Milk : Nutrition Level, Processed Products and Standards

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Milk is a nutritious food with an excellent source of energy, protein, fat, carbohydrates, vitamins and minerals. Cows' milk is the type of milk most commonly consumed. Other types that are also used are buffalo milk and goat milk. Milk should always undergo some form of heat processing such as pasteurisation, sterilisation or ultra high temperature (UHT) treatment prior to consumption. This is to ensure that any harmful micro-organisms present are destroyed before the milk is consumed and its keeping qualities are improved.

Nutrition Level of Milk

Milk and dairy products are an important part of a healthy diet suitable for all age groups except for children under 12 months of age for whom mother's breast milk is the best. It is recommended in the Food Based Dietary Guidelines for Sri Lanka that we consume at least 1 – 2 servings (serving = 200 ml) of dairy products a day. Inclusion of milk or other dairy products make a major contribution to the nutrient intake in the daily diet and are among the basic food groups needed each day for a balanced diet (Figure 1). Milk is an important food from a nutritional perspective, largely due to the presence of proteins and calcium. Table 1 shows the serving size for different milk and milk products and the nutrient content per serving.

Milk Fat

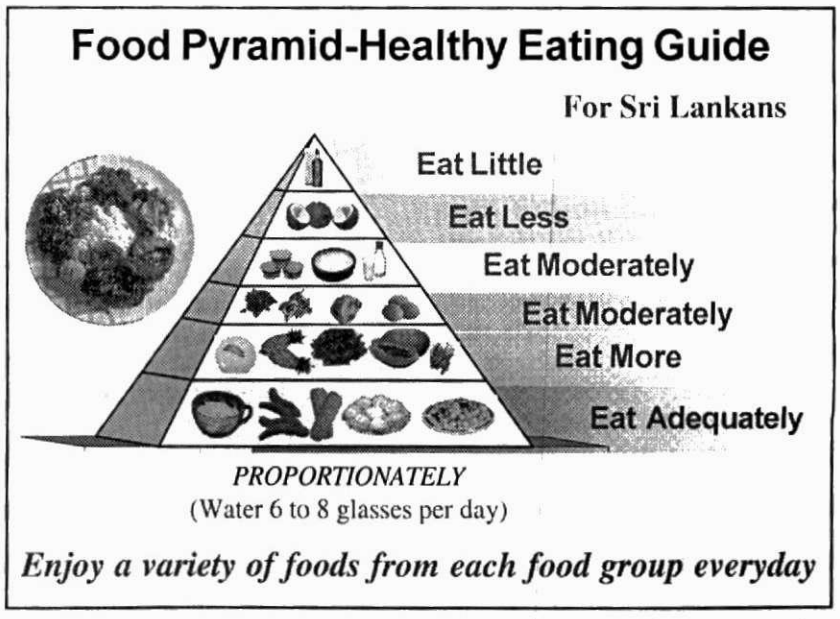
It is not ***always*** true that altering the dietary intake of fat, containing cholesterol, will alter the blood cholesterol level. Other factors such as the total diet, genetics, and physical activity level play an important role. The level of cholesterol in milk fat is 0.35 percent, whereas the level in milk is about 0.014 percent. Cholesterol levels in human blood average around 200 milligrams per 100 milliliters. Milk fat contains as much as 25 percent cis 18:1 fatty acid, one of the healthy fatty acids thought to help prevent heart disease.

Children fed cow's milk during the first 8 days of life are twice as likely to develop insulin-dependent diabetes mellitus [IDDM] as children who are not fed cow's milk during the first week of life.

Milk Proteins

Milk is an excellent source of protein in man's diet. Milk proteins consist of casein and whey proteins , α lactalbumin and β lactoglobulin. Casein precipitates when milk is acidified to a pH of 4.7, which occurs in the manufacture of fermented milk products like curd, yoghurt and cheese.

Figure 1



Milk Sugar- Lactose Intolerance

Lactose intolerance is a disease characterized by symptoms such as abdominal cramps, bloating, and diarrhoea, brought about by the inability to metabolize lactose. This condition is more prevalent among Asians and Africans. It is not a normal occurrence among young children, and the incidence rises as age increases.

