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Sanitary Status

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WHY NOT ENCOURAGE THE COMPETENT PRODUCER?

C. K. JOHNS

Technical Consultant, Lazarus Laboratories Division, West Chemical Products, Inc. Long Island City, New York

It has been estimated that around 25% of milk producers are producing the highest quality milk they know how to. This milk is low in bacteria, leucocytes and sediment. A much higher percentage know how to produce such milk but are not doing their best. They see incompetent, indifferent neighbors cutting corners in the care of their milk-handling equipment, yet still meeting current bacteriological standards and getting as much money for their milk. Thus the middle group have become discouraged and just aim to get by. Perhaps if we did more to encourage the competent producer and to discourage the poor one we would make greater progress in improving milk quality.

HAVE BULK TANKS IMPROVED QUALITY?

Since bulk tanks have become standard equipment for fluid milk shippers in North America, there have been many reports that milk quality has improved. The basis for such statements has been the lower bacterial counts. But do these lower counts really represent more sanitary milk production? My own guess is that in most cases they merely reflect the effectiveness of bulk tank cooling in inhibiting bacterial growth, and that frequently the milking equipment has received less case than formerly. While it is much easier to persuade a producer to install better cleaning facilities than to do a better job of cleaning his equipment, I wonder whether the substitution of better cooling for better cleaning can be regarded as progress. In my opinion, only milk from clean, healthy cows, handled in equipment in good sanitary condition, can be regarded as being of top quality. Is this not what we should be working toward?

Why is neglected equipment not being detected by routine bacterial counts of milk? With bulk cooling, growth is practically eliminated, so the answer must lie in the huge dilution factor, which few people have recognized. If we assume that 110 lbs (50 liters) of milk pass through a milker unit at one milking, this means that 50,000 bacteria washed from the surfaces of the unit would only add one organism per ml to the milk! As the count on milk aseptically drawn from a healthy udder is normally less than 1,000/ml, a dirty milker unit could contribute up to 450,000,000 bacteria at a milking and not raise the count on the milk to over 10,000/ml. Thus it should
be obvious that current and contemplated standards in many areas are no longer meaningful in terms of detecting equipment in insanitary condition—and this is the only reason I can see for running bacteriological tests on bulk-cooled milk.

If current standards are no longer meaningful, where should they be placed? As shown in the above example, even a limit as low as 10,000/ml, which most sanitarians would consider very stiff, would fail to detect an appreciable number of cases where milking equipment had been neglected. In our collaborative studies at three Canadian centers (Edmonton, Winnipeg and Guelph) it was found that 23% of the samples with initial standard plate counts (SPCs) not over 10,000/ml were from farms where milking equipment was reported as “unsatisfactory” on inspection. Nevertheless, it goes without saying that such a standard would require much better care of the milking equipment than is the case with the very lenient standards now in force.

Is a standard of 10,000/ml unreasonably stiff? Back in 1959 I queried my good friend Bill Moseley of Indianapolis on this point. Moseley operates a large commercial testing laboratory and probably gets onto as many farms in a year as anyone I know. He replied: “I will agree with you that a 10,000 count can be maintained easily if the equipment is clean. I have thought that our public health service, state sanitarians and others have been a little “nutty” in requiring a cooling temperature of 50 F or below; the cooling temperature becomes less significant if we actually have cleanliness” (3). Again, in Aberdeen, Scotland, they have established a standard for bulk milk of 10,000/ml with no coliforms in 1 ml (1). Finally, in our collaborative studies I have been impressed with the number of producers who were able to meet this standard. As even this standard permits appreciable contamination from insanitary equipment I can see no justification for any more lenient one.

**Detecting Insanitary Equipment**

In view of the dilution effect, there is a question in my mind as to whether a lower count limit such as 10,000/ml is the surest way to promote cleaner milking equipment. For this reason I have advocated (2) preincubation (PI) of raw milk samples before testing. A temperature of 55 F has been recommended, for at this temperature the udder flora do not multiply, while a significant proportion of the contaminating bacteria do. Thus a number of samples with SPCs of 10,000/ml or less when examined before PI “blows up” on PI. Experimental studies have shown that milk drawn with clean equipment shows little or no increase in count on PI, so it seems reasonable to conclude that where a low count milk "blows up" on PI it has been contaminated by the milk-handling equipment. In our studies at Ottawa (2) 20% of the samples meeting a 10,000/ml standard before PI gave counts over 100,000/ml after PI, while at another center this held true for 60% of the samples. These are the type of samples with which fieldmen are familiar. They often come from farms with neglected equipment, but where the producer refuses to clean up because his bacteria counts are far below that permitted for Grade A milk. Where PI has been instituted, however, the story appears to be different. The producers usually get very much higher counts. They know only too well they have been neglecting their equipment, so they clean it up, replace worn rubberware, and down come their counts. Thus in these areas milk counts are lowered and even more important, equipment is cleaner. And this is surely what we should be aiming at.

