

# **CHEESE**

**The topic Cheese will be discussed under 5 sub units.**

- 1. INTRODUCTION**
- 2. CLASSIFICATION OF CHEESES**
- 3. TYPES OF CHEESES**
- 4. GENERAL MANUFACTURING PROCEDURE**
- 5. COMPOSITION OF CHEESE**

## **1. INTRODUCTION**

Cheese is a food derived from milk consumed throughout the world, with a wide range of flavors, textures, and forms. The Food and Agricultural Organization devised the different definitions of cheeses. Cheese is the fresh or matured product obtained by the drainage of liquid after the coagulation of milk, cream, skimmed or partly skimmed milk, or butter milk. A second definition was added for cheeses made from the liquid whey obtained during manufacturing of cheese. Modern cheese manufacturing techniques deviate slightly from the details of these definitions but not from the general concepts.

Cheese can be made using pasteurized or raw milk. If it is made from raw milk imparts different flavors and textural characteristics to the finished cheese. For some cheese varieties, raw milk is given a mild heat treatment (below pasteurization) prior to cheese making to destroy some of the spoilage microbes and provide better conditions for the cheese cultures. Cheese made from raw milk must be aged for at least 60 days, to reduce the possibility of exposure to disease causing pathogenic microorganisms that may be present in the milk. For some varieties cheese must be aged longer than 60 days.

It is believed that goat and sheep milk were the first milks used to prepare cheese. This assumption is drawn from the idea that these were the first milk-producing animals that were domesticated. Today, cow's milk is the basis for most cheeses, which are produced. It is followed in turn by sheep's milk, goat's milk and buffalo's milk. Yaks, camels and llama are also milk-producing animals whose milk are utilized to prepare cheeses.

Cheeses are generally a product of their environment. Certain cheeses, which are produced in France or Italy, cannot be reproduced in other parts of the world because the environment isn't the same. The milk derived from the animals in France is being exposed to foods, nutrients, wild spores and climate changes, which are distinct to France. There are even cheeses prepared in certain regions of France which cannot be replicated in other regions because of climate differences. All this information should lead to the realization that there are thousands of different kinds of cheese found throughout the world.

## **2. CLASSIFICATION OF CHEESES**

It is not surprising, with the development of the cheese industry, when travel and communications were relatively limited, that a large number of cheese varieties would evolve. The exact number of cheese varieties would be impossible to determine and probably meaningless to ascertain. It is estimated that 2000 different varieties have been developed; among that, 400 varieties have been described.

Cheeses can be classified by texture, fat content, ripening method or country of origin.

## FIVE BASIC CHEESE CATEGORIES

1. *Fresh or Unripened Cheeses*: These are uncooked and unripened. They are generally mild and creamy with a slight tanginess. They usually have a high moisture content ranging from 40-80%. Because of their high moisture content, they are highly perishable.
2. *Soft Cheeses*: These have thin skins and creamy centers. They are among the most popular and delicious cheeses in the world. They ripen quickly and remain at their peak of flavor for 3-5 days. They are highly perishable possessing a moisture content of 50-75%.
3. *Semi-Soft Cheeses*: These include mild, buttery cheeses with smooth, sliceable textures. Some cheeses in this category are referred to as monastery cheeses because their origins can be traced back to monasteries during the Middle Ages. The moisture content of these cheeses ranges from 40-50%, giving them a longer shelf life than the fresh or soft cheeses.
4. *Firm Cheeses*: These have a dense texture. Many of the cheeses have a slightly flaky consistency making them difficult to slice thinly by hand. They have a moisture content of between 30-40% giving them a longer shelf life than previously mentioned cheeses, and making it less perishable as well.
5. *Hard Cheeses*: These cheeses that have been carefully aged for extended periods of time. Many of these cheeses are cooked at high temperatures in order to create a tight protein bond prior to aging. These cheeses have a moisture content of approximately 30%. Hard cheeses are well suited for grating because of the combination of low moisture and tight protein bonding. Grating cheeses have the longest shelf life of all the natural cheeses.

