Nutritional Value Of Dairy Products

Cheese is a dairy product, derived from milk and produced in wide ranges of flavors, textures and forms by coagulation of the milk protein casein. It comprises proteins and fat from milk, usually the milk of cows, buffalo, goats, or sheep. During production, the milk is usually acidified and adding the enzymes of rennet (or bacterial enzymes with similar activity) causes the milk proteins (casein) to coagulate. The solids (curd) are separated from the liquid (whey) and pressed into final form. Some cheeses have aromatic molds on the rind, the outer layer, or throughout. Most cheeses melt at cooking temperature.

The primary components of milk that are essential for cheese making are proteins and fat. The predominant proteins involved in curd formation are the casein proteins. When making cheese, curd formation can be accomplished through acidification, increasing temperature, or adding rennet. It is not uncommon for all three methods to be used simultaneously at different level. Rennet is a family or series of enzyme produces in the stomach of animals called ruminant mammals. The enzyme help the young digest mother's milk. In cheese making, we use rennet to separate milk into solid curds. A description of cheese and cheese making along with the science behind it can be found in Chapter 5: Cheese, Yogurt, and Sour Cream.

Cheese is valued for its portability, long life, and high content of fat, protein, calcium, and phosphorus. Cheese is more compact and has a longer shelf life than milk, although how long a cheese will keep depends on the type of cheese.

Methods chees processing

1. **Aging Method**: The milk may simply naturally sour by exposing to air and naturally occurring bacteria. The curds that form are pressed and used to form cheese.

2. **Bacterial-culture Method**: New batches of cheese are started with specific cultures of Lactobacillus bacteria, bacteria known to make milk curdle found in, for example, buttermilk and yogurt.

3. **Calf Stomach Enzyme Method**: One of the earliest methods for making cheese was accidently found when ancient people used animal stomachs as a canteen to store milk. They discovered that the milk stored in these stomachs became clumpy. It is now known that cells that line animal stomachs contain enzymes, specifically proteases. It

was subsequently found that if we add a purified form of a protease, known as rennin, that it can stimulate the formation of curds by breaking down casein into small fragments. Rennin is isolated from the cells that line calves' stomach. To retrieve the enzyme for commercial use, companies grind up calves' stomach and separate and purify the rennin enzyme from other macromolecules (proteins, carbohydrates, nucleic acids). Because of the animal source of rennin, some vegetarians and vegans do not eat rennin cheeses (e.g. cheddar cheese, asiago cheese, blue cheese).

4. **Recombinant Enzyme Method**: Scientists isolated the gene that encodes for rennin from calves' cells and inserted into a plasmid. The recombinant DNA molecule (Calf DNA + Fungal DNA) was inserted into yeast (a fungus) cells. The yeast cells produce rennin in larger amounts and faster than normally occurs in the calf's stomach. Cheese makers use the genetically engineered enzyme known as chymosin to speed curdling process. chymosin cheeses include Jack, mozzarella, and most Swiss cheeses.

Rennin: Rennin which is retrieved from the cells lining the stomachs of calves. Rennin is a type of protease, and like other proteases, it cleaves the casein into small fragments that settle out as curds.

Pasteurization, heat-treatment process that destroys pathogenic microorganisms in certain foods and beverages. It is named for the French scientist Louis Pasteur, who in the 1860s demonstrated that abnormal fermentation of wine and beer could be prevented by heating the beverages to about 57° C (135° F) for a few minutes. Pasteurization of milk, widely practiced in several countries, notably the United States, requires temperatures of about 63° C (145° F) maintained for 30 minutes or, alternatively, heating to a higher temperature, 72° C (162° F), and holding for 15 seconds (and yet higher temperatures for shorter periods of time). The times and temperatures are those determined to be necessary to destroy the Mycobacterium tuberculosis and other more heat-resistant of the non-spore-forming, disease-causing microorganisms found in milk. The treatment also destroys most of the microorganisms that cause spoilage and so prolongs the storage time of food.

Steps of making cheese:

1-Filter the milk to avoid unwanted materials.

2-Pasteurize the milk at 73 for 30 seconds.

3- Cool the milk directly to around 40ºC.

4- Add rennet enzyme to the milk

Add around a table spoon for 3 liters of milk.