For some years I have been inclined to agree with Moseley that if equipment is really clean, sanitizing is scarcely necessary. However, during my recent travels I have heard reports in several areas that producers who failed to sanitize their equipment had trouble getting their counts down when PI was used. However, in each case, when an adequate sanitizing procedure was carried out, the counts fell well below the limit. Incidentally, several plants were using a standard of 50,000/ml with PI. This is very much harder to meet than 10,000/ml without PI, yet their producers were having little difficulty in meeting it.

It has been contended that PI is of questionable value because it relies upon bacterial growth at 55 F, and some species will not grow at that temperature in milk. However, if there is a substantial percentage of Gram-negative rods, including coliforms, there will usually be rapid growth and the sample will “blow up” on PI. If coccus types predominate, there will be little or no increase in count, and this type of contamination would not be detected by PI unless the count was unusually high. Our collaborative studies suggest that the Gram-negative rods are more likely to be associated with insanitary conditions. At one center the average percentage of these bacteria isolated from milk samples rose from 13.8 where milker rubberware was reported as “clean” to 31.4 where it was reported as "fair". Welsh investigators (5) have also shown that the percentage of Gram-negative rods increases sharply as the count level (without PI) increases, suggesting that these types are associated with poor sanitary conditions. Thus while it is possible that some farms with neglected...
equipment may escape detection when PI is used, it seems likely that these will be in the minority. Even if PI should only succeed in showing up 10% of the cases where insanitary conditions are not being reflected by the initial count, it would appear to be worth while. Judging from the enthusiastic comments of fieldmen from Vermont to Washington who have tried it, PI is proving very effective in directing attention to those farms where equipment has been neglected.

In the collaborative studies at Edmonton, Winnipeg and Guelph, we had hoped to get a definite answer concerning the relative value of the various bacteriological tests, both with and without PI, in reflecting the condition of milking equipment. Much to our surprise, the results failed to show the expected advantage for PI. Only much later was it suspected that the age of the sample played an important part. In this work, milk samples were taken from the bulk tank when it contained two milkings, whereas the usual practice is to sample from the tank when it contains four milkings. Recent studies have shown that when two-milking samples were held refrigerated for an additional 24 hours (to make them the same age as ordinary commercial samples) before testing, four times as many "blew up" on PI as when they were testing before this additional holding period. Further comparisons are being carried out this summer using four-milking samples to establish more definitely the value of PI in reflecting neglected milking equipment. These will be reported in due course.

**Other Effective Measures**

What other possibilities are there for increasing the effectiveness of our quality control operations? Probably the most valuable of all would be frequent, careful inspection by a well-trained person to determine the sanitary condition of the milking-handling equipment. Inspection after the evening milking is often most illuminating, as few producers do as thorough a job of washing the milking equipment then as after the morning milking. Inspection at milking time also frequently proves to be an eye-opener. While farm inspection has largely fallen out of fashion in many areas, where almost complete reliance has been placed upon the results of bacteriological tests, it is beginning to be realized that proper farm inspection is necessary as a supplement to laboratory tests. In fact, people with a wealth of experience have asserted that if they had to choose between the laboratory and a well-trained fieldman to operate a quality control program, they would be much better off with the fieldman.

If we are really interested in sanitary milk production, then, it would appear that more emphasis must be placed on farm inspection as a supplement to laboratory testing. Not only will careful inspection provide increased assurance that methods and equipment are satisfactory, but it will also afford opportunities to stress to the producer the esthetic aspects of milk production. These include clean, healthy cows, clean stables or parlors, and a generally attractive air about the farmstead. During my recent travels in the United States and Canada I am sorry to say that in many areas a significant percentage of the farms fell short of the above specifications. This could not be said of the farms I saw in Scandinavia and in Britain in 1962. It would seem that we have a job on our hands convincing the farmer that he is operating a food factory, where a very delicate food product is being produced twice a day. Like any other food factory, it should appeal to the consumer as a place she would like to have her food (milk and dairy products) come from. We should all be doing more to encourage producers to set their sights higher in this respect, as well as in cleaning their milk-handling equipment. While it may be argued that milk production is so unprofitable that the producer cannot afford to make his premises attractive, with well-painted buildings, etc., I was impressed with the numerous attractive set-ups in Wisconsin and Minnesota, where milk prices are among the lowest on this continent.

