

A glass of milk is shown with a splash of milk being poured into it. The background is a solid blue color. The milk is white and the splash is dynamic, with many small droplets in the air. A red banner is overlaid on the top part of the image, containing white text.

**Do you know that
fresh milk may not
be safe even after
boiling ?**

The dictionary says fresh means recently obtained. A few decades ago milk in most of the households was supplied by the milkman after milking the animal, most often in front of the houses.

Research has proved that the raw milk thus obtained may contain certain disease causing organisms infecting the animal being milked. It may also contain the residue of the antibiotic administered to the animal to combat disease. Hence it is not advisable to drink such milk even after boiling, as even boiling does not totally render the antibiotics inactive.

Pasteurized and homogenised milk is safe for consumption provided it conforms to Safety and Quality Standards of Food Safety and Standards Authority of India (FSSAI).

Most of us recall our grandmothers with a lot of fondness. Our recollections are filled with memories of incidents demonstrating granny's selfless love and affection. Any argument with one's mother was always decided in favour of the grandchild by the grandmother who often assigned herself the responsibility of being the judge. Today one should recall her with admiration! If you remember your growing years whenever you wanted to skip a meal your grandmother would insist on your having a cup of milk instead. Today the health and fitness industry talks about meal replacements which are powders to be gulped down either mixed with water or a little milk.

Our grandmothers certainly had the wisdom to consider that milk can serve as a meal replacement!

What is milk?

Just like a mother lactates to feed her child, the cow or buffalo also produces milk for her calf; this milk is drawn by us and collected for our use. Milk (cow or buffalo) may be defined as the lacteal secretion obtained by complete milking of one or more healthy milch animals.

Colostrum – Nature's best kept secret:

Colostrum is the first lacteal secretion produced by the mammary gland of a mother prior to the production of

milk. Only colostrum collected from the single first milking within 0-6 hours after birth maintains nature's perfect balance and highest levels of immunological and body regulating biologically active proteins. Colostrum is beneficial to humans and animals. Newborns (human and veterinary mammals) need first milking colostrum proteins to awaken their organs, glands and all other body functions. These same regulating bio-proteins continue to normalize, regulate and maintain normal body function at any age.



Myth: Babies need to have formula the first few days after birth because the milk hasn't "come in" yet.

Mythbuster: The mother's body is preparing to breastfeed her baby even before it is born! Around the 5th month of pregnancy, a yellow, nutrient-rich fluid called colostrums is produced. It is available as soon as the baby is born. Colostrum is the perfect first food for premature as well as full-term infants. Right after the baby's birth, the sudden drop in progesterone tells the body there is a baby to feed and it switches gears to begin producing milk. The transition from colostrum to mature milk is a gradual process. Colostrum is delivered to the baby

in small amounts helping her to learn to breastfeed -Milk should also contain the minimum prescribed percentages of milk fat and milk Solids Not Fat (SNF) which are the protein, carbohydrates, minerals (eg. Calcium) and vitamins. Nature has intended that Milk is produced to nurture the young ones; it is one food which is nutritionally balanced and complete in all nourishment required by the body. Let us not forget that milk produced by the milch animal is intended by nature for the calf and not human beings.

Nutrients in milk

Fat:

Milk contains fat which is required for many functions in the body including storage and provision of energy, production of hormones, protection, warmth and provision of fat soluble vitamins amongst many others. The fat in milk contributes unique characteristics to the flavour, texture, appearance and satiability of dairy foods as well as providing a source of fat soluble vitamins, essential fatty acids and other health promoting compounds. The fat present in milk exists as small globules throughout the milk. They are less dense than water and rise to the top forming a layer of cream. The process of "homogenization" undertaken at several dairies breaks these fat globules into smaller globules and therefore they do not rise to the top. Milk that is marketed is sold in sachets or bottles and is classified as whole, standardized, toned, double toned and skimmed milk, based on the fat content.

