THE IMPORTANCE OF A GOOD MILKING MANAGEMENT PROGRAM

by

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Milking cows for maximum profit is the goal of almost every dairy operation. The means of achieving that goal will vary from farm to farm. In spite of those differences a key element to any successful program is adequate mastitis control. Studies reveal that a new infection will decrease the milk production of a quarter an average of 40%. In a herd with an average infection the cost of mastitis is often greater than the profit for the year.

Many factors are involved in the mastitis complex. In this presentation, I would like to concentrate on the possible negative effect of the milking machine on mastitis and on the probable role of new milking equipment in aiding in mastitis control.

How important is the milking machine in causing mastitis? That is certainly an age old question, and if one reads articles in the popular press the answer will vary from it has very little effect to it is the major cause of mastitis.

Why is there such a big difference in the answers with so many experts working with the disease? The first reason is that mastitis actually occurs very infrequently (I know it is difficult to convince dairymen of that). In a teat dipped herd we would expect one new mastitis infection in more than 2,500 quarter milkings. So the chance of new infection is one in 2,500, not very good odds. Even if you double, triple or have a tenfold increase in new infection the increased infection can go unnoticed in many dairy herds for months or more. Thus experiments on mastitis must involve a large number of cows to be carried out over a long period of time and must be properly controlled.

The second reason for confusion is due to the method by which we gain information. Information is usually gathered in one of three ways. The first is gross observation. An "expert" goes to a farm with a mastitis problem, notices a bad milking machine or a dirty farm and draws the conclusion that the factors he sees are the cause of the problem. That is the method used for "troubleshooting" but one must realize that it could be the wrong answer. Those recommendations should not be used to make suggestions on other farms. The second information gathering system is to do a survey. The researcher will go to a number of farms, measure the amount of mastitis and record the management practices used and the conditions of the equipment and the environment. The observations will then be correlated with the mastitis incidence in an attempt to determine which factors are most important. This system is far

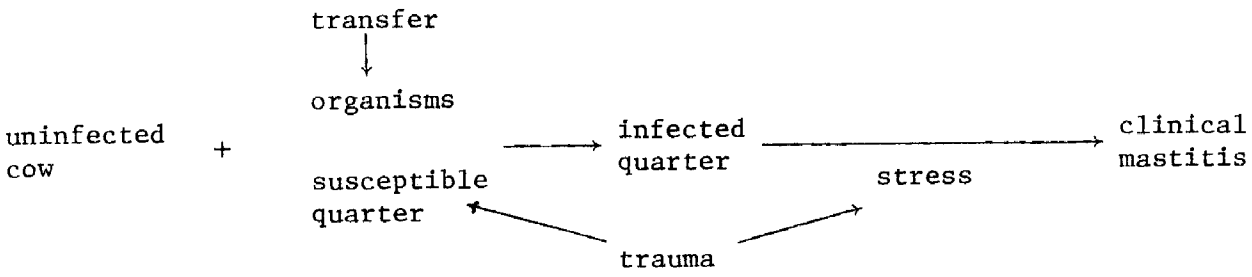
better than the observation method but still leaves a lot of room for error. The most important cause or causes of the diseases may be overlooked.

The third means of gaining information is to conduct a controlled experiment. This means dividing a herd or herds into a control and a treatment group. By changing one condition, i.e., vacuum level in one group, and then comparing the difference in new infection rates or clinical mastitis between the two groups over time, we can determine the effect of vacuum on udder health. This is a very difficult, expensive procedure to use especially in milking machine research That is why we don't have good reliable information on the effect of milking machine function on udder health. Even more difficult to determine are interaction such as the effects of various vacuum levels and pulsation rates on mastitis infection. There is no question that a controlled study is the most reliable means of obtaining information, so from now on as you read articles ask yourself how the information was gathered before you decide how much faith you will put in the results.

Milking Machine and Mastitis

Before going into the specifics let us examine the flow diagram below to find the possible places where the milking machine may be involved.

Possible Role of Milking Machine



All clinical mastitis starts with a quarter of an uninfected cow becoming susceptible to infection. Once susceptible any challenge by organisms will result in infection. That infection may continue for an entire lactation without being identified by the dairyman. An infected quarter should be considered a potential mastitis case.

The milking machine may enter the infection process in several places. The first is in traumatizing the teat end with condition like improper milk rest ratio, high vacuum, and overmilking. It is also possible that these same factor may be involved in changing an infected quarter to the clinical mastitis stage. As is demonstrated on the right side of the diagram, trauma may be the factor which causes an infected quarter to show clinical symptoms.

On the transfer of organisms portion, we have vacuum fluctuation, liner slip, cracked liners, take off procedure and milking wet udders as means of increasing transfer. On the other hand, rough and cracked liners allow for the growth of organisms which are placed in contact with the teat. Thus, if the milking machine is involved these are the areas of which we must be aware.

