Problem Solving in Dairy Practice I: Mastitis Management

Paul Blackmer, *D.V.M.*
Upland CA 91786
James Jarrett, *D.V.M.*
Rome, GA 30161
Darrell Johnson, *D.V.M.*
Weyauwega, WI 54983

This problem solving session was presented in Dairy Split Session III on December 1, 1983 at the 16th Annual AABP Conference in Oklahoma City, Dr. Tom Fuhrmann, moderator. Dr. Blackmer represented large dairies, Dr. Johnson, small dairies, and Dr. Jarrett intermediate size dairies. The session was designed to allow the attendees to determine the course of discussion. The panel members were chosen for their experience, expertise, and geographical location and responded to questions from the audience.

Dr. Fuhrmann: I would like to start off with a chance for each of the panel members to offer a few comments. We will start the discussion in the general area of mastitis therapy. I would like to ask each of the panel members, starting with Dr. Jarrett, to discuss his approach to individual animal treatment. 1) do they do much of it themselves and how? 2) describe their general approach if indeed they don't do much hands-on treatment themselves.

Dr. Jarrett: It is a failure on our part in having to control mastitis and not prevent it. We do like everyone else in the room. We use whatever we can get to work. There was a time in my practice when I didn't mix a lot of drugs, but at this point I feel we now have available, in almost every case, plenty of drugs that do a good job. But again to emphasize my beginning statement, when we see mastitis and have to resort to treatment, I think we should look at it as a failure on our part and on the part of the dairyman.

Dr. Blackmer: In the herds that I work with on a regular basis, we accumulate bulk milk samples to know what the major pathogens are in the herd. We also have educational-type programs to try and guess what would be the best therapy for the clinical signs that are presented. Right up front we established that no homemade treatments will be used; we use only commercially prepared individual mastitis syringes. I think that the most important thing that can be done in the handling of clinical mastitis is that she will be treated. Part of the treatment which I feel is very important is getting the cow milked out followed by prompt intramammary therapy. If the cow is clinically ill, systemic therapy is given as well. I am a little bit hard pressed to recommend a treatment at this time in light of the use of non-label drugs. Basically we'll work with intramammary type preparations. Try and find out what the clinical signs are and the best treatment for that situation.

Dr. Johnson: I am sure we all agree that we have evolved to the point now where we recognize that mastitis is a management disease. It took awhile in the area of respiratory infection, and took even longer, it seems, and we're still having our problems in recognizing mastitis out in the field, in the midwest, anyway, as a management disease. It is alveolar tissue whether it is within the thoracic cavity or in the mammary gland and it is extremely delicate. That's the message we have to get to our dairymen. We get involved with therapy in our small herds. They know their cows individually. We know their cows individually. We know Gladys and Bart, their dog! When we deal with a smaller herd they are going to call us out and I think probably what we have to realize when we are going into that barn is that this will take me twenty minutes; I should have time for those three lame cows before lunch. When we are walking in there we better look around to see why this cow has mastitis and proceed from there. The level of mastitis in a herd is going to be affected by the rate of infection and the duration of existing infection, so this is an opportunity. We recognize this failure that Dr. Jarrett referred to as an opportunity to look around. Did she step on a teat? Is it obvious? If it's not obvious, you want to look a little harder. I think we're past the point where we look at the abnormal situation and interpret what kind of mastitis it is. If someone says he can do it routinely and hasn't been doing much culture work, the cow with the watery secretion and the soft quarter and soft diarrhea can probably be nailed down as gram negative. I feel like a grade cow in a purebred herd with these two colleagues, but I take the position today that they are where we're going and I have to deal with the smaller herds that are in the process of getting there. We use a lot of DHI somatic cell individual cow information now. We feel that is the place to really concentrate and get the owner to recognize that subclinical infections exist in his herd both on a culling basis and for dry cow therapy. So we like to put in their hands a CMT paddle so that they can determine which quarters are involved from the long term through lactation and they can specifically get involved with a quarter on dry cow treatment. We certainly want to treat all four quarters. But in these small herds where we can individualize these cows, and this is a super old cow, they sure want to get another lactation in, she's infected now, we will double dry treat a

particular quarter in these cows. So that sort of approach may be quite a bit different with a large herd. When we get involved with these cows, if I can digress a moment, we can call back on an individual cow with a problem and say, "how's that cow doing?" and he can tell us. Our culturing then is tied to the DHIA somatic cell information and we try to determine sensitivities and the predominant organisms on a regular basis so that we can effectively use dry cow products. There again we always use commercial products on dry cows and we do in Wisconsin, and I think I speak for mid-western practitioners, formulate for our coliform gram negative cases on an individual cow basis.

