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Programme : M.Sc., Biochemistry

Course Title : VALUE ADDITION IN FOOD Couse Code :BC003VAC

UNIT-IV

Meat fish and Poultry Products

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VALUE ADDITION IN FOOD

Reconstituted milk

- Reconstituted milk is a type of milk made by adding water to milk powder (dried milk) to restore it to its original liquid form. The milk powder is typically produced by evaporating the water content from fresh milk, allowing it to be stored in a dry form for a longer period without spoiling. Reconstituting the milk simply involves mixing the powdered milk with the correct proportion of water, which then yields a liquid that closely resembles fresh milk in taste, texture, and nutritional content.

Nutritional Value:

- When properly reconstituted, the milk has nearly the same nutritional content as fresh milk. It provides essential nutrients like protein, calcium, vitamins (especially B12 and D), and carbohydrates.

TYPES

Whole Milk Powder

Skimmed Milk Powder

Applications

- **Food Manufacturing**: In the production of goods like chocolates, baked goods, sauces, and soups.
- **Emergency Food Aid**: In regions affected by food scarcity or natural disasters, reconstituted milk is often part of emergency food supplies.
- **Infant Formula**: Some infant formulas are made using reconstituted milk powder as a base.

Flavored milk

- Flavored milk is a dairy beverage made by adding flavorings and sweeteners to regular milk. Common flavors include chocolate, strawberry, vanilla, and more exotic options like banana, caramel, or coffee. Flavored milk is popular among children and adults as a tasty alternative to plain milk, and it can be consumed cold, hot, or in smoothies.
- **Key Features of Flavored Milk:**
- **Variety of Flavors**:
  - **Chocolate Milk**: The most popular and widely consumed flavored milk, made with cocoa or chocolate syrup.
  - **Strawberry Milk**: A pink, sweet variety typically flavored with strawberry syrup or powder.
  - **Vanilla Milk**: A subtler flavor, usually made by adding vanilla extract or syrup.
  - Other flavors like banana, caramel, hazelnut, coffee, and even seasonal or regional varieties (e.g., spiced milk or mango milk).

Benefits of Flavored Milk

- **Nutritional Advantages**:
  - Encourages milk consumption, especially among children who may not like the taste of plain milk, thus helping them meet daily dairy intake recommendations.
  - Provides essential nutrients like calcium, protein, and vitamins, which support growth, bone health, and overall well-being.
- **Convenient and Ready-to-Drink**:
  - Flavored milk is a convenient on-the-go beverage, often available in single-serving cartons, bottles, or pouches. It can be consumed as a snack or part of a meal.
- **Variety of Packaging**:
  - Available in various packaging forms such as Tetra Paks, glass bottles, plastic bottles, or cartons, allowing for portability and shelf-stability.
- **Promotes Hydration and Energy**:
  - The sugar content in flavored milk, especially chocolate milk, can provide a quick source of energy. It's often recommended as a post-workout recovery drink due to its combination of carbohydrates and protein, which helps in muscle recovery.

Applications

- **School Lunches**: Flavored milk is commonly offered in school cafeterias as a way to ensure children receive essential nutrients.
- **Sports and Fitness**: Chocolate milk is often marketed as a recovery drink for athletes due to its balanced ratio of carbohydrates and proteins.
- **Desserts and Shakes**: Flavored milk can be used as a base for milkshakes, smoothies, or as an ingredient in desserts like puddings and ice creams.

Technology of fermented milk

- Fermented milk technology involves the use of microorganisms, such as bacteria or yeast, to convert milk into a variety of products with unique flavors, textures, and nutritional profiles.

Types of fermented milk:

- **Yogurt** : Made by adding Lactobacillus bulgaricus and Streptococcus thermophilus to milk.
- **Kefir**: A fermented milk drink containing a variety of bacteria and yeast.
- **Cheese**: Produced by fermenting milk with bacteria, such as Lactococcus lactis, and enzymes, like rennet.
- **Buttermilk**: Made by adding bacterial cultures, such as Lactococcus lactis, to low-fat milk.
- **Kumis**: A fermented milk drink originating from Central Asia, made with Lactobacillus acidophilus and yeast.