Lactose, often called the milk sugar, is primarily found in milk. The level in bovine milk is around 5 per cent. This relatively high concentration means that digestion of milk can be a problem for people who suffer from this disease. Lactose is a disaccharide consisting of glucose and a galactose molecule joined by a glycosidic covalent bond. In normal digestion, an enzyme called lactase will hydrolyze lactose, producing glucose and galactose, which are subsequently further metabolized in the body. People who suffer from lactose intolerance lack this enzyme. The onset of symptoms is related to the level of lactose ingested. Small amounts of milk may not be a problem for some people who would otherwise suffer from lactose intolerance.

Lactose is found in relatively large quantities in milk, ice cream, and other nonfermented milk products. It is not usually found in matured cheese. Very small amounts may be found in yogurt and fresh cheeses, such as cottage or cream cheese, but probably not sufficient to cause lactose intolerance symptoms.

A remedy to aid digestion is to consume lactase in liquid form. An alternative solution is to manufacture low-lactose milk by the addition of lactase during processing. This step will produce much sweeter milk, as both glucose and galactose are sweeter than lactose. To prevent the problem of excessive sweetness in milk, lactose levels must be reduced before the hydrolysis step takes place. Other more novel techniques involve adding lactic acid bacteria to cold milk; the bacteria remain dormant until the milk is consumed and warmed up in the body. They then metabolize lactose in the human gut.

Vitamins and Minerals in Milk

All of the essential vitamins are found in milk, although in some cases the amount is not sufficient to meet the recommended daily allowance. Vitamin C levels are reduced by approximately one half under pasteurization conditions; however, this is of limited concern, as milk is such a poor source of this vitamin.

Folic acid and thiamin (vitamin B_1) are reduced by around 10 percent during pasteurization. The water-soluble vitamins (B and C) are largely lost into the whey during cheese making, whereas the fat-soluble vitamins are concentrated, although some molds are capable of synthesizing vitamin B in mold-ripened cheeses. Riboflavin has an orange color that is more evident in skim milk than whole milk, and can be seen very clearly if fat and protein are removed from milk by membrane filtration. A vitamin A precursor, ß-carotene, gives milk fat its characteristic yellow colour.

Milk is an important source of vitamins A and D, the latter due largely to fortification, which is a common practice. Milk is otherwise a poor source of vitamin D; however, it assists in the absorption of dietary calcium.

Dairy products are a good source of many minerals, particularly calcium where it furnishes the dietary need depending on consumption pattern. The bioavailability of calcium from milk products is around 80 percent, compared to 20–75 percent from vegetable sources. Main sources of calcium in Sri Lankan diet are green leafy vegetables, pulses, cereals and soy based foods as our dairy based food consumption is usually low.

Other trace elements of nutritional importance found in milk include iodine, which is required for thyroid hormone production, magnesium for energy-requiring biological functions, and zinc for the function of some enzymes in the human body. Bovine milk is a poor source of dietary iron; children can develop anaemia if not breast-fed with human milk (which contains a higher bioavailability of iron compared to bovine milk) or if other dietary sources are not found.

Processed Milk Products

Milk has been derived from many types of mammals and put to different uses over the centuries. This has resulted in the development of a number of products from milk. These include butter, cheese, cream, curd and yogurt in addition to the different forms of powdered milk. The high water content and only slightly acidic pH render milk susceptible to microbiological spoilage. The dairy processing industry has developed to circumvent the spoilage issue through the manufacture of products with low moisture and higher acidity. This allows the development of dairy products, as milk products can now be shipped to distant lands without compromising quality and safety. The variety of dairy products, most notably illustrated by the seemingly unending array of yoghurts and cheeses, is a testimony to the potential of milk for continued development of nutritious and tasty milk-based foods.

Nutritional composition of different milk products are given in Table 2.

Major processed milk products available in Sri Lanka

There are several processed milk products manufactured in Sri Lanka. These will be discussed below.

Standardized Milk is cow milk and/or buffalo milk that have been standardized to fat of 3.25 % and milk solids other than milk fat of 8.25 %. **Recombined milk, Reconstituted Milk and Lactose hydrolysed Milk** should also have the same fat and milk solids other than fat levels.

Semi-skimmed Milk/Low Fat Milk is a product prepared by the partial removal of milk fat from cow milk and/or buffalo milk that has a maximum fat content of 2.0 % and milk solids other than milk fat content of 8.5 %.

Skimmed Milk/Non Fat Milk is a product prepared from cow milk and/or buffalo milk from which almost all the milk fat has been removed so that it has a maximum fat content of 0.5 % and milk solids other than milk fat content of 8.5 %.

