In addition to making a functional healthy food, ice cream in itself contains beneficial substances such as dairy raw materials, vitamins and minerals, and is consumed by the general population. Supplementation of ice cream with probiotic bacteria has been found to have little effect on its flavor, texture or other sensory characteristics. There are also many ways to improve the sensory attributes of the product to compensate for any changes that do occur. This article reviews the viability of probiotic bacteria in ice cream and the main methods used to improve their viability and the sensory characteristics of probiotic ice cream.

Challenge – However, losses in the viability of probiotic bacteria in ice cream unavoidably occur

during product formulation, processing, storage and melting. During these stages, probiotic cells are subjected to different stresses related to pH, acidity, redox potential, freezing, oxygen (especially in overrun processing), sugar concentration and osmotic effects, hydrogen peroxide, antagonistic impact of co-cultures (in fermented ice creams), and mechanical shearing. It seems that the rate of loss of probiotic cells is greater during the freezing process than during storage.

Studies are being carried on the use of other probiotics apart from animal based dairy products keeping in mind the term lactose intolerance, along with the concept of vegan foods which can be commonly found around. But the same has many challenges to face. According to Grand View Research, the global vegan food market is expected to grow at 10.6% compound annual growth rate (CAGR) per year between 2022 and 2030.

Acknowledgement:

All the authors acknowledge the role of TMSL Management for providing an excellent laboratory environment for carrying out experiment. Both the authors sincerely acknowledge the role of laboratory staffs for their support during the course of experiment. Last but not the least Techno Group management for providing an excellent infrastructure in different laboratories for carrying out research work.

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