Carbohydrates:

Milk also contains carbohydrates which provide the body with energy required for most functions in the body. Lactose is the principal and typical carbohydrate of milk, known as milk sugar. The proteins present in the milk are casein and whey protein. Whey is left over when milk coagulates and contains everything that is soluble from milk. It is the liquid remaining after extracting paneer (coagulated portion) from milk by adding a few drops of lemon juice.

Vitamins:

Milk contains fat soluble vitamins A, D, E and K, and water soluble vitamins B vitamins – B12, B1, B2, B6, Niacin and Folic acid and Vitamin C. The exact components of raw milk vary from animal to animal, but as it contains significant amounts of fat, protein and calcium as well as Vitamin C it is wholesome and complete with all nutrients.



Types of Milk Available in the market

Type of Milk

Characteristics

Raw

It is the milk supplied by the milkman after milking the animal. Sometimes, If the animal suffers from mastitis or any other disease, the disease causing organisms or the residues of the drug given to the animal, will be present in the milk.

Pasteurised

Pasteurized milk supplied as packaged milk by the organized sector is heated up to not less than 72.5° C for 16 seconds and automatically and immediately cooled down to 4° C.

Homogenised

All the fat is broken down and the size of the fat globule will be less than 0.1 micron and fully dispersed; consequently this milk will look more viscous. This is easily digestible, and curd set using this milk, is of uniform consistency in comparison to that made from non-homogenized milk. At the same time skimming of the milk at home by removing the cream from the milk, and churning out butter is not possible.

Lactose Free

In this type of milk lactose is completely removed and it is ideal for children/adults having Lactose intolerance (that leads to diahorrea).

Tetra Pack Ultra Heat Milk

This is zero bacteria milk and is a special type of milk with less Lactic acid. This milk is heated up to 145 degree C for 3.5 seconds to destroy all bacteria and viruses and cooled to room temperature (26 degree C to 28 degree C) before packing in sterile cartons. Since this milk is heated up to 145° C, this is known as Ultra Heat Temperature (UHT) Milk. It has a long shelf life (180 days) and it is very expensive.

Classification of milk based on fat content

Type of Milk	Fat %	SNF	Use
Full Cream	6 %	9 %	Ideal for youngsters and for making milk sweets
Standardised	4.5 %	8.5 %	Ideal for all, except senior citizens who do less physical work.
Toned	3 %	8.5 %	Suitable for all – the young and the old
Double Toned	1.5 %	9 %	This is recommended for persons trying to shed excess weight as it contains less fat.
Skimmed	> .5%	9 %	Dieter's delight. But tastes poor and it is very thin in consistency as all fat is removed.

HERE'S HOW YOU CAN TEST MILK AT HOME

Most of us are adept at clearly stating the quality of the milk. There are some simple easy to perform tests listed below which help to check whether the milk is adulterated or neutralizers or adulterants have been added to enhance the total solids (TS) to get a better price. Neutralisers like soda bicarb, urea in small but identifiable quantities, are added to milk to get higher SNF which means a better price.

TESTS THAT CAN BE DONE IN THE KITCHEN

A. Organoleptic (OT) Test: It is nothing but tasting the milk and checking whether freshness is retained and it possesses a milky flavour or if the milk is sour or thready? One can feel a

texture of smoothness and roughness by just swirling a little milk in the mouth.

B. Lactometer Reading: Check with lactometer for any adulteration with the addition of water. The specific gravity of unadulterated milk will have to be 27/28 at room temperature. This meter is not expensive; it can be procured online from the manufacturers or a dealer dealing in pressure gauges.

Water is added sometimes even to packed milk available in sachets. Unscrupulous persons cut open the sachet in the corner, draw the milk and reseal it after adding the same volume of water. Even, if 50 ml is drawn from each sachet, the adulterator can collect 2.5 litres from 50 one litre packets and make an illegal earning of nearly Rs.80-100 a day.

C. Test for Neutralizers: While doing the OT test described above, if any irritation is felt in the mouth, then it could be due to the addition of some neutralizer (carbonate/urea – also used as a fertilizer) to improve the shelf life of milk; consequently there is an increase in Total Solids (TS), which will fetch a better price for such milk. CONCERT has developed a SPOT TEST KIT called Annam Kit which can be used to detect the adulteration of foods at home including milk. This simple method to detect adulteration at household level will be useful to consumers to select right type of food or to avoid foods of doubtful quality.