Pasteurized Milk is milk that has been heated in such a way that every particle of milk is heated to at least 63°C and not more than 65° C and held continuously at that temperature for at least 30 minutes or heated to at least 71.5°C and held at that temperature continuously for at least 15 seconds or any other approved equivalent temperature–time combination that will serve to give a negative phosphatase test, and cooled immediately to a temperature of 4°C and kept at a temperature not more than 10°C until sale.

Sterilized Milk is milk that has been filtered, homogenized and thereafter heated to and maintained at a temperature of not less than 100°C for a length of time, without appreciable loss of volume, sufficient to render it commercially sterile and packed in hermetically sealed containers.

Liquid milk is available according to the percentage of fat: 1%, 2%, whole milk (3.25 %), and skim (less than 0.5% fat). The milk can be fortified with vitamins A and D.

Ultra Heat Treated Milk (Ultra High Temperature Milk) or U.H.T. Milk is milk that has been heated, without appreciable loss of volume, to a temperature of 135°- 150°C for not less than 4 seconds , essentially sterilizing the milk, and then be filled and sealed aseptically into sterile containers and can be stored at room temperature for up to six months. The main methods of producing UHT milk are by indirect heating by passing milk over a stainless steel surface that is heated by high pressure steam in a tubular heat exchanger or a scraped surface heat exchanger.

Flavoured Milk is a product with a minimum fat content of 2.0% and a milk solids other than milk fat content of 7.2%, prepared from milk, recombined milk, milk powder or condensed milk and suitable ingredients, or other permitted flavouring, with or without permitted food additives and effectively heat treated.

Flavoured milks are becoming increasingly popular as a nutritious beverage, particularly among young people. UHT sterilized flavoured milk with a shelf life of more than 3 months are often low in fat and may contain added stabilizers (such as gelatine, lecithins, alginates, pectins, alginates, microcrystalline cellulose, mono and diglycerides of fatty acids, xanthan gum, guar gum and carrageenan) to compensate for the loss in creaminess.

Evaporated Milk are milk products which can be obtained by the partial removal of water from milk by heat, or by any other process which leads to a product of the same composition and characteristics.

Sweetened Full Cream Condensed Milk is a milk product which can be obtained by the partial removal of water from milk with addition of sugar which leads to a product of the same composition and characteristics. The removal of water is done by heating under reduced pressure to avoid excessive heat damage to proteins

Milk Powder is prepared from milk obtained from fresh cow milk or buffalo milk or a mixture, standardized by adjustment of suitably processed milk solids by the addition and/or withdrawal of milk constituents in such a way as not to alter the whey protein to casein ratio of the milk being adjusted, prior to spray drying in a manner that minimizes the loss of nutritive value, particularly protein quality.

Types of milk powder manufactured include skim milk powder (SMP), whole milk powder (WMP). WMP contains a minimum of 26 percent fat, whereas SMP contains less than 1.5 % fat.

Yoghurt is a coagulated milk product obtained by fermentation through the action of a harmless lactic acid producing bacterial culture on any type of liquid milk and milk products or any type of milk powder and whey proteins. These microorganisms must be viable and abundant in the final product.

Yoghurt probably originated in the Middle East, where milk was soured by the presence of naturally occurring bacteria. It is a favorite food in India, where it is unflavored and made from buffalo milk. Lactic acid bacteria (a 1:1 ratio of *Lactobacillus delbrueckii* ssp. *bulgaricus* and *Streptococcus thermophilus*) convert lactose

to lactic acid in milk, lowering the pH from 6.7 to around 4.2 and give yoghurt its characteristic clean, acid taste. Often fruit and fruit flavorings are added to make yoghurt into a dessert or snack product. The trend is for reduced fat (or nonfat) yoghurt where the fat content in yoghurt is typically not more than 0.5 %.

To enhance the creaminess sensation of reduced or non fat yoghurt, polysaccharide stabilizers such as gelatin, pectin, modified starches or agar agar could be added. Probiotic cultures, such as *Lactobacillus* species (*casei* and *acidophilus*) and *Bifidobacterium* species can be added to yoghurt and also to milk protein-based beverages. The combination of bacterial cultures, including probiotic cultures, found in yoghurt has long been believed to provide good health. Yoghurt interacts directly and indirectly with the gut flora to maintain healthy intestinal function.

