CLEAN MILK PRODUCTION

It refers to three items:

1. Suspended dirt
2. Abnormal smell or odour.
3. Microbial contamination.

When milk contains the above three items then it is known unclean milk. A free milk is milk, which is free from suspended dirt, abnormal odours or smell and abnormal microbial content. The cow must be clean, that is:

1. Disease free
2. Clean from physical dirt on the body
3. Clean surroundings,
4. Clean utensils and
5. Sanitary/cleanliness of the milker.

There should not be any thing around the milking shed, e.g. onions, etc. because milk absorbs the smell, which is not liked. With the proper shed/milking parlour and equipment, it should not be a difficult task to produce high grade milk. Proper methods must be followed if the best results are to be obtained in fact, high grade milk may be produced in very ordinary sheds and with mediocre equipment, if the methods are good. In order to produce clean, high quality milk the dairy man must understand what contributes cleanliness and be willing to watch the details that are necessary for the production of such milk.

The Temperament:

Milk is easily contaminated with dirt, bacteria and odours. Milk furnishes an excellent medium for the growth of bacteria, particularly when not properly cooled. Great care is necessary in the production and handling milk as a food product, in order to put it in the hands of consumers in a satisfactory condition.

Producing High Quality /Clean Milk:

Milk to be of high grade must be clean and of good flavour and contain a minimum of bacteria, none of which should be harmful in order to produce such milk very careful methods have been devised. These methods do not require elaborate or expensive equipment but the do require great care and cleanliness.

Healthy Cows:

Milk should be produced from cows known to be free from disease. Cows should be tested for tuberculosis and Brucellosis at least once a year and if the disease is found the test should be made more frequently. All reacting animals must be removed from the herd and the shed and premises properly disinfected. Milk that is in any way abnormal should be discarded. As a general rule, milk from a cow two weeks before calving or 4 days after calving should not be used. Only milk from healthy, normal cows should be used. The milk from cows that are affected with mastitis is often abnormal chemically and physically and usually has high bacterial count.
The use of antibiotics in the treatment of mastitis has proved effective however, the milk produced for several days after treatment contains some of the antibiotics. Such milk causes difficulty in cheese making and in the manufacture of culture, butter milk or churning. Milk from cows treated with penicillin or aureomycin or other antibiotics should not be used for a period of 72 hours following treatment.

**Clean Cows:**

Much of the dirt and dust that get in to the milk comes from the cow’s udder or abdomen during milking time. For this reason the cows should be cleaned before they are milked. The amount of labour required to keep a cow clean is lessened by having the stall plat form the right length, by using sufficient bedding and by keeping the hair clipped from the udder, flanks and belly. Long hair that drop into the milk carry with them large number of bacteria. Dust also is removed from the cow with greater difficulty if long hair is present on the parts mentioned. When kept in the shed the cows should be given at least a complete grooming daily. This should be done long enough before milking so that there will be time for the dust to settle. The udder and teat should be washed immediately before milking. The wash water should contain disinfectant solution. Chlorine (solution of 200 PPM) has been the standard chemical for this use for many years. Other disinfectants like potassium permanganate can also be used. A clean cloth or towel should be used for wiping the udder. It is desirable to use different towels for each cow. Milk always contains some bacterial when drawn from the cow. The number of bacteria found in the udder of different cows varies considerably. In studies on udder flora, it was found that certain cows produced milk containing not more than 300 or 400 bacteria/ml, whereas the milk from others the count did not go below 20,000 or more. This may possibly be caused by the fact that the opening of some teats is larger than that of others or that the sphincter muscle of the teats closes imperfectly, allowing a greater number of bacteria to enter the udder. Also, udder trouble such as mastitis, results in many bacteria being given off in the milk. Some cows may have chronic udder trouble, which is not generally noticeable but which causes them to give off large number of bacteria. Whatever the cause, it is necessary that the production of highest grade of milk to make a study of the individual cows and to correct the cause or to eliminate those constantly produce milk containing many bacteria. As there are slightly more bacteria in the milk first drawn than in that drawn later, it is the practice of some dairy men to discard the first few strips from each teat. This practice fits well with the use of a strip cup as a control measure for mastitis.

**Clean Sheds:**

Whenever possible, the shed should be located on high ground with good natural drainage and at a good distance from poultry houses, hog pens, manure pits or other surroundings that might pollute the shed air and furnish breeding grounds for flies. The floor of the shed should be non-absorbent and smooth so that it can be
easily cleaned. Drains should be provided so that the floors and walls can be washed. The stalls and mangers should be such that they offer the least surface for collecting dust and the least obstruction to the circulation of air. Good ventilation should be provided so that the air can be kept pure and clean both for the health of the cows and to prevent sours being taken up by the milk. Bacteria do not thrive in brightly lighted places especially in sunlight and hence good ventilation is essential. The air of the shed should be kept clean. Dust carries bacteria, hence it is necessary the production of clean milk to have the shed as free from dust as possible. Feeds containing dust should not be fed for sometime before milking nor should dusty bedding be used. Care should be taken in the feeding of cows to prevent the milk from contamination, both while it is being drawn and after it has been drawn. Certain feeds impart a good flavour to milk and others give an objectionable flavour. None of the feed with strong odours such as turnips or silage should be fed immediately before or after milking.

