WASHING AND SANITIZING THE COW'S UDDER

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Liberal use of a plain water wash, preceding a bactericidal treatment is an effective means of sanitizing the cow's udder, preparatory to milking. Both hypochlorite and quaternary ammonium bactericides are aided by the plain water rinse. In this study hypochlorite reduced bacteria counts on teat surfaces and in the milk more satisfactorily than quaternary ammonium solution.

An important part of a sanitary milk production procedure is cleaning and sanitizing the udder at milking time. The exterior of the udder is always contaminated with bacteria and because of its texture, it presents a much different sanitary problem than milk utensils. The skin of some animals including cows, exhibits a germicidal property, but this is ineffective against masses of soil which harbor and protect bacteria. Cleaning and sanitizing practices used on udders must necessarily be relatively mild. Even though clotted soil is not present, there always will be dust or contaminated water on the udder prior to the pre-milking preparation. An udder in satisfactory sanitary condition for milking is clipped close, has no physical soil adhering to it and is dry enough following the use of a sanitizer to avoid drip from the hands or into the cups of mechanical milkers. The term physical soil is used here in contrast to biological soil because it is quite unlikely that the wrinkled surface of the udder can be rendered completely free of bacteria, mold or yeast by any reasonable and practical method of sanitizing.

The specifications for producing Grade A milk according to the U. S. Public Health Service Milk Ordinance and Code (5) include, "the udders and teats of all milking cows shall be clean and wiped with an approved bactericidal solution at the time of milking" (item 17Cr., p. 73). Observation at many dairies of the procedures employed in preparing the udder for milking make it appear that the terms "clean" and "wiped with an approved germicide" are not interpreted as the Code intends them to be. In Appendix F, p. 196, the description of milk utensil sanitizing includes "an intermediate, plain water rinse must be provided between the wash and the bactericidal treatment". The plain water rinse is for removing as much as possible of the soil or any cleaning material residues, so that the bactericidal agent will have maximum effectiveness. A metal surface can be cleaned and sanitized more easily than the surface of the cow's udder. It should be clear then, that the surface of the udder and teats also should have "an intermediate plain water rinse", or if no detergent has been used, at least a water rinse to precede the use of a bactericidal agent. Since it is not practical to effect sterilization of the udder and teat surfaces, the bactericidal agent must be given every opportunity to act, and this means having a physically clean surface.

Some Previous Work

Hammer (3) has reviewed several reports pertaining to the reduction of bacteria in milk by various methods of udder washing. It is certain that the exterior of the udder is an important contributor of bacterial contamination.

Beck and Claydon (1) compared chlorine soaked paper towels, chlorine soaked flannel towels and dry hand cleaning of udders. They reported no significant differences in the bacteria counts of milk.
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when cows were prepared for milking by these methods.

Kesler et al. (4) compared chlorine solutions, quaternary ammonium solutions and water as udder washes with soaked turkish towels. While the bacteria counts of milk produced by the three washing methods were not statistically significant, there were several instances in which the water wash gave counts lower than either of the two bactericides. When seven cows were washed with the same 2 gallons of warm water, using one flannel cloth, and the teats then immersed to the base in sterile water or in 150 ppm chlorine water, Byers and Ewalt (2) observed that the immersion in the chlorine water effected a lower bacteria count in the rinse by 36.2 percent.

**Object of Study**

The purpose of this study was to determine the influence upon bacterial loads in freshly drawn milk and on teat surfaces, when bactericides were used alone, and when they followed a rinse of plain water, in udder washing procedures.

**Experimental**

The first part of the study was a comparison of standard plate counts of milk samples taken from the weigh bowls in a pipeline milker system, when the udders were either washed with water only, or were wiped with a one-foot square muslin cloth soaked in a 200 ppm hypochlorite solution. Following the water rinse, the udders were wiped with single service paper towels; following the chlorine wiping, the udders were wiped only with the wrung cloth. The water rinse was done with a hose that delivered one pint in 5 seconds. The amount needed to accomplish a visually clean udder varied from one to six pints. The average rinsing time was 14 seconds, and about three pints of water was the average amount used per udder. At the afternoon milking on alternate days the udders of Jersey and Holstein cows, all mastitis-free, were washed with water and chlorine until three samples of milk had been collected for each treatment. Prior to this, each cow’s milk was sampled aseptically, two consecutive days, and plated. These counts on the milk of individual cows ranged from 100 to 2040 per ml., showing a median of 400 per ml.

The first series of tests was run during both wet and dry weather, about 3 months apart. The results are shown in Table 1.