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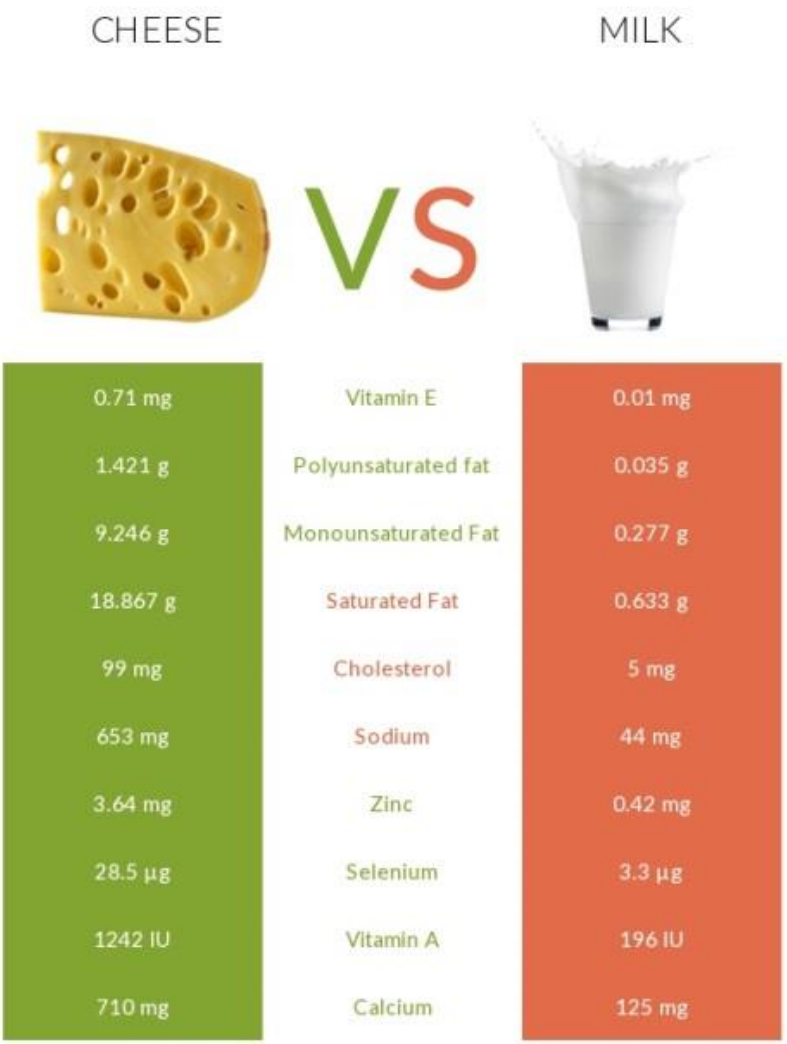
Nutritional value of milk and cheese



WHICH FOOD IS PREFERABLE IN CASE OF DIETS?

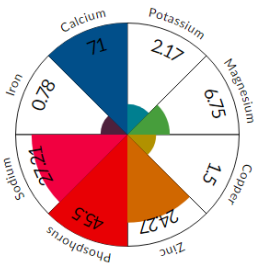
Low Calories diet Low Fats diet Low Carbs diet Low glycemic index diet

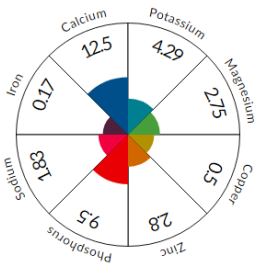
Low Calories diet		✓
Low Fats diet		✓
Low Carbs diet	✓	
Low glycemic index diet	✓	

MINERAL COMPARISON

Mineral comparison score is based on the number of minerals by which one or the other food is richer. The "coverage" chart below show how much of the daily needs can be covered by 300 grams of the food

Cheese 6 : 2 Milk





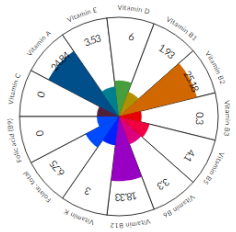
Contains more Iron +366.7%
Contains more Calcium +468%
Contains more Magnesium +145.5%
Contains more Copper +200%
Contains more Zinc +766.7%
Contains more Phosphorus +378.9%

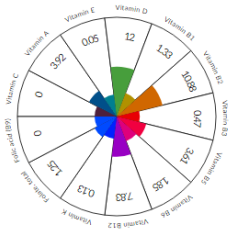
Contains more Potassium +97.4%
Contains less Sodium -93.3%

VITAMIN COMPARISON

Vitamin comparison score is based on the number of vitamins by which one or the other food is richer. The "coverage" chart below show how much of the daily needs can be covered by 300 grams of the food

Cheese 9 : 2 Milk





Contains more Vitamin A +533.7%
Contains more Vitamin E +7000%
Contains more Vitamin B1 +45%
Contains more Vitamin B2 +131.4%
Contains more Vitamin B5 +13.6%
Contains more Vitamin B6 +78.4%
Contains more Vitamin B12 +134%
Contains more Vitamin K +2300%
Contains more Folate, total +440%

Contains more Vitamin D +100%
Contains more Vitamin B3 +57.6%