High Bulk Tank Bacteria Counts Without Udder Disease in Two Dairy Herds

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I have been interested in mastitis control in dairy herds for many years. Until recently, however, I did not concern myself with high bulk tank bacteria counts, unless leukocytes were also elevated. I was convinced that if leukocyte counts were normal, then high bacteria counts were due to either improper sanitation of milk handling equipment, or improper cooling of the milk. I reasoned that if the cows themselves were not involved, then high bacteria counts were not the concern of the herd veterinarian.

My opinion on this subject was changed when I was forced to get involved with high bulk tank bacteria counts (>100,000/ml.) with two of my clients. In both herds a sanitation fieldman had been to the farm to investigate the cause of the high bacteria counts. In both cases he reported to the dairyman that there was no problem in sanitation or cooling, so therefore there had to be some problem with the cows themselves. He then instructed the farmer to contact his veterinarian to find out which cows were causing the problem and to correct the source. Of course, those instructions led to my involvement.

When the fieldman stated that sanitation and cooling were adequate on these two farms, I assumed he knew what he was talking about. I then proceeded to look for infected cows which would be shedding high numbers of bacteria. I first ran C.M.T.'s on all cows. Those that showed high scores were cultured to identify the organisms present.

Results of these tests were somewhat disturbing. To begin with, neither herd had a lot of cows with high C.M.T. scores. It seemed to me that if the cows themselves were infected to the point that they were causing high bulk tank bacteria counts, then I should have found a lot of cows with high C.M.T. results. Secondly, the organisms I found were predominantly *Staph. aureus* in one herd, and *Strep. uberis* in the other. I did not believe either of these organisms were likely to be associated with high bulk tank bacteria counts.

A very useful procedure to have done in this situation would have been a bulk tank differential bacteria count, to identify just what types of bacteria were responsible for the high count. However, at the time I was working with these herds this procedure was not being done in our practice.

Although I had serious doubts that the cows themselves were responsible for the high bulk tank bacteria counts, I still worked with the dairymen to do all we could to reduce udder infections. In the first herd, a review of his milking system revealed some real problems. He was using Surge bucket milkers, with a one inch non-looped vacuum line. He had an old S-P 22 vacuum pump, and an ancient regulator which I did not recognize. A test with a flow meter showed a pump capacity of about 10 c.f.m. (New Zealand). A vacuum recording made on the line during milking showed vacuum level varied from 14.5″ of mercury to 11.5″.

I told this dairyman that I was not convinced that his cows were causing his high bacteria count, but without a doubt his milking system needed upgrading. He agreed, and immediately had a new pump, vacuum line, and regulator installed. As luck would have it, the milk hauler took a bulk tank sample for a bacteria count the day that this new system was being installed.

The dairyman, anxious to see if the changes would pay off, asked to have another sample tested the very next pickup. He relayed to me that he had made this request, and I chastised him a little bit, telling him that it would take some time for the counts to come down even after the new equipment was in use.

A couple of days later, the dairyman called, saying "Doc, you're a genius. The count went from 100,000 to 10,000 since we put in the new pump and stuff. I thought you said it would take a few weeks for the count to come down." Anxious though I was to claim credit, I knew that infected udders had not been cured overnight.

At this point I was confused enough to call Steve Spencer, a milking machine expert at Penn State, and ask his opinion of this case. He knew exactly what was going on, and was able to explain it to me rather easily.

I mentioned earlier in this report that the vacuum level in the system varied from 14.5″ to 11.5″. It was Steve's opinion that when the vacuum in the line dropped, air and debris were aspirated from the vacuum line back into the bucket milkers. This air and debris contained high numbers of bacteria, and thus contaminated the milk. He pointed out that a check valve in the milking units was supposed to prevent this from occurring, but these check valves were subject to wear, and often did not function properly in old equipment.

When the new line, regulator, and pump were installed, the vacuum in the line was stable, and the backflow of air and debris did not occur. This explained the immediate and dramatic drop in bacteria counts. Thus I had made the right recommendation to this dairyman, but for the wrong reason.