The shelf-life of yoghurt at 39°F (4°C) is generally 14 days. The two main types of yoghurt are stirred and set. In set yogurt, milk is allowed to coagulate to form the yoghurt network structure without mechanical disturbance. In stirred yoghurt, the coagulated milk is stirred while cooling down and then the fruit puree is added, if required.

Curd is the fermented milk product obtained from coagulation of cow milk or a combination of cow and buffalo milk by a harmless lactic acid producing bacterial culture, while Buffalo Curd is the similar product obtained from buffalo milk.

Dairy Cream is the milk product comparatively rich in fat separated from milk, which takes the form of an emulsion of fat-in-skimmed milk.

Butter is a fatty product derived exclusively from milk and/or products obtained from milk. Cream, which is a oil–in-water emulsion, is pasteurized, deodourized and aged prior to churning and working to convert it into butter which is an emulsion of the type water-in-oil

Buttermilk, Butter oil and Ghee

Buttermilk is a by-product of churning in butter manufacture. It is low in fat (about 1%), and rich in the phospholipids and protein components at the milk fat globule membrane layer. Milk fermented with lactic acid bacteria and subsequently separated into cream used in the manufacture of cultured or ripened butter. Cultured buttermilk is derived from cultured butter.

Butter oil is produced by centrifuging liquid butter to a fat content in excess of 99%, the remainder being mostly water. This product is solidified at room temperature. A higher grade, at more than 99.8 % fat, is called anhydrous milk fat.

Ghee is the product exclusively obtained from milk, cream, or butter by means of process which result in almost total removal of water and non-fat-solids and in the development of a characteristic flavour and texture.

Ghee is similar in composition to butter oil and used for confectionery manufacture and for cooking in India and in Egypt. Buffalo milk is boiled for one hour; the curd skimmed off, and churned for thirty minutes to form butter. This is heated and strained to yield ghee, clear oil with a characteristic flavour.

Cheese is the fresh or matured solid or semi-solid product in which the whey protein/casein ratio does not exceed that of milk and is obtained by coagulating (wholly or partly any type of liquid milk, cream or buttermilk or any combination, through the action of rennet or other suitable coagulating agents, and by partially draining the whey resulting from such coagulation and/or by processing techniques involving coagulation of milk and / or materials obtained from milk which give an end product which has similar physical, chemical and organoleptic characteristics. Cheese is categorized as hard cheese semi-hard cheese and soft cheese.

Processed Cheese and Cheese Spread or Cheese Paste are obtained by grinding, mixing, melting and emulsifying one or more varieties of cheese.

Ice Cream is the frozen product obtained from cow or buffalo milk or a combination,or from cream and /or milk products with or without the addition of carbohydrate sweetners, maltodextrin, edible fats, eggs, fruit products, nuts, chocolate or other similar substances, edible flavours and permitted colouring substances, subjected to an acceptable heat treatment before freezing.

Dairy based drinks

Highlighting Dairy Products Used as Ingredients in Other Foods

Highlighting the presence of a dairy ingredient, either within the common name of a food or as a separate claim, is often encountered. This should only be done when the dairy ingredient is present in a significant proportion and a statement of the amount of the dairy ingredient should be made in close proximity to the common name or claim.

When a food includes a dairy flavour, such as cheddar cheese flavour, which is highlighted on the label, the words "flavour" or "artificial flavour" should accompany the flavour designation. When flavours are used to characterize a product, claims must not give the impression that the flavour is a result of the presence of a dairy ingredient.

Standards for Milk Products

All foods have a potential to cause food borne illness and milk and milk products are no exception. Milking procedure, subsequent pooling and the storage of milk carry the risk of contamination from the animal or man or the environment or the growth of inherent pathogens. Further, the composition of many milk products makes them good media for the growth of pathogenic microorganisms. The potential also exists for the contamination of milk with residues of veterinary drugs, pesticides and other chemical contaminants.

Therefore, implementing proper hygienic control of milk and milk products throughout the food chain is essential to ensure the safety and suitability of these foods for their intended use.