Dr. Jarrett: Just a comment on DHIA somatic cell counting. We are very fortunate in most areas of the southeast to deal with the Raleigh processing center with DHIA records and that, to me, has got to be one of the better ones in the country. I also have the opportunity to be exposed to other DHIA processing centers around the country as well and there are some other good ones, but the somatic cell program is administered through the Raleigh Office and is an outstanding tool, in my experience, to use as a herd barometer, as well as having individual animal implications. Primarily I use that information as a herd barometer. Incidentally, I think if you want to talk about numbers we've got some very achievable goals. For example, the Raleigh information comes out, and I'm sure many of you in the room have many clients on that processing center, each month with a summary of the percentage of cows under 200,000, those 2-4, 4-8 and those over 800,000. I think achievable goals are at least 80% in the first column, 10% in the next column, and 5 and 5 in the last 2 columns with a weighted average, which again is given each month, of less than 200,000. We have several herds that are maintaining these goals and I think they are very achievable and very profitable when they are achieved and that's the name of the game anyway.

Dr. Blackmer: There is one thing I thought of that I'd like to mention. Yesterday, after the seminar, there was a question on the use of the paddle to test CMP. After you have treated a cow and the somatic cell count remains high, how do you know when to discontinue treatment? This would be an improper use of the paddle test after treatment. We don't conclude success or failure on a treatment by daily somatic cell evaluation. After a chronic infection we can expect a period of up to 6 weeks, even if the organism has been eliminated, before the somatic cell count would go down. End point of evaluation should be after the full series of treatments, using them according to the directions on the preparation in use and remission of clinical signs. We don't use a somatic cell test or CMT test to determine the end points of treating.

Dr. Johnson: When I talk about double dry cow treatment on a specific quarter, I'm talking about two tubes of a commercial dry cow product at intervals of one week, at the initial drying off. Dry her off, one week strip her down and retreat her. Now that isn't standard operating procedure, but we do get involved with it and I am not sure we have any data that can support that. Formulating for gram negative organisms, I hate to get into that, but on the basis of sensitivity we are involved with broad spectrum antibiotics, and use the squeeze jet and formulate on that basis. We have a couple of products, combinations, that we use. Based on sensitivity, we use cephalosporins almost 100%.

Dr. Blackmer: Likewise my recommendation would be to either use the ampicillin type, or cephalosporin lactating tube. In regard to dry cow treatment, we follow a pretty consistent policy. In the larger dairies, we are able to segregate cows for a number of reasons such as for nutrition, and to accommodate mastitis segregation. These are the main reasons for segregating cows. The two happen to go together pretty good in terms of segregating for low production and segregating cows getting ready for drying off. If we can get those cows that are being considered for drying off in this low production feeding group, select them, reconfirm their pregnancy status while they're still out in the corral before they come in the barn for the dry cow treatment, we really like to mark them for pregnancy status while they are still out in the corral. We like to really mark these cows out in the corral with crayon markings so there will be no mistake which cows go dry and which cows have been dry cow treated. After they have spent a period of time, maybe a week or two weeks getting in this low production string, if they were not there longer we mark the cows, run them through the barn, milk them. Immediately after milking we will dip their teats in a fresh solution of 1% iodophore, dry cow treat, one tube to each quarter, every cow, dip their teats again and send them off to a corral. Hopefully if the herd is large enough, and we have dry cows segregation, there would be a corral for recently dry cows which would be held in the pen until their udders involute. It has been my experience with this kind of a dry cow treatment program that about the only time we have blow ups or clinical mastitis in a dry pen is when mycoplasma mastitis strains are in the herd and the antibiotics were not effective.

