CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

MILK QUALITY AND SAFETY

Making progress possible. Together.

CONTENTS

OVERVIEW

The Milk Control section was founded about 55 years ago by the then Cape Town City Council after the Cape experienced a serious gastro – enteritis epidemic as a result of the distribution of contaminated milk. This service supports the different Sub-Districts in the City of Cape Town by providing laboratory facilities where food, milk and soft serve samples can be tested and evaluated. It ensures the distribution of safe and healthy milk and dairy products by monitoring these products from the producer farms, the road tankers, through the pasteurizing and processing plants and finally to the retail outlets. It also works towards educating those who work with milk and dairy products to ensure high standards of handling.

Laboratory Service

The laboratory forms an integral part of the Milk Control section and its main function is to analyze all samples received. A service is also rendered to the various Sub-Districts where food samples from different outlets are tested. In order to determine the chemical composition of milk, the sample is tested for the percentage fat, protein, lactose and added water present.

Bacteriological tests are performed in accordance with Regulation R1555 for milk and milk products. Using prescribed methods and culture media the following tests are performed:

- Plate Count: to determine the number of colony forming units/1ml.
- Coliform Count: indicates the level of hygiene and cleaning. Modified Eijkman : indicates faecal contamination if Escherichia coli is present.
- Kundrat test: to establish antibioticsor antibiotic substances.
- Baira Parker Plate: to establish the presence of staphylococcus aureus.
- Aschaffenberg Mullen: indicates effective pateurization.

- Phosphatase test

Milk Control Core Business
The core business of the Milk Control branch is to ensure the distribution of safe and healthy milk and dairy related products within the City of Cape Town's boundaries by monitoring the product from the producer farms to the processing plants and bulk milk outlets.

Milk Control Functions
The Environmental Health Practitioners are responsible for the following functions:-

- Producer farms are visited monthly and raw milk samples are taken for analysis.
- Hygiene practices are monitored strictly on farms through implementing health regulations relating to milking sheds and the transport of milk.
- Milk tankers are inspected regularly and loading procedures scrutinized.
- Dairy processing plants are monitored by sampling their products daily, weekly or monthly depending on the volume they produce.
- All plants are visited and inspected monthly to ensure acceptability of production procedures.
- Inspection reports are submitted to the responsible authorities.

Bulk milk outlets are also monitored within the Unicity's boundaries – this is a new concept and arises from milk retailing in bulk to the public.

Monitoring starts on the producer farm, the pasteurizing and distribution plant, transport to the depot and finally the milk as it sold to the consumer.

DEFINITION OF MILK

Milk is a fluid secreted by the mammary glands of healthy cows of the bovine species during the usual lactation period by means of complete and regular milking. It is a concentrated food, designed to initially protect the newly born animal by supplying concentrated antibodies to counter disease (passive immunity), until the immune system of the young animal is fully functional, and thereafter also to ensure rapid growth until the young are more independent.

The composition of milk
Next to blood, milk is the most complex of biological fluids and although the major constituents have been known for many years the list of minor constituents grows every year and at present more than 200 different constituents have been identified. The following table indicates the gross average composition of milk:

Milk Composition	%
Fat	3.8%
Total Protein	3.4%
Casein	2.7%
Albuman and Globulin	0.7%
Lactose	4.8%
Mineral Salts	0.7%
Water	87.3%

Vitamins

Although milk does not contain all the vitamins we require, it is a very important source of them. The following are the more important ones found in milk:

- Vitamin A
- Thiamine or Vit.B1
- Riboflavin B2
- Nicotinic Acid (Niacin)
- Vitamin B6
- Vitamin B12
- Vitamin C
- Vitamin D

Milk Products

Apart from the sale of milk, dairies have found a demand for a variety of other products made from milk. Low fat milk, skim milk and cream are commonly used, while yoghurts in the form of fruit yoghurt, plain and drinking yoghurt are growing. Other products are cheese, cultured buttermilk, ice cream, soft serve and milk desserts. All these products are tested by the City of Cape Town's Milk Control section for various health related risks such as bacterial contamination, phosphatase and the presence of antibiotics, as laid down by The Foodstuffs, Cosmetics and Disinfectants Act.

