

# Feed Bunk Management: How to Get Good Nutrition in the Cow

**Moderator:** Dr. Ben Harrington, Raleigh, North Carolina  
**Panelists:** Dr. Sam Galphin, Apex, North Carolina  
 Dr. Tim Lesch, Belleville, Illinois  
 Dr. Ken Norland, Fergus Falls, Minnesota  
 Dr. Arden Nelson, Cortland, New York

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**Dr. Ben Harrington:** We will be discussing feed bunk management and how to get good nutrition in a cow. Keeping up with tradition I think all of us will recognize over the past several years the importance that nutrition is playing more and more every day in our practices, related to health, and I think that most of us have heard the saying that if we're going to work in herd health and nutrition, as we try to administer this on the farm, that at our present state of affairs, the science part would contribute about 40% of our effort and then the other 60% would be related to the art that we would have to be on the farm and actually working with the animals in order to get the job done. If we look at the problem, on most farms there are several rations, and that's the one that we might generate ourselves or the neighbor might generate. The extension person might generate a ration and professional nutritionists might also be working with the herd. The dairyman very often will sit down and calculate out a ration. Then there's the ration that we are actually feeding our cows, but the one that is the most important from my standpoint, and I think for most of us, is the ration that the cows are actually eating. Until we can manage and know what is happening on that farm and control and know that the cow is actually eating, then I don't think we are going to be able to solve a lot of problems. What we are going to try to do today is to have each one of our panel members to come up and present a case problem they were involved with, and along with it present some key things they look at in order to get the job done. We have a wide distribution of different types of practices and we want to try to spend about 15 minutes for each one of these and then spend the greater portion of our time with questions from you. I think it would help a lot as we go along to jot down some questions and then we'll take them up. To start off our morning session, I would like to first introduce Dr. Arden Nelson. Arden graduated from the University of Minnesota in 1976. He is now in a mixed practice in Hallmark, New York. This is a group practice and he does 95% dairy work, production medicine. Currently he is doing 16 herds under a contract herd health agreement, and he is one of the co-founders of the Dairy Production Consultants' group that started back in August and a lot of you have already been working with that since August of 1985. He has also talked at several of our meetings on what the cow actually eats and trying to determine this.

**Dr. Arden Nelson:** We are going to talk this morning about feed bunk management. There is some science to be applied there, but a lot of it is art. It is part of a total package. I did not coin that phrase, but it is a complete program for the dairy, not just a piecemeal type

approach of this little program and that little program. It's the total thing. All of it has to be measured economically and it is more than rectaling. Rectaling cows many times gets us on the farm and gives us an opportunity to progress from there. In fact it's gotten to the point that, in my opinion, on a lot of farms both the dairyman and myself think the rectals get in the way of the real important things. Everything has to be based on an economic evaluation and if we just decide that our decisions are going to be influenced mainly on the basis of dollars that go out of that dairy in the form of milk, it wakes us up. The foundation for all of this is the records because records give us the key to educate, first ourselves, and then our clients and go on and discover the true cause and effect relationships. I want to quote a friend of mine. He can remain anonymous, but initially in our relationship he said to me, "You think nutrition cures everything?" I said, "No, not everything, just 98%." Six months after delving into records more deeply, he said "nutrition's a lot more important than I thought it was," and this is a practitioner that was doing rations before that. When you start looking at records you find out that a big share of the program has to be oriented towards the immediate production out of the cows that are milking. Ben already alluded to this. Every farm has a ration on paper for every group of animals. Some of the rations come with high price tags, some of them come free. The important thing is that somebody be around to try and find out that that ration on paper somewhat matches what is being fed and hopefully somewhat matches what the cow is really eating. This ration that the cow is eating is really the only thing that matters. The dairy I want to share with you this morning is one run by two brothers. I visited their farm the first time in July of 1985 and had never been there before. Our nutrition assistance program started in August and I'll just re-create the scene for you. This herd was at about 17,000 lbs., 100 cows, all pure-bred, free stall, excellently managed. This was a herd that, before I became involved, they knew each pickup how many pounds of milk were leaving on a per cow basis. It is a purebred herd. They are not concerned with selling breeding stock, yet. They hope to be sometime. The two brothers run this 100-cow dairy and a fairly extensive cropping enterprise. They sell quite a lot of corn, by themselves, with the exception of some part-time help in the summer. This becomes important later on in the story. We started the rations at that first visit and the second visit we talked about a lot of management changes we wanted to do, including changing the energy levels in the high group and the low group. We also beefed up the dry-cow nutrition program. Within a