Dr. Jarrett: My dry cow recommendation is going to be somewhere between those two. I don't have quite the luxury of being able to string cattle in a lot of these herds, but the usual procedure and recommendation that I have on dry cow handling are that they be milked twice a day or three times a day, whichever the case may be, up until the time to turn them dry, that they will be milked out completely the last time and I conclude with the procedure of dipping, treating and then redipping and then usually we're able to take these cows somewhere, take them off grain and put them on nothing but hay and water for about 5 days. We bring them back through and re-examine them and re-treat

any quarters that are necessary. If we have to strip out a quarter to be sure, we don't hesitate to do that. Be sure that everything is all right at that five day point. Re-treat if necessary. Generally the percentage is extremely low with the products that are available now. Then she goes into an early dry group for the first 3-4 weeks of the dry period and then into a closed up group for the last 2-3 weeks. I read somewhere that you start the lactation on a dairy cow the day you turn her dry and I think that's very true. I think that health-wise and nutrition-wise, the dry cow's importance is too often under estimated.

Dr. Blackmer: Shortly after I started practice, dry cow tubes of greater potency were just licensed and coming on the market. We started with a product, a million units of penicillin and a gram of streptomycin, and we had very good results with it and ever since that time, more than 10 years ago, some herds have used just one product on every cow in every quarter and have reduced to extremely low levels the incidence of staph and very low levels or non existent levels of *strep ag.* I am not convinced there would be any advantage of switching dry cow tubes periodically, like use one for one month and another for another month. I've had very good luck with just a single dry cow tube.

Dr. Johnson: If you are doing the sensitivities in your own laboratory, I read some information that cloxycillin can come up falsely resistant if you are not using a methycillin disc and maybe you can comment on that, Paul.

Dr. Blackmer: You need to be a little careful, even with navabiocin. Talking about drug sensitivity as a basis for dry cow treatment, I'm not aware of any antibiotic sensitivity tests that can be conducted that will show a synergistic effect of two drugs together. If you say an organism that has been isolated from a herd that is penicillin resistant would not be sensitive to a combination of penicillin and streptomycin. I don't think that extrapolation can be made.

I try to determine that indeed it is a pathogenic strain of mycoplasma. In my experience with mycoplasma strains, *M. bovis* and *M. californicum,* also known as ST6 strains, are the only pathogenic forms that I have been exposed to. I would be interested to know how it was determined to be in the herd and if it were picked up on a quarter culture. I would advise management that has been there that some of the quarters should be sampled, all pre-treatment clinical cases should be sampled for awhile to determine the prevalence in the herd. If they had been picked up from the bulk tank, I would alert the management that it was in the herd and it may be a good idea to do pre-treatment cultures. Once we had some idea of the magnitude of the infection, we would make a decision whether we should attempt to go through and eradicate or segregate for it. I will say that there have been herds that we have known about one of the pathogens, *M. bovis,* being in the bulk tank for several years without any clinical disaster. I don't think mycoplasma always has to be associated with these disasters. Certainly you should not be using poor sepsis and treatment of cows and you should not be using homemade medicine. If there is a history, or if there are signs you have a mastitis problem, by all means you need to culture as soon as possible, segregate or eradicate, and that decision needs to be made on an individual basis in each herd. If it has been in the herd for a long time you may have 10 or 15% of the herd infected and you may not be able to cull all of those cows. If it is a case where the problem is limited to one or two cows and these cows are considered culls for other reasons, by all means get rid of them. Usually it it not that easy though.

Question regarding pasteurella mastitis

Dr. Blackmer: I think what I would do if presented with this, and it is theoretical because I have not been presented with it, I would like to go back and collect a sample from the cow myself and verify that it is from the udder and not a contaminant. I think whenever you have a herd mastitis problem, the big thing is try to put together an integrated program that will control that type organism. This is not the typical organism whose primary habitat is within the bovine udder. I think that pre-milking hygiene, perhaps housing, would be aspects of management that should be looked at in the overall control of the disease. I would like to start off by verifying that it is a mastitis pathogen and not a contaminant.

Question in regard to a high staph. cow on a bulk tank sample.

Dr. Blackmer; I would approach that by thinking that is probably incubation and the number of staphs in that sample may not have any bearing on the number of infected cows in the herd. The next thing I would want to do is somatic cell testing because you find out what the somatic cell test is and in my experience when staph. cows exceed 10,000 per ml because incubation is occurring, somewhere there is a flat spot in the milk line or the milk filters are not changed often enough, or perhaps there is a refrigeration problem somewhere else.