Fermentation Process

- **Milk Preparation**: Milk is heated, pasteurized, and standardized to create an optimal environment for fermentation.
- **Inoculation**: Microorganisms are added to the milk to initiate fermentation.
- **Incubation**: The milk is incubated at a controlled temperature, allowing the microorganisms to grow and ferment the lactose.
- **Fermentation**: The microorganisms convert the lactose into lactic acid, causing the milk to curdle and thicken.
- **Post-Fermentation**: The Fermented milk is Cooled, Packaged, distributed.

Benefits of Fermented Milk Products

- **Improved Digestibility**: Fermentation breaks down lactose and proteins, making them easier to digest.
- **Increased Nutritional Value**: Fermented milk products contain higher levels of vitamins, minerals, and probiotics
- **Enhanced Flavor and Texture**: Fermentation creates unique flavors and textures, such as the tanginess of yogurt or the creaminess of cheese.

Value Addition In food

Milk Product Processing

Milk Processing

- Most milk undergoes processing before you buy it at the store. The three primary steps include:
- **pasteurization**
- **homogenization**
- **fortification**

Cream

Cream is the high-fat component separated from whole milk as a result of the creaming process. It has a higher proportion of fat droplets to milk than regular fluid milk. Due to this high fat content of cream compared to milk, some yellow, fat-soluble pigments may be apparent on it.

Butter

Butter is a concentrated form of fluid milk produced through churning of cream. It is made from sweet or sour cream. Milk is churned to form butter and the watery buttermilk. Butter may have a yellow color due to the fat-soluble animal pigment, carotene, or an additive.

Ghee

It is type of clarified butter, is prepared by simmering butter and removing the residue. The texture, colour, and taste of ghee depend on the quality of the butter and the duration of the boiling.

Cheese

- Cheese may be the most popular fermented milk product Cheese is produced throughout the world in wide-ranging flavours, textures, and forms.
- Cheese consists of proteins and fat from milk, usually the milk of *cows*, *buffalo*, *goat*, or *sheep*.

  It is produced by coagulation of the milk protein *casein*.

Condensed Milk

- Condensed Milk
  Evaporated milk with sugar added.