PASTEURISED MILK

The process of pasteurisation is named after Louis Pasteur, the French scientist (1822 - 1895), who became famous for his study of bacteria. In 1864 he discovered that spoilage could be prevented in wine and beer by raising the temperature for a short time. This process now called pasteurising, and is also applied to milk, which is an ideal medium for bacterial growth, including certain pathogenic types.

This is where pasteurisation is most beneficial and the temperature-time combination of the process is laid down by law Regulations Relating to Milk and Dairy Products - R 1555 of 1997 and Amendment R 759 of 2004, and is sufficient to destroy any pathogenic organisms which may have entered the milk and so that the authorities can be confident that public health will always be safeguarded.

Pasteurisation does not sterilise milk, but will render milk safe, unless it is recontaminated after pasteurisation. The process of pasteurisation not only requires the heating of milk to a certain temperature for a certain time, but also requires immediate cooling to 4 °C and kept below 4 °C until sold.

Pasteurisation
The heating of milk in the pasteurising process nowadays is mostly the High Temperature Short Time method where the milk is pumped between closely spaced stainless steel plates causing a wide but thin film of milk. On the other sides of the plates, hot water flows, having been heated by steam and kept accurately at a temperature high enough to just bring the milk to its pasteurising temperature of 72 °C. The milk stays at this temperature for 15 seconds regulated by a Flow Controller. After this it passes through other stainless steel plates causing a thin film of milk as before and the heat of the milk is transferred to ice water flowing on the other sides of these plates until it reaches 4 °C and remain at this temperature until it is sold to the consumer.

Batch method of Pasteurising
An alternative to the above system is a batch method where a tank of milk is heated to 63 °C and held for 30 minutes and then cooled. The heating and cooling is also done by water as above but in a jacket around the tank. Because of the long holding time, a cooked flavour is noticed in the milk.

Sterilised or UHT (Ultra Heat Treatment) milk
The process of pasteurisation and batch method uses temperatures far below that of boiling water, which is 100 °C. However, if the milk were to be subjected to a temperature just above boiling water for a short time all bacteria would be destroyed. If it were kept sealed i.e. not recontaminated, it would never be soured by bacteria. On reopening it would of course become perishable like normal milk. This is sterilisation and is similar to preparing of a baby's bottle.

Tests carried out by the City of Cape Town to ensure that milk is pasteurised efficiently?
The City of Cape Town's Milk Control section will conduct a test called the **phosphatase test** to indicate if milk were pasteurised properly. All pasteurising

plants inside the City and also those plants situated outside the City's boundaries distributing milk inside the City are subjected to these tests.

Phosphatase is an enzyme present in milk and is inactivated by pasteurisation. The test is sensitive and one litre of raw milk is easily detectable in 1000 litre of pasteurised milk. The test result should be negative for phosphatase.

The City of Cape Town will only allow properly pasteurised milk to be sold to the public.

RAW MILK – A RISK TO PUBLIC HEALTH

Are you drinking raw milk, milk that has not been pasteurised to destroy disease-causing bacteria?

Milk is a highly perishable food product and is an excellent medium for transmitting a variety of diseases.

How is raw milk different than pasteurized milk?
Raw milk is unprocessed milk, which is consumed directly after milking the cow or goat. Pasteurised milk, on the other hand, has been heat - treated to destroy all disease causing bacteria that can be present in raw milk.
Have you been told that raw milk is better than pasteurised milk?
There are a number of myths about this. For example: -

Is raw milk better for you?
No, there is absolutely no evidence to support the contention that raw milk is more nutritious than pasteurised milk.

Does pasteurised milk contain chemical additives?
No, pasteurised milk does not contain any chemical additives. In fact, law prohibits chemical additives.

Is raw milk "pure"?
No, raw milk can contain many disease-causing organisms. Raw milk for human consumption usually originates from unapproved and/or uninspected farms, which are not monitored for the presence of drug residues such as antibiotics.