Code of hygienic practices for milk and milk products, regulations and standards on milk and milk products provide guidance to maintain the appropriate level of public health protection and prevent unhygienic practices and conditions in the production, processing and handling of milk and milk products. Mandatory regulations on milk and milk products in Sri Lanka come under the Food Act No 26 of 1980 and its amendment of 1991.Food regulations and standards related to milk and milk products under the above Food Act are mandatory and are:

- Food (Standards) Regulations 1989 No: 673/8 of 01/08/1991 on milk and milk products
- Food(Standards) Regulations 1989 No: 823/16 of 16/06/1994 on butter, ghee, cheese, yoghurt, curd, ice cream malted food (malted milk powder)
- Food Regulations-1988 No: 560/13 of 02/06/1989 on food hygiene
- Food(Labeling and Advertising) Regulations 2005 No:1376/9 of 19/01/2005 on labeling and addition of nutrients.

The first two regulations will be replaced by Food (Milk and Milk Products) Regulations very soon. The final draft of this regulation has been prepared.

There are also standards for milk and milk products available under the Sri Lanka Standards Institution.

- Sri Lanka Standard Specification for milk powder (SLS 731)

- Sri Lanka Standard Specification for Sweetened full cream condensed milk (SLS 179)
- Sri Lanka Standard Specification for Raw and processed milk (SLS 181)
- Sri Lanka Standard Specification for Ice cream (SLS 223)
- Sri Lanka Standard Specification for Butter (SLS 279)
- Sri Lanka Standard Specification for Infant formula (SLS 651)
- Sri Lanka Standard Specification for Cheese (SLS 773)
- Sri Lanka Standard Specification for Fermented milk products Part 1 Curd
- Sri Lanka Standard Specification for Fermented milk products Part 2 Yoghurt (SLS 824)
- Sri Lanka Standard Specification for Milk added drinks (SLS 917)
- Code of Hygienic Practice for Dairy Industries (SLS 872)

The above SLS specifications define the essential composition and quality factors, food additives, contaminants, hygiene, labeling and methods of analysis and sampling of milk samples. As with all foods with a standard of identity, the use of a common name of a standardized dairy product is restricted to foods that meet the provisions set out in the standard for composition, strength, potency, purity, quality for that food.

- Draft revised Standard for Infant Formulas and Formulas for Special Medical Purposes intended for Infants are to be submitted for adoption

The appropriate common name must be used when referring to a milk product. For example, "**skim milk powder**" or "**low fat milk powder**" should not be referred to as "**milk**" or "**powdered milk**", nor should "**chocolate partly skimmed milk**" be called "**chocolate milk**". It is generally considered acceptable to identify a product by use of a trade name provided the product has first been clearly identified by its common name. It is essential that the trade name would not mislead the consumer.

A food that deviates from the prescribed standard may not use the common name prescribed by the applicable standard unless the standardized common name is modified to indicate how the food differs in every respect from the food described by the standard.

For example, Cheddar Cheese must contain a minimum of 31% milk fat. A cheese made exactly like cheddar cheese in every respect except for a lower milk fat content, would have to indicate, within the common name, that the product has a lower fat content than "cheddar cheese". Such a product might be called "Reduced Fat Cheddar Cheese" providing all the compositional and labeling requirements for a "reduced fat" claim were met.

International standards applicable to milk and milk products

The Codex Alimentarius Commission has many standards related to milk and milk products. The latest versions of the standards can be downloaded from their website http://www.codexalimentarius.net.

- CAC/RCP 57 2004 Code of hygienic practice for milk and milk products
- CXS A 01 Codex standard specification for butter
- CXS A02 Codex standard specification for milkfat products
- CXS A 03 Codex standard specification for evaporated milk
- CXS A 04 Codex standard specification for sweetened condensed milk
- CXS A 06 Codex General standard for cheese
- CXS A 08 Codex standard for Processed and spreadable processed cheese
- CXS A 09 Codex standard specification for cream
- CXS 243 Codex standard specification for fermented milk
- CXS 072 Codex standard specification for infant formula and formulas for special medical purposes for infants
- CXS 156 Codex standard specification for follow up formula
- CXS 253 Codex standard specification for dairy fat spread
- CXS 207 Codex standard for milk powder and cream powder

The products covered by these standards should also comply with the maximum limits for contaminants and the Maximum Residue Limits (MRL)/ Extraneous Maximum Residue Limits (EMRL) for pesticides and veterinary drugs established by the Codex Alimentarius Commission.