EVAPORATED MILK POWDER,SKIMMED MILK POWDER,WHOLE MILK POWDER

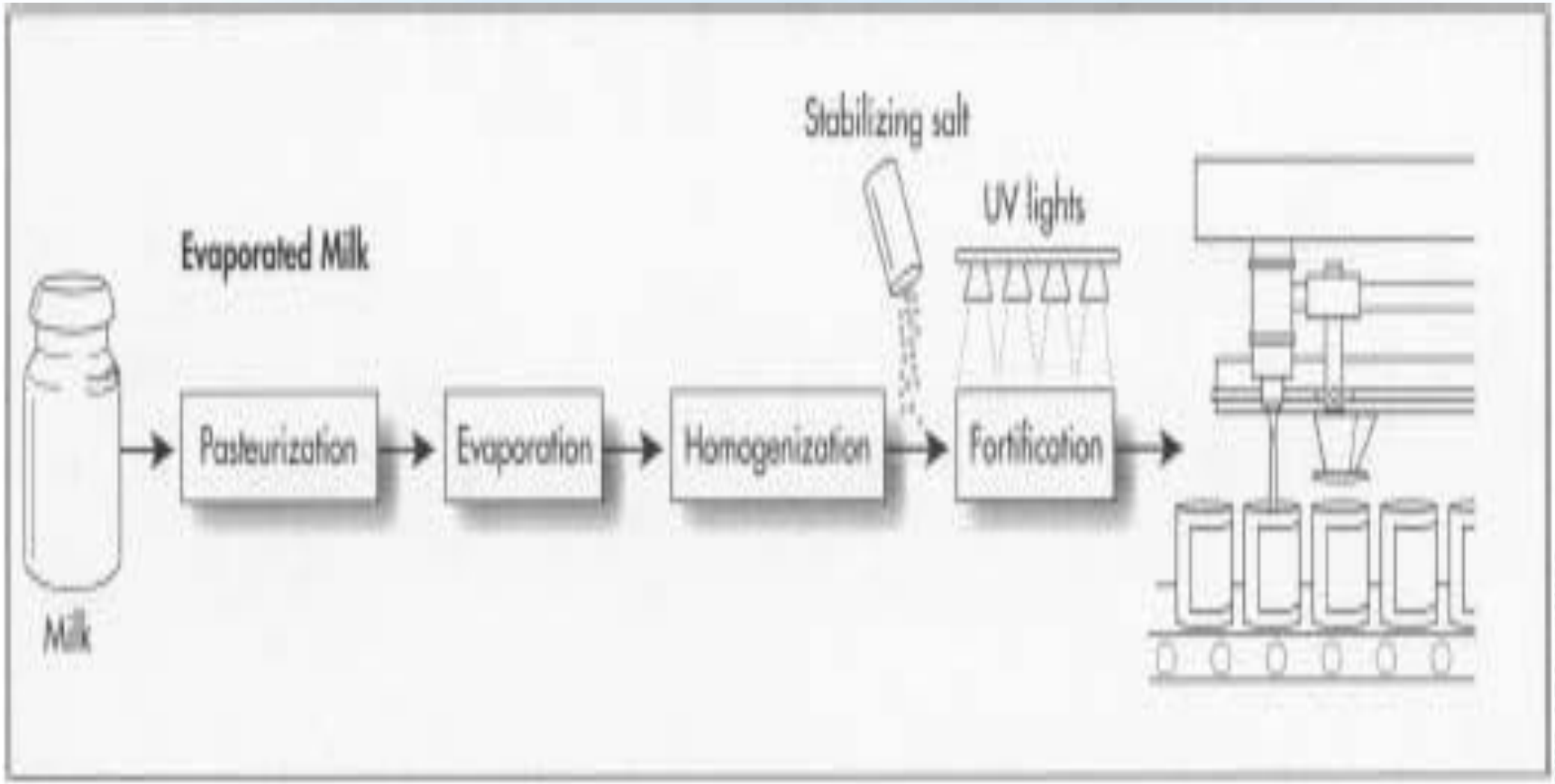
EVAPORATED MILK

- Evaporated milk, also known as unsweetened condensed milk, is a type of milk that has been heated to remove a significant amount of its water content.
- This process involves heating the milk to a high temperature, typically around 180°F (82°C), and then cooling it slowly to allow the water to evaporate.
- As a result, the milk becomes thicker and creamier, with a richer flavor and a more velvety texture.

Process

- **Pasteurization**:
- Fresh milk is first pasteurized by heating it to a high temperature (around 161°F or 72°C) for a short period of time (around 15-20 seconds) to kill off any bacteria and extend its shelf life.
- **Homogenization**:
- The pasteurized milk is then homogenized, which involves breaking down the fat molecules into smaller particles so that they are evenly distributed throughout the milk. This process helps to prevent the cream from separating from the rest of the milk.
- **Standardization**:
- The homogenized milk is then standardized to a specific fat content, typically around 3-4% for evaporated milk.
- **Evaporation**:
- The standardized milk is then heated in a vacuum evaporator or a steam-heated evaporator to remove excess water. This process involves heating the milk to a high temperature (around 180°F or 82°C) while reducing the pressure, which causes the water to evaporate quickly.

- **Concentration**:
- The evaporation process continues until the milk has reached the desired concentration, typically around 7-8% fat and 30-40% solids. The concentrated milk is then cooled to around 40°F (4°C).
- **Sterilization**:
- The concentrated milk is then sterilized by heating it to a high temperature (around 212°F or 100°C) for a short period of time (around 15-30 seconds) to kill off any remaining bacteria and extend its shelf life.
- **Packaging**:
- The sterilized evaporated milk is then packaged in cans, cartons, or other containers for distribution and sale.


