

Cheese Ripening & Aging

Cheese manufacturing in general

Since humans began to domesticate milk-producing animals around 10,000 BCE, they have known about the propensity of milk to separate into curds and whey. It is the curds that are used to produce cheese.

Cheese Manufacturing Process

There are three production steps common to the manufacturing process in most types of cheese; preparing the cheese milk, separating curd from whey and aging or ripening.

Preparing the cheese milk:

Either pasteurized or non pasteurized cheese milk is used. Non pasteurized cheese milk contains the necessary bacteria to produce lactic acid, one of the agents that triggers curdling. Pasteurized cheese milk must contain a culture



of bacteria in order to produce this lactic acid.

If non-pasteurized cheese milk is used, the cheese must be ripened for at least 60 days at a temperature of not less than 4°C to ensure against growth of pathogenic organisms.

Separating the curds from the whey:

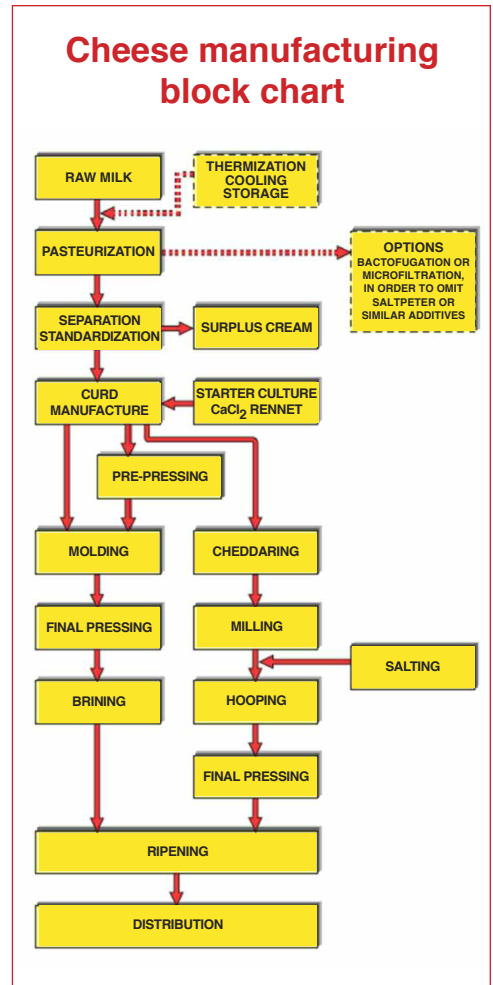
Animal or vegetable rennet is added to the cheese milk. The enzyme activity of the rennet causes the milk to coagulate as seen by the appearance of curd. The liquid remaining after the milk has been curdled and strained is the whey.

The curd is finally put into molds and placed on draining boards. Once in the molds, the curd is ready for pressing.

Aging the cheese:

The cheese is stored in a place of proper temperature and humidity for aging also known as ripening. Some cheeses are aged for a month and some are aged for several years.

continued



Facts & Figures

- According to the Wisconsin Milk Marketing Board, per capita cheese consumption in the US is 33 pounds. Canada per capita consumption is 20.4 pounds and France per capita consumption is a whopping 52.7 pounds.
- In 1955, 13% of milk was made into cheese, by 1984, this percentage had grown to 31% and continues to increase...
- As much as 90% of milk produced in Wisconsin is made into cheese.
- France is home to about 400 commercially available cheeses.

Why is it important to measure and control relative humidity?

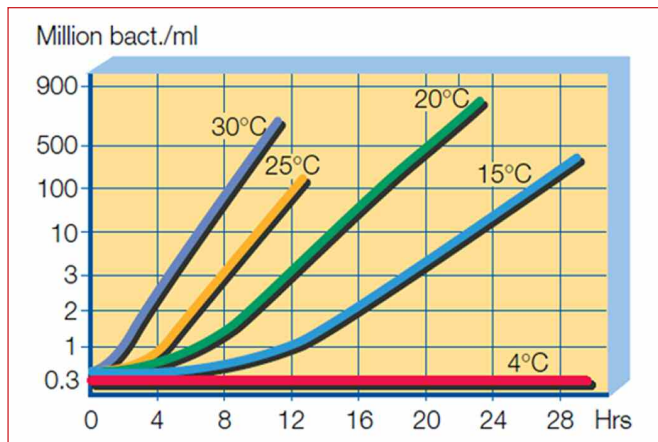
Storage

For centuries, caves (which are usually cool and have a constant humidity) have provided an excellent environment to age and store cheese. Caves are still used today. Roquefort cheese, for example, is a cheese aged in the natural Combalou caves in France. In most cases, cheese storage areas are man-made structures with a tightly controlled environment.

The treatment during curd making and pressing determines the characteristics of the cheese. The actual flavor of the cheese is determined during the ripening of the cheese in the storage area.

The ripening of the cheese is characterized first and foremost by the decomposition of protein. The degree of protein decomposition significantly affects the quality (consistency and taste) of the cheese.

The purpose of storage is to create the external conditions which are necessary to control the ripening cycle of the cheese. For every type of cheese, a specific combination of temperature and



The Influence of temperature on bacterial development in raw milk. Source: dairy processing Handbook.

relative humidity must be maintained in the different storage rooms during the various stages of ripening.

The environmental conditions are critically important to the rate of ripening, loss of weight, rind formation and development of the surface flora. These characteristics are what one would consider as the very essence that distinguishes one cheese from another!

The optimum conditions

Here are a few examples of storage conditions for a few cheeses:

Cheeses of the cheddar family require low temperatures between 4 and 8°C and relative humidity lower than 80%. The cheese is often wrapped in plastic to prevent excessive water loss. The ripening time may vary between a few months and up to 8 or 10 Months.

Cheeses like Emmentaler have a more complex ripening process; 3 to 4 weeks between 8 and 12°C followed by 6 to 7 weeks at 22 to 25°C. The final stage of ripening is several months between 8 and 12°C. The relative humidity remains consistent between 85 and 90%.

Semi hard cheeses like Tilsiter or Havarti spend 2 weeks in a fermenting room at 14 to 16°C with a relative humidity of about 90%.

During the fermenting process, the cheese is covered with a special cultured mix of a salt solution. After 2 weeks, the cheese is transferred to the ripening room for another 3 weeks at 10 to 12°C and 90% RH. The final stage is storage in a cold room at 6 to 10°C at 70 to 75% RH.

Other hard and semi hard cheeses like Gouda are stored at 10 to 12°C for a few weeks at 75% RH, followed by a few weeks at 12 to 18°C and 80% RH. The last stage or ripening occurs in a storage room at 10 to 12°C at 75%rh where the final characteristics are established.

Air conditioning:

During the maturing process, water vapor needs to be removed from the cheese. Water vapor will move from the cheese to the air (equilibration) therefore, the air in the storage area must be continuously regulated and adjusted.