**Clean Milk Maintains Its Quality**

One aspect of sanitary milk production which many appear to have been lost sight of is that milk produced under sanitary conditions can take a lot of punishment. This was referred to by Moseley in his letter, from which I quoted. Such milk does not need to be cooled immediately to a low temperature, for the few bacteria present come mainly from the udder, and these grow very slowly for many hours. This was particularly evident from the results obtained in the clean milk competitions conducted in Britain during the 1920's. Many samples not cooled below 60°F, and which were 24 hr old when tested gave counts of 5,000/ml or less. Again, I have seen records of producers shipping milk in cans to plants in Denmark and in Scotland; none of these farms had mechanical refrigeration, yet their counts rarely exceeded 10,000/ml. When I asked how this was possible, I was told, "The producers know how to clean their equipment." In the light of these facts, I seriously question the desirability of setting maximum permissible temperatures for fluid milk. To do so puts too much emphasis upon cooling, and the producer soon learns that efficient cooling can be substituted for good cleaning. Surely this is not the right road to sanitary milk production!

Mention might also be made of another aspect of
milk quality control. It has been estimated that probably 90% of a fieldman’s time is spent in field calls on 10% of the producers — the ones who seem unable to stay out of trouble. Such calls are expensive; John Dean, of Dean Foods, who addressed the IAMFES at the Toronto meeting, estimated each call cost $7.05 while Nielsen (4) estimated an average of $5.00 per visit. These costs, as well as those for the extra sampling, bookkeeping, etc., for producers with sub-standard milk, are really coming out of the pockets of the good producers. The sooner the latter recognize this, the sooner they will urge stiffer standards to eliminate the unsatisfactory producers. Then the fieldman can spend more of his time on such worth-while activities as a flavor improvement program, which can be expected to lead to increased milk consumption and a better return to the producer.

**HOW TO ENCOURAGE COMPETENT PRODUCERS**

What can be done to encourage the competent producer? In addition to more meaningful standards, much could be accomplished by making a deduction of, say 50 cents per cwt from the 20% of shippers with the poorest quality record for the month, and distributing this as a bonus to the best 20%. This would act as both “a stick and a carrot”, spurring on the indifferent producer and giving recognition and reward to the best producer. Setting up an annual Honor Roll, and awarding certificates to the top rank of producers, preferably at a banquet or similar gathering, might also be helpful. Perhaps a plaque awarded for an extra good record, such as I found on milkhouse doors around Helsinki, Finland, would encourage greater effort. Finally, a roadside sign awarded annually could act as good advertising for the plant receiving the milk as well as giving the producer a pat on the back for a job well done.

**STRicter Sanitation Standards Indicated?**

Dairymen in several areas I visited are beginning to urge stiffer standards. One of the most interesting observations I encountered during my travels came from a young dairyman who holds a high office in the Northwestern Dairymen’s Association. In his talks with dairy farmers he had been impressed to hear good producers express their strong dislike at having the milk of a careless producer put into the tanker to contaminate their milk. Likewise, opposition has been voiced by good producers to the practice of “Paul Revering” when an inspection, official or unofficial, is about to take place; this gives the careless producer ample time to clean up his equipment and premises before the inspection takes place. These instances indicate that many competent dairymen do take a real pride in producing the best quality of milk they are capable of. We should be doing all we can to give them suitable recognition, and also to encourage others who can do better. As it is, one would suspect that many of our standards were purposely made so lenient that even the indifferent producer can meet them. Surely the time has come to reverse this attitude and put the emphasis on encouraging, in every possible way, the practice of really sanitary milk production.

In conclusion, I should like to urge a re-appraisal of our ideas on sanitary milk production and control. With well-cooled milk, current standards are far too lenient to detect neglected milking equipment. We need more meaningful standards to challenge the competent producer, and to cause the indifferent producer to mend his way or drop out of milk production.

**REFERENCES**