

Unit I – Topic 6

Sanitization of Dairy equipment

"The product contact surfaces of all multi-use containers, utensils, and equipment used in the transportation, processing, handling, and storage of milk or milk products shall be effectively cleaned and shall be sanitized before each use. Provided, that piping, equipment and containers used to process, conduct or package aseptically processed milk and milk products beyond the final heat treatment process shall be sterilized before any aseptically processed milk or milk product is packaged and shall be re-sterilized whenever any unsterile product has contaminated it."

CLEANING OPERATIONS

This item requires that all milk contact surfaces be effectively cleaned and sanitized before each use. The only exception to this is the Ordinance provision that milk storage tanks be emptied and cleaned at least every 72 hours and raw milk and heat treated milk storage tanks use to store products longer than 24 hours and all raw milk silo tanks be equipped with a 7-day temperature recording device.

This recorder shall have a scale span of not less than 50 F, be accurate to plus or minus 2 F, include the normal storage temperatures plus and minus 5 F, with 2 F minimum scale divisions not less than 0.040 inch apart and time scale divisions of not more than 1 hour. The recording chart of these devices must be capable of recording temperatures up to 180 F.

Computer generated temperature recorders which provide a printout which is readily discernible and meets the intent of the Ordinance are acceptable as are devices equipped with multiple sensors or recording pens.

Records are a significant part of the cleaning and sanitizing process. All CIP charts are to be retained by the plant for a minimum of three (3) months. This includes records for cleaning and sanitizing of all plant product processing equipment.

It is also recommended that log records are maintained of manual cleaning operations. This will enable plant quality control staff and the regulatory agency to validate plant cleaning/sanitizing operations.

The Ordinance requires that the regulatory agency review and initial CIP charts during each inspection.

Milk tank trucks shall be tagged or log book records maintained to verify each time the tanker is cleaned and sanitized. The wash tags shall only be removed at the plant or receiving station where the tanker is next cleaned and sanitized. These records shall be retained for 15 days for regulatory review.

Note: Cultured product storage/processing vessels may not have to meet the 24 hour emptying and cleaning requirements if their process demands extended periods of storage, however, a plant should package cultured product within 24 hours of breaking the curd.



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Recent changes in the PMO permit the restricted use of condensing water from milk evaporators and water reclaimed from milk or milk products as follows:

1. Pre-rinsing of the product surfaces where pre-rinses will not be used in food products, and
 - Cleaning solution make-up water; provided that
 - There is no carry-over water from one day to the next OR,
 - The temperature of all water in the storage and distribution system is maintained at 63o C (145o F) or higher by automatic means, or
 - The water is treated with a suitable, approved chemical to suppress bacterial growth by automatic methods prior to entering the storage tank, AND
 - Distribution lines and hose stations are clearly identified as "limited use reclaimed water", AND
 - Water handling practices and guidelines are clearly described and prominently displayed at appropriate locations within the plant, AND
 - These water lines are not permanently connected to product vessels, without a break to the atmosphere and sufficient automatic controls, to prevent the inadvertent addition of this water to product streams. NOTE: Recovered water may be used as boiler feedwater for boilers not used for generating culinary steam or in a thick, double walled, enclosed heat exchanger.

CLEANING OF MILK TANKS



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ASPECTS OF CLEANING

The arrangements for cleaning equipment that comes in contact with products are an essential part of a food processing plant. It must be kept in mind that food manufacturers are always obliged to maintain high hygienic standards; this applies both to the equipment and, naturally, to the staff involved in production. This obligation can be considered under three headings:

1. Trade obligation
2. Moral obligation
3. Legal obligation

TRADE OBLIGATIONS

Good, wholesome, clean products that keep well and are free from health hazards are obviously good for trade; customers will buy the same product again. However, if a product is contaminated, does not keep well or is the subject of complaints to the authorities, the reverse is true, and the resulting publicity is very damaging.

The potential effects of poor cleaning, poor standards and poor quality must be kept in mind at all times.

MORAL OBLIGATION

Most of the customers who consume the products never see the factory or how the products are handled. They trust the company, rely on its reputation, and take it for granted that operations are carried out under the cleanest of conditions by well-trained staff who are continually aware and conscious of these factors

LEGAL OBLIGATION

The law attempts to protect the customer and purchaser in respect of health and quality. Failure to meet legal obligations, national or local, can result in very severe action, and prosecution proceedings can be very costly.

Prevention is better than cure, and companies are obliged to meet legal requirements and maintain high standards. Milk and milk products by their nature are ideal media for the growth of microorganisms, including many pathogens. As a result of this, there is more legislation concerning milk – its production, handling, processing, packaging, storage and distribution – than any other food product. Each country has its own national and perhaps local legislation standards.



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CLEANING OBJECTIVES

Talking about cleaning results, the following terms are used to define the degree of cleanliness:

- Physical cleanliness – removal of all visible dirt from the surface
- Chemical cleanliness – removal not only of all visible dirt but also of microscopic residues that can be detected by taste or smell but are not visible to the naked eye
- Bacteriological cleanliness – attained by disinfection
- Sterile cleanliness – destruction of all microorganisms

It is important to note that equipment can be bacteriologically clean without necessarily being physically or chemically clean. However, it is easier to achieve bacteriological cleanliness as a matter of routine if the surfaces in question are first rendered at least physically clean.

In dairy cleaning operations, the objective is nearly always to achieve both chemical and bacteriological cleanliness. The equipment surfaces are therefore first thoroughly cleaned with chemical detergents and then disinfected.

DIRT

It consists of deposits stuck to a surface and its composition, in this particular case, is based on milk components that are utilized by bacteria 'hidden' in the dirt.

HEATED SURFACES

When milk is heated above 60 °C, *milk fouling* starts to form. This is a deposit of calcium (and magnesium) phosphates, proteins, fat, etc. You can easily see the result on heat exchanger plates after a long production run, in the heating section and the first part of the regenerative section to follow. The deposits stick tight to the surfaces, and after runs of more than eight hours, a change of colour from whitish to brownish can also be observed. Figure 21.1 shows an attempt to visualise the dirt on a heated surface.



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COLD SURFACES

A film of milk adheres to the walls of pipelines, pumps, tanks, etc. ('cold' surfaces). When a system is emptied, cleaning should start as soon as possible, or otherwise this film will dry out and be harder to remove

CLEANING PROCEDURES

Cleaning of dairy equipment was formerly done (and still is in some places) by people armed with brushes and detergent solutions, who had to dismantle equipment and enter tanks to get to the surfaces. This was not only laborious but also ineffective; products were often reinfected from imperfectly cleaned equipment.

Circulatory cleaning-in-place (CIP) systems adapted to the various parts of a processing plant have been developed to achieve good cleaning and sanitation results.

Cleaning operations must be performed strictly according to a carefully worked out procedure in order to attain the required degree of cleanliness. This means that the sequence must be exactly the same every time.

The cleaning cycle in a dairy comprises the following stages:

- Recovery of product residues by scraping, drainage and expulsion with water or compressed air
- Pre-rinsing with water to remove loose dirt
- Cleaning with detergent
- Rinsing with clean water
- Disinfection by heating or with chemical agents (optional); if this step is included, the cycle ends with a final rinse, if the water quality is good.