month they witnessed the fresh adult cows were performing much better. The feedback was quite immediate. They were quite favorable in their response. Shortly thereafter because we were looking at the records, I became quite concerned the cows were milking fine but the fat test was too low. In fact we had 3 months in a row that the fat test was 3.1 and 3.2 on this herd. They were around 60 lbs. a day. The owners were very happy with the ways the cows were producing and told me I should not worry about the fat test because fat test had always been a problem for them and they were very content. The cows were healthier, production was fine. I pushed them and I said 3.2, 3.1 fat is totally unacceptable. It's going to be the tip of the iceberg and we're going to have other problems. We've got to solve that.

This was a dairy that at the time our assistance was kind of piecemeal—visit when it was necessary. We had not established a program. I pushed them. I talked to Rick on the phone one day, “Rick, I’ve redone these rations. We re-analyzed things. Dry matter intake is fine. I think I should come up at feeding time to watch you feed to see if there is any little thing that we might pick up.” I said, “What time are you feeding the cows.” He said, “About noon.” I said, “Noon? When do you feed them the second time?” He said, “We don’t.” Now the interesting thing is we had talked about this in July and that was one of the things I thought they were going to change. They did everything else and I assumed that they were feeding the cows more than once a day. What we had done to the rations was basically beef them up energy-wise. In fact they were feeding a little too much protein, so that, in essence, my paper rations which were getting delivered to the cows actually assisted them in the problem we had with the fat test. I showed up that day and watched them prepare the ration but before they started preparing the ration I went off to observe the cows in the bunk. The bunk was so clean you could roller skate in it. They feed out of bunker silos, but absolutely not a stitch of forage or grain was in that bunk. The cows looked extremely content in this lot in which there were about 80 cows. They were all lying down except for three cows. One cow was over by the bunk but she was not there because there was feed around, she was there because she was drinking. So John came in. He had to move three cows to close the gate. They have a drive-through barn but it is also the cow-alley. Rick came around with the ration. When the cows heard the tractor approaching the barn they all stood up. They went over and lined up by the gate. When the gate opened it reminded me of the Kentucky Derby! I knew instantly, beyond any shadow of a doubt, that there was adequate bunk space per cow because every single cow in that group was eating. It alarmed me, so after we were done feeding the low group we had a little discussion. I said, “Rick, is the emptiness of that bunk normal?” He said, “Yes, they are really eating that ration well.” I said, “How many cows do you have in that group and how many are you feeding?” He said, “There are 80 cows in there and I’m feeding them a ration for 85-90 cows.” I said, “How much of that ration is left at tonight’s milking time?” He thought about that awhile and he said, “well, maybe 30%.” Milking time tonight, that’s 4:30. It was 1:00 by the time they got fed. Those cows really liked that ration. I said, “When do you come to the barn to check the cows at night?” He said, “I’m out here about 9:00.” I said, “How much of that ration is left then?” He said, “Well, after milking the cows go back out and eat again. Maybe there’s 15-20% left. But maybe there’s not that much.” I said, “Is there any ration left in the morning?” “Oh yes, you can find some.” All of a sudden I thought the light bulbs were going on. I got out my pH meter and we took some manure pH’s which we had not done in

