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Lecture title: **Definition of Milk**

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Summary:

Definition of Milk

According to the US Code of Federal Regulations, Milk is a white liquid produced by the mammary glands of mammals, It is the primary source of nutrition for infant mammals before they are able to digest other types of food. Milk obtained by the complete milking of one or more healthy cows, which contains not less than 8.25% of milk solids-not-fat and not less than 3.25% of milk fat.

Definition types of milk

There are three definition types of milk

1. Biological definition

2. Chemical definition

3. Legal definition

1. Biological definition

Milk is a normal secretion of the mammary glands of mammals, its primary natural function being nutrition of the young. Milk of some animals, especially cows, buffaloes, goats, sheep, camel, horses is also used for human consumption, either as such or in the form of a range of dairy products.

2. Chemical definition

Milk is a complex chemical nature. It is an emulsion of fat in a watery solution of sugar, mineral salts, and with protein in the colloidal dispersion divided particles 1-100 millimicron in diameter.

3. Legal definition

milk is whole lacteal secretion obtained by the complete milking of one or more healthy cows and obtained 15 days before calving or 5 days after calving and free from colostrum. The milk contain: 8.25% milk solids not fat and 3.25% milk fat.

Why Milk is Important

Milk production began 6000 years ago or even earlier. Cows are the most common dairy animal in the world. However, water buffalo, goat, sheep, camel, and mare also contribute significantly to milk production in certain parts of the world.

The important of milk for animals

Milk is an excellent functional and live biological fluid.

The young of the species depends on the mother's milk for:

1. Growth and development.
2. For vital immune support during early stages of life.
3. Vital protective factors such as immunoglobulins and antibacterial factors such as lysozyme and lactoferrin in mother's milk provide much protection against most childhood infections.
4. Milk supplies a numerous of constituents to help in digestion processes (proteinases, lipases).
5. Milk supplies hormones essential for the growth of the neonate.

Colostrum

Colostrum is the milk from first and subsequent 72 hour of milking of cow immediately after calving. Colostrum is much more concentrated than normal milk. It contains high amounts of milk solids as well as numerous quantities of immunoglobulins to transfer immunity from mother to the offspring.

Colostrum having twice the level of total solids (25%) and a very much higher level of protein (15%) due to the high level of antibody present. This is why heating colostrum leads to its coagulation and why Dairy Regulations state that milk should be discarded for the first 4 days after calving.

Composition of milk

The nutritional and physiological requirements of different species are different. Consequently, milk composition is species-specific and therefore, varies considerably. Milk is predominantly (80–87%) water. The major components of milk solids are carbohydrate, fats, protein and lactose (Table 1).

Table 1: Composition of milk from different types of animals

Animal	Protein total %	Casein %	Whey protein %	Fat %	Carbo-hydrate %	Ash %
Human	1.2	0.5	0.7	3.8	7.0	0.2
Horse	2.2	1.3	0.9	1.7	6.2	0.5
Cow	3.5	2.8	0.7	3.7	4.8	0.7
Buffalo	4.0	3.5	0.5	7.5	4.8	0.7
Goat	3.6	2.7	0.9	4.1	4.7	0.8
Sheep	5.8	4.9	0.9	7.9	4.5	0.8

Milk composition change after milking

Milk composition continues to change after milking, depending on how it is stored or treated.

1. Physical and chemical equilibria related to proteins and minerals are susceptible to shifts caused by changes in pH and temperature.
2. The enzymes of raw milk could induce alterations in oxidation/ reduction system, and degradation of proteins and lipids.

3. The growth of microorganisms could induce a cascade of changes.
4. Loss of CO2 from raw milk changes acid–base equilibrium.
5. The structure of milk fat globule membrane (FGM) is in fluctuation and vulnerable to changes. In fact, manipulation of chemical system, enzyme system, and resultant physical structure holds great promise for optimizing processing, technological, nutritional, and therapeutic aspects of milk and milk-derived foods.