Stabilizing salt
UV lights
Evaporated Milk
Pasteurization
Evaporation
Homogenization
Fortification
Milk

- Advantages:
- 1. Long shelf life
- Evaporated milk has a long shelf life, typically up to 2 years, due to the sterilization process.

- 2. Convenient:
- Evaporated milk is a convenient option for cooking and baking, as it can be stored in the pantry and used as needed.

- 3. Easy to store:
- Evaporated milk does not require refrigeration, making it a great option for camping or emergency food supplies.

- 4. Cost-effective:
- Evaporated milk is often less expensive than fresh milk, especially in bulk quantities.

- 5. Rich flavor:
- Evaporated milk has a rich, creamy flavor that is often preferred in recipes.

- 6. Thickening agent:
- Evaporated milk can be used as a thickening agent in recipes, as it has been concentrated during the sterilization process.

- Disadvantages:
- 1. Texture:
- Evaporated milk has a thick, creamy texture that some people may find unappealing.
- 2. Less nutritious:
- Evaporated milk has fewer nutrients than fresh milk, including protein, calcium, and vitamins.
- 3. May contain additives
- Some evaporated milk products may contain additives such as preservatives, thickeners, or flavor enhancers.
- 4. Limited uses:
- Evaporated milk is not suitable for all recipes, as it can curdle or separate when mixed with certain ingredients.
- 5. May not be suitable for everyone:
- Evaporated milk may not be suitable for individuals with lactose intolerance or dairy allergies, as it is still a dairy product.
- 6. Higher calorie count:
- Evaporated milk has a higher calorie count than fresh milk due to the concentration process.
- 7. May have a stronger flavor:
- Evaporated milk can have a stronger flavor than fresh milk, which may be overpowering in some recipes.

WHOLE MILK POWDER

- Whole milk powder (WMP) is a type of dairy product that is made by evaporating milk to remove the water content and then powdering the resulting concentrate.
- It is a popular ingredient in many food products, including infant formula, coffee creamers, and baked goods.
- WMP is a versatile product that offers a range of benefits and uses.

- The production of whole milk powder involves the following steps:

- Milk reception: Fresh milk is received at the processing plant and tested for quality and purity.
- Pasteurization: The milk is heated to a high temperature to kill off bacteria and extend its shelf life.
- Standardization: The milk is standardized to a specific fat content, usually around 35-40%.
- Evaporation: The milk is heated to remove the water content, resulting in a concentrated liquid.
- Spraying: The concentrated liquid is then sprayed into a hot air stream, which instantly evaporates the remaining water content.
- Powdering: The resulting powder is then cooled and packaged for distribution.

ADVANTAGES

- Long shelf life: WMP has a long shelf life due to its low moisture content, making it a convenient ingredient for manufacturers.
- Easy to store: WMP can be stored in dry conditions, making it ideal for transportation and storage.
- High nutritional value: WMP retains the nutritional value of milk, including protein, calcium, and vitamins.
- Versatile: WMP can be used in a wide range of applications, including infant formula, coffee creamers, baked goods, and more.
- Cost-effective: WMP is often cheaper than other dairy products, making it a popular choice for manufacturers.

DISADVANTAGES

- Limited flavor profile: WMP can have a bland or neutral flavor profile, which may limit its use in certain applications.
- Texture issues: WMP can be prone to lumping or caking if not handled properly, which can affect its texture in final products.
- Quality variability: The quality of WMP can vary depending on factors such as the quality of the milk used, the processing conditions, and the storage conditions.
- Allergenic concerns: WMP contains lactose and casein, which can be allergenic for some individuals.
- Environmental concerns: The production of WMP requires large amounts of energy and water, which can have negative environmental impacts.