that herd before. Of about 20 cows in the high group, they averaged fecal pH of 5.9. There was a lot of grain in the manure, by the way. I was not involved in the reproduction program on this farm, and if you are not doing the total package you really miss things. They had not heard about fecal pH’s and there can be arguments about the significance of them. Interestingly, once we fixed the situation and they went to 2x feeding, the fecal pH went to 6.2 to 6.3. Not a big thing but it’s a little thing the dairyman can hang his hat on. So the obvious remedy was to feed the cows twice a day—not a very difficult thing to institute and not something that took a tremendous amount of investigative power to figure out. They had been feeding the cows once a day based on research that one of the large cooperatives had done in our area, but they were breaking a lot of rules. The Co-op that did that research had feed in the bunk all the time and they cleaned out 10-15% of it every time they fed the cows. Just to show you what happened. They were feeding these cows once a day and 80 or 90% of that ration 8 hours later was gone. That’s the best guesstimate but that’s probably pretty close to reality. All I want to point out here is that the ration did not change very much. The ration on the left-hand side (on a slide) made up of a little bit of alfalfa hay, corn silage, haylage, wet brewers grains, high moisture year corn, some dry shelled corn, a 48 soy and mineral package. There’s not much change in that. A before ration and an after ration. I formulated both of those so there shouldn’t be too much difference. Dry matter intake on these cows went down. They dropped about 5% per head per day when we went to 2 times a day feeding. Now that is unusual, but it happened. That’s the best way we know to measure it. The rations as they were built up were no different—built in a 49 lb. package with crude protein between 16½ and 17, energy level between .74 and .75 megacalories per pound and a fiber level of about 19. The ration did not change that much. It was the message we were delivering. The herd average before on this herd, 17.3, 17.9, 12 months later. The fat went up a little. Rolling herd averages don’t tell you the story well enough if you’re going to monitor a herd and do a decent job. Protein has come up, fat has come up a little, but you don’t gain an appreciation for what we’re looking at. So I took the average milk per cow for the 12 months prior and the 12 months after, in a sense to take out some of that slow change on the rolling herd average. We had a difference of 56 lbs. of milk up to 58.3. Two lbs. of milk, not that big a thing, you extend it over the whole lactation and you have a big thing. I took the fat test from a little below 3.5 to 3.6. In a sense that’s free money. All I had to do was free feed the cows a second time. Days in milk don’t change significantly.

Now we can look at all these numbers and we can take them out to the dairyman. My experience over about 8 years is that numbers don’t impress dairymen very much. They get bored, they fall asleep! I did a graph on Symphony. Until you put it on a graph so that each month you have that data so you know where you were last month and the month before and hopefully the year before, unless you do that you don’t gain an appreciation for where you’ve been. On the fat test on that herd, I split out 14 months worth starting in August and ending in October. So it’s August of ‘85 to October of ‘86. A little difference in the fat test. Now the best measure, I think, to evaluate changes on a monthly basis based on DHI data is adjusted corrected milk. Dr. Norland will explain this further. A significant change there. That is something that can change month to month. Now those graphs are fine. In the Northeast I think we are lucky to have a good DHIA center and a good dairy records laboratory. We have taken the opportunity to use the dial-up system in Dairy Production Consultants. We have developed that into a system of monitoring.