Does raw milk help keep you from getting sick?
No, there is no scientific evidence that raw milk makes you more resistant to disease.

Does raw milk help develop teeth better than pasteurised milk?
No, there is no scientific evidence that raw milk promotes better development of teeth.

Some people may say they have grown up drinking raw milk and never suffered ill effects. However, public health authorities have documented many cases of illnesses caused by drinking raw milk, which tell a far different story. While mandatory pasteurisation of milk has virtually eliminated large outbreaks of milk borne disease in Canada, occasional cases still remind us of the hazards of raw milk consumption.

For example:
Case studies done in Canada

In Chilliwack, 5 members of a family became ill with Salmonella from raw goat's milk.

On Central Vancouver Island, 9 kindergarten children became ill with Campylobacter after drinking raw milk while on a school visit to a local farm.

In Vernon, numerous cases of Campylobacter were traced to the consumption of raw milk.

In the Kootenays, a 35 year old woman needed surgery and a long stay in hospital due to Brucella infection. She had previously consumed raw milk from several sources.

In Ladysmith, a 4-year-old girl developed neck abscesses due to Yersinia infection. The family had consumed raw milk for many years. The older brother previously had a similar abscess in his neck and lip.

On the Queen Charlotte Islands, 2 people developed Toxoplasmosis after consuming raw goat's milk.

What can you do to protect yourself?
Buy pasteurised milk products from retail outlets. Milk that you buy from grocery stores is pasteurised and packaged in an approved dairy plant.

Nobody is naturally immune to the disease - causing agents, which may be found in raw milk. However, infants and children are at more risk of getting sick from drinking unpasteurised milk because they usually drink a lot of milk, and are more vulnerable to infection.

Please Note: For people living in rural areas who do not have access to commercially pasteurised milk the following process is recommended for home pasteurization:

- Disinfect milk bottles and tops by boiling in water for 10 minutes.
- Place raw milk in the top part of a double boiler. Gradually raise the temperature of the milk to 62 °C and hold this temperature for 30 minutes.
- Check the temperature of the milk frequently with a reliable thermometer.
- Cool the pasteurised milk promptly by placing the top part of the boiler in ice water. Stir frequently to speed up the cooling process.
- Pour the cooled milk into the disinfected containers and place under refrigeration at 4 °C.

Please also note: Home pasteurisation by using a microwave oven is not a reliable method and should not be used as an alternative to the above process.

ASPECTS OF MILK-RELATED DISEASE

Milk is a major factor in disease dissemination and also presents a favorable physical environment where microorganisms can multiply. Primary diseases in the cow play a minor part in milk-related disease in man. This is especially true when one considers that the five major milk related conditions that originate from the cow are namely:

- Tuberculosis - Mycobacterium tuberculosis
- Brucellosis - Brucella abortus
- Anthrax - Bacillus antracis
- Food poisoning - Staphylococcus aureus
- Sore throat - Streptococcus pyogenes

All the abovementioned diseases are eliminated by pasteurisation.

Major milk-borne epidemics have all occurred as a result of the following:

- The environment - for example, contaminated water for washing surfaces and dust contamination.
- The withdrawing of milk from the udder may contaminate the product with a disease carried by the worker.
- Contamination by improperly maintained equipment.
- Storage and transport vessels may contaminate milk.
- Processing may lead to further degradation and contamination by ill-considered methods.
- Product handling, display and distribution to the final user could lead to an

inferior product-for example the ease with which bacteria could multiply when temperatures rise to above 4 °C.