## 3. TYPES OF CHEESE

*Fresh or Unripened Cheeses: Under this category, the most popular cheeses available in the market are*

- **Cream Cheese** is a soft cow's milk cheese produced in the United States. It can be purchased in solids, whipped or flavored, with regular fat content, light or fat free. It has many uses in the kitchen beginning with spreads for bagels in the morning right through to the main ingredient in a cheesecake for a dinner dessert.
- **Goat cheese** usually has its own category as does blue cheese, but here it will be treated like the other fresh cheeses. This cheese is usually produced exclusively from goat's milk, but some varieties combine goat and cow's milk. Goat's milk is higher in fat and protein than cow's milk and has a more concentrated, sharp, tangy flavor. Most goat cheese sold is fresh, making it very soft and creamy with an average life span of a couple weeks. Some goat cheeses are aged for a longer period of time, creating a firmer product that will have a longer shelf life. All these cheeses are produced in a variety of shapes and sizes, ranging from cones to disks and from pyramids to cylinders. Many times they are coated with seasonings, herbs and ash.
- **Mozzarella** is an Italian cheese, which was traditionally made from buffalo's milk. Today it is primarily made from cow's milk, although excellent buffalo mozzarella can be ordered from distributors in South America and Italy. The flavor of fresh mozzarella is directly impacted by the amount of salt utilized in the final stretching, kneading and forming process. Usually it is a smooth, soft mild white cheese that can

be smoked, flavored or rolled with different complimentary ingredients creating a stunning presentation.

*Soft Cheeses: Under this category, the most popular cheeses available in the market are*

- **Bel Paese** is a recent Italian creation made from cow's milk and containing approximately 50% fat. It melts easily and has a wonderful fruity flavor that attracts and keeps many who taste it for the first time. It is usually a party favorite.
- **Brie** is a mold ripened French cheese. It is produced using cow's milk and possesses a fat content of approximately 60%. Prior to it reaching its peak of ripeness, it is firm and chalky. When ripe, its interior is soft and creamy sometimes to the point of having a custardy consistency. This period of peak ripeness will last for a few days. An ammonia smell will begin to dominate the cheese when it over-ripens. At this point, the cheese should not be served. This cheese can be served on its own at room temperature, baked in puff pastry and served hot or stripped of its moldy exterior and blended into a soup to create a full body and full flavor. This is a very popular and versatile cheese.
- **Boursin** is a triple cream cheese from France. It contains approximately 75% fat. This cheese is white, spreadable and usually flavored with either fresh herbs and seasonings or peppercorns. It is sold in small foil wrapped cylinders, which can be quickly unwrapped and served immediately with crackers, etc. This cheese can be used as a flavoring base for tea sandwich. It can be incorporated into hot food preparations such as stuffings or sauces.
- **Camembert** is a French ripened cheese similar in appearance to Brie. It contains approximately 45% fat. It possesses the same ripening characteristics as Brie but has a milder flavor. Camembert's window of ripeness is slightly shorter than that of Brie. Many customers will purchase this product in tins or cans so it will not be exposed to the air thereby stunting the aging process.

*Semi-Soft Cheeses: Under this category, the most popular cheeses available in the market are*

- **Gorgonzola** is a bluish-green veined Italian cheese prepared from cow's milk. It contains 48% fat and becomes very creamy when allowed to sit at room temperature. All blue cheeses are versatile, finding uses in salads, dressings, dips, soups, sauces, appetizers, entrees and desserts.
- **Roquefort** is a blue-veined cheese made in France. It is prepared from sheep's milk and possesses a 45% fat content. It is a pungent, salty cheese with a very aromatic quality. As with the Gorgonzola, Roquefort becomes very soft and creamy at room temperature and is very versatile.

*Firm Cheeses: Under this category, the most popular cheeses available in the market are*

- **Cheddars** were originally produced in Great Britain. The United States now produces a tremendous amount of Cheddar as well. The more famous American Cheddars are produced in Wisconsin, Vermont, New York and Oregon. They contain anywhere from 40-50% fat. The best of these Cheddars are aged at least 60 days. Many Cheddars are aged longer and have a sharper flavor and firmer more crumbly texture than their younger cousins. Colby cheese is a cheddar that is prepared with a slightly open-face. All these Cheddar cheeses, come in a variety of sizes, from rounds (wheels), to blocks, to cylinders (longhorns).

