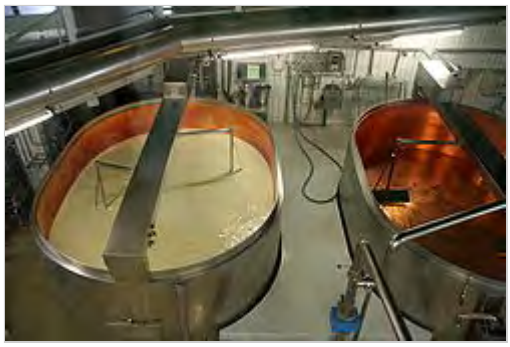
Cheesemaking

From Wikipedia, the free encyclopedia

The production of cheese, like many other food preservation processes, allows the nutritional and economic value of a food material, in this case milk, to be preserved. It allows the consumer to choose (within limits) when to consume the food rather than have to consume it straight away, and it allows the product to be altered which gives it higher value.

Cheesemaking may have originated from nomadic herdsmen who stored milk in vessels made from the sheep's and goats' stomachs. Because their stomach linings contains a mix of lactic acid, wild bacteria as milk contaminants and rennet, the milk would ferment and coagulate. A product reminiscent of yogurt would have been produced, which, through gentle agitation and the separation of curds from whey would have resulted in the production of cheese; the cheese being essentially a concentration of the major milk protein, casein, and milk fat. The whey proteins, other minor milk proteins, and the lactose are all removed in the cheese whey.

A cheesemaking workshop with goats at Maker Faire 2011. The sign declares, "Eat your Zipcode", in reference to the locavore movement



During industrial production of Emmental cheese, the as-yet-undrained curd is broken by rotating mixers.

Contents

Process

The job of the cheesemaker is to control the spoiling of milk into cheese. The milk may be from a cow, goat, sheep or buffalo, although worldwide cow's milk is most commonly used. The cheesemaker applies craft and skill to the practise of cheesemaking, intending to produce a product with specific characteristics and organoleptic requirements (appearance, aroma, taste, texture) that are consistent

every time it is made. This is not to say, of course, there is no room for variety or innovation, but a particular cheese needs to be made a particular way. Thus, the crafts and skills employed by the cheesemaker to make a Camembert will be similar to, but not quite the same as, those used to make Cheddar.

In modern industrial cheesemaking factories (sometimes called creameries) the craft elements of cheesemaking are retained to some extent, but there is more science than craft. This is seen particularly in factories that use computer-aided manufacturing. The end product is very predictable. So in contrast, individual cheesemakers tend to operate on a much smaller scale and sell "handmade" products; each batch may differ, but their customers expect and anticipate this, much like with wines, teas and many other natural products.

Some cheeses may be deliberately left to ferment from naturally airborne spores and bacteria; this generally leads to a less consistent product but one that is highly valuable in a niche market for exactly that reason, no two are ever quite the same.

The production of Gruyère cheese at the cheesemaking factory of Gruyères, Canton of Fribourg, Switzerland

Culturing

To make cheese the cheesemaker brings milk (possibly pasteurised) in the cheese vat to a temperature required to promote the growth of the bacteria that feed on lactose and thus ferment the lactose into lactic acid. These bacteria in the milk may be wild, as is the case with unpasteurised milk, added from a culture, frozen or freeze dried concentrate of starter bacteria. Bacteria which produce only lactic acid during fermentation are homofermentative; those that also produce lactic acid and other compounds such as carbon dioxide, alcohol, aldehydes and ketones are heterofermentative. Fermentation using homofermentative bacteria is important in the production of cheeses such as Cheddar, where a clean, acid flavour is required. For cheeses such as Emmental the use of heterofermentative bacteria is necessary to produce the compounds that give characteristic fruity flavours and, importantly, the gas that results in the formation of bubbles in the cheese ('eye holes').

Cheesemakers choose starter cultures to give a cheese its specific characteristics. Also, if the cheesemaker intends to make a mould-ripened cheese such as Stilton, Roquefort or Camembert, mould spores (fungal spores) may be added to the milk in the cheese vat or can be added later to the cheese curd.

Coagulation

When during the fermentation the cheesemaker has gauged that sufficient lactic acid has been developed, rennet is added to cause the casein to precipitate. Rennet contains the enzyme chymosin which converts κ-casein to para-κ-caseinate (the main component of cheese curd, which is a salt of one fragment of the casein) and glycomacropeptide, which is lost in the cheese whey. As the curd is formed, milk fat is trapped in a casein matrix. After adding the rennet, the cheese milk is left to form curds over a period of time.