DISEASES ASSOCIATED WITH MILK:

Brucellosis
All three species of Brucella have been isolated from milk in various parts of the world. In non-pregnant cows the organism is found in the secretory tissue of the udder. In man it causes systemic disease, usually with an insidious onset resembling flu, and clinical diagnosis is usually difficult. **(Pasteurisation destroys this organism)**

Staphylococcus infections
In man, pathogenic staphylococci are commonly associated with skin lesions, infected lacerations, boils and pustules that are common in farm workers. In cattle, staphylococcus is often found in older cows as a low grade, sub clinical mastitis or from small ulcers on the teats. **(Pasteurisation destroys this organism, but not the toxin)**

E-coli
E-coli is found naturally in the environment for example in soil, water and faeces/manure or in the digestive tract of humans and animals. It is an important indicator of poor hygiene practices or improper processing. Symptoms of contracting this organism are vomiting, fever, diarrhoea and stomach cramps.**(Pasteurisation destroys this organism)**

Tuberculosis
Infected milk is the most important vehicle for the transmission of bovine tuberculosis in man, and it would appear that the presence in man is dependent on the prevalence in cattle, and the amount of raw milk consumed. **(Pasteurisation destroys this organism)**

Streptococcal infections
Group A streptococci (sore throat, scarlet fever and mastitis) originate from human carriers that in turn may affect the udder. Unpasteurised or inefficiently cooled milk can lead to a rapid multiplication.**(Pasteurisation destroys this organism)**

Typhoid and Paratyphoid (Salmonellosis)
These are not natural pathogens of milk animals, but are readily transmitted by milk in those areas where pasteurization is not enforced. This is a common food poisoning organism due to poor hygiene or incorrect processing. Symptoms associated with contracting this organism are nausea, vomiting, abdominal pain,

headache, chills and diarrhoea. **(Pasteurisation destroys this organism)**

Shigellosis
Shigella infections in man are often associated with the ingestion of raw milk. It occurs worldwide and two thirds of the cases and most of the deaths are in children under the age of 10 years. This occurs commonly in population living under poor conditions-malnutrition, poor sanitation and crowding. Sources are hands of milkers, water and flies. **(Pasteurisation destroys this organism)**

Campylobacter jejuni
This organism is found naturally in soil, water, and farm waste and in the digestive tract of animals. In recent years there have been reports of severe outbreaks of enteritis in the UK attributed to Campylobacter jejuni. In all cases consumption of unpasteurised milk was implicated. Symptoms are profuse diarrhoea (sometimes bloody), stomach cramps, nausea, dizziness and fever. **(Pasteurisation destroys this organism)**

Heliobacter pylori
This organism may be transmitted through contaminated milk. Infection with the organism is a powerful predisposing factor to the development of stomach cancer. Treatment of clinical cases is expensive, and a correct diagnosis in humans requires a gastric biopsy. **(Pasteurisation destroys this organism)**

Listeria monocytogenes
This organism is found naturally in the environment. Consuming raw milk could lead to contracting this organism. It could cause symptoms like flu-like illnesses to meningitis. It may also cause abortion in pregnant women. It has a mortality rate of 30% of those who are infected. **(Pasteurisation destroys this organism)**

Consuming raw milk (unpasteurised) could expose the public to many disease-causing organisms. All milk sold in the City of Cape Town is required by law to be pasteurised.

MICRO-ORGANISMS RELATED TO MILK

The classification of the various types of bacteria according to the type of reaction they could cause in milk, or according to their temperature related characteristics, is very significant from the milk industry's point of view. Important bacterial groups, according to the abovementioned classification, are **as follows:**

Acid forming bacteria
These bacteria will cause a sour taste in milk and will lead to a pH drop in milk from

6,6 to a pH of 4,6. A pH lower than 5,2 will coagulate the casien, which causes the milk to thicken. Acid formers are mainly mesophilic bacteria and will dominate in milk that has not been cooled properly.

Examples: *Streptococcus lactis* and *lactobacillus bulgaricus*.

Gas forming bacteria
Lactose fermentation by these bacteria causes a considerate amount of gas forming, namely carbon dioxide and hydrogen gasses.

Examples: Coliform bacteria causing early bloating in cheese *Clostridium butyricum* - a spore forming bacteria.

Sweet curdlers and ropiness
Bacteria causing these problems in milk are able to increase the viscosity of milk without causing considerable acid forming.