QUALITY OF MILK AND NEED FOR COMPARATIVE TESTING

Milk is an integral part of nutrition. The production of milk in India is in the hands of cattle farmers in villages, far from the dairies. The producers do not know about the need for making wholesome, clean milk available to consumers and how to avoid contamination. Because of that, micro organisms gain entry into milk; other factors -like delay in transportation, improper cleaning of cans etc. (also aid in growth of the micro organisms.)

Further, milk and milk products are easily subjected to adulteration by unscrupulous producers and

traders; Hence the basic public health and economic consideration necessitates that consumers should be provided with pure, unadulterated, bacteriologically safe, quality milk. To ensure this, Government of India has specified the standards in Prevention of Food Adulterants (PFA) Rules 1955 under and PFA Act 1954. This has been now changed to Food Safety and Standard (FS and S) Rules (2011) under FS and S Act 2006. There are BIS (IS) standards for different types of milk. Conformance to these standards is compulsory. The milk you buy in sachets must conform to FSSAI standard.

What is Comparative Testing?

Comparative Testing is a formal process by which different brands of a product category are tested for Quality, for conformance to the minimum standards laid down by Bureau of Indian Standards. Such a test also reveals, if a particular tested brand exceeds such minimum standards, whether there can be potential health and safety hazards and verification of special claims by manufacturers, if any. The results for all the tested brands are published in a Comparative Test Report which would provide consumers information to make an informed choice.

CONCERT has undertaken this project of Comparative Testing for Southern Region under a grant from Department of Consumer Affairs,

Government of India. In the first year, Concert will be testing 7 products and 3 services. One of the products selected for testing is the packaged milk. The Comparative Testing of Milk has been carried out to evaluate the popular brands of packaged milk sold in the four states of South India namely Kerala, Tamil Nadu, Andhra Pradesh and Karnataka. A market survey revealed that 70 % of the milk used is Toned milk, 25 % milk is standardized milk, and the other type of milk is only 5 %. Therefore only Standardized and toned milk were tested. Purchasing the fresh samples from the 4 states and sending the procured sample to the testing lab was quite challenging as the milk sample had to be kept between 0-4 deg. C to ensure the milk is not spoilt and to ensure the right microbiological content of the milk is maintained.

PARAMETERS FOR TESTING

Health and Safety

Milk though wholesome and nutritive, will do more harm than good if the safety standards are compromised. The health and safety parameters go hand in hand. Since milk is a secretion from the body of an animal it will carry all the micro organisms the animal is infected with, as well as the antibiotic residue administered to treat and combat the infection of the milching animal.

Bacteriological Analysis - The following bacteria may be found in the milk you use; it can be dangerous if it exceeds the permitted limit.

E. coli – is a bacteria which causes enteritis, urinary infection etc., when it exceeds the threshold level. It should be absent in the milk.

Coliform bacteria – Its presence indicates unhygienic manufacturing process.

The under mentioned pathogenic or disease causing bacteria, if present in milk will cause harmful effects as under:

Salmonella – causes food poisoning and typhoid.

Listeria – causes Listeriosis infections which may create symptoms such as fever, vomiting, diarrhoea, lethargy, difficulty in breathing.

Staphylococcus – causes food poisoning, diarrhoea and gastritis.

These pathogenic bacteria should be absent in the milk.

Total count Bacteria: Though it is considered to be of non-pathogenic (harmless) origin, when it exceeds the FSSAI standard limits, it is indicative of unhygienic processing of milk bringing down the shelf life and increasing the acidity very fast. If such milk is consumed it will lead to indigestion and related ailments.

Antibiotic Residue: When the animal is suffering from Mastitis (udder infection) it is treated with Antibiotic infusion in the udder through the teats. As per norms, once the animal is treated with antibiotic infusion for mastitis, milk should not be used for 4 days after the animal is cured, as the residue of antibiotic will be there in the milk. It is not advisable to consume this milk that will cause allergic sensitivity, skin rashes etc. Very often this norm is neglected and not adhered to by the cattle farmers.