The second herd I worked with used a pipeline milker which had recently been purchased from another farm and moved to this barn. On the previous farm, the milk house was located at the end of the barn, and the pipeline was installed as a single loop. The farm the pipeline was moved to had the milkhouse located along one side of the barn, with approxi-

mately forty feet of barn on one side of it and eighty feet on the other. When the pipeline was installed on this farm two loops were created to serve the portions of the barn to either side of the milkhouse.

I started out investigating the problem in this herd just as in the first one, with C.M.T.s, cultures, and an evaluation of equipment and milking techniques. I could find no problems at all in this herd. I told the dairyman that I did not believe the high bacteria count was coming from the udders, and that he should investigate his sanitation and cooling more thoroughly.

Since the problem had begun shortly after the pipeline was installed, it made sense to concentrate on the pipeline in looking for the problem. The dairyman proceeded to take it down, length by length. He found the problem, on the far side of the barn, at the "Y" fitting where the two loops joined. The pipeline on the longer side of the loop was caked with spoiled milk, with just a narrow streak at the bottom which was clean.

Obviously this pipeline was not being properly washed, and the source of the problem was traced to the way the line was installed in the new barn. In the old barn, all four units were used to draw wash water into the single loop. This water was circulated to wash the line.

In the new barn, with the two loops, two units were used to wash each loop. On the longer loop, two units simply did not allow enough water to be drawn into the system to get an adequate "slug" of water to properly wash the 2″ diameter line. By the time the "slug" reached the end of the longer loop, it had died to just a trickle.

The problem was resolved in this barn by adding an extra inlet to the long loop, and running a hose directly to the wash tank from this inlet to allow more wash water to be drawn up into the line.

Since I was drawn into working with these two clients on high bacteria counts, I have taken the Quality Milk Seminar associated with the annual A.A.B.P. Convention. I am more comfortable dealing with such problems now as a result of attending that seminar.

I believe these two cases are important to share because they illustrate that even when practitioners try to stay out of "non-cow" areas of milk quality, we are sometimes forced to get involved. When a milk inspector tells the dairyman that "the problem is in the cows, call your veterinarian", we are forced to do something. It behooves us to understand the factors that can play a role with high bulk tank bacteria counts.

Abstracts

Effects of luteinising hormone on embryo production in superovulated cows

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Equivalent doses of follicle stimulating hormone (FSH) produced the same number of embryos and ova from a single flush irrespective of the luteinising hormone (LH) content of the superovulating drug ($P < 0{\cdot}108$). As the LH content of the FSH increased, the proportion of transferable embryos decreased ($P < 0{\cdot}001$) because the proportion fertilised decreased ($P < 0{\cdot}001$) and the degeneration rate of the fertilised embryos increased ($P < 0{\cdot}002$). FSH-W free from detectable luteinising hormone produced 8·8 embryos per flush of which 5·7 were transferable, representing 7·6 fertilised embryos of which 21 per cent had degenerated. The addition of a very small quantity of LH (FSH/LH ratio more than 500) resulted in 5·8 transferable embryos from a total of 10·6, of which 9·0 had been fertilised and 34 per cent of those fertilised had degenerated. Commercial FSH-P (FSH/LH less than 100) produced 3·3 transferable embryos from a total of 8·1, of which six had been fertilised and 39 per cent of those fertilised had degenerated. The luteinising hormone content of FSH-P has to be controlled and limited for optimum superovulation in cattle.

Copper deficiency in ruminants; recent developments

N. F. Suttle

Veterinary Record (1986) **119**, 519-522

The aetiology of copper deficiency in grazing ruminants has been clarified by a number of recent discoveries: the low availability of copper in lush grazed pasture compared with conserved forage; the inhibitory effects on absorption of small increases in herbage molybdenum and sulphur and the antagonism from iron ingested in soil; and the wide genetic variation in copper absorption between different breeds of sheep. The economic importance of copper deficiency has been emphasised by the discovery of unsuspected causes of loss: increased susceptibility to infection and growth retardation in lambs and infertility in cattle. The diagnosis of functional copper deficiency has been improved by the addition of erythrocyte superoxide dismutase to the assays of copper status.