Examples: Alcaligenes viscosus- from stagnant water and *Bacillus* subtitles- from dust

Proteolytic bacteria
This type of bacteria will decompose casein, causing faecal odors and a bitter taste in milk. Due to the putrefaction of the protein, the milk becomes watery in appearance.

Example: *Clostridium batyricum*

Psychrotrophic bacteria
These bacteria are able to multiply at temperatures as low as 2 °C - 10 °C. They are the most dominant bacterial population in milk that is stored for two days or longer at 10 °C or lower. They cause a bitter taste in pasteurised milk.

Examples: *Pseudomonas* species

Mesophilic bacteria
Mesophilic bacteria can multiply at room temperature between 5 °C and 45 °C, but have an optimum growth temperature of 25 °C to 37 °C. These bacteria are the most dominant in nature. It is therefore very important to keep milk below 4 °C.

Examples: *Streptococci lactis* - acid forming in milk and *Micrococci pyogenes* - causes mastitis

Thermophilic bacteria

These bacteria can often survive the pasteurisation process. Examples of temperature and time combinations for pasteurisation include: 72 °C for 15 seconds or 62,8 °C for 30 minutes

Examples: *Micrococcus Streptococcus*

Spore forming bacteria
Spore forming bacteria are able to form endospores, which will survive a heat treatment of 80 °C for 10 minutes.

Examples: *Bacillus cereus, Bacillus subtilis* and *Clostridium butiricum*

Coliform bacteria
The presence of these bacteria requires urgent attention for the following reasons:

Their relationship with faecal contamination (*E-coli*)
The 'off ' tastes they cause in milk *Coliform* bacteria are an indication of good sanitation of all milk contact surfaces and equipment.

When *coliforms* are present in pasteurised products, it almost always indicates that spoilage bacteria are present.

Example: *E-coli* (faecal contamination)

MILKING PROCESS AND LEGAL REQUIREMENTS

The supply of milk to the consumer is a service, which often is taken for granted. Between the production of milk on the farm and its delivery to the consumer, a highly organised and efficient industry must function to ensure that consumer's demands are satisfied. The City of Cape Town' s Milk Control section is involved throughout this whole process in monitoring the product from the farm to the processing plants.

Milking and milking sheds
In South Africa it is seldom so cold that cows have to be kept stabled. Stables are used only to milk and feed cows. The most common method of milking is by machine instead of hand milking. The milk from the milking machines flows along a pipe to a refrigerated, insulated, stainless steel tank where it is chilled to = or <4 °C. These tanks have holding capacities of up to 5000 litres and are provided with stirrers ensuring a rapid cooling of the milk. Regardless of what method is used, milking is always preceded by the thorough washing of the udder to clean it of all contaminated material. The washing and sterilising of all equipment used and the cleaning of the stable is an important part of the stable routine.

Legal requirements:
These milking sheds are subjected to the provisions made in the Regulations relating to Milking Sheds and the Transport of Milk - R 1256 of 1986. In terms of these regulations, a milking shed must comply with all the provisions made and is deemed in all respects suitable for the production and hygiene handling of milk. The Local Authority will then issue Certificate of Acceptability if he is satisfied that the milking shed is suitable for production. The Environmental Health Officer in terms of this Act, has the authority to implement legal action should they not be in compliance with these regulations.

Transport of milk from the farms to the factory
From the farm, the milk will be pumped from the refrigerated tank to a tanker which is an insulated stainless steel tank built onto a lorry. The driver of the truck, on arriving at the farm measures the volume of the milk in the tank by means of a graduated dipstick, he will then check the temperature of the milk, which should be 4 °C or lower and ensures that there are no foreign flavors present in the milk. The stirrers are then switched on and after the milk has been thoroughly mixed two samples are taken, one for bacteriological and the other for chemical analysis. If the driver is satisfied that the milk is sound, he then connects the farm tank to the tanker and pumps the milk out. The tanker will then continue to the next farm. When the tanker has a full load, it will proceed to the processing factory. The temperature should remain = or < 4 °C in this insulated tank.