OTHER SAFETY CRITERIA

Milk should be free from toxic material like heavy metal, pesticide residue, Melamine and aflatoxin should be absent or within the limit and conform to the standard prescribed under the FSSAI.

a. Melamine: It is a synthetic chemical and is used to adulterate skim milk powder to enhance protein content to fetch better price. This is very injurious to health. During the manufacture of standardized, toned milk, such adulterated skim milk powder is added to maintain protein content to conform to BIS and FSSAI standards, by some unscrupulous manufacturers. If such milk is consumed, melamine poisoning will occur. Melamine poisoning will affect the kidney and the urinary bladder – melamine should be totally absent in the milk.

Melamine contamination was found in some milk samples in China and this led to severe action being taken by the Food and Drug authorities. This raised a lot of questions in the minds of consumers regarding the safety of the milk being consumed by them and there was extensive coverage in the media. Consequently to this, imports of food items from China were banned in India.

b. Aflatoxin: When the animal is fed with feed that is fungal (aflatoxin) infected, it will get excreted in the milk. This should not be present in the milk as per WHO Standard. When such milk is consumed it will act like a cumulative poison and it will damage the liver and cause cirrhosis.

c. Heavy metal - Lead:

It should be absent in the milk and if lead laden milk is consumed it will cause cumulative poison and develop cancer.

d. Pesticide residue:

It should conform to standards prescribed in PFA now FSSAI. If it exceeds the prescribed limits it will cause peptic ulcers and even cancer after prolonged usage.

e. Chemical analysis:

This is done to ascertain the percentage of protein, fat, lactose and calcium in the milk.

QUALITY

Milk being highly perishable, due care should be taken to preserve the quality of the milk from the time of milking, to processing, transport and up to the point of consumption. Proper hygienic measures have to be taken in all the processes before milking, during collection, and also during the processing. - maintaining the temperature of milk below 4 deg. C during transportation, distribution etc. till it reaches the consumers. This is a very important factor to ensure the freshness of the milk is preserved. If any slackness occurs in the entire process, acidity in milk will shoot up which is likely to affect one's health. It takes a lot of effort to preserve the milk. To make this task simpler as well as compensate the slack in the processing, preservatives and neutralizers such as Hydrogen Peroxide and Carbonates are added, to ensure the milk retains its quality. This is the normal practice among cattle farmers and also unscrupulous dairies but is prohibited as per the FSSA Act as it is injurious to health. Milk, as already explained, contains Fat and Solid Not Fat (SNF) which are the carbohydrates, proteins, minerals and vitamins present. The price of milk is usually determined by its Fat and /or SNF content. This Fat and SNF put together is termed as TOTAL SOLIDS (TS).

Adulteration in Milk:

Milk is adulterated to earn better profits. Dairies and cattle farmers, add the adulterants knowingly and unknowingly. The cattle farmers most often do not know the consequences of their action. Commonly used adulterants are Salt, Cane Sugar and Urea (used in fertilizers and farming), which are easily available in the villages; it is added to the milk to boost Solid Not Fat (SNF) in milk to get a better price. This is prohibited as per the FSS Act. The processed milk should be free from all such adulterants.

Concerts comparative test checked all these important standards in the market samples and the results are given in the following table.

Toned Milk

Brand of Milk	offer & packing label	Health & Safety	Quality	MRP Price (500ml)	Color	Taste	Smell
Hatsun (HG)/(TN)	Very Good	Very Good	Good	₹.14.00	White & Dull	Milky	Milky
Aavin Blue Nice (TN)	Very Good	Good	Good	₹10.25	Light Yellowish White	Milky	Milky
Nandini (KA)	Good	Very Good	Good	₹10.25	Light Yellowish White	Watery	Milky/ Cowy
Niligiris (KA)	Fair	Good	Good	₹14.00	White & Dull White	Creamy	Milky/ Cowy
Milma (KL)	Very Good	Good	Good	₹11.50	Light Yellowish White	Milky	Milky
Cowma (KL)	Good	Very Good	Good	₹13.50	White & Dull White	Creamy	Milky
Cavins (KL)	Very Good	Very Good	Good	₹12.50 (450ml)	White & Dull White	Milky	Milky
Vijaya (AP)	Poor	Good	Good	₹16.00	Pure-White	Milky	Milky
Health Heritage (AP)	Very Good	Fair	Good	₹14.00	White & Dull White	Milky	Milky

