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Food Science and Technology Notes

Extension Division Department of Food Science and Technology Virginia Polytechnic Institute Blacksburg, Virginia

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THE STORY OF MILK

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DAIRY PRODUCTS ARE NOT ONLY GOOD
THEY ARE GOOD FOR YOU

Milk and milk products are:

- * *Highly nutritious*
- * *Easily digestible*
- * *Excellent sources of energy*
- * *Excellent sources of protein*
- * *Excellent sources of calcium and phosphorus*
- * *Sources of many vitamins*

Milk is one of the oldest foods known to man. Cows were being milked as early as 9000 B.C. Christopher Columbus brought back cows on his second voyage to the islands of the West Indies, and the first cows brought to this country arrived at the Jamestown colony in 1611. Since then the dairy industry has played an important part in the health and growth of this country.

Dairy products are the most widely used foods in this country and account for over 17% of the food consumed annually. The retail value of the annual output of all dairy products is about \$12,900,000,000 per year. Approximately 56% of this money goes to the producers and the remaining 44% goes to the processors. However, after the processor pays wages, rent, insurance, taxes, license fees, services, supplies and advertising he ends up with only 0.9% for profit or less than 1¢ for each dollar of sales.

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Milk was designed by nature for the nourishment of the mammal's newborn. It is nature's most nearly perfect food in respect to nutrition since its nutrients are almost perfectly balanced. Because milk is used to nourish the newborn, the old and the sick, it is the most highly regulated industry. The Department of Health, the Department of Agriculture, or both, at all levels of government (federal, state, county, city) are concerned with the regulation of milk production and processing.

The major components of milk are water, fat, protein, sugar and minerals. However, there are numerous other highly important components in milk.

Water-87%: Water acts as a carrier for all the other components and is the most nutritious ingredient in any food. If most foods did not have a high water content, we would have to drink considerably more water than we do. Although milk is a liquid, it contains approximately the same amount of water as many solid foods such as potatoes (78%), fresh lean beef (77%), onions (88%), carrots (92%), asparagus (94%), and cucumbers (95%).

Carbohydrate-(sugar)-4.9%: Lactose is the major carbohydrate in milk. It accounts for about 1/2 the total solids in milk and about 30% of the calories. Lactose is about 1/6 as sweet as sucrose (common table sugar). Besides being a quick source of energy, lactose also has the advantage of being absorbed slowly in the intestinal tract and providing food for the growth of desirable lactic acid-producing bacteria. This is important because intestinal bacteria synthesize the vitamins, biotin, riboflavin, and folic acid which are essential for health. Lactose also stimulates the absorption of calcium into the body.

Fat-3.9%: Fat contributes about 48% of the calories of whole milk. Fat for years has been considered commercially the most valuable milk constituent. The producer is paid a rate based on 100 lbs. of milk containing 3.5% butterfat and is then paid a premium for each additional 0.1% of fat that the milk contains.

Fat is the best possible energy source for the body. Milk fat acts as a carrier for the fat-soluble vitamins, A, D, E, and K in milk. Milk fat contains at least 64 different fatty acids including a large amount of small, chained fatty acids which account for the characteristic flavor of butter. In general, about 60 to 75% of the fats in milk are saturated, 24 to 40% monounsaturated, and from 2 to 10% polyunsaturated. Milk fat is a small but dependable source of the two fatty acids considered essential for health.

Many people have the mistaken idea that milk (3.25% fat) is a high fat food. Even a slice of white bread contains 3.2% fat, many luncheon meats and hot dogs contain 30% or more fat, and potato chips have 39%.