Legal requirements:
The Minister of Health has promulgated Regulations governing Milking Sheds and the Transport of Milk, Regulation 1256 of 1986. In terms of these regulations the driver of the truck is required to comply with the Duties of a Driver as prescribed in the regulation.

The tanker should also be built to the specifications as required by the SABS CODE 1187 of 1978. Environmental Health Practitioners are responsible for inspecting these tankers regularly and have the authority to implement legal action if deemed necessary.

Reception at the processing factory
Even while being transported, the milk is kept at a temperature of = or < 4 °C, and upon its arrival at the processing factory the temperature is checked and the whole load of milk will be rejected if it is not cold enough. After this, further quality tests are done to ensure that bacterial activity has been kept to a minimum. When the laboratory is satisfied with the quality, the milk will be pumped through stainless steel pipes to holding tanks (silo's), each of which in the larger dairies, is capable of

accommodating 70 000 litres. After this, the tanker will be cleaned thoroughly. Facilities exist at larger factories for the internal washing of these tankers, which is done automatically by pumps, which pump water and detergents through spraying devices situated inside the tankers.

Legal requirements:
The Minister of Health has, in terms of section 35, read with section 40, of the Health Act 63 of 1977, promulgated Regulations Governing General Hygiene Requirements for Food Premises and the Transport of Food - R 918 of 1999. In terms of these regulations, the person in charge, or the owner, is required to be in possession of a Certificate of Acceptability. The Environmental Health Practitioner will maintain a milk-sampling program whereby random milk samples are taken and which are sent to the Laboratory for a bacteriological analyses. In terms of this Act they have the authority to implement legal action against any producer, manufacturer or supplier, should they not be in compliance with any section of this Act or any of the regulations made in terms of this Act.

Pasteurisation
From these first holding tanks the milk flows to the pasteurisers where it is given a heat treatment. The purpose of pasteurisation is to destroy any pathogenic organisms, which may have entered the milk. The heating of milk in the pasteurising process is mostly the High Temperature Short Time method where the milk is heated to 72 °C for 15 seconds and then immediately cooled down to 4 °C and kept at 4 °C until sold to the consumer.

***Legal requirements*:**
The method of pasteurisation is prescribed in Regulations Relating to Milk and Dairy Products - R 1555 of 1997, and the amendment R 759 of 2004.

All milk sold in the City of Cape Town is required by law to be pasteurised.

Clarifying and homogenising
A modern technique used to ensure that the milk is completely free of all foreign particles before it is pasteurized, and entails the continuous free flow of milk through a rapidly rotating centrifuge (7000 rpm). The clean milk flows out again in a pipe concentric with the inlet pipe.

The homogenisation process is a method of breaking up each particle of fat until it is very small. Homogenising will make them all the same size as well as making the milk more palatable and digestible.

Filling and washing

After the abovementioned processes, the pasteurised milk is held in tanks before being filled into containers. These containers are filled with milk by automated machines, which fill hundreds of bottles and sachets a minute. The containers are then put into crates and moved to the cold rooms to await delivery to the retail outlets.

It is of paramount importance that each piece of equipment is thoroughly washed each day after use. Pipelines and pumps used for milk are designed in circuits so that, for cleaning purposes, detergents can be pumped around internally.

Delivery
Some dairies dispatch straight to the consumer while some dispatch to local distribution points, cafes and supermarkets. It is very important that the milk's temperature will remain at = or < 4°C during this delivery process. We know from experience that milk can turn sour and the reason for this is mainly due to the bacteria, which turn the milk sugars to acids. These bacteria are mostly active at warm temperatures, and at low temperatures this activity is greatly reduced. Because milk is also a good nutrient for bacteria it must be kept very clean and cold and this is what makes the whole operation very difficult.

MILK MONITORING AND TESTING

Monitoring and product sampling should begin at the known producer farms, bulk milk road tankers and the pasteurising plants. The object is to ensure that suitable milk is properly processed and packaged and conforms to required standards.

