

CALVING EASE

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Using Bleach as a Germicide For Manual Washing Feeding Equipment

What is it?

Nearly everyone is familiar with “bleach.” Technically, bleach is a water-based solution of sodium hypochlorite (NaOCl in water). The most common form is household strength dilution. It varies from 5.25 to 6 percent by weight of the active ingredient. Commercial supplies are available in the 12 to 15 percent dilution range. This strength is frequently used to sanitize bulk tanks and milking systems on dairy farms. The national brand best known in this product is Clorox®. Much like other familiar brands (e.g., Kleenex, Vaseline) this name has become nearly equal to the product itself.

As a chlorine compound, bleach acts “on microbial membranes ... and oxidizes cellular protein. Chlorine has activity at relatively low temperatures, is relatively cheap, and leaves minimal residue or film on surfaces.” (Schmidt, p10) It is the first choice for many farms.

How can I make it work effectively?

Like other oxidizing agents, it is important to use bleach properly. The four factors that determine how well bleach works as a germicide are:

- Strength of the bleach – the percent of active ingredient as used
- Concentration of bleach – how much bleach is added to a given amount of water
- Temperature of bleach solution
- Duration of exposure of equipment to bleach solution

Strength of the Bleach

Don't confuse the strength of the product with the washing solution concentration. As a hazardous liquid, all chlorine bleach must be labeled. The label will show the concentration as manufactured. However, sodium hypochlorite solutions are not very stable. Unfavorable storage conditions can cause accelerated decay or decomposition. Favorable conditions are: (1) temperature not above 70°, (2) plastic container (not metal), (3) opaque container (minimize exposure to light), and closed container (minimize exposure to air). It's common to measure fifty-percent decay within one month under favorable storage conditions.

Ideally, buying weekly would insure close to full strength product. Purchasing more than one month's supply at a time will result in substantial product losses even in the unopened containers. For manual washing calf feeding equipment I like to buy whatever brand sells the most rapidly at the local supermarket.

Concentration of Bleach

When used as a germicide in 130° wash water for manually scrubbing calf milk feeding equipment 200 parts per million (PPM) is recommended. This is based on an approximate exposure time of ten seconds. Two to three ounces of household bleach in five gallons of water will come close to this concentration.

Remember that this assumes that the equipment has been rinsed prior to washing. Organic loads (such as milk, mud, and manure) drastically reduce the germicidal activity of bleach. Check yourself half way through the wash up routine. Can you still see the bottom of the sink as well as you could when you started? If you cannot, your organic load is too high. The bleach is toast. If the organic load gets high, dump the water and start over. Adding more bleach to dirty water will not give effective germicidal control.

If you plan to soak some equipment after it has been washed (bottles, tube feeder) plan on a 2000 PPM solution in hot water for at least one hour. A quick prefeeding rinse with a 50 PPM solution can cut bacteria regrowth populations to one-tenth their original level. [50 PPM = 1 ounce in 5 gallons, 2000 PPM = between 2 and 3 cups bleach in 5 gallons]

Temperature and Duration of Exposure

The hotter the solution the more active the chlorine as a germicide. For a manual wash situation, we always want the wash water to be over 120°. Most of us can't stand to work in water much over 140°.

The longer the duration of exposure the more effective the germicidal action. For a manual wash situation, duration is going to be determined by how long it takes to brush the equipment. Bucket washing exposure time may be as low as five seconds. Careful bottle washing can get up to fifteen seconds. Compared to CIP milk pipeline washing these are very short times. So, plan on the high temperature and 200 PPM concentration to do the job – don't slow down washing to get greater exposure.

Residues

The chlorine residue will be so low given the above recommendations that equipment does not need to be rinsed in order to make it safe for feeding calves. We do recommend rinsing in an acid solution, however, to lower the pH to further prevent regrowth of bacteria between feedings.

References: Schmidt, R.H., "Basic elements of equipment cleaning and sanitizing in the food processing industry and handling operations." Univ. Florida Cooperative Extension Service FS14 2003. Gay, J., "Sanitation in the control of livestock infections disease." Washington State Univ. College of Vet. Med., www.vetmed.wsu.edu/courses/jmgay/FDIUSanitation.htm

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