- CXS 193 Codex Standard on Contaminants and Toxins in Foods
- CAC/ MRL 1 and CAC/MRL 3 Codex Pesticides Residues in Foods

  (Codex has specified MRLs/ EMRLs for 88 pesticides in milks)
- CAC/MRL 2 Codex Residues of Veterinary Drugs in Foods

  (Codex has established and MRLs for 27 veterinary drugs in milks)

In addition to the permissible food additives given in the product standards these products should also comply with the latest revision of the following Codex standard:

- Codex Stan 192 Codex General Standard on Food Additives

It is recommended that the products covered by the provisions of these standards be prepared and handled in accordance with the appropriate sections of the

- Recommended International Code of Practice – General Principles of Food Hygiene

  CAC/RCP 1
- Code of Hygienic Practice for Milk and Milk Products CAC/RCP 40
- Other relevant Codex texts.

The products should also comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21).

The objectives of having these Codex guidelines and regulations are to protect the consumer and facilitating fair practices in food trade. Non-mandatory in nature, Codex standards and related texts have, since 1995, become international benchmarks for harmonization under the SPS and TBT Agreements of WTO. The draft regulation on Milk and Milk Products due to be gazetted in the near future under the Food Act have taken into consideration these International Codex standards during drafting.

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Table 1: Nutrient content per serving of milk and milk products

Serving Gms	Milk or Milk products	Energy kcal	Protein g	Fat g	Carbohydrate G	Calcium Mg	Phosphorus mg	Iron mg	Vitamin A Mcg	Carotene mcg	Thiamin mg	Riboflavin mg	Niacin mg	Vitamin C mg
100	Milk, cow's	67	3.2	4.1	4.4	120.0	90.0	0.20	52.2	6.0	0.1	0.2	0.1	2.0
25	Milk, condensed, sweetened (skim) cow's	68	2.6	0.1	14.5	125.0	75.0	0.13	0.0	0.0	0.0	0.1	0.1	0.5
50	Milk, evaporated, unsweetened, cow's	68	3.5	4.0	4.8	127.5	101.0	0.10	30.0	25.0	0.0	0.2	0.1	0.5
100	Milk, liquid, skim	29	2.5	0.1	4.6	120.0	90.0	0.20	0.0	0.0	0.0	0.0	0.1	1.0
13.5	Milk, powdered, skim, cow's	48	5.1	0.0	6.9	185.0	135.0	0.19	0.0	0.0	0.1	0.2	0.1	0.7
13.5	Milk, powdered, whole, cow's	67	3.5	3.6	5.1	128.3	98.6	0.08	70.2	0.0	0.0	0.2	0.1	0.5
10	Butter	73	0.0	8.1	0.0	0.0	0.0	0.00	96.0	0.0	0.0	0.0	0.0	0.0
200	Buttermilk	30	1.6	2.2	1.0	60.0	60.0	1.60	0.0	0.0	0.0	0.0	0.0	0.0
20	Cheese	70	4.8	5.0	1.3	158.0	104.0	0.42	16.4	0.0	0.0	0.0	0.0	0.0
100	Curds	60	3.1	4.0	3.0	149.0	93.0	0.20	30.6	0.0	0.1	0.2	0.1	1.0
80	Yoghurt (from partially skimmed milk)	72	2.9	0.6	14.1	112.0	104.0	0.08	8.0	0.0	0.0	0.1	0.1	0.0
80	Yoghurt (from skimmed milk)	61	2.8	0.1	12.4	96.0	80.0	0.08	0.0	0.0	0.0	0.1	0.1	0.0
20	Malted Milk	83	3.1	1.8	13.1	70.0	0.0	0.42	16.8	0.0	0.1	0.1	0.0	0.0
180	Tea	215	3.7	4.3	42.1	136.9	105.2	0.09	74.9	0.0	0.0	0.2	0.1	0.0
180	Milk coffee	226	4.2	4.4	42.5	141.6	110.9	0.23	74.9	0.0	0.0	0.2	0.1	0.0

Table 2 : PROXIMATE PRINCIPLES, MINERALS AND VITAMINS
(Values are per 100g. of edible portion)