Dr. Jarrett: Staph, in my experience, does not precipitate all that high a cell count on the bulk tank and to tie it back to somatic cells it is as well to determine whether that is a problem.

Dr. Blackmer: High plate counts can be a symptom of a number of causes and one of the most common causes of high center plate count is high *Strept. agalactiae (Strep. ag)* count and I think that whenever you are presented with high bacteria count you need to plate the organism out on blood agar and determine what those organisms are that are causing the high count. *Strep. ag.* is very easy to identify on a

plate. Another test that we do, which is not all that difficult for our profession, is pasteurize a sample, do a center plate count type procedure on blood agar again and if all the organism that were making that center plate count disappear on pasteurization, I would think they could have been *Strep. ag.* Whereas, on the other hand, if they didn't disappear I would feel very confident I would be dealing with a strep-like organism or some other organism that has soiled the milk line.

Dr. Johnson: If I get a situation like that in a small herd, the first thing I want to know is whether he is using a bucket to milk his fresh cows, because they are the dirtiest, most uncared for things you can ever imagine. Secondly, I follow the premise that with this coliform problem I need to check his premilking sanitation very closely and thirdly, if they're calving in a pen, what is his pen management. Anytime you've got a cow that is in a too small pen, a pen that is not cleaned regularly so that she is eating, sleeping, and defecating in essentially the same spot, and they are leaving the calf in there, you are getting milk let down several times a day because that calf is there, that predisposes to coliform infections a great deal. Our pen management recommendations are to get the calf out ! Udder edema is related very remotely, I would think.

Dr. Blackmer: In regard to the udder edema, it is a stress on the udder. A stressed cow with a stressed udder has to be more susceptible to mastitis than the non-stressed udder cow. As far as udder edema goes on the individual animal basis, I recommend treatment with either a diuretic or a diuretic-steroid preparation, but that would be my immediate reaction to that situation. I would rather work on dry cow nutrition if udder edema was a problem. Udder edema is managed by the activity of the dry cow and by her nutritional intake. I think that is really what the long term program should call for.

Dr. Jarrett: I agree with Paul on dry cow nutrition. I think you need to take a close look at what is happening in those last three weeks if udder edema does become a problem. All the other things, too. One of the things that I encounter rather frequently in this kind of a situation is the milking procedure. Usually fresh cows are milked last and by that time everybody is going through the parlor turning off milking units and a lot of water is being used in the milking procedure and I think anytime coliform is a problem you need to take a real close look at what is happening in that farm, how much water is being used, and what those milking procedures are.

Dr.Johnson: I'll just comment on pseudocowpox. We use nothing but emollients but using segregation in milking in a stanchion barn works pretty well. Use one unit on those animals and put fluorescent tape on the tails as we do to identify high count cows. That would be effective. Nocardia?, yes I have seen very few. Several years ago we had a lot of people around who liked to suck pen. strep. out of a 100 cc vial and hammer it into these quarters and we had some beautiful nocardia then that I have not seen in maybe five years!

Dr. Jarrett: I did an article (in Hoard's Dairyman) in the last six months about a herd experience with nocardia and that may have been what precipitated that question. In the past few months I have had a rather disastrous experience with nocardia in one herd. It related back to **grossly** improper treatment techniques and very suspect decisions as to which animals were treated, and so forth. Once it is established, I know of no therapy that will alleviate this condition. It is usually a matter of spontaneous recovery or the slaughter pen.

Question: What is acceptable mastitis cow numbers in large herds? Do you make a distinction between average number of mastitis cows versus new infections over a given period of time?

Dr. Jarrett: Again without getting into a lot of detail, one half to one percent in the treatment string of the milking herd is an acceptable achievable goal. This includes cattle that are showing clinical signs as well as those that are waiting for drug withdrawal to get back on the line. I think these are achievable goals, although these numbers will vary somewhat, particularly in some areas of the southeast with the weather. But I have herds that are doing this that also still have good looking milk filters. The place we've got to start is good milking procedure and getting diagnosis early and if that's being done honestly, then that half to one percent of the milking herd under treatment or withdrawal at any one time.

