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# Dairy Guidelines

COOPERATIVE EXTENSION SERVICE, V.P.I., BLACKSBURG, VIRGINIA

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## Cleaning and Sanitizing Milking Equipment

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Clean and sanitary milking equipment is a requirement that no dairyman can afford to disregard. Milk is an extremely perishable food, and once it has been removed from the cow's udder, it can become grossly contaminated with bacteria.

The most common source of bacterial contamination is the surface of equipment with which milk comes in contact. Such surfaces, when residues of dried milk or milkstone are allowed to accumulate, are coated with billions of bacteria. These are washed into milk during the next use of the equipment and are responsible, in most cases, for high bacterial counts and rapid spoilage of milk.

### Procedure for Hand Cleaning and Sanitizing of Milking Equipment

Clean and sanitary equipment is the result of regular and thorough attention immediately after use. Any delay only creates a more difficult task.

#### Rinse - Scrub - Rinse

**Rinse** immediately after each use in cold or warm water (95° to 110°F). This will remove a large portion of the wet milk adhering to surfaces of the equipment. If this step is delayed, and milk is allowed to dry, the job of washing becomes more laborious and time-consuming. Rinse the milking machine while it is attached to the vacuum line. Draw a pailful of the water into the machine while lowering and raising the teat cups in and out of the water to provide "air-brush" action. Then rock the unit several times to rinse the entire inner surface of the unit. Empty and disassemble the machine for cleaning.

**Scrub** the equipment in a hot detergent solution, preferably a chlorinated detergent, using appropriate brushes to reach the hard-to-get areas. The solution should be as hot as the hands can stand. Rubber gloves are sometimes helpful for protecting hands from the corrosive action of the detergent. Follow directions for detergent strength given on the label of the detergent container. Do not guess at the amount of water in the wash vat. Measure the gallons required, and permanently mark the water level on the wash vat for use as a guide in the future. Proper concentration of the detergent solution provides for a thorough cleaning job each time and helps prevent the formation of protein and/or milkstone build-up on equipment. Weak detergent concentration results in insufficient cleaning action, while too strong detergent concentration is harsh on the hands, is wasteful, and expensive.

**Rinse** the equipment in very hot ( $140^{\circ}\text{F}$  and higher) acidified water (1 to  $1\frac{1}{2}$  ounces of milkstone remover in each 10 gallons of water). When an acidified rinse is used after each scrubbing, there should be no build-up of milkstone at any time.

**Store**

Store equipment, immediately after the last rinse, on racks to drain and dry. The hotter the temperature of the rinse water, the faster the equipment will dry. Milking machine parts should be stored dry and unassembled between milkings. Equipment surfaces must be dry during storage to prevent growth of any bacteria that may remain on them.

**Sanitize**

Sanitize equipment, within  $\frac{1}{2}$  hour of the next milking, in hot water containing 200 p.p.m. of chlorine. Iodine sanitizers ( $12\frac{1}{2}$  p.p.m.) are acceptable in some markets. Temperatures of iodine solutions should not exceed  $120^{\circ}\text{F}$ .

To sanitize milking machines, completely assemble them, attach them to the vacuum line, and draw 2 to 3 gallons of the sanitizing solution into them using "air-brush" action. Rock the machines to thoroughly sanitize all milk contact surfaces, and empty them completely before use. Sanitizing solutions may be saved for use in washing udders or for sanitizing teat cups between cows.

Procedure for Cleaning and Sanitizing Pipelines

The variety of installations and of types of pipeline milking systems require that cleaning programs be tailored to specific situations. Continuous circulation systems are more easily cleaned. There are, however, some cleaning-in-place methods which have proved successful: (1) The pressure re-circulation method; (2) The vacuum re-circulation method; and, (3) The mechanical vacuum-gravity method. The basic cleaning and sanitizing procedures are the same for all systems.

**Flush** the system with cold or warm water ( $95^{\circ}$  to  $110^{\circ}\text{F}$ ) immediately after milking. Use fresh water and flush until the discharge runs clear, discharging the rinse water down the drain.

**Wash** the system with hot water, containing a non-foaming, chlorinated detergent, for 10 to 15 minutes, starting with a temperature of  $160^{\circ}\text{F}$ . Mix the wash solution in the wash vat using the exact number of gallons of water necessary to continuously circulate in the system. Not all detergents will do an effective job of cleaning pipelines in-place. Detergent manufacturer's directions for strength are specific; therefore, measure both water and detergent. Do not guess! While circulating the wash solution, brush-wash all parts not coming in contact with the circulating solution. At the completion of the wash circulation period, drain the line and the vat.

