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**EFFECTIVENESS OF A QUATERNARY AMMONIUM  
DETERGENT-SANITIZER FOR SANITIZING MILKING  
EQUIPMENT**

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Several published reports (Speck and Lucas 1957; Thomas 1961; Thomas *et al.* 1963) have claimed that detergent-sanitizers containing quaternary ammonium compounds are satisfactory for cleaning and sanitizing milking machines and other farm dairy equipment. These reports have come from countries with a cold or temperate climate and there appears to be no information concerning the effectiveness of these products when used under tropical and subtropical conditions such as exist in Queensland. Therefore, a field trial was undertaken in which the efficacy of a detergent-sanitizer method of cleaning and sanitizing milking equipment was compared with that of the conventional method.

**Methods and Materials**

The cleaning and sanitizing agents chosen for use in this trial, and their methods of use, were as follows:

*Conventional method.*—Sodium metasilicate, combined with surfactants, is the detergent most widely used in Queensland and sodium hypochlorite is the most popular chemical sterilant. These two products were therefore selected as being representative of the detergents and sanitizers now employed for the conventional method of sanitizing dairy equipment. They were used in the manner outlined by Major (1960).

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*Detergent-sanitizer method.*—The detergent-sanitizer used in this trial contained a quaternary ammonium compound (alkyl benzyl ammonium chloride). It was used according to the manufacturer's directions in the following manner:—

(i) *After milking.*—(1) The milking machine, vat, cooler, etc. were rinsed with cold water to remove free residues of milk and cream. Between 1 and 2 gal of water was drawn through each set of teat-cups. (2) The milking equipment was then rinsed with a solution of the detergent-sanitizer containing approximately 170 p.p.m. alkyl benzyl ammonium chloride and at a temperature of 50-55°C. One gallon of this solution was drawn through each set of teat-cups. (3) The equipment was then left to drain and dry with the residual traces of the detergent-sanitizer still in contact.

(ii) *Before milking.*—The milking equipment was rinsed with a cold dilute solution of the detergent-sanitizer containing approximately 20 p.p.m. alkyl benzyl ammonium chloride. One gallon of this solution was drawn through each set of teat-cups.

Both the sodium hypochlorite sterilant and the detergent-sanitizer gave satisfactory results under laboratory conditions when tested by the method of Weber and Black (1948).

*Farm trial procedure.*—The farm trial, which took place from July to November inclusive, was conducted in the following manner:—

- (1) Two dairy farms, each having a 3-unit milking machine, were selected in the same district. Before the trial commenced the milking machine on each farm was dismantled. The rubberware was visually inspected (and renewed if necessary) and boiled in a caustic soda solution (0.2%) for 15-20 min, followed by a thorough brushing.
- (2) For a period of 4 weeks the conventional method of cleaning was used on one of the farms while the detergent-sanitizer method was used on the other farm.
- (3) At the end of the 4-week period the milking machines were again dismantled, visually inspected, and the rubberware boiled in a caustic soda solution and thoroughly cleaned. The different cleaning procedures were then exchanged on the the two farms and the trial continued for another period of four weeks.
- (4) At the end of this second period another two farms in the district were selected and the whole procedure was repeated, so that at the end of approximately four months both sanitizing methods had been used on four separate farms.

*Sampling procedure.*—A composite sample of the mixed morning and evening milk produced on each of the farms was taken from the weigh vat of the milk receiving factory. The milk was first sampled on the day following the dismantling and cleaning of the milking machines, and subsequent samples were obtained at weekly intervals thereafter.

*Bacterial examinations.*—The standard plate count was performed in accordance with the standard method (American Public Health Association 1960). For counts of thermophilic bacteria, a 10-ml sample of raw milk was pasteurized in the laboratory at 72-73°C for 15 sec and a standard plate count made.

### Results

The results of the bacteriological tests performed on the milk samples are given in Table 1.

TABLE 1  
RESULTS OF BACTERIOLOGICAL TESTS

Farm	Sanitizing Method	Test	Number of Bacteria/ml Milk				
			Cleaned	First Week	Second Week	Third Week	Fourth Week
A	Conventional ..	SPC	9,000	37,200	15,000	19,000	9,700
		TBC	2,000	600	170	520	750
B	Detergent-sanitizer	SPC	10,000	2,660	2,200	4,700	1,890
		TBC	3,000	150	340	340	920
A	Detergent-sanitizer	SPC	9,800	6,400	20,900	6,700	9,300
		TBC	530	570	1,500	460	200
B	Conventional ..	SPC	2,640	2,040	2,520	1,710	6,200
		TBC	190	200	270	100	400
C	Conventional ..	SPC	4,900	2,090	16,400	5,500	8,900
		TBC	150	130	200	250	730
D	Detergent-sanitizer	SPC	2,530	4,700	10,100	6,500	6,900
		TBC	210	60	7,700	2,320	3,500
C	Detergent-sanitizer	SPC	7,700	26,600	6,800	8,140	13,600
		TBC	200	1,250	280	620	990
D	Conventional ..	SPC	33,300	4,800	4,500	4,600	4,600
		TBC	820	1,460	620	1,310	970

SPC = Standard plate count of raw milk.

TBC = Thermophilic bacteria count after laboratory pasteurization.

### Discussion

The results indicate that the detergent-sanitizer is quite effective for maintaining dairy equipment in a satisfactory state of hygiene. A statistical analysis showed no significant differences between the standard plate counts or the thermophilic bacteria counts of the milk produced on farms when either of the sanitizing procedures was used.

As the thermophilic bacteria count of milk reflects the standard of hygiene maintained on the farm on which the milk was produced, the low thermophilic counts obtained in most instances during this trial may be taken as showing that the milking equipment was kept in a good state of hygiene on each of the participating farms. The regular dismantling and thorough cleaning of the rubberware at monthly intervals no doubt contributed largely to the success of both methods of sanitation and prevented a significant build-up of any deposits in the milk lines.

During the monthly inspections of the rubber and metal milk lines, no detrimental effects due to the use of the detergent-sanitizer were found. It was not corrosive and the only criticism of its use is that it leaves the dairy equipment with a slightly greasy feeling, although this does not appear to affect the bacterial cleanliness of the utensils.

The results of this trial, conducted during Queensland's winter and early summer (very little rain and shade temperature up to 92°F) show that provided milking machines are regularly dismantled and thoroughly cleaned, and the rubberware is kept in good condition, the efficacy of this detergent-sanitizer method of sanitizing dairy equipment is comparable with that of the conventional procedure.

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