SKIMMED MILK POWDER

- Skimmed milk powder (SMP) is a type of dairy product that is made by evaporating skimmed milk to remove the water content and then powdering the resulting concentrate.
- Skimmed milk is milk that has been separated from its cream, resulting in a lower fat content compared to whole milk.
- SMP is often used in food products, such as infant formula, soups, and sauces, due to its low fat content and neutral flavor

PROCESS

- Milk reception:
- Fresh skimmed milk is received at the processing plant and tested for quality and purity.
- Pasteurization:
- The milk is heated to a high temperature to kill off bacteria and extend its shelf life.
- Standardization:
- The milk is standardized to a specific fat content, usually around 0-1%.
- Evaporation:
- The milk is heated to remove the water content, resulting in a concentrated liquid.
- Spraying:
- The concentrated liquid is then sprayed into a hot air stream, which instantly evaporates the remaining water content.
- Powdering:
- The resulting powder is then cooled and packaged for distribution.

ADVANTAGES

- Low fat content:
- SMP has a very low fat content, making it ideal for manufacturers who require low-fat or fat-free products.
- Neutral flavor:
- SMP has a neutral flavor profile, which makes it suitable for use in a wide range of applications.
- High protein content:
- SMP retains the protein content of skimmed milk, making it an excellent source of protein for various applications.
- Cost-effective
- SMP is often cheaper than other dairy products, making it a popular choice for manufacturers.
- Easy to store:
- SMP can be stored in dry conditions, making it easy to transport and store.

DISADVANTAGES

- Limited Nutritional value :
- SMP lacks the nutritional value of whole milk, including vitamins and minerals.
- May not be suitable for all applications:
- SMP's low fat content and neutral flavor may make it unsuitable for some applications that require a richer or more flavorful product.
- May require additional fortification:
- SMP may require additional fortification with vitamins and minerals to meet nutritional requirements.
- Allergenic concerns:
- SMP contains lactose and casein, which can be allergenic for some individuals.
- Environmental concerns:
- The production of SMP requires large amounts of energy and water, which can have negative environmental impacts.

Milk products processing such as ice cream, khoa, channa, paneer

ICE CREAM

- **Ice cream production** involves several important steps that turn raw ingredients into the smooth, frozen.

- Non-fat milk solids (MSNF):

  This comprises milk's proteins, lactose-containing carbohydrates, and minerals. MSNF stabilizes the ice cream's structure, which helps it retain water and stay smooth.

  MSNF should make up roughly 17% of the mixture for optimal outcomes.
- Stabilizers & Emulsifiers:

  These aid with texture enhancement and prevent ice cream from melting too rapidly.

  Emulsifiers, such as mono- and diglycerides, aid in combining the water and fat.

- Additional components:

Cream or milk fat provides richness.

In addition to adding sweetness, sugar or sweeteners modify the ice cream's softness.

For the appearance they use the colors and for taste use the flavors .

Steps

Blending:

To create a smooth, uniform mixture, ingredients such as milk, cream, sugar, and powders are combined and cooked.

Homogenization and Pasteurization:

To eradicate dangerous microorganisms, the mixture is heated.

The fat is then broken up into tiny droplets by homogenizing (high-pressure mixing), which thickens the ice cream.

Growing Older:

After cooling, the mixture is given a few hours to rest. This stage facilitates the ingredients' proper settling and blending, notably the protein and fat.