Question: Would you comment on clinical case numbers in small herds? Do you think that is a reliable measure of a herd's mastitis status?

Dr. Johnson: No, if you look at somatic cell counts on an individual cow basis, obviously the herd is so full of hidden mastitis, you don't want any clinical cases. In stanchion situations you are going to have more teat injuries so you're going to have some, I would say 2% clinical cases, in well managed stanchion operations. There again, early detection and early treatment are essential, and all our clients are familiar with the use of oxytocin and the precautions that we apply. I had one client that went wild with oxytocin and I did not know it until I got there to do a herd check and there was a carton of 12 x 100cc oxytocin bottles on the counter! For the last three months we had had some embryonic abortions that we were concerned about. I don't know if that was the tie or not, but I think they told us in advanced reproduction

seminar that there is a relationship. They are certainly tying together oxytocin release with uterine muscle which in turn releases prostaglandin. So I got him shortened up pretty quick! We recommend the judicial use of oxytocin in a stanchion situation for these clients because we try to stress that they want to save every pound of milk they can, and they've got to hammer that quarter at least three times if it is new with infection. Years ago those package inserts used to say, after three times, re-diagnose. We tell them 8 or 9 times, keep hammering, or we are going to have a chronic infection and then we are going to have to go the dry cow route.

Dr. Blackmer: I agree with what Jim said. I want to add to it just a little bit more. I am very concerned when a dairy operation is so good that they don't have any mastitis. Less than one half percent usually indicates that clinicals are being milked into the line, if you define a clinical as any cow that you can determine to have a mastitis infection by sight or by feel. I don't know of any herd that is realistically below one half of one percent. On the other extreme, when we have bad weather, we expect the number of cows undergoing treatment and being withheld for antibiotic residue specifically for mastitis, to get as high as 2%. Anybody that has over 2% clinicals could really benefit on focusing on a mastitis prevention program.

Question: I suspect that the latex based teat dips may be causing teat injury indirectly when the milker washes the teats and the latex still sticks to them. What can be done about this? Please comment on this topic and whether you feel it is a major problem now.

Dr. Johnson: I presume they are talking about barrier dips and not just the latex. We don't have many clients using them because they just don't want to tangle with the time required to get that material off. I notice in the summer time when we have high humidity, the skin gets so moist and the humidity seems to solubilize the non-latex barrier dips and there it is hanging in shreds all over. It makes me nervous, we do have a few that will dip individual cows in the summer time when it is hot, humid and wet and we feel there is some benefit from that. I can think of one person we have that is using the barrier dip, not the latex type, almost year round. He pays the price and he believes in it. I have not seen teat end injuries as a result.

Moderator: *Would one of you care to address the question of using either latex or barrier dips in the final, or after the dry-off procedure on cows.*

Dr. Blackmer: My experience with barrier dips has been a single product. I know what it costs—about three times as much as say a one percent iodophore, 10% glycerin and we've had good enough results with this product and with proper use that we would have a hard time with the tremendous teat dip uses that goes on in the dairies to go to a teat dip that costs three times as much and may incur additional labor and other problems that we don't anticipate.

Dr. Jarrett: I don't want to over simplify but I guess we all ought to remember that mastitis is still an infectious procedure that occurs when pathogens gain entry to the glands and basically I think that most authorities are in agreement now that this passage from outside to inside the gland occurs during or very closely surrounding the milking act. So I think that in addition or once that milking machine function is established, then milking hygiene becomes very important. On the other hand I also think that we probably should think in terms of starting any mastitis control program, whether we are talking about 50 cows or 5,000, with sanitation in the environment and holding the bacteria count on the surface of that cow's body as low as we possibly can through environmental sanitation and then, secondly, sanitary procedures during the milking act—things like pre-sanitizing, pre-dipping, whatever, backflushing, and so forth, that go into ensuring that the vicinity of that teat end is as bacteria-free as is practically possible during that milking act. I think that is going to apply, in my experience, almost regardless of what type bacteria you are thinking about.