<table>
<thead>
<tr>
<th>Standard plate count</th>
<th>Dry Weather (5 cows)</th>
<th>Wet Weather (21 cows)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water</td>
<td>Chlorine</td>
</tr>
<tr>
<td>Minimum</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Maximum</td>
<td>5100</td>
<td>29,100</td>
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<tr>
<td>Average</td>
<td>885</td>
<td>4,590</td>
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<tr>
<td>Median</td>
<td>430</td>
<td>550</td>
</tr>
</tbody>
</table>

The second part of the study was a comparison of the sanitizing effect of 5 methods of washing external teat surfaces. Five Jersey cows, all mastitis-free, having good uniformity of teat size and texture were prepared for milking by the following methods: (a) udder washed by hand with plain water from a hose until it appeared to be clean, using as much water as necessary and drying with paper towel, (b) washed as in (a), followed by wiping with a cloth soaked in 200 ppm hypochlorite solution and wiped dry with the wrung cloth, (c) washed as in (b), except with a 200 ppm quaternary ammonium compound, (d) wiped with 200 ppm hypochlorite solution soaked cloth without prior water wash, and (e) wiped with 200 ppm quaternary ammonium solution without prior water wash. Each of the five cows was prepared by each method five consecutive days. The right front teat was immersed to the base for 15 to 20 seconds in 100 ml. of sterile single strength tryptose broth contained in wide mouth jars. The exposed broth was plated in tryptone-glucose-extract agar within one hour after the udder washing treatment. The results are shown in Table 2.

**Results**

The bacteria counts of weigh bowl milk samples shown in Table 1 indicate that in both dry and wet weather, washing the udders with water only and drying them with a separate paper towel, was a more satisfactory method than wiping them with a 200 ppm chlorine soaked cloth. Although a fresh cloth was used on each cow, there was apparently enough soil on the udder and teat surface to reduce the effectiveness of the chlorine. An average of three pints of wash water per udder was used. This seems to have physically removed many bacteria as well as the soil, whereas there was insufficient wetting, soil removal and bacterial destruction provided by the chlorine in the cloth.
TABLE 2 — BACTERIAL COUNTS SHOWING THE CONTAMINATION PER MILLILITER IN TRYPTOSE BROTH AFTER USE AS A RINSE ON ONE SANITIZED TEAT OF EACH OF FIVE COWS FOLLOWING VARIOUS METHODS OF SANITIZING.

<table>
<thead>
<tr>
<th>Trial</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>All procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>36,000</td>
<td>13,500</td>
<td>20,500</td>
<td>31,000</td>
<td>27,500</td>
<td>24,000</td>
</tr>
<tr>
<td>2</td>
<td>24,500</td>
<td>16,000</td>
<td>40,000</td>
<td>12,000</td>
<td>22,500</td>
<td>21,000</td>
</tr>
<tr>
<td>3</td>
<td>43,000</td>
<td>5,000</td>
<td>16,500</td>
<td>20,500</td>
<td>59,000</td>
<td>21,000</td>
</tr>
<tr>
<td>4</td>
<td>85,500</td>
<td>6,000</td>
<td>25,000</td>
<td>26,000</td>
<td>69,000</td>
<td>29,000</td>
</tr>
<tr>
<td>5</td>
<td>81,500</td>
<td>8,000</td>
<td>8,000</td>
<td>9,000</td>
<td>66,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Average</td>
<td>48,000</td>
<td>8,500</td>
<td>19,500</td>
<td>17,500</td>
<td>44,000</td>
<td></td>
</tr>
</tbody>
</table>

*aLogarithmic averages to nearest 500.
*bFor description of procedure see text.

The usual interpretation of the correct method of udder sanitizing is method (d) as used in this study. Udders are not ordinarily washed with water prior to the wiping with a chlorine soaked cloth. Method (e) is essentially the same, but a quaternary ammonium soaked cloth is not permitted in some milk sheds. Table 2 shows that the sanitizing methods in order of desirability are (b), (d), (c), (e), and (a), there being little practical advantage of (d) over (c) or of (e) over (a). Methods (b) and (c) give the proper interpretation to “clean and wiped with an approved bactericidal solution”. In this study, however, the chlorine solution was better than the quaternary solution as a sanitizer. The importance of first removing physical soil is illustrated by methods (b) and (c). There was no practical difference between the average bacterial counts obtained after use of all methods on the 5 cows individually (see last column of table 2).

In comparing the magnitude of the counts in Tables 1 and 2 it should be recognized that a much greater concentration of the bacteria resulted when the teat was rinsed in but 100 ml. of broth; as compared to the concentration of the bacteria in a sample from the complete milking after the washing treatment of all four teats.

It should not be assumed from this study that re-using the plain water pre-rinse is a substitute for pressured hose water that is wasted as it is used.

CONCLUSIONS

Bacteria counts of freshly drawn milk are lower if a comparatively large volume of plain water is used to rinse the udder, as compared to wiping the udder only with a hypochlorite soaked cloth.

The best of 5 methods of udder washing in this study was: a thorough rinse with plain water which was not re-used, followed by wiping with a cloth soaked with 200 ppm hypochlorite.

The teats of cows are sanitized more effectively when a water rinse precedes wiping with a bactericidal solution.

Following a plain water rinse, a cloth soaked in 200 ppm hypochlorite is more effective than one soaked in the same strength quaternary ammonium solution.

ACKNOWLEDGEMENT

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REFERENCES