We try to assist veterinarians on getting started on this kind of a situation. I wanted to share with you some graphs on this herd. First of all I'll show you the base-line things that we're looking at. These are curves that were generated partly by ourselves, at Dairy Production Consultants, and partly by New York DHIC. On the top we have milk graphs. This is for all lactations. The dash line I refer to as a low low, it's herds at rolling herd averages of under 14,500 lbs., and that includes all those herds in the Northeast. The top milk line comes off data that we put together. Those herds average 21,145 milk, 365 fat, and 3.2 protein. The fat and the protein we have demonstrated in a graph as a buttermilk percent and protein percent lactation curve and have found these to be extremely useful in monitoring rumen health and ration adequacy, and not just the ration on paper. It is the ration the cows are eating that we are monitoring here. We have these with all cows split out by lactations. The butterfat protein curve did not change that much. In one particular herd I had done the butterfat protein curves initially when we got to the farm. I did them again when I discovered this butterfat problem. The problem comes when we get down to the butterfat protein curve which is very low on the screen. We have, for 5-6 months out of the year, butterfat and protein inversions in this herd—a cardinal sign that we have a rumen problem. That's all lactations put together. First lactation, you can see all the inversion there, same sort of thing. By the way, the proteins in those younger cows are at normal and above. The fat is terribly depressed. Third lactation, same kind of story. Third and above. We sneaked a few more pounds out of these cows. The butterfat and protein curve is dramatically improved and yet butterfat is not normal in this herd. Remember now that these butterfat and protein curves came out of 47 herds, 4200 cows, and the rolling herd average was 21,000 lbs. So we're not looking at a situation here that it can't be done no matter what the production level is. I want to point out one thing and that is, in the adult cows, we went to one group of milk cows in this herd because of the time limits. We've been trying to get them to do a better job on dry cows, so we went from a high and a low group at a milking herd to one group. The solids in our adult cows have been hurt by this. We have a solids depression and I think when we can manage it we can go back to two groups. Don't do something you can't manage. My timing wasn't good on this. I was going to point out that the attention that you can get from a dairyman based on a picture is much better than any picture of numbers. Graphs seem to be the key way to bring records information back to the dairyman to generate change. We've also put on a new face to draw attention to a particular problem, that of improper manure consistency. I tried to get a herdsman to do this for me. I couldn't talk him into it. He bet me one day that I wouldn't do it. We went out and got some manure that was just right, applied it, and made our point—for those that are not like us, that don't have their arms in a cow!

**Dr. Harrington:** Our next panel participant is Dr. Ken Norland from Fergus Falls, Minnesota. We're moving from the Northeast over further west. Ken graduated from the University of Minnesota in 1977. He has been in a group mixed practice in Fergus Falls since 1977. One of the things that I think is very significant for me is that a little over a year ago, Ken, at one of our meetings, introduced all of us to the adjusted corrected milk. We have that in our herd health monitoring system now and it has really been fascinating as a tool to evaluate nutrition with our herds. I'm hoping Ken will discuss that as part of his problem herd situation.

**Dr. Norland:** There have been several references to measuring milk and yet the rest of the world seems to have an easier time with

this than I do. Eastman Kodak introduces IsoPlus and gets a nice 5 lbs. per cow. Arden goes home and imposes all sorts of techniques on his clients and he gets a nice consistent two pounds per cow. I go home to my clients and introduce a new feed or a new ration or a new feed bunk management technique and return a month later to look at production and we try to make a judgment on whether the program worked or not! We can't tell. A lot of people say "easy." I simply divide the number of cows by the pounds of milk. I go to my client and we look at the bulk tank pickup slip and it will say 6,432 lbs. I will turn to my client and say, "How many cows are you milking?" And he'll say, with a great deal of confidence, "52," so I sort of look at him cross-eyed and say, "Are there any corrections or additions to that report?" He will smile and say, "Well, Doc, No. 14 freshened a couple of days ago and we started putting her milk in the tank, uh, son, when did we put that milk in the tank?" And then he'll say, "Oh, No. 37, we pulled her off the line for mastitis treatment and I'm pretty sure that happened Thursday night. Son, when did we pull that cow off the line? And then, Doc, there's some milk that goes over to the calf barn and we've had a lot of fresh cows lately and my wife takes care of that and she knows that stuff. Of course there's been some scours over there and they're using some electrolytes. Then, we have five neighbors that stop by and pick up milk and they stop by every four or five days. They pick up a little bit more on the weekend when the kids are home all day and you can count on that, Doc." So my friends go and get two lbs. of milk per cow per day after imposing a new technique, and I can go home at any point and find two lbs. of ambiguity! The point remains that my clients go to the bulk tank and they make a personal observation of the pickup slips. They make a first hand impression of whether rations are working, and they make judgments of the overall program. I think we need to keep in mind that personal observation and first hand impressions *are suspect at best*. I think they can best be characterized by comparing them with automobile accident reports. Some of you are in accidents regularly and you are familiar with those blank lines at the bottom of your report sheet where you are asked to describe an accident in your own terms, exactly as you saw it. Several years ago the Toronto Sun published a collection of such reports and I'd like to share a few with you. I quote, "I pulled away from the curb, glanced at my mother-in-law and headed straight over the embankment." "The pedestrian had no idea which way to go so I ran over him." "The guy was all over the road. I swerved several times before I hit him." So enough of first hand impressions! When I go to the bulk tank I've been frustrated with that, yet we have to make observations and judgments on a timely and monthly basis. I have found the DHIA report in Minnesota to be the most useful way of analyzing and judging performance of ration changes, and I would like to make some comments on that. There are all sorts of numbers being generated about cows and I think a lot of them lack some qualities in terms of directness and relevancy to dairies. I personally get bored fairly quickly with numbers if I'm looking for, like the Marines, a few good ones. I do focus on average milk production per cow per day.