Each criterion, sub-parameter, and parameter is rated individually on a 5-point scale. The rating given is 0 (Poor), 1, (Fair), 2 (Good), 3 (Very Good), and 4 (Excellent). KL –Kerala, TN- Tamil Nadu, KN-Kamataka, AP-Andhra Pradesh

turn overleaf

Standardised Milk

Brand of Milk	offer & packing label	Health & Safety	Quality	MRP Price (500ml)	Color	Taste	Smell
Aavin Green Magic (TN)	Very Good	Good	Good	₹ 13.00	Light Yellowish	Creamy	Milky
Arokyaa (TN)	Good	Very Good	Good	₹ 16.00	Light Yellowish / Yesllowish White	Powdery	Milky
Nandini (KA)	Good	Fair	Good	₹ 13.00	Yellowish White	Powdery	Milky
Niligiris (KA)	Very Good	Very Good	Good	₹ 16.00	Dull White / Light	Milky	Milky
Cavins (KL)	Very Good	Fair	Good	₹ 14.00 (450ml)	Dull White	Milky	Milky
Health Heritage Gold (AP)	Very Good	Fair	Good	₹ 17.00	Dull White	Creamy	Milky

Note: Note: When any parameter tested fails to meet the standard requirement it is scored as **Poor** or **Fair** based on the extent of deviation from the standard. When it meets the defined standards, it is given the scoring of **Good**. When it exceeds the standards significantly and shows appreciable innovation it will be rated **Excellent**.

We present the results against these criteria, which in our opinion is fair, and without any subjective element. The consumers are encouraged to study these results and make their purchase decisions based on their requirements and judgment.

In the comparative tests that CONCERT conducted, twenty five randomly chosen participants were asked to observe the colour, taste and smell of the milk. Their observation has been tabulated. The observation reported in the table pertains to the opinion of the majority of the participants. If equal number of participants expressed

different observations, in such cases both the observations have been reported. The prices of different brands of milk mentioned in the table above were the prevailing MRP in the month of September 2011

SENSORY TEST

Sensory test is known as Organoleptic test (or OT). This permits rapid identification of poor quality. No equipment is required but the milk grader must have a good sense of sight, smell, and taste; this exercise which most of have been doing on a day to day basis, is known as the organoleptic test. In the comparative test that CONCERT conducted, twenty five randomly chosen participants were asked to observe the colour, taste and smell of the milk. Their observation is tabulated and pertains to the opinion of the majority of the participants.

LABELLING

It is compulsory under Indian law that the label on every milk pack or the plastic sachet should contain the following details:

- ✓ Name and complete address of Manufacturer and manufacturing/ packaging unit
- ✓ Name and type of product with appropriate prefix such as Toned, Full Cream or Standardized.
- ✓ Name and full postal address of the dairy, Consumer complaints phone number. Batch or Code No, Manufacturing date, Use by Date MRP (Maximum retail price)
- ✓ Net Quantity in litre/millilitre (milk inside the sachet)
- ✓ Nutritional Information per 100 ml of the contents in each sachet
- ✓ Storage Instructions

The labels are supposed to provide valuable, useful information for the guidance of consumers. They should be a tool for consumer education and awareness. But sometimes, false, and wrong claims are made on the labels as a marketing strategy to woo, deceive and misguide consumers. Such methods are against the law.

Micro biology and volume of milk in the following brands did not conform to the standards and the volume of milk in the 500 ml packed pouch was less.