(11) MILK & MILK PRODUCTS

Name of Foodstuff	Moisture	Energy	Proteins	Fats	Carbohydrates	Fibre	Ash	Calcium	Phosphorus	Iron	Sodium	Potassium	Copper	Zinc	Retinol	Carotene	Carotene B	Vitamin A	Thiamine	Riboflavin	Niacin	Vitamin C	Waste as purchasedsed
	(g)	(Kcal)	(g)	(g)	(g)	(g)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	(µg)	(µg)	(µg)	(µg)	(mg)	(mg)	(mg)	(mg)	(%)
Milk, buffalo, fluid, full cream	78.6	131	6.2	9.8	4.6	0	0.8	189	117	0.2	-	-	-	-	54		21	58	0.04	0.06	1.3	0	
Milk, cow's, fresh	87.5	67	3.2	4.1	4.4			120	90	0.2	73	140	-	-		174			0.05	0.19	0.1	2	0
Milk, goat's, fluid, full cream	86.8	72	3.3	4.5	4.6			170	120	0.3	11	110	-	-		132			0.05	0.04	0.3	1	0
Milk, human	88.0	65	1.1	3.4	7.4	-		28	11	0.1						137			0.02	0.02	..	3	0
Milk, human, 1 month lactation, per 100 ml	90.5	52	0.9	2.0	7.7	0	0.25	33	12	0.1	-	-	-	-	-		-	-	0.01	0.03	0.2	-	
Milk, human, 3 month lactation, per 100 ml	90.1	56	0.8	2.5	7.6	0	0.25	26	11	0.3	-	-	-	-	-		-	-	0.01	0.02	0.2	0	
Milk, human, 6 month lactation, per 100 ml	90.5	56	0.8	2.5	7.6	0	0.23	23	10	0.1	-	-	-	-	-		-	-	0.01	0.02	0.2	-	
Milk, condensed, sweetened (whole) cow's	25.1	337	8.2	8.9	56.0	0	1.8	302	213	0.4	120	6	-	-	223		46	231	0.32	0.43	0.4	Op	
Milk, filled, condensed, sweetened	25.4	339	8.5	9.5	54.8	0	1.8	292	227	0.3	106	268	-	-	280		0	280	0.59	0.44	0.2	1	
Milk, evaporated, filled	72.9	134	7.7	6.7	10.8	0	1.9	320	206	0.2	129	4	-	-	158		11	160	0.06	0.09	T	0	
Milk, liquid, skim	92.1	29	2.5	0.1	4.6	-		120	90	0.2						-			..	..	0.1	1	0
Milk, powdered, skim, cow's	4.1	357	38.0	0.1	51.0	-		1370	1000	1.4						0			0.45	1.64	1.0	5	0
Milk, powdered, whole, cow's	3.5	496	25.8	26.7	38.0	-		950	730	0.6						1400			0.31	1.30	0.8	4	0
Milk, powder, reduced fat	2.9	405	30.4	11.6	44.8	0	10.3	1734	828	15.3	338	1322	0.02	3.3	1450		-	-	0.42	1.79	1.0	121	
Milk, powder, infant formula	2.6	500	16.6	24.9	52.4	-	3.5	566	249	5.9	188	486	-	-	311		83	325	0.56	1.31	0.7	-	

Table 2 ctd : PROXIMATE PRINCIPLES, **MINERALS AND VITAMINS**
(Values are per 100g. of edible portion)