The Minnesota DHIA report is similar to most reports. It may be different than some but there is a section that refers to milking cows only and I think that's included on every DHIA report in the United States, but there are several columns there. If you look at the one difference from what you may be used to, the Minnesota reports the most recent test record listed on the top and ones that occurred in prior months go toward the bottom. I have a client that, in terms of milk per cow per day, the last month we saw 65 lbs. and 6-7 months ago there were 49 lbs. We have a dairyman that's fairly pleased with

## Answers to Your Questions About New

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THE MASTER PLAN FOR HERD HEALTH MANAGEMENT

Here are questions cattlemen and dairymen are asking about new 'CattleMaster', with answers by veterinarian Dr. Jack Hadley, Manager, Customer Relations at Norden Laboratories.

**Q.** Dr. Hadley, when you talk about a 'CattleMaster' Master Plan, what do you mean?

**A.** 'CattleMaster' brings together the major types of respiratory and reproductive disease protection you need... in the same vaccination. You immediately get the upper hand on whatever diseases you select. And you do it in a flexible program that's not only effective, but convenient and manageable. In other words, 'CattleMaster' gives you a Master Plan for herd health management.

**Q.** And part of this Master Plan comes from the use of three different vaccine technologies you mentioned?

**A.** Yes. By using the three technologies, we were able to pick and choose vaccine components to give you the best possible protection for each disease... with the greatest safety.

**Q.** Could you explain that a little further?

**A.** Let's look at some components in 'CattleMaster'. The IBR and PI<sub>3</sub> antigens, for example, are prepared by a patented process which produces chemically-altered, genetically-stable viruses. As a result, both components stimulate an optimum immune response and in tests were proved as effective as an MLV vaccine. And these components are as *safe* as a killed vaccine. The high level of safety was demonstrated in field trials; also in tests with pregnant cows and even through direct inoculation of unborn fetuses with the IBR fraction. All fetuses were normal.

**Q.** I see. Does this mean I can vaccinate pregnant cows, feeders and calves safely?

**A.** Yes... and the same advantage holds if you want to vaccinate a calf that's nursing a pregnant cow. You can pro-

tect the calf without fear the vaccine virus will "shed" back to the cow and cause her to abort the calf she's carrying. This same high-level safety makes it possible to vaccinate replacements, feeders... any type of cattle... without undue stress or setbacks.

