

Blue Cheese

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Roquefort France



Cabrales Spain



Gorgonzola Italy



Stilton United Kingdom

The fermented food

Blue cheese is easily recognisable among other cheeses by the blue veins that run through the cheese. Several countries have their own emblematic blue cheese, such as Roquefort in France, Stilton and Shropshire in the United Kingdom, Cabrales in Spain, Danablu in Denmark, Aura in Finland and Gorgonzola in Italy.

Where is it predominantly made and found?

Blue cheese is made and consumed worldwide, but France displays the greatest diversity of blue cheeses! You can buy the most famous blue cheeses worldwide.

What are its ingredients?

Cow, sheep or goat milk (raw or pasteurized), lactic acid bacteria and/or rennet, the mold *Penicillium roqueforti*, salt

How do we make it?

To make cheese, three steps are necessary: *curdling* (the conversion of a homogeneous milk emulsion into solids, the *curds* which are used to make the cheese, and remaining liquid, the whey), draining the curds, and ripening. The milk (raw or pasteurized) is curdled by lactic acid bacteria or rennet (an enzyme coming from the stomachs of young ruminants), or by a combined action of both. Lactic acid bacteria make the milk acidic, which causes the milk proteins to coagulate.

Draining the curd enables the removal of the whey, the liquid part resulting from the coagulation of the milk, by biological and mechanical processes. The biological process is due to lactic bacteria that acidify the curd, making it porous.

To make blue cheese, the fungus *Penicillium roqueforti* is inoculated during coagulation. Then, the mechanical processes involved are cutting and brewing. Holes are made in the curd to allow the blue mold to develop during the ripening process.

Before ripening, cheeses are salted, by adding salt directly or soaking the cheeses in brine baths, to prevent spoiling or toxic bacteria and fungi from developing. Ripening is the result of more

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or less complex microbial transformations of the curd, and is responsible for the final appearance of the cheese. This stage can last only two weeks for Bleu de Bresse or several months (at least four) for Roquefort, Gorgonzola or Stilton.

The maturing process takes place in natural caves, such as in the French town Roquefort-sur-Soulzon, or in plastic cellars, where humidity and temperature are well controlled. The salt migrates into the cheese and the rind begins to form on the surface. The maturing process for blue cheeses takes place from the inside to the outside, with the development of the blue mold *Penicillium roqueforti* in the holes.



Credit: GEE team

Roquefort-sur-Soulzon, a small village in the south of France where Roquefort is made



Credit: GEE team

A cave where Roquefort cheeses are maturing

The microbiology of the process

The blue in blue cheeses, and their musty taste, are the result of the development of a fungus named *Penicillium roqueforti*.



Zoom in a Roquefort vein, which is blue because of the mold *Penicillium roqueforti*; the circle represents a microscopic view of *Penicillium roqueforti*, showing the pencils of the fungus, with spores at the tips.



Zoom in a Roquefort vein, which is blue and moldy because of the mold *Penicillium roqueforti*

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How/when do we use and enjoy it?

Blue cheese can be eaten at any meal: at breakfast with a cup of coffee, during a meal as a main course in a salad or in a sauce with meat, with dessert, plain with a piece of bread or incorporated into a cake.

Variations, regional variations

As mentioned above, there are many different blue cheeses, both among and within different countries. For example in France, there are seven blue cheeses protected by the PDO (Protected Designation of Origin) label but more than 20 different blue cheese types. These different cheeses do not have the same taste at all: for example Roquefort has a pronounced salty musty taste, whereas Bleu de Bresse is a mild cheese appreciated by children.

Beneficial properties

Cheese has allowed humans to preserve milk, a perishable beverage, and to be more digestible than milk. Indeed, lactose, a sugar naturally present in milk that for some people is not easy to digest, is present in lower quantities in cheese because the microorganisms involved in the cheese production process consume it. Cheese is a source of calcium, protein, vitamins (including vitamin B12, exclusively synthesized by microorganisms).

Cultural roots and importance

The origins of cheese date back to the Neolithic period (7000-1700 BCE), a pivotal time in history when people settled down and began to domesticate goats and sheep to raise livestock and consume their milk. The chance discovery of milk curdling marks the beginning of cheese production. Cheese is one of the emblematic foods of France, and Roquefort is often nicknamed “the King of cheese”; it was already consumed by Charles the Great, the King of the Franks in the XIIIth century. In the XIVth century, Charles VI, the King of France, gave Roquefort its protection.

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