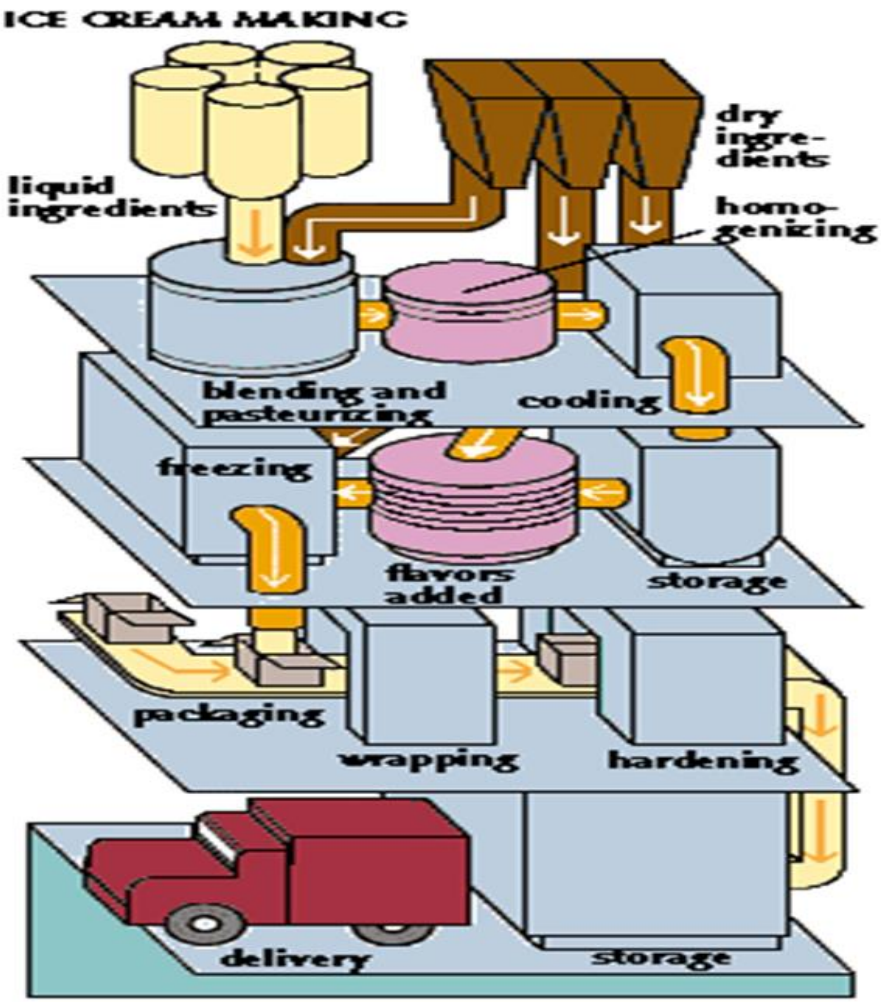
Churning and Freezing:

The texture of ice cream is light and fluffy because the mixture is frozen while being churned to incorporate air.

The formation of tiny ice crystals maintains the ice cream smooth.

Packaging:

To make sure the ice cream is solid and ready to eat, it is first frozen, then it is put into molds or containers and further stiffened in cold storage.



KHOA

Milk Processing: A concentrated milk product called khoa is frequently used in Indian desserts.

1.Selection of Raw Milk

Fresh, high-quality milk is selected as the primary ingredient.

2.Warming the Milk

Poured into a big vessel, the raw milk is cooked over low heat.

Care is used to prevent the milk from scorching.

3.Gently simmering

The milk is constantly swirled while being held at a low boil.

As a result, the milk solids are concentrated

4. Evaporation

The milk is left to continue until most of the water content evaporates and the milk thickens.

Once reduced, the milk has a thick, semi-solid consistency.

5. Dissipation

Remove the khoa from the fire as soon as the appropriate thickness is reached.

It is not handled until it has cooled down.

6. Retention

You can use the khoa right away in desserts or save it in the refrigerator for later use.

For convenience, it is frequently formed into blocks or balls

Applications for Khoa

Sweets: A key ingredients in several well-known Indian desserts, including gulab jamun, peda, and burfi, is khoa.
Taste and Texture: It gives a variety of foods and sweets a rich, creamy quality.

In conclusion, Khoa is a multipurpose dairy product that is prepared by reducing the water content of milk through simmering, which yields concentrated milk solids. It is a preferred component in many Indian desserts because of its deep flavor and texture.

CHANNA

Indian sweets,a fresh cheese formed from curdled milk. The following steps are involved in manufacturing channa:

1. Selection of Raw Milk
Start with premium, fresh milk. It's common to use milk from cows or buffalo.
2. Warming the Milk
After adding the milk to a large saucepan, slowly heat it until it almost boils.
3. Milk Curdling
Add an acidic ingredient to the boiling milk, like vinegar or lemon juice.
As the milk starts to curdle, it will separate into liquid whey and solid curds.
4. Divorce
The mixture is gently swirled once the milk has completely curdled.
Next, the curds are taken out of the whey with a fine strainer or muslin cloth.