Dr. Johnson: Just to help a client out with his 15 cows, if that's in a 50 cow dairy, that would be fairly critical. Now it depends on the mentality and initiative and insight of the dairyman that you're working with and how much money he has. But there is probably, (if it is) a staph. problem, an equipment problem, and how quickly you are able to correct that is going to influence what you are going to do a little bit. I go along with all that Jim said, but there is probably a staph. vaccine opportunity here. I have never vaccinated a herd with a staph. bacterin or toxoid, although there have been just a few herds in my practice where it has been done. That will reduce the severity of the outbreak while you are correcting the condition and they do tell us at Louisiana State that probably you have fewer chronics developing when you initially treat these new staph. infections and that is apparently the state of the art right now. That would be the only indication where I would use the vaccine.

Dr. Blackmer: I have not used a vaccine but I have heard reports that sometimes in these situations where you do use a vaccine that would be pretty close to a D grade level on somatic cell count, and the bulk may go up following vaccination. You should consider that. If I were presented with a situation of a dramatic increase in clinicals all of a sudden, and the type herds I am dealing with, a larger milking system, quite often they have very large, high capacity vacuum pumps and a report of a sudden upsurge in clinical mastitis where there has been no major problem before, usually indicates that we have a mechanical problem. Most frequently we are dealing with a sticky vacuum controller. Whenever there is an uspwing in clinical mastitis, you would think that right then would be a good time to do

an equipment evaluation, just to rule out that there is no gross equipment defect. Obviously if you don't find any equipment problems, there are many other things that could have caused it.

Moderator: *Dr. Jarrett, there are two questions here that are very similar. The questioners are talking about well-managed herds, one of them has a bulk tank somatic cell count of 100,000 or so. What do you do for a nagging incidence of coliform mastitis in apparent excellent hygiene and good weather?*

Dr. Jarrett: Look at the environment first and milking procedure next, or even reverse those two and I don't think it would make a whole lot of difference. Almost every time I have encountered that situation with the well managed herd and there is no doubt we probably see or think we see more coliform mastitis in the well managed herd with low somatic cell counts. On the other hand, the profit potential is so much greater to maintain that cell count level as low as possible, reasonably. I think that is our goal. Almost every time I have seen coliform problems it has usually been somewhere in the milking parlor in the milking procedure. The common fault again I see there is usually a lot of water being used in the milking procedure, giving these organisms an opportunity to move toward the vicinity of the teat end during the milking act. Milking wet udders is where I see the most problems, usually.

Moderator: *I have a couple of questions dealing with milking equipment and equipment evaluation. Generally the questions are, do you think veterinarians should become involved in pulsator graphing and that kind of thing, but also would one of you comment on uneven milk out and problems of that sort as it relates to equipment evaluation?*

Dr. Jarrett: As far as I'm concerned when you think of equipment evaluation I don't think that the veterinarian needs the expertise. Again depending on what his practice load is, if he's involved in dairying a great deal of time, I think he at least needs the background expertise to evaluate milking equipment. Having the opportunity to move around as I do, I also encounter in some areas support dealers, i.e., dealers and service people, who are excellent in making evaluations. In other areas they leave quite a bit to be desired. Many of you have heard me speak to local meetings and know that I feel that the local veterinarian is the one to chair or be the captain of the total health management team and in that regard I think he needs at least enough basic knowledge to evaluate pulsator tapes and pulsator graphs, as an example, and many other areas. Maybe he's not doing a lot of them, but at least has the ability to evaluate, especially gross inadequacies in these things. When you look at the practice, the milking machine is the only piece of equipment that can harvest a money crop from living tissue twice a day and the fact that we are responsible and involved in maintaining health of cattle, I think that, yes, we should be involved with milking equipment evaluation.

Dr. Blackmer: In regard to uneven milk out, I can think of three things I would want to consider and look at. One would be the foremilking procedures. Usually cows that are properly stimulated to let their milk down and have the machine attached at the right time, in other words when the teats are ballooned with milk, usually they will milk out pretty clean unless there is a teat end problem which would be on an individual animal basis, I would hope. I would really need to look at the fore milking procedures to make sure we have the good stimulation and the wait period for the teat to balloon. The next thing I would want to look at is the inflation and claw assembly. I would like to know that the mouthpiece of the line is in reasonably good shape and the inflations are being changed regularly. Incidentally, that question about the herd with the 100,000 somatic cell count, in coliform mastitis, I would want to look right away at inflation cleanliness, and how frequently they were changed. Sometimes we run into cows not milking out because the inflations are stretched out, and the third possibility for uneven milk out would be some sort of noxious stimulus in the milking parlor that would keep the cow from letting her milk down. Stray voltage would be one, strangers or something new, but usually the cows acclimate to that fairly soon.

