

# GOT MILK?

## GOOD. NOW KEEP CONTAMINANTS OUT

Spic and span equipment, milk hygiene vital to dairy

*LaDonna Foley*

People in Wyoming can now obtain raw, unpasteurized milk. Purchase is not allowed, but a citizen may have the production of their own animal.

For those who don't wish to milk or care for their own dairy animals, dairymen offer shares in a herd. Increased interest in herd shares and raw milk consumption mean the ability to produce safe milk is increasingly important.

Nine children under 7 years old became sick in a recent case of drinking raw milk contaminated with *E. coli*. Of five requiring hospitalization, three were diagnosed with hemolytic uremic syndrome, which leads to life-threatening kidney failure.

*E. coli* is not the only harmful pathogenic bacteria that can contaminate milk, others include *Salmonella*, *Listeria*, and *Campylobacter*. Bacteria can also cause mastitis in cows and goat does, permanently affecting animal health and milk production.

To help reduce the risk of illness, effective equipment sanitation and milking hygiene controls many of these pathogens.

### Contamination

Microorganisms get into milk several ways:

- Soil (not dirt but all the organic and inorganic compounds on the equipment, including milk) drops from the animal to contaminate milk or is sucked into milking machines when units fall off.
- Milking machines come in contact with dirty water during the

milking process or at cleaning.

- Cows and dairy goats with a bacterial infection of the mammary glands (called mastitis) not showing physical symptoms are milked into the general pool.
- Microorganisms are growing on milking equipment and in storage containers.

In most cases, the milker cannot tell by looking if milk has been contaminated. Bacteria, yeasts, and mold are always present in the environment and grow exponentially as long as food and habitat are available. Continual monitoring of milking and cleaning practices is necessary to prevent milk contamination.

### Steps for washing milking equipment:

**Disassemble:** Before cleaning, disassemble the milking system. If hand milking into a stainless steel bucket, this is very simple – you may only need to take apart the filter on the milk tote. Automatic bucket milkers need to be taken apart and washed by hand – lid gaskets are very easy to overlook and a great place for bacteria to hide, so double check





*Bucket milker assembled for two goats. Milking machines allow a single person to milk multiple animals at once but increase cleaning time.*



these areas. Even large dairies designed with complex, clean-in-place, in-line systems have parts such as outlet valves that need hand washed. Pasteurizers and storage containers – everything milk may touch – should be washed.

**Pre-rinse:** Rinse all milking equipment with 100-110 F water to prevent dried milk film. Pre-rinsing removes up to 70 percent of the soil load, so continue rinsing until the water clears (don't recirculate this water). Temperatures more than 110 F at this step can cause a protein film to stick to surfaces while water under 93 F leads to a greasy film from fat crystallization. The longer milk dries on equipment, the harder it is to remove, so make sure to rinse right away.

**Wash:** Dairy detergent removes fats, proteins, and other organics. Water temperature needs to be greater than 120 F so milk solids don't redeposit onto equipment. An alkaline detergent with a pH of 11-13 breaks milkfat into smaller droplets, which will be suspended in the water and washed away. Many dairy detergents contain chlorine, which helps protein become soluble in water, but this is not a sanitizing step.

The proper detergent-to-water ratio is essential for adequate cleaning. Too little detergent, and soils stick onto equipment, but too much detergent wastes money. If your wash bucket or sink doesn't have volume marks, measure out the water or add a fill line. The amount of detergent can vary greatly between brands, and many come with small, plastic measuring cups specifically sized for the product. For example, Phanzite powdered dairy detergent uses 2-3

ounces of powder while Liquid K uses half an ounce of detergent for every 3 gallons of water.

Hand-washed items should soak in 120-135 F wash solution for at least five minutes before being thoroughly scrubbed. Wash water sucked into automatic milking systems should start out at 170 F. Heating to this temperature requires a booster heater. These systems need to have the water circulating through for six to 10 minutes. The solution should still be above 120 F at the end. Circulating air is then sucked through the system for two to three minutes to clear out wash water.

**Rinse:** Clean water should completely rinse everything before the acid wash. Rinse the milking equipment, and if you are using the same sink and brushes, rinse them. Chlorine left from the detergent when mixed with acids will combine into a toxic gas. Never mix chlorine detergents with acids!

**Acid rinse:** The acid rinse removes mineral and milkstone buildup. This also helps rubber parts last longer by neutralizing chlorine and alkaline molecules left from the wash cycle. How often you do this depends on your system and water hardness. Small, home producers may only acid rinse once a week while large commercial dairies may acid rinse after each washing. Acid rinses need a pH of 3-4, so check the container label for proper measurements, and use your pH strips. Use lukewarm or cool water in this step. Hand-washed items should soak in the acid rinse for three to five minutes before scrubbing. Automatic systems circulate the acid solution for two to three minutes followed by two to three minutes of

air. Although acid rinse is not necessarily a sanitizer, the low pH prevents bacterial growth. Acid rinses including sanitizers are available.

**Drain and air dry:** Air drying prevents transferring bacteria between components. Towels can smear microorganisms into clean areas or harbor colonies of organisms. This is a great time to check for cracks, holes, or rough areas in rubber parts; all are excellent places for bacteria to hide. An inflation liner with a tiny hole can establish microbial colonies next to the shell and push bacteria up into the udder or down into the milk bucket. Teat cup liners and other rubber parts should be replaced after the recommended number of uses.

**Sanitization:** 30 minutes or less before milking, sanitize all equipment that will contact milk. This includes buckets, filters, totes, and storage containers as many bacteria can grow under refrigeration. Sanitization can be done with hot water (170 F for five minutes) or chemically (chlorine or iodophor compounds with room-temperature water).

Properly cleaning milking equipment is a critical step in preventing microorganisms from growing in milk. Attention to detail and consistency in sanitation procedures is one part of the process that is completely under our control in producing good-tasting, healthy milk.

*Hand milking uses minimal equipment and cleaning time (from left): udder wash, disposable paper towels, strip cup, teat dip, and a stainless steel milking bucket.*



## Have the Right Equipment

Proper cleaning requires a lot of hot water, alkaline detergent (for removing milk solids), acid wash (for removing minerals and milkstone), brushes, and safety gear. A thermometer and pH strips to check detergent and acid rinse solutions should also be included. I use splash goggles, a waterproof apron, and heavy-duty rubber gloves while washing to protect clothing and skin. Synthetic brushes should be used to limit areas for bacterial growth and to hold up with heavy use. Safety equipment can be picked up at a home improvement store, and brushes, alkaline dairy detergent, and acid wash are available from dairy supply stores and catalogues.

Check the label on detergent and acid rinse containers to determine amount needed as this is dependent on the brand and your water hardness. Increase the amount of detergent and/or use a water softener with hard water to get effective cleaning action. Whenever using acid, put water into the sink first and then add the acid to prevent backsplash and risk of explosion.

Most dairy detergents and acid rinses are very concentrated, and a bucket can last a small producer a long time. Chlorine compounds decrease in efficiency with age, and iodine compounds break down at temperatures above 120 F, so storage length and storage area are important.

Some people with small herds go in with friends and split an order. If you do, make sure to copy the label and Material Safety Data Sheet so everyone knows exactly what they have.

**LaDonna Foley** received her master's degree in animal science from UC, Davis and enjoys living on the prairie near Cheyenne. She can be reached at [LaDonna\\_Foley@msn.com](mailto:LaDonna_Foley@msn.com).