The saturated fatty acids and the small amount of cholesterol in milk have been implicated in heart disease, and this has received a great deal of adverse publicity. The fact is that no one has been able to prove any relation between these constituents and the incidence of heart disease. It is true that plaques which build up in the arteries and restrict or block blood flow contain cholesterol. However, there is no sound evidence that cholesterol levels in the blood are the cause. Studies made by a number of highly respected heart surgeons indicate no

correlation between blood cholesterol levels and arteriosclerosis or heart disease. Cholesterol is a normal constituent of blood, and the liver synthesizes daily more cholesterol than is ingested in the average diet. Researchers have reported that unsaturated fats reduce the blood cholesterol levels, but there is no proof that high cholesterol levels in blood are the least bit injurious to health. Recent evidence has even indicated that unsaturated fatty acids may be the villain.

The per capita consumption of animal fat, eggs, and dairy products has continued to decline since World War II, while the consumption of unsaturated vegetable fats has increased, as has arteriosclerosis. This alone is a strong indication that cholesterol is not the sole cause of arteriosclerosis and atherosclerosis. Other factors such as overweight, lack of exercise, heavy cigarette smoking, heredity, and hypertension are generally accepted as playing a role in these diseases.

Protein-3.5%: The total proteins contribute about 22% of the calories in whole milk. The body is dynamic, meaning that it is constantly being broken down and built up again. Proteins supply energy to the body and are necessary for growth and repair of body tissue. Casein is the most important protein in milk and comprises about 82% of the total protein. Milk is the only known source of casein. Casein is a complete protein, meaning that it contains a good ratio of all the amino acids essential for growth, including a large quantity of lysine which is lacking in cereal and vegetable protein. Amino acids are the building blocks of all protein.

Mineral Salts-(ash)-0.7%: From the standpoint of its assortment of minerals and their availability to the body, milk is one of the best foods known. Milk is not a good dietary source of iron, copper, iodine, and manganese, but contains at least 13 minerals that are believed to be essential. Calcium and phosphorus are the most important minerals in milk. Both minerals are essential for building bones and teeth. Milk is the main source of calcium in the American diet, and it has the added advantage of containing calcium and phosphorus in the same ratio as found in the human skeleton. One quart of milk a day would supply 105% of the daily requirement for girls and 83% of the requirement for boys. It would be difficult as well as impractical to provide the body with the recommended daily amounts of dietary calcium without using milk or milk products. One quart of milk supplies as much calcium as 20 eggs, 26 lbs. of lean beef, 10 lbs. of green peas, 5 lbs. of whole-wheat bread or 2-1/4 lbs. of oatmeal.

A recent survey has indicated that seven million women are afflicted with osteoporosis, a bone deterioration disease resulting from insufficient calcium in the diet. Due to a lack of required calcium, a person's height and strength may be reduced; bone fractures, particularly in the vertebrae, are common but not always apparent. Experimental research shows that young mothers with poor diets, whose consumption of calcium and other nutrients was insufficient during teen years, are experiencing more birth difficulties. This lack of calcium in the diet has been credited to the low consumption of milk and other dairy products.

In addition to these five major groups, milk contains other beneficial constituents including vitamins. All the vitamins known to be required by man

have been found in milk, including vitamin A, vitamin D, riboflavin, niacin, and thiamine.

Vitamin A: Vitamin A and its precursor, carotene, are present in high concentrations in milk fat. Vitamin A aids in maintaining a healthy and normal condition of the skin and is associated with vision in a subdued light.

Vitamin D: Milk is commercially fortified with 400 I.U. per quart of vitamin D. Since vitamin D regulates the utilization of calcium and phosphorus, it is essential for proper development of bones and teeth.

Riboflavin: Milk is an abundant source of this vitamin which is important for the proper growth, the sense of sight, the nervous system and for healthy skin and hair.

Niacin: Although niacin occurs in milk at a low level, it is in a fully available form. In addition, milk proteins are a good source of the amino acid, tryptophan, from which niacin is formed in the body.

Thiamine: Milk contains significant amounts of thiamine which is important in the prevention and cure of beriberi.

Reference: "Newer Knowledge of Milk," 3rd Edition, National Dairy Council, Chicago, Illinois 60606