Dr. Johnson: Just a comment on the small dairy and we are labor intensive in many areas of dairy practice. The team approach is the way we have to go so we like to involve our milking machine dealer if he is competent. Years ago we were doing a lot of milking machine analysis when their installation was going on and the different milking organizations were training their dealers. Now we have most of the initial installations done and they have their service routes, which I thought would be great, but they have unqualified people and they are selling inflations and various sanitation products. So we are having to get back into it. The criteria of how involved we get depends on how much we think we can impact on the attitude of that dairyman. How much will he get out of the involvement beyond his actual solving of some of the equipment-related milking problems. Maybe he just needs routine exams. All these factors come in.

Moderator: *This questioner wants to know how many dairymen are dipping, pre-dipping in your given area, and with what products. He wants to know about potential development of new products if any of you are aware of them.*

Dr. Johnson: I don't have anyone pre-dipping at this point. I don't know if it is cost effective. I don't know if they are going to let that dip stay on that teat long enough on an individual farmer basis. It has got to be fairly wiped off or

we're going to have this residue in the milk. Surely it has to be on there more than 15 or 30 seconds and then you're doubling cost of teat dip. I am not sold on it and I think I would have a hard time selling it. I think there are other management areas I can emphasize in our stanchion herd.

Dr. Blackmer: Several herds that I work with have done pre-milking teat dip much on their own extensivley and, for the most part, there have been favorable responses to it. Some of the things we have learned from their experience is that pre-dipping should be done to a relatively clean teat and in the larger herds I'm used to dealing with in the dry lots in the Southern part of the country area, we use a wash pen, where large groups of cows are washed. You can go from a wash pen to a drip pen when the cow enters the barn relatively clean. If we are going to have a free stall situation or a high temperature and humidity situation and coliform exposure to the teats is very great, exceeding that 10^6 threshold that is supposed to be the area above which it takes very excellent hygiene to prevent coliform, from those areas we have had very good reports. It is something that I did not really anticipate. I thought this would be extra work and would add to the routine and really be objectionable. Once it has worked into a good routine, it does not appear to be any extra work and dairy managers that are pretty informed and veterinarians that have had experience with coliform mastitis, are glad that, with pre-dipping being worked into a sound routine, the water hose comes out of the hand. It is not a case of using both in the barn—it's either/or. (If we had to use both, the time factor would be too great). The routine that I have seen adopted with some success in these herds with the high coliform challenge, is that the cow enters the barn relatively clean, she's fore milked on to the floor, immediately dipped and the milkers go on, and likewise treat four or five cows and then return to the first cow, attach the machine after wiping off the teat surface with a paper towel. The products I have had experience with is a low iodine formulation that represents a relatively new technology, particularly in that some of these products are food grade type products. They contain chemicals that are already approved for use in foods, with the exception of the iodine. Incidentally, iodine is considered a food. It is also considered an adulterant. With low iodine levels we have less risk that it will show up in the tank. One of the things we have found out is that the glycerine-iodine teat dip is very hard to wipe off. If you were to dip your finger in a glass of water and wipe it off you can imagine that is not too hard. Try dipping your finger in motor oil and wipe that off and it is a little bit more difficult. I think with low iodine, a non glycerine compound, working it into a sound routine, it can be a real benefit. Companies that manufacture teat dips are really excited about this. They see a chance to double their volume of product sales. They are in the process of having research done to support the positive aspects of the practice, and I suspect over the next 2-3 years that will be the main thrust of their advertising.