Laws controlling the dairy industry
The different tests done on milk are prescribed in the following Acts:
The Foodstuffs, Cosmetics and Disinfectants Act No. 54 of 1977 – In most cases this Act is being policed by the different local authorities. The Act addresses the health issues of dairy products: bacterial contamination, phosphatase and the presence of antibiotics in the products.

Agricultural Product Standard Act No. 119 of 1990 – This law controls the quality issues of milk: butter fat, protein and lactose content, any added water and possible fake products sold as dairy products.

The S.A.Bureau of Standards – The SABS make sure that the contents in packages are in fact of the same mass or volume as indicated on the package.

The Environmental Health Practitioners of the City's Milk Control section will take samples from the producer farms, processing factories, bulk milk outlets and the

informal dairies to be analyzed by the laboratory. Samples are taken daily, weekly or monthly depending on the volume produced.

The Milk Control Laboratory will then conduct the following tests in accordance with the Regulation as laid down by the Act using prescribed methods and culture media:-

Test for Pasteurised Milk	**Minimum legal standard**
Total Count	<50 000/ml
Coliform Count	<10/ml
Presence of E-coli	negative
Phosphatase test	negative
Added water	0%
Test for By-Products	**Minimum legal standard**
Coliform count (non-ripened products)	<50/ml or g
Coliform count (ripened products)	<1000/ml or g
E-coli	negative

Interpretation of tests

Total count (Bacterial count) A high bacterial count can result from two primary causes: -

- Inadequate cleaning of equipment
- Inadequate cooling of milk

Improper cleaning is the major cause behind a high bacterial count. Various organic and mineral soils can form on equipment surfaces. If not removed completely, they provide a means for bacteria to grow and multiply. The result is a high bacterial count and low quality milk.

Coliform Count
Coliform bacteria are destroyed at a temperature of about 46°C, so pasteurisation easily eliminates them when present in any reasonable numbers. The presence of

coliform bacteria in pasteurised milk indicates that there was contamination after pasteurisation. When coliforms are present in milk, it almost always indicates that spoilage bacteria are present.

Presence of E - coli

Escherichia coli is a pathogenic organism that is found in human and animal intestines that could cause food poisoning. Symptoms are diarrhoea and dysentery. This may not be present in milk and milk products. Pasteurisation destroys the organism.

Phosphatase test

This test will indicate whether milk was pasteurised effectively. Phosphatase is an enzyme in milk and is inactivated by pasteurisation. Only properly pasteurised milk is allowed to be sold in the City of Cape Town.

Added water

No added water is allowed in milk.

Raw Milk (Unpasteurised)	
Test	**Minimum legal standards**
Total count	<50 000/ml
HSCC (Herd Somatic Cell Count)	<500 000/ml
Antibiotics	negative
Resazurin	2 - 6
E-coli	negative
MRT (Milk Ring test)	negative
Staphylococcus aureus	negative
Streptococcus agalactiae	negative

Interpretation of tests

HSCC (Herd Somatic Cell Count)

Abnormally high levels of somatic cell counts could result from three factors:-

- The cow is infected with mastitis causing organisms.
- The cow is in late lactation.

- The udder has been injured.

A cell count of 500 000/ ml is acceptable but a count of 750 000/ ml and above indicates mastitis.

Antibiotics
Antibiotics are not allowed in raw milk. It would adversely affect the milk for the making of sour milk and cheese. Antibiotics could originate from medicine that the cow is treated with, or from detergents or cleaning solutions remaining in the containers used.

Resazurin
This test indicates the shelf life of raw milk. It is gauged on a scale from 0 - 6

6 - excellent
2 - acceptable
0 – poor

MRT (Milk Ring Test)
This test indicates Brucellosis in the herd. In non-pregnant cows the organism is found in the secretory tissue of the udder. In man it causes systemic disease, usually with an insidious onset resembling flu.

Pathogens
E - coli, staphylococcus and streptococci are a group of organisms causing disease in man and should not be present in the milk.

All milk obtained from farms, processing factories, bulk milk outlets and informal dairies must comply with the minimum standards as laid down in the regulations.