Teat dipping has its main effect in killing organisms which are transferred to the teat. Thus you can see that as long as the organisms remain on the teats during milking and are not forced into the teat by the milking machine, the teat dip can eliminate all the negative effects of the milking machine associated with the transfer of organisms.

Therefore, the milking machine factors of greatest concern are those which could force organisms into the teat, could traumatize the teat end or cause stress on the animal.

Vacuum Level

Milking with high vacuum, levels of 17" of Hg or greater, will increase trauma on the teat and the rate of new infection. However milking at 15" or less seems to have little effect on udder health. Based on those results it would appear that vacuum should be at the minimum level which will result in an acceptable milking speed.

Vacuum Fluctuations

Research has demonstrated that the simultaneous occurrence of cyclic (those which occur normally in the milking cycle) and irregular vacuum fluctuations (those which occur with units falling off or careless handling of units) will increase the new infection rate. Infection is increased because small droplets of milk are backjetted against the teat end with some organisms being forced into the teat. The British workers designed a teat shield which was installed in the short milk tube at the base of the liner. It prevents the backjetting of all organisms against the teat end. When tested in commercial dairy herds it reduced infection in a small proportion of herds. While this phenomenon can occur, it apparently happens infrequently.

Pump Capacity

The realization that inadequate pump capacity will result in increased vacuum fluctuation has caused some people to increase the recommended pump capacities to 10-12 CFM per unit. While it is true that inadequate capacity is deleterious, added capacity beyond the maximum used is wasteful. Recent evidence indicates that the old standard of 4-5 CFM per unit is adequate especially in parlors with 8 or more units. Adding extra capacity beyond what is used will increase the amount of air going through the regulator and will not affect udder health. To compensate for the large amount of air going through the regulator a larger regulator is required and it must be cleaned more frequently.

Liner Design

Some evidence indicates there may be a relationship between liner design and teat trauma. A method needs to be devised to test the effects of liners on teat tissue before they become available on the market. Liner slip occurs when the liner moves up or down on the teat. While slipping, sufficient air is admitted into the system to cause movement of organisms from one cup to the adjacent teat cup. Liner slip is associated with an increased incidence of new infection. This suggests that more work is needed in designing liners which will form a better seal on the teat.

Pulsation

The action of the pulsator is the cause of cyclic vacuum fluctuation and with present milking equipment it cannot be eliminated. This is not of major concern since cyclic vacuum fluctuation alone has little effect on udder health Milking at very high pulsation rates or with milk rest ratios greater than 70:1 should be avoided.

Claw Design

Most claws on the market today are fitted with air admission holes to decrease the amount of flooding. Similar results can be obtained by closing the holes in the claw and inserting air bleeds in the liner. In either location air bleeds must be kept open to prevent serious mastitis problems.

A common problem with most claws is the small diameter of the nipples. The effect is increased when the ends become bent because the effective inside diameter is decreased which increases the likelihood of cyclic vacuum fluctuation.

Line Size and Installation

Inadequate milk transfer line diameter can result in slug formation and an increase in vacuum fluctuation. Installation of a line with a minimum of a 1% slope and a complete loop will minimize the required diameter size. Again present recommendations appear to be larger than necessary.

Installation of milk lines below the level of the udder allows for gravity flow of milk and reduces vacuum fluctuation. To gain the benefits of a low milk transfer line, efforts must be made to eliminate loops in the milk hoses.

Effect of New Equipment on Mastitis Infection

Automatic detachers are being sold by some companies and promoted as a method for reducing overmilking and improving udder health. Most research studies on overmilking suggest that it has little or no effect on udder health. Thus dairymen who are considering this equipment should consider its possible benefit on labor efficiency and should not expect to see improved udder health.

Prep stalls or rainbird sprinklers are labor saving devices that could potentially increase the risk of mastitis. In dairies where udders are not adequately dried before milking, the risk of infection may be increased, especially when combined with liner slip.

Backflushers are designed to remove the milk and organisms from the cluste thus reducing the transfer of organisms from cow to cow. While these devices are effective in reducing transfer, they will have limited value in improving udder health in teat dipped herds. Dairymen should not expect to see major decreases in clinical mastitis as a result of installing this equipment, especially in smaller herds. The milking cycle can be divided into three segments as illustrated in the diagram. While organisms can be transferred at each of the three times shown, the backflusher can only reduce those normally transferred by the teat cup liners at the start of milking.

Summary

The milking machine may be involved in the mastitis process especially when it is malfunctioning. High pulsation rates, wide pulsation ratios, high vacuum levels and careless machine handling should be avoided. Adding excess pump capacity or installing very large lines is not the answer to improved udder health. The equipment must be checked regularly and maintained properly. A properly functioning machine will have a minimal negative effect on udder health. Installation of automatic detachers and backflushers should not be expected to be as valuable as the use of teat dip and dry cow therapy in controlling mastitis. As the dairy industry is pushed to achieve greater and greater efficiency, the maintenance of udder health will continue to be a key element in determining profitability.