Clean Milker:

The methods of the milker are important in the production of clean milk. Man who is clean in his milking operations can produce high-grade milk in almost any shed, whereas a careless milker cannot produce good milk under the best conditions of management. The milker should be healthy, and should avoid exposure to communicable diseases. This is desirable that the man doing the milking being examined for evidence of septic sore throat, Typhoid or other diseases because apparently healthy people may be carriers of certain disease germs. The milker should always milk with clean, dry hands. If the teats are hard and dry and it seems necessary to moisten them, a small quantity of lanolin (or any Vaseline) may be applied after they have been washed. The milking should be done quickly and thoroughly. Milker should wear clean cloths throughout the milking time. Small top milk pails must be used—since in hand milking a large part of the dirt found in milk falls from the body of the cow into the pail at milking time, the advantages of a small top milk pail is obvious. The use of such a pail results in a cleaner milk and a lower bacterial count, because it keeps much of the dirt from getting into the milk. (Practically dairies which produce fluid milk use milking machine)

Handling the Milk:

The milk should be removed to the milk house immediately after it is drawn. Contamination may take place if it is left in the shed. Milk readily absorbs odours of the shed. The milk should then be trained into can or milk tanks. It the cows are carefully milked the straining need to be necessary. It is impossible to strain bacteria out of milk. However, it is usually desirable to filter the milk in order to remove any hair or particles of bedding or feed that may have gained entry into it. Clean Muslim cloth issued for straining milk.
Cooling Milk:

Proper cooling is one of the essential factors in the production of high grade milk. Even though milk has been carefully produced, it will contain a large number of bacteria when it reaches the consumer unless it is properly cooled and held at low temperature until it is delivered. It is impossible to produce milk without some bacteria. The point to observe is to prevent the multiplication of the bacteria that have gained access. If the temperature is held below 40°F the increase in bacterial number will be slow whereas a temperature much above 50°F will cause them to increase rapidly.

There are various means of cooling milk. When milk is sold for manufacturing purposes and non-restriction on temperature and bacterial count are less strict the cooling may be taken care of by immersing the cans of milk in a tank of spring or well water. But preferably in a mechanical cooler. When milk is to be used as market milk, with a low temperature and a low bacterial count, it is necessary to have a mechanical cooler. The simplest of these is vat storage box where the cans of milk are set in water cooled by refrigeration.

This system may be modified by pumping pre-cooled water through an aerator and cooling the milk before storing in the vat storage.

The cold wall tank is the latest development in milk cooling and storage. It is a stainless steel refrigerated tank. The milk is poured directly into it instead of cans. When pipe line system of milking is used the milk goes directly from the udder through sanitary pipes to the tank.

Utensils:

It is important that the dairy utensils be jointless or constructed with smooth, filed joints and corners so that they may easily be kept in good condition. Rusty tin ware should not be used. One of the most common sources of contamination of milk is utensils. In one experiment, milk drawn into sterilised pails had an average bacterial count of only 6306/ml, whereas samples from a pail that had not been sterilised contained on an average 73308/ml. Even when utensils are well cleaned bacteria may exist and increase very rapidly in them.

Utensils should first be washed with lukewarm water, then with hot water and a detergent that includes a wetting agent not soap. They should then be rinsed and sterilised. Utensils should be sterilised exposing them to steam for several minutes, by placing them in a steriliser under pressure or by using a chlorine solution. A rise with chlorine solution just before use is a recommended practice.

Diseases Transmitted to Human through Milk (Milk-borne Diseases)

1. Infection of milk directly from the cow:

The diseases are essentially of bovine origin that may secondarily be transmitted to human specially if raw milk is consumed. The causative organisms enter the milk through the mammary glands or through faecal contamination and thus cause a diseased condition in persons who consume such milk without
pasteurisation or boiling. Examples: Bovine tuberculosis, Undulant fever or Malta fever, etc.

2. *Infection from man to cow and then to milk:*  
Theses diseases are essentially of human nature, but can become established in cow’s udder, e.g., Septic sore throat disease, which is actually an acute tonsillitis, begins suddenly with a chill, fever up to 105°F, severe swelling and soreness of the throat with painful swallowing. Contaminated milk from infected cows is the main source of the infection.

3. *Direct contamination of milk by human beings:*  
These diseases may be transmitted to the milk by direct contamination through human contact, either by carriers or patients. Examples: Typhoid fever, Paratyphoid fever, Dysentery, Gastroenteritis, etc.

4. *Indirect contamination of milk by human beings:*  
There are human diseases, the pathogenic organisms that enter the milk through contaminated bottles or other utensils, water supply, insects and dusts. Example: Typhoid or Paratyphoid fever, Dysentery or Diarrhoea, etc.