Bulk cooling of milk has been an established fact for at least a decade. People used to say that farmers would never pay that kind of money for a bulk tank when their old can cooler was still doing a good job. But that was before farmers began installing bulk tanks, pipeline milkers, CIP systems, gutter cleaners, and a host of other new mechanical tools in the barn and milkhouse at a rate none of us could even believe possible.

There was, and is, a lot of pride in these installations that farmers purchased, many times at the expense of postponing needed improvements in the homes. In much of the country, adjustments have been made and a major portion of our milk is cooled in bulk tanks. Our milk quality as a whole is considerably improved over that delivered ten years ago. There is no question in anyone’s mind that bulk tanks are here to stay.

We have had our problems during the past 10-12 years. The automatic improvement in milk quality which was supposed to happen overnight just did not quite happen that way. Our research and that of several other workers have shown that quality problems with bulk cooling of milk on farms can not be truly evaluated using the standards of a decade ago. Through the years we are learning there is more to milk quality than a low standard plate count, but it has not been an easy message to get to the several segments of the dairy industry.

After a decade of bulk handling, a new problem comes along to bother the dairy industry. Equipment wears out. Usually controls wear out quicker. No one knows just when a given tank or its controls will cease to function properly but it is recognized the day must come. Faulty fat tests and quality problems will occur with increasing frequency and intensity as more and more tanks reach this uncertain age when continued usage under varying conditions of temperature, moisture, and care begins to “take its toll.”

With increasing age of tanks, there is a loss of this pride of ownership which was so evident when tanks were new. Unless milk producers are properly instructed, sanitation slips and remains unnoticed because plate counts do not indicate sanitation errors as they did with can cooling. Deposits of milkstone or water minerals remain on the tank surface. Pitting takes place under these films and a continuing sanitation problem exists. Milk quality suffers because the bacteria which thrive in these films will grow at refrigeration temperatures and are capable of breaking down milk fat and protein.

Milk quality would suffer less if tanks would operate properly until they wear out and then just stop. The condition would be obvious and something could be done about it immediately. Unfortunately, this is the exception rather than the rule. The controls may function improperly or erratically for months without anything being noticed. Such improper functioning may cost the producer considerable money from low fat tests and cause the milk handler to suffer serious decline in the sales appeal of his milk products.

When bulk tank controls cease to operate properly, either freezing or churning of the milk is likely to occur. The milk loses its normal physical character. However, close attention to the operation of the tank can save the industry a lot of unnecessary expense from fat losses and quality problems.

The bulk milk collector must be made aware of the problems of improperly functioning bulk tanks. In many cases, he is the only one aware that something is wrong. At least, if he is alert to his responsibility to the producer and the milk plant, he can be the first to observe the effects of erratic tank operation. Bulk milk collectors should look at the bottom of the tank after the milk has been collected and before the tank is rinsed with water. The presence of butter particles (sometimes as big as peas but anything you can see is “too big”) or flakes is a good indi-
PROBLEMS OF AGING BULK TANKS

cation something is wrong. Milk may freeze during the first milking and then thaw as additional milk is added. Even though one does not see ice floating around in the milk at collection time, the fat and the protein have been altered and will not go back into their original state. When insufficient cooling occurs, churning is common as the milk is agitated during the second, third, and fourth milking. The collector should be made aware of the quality and sampling problems caused by freezing and thawing so he will inform the producer in time to avoid extensive losses.

The milk producer can make easy routine inspection to determine if the tank is working properly. Several things should be checked as often as possible. Is the milk being cooled properly? Is the holding temperature the same as usual? Does the compressor cut in and cut out when you expect it to? Or, does it take several hours to cool milk down to 40 °F? Does the compressor seem to be running a lot more than usual? Is the compressor still warm during the middle part of the day? If these latter conditions exist, faulty controls or low refrigerant may be the reason. In any case, something is wrong and the refrigeration service man should be called. Lost fat will pay for a lot of service calls.

Just looking at the milk may tell a lot about its temperature history. Are butter particles floating on the surface? Or is there floating ice? Either is a mighty expensive sight, payable both in cash and in lower milk quality.

Let us review some of the problems caused by improperly functioning old (or new) tanks. Is enough ice being built in an ice bank tank to properly cool the milk supply during peak production? Or do the controls stick so the ice keeps forming, causing a pressure on the milk holding tank? Possibly the controls stick so the agitator goes all day or does not start when new milk is added to that already in the tank. Occasionally “malty” milk flavors have been caused by failure of the compressor to respond during extremely cold spells. Thus no cooling occurred until the compressor warmed up in midday. The industry used to have problems of corrosion, especially in the ice bank type, due to bimetallic corrosion resulting from construction with dissimilar metals, but that does not seem to be a problem in recent years. Likewise, tank manufacturers appear to have found the way to avoid the rather common problem of some years ago of oil dripping from the agitator motors after several years of use.

The more common problems relating to faulty operation of aged tanks have to do with milk quality and butterfat control. It is next to impossible to get a proper fat test on milk which has been churned or frozen. Few producers realize that a difference of 0.1% in fat test will cost him about $45 per month if he delivers 4000 pounds of milk every other day. Fat tests are likely to be far more than 0.1% in error when milk has been frozen or churned.

When milk is churned or frozen, the protective membrane around the butterfat globules is destroyed. Milk lipase then may attack the milk fat. Rancidity or unclean flavors are common as a result.

The milk company objects to buying milk that has been frozen or churned. The lower price the farmer gets for his milk through faulty fat tests does not help the buyer any. This is money lost. The industry has additional problems with churned or frozen milk. Bottled milk from these sources often shows a “cream plug” on the top of the milk. Cream oils-off in coffee or “feathers” (similar to high acid milk). Whipped cream will not maintain its normal stability—it “droops” and gets soggy. Any of these conditions is distasteful to the housewife.

All of us should be concerned about this potential problem of aging tanks. The situation will get worse instead of better unless something is done about it. Every clump of butter in the bottom of the tank means something has happened to the normal fat emulsion and the fat test and general quality will be lowered. The dairy industry can not afford the use of faulty bulk tanks. Improperly operating tanks are easy to detect if they are checked periodically.