

Cheese

Cheese is a nutritious and versatile dairy food. It contains a high concentration of essential nutrients relative to its energy level. Its precise nutritional composition is determined by multifactorial parameters, including the type of milk used (species, breed, stage of lactation, and fat content) and the manufacturing and ripening procedures. In general, cheese is rich in the fat and casein constituents of milk, which are retained in the curd during manufacture. It contains relatively small amounts of the water-soluble constituents (whey proteins, lactose, and water-soluble vitamins), which partition mainly into the whey.

COMPOSITION AND NUTRITIONAL VALUE OF CHEESE

Protein

Cheese contains a high content of biologically valuable protein. The protein content of cheese ranges from approximately 4-40%, depending upon the variety. It varies inversely with the fat content of cheese. During cheese manufacture, most of the whey proteins are lost in whey and thus only casein remains in cheese. Casein is slightly deficient in sulphur-containing amino acids. Thus the biological value of cheese protein is slightly less than that of the total milk protein. Cheese protein is almost 100% digestible, as the ripening phase of cheese manufacture involves a progressive breakdown of casein, to water-soluble peptides and free amino acids. Hence, a significant degree of breakdown of cheese protein has occurred before it is consumed and subjected to the effects of gastrointestinal proteolytic activity. A range of bioactive peptides are released during proteolysis of cheese, which exert specific health benefit to the human body (e.g. the peptides that inhibit the activity of angiotensin-I converting enzyme which give rise to antihypertensive and immunomodulatory effects).

Carbohydrate

The principal carbohydrate in milk is lactose, most of which is lost in whey during cheese manufacture. Only trace amount of carbohydrate remains in the cheese, this too is hydrolysed by starter lactic acid bacteria. Cheese is therefore, a safe food for lactose-intolerant people.

Lipids

Most of the cheese varieties are rich in fat. Fat affects cheese firmness, adhesiveness, mouthfeel and flavour and also provides nutrition. It contributes a significant amount of both saturated and total fat to the diet. Cheese fat generally contains 66% saturated, 30% monounsaturated and 4% polyunsaturated fatty acids. Thus, cheese represents a significant dietary source of both total fat and saturated fatty acids. The cholesterol content of cheese is a function of its fat content and ranges from approximately 10-100 mg/100 g, depending on the variety. Dietary cholesterol has much less influence on blood cholesterol level than dietary saturated fat. Thus, the cholesterol content of cheese is of lesser importance than its saturated fat content.

Vitamins and Minerals

As most of the milk fat is retained in cheese curd, the fat soluble vitamins remain in the curd while most of the water soluble vitamins are lost in whey. However, some microbial synthesis of B vitamins may occur in cheese during ripening. In general, most cheeses are good sources of vitamin A, riboflavin, vitamin B12, and, to a lesser extent, folate. Cheese contains negligible amounts of vitamin C.

Cheese is also an important source of several nutritionally important elements, including calcium, phosphorus, and magnesium. It is a particularly good source of bioavailable calcium, with most hard cheeses containing approximately 800 mg calcium/100 g cheese. Cheese has a potential role in supplying extra and highly bioavailable calcium. However, acid-coagulated cheeses (e.g., Cottage) contain considerably less calcium than rennet-coagulated varieties. Bioavailability of the calcium from cheese is equivalent to that from milk. It has been reported that 22.9, 26.7 and 25.4% of total calcium was absorbed from cream cheese, whole milk and yoghurt, respectively. Adequate calcium intake during childhood and in teenage years is important in development of high bone mass which may prevent osteoporosis in the later years.

Classification of Cheese

Several schemes to classify cheese have been proposed to assist international trade and to provide compositional and nutritional information. The basis for such classification include age, type of milk, country of origin, ripening process/agents, important compositional varieties, like moisture and fat, general appearance, texture and rheological qualities. However, none of the above schemes is complete in itself. There are about 2000 names of cheeses. It is very difficult to classify the different cheeses satisfactorily, in groups. There are probably only about 18 types of natural cheeses. These are: Cheddar, Gouda, Edam, Swiss, Brick, Herve, Camembert, Limburger, Parmesan, Provolone, Romano, Roquefort, Sapsago, Cottage, Neufchatel, Trappist, Cream and Whey cheeses.

Such a grouping, though informative, is imperfect and incomplete. These can also be classified on the basis of their rheology, and according to the manner of ripening as shown below:

1) Very hard (grating) - Moisture $< 35\%$ on matured cheese and ripened by bacteria, e.g. Parmesan, Romano.

2) Hard - Moisture $< 40\%$

a) Ripened by bacteria, without eyes: Cheddar

b) Ripened by bacteria, with eyes: Swiss

3) Semi-hard - Moisture 40-47%

a) Ripened principally by bacteria: Brick

b) Ripened by bacteria and surface microorganisms: Limburger

c) Ripened principally by blue mould:

i) External – Camembert

ii) Internal – Gorgonzola, Blue, Roquefort.

4) Soft - Moisture $> 47\%$

a) Unripened – Cottage

b) Ripened – Neufchatel