Brand of Milk	Standard plate count cfu/gm	Coliform count cfu/gm	Actual Volume (500ml pack)
Aavin (Toned)	110,000	1400	—
Nandini (Toned)	160,000	620	494.4 ml
Niligiris (Toned)	—	150	499.3 ml
Vijaya (Toned)	—	—	491.8 ml
Aavin (Standardised)	32,000	380	—
Aarokya (Standardised)	—	20	494.9 ml
Nandini (Standardised)	150,000	470	499.2 ml
Niligiris (Standardised)	—	20	—

As per Standards:

- The standard Plate count should not exceed 30,000 cfu* per gram.
- Coliform should be absent.

*cfu means colony forming units.

Misleading Pictures on the pack

The milk packs of Arokyia (toned and standardized), Nandini (toned and standardized) and Vijaya (toned), depicts the picture of a cow and Cavin's (toned and standardized) milk sachets depict the udder of the cow. These pictorial representations mislead consumers as packaged milk is not brought directly from an animal or cow; but it is a processed one.

PLEASE NOTE THAT NO PACKAGED MILK IN ANY FORM SOLD IN OUR (OR ANY) COUNTRY IS FRESH. MOST OF THEM ARE REFORMULATED IN DAIRIES TO ENSURE SAFETY TO CONSUMERS.

Brand of Milk	Claim on Label	Remarks
Nandini (Toned & Standardized) Milma (Toned) Cavin's (Toned & Standardized)	Fresh & Pure	Though hygienically produced, cannot claim to be fresh; it is reconstituted milk and it reaches (after processing) the point of use 36/48 hours after procurement of fresh milk from villages.
Aavin (Toned & Standardized)	Pure, Fresh & healthy	The claim healthy may be accepted but the milk is not pure and fresh.
Cowma (Toned)	Fat content as 3.3% ± 0.3	This is exaggerated, misleading and not in conformance of the labelling requirement
Niligiris (Toned & Standardized)	Best before 2 days is embossed near the joint// Three addresses are printed on the sachet, but the legend to identify the one, where this was packed, from these addresses is not given.	Use by Date, which is a mandatory requirement. Since it is embossed near the joint it is not legible.// Non conformance to the standard
Vijaya (Toned)	Best before one day	Use by Date, which is a mandatory requirement, this is non conformance to requirement.
Milma (Toned)	Milma Jersey	Jersey refers to a breed of cow. The milk cannot be claimed to be exclusively from Jersey breed.
Hatsun(Toned) Aarokya (Standardized) Nilgiri (Toned& standardized) Heritage (Toned & Standardized) Cowma (Toned) Cavin's (Toned & Standardized)	Vegeterian Logo	Milk is not from a vegetable source but is of animal origin.

WHAT DO THE TESTS REVEAL?

Nilgiris brand (toned milk) and Nandini brand (standardized milk) contained Cane Sugar in the sample tested. Cane sugar is an adulterant added to milk to increase the solid content and to get a better price. This should be absent.

Strange observations:

Cavin's is marketed only in 450ml (Toned) and 900ml (Standardized) sachets in Palakkad, Kerala which is not the case in other states.

Aavin milk is priced the least. But the retail shops sell this above the MRP (maximum retail price) marked on the pack.

Dear readers the milk these animals produced was not intended for us. Jenny Moxham put it down as a poem which provides a lot of food for thought.

***' We're told we need the calcium to make our bones grow strong,
Yet cow's get theirs from nice green grass, How did we get it wrong? '***

Be sure the milk you consume is treated and rendered safe for consumption. Choose the right brand and the right milk!

FOR YOUR SAFETY

- ✓ Wash the milk pack before putting it in the refrigerator.
- ✓ Do not freeze the milk as the pack can get damaged while trying to de-freeze, contaminating the milk.
- ✓ Do not boil milk for long as it will destroy all the nutrients.
- ✓ Do not dilute milk with tap water.

Comparative Test Team

Trustee in charge of Project	Mr. S. Ramani
Program Manager	Mr. M. Mohan
Concert Lead	Dr. N. Sankaran (Former GM (QC), Aavin)
Report compiled by Consultant Editor	Ms. S. Sripriya
Edited By	Ms. Nirmala Desikan
Special Supplement designed by	Mr S. Baskar Rao / Mr Bhushanraj