**Rinse** the system by circulating a large volume of cold acidified water, using 1 to  $1\frac{1}{2}$  ounces of milkstone remover for each 10 gallons of water. (Follow manufacturer's recommendations as to strength of rinse solution.) Allow the line to drain completely.

**Sanitize** the system just before the next milking by circulating with a sanitizing solution, containing 200 p.p.m. of available chlorine, or other approved sanitizer used at the manufacturer's recommended strength. Drain the line thoroughly before milking.

Automatic systems for cleaning and sanitizing pipeline milking systems are quite acceptable when installed and operating properly. As with any mechanical system, they require the constant attention of the dairyman, and periodical servicing by the manufacturer's representative, to see that they are operating properly and doing a good job of cleaning and sanitizing the system.

#### Procedure for Cleaning and Sanitizing Bulk Tanks

Farm bulk tanks have been responsible for much of the recent improvement in milk quality because of their ability to cool milk quickly to temperatures that inhibit the growth of most bacteria commonly found in milk. The bulk tank, however, becomes a serious threat to milk quality when it is improperly cleaned and sanitized, for it can serve as an ideal habitat for bacteria that grow and multiply at refrigerated temperatures. The importance of proper cleaning and sanitizing of bulk tanks, therefore, is as great as for any other piece of milking equipment. Follow this general procedure:

**Rinse** the tank thoroughly with cold or warm water (95° to 110°F).

**Wash** the tank with a concentrated solution of high-foaming chlorinated detergent. Follow the manufacturer's directions for detergent strength. Brush-wash the tank thoroughly working from a plastic pail within the tank and with the tank outlet valve closed. After brushing the tank, agitator, and undersides of the bridge and tank covers, drain the solution from the tank back into the pail, brushing the outlet valve and measuring stick while the solution is draining. Use the same solution for brushing the outside of the tank.

**Rinse** the tank thoroughly, first with tap water and then with an acid rinse ( 1 to 1½ ounces of milkstone remover to each 10 gallons of water). Drain the tank thoroughly.

**Sanitize** the tank, within 30 minutes prior to use, with a solution of 200 p.p.m. of available chlorine or other approved sanitizer used at the proper strength. Drain the tank thoroughly before use.

#### Precautionary Measures to Follow

Cleaning and sanitizing compounds are essential aids to the dairyman in his efforts to produce high quality milk. In order that they be used most effectively to do the job for which they are intended, there are certain rules that apply. When used improperly, in some cases they can be dangerous to the person who is handling them.

#### **Don'ts**

1. Don't mix an acid cleaner (milkstone remover) with a chlorinated cleaning compound. When this is done, poisonous chlorine gas is released.

2. Don't mix any detergent with acid cleaner and expect to get equipment clean. Because of chemical action, the cleaning properties of both compounds are destroyed.
3. Don't soak milking equipment in chlorine solutions between milkings. Prolonged soaking in chlorine causes pitting of stainless steel parts and will ruin rubber parts. Always sanitize equipment within 30 minutes prior to milking.
4. Don't use acid cleaner (milkstone remover) for doing the whole job of cleaning. Acid cleaners are necessary to prevent deposits of milkstone from building up on surfaces of equipment. However, they will not loosen and remove films of fat and protein from equipment. Chlorinated detergent solutions are most effective, and their use should precede the application of acid rinses.
5. Don't use too hot water with iodine solutions. At temperatures over 120<sup>o</sup>F, iodine solutions become unstable and equipment, ceilings, and walls will become stained.
6. Don't use iodine sanitizers in spraying devices that are designed for using chlorine compounds. The differences in concentration of compounds and p.p.m. requirements result in improper strength of sprays for sanitizing.
7. Don't use different sanitizing compounds for dipping teat cups between cows and for washing cows' udders. Chemical action of chlorine solutions with iodine solutions may be injurious to udders and teats and to the milker's hands.
8. Don't disregard instructions of suppliers on use strength of cleaning and sanitizing solutions. Too little strength will not get the job done, while too strong solutions are sometimes corrosive to the skin and equipment and are more costly.