**Q.** Yes... but what about the BVD fraction... that can be a problem, too.

**A.** It sure can. As you're aware, BVD is a frequent cause of abortion in some herds. So while you need to vaccinate, you need to choose your vaccine carefully. Independent challenge studies showed the BVD component in 'CattleMaster' to be protective. And we head off worries about possible vaccine reactions by using a new, killed BVD antigen. It's safe... so safe you can go ahead and vaccinate calves and even pregnant cows. This was proved in tests where cows in various stages of pregnancy were vaccinated with the 'CattleMaster' BVD antigen. There were no abortions. All calves were born healthy... and remained normal throughout the observation period. In addition, our component contains both cytopathic and noncytopathic BVD strains. The typical BVD vaccine is cytopathic only.

**Q.** What's the significance of this?

**A.** Having two strains may increase the range of protection. Furthermore, being inactivated, old concerns about vaccination of immunotolerant calves—that is, calves born to mothers carrying low-grade noncytopathic BVD

infection—can be safely laid to rest. There is virtually no chance of our BVD fraction triggering unwanted reactions in these calves. Or any other calves, for that matter.

**Q.** All right. Now, what about the modified live portion of 'CattleMaster'?

**A.** The modified live fraction in 'CattleMaster' is bovine RSV. Incidentally, this disease is being recognized more and more as a problem—not only for what it can do directly, but also for its ability to invite or trigger other serious respiratory problems. We chose MLV because it provides fast, dependable immunity against bovine RSV. This, too, is safe in pregnant cows. In independent studies, our bovine RSV component was injected directly into fetuses... with no abortions or other reactions.

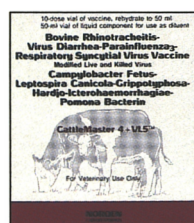
**Q.** How about the other components?

**A.** You're probably familiar with our 5-way lepto and vibrio fractions. They have now been used successfully in millions of vaccinations. Interestingly, recent independent tests show the Norden lepto fraction is effective against both genotypes of *L. hardjo* as well as the four other major kinds of leptos. This was shown in a recent study—a world's first with *hardjo*—and is further evidence of the strong lepto protection available with new 'CattleMaster'. The vibrio component is well known and was proved highly successful in challenge studies by Colorado State University as well as in many years of field use.

**Q.** I see. And this helps explain the "Master Plan" you promise with 'CattleMaster'?

**A.** Yes... When you consider the technology of this new product... the high level of efficacy it provides... the convenience and safety... you will agree 'CattleMaster' is a generation ahead in herd health management. *It's available now, so be sure to ask your veterinarian for 'CattleMaster' the next time you vaccinate!*

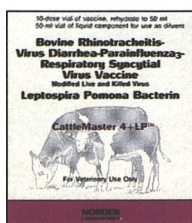
## Draw Your Master Plan with CattleMaster™



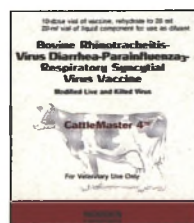
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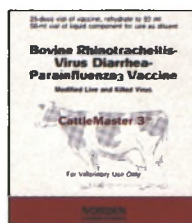
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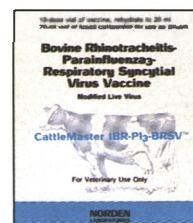
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CattleMaster 3



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Now... Norden's 'CattleMaster' vaccine provides a Master Plan for controlling major Respiratory/Reproductive diseases with a single syringe.

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'CattleMaster' represents a breakthrough combination of three basic vaccine technologies –chemically-altered, modified live and killed. For the first time, each vaccine component has been selected strictly for top performance, regardless of antigen type. 'CattleMaster' components are fully compatible – working together to give you outstanding protection against each disease you select... with safety and convenience. There's no loss of efficacy – whether you select four, five... or all ten antigens in combination!

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'CattleMaster' makes life easier for you... and your cattle. There's no need to fill and juggle an armload of syringes. No need to work cattle at different times and set up undue stress. 'CattleMaster' puts you in charge. You pick the time and the protection – including diseases you may not have vaccinated against in the past because it was "too much trouble." And you vaccinate on whatever schedule works best with your management.