Dr. Jarrett: I have several clients, in fact I probably have about 30 regular clients that I work with on a routine basis, and at this point at least half of them are predipping. I agree totally with what Paul said in that it must be part of a total control program and if you are going to evaluate it as a stand alone procedure, then your evaluation and results are going to be very disappointing. Without going into a lot of detail, look at that cow's environment and whatever it takes to bring her to the milking position clean and dry, and very close to being ready to milk. Then prestrip first, predip, and allow long enough for the dip to react. In a herring bone barn it works very nicely to do 3-5 cows, then go back to the first one, wipe the dip off and attach the machine. Predipping, coupled with backflushing, or some form of unit sanitizing between every cow, I think can be extremely profitable, particularly in the herds that are well enough managed that we will say they are able to maintain a 3-500,000 leukocyte count without it. In my experience, those two procedures combined, with everything else, have had the greatest impact in moving those herds back into the honest, consistent 200,000 cell count range. The clients that have done it, early on, took quite a bit of convincing to get them to start, but most of them who are doing it right now, I would be hard pressed to get them to stop. The products that are being used are the low iodine products, the 10% iodine products. I have two clients that are using the old standard clorox combination—clorox, not just anybody's bleach. That seems to be working particularly well in that herd. The detergent teat dip, some people are using that as well. I do prefer the higher iodine concentrations as a post-dip and certainly predipping is not going to replace postdipping but rather just another step to try and sanitize the vicinity of that teat end during milking.

Moderator: There is some hard data coming out now on predipping as a milking hygiene technique. Two people that probably do more either in field trial work or controlled data on that topic are Dave Galton who is an animal scientist at Cornell University, and Dr. Bob Bushnell, who is an Extension Veterinarian in California. Dr. Galton has done a controlled study and that information appeared in some form in the Journal of Dairy Science a couple of months ago. Dr. Galton and Dr. Bushnell are going to appear on the program for the National Mastitis Council meeting, Feb. 21 and 22 in Kansas City, and the topic is going to be touched upon by them.

In small dairy stanchion barns, what recommendation do you have on dipping milkers between cows? I'd like to get some comments on backflushing which is essentially sanitizing the backcluster between cows.

Dr. Johnson: Dipping inflations between cows in the stanchion operation is going to require some method of keeping the water hot apparently to get the really full value out of your disinfectants. You are going to need two buckets

to rinse the milk off initially and to put it into the disinfectant solution. You've got to have a break in your vacuum or you will get an air lock and disinfectant will not go up into the line long enough and you will have to hold it, or allow it to sit in there, replacing the solution over a period of time, certainly a minute. If you can achieve those goals in a stanchion operation, there are results.

Dr. Blackmer: I have had some experience with dipping clusters in a bucket. It was very bad. Theoretically it is a good practice if it is done right. When you go to the larger herds with a number of units in a barn, the tendency is to overuse these solutions. Instead of the solution being a disinfectant, it becomes a contaminant and can really hurt a herd. Cluster disinfection, external surfaces, internal surfaces, as bucket dipping would do, is an excellent idea, but in a larger herd is dangerous. Backflushing is something that has been widely adopted over the last few years in a number of the larger herds. The way I look at backflushing, one of the last steps in fine tuning a super mastitis control, mastitis prevention control, is that it can be a useful adjunct to cleaning up a problem herd. The manufacturers are developing technology that is quite good, however by the time installation is put in use for 6 months, many of the backflush systems are ineffective. They are either not maintained properly or they were installed at the lowest bid and they were put in so cheaply that either because of the installation or the maintenance they are not all that functional. I really support the concept of backflushing in the large herds, but it requires a lot of attention and it certainly is a waste of money if premilking practices are lousy, with wet, dirty teats, the producer has no business spending money on backflushing.

Dr. Jarrett: I can't do much more than just say amen to that! I tried to indicate earlier that backflushing is just one of the final steps. To go along with what Paul said, I have had some very disappointing experiences both labor-wise and results, in terms of trying to dip units even in the size of the herds I deal with. I think we need to look at these barns in terms of how many hours a day they are being used and what kind of financial return we can get from capital investment when we look at the money it takes to get into backflushing, mechanically. There are some manual ways to get it done, if they are executed properly and carefully. The bottom line still is to some way or other get that unit sanitized as thoroughly and completely as possible between cows.

Moderator: *Does anyone know if there is any relationship between staph. mastitis and reproductive problems on a herd basis?*

Dr. Jarrett: I don't know of any relationship between the two.

Editor's Note: The above discussion was transcribed from a tape recording of the meeting.