- **Emmenthaler** is a Swiss cheese containing approximately 45% fat. It is a mellow, rich and nutty cheese with a light yellow interior and a variety of hole sizes. Authentic Emmenthaler is sold in 200-pound wheels with the word Switzerland stamped on the surface like the spokes of a bicycle. This cheese is considered to be the original Swiss Cheese.
- **Provolone** is a product of southern Italy containing approximately 45% fat. Provolone is sold in a number of different varieties. It can be aged 3 months, 6 months or 9 months, regular or smoked. An older provolone is sometimes mistaken for Parmesan. It comes in a variety of shapes and sizes and is popular in sandwiches, pizzas and pasta dishes.

*Hard Cheeses: Under this category, the most popular cheeses available in the market are*

- **Asiago** is an Italian cow's milk cheese containing approximately 30% fat. This cheese is usually aged for one year at which point it has developed a sharp, nutty flavor with a cheddar-like consistency. Asiago is not as grainy as other hard grating cheeses. It has a very long shelf life if properly cared for.
- **Parmigiano-Reggiano** is a cow's milk made near Parma, Italy. It contains 30-35% fat and is used primarily for grating and cooking. It has a sharp, rich spicy flavor, where a little goes a long way. It is sold in 80-pound wheels with the name Parmigiano-Reggiano stamped all over the exterior. This cheese is produced from mid-April through mid-November.
- **Romano** is a cheese made in central and southern Italy. It is made exclusively with sheep's milk and contains approximately 35% fat. Romano has a brittle consistency and a very sharp tangy flavor. The flavor is noticeably sharper. This is aged in large cylinders and possesses a yellow rind. It is primarily used for grating, but can also be served in small portions with olives, sausages and other antipasto items.

#### 4. GENERAL MANUFACTURING PROCEDURE

The basic principles behind the preparation of natural cheese are pretty much the same today as they were hundreds of years ago. Today, many of the steps have been mechanized.

##### **Production of Cheese**

All cheese is made from milk, but different manufacturing and aging processes are used to produce the array of cheeses available today. Cheese is made by coagulating or curdling milk, stirring and heating the curd, draining off the whey (the liquid part of the milk), collecting and pressing the curd, and in some cases, ripening. Cheese can be made from whole, 1% or 2% lowfat, or fat-free milk, or combinations of these milks. About one-third of all milk produced each year in the U.S. is used to make cheese.

Starter cultures are used early in the cheese making process to assist with coagulation by lowering the pH prior to rennet addition. The metabolism of the starter cultures contribute desirable flavor compounds, and help prevent the growth of spoilage organisms and pathogens. Typical starter bacteria include *Lactococcus lactis*, *Streptococcus thermophilus* and *Lactobacillus delbruckii*. The bacteria used in cheese making are either gas producers or acid producers. Gas producers release carbon dioxide, while the acid producers form lactic acid from lactose. It is the gas producers that determine the texture of a cheese and the acid producers determine the flavour.

## **General Cheese Processing Steps includes**

- Standardize the Milk
- Pasteurize/Heat Treat the Milk
- Cool Milk
- Inoculate with Starter & Non-Starter Bacteria and Ripen
- Add Rennet and Form Curd
- Cut Curd and Heat
- Drain Whey
- Texture Curd
- Dry Salt or Brine
- Form Cheese into Blocks
- Store and Age
- Package

### *1. Standardize Milk*

Milk is often standardized before cheese making to optimize the protein to fat ratio to make a good quality cheese with a high yield.

### *2. Pasteurize/Heat Treat Milk*

Depending on the desired cheese, the milk may be pasteurized or mildly heat-treated to reduce the number of spoilage organisms and improve the environment for the starter cultures to grow. Some varieties of milk are made from raw milk so they are not pasteurized or heat-treated. Raw milk cheeses must be aged for at least 60 days to reduce the possibility of exposure to disease causing microorganisms (pathogens) that may be present in the milk.

### *3. Cool Milk*

Milk is cooled after pasteurization or heat treatment to 32°C to bring it to the temperature needed for the starter bacteria to grow. If raw milk is used the milk must be heated to 32°C.

### *4. Inoculate with Starter & Non-Starter Bacteria and Ripen*

The starter cultures are added to the milk and held at 32°C for 30 minutes to ripen. The ripening step allows the bacteria to grow and begin fermentation, which lowers the pH and develops the flavor of the cheese.

### *5. Add Rennet and Form Curd*

The rennet is the enzyme that acts on the milk proteins to form the curd. After the rennet is added, the curd is not disturbed for approximately 30 minutes so a firm coagulum forms.