(11) MILK & MILK PRODUCTS

Name of Foodstuff	Moisture	Energy	Proteins	Fats	Carbohydrates	Fibre	Ash	Calcium	Phosphorus	Iron	Sodium	Potassium	Copper	Zinc	Retinol	Carotene	Carotene B	Vitamin A	Thiamine	Riboflavin	Niacin	Vitamin C	Waste as purchased
	(g)	(Kcal)	(g)	(g)	(g)	(g)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	(µg)	(µg)	(µg)	(µg)	(mg)	(mg)	(mg)	(mg)	(%)
Milk powder, filled, instant	2.2	508	26.2	28.0	37.8	0	5.8	854	688	0.3	-	-	-	-	750		30	755	0.26	0.21	-	-	
Milk, powder, skim, instant	3.6	361	34.9	(1.0)	53.1	0	7.4	1146	860	6.4	-	-	-	-	80		10	82	0.36	1.05	-	48	
Milk, powder, skim, unenriched	2.4	362	40.8	(0.8)	48.0	0	8.0	1318	949	5.4	-	-	-	-	30		15	33	0.39	0.09	-	-	
Milk, whole, pasteurized, sweetened, per 100 ml	88.4	77	3.2	3.3	8.5	0	0.8	96	81	0.1	48	-	-	-	33	0.03	-	-	0.4	0.20	-	-	
Milk, pasteurized, chocolate flavor, per 100 ml	87	83	3.0	3.2	10.6	-	0.9	101	89	0.1	47	-	-	-	35		-	-	0.03	0.19	-	-	
Milk, pasteurized, coffee flavor, per 100 ml	88.3	70	2.7	2.5	9.1	-	0.8	98	-	0.1	48	-	-	-	36		-	-	0.03	0.20	-	-	
Milk , Pasteurized, natural, per 100 ml	90.6	62	3.2	3.7	3.9	0	0.8	102	81	0.1	45	-	-	-	35		-	-	0.04	0.21	-	-	
Milk, pasteurized, strawberry flavor, per 100 ml	87.9	76	2.9	3.2	8.8	0	0.7	103	-	0.2	53	-	-	-	26		-	-	0.04	0.21	-	-	
Milk, sterilized	88.1	62	3.2	3.4	4.6	0	8.0	93	81	0.1	67	114	-	-	40		0	40	0.03	0.48	0.9	8	
Milk, sterilized, per 100 ml	89.7	61	3.3	3.4	4.2	0	0.7	114	82	0.2	52	-	-	-	35		-	35	0.03	0.11	T	4	
Milk, UHT, chocolate flavor	83.6	73	3.3	2.1	10.3	-	0.7	120	87	0.3	54	126	-	-	13		5	14	0.03	0,36	0.2	1	
Milk, UHT, chocolate flavor, per 100 ml	88.0	79	3.2	2.6	10.6	-	0.7	121	89	0.2	48	154	-	-	18		-	-	0.02	0.14	0.1	0	
Milk, UHT, full cream, per 100 g	85.3	73	3.5	3.4	7.1	0	0.7	109	93	0.1	36	98	-	-	26		0	26	0.03	0.33	0.3	-	
Milk, UHT, full cream, per 100ml	89.3	67	3.3	3.8	4.9	0	0.9	113	90	0.1	51	123	-	-	29		-	-	0.03	0.4	0.5	-	
Butter	19.0	729	..	81.0	..	-		..	..	..						3200			-	-	-	-	0
Butter, pure creamy, salted	14	758	0.4	84.0	0p	0	2.2	15	-	0.2	563	-	-	-	415		-	-	0p	0p	-	0	
Butter, unsalted	15.6	760	0.7	84.1	0p	0	0.1	21	-	0.2	11	-	-	-	685		-	-	0p	0.12	1.0	0	
Buttermilk	97.5	15	0.8	1.1	0.5	-	0.7	30	30	0.1	-	-	-	-	630		15	633	0.06	0.29	0.1	0	0
Cheese, cottage	78.6	94	13.2	(3.0)	3.6	0	1.6	87	120	0.6	-	-	-	-	415		45	423	0.03	0.2	-	-	
Cheese, processed, cheddar	42.0	323	21.7	23.0	7.3	0	6.0	563	517	0.7	1330	78	-	-	82		121	102	0.02	0.35	0.1	0	
Cheese, spread	55.2	210	14.0	(11.0)	13.7	0	6.1	430	782	0.6	-	-	-	-	345		165	373	0.03	0.09	-	-	
Curds (cow's milk)	89.1	60	3.1	4.0	3.0	-		149	93	0.2	32	130	-	-		102			0.05	0.16	0.1	1	0
Ice cream (regular)	71.5	157	4.2	(9.5)	13.7	0	1.1	169	101	0.3	-	-	-	-	25		25	-	-	T	-	-	-
Cream milk	66.4	267	2.4	27.0	3.6	0	0.6	88	66	0.2	-	-	-	-	124		233	163	0.05	0.24	0.1	0	0
Yoghurt	85.1	76	4.8	4.1	5.0	0	1.0	150	110	0.1	-	-	-	-	77		36	83	0.06	0.36	0.7	0	
Yoghurt, cream, flavour	67.6	182	3.5	11.3	16.6	-	1.0	140	113	0.2	69	116	-	-	38		24	42	0.04	0.21	0.1	0	
Yoghurt, drinking, pasteurized, different flavors (except natural flavors), average per 100 ml	85.0	86	2.0	1.6	16	0	0.4	53	45	0.2	35	-	-	-	14		-	-	0.02	0.09	-	-	
Yogurt, drinking, pasteurized, natural flavored, average per 100 ml	84.9	82	1.5	2.0	14.6	0	0.4	51	54	-	-	-	-	-	15		-	-	-	0.09	-	-	