5.Cleaning the Curds

To get rid of any acidity left by the vinegar or lemon juice, the curds are rinsed under cold water.

The curds become simpler to handle and cool down as a result.

6. Pushing

After being cleaned, the curds are reinserted into the cloth and compressed to eliminate any remaining moisture.

The channa's intended consistency (soft or stiffer) can be taken into consideration while adjusting this pressing.

7. Concluding Preparations

It's now time to use the channa in a variety of recipes.

It can be flavored, sweetened, or shaped to fit the food that it is meant for.

Uses for Channa: Sweets:

The major component in well-known Indian desserts like channa payesh, sandesh, and rasgulla.

Savory recipes:

It can also be used as a stuffing for stuffed flatbread or in savory recipes like paneer bhurji.

In conclusion, channa is an easy-to-make, multipurpose dairy product that is created by **adding acid to hot milk.** It's a main ingredient in many Indian desserts and meals because of its soft texture and capacity to take in flavors.

PANEER

Processing of Milk Products, namely Paneer

Fresh cheese called paneer is frequently used in Indian cooking.

1. Heating Milk to a Boil

The temperature of fresh cow or buffalo milk is raised to just below boiling.

2. Including the Coagulant

To get the solids and liquids to separate, add an acidic ingredient to the milk, such as vinegar or lemon juice.

3. Emptying the Fluid

Once the liquid and solids have fully separated, the solid portion is collected by passing the combination through a cloth that lets the liquid pass through but traps the solids.

4. Cleaning

To get rid of the coagulant's acidic taste, the collected particles are then washed with cold water.

5. Applying Pressure to the Solids

After that, the collected solids are compressed for 20 to 30 minutes using weight. By removing the extra moisture in this phase, it becomes compact and firm.

6. Slicing and Keeping

After the cheese solidifies, it can be sliced into cubes or blocks and preserved in water or chilled for later use.

- Applications for Paneer:

Savory foods like curries, grilled foods, and stir-fries frequently use paneer.

Additionally, it is a component of appetizers such as samosas and nibbles like fried bits or marinated cubes.

DIFFERENCE BETWEEN

Aspect	Channa	Paneer
Texture	Soft, moist	Firm, holds shape
Processing	Lightly drained, not pressed	Pressed to remove water
Uses	Sweets (rasgulla, sandesh)	Savory dishes (curries, grilling)
Moisture	High moisture content	Lower moisture content
Cooking	Used in desserts, not good for frying	Can be fried, grilled and used in spicy foods

Fortification of Food

General Definitions

- **Fortification**: Means deliberately increasing the content of essential micronutrients in a food so as to improve the nutritional quality of food and to provide public health benefit with minimal risk to health
- **Fortificant**: Substance added to food to provide micronutrients but does not include nutraceuticals or foods for Special Dietary Uses.
- **Fortified food**: Food, as specified under the Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011, that has undergone the process of fortification as per the provisions of these regulations.

- **Fortified Processed Foods**: Processed foods (i.e., foods that have been altered from its natural state by industrial processing methods) that have undergone the process of fortification as per the provisions of these regulations. The same may have fortified staples as raw materials and/or fortified with permitted micronutrients and additives as specified under the Food Safety and Standards (Food Product Standards and Food Additives) Regulation, 2011.
- **Micronutrients**: Means essential dietary nutrients including vitamins, minerals or trace elements that are required in very small quantities and are vital to development, disease prevention and wellbeing of human beings.

common nutrients used in fortification

- **Iron**: Prevents anemia and supports healthy blood circulation. Often added to cereals, bread, and pasta.
- **Folic Acid (Vitamin B9)**: Critical for fetal development, especially in preventing neural tube defects. Commonly added to bread, pasta, and breakfast cereals.
- **Calcium**: Strengthens bones and teeth. Used in biscuits, cereals, and noodles.
- **Vitamin D**: Enhances calcium absorption and supports bone health, often added to cereals and bread.
- **Vitamin A**: Essential for vision and immune function, frequently added to flour used in breads and biscuits.
- **B-Vitamins (e.g., Thiamine, Riboflavin, Niacin)**: Important for energy metabolism, added to cereals, pasta, and bread.