### *6. Cut Curd and Heat*

The curd is allowed to ferment until it reaches pH 6.4. The curd is then cut with cheese knives into small pieces and heated to 38°C. The heating step helps to separate the whey from the curd.

### *7. Drain whey*

The whey is drained from the vat and the curd forms a mat.

### *8. Texture curd*

The curd mats are cut into sections and piled on top of each other and flipped periodically. This step is called **cheddaring**. Cheddaring helps to expel more whey, allows the

fermentation to continue until a pH of 5.1 to 5.5 is reached, and allows the mats to "knit" together and form a tighter matted structure. The curd mats are then cut into smaller pieces.

#### *9. Dry Salt or Brine*

For cheddar cheese, the smaller, milled curd pieces are put back in the vat and salted by sprinkling dry salt on the curd and mixing in the salt. In some cheese varieties, such as mozzarella, the curd is formed into loaves and then the loaves are placed in a brine (salt water solution).

#### *10. Form Cheese into Blocks*

The salted curd pieces are placed in cheese hoops and pressed into blocks to form the cheese.

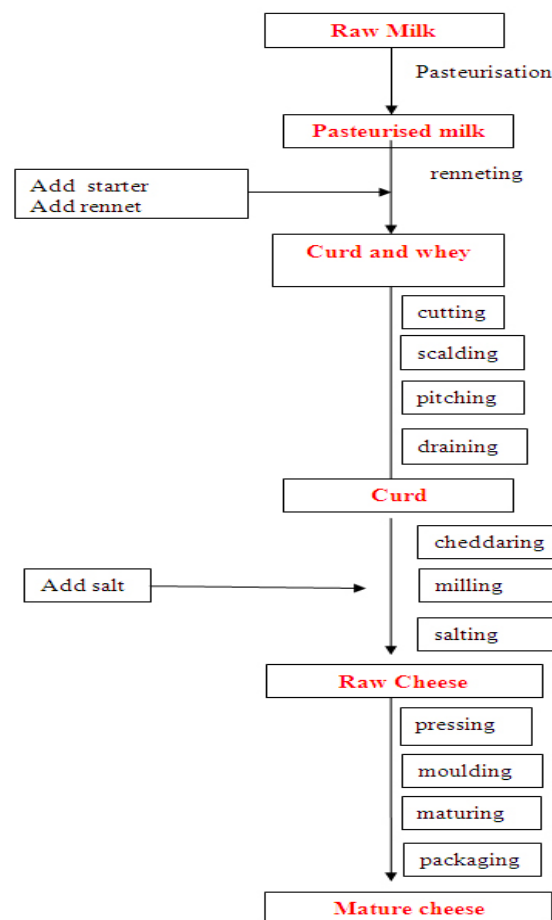
#### *11. Store and Age*

The cheese is stored in coolers until the desired age is reached. Depending on the variety, cheese can be aged from several days to several months.

#### *12. Package*

Cheese may be cut and packaged into blocks or it may be waxed.

### **An outline of various stages in the manufacture of Cheddar cheese**



## **5. COMPOSITION OF CHEESE**

Cheese contains a good number of essential nutrients, including protein, calcium, zinc, phosphorus, magnesium, vitamin A, vitamin B2 (riboflavin) and vitamin B12. The amount of nutrients in cheese may vary depending on the composition of milk used and also how the cheese is made, but the major nutrients found in cheese includes

- Protein – is important for growth and development, and helping to build and repair tissues in the body.
- Calcium – is important for the health of bones and teeth, and for normal nerve and muscle function.
- Zinc – can contribute to the structure of skin, can assist in wound healing, and can also help to support immune system.
- Phosphorus – is important for the health of bones and teeth.
- Vitamin A – is a fat soluble vitamin which is important for vision, for maintaining the health of skin, as well as being important for bones.
- Vitamin B2 (Riboflavin) – is involved in converting energy from food, for use by the body.
- Vitamin B12 – is important for producing cells in the body, such as red blood cells.

**Conclusion:** Worldwide, cheese is a major agricultural product. Cheese is one of the most fascinating, complex, and diverse foods enjoyed today. Cheeses are found almost all cultures throughout the world and cheese is one of our oldest food items. There are many types of cheeses in India and around the world. According to the Food and Agricultural Organization of the United Nations, over 20 million metric tons of cheese was produced worldwide in 2011. This is about three kg for each person on Earth.