Draining

Once the cheese curd is judged to be ready, the cheese whey must be released. As with many foods the presence of water and the bacteria in it encourages decomposition. The cheesemaker must, therefore, remove most of the water (whey) from the cheese milk, and hence cheese curd, to make a partial dehydration of the curd. This ensures a product of good quality and that will keep. There are several ways to separate the curd from the whey, and it is again controlled by the cheesemaker.

Fresh chevre hanging in cheesecloth to drain.

Scalding

If making Cheddar (or many other hard cheeses) the curd is cut into small cubes and the temperature is raised to around 39 °C (102 °F) to 'scald' the curd particles. Syneresis occurs and cheese whey is expressed from the particles. The Cheddar curds and whey are often transferred from the cheese vat to a cooling table which contains screens that allow the whey to drain, but which trap the curd. The curd is cut using long, blunt knives and 'blocked' (stacked, cut and turned) by the cheesemaker to promote the release of cheese whey in a process known as 'cheddaring'. During this process the acidity of the curd increases and when the cheesemaker is satisfied it has reached the required level, around 0.65%, the curd is milled into ribbon shaped pieces and salt is mixed into it to arrest acid development. The salted green cheese curd is put into cheese moulds lined with cheesecloths and pressed overnight to allow the curd particles to bind together. The pressed blocks of cheese are then removed from the cheese moulds and are either bound with muslin-like cloth, or waxed or vacuum packed in plastic bags to be stored for maturation. Vacuum packing removes oxygen and prevents mould (fungal) growth during maturation, which depending on the wanted final product may be a desirable characteristic or not.

Mould-ripening

In contrast to cheddaring, making cheeses like Camembert requires a more gentle treatment of the curd. It is carefully transferred to cheese hoops and the whey is allowed to drain from the curd by gravity, generally overnight. The cheese curds are then removed from the hoops to be brined by immersion in a saturated salt solution. The salt absorption stops bacteria growing, as with Cheddar. If white mould spores have not been added to the cheese milk the cheesemaker applies them to the cheese either by spraying the cheese with a suspension of mould spores in water or by immersing the cheese in a bath containing spores of, e.g., *Penicillium candida*.

By taking the cheese through a series of maturation stages where temperature and relative humidity are carefully controlled, the cheesemaker allows the surface mould to grow and the mould-ripening of the cheese by fungi to occur. Mould-ripened cheeses ripen very quickly compared to hard cheeses (weeks against months or years). This is because the fungi used are biochemically very active when compared with starter bacteria. Some cheeses are surface-ripened by moulds, such as Camembert and Brie, some are ripened internally, such as Stilton, which is pierced by the cheesemaker with stainless steel wires, to admit air to promote mould spore germination and growth, as with *Penicillium roqueforti*. Surface ripening of some cheeses, such as Saint-Nectaire, may also be influenced by yeasts which contribute

flavour and coat texture. Others are allowed by the cheesemaker to develop bacterial surface growths which give characteristic colours and appearances, e.g. by the growth of *Brevibacterium linens* which gives an orange coat to cheeses.

Quality control

Cheesemakers must be skilled in the grading of cheese to assess quality, defects and suitability for release from the maturing store for sale. The grading process is one of sampling by sight, smell, taste and texture. Part of the cheesemaker's skill lies in the ability to predict when a cheese will be ready for sale or consumption, as the characteristics of cheese change constantly during maturation.

A cheesemaker is thus a person who has developed the knowledge and skills required to convert milk into cheese, by controlling precisely the types and amounts of ingredients used, and the parameters of the cheesemaking process, to make specific types and qualities of cheese. Most cheesemakers by virtue of their knowledge and experience are adept at making particular types of cheese. Few, if any, could quickly turn their hand to making other kinds. Such is the specialisation of cheesemaking.

Making artisan cheese or farmstead cheese in the United States has become more popular in recent times, as an extension of the craft of cheesemaking.

See also

- List of cheesemakers

References

- Robinson, R.K.; Wilbey, R.A. (1998). *Cheesemaking practice* (3rd ed.). Dordrecht: Kluwer Academic.
- Banks, J (1998). *Cheese* (2nd ed.).
- Early, R. *The technology of dairy products*. London: Chapman and Hall.
- www.telegraph.co.uk

External links

- Illustrated recipes for making cheese at home (http://biology.clc.uc.edu/fankhauser/Cheese/CHEESE.HTML)
- Cheese Terminology and Classifications (http://www.sandandsuccotash.com/cheese-terminology-classifications/)

Categories: Cheesemakers | Food services occupations