Calving Ease

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By Sam Leadley of Attica Veterinary Associates

Using Bleach Effectively

Bleach, our common name for a weak aqueous solution of sodium hypochlorite, is a very useful disinfectant and cleaning compound. And, even better, it is inexpensive. However, in order to get our money's worth bleach must be stored and used properly.

Shelf life for bleach

The length of time the bleach remains usable is usually measured by what we call "shelf life." Chemists know the factors that determine the stability of bleach solutions. They are:

- Concentration – the weaker the solution, the longer the shelf life.
- Temperature – the cooler the solution, the longer the shelf life.
- pH – the higher the pH, the longer the shelf life (up to about 11.5).
- Concentration of impurities – avoid exposure to copper, iron and cobalt.
- Light – avoid light exposure.

"In summary, the most stable solutions [longest shelf life] are those of low hypochlorite concentration, with a pH of 10 or higher, low copper, iron and nickel content, and stored in the dark at low temperatures."([Pioneer Chemical Co., "Stability of Sodium Hypochlorite Solutions")

The one factor that we often control is the temperature at which bleach is stored. We may not have facilities to keep it cool in the summer. However, we can avoid locations that tend to have very high temperatures. Especially to be avoided is a location near refrigeration compressors.

The rate of decomposition, nevertheless, even under favorable conditions is still fairly rapid. When stored at room temperature out of sunlight we can expect to have nearly full-strength bleach for a month. By three months household bleach will have lost slightly over eleven percent of its active ingredient.

This means more frequent purchases are better than buying large volumes annually or semi-annually. For manual washing where we use liquid bleach our best buy is the place with the freshest supply. That's probably the store-brand bleach from the busiest supermarket in town.

Fortunately many on-farm uses allow us to increase the volume used to compensate for decreases in concentration due to decomposition. This strategy probably is cost effective given the original low cost per gallon. See www.atticacows.com , the Calf Facts section for tables for bleach dilutions for washing, sanitizing and soaking when using household-concentration bleach.

Cleaning equipment

It is well known that including bleach with a detergent promotes effective cleaning of equipment exposed to milk solids. Some farms use a dry powder product that combines the detergent and sodium hypochlorite. Others choose to add bleach as a liquid to wash water. In both cases milk proteins are more effectively removed from surfaces than when the detergent is used alone.

The presence of milk solids, however, rapidly degrades the sodium hypochlorite ingredient in bleach. In a study using several milk components it was shown that milk proteins, especially casein, degrade bleach rapidly (Hekmati & Bradley). Therefore, it is essential to remove as much of the milk solids before starting the "washing" step in the cleaning process. That is, before washing equipment in a hot water solution of detergent and bleach be sure to rinse all surfaces thoroughly with lukewarm water.

Sanitizing equipment

It is also known that the bactericidal effect of bleach is increased by:

- Time – the longer exposure to the solution the better it kills.
- Concentration – the stronger the solution the better it kills.
- Temperature – the hotter the solution the better it kills.

Thus, more effective kills of regrowth bacteria on equipment surfaces depend on using a strong, hot solution and making exposure as long as is practical.

Sanitizing milk

It seems to make sense that if bleach kills bacteria on surfaces then adding bleach to milk would decrease the bacteria content in the milk. Zoller and Eaton demonstrated modest decreases in bacteria counts in milk at room temperature. However, they concluded, "In regard to cow's milk, we can say that sodium hypochlorite has a relatively low bactericidal effect." (p133). So, on one hand, bleach is not an effective way to decrease bacteria counts in milk. On the other hand, Zoller and Eaton demonstrated that residual amounts of bleach left on equipment after a pre-use sanitizing step have virtually no effect on the milk. Not to worry about hurting the calves.

References: Pioneer Chemical Co., "Stability of Sodium Hypochlorite Solutions" Merrill, E. P, JM Jensen and ST Bass, "Detergency Effects of Trisodium Phosphate with and without Sodium Hypochlorite on Milk-Protein Solids" Journal of Dairy Science 1962 45 No.5, 613-617. J.D. Pécora, DZ Guerisoli, RS daSilva and LP Vansan, "Shelf Life of 5% Solution Hypochlorite Solutions" at www.forp.usp.br/restauradora/soda/sodaingl.html accessed 10/27/08. H.F. Zoller and SM Eaton "Some Studies on the Bactericidal Action of Sodium Hypochlorite in Cow's Milk" Journal of Dairy Science 1923 6:131-134. M. Hekmati and RL Bradley, Jr. "Effect of Milk Constituents on the Persistence of Sodium Hypochlorite Sanitizer" Journal of Dairy Science 1979 62:47-48.

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