Standards on fortifications

- Wherever “Iron (As Fe)” is used as a source of nutrient, heme iron shall not be used in any form in any article of food.
- Micronutrients may be appropriately added to foods as mentioned in Schedule-I
- High Fat Sugar Salt (HFSS) Foods shall be excluded from Fortified Processed Foods category
- The Fortified Processed Food shall provide 15-30% of the Indian adult RDA of micronutrient based on an average calorie intake of 600 kcal

Packaging and Labelling Requirements

- Every package of fortified food shall carry the words “fortified with …… (name of the fortificant)” and the logo
- It may also carry a tag line “**Sampoorna Poshan Swasth Jeevan”** under the logo.
- Every package of food, fortified with Iron shall carry a statement “People with Thalassemia may take under medical supervision and persons with Sickle Cell Anaemia are advised not to consume iron fortified food products
- All fortified food shall be packaged in a manner that takes into consideration the nature of the fortificant added and its effect on the shelf life of such food.
- Fortified food shall be permitted to make a nutrition claim in relation to an article of fortified food under the Food Safety and Standards (Packaging and Labeling) Regulations, 2011.

Benefits

- Food fortification offers several significant benefits for public health, particularly in addressing nutritional deficiencies in populations.

Here are the key benefits:

Prevents Nutrient Deficiencies

- Fortification helps prevent common deficiencies in essential nutrients like iron, iodine, folic acid, and vitamin A, which can lead to health problems such as anemia, cognitive impairment, and immune system weakness.

2. Improves Public Health

- By adding micronutrients to widely consumed foods, fortification can improve overall health outcomes, including better brain development in children, enhanced immunity, and stronger bones.

3. Cost-Effective Public Health Strategy

- Fortification is a relatively low-cost intervention compared to other health strategies, making it an affordable solution for governments and industries to address large-scale nutrient deficiencies.

4.Targets Vulnerable Populations

- It can particularly benefit vulnerable groups, such as pregnant women, children, and the elderly, who are more prone to deficiencies that can affect growth, cognitive development, and general well-being.

5. Does Not Require Behavioral Change

- Since it’s added to everyday staple foods like flour, salt, milk, and cereals, people don't have to change their eating habits to get the benefits, ensuring better reach and compliance.

6. Boosts Cognitive and Physical Development

- Fortifying foods with nutrients like iron, iodine, and folic acid supports cognitive development in children and prevents birth defects, leading to better school performance and physical health outcomes.

7. Helps Prevent Chronic Diseases

- Fortification with vitamins like D and A, and minerals like calcium and zinc, can help reduce the risk of diseases such as osteoporosis, heart disease, and vision impairment.

8. Supports Economic Growth

- By improving the overall health of a population, fortification can reduce healthcare costs, increase productivity, and support economic growth.

micronutrient fortification of snacks products

- Micronutrient fortification of snack products involves adding essential vitamins and minerals to improve their nutritional content, particularly targeting deficiencies in the general population.

Here's an overview of the process and common nutrients used in snack fortification:

Commonly Fortified Snacks:

- Chips and crackers
- Biscuits and cookies
- Energy bars
- Instant noodles
- Cereal-based snacks

Fortification Process

- **Choosing the Nutrients**: Depending on the nutritional gaps in a population, specific micronutrients are selected for fortification.
- **Adding to Ingredients**: During the production of snacks, micronutrient powders or premixes are incorporated into the dough or batter used to make the snack.
- **Processing and Packaging**: The fortified mixture is processed, baked, or fried, and then packaged. The nutrients remain stable during the process, ensuring they are present in the final product.