### Masterly Performance

'CattleMaster' survived tough tests in laboratory and field usage. Including independent challenge tests of our killed BVD component. Every compo-

nent did its job – and the tests showed no loss of efficacy when components were combined.

### Maximum Safety

Tests with 'CattleMaster' showed no unwanted reactions under feedlot, range and dairy usage. Tests with pregnant cows showed 'CattleMaster' was so safe cows could be vaccinated in any trimester. There were no vaccine-related abortions. Calves were born healthy and normal.

### Masterful Combinations

Since 'CattleMaster' is prepared in six different combinations, it provides the cornerstone of a total herd health management plan. Your veterinarian can recommend which 'CattleMaster' vaccine will deliver the best protection for your situation – whether feedlot, cow/calf or dairy! Call today.

\* *L. pomona*, *L. hardjo*, *L. grippotyphosa*, *L. icterohaemorrhagiae*, *L. canicola*

### Draw Your Master Plan with These Cattlemaster Combinations

**CattleMaster 4 + VL5** (IBR, PI<sub>3</sub>, BVD, bovine RSV, 5-way lepto, vibriosis): Cow/calf and dairy operations where small, strung-out calf crops suggest vibriosis problem.

**CattleMaster 4 + L5** (IBR, PI<sub>3</sub>, BVD, bovine RSV, 5-way lepto): Ideal for dairy cow protection.

**CattleMaster 4 + LP** (IBR, PI<sub>3</sub>, BVD, bovine RSV, *Lepto pomona*): Feedlot calves, also cow/calf operations in preconditioning programs.

**CattleMaster 4** (IBR, PI<sub>3</sub>, BVD, bovine RSV): Ideal for cow/calf operations, feedlot calves and dairy calves.

**CattleMaster 3** (IBR, PI<sub>3</sub>, BVD): Basic protection for incoming feedlot calves, also dairy cows in production and weaned calves.

**CattleMaster IBR-PI<sub>3</sub>-BRSV**: Basic protection for cow/calf operations, also feedlot calves.

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FOR HERD HEALTH  
MANAGEMENT

his production. For purposes of clarity I've put the same information where we start in September and go down toward January on the bottom. Here again we're looking at 49 lbs. in December, up to 60, and then 63. If I were looking at this ration on the basis of raw pounds of milk per cow per day I would be fairly pleased, and my dairyman was pleased, yet there are other items that we need to look at here. The rolling herd average is very stable in the face of radical changes in milk production per cow per day. There are other items that I'm interested in here—the average days in milk (AVIM), for the herd as a whole. This refers to milking cows only and then the average percent butterfat. Pounds, days in milk, and butterfat. In Minnesota dairies we frequently see average herd milk run from 100 up to 220 days in milk—very common. You are all familiar with typical lactation curves. And the point here is if we have 49 lbs., we can find 49 lbs. of milk or 50 lbs. of milk on all different production levels. All except the 8,000 lb. herd. But 12, 16, and 20,000 lbs. of milk all at some point hit 50 lbs. The point is that, if we are looking at production on the basis of raw pounds of milk, and not adjusting for days in milk, we don't know where we are, because 50 lbs. can be at any of these levels, so we would like to have a number that will tell us which of these curves we are on. There are DHIA numbers such as mature equivalents which can be used similarly but they are based upon all of the lactation numbers generated in that lactation to date and do not reflect simply the changes in the last month. Persistencies work, but there you are dealing with an index number that implies, for example, if the herd crashes or does very poorly, and you get a 60 percent persistency one month, it's just been a devastating production. The next month it's the same, the persistency will tend to stay at 100 and everyone's fairly pleased. It's a confusing number and not very meaningful to dairymen. The point here is that we are looking in Minnesota herds at an average of 8.7% decline per month. It varies from herd to herd. But that's the average, or .29 percent per day, within this range of 100 to 220 days where our herds tend to lie. By making up a simple formula you can adjust production to standardized days in milk. In terms of a thumb rule, 9% per month or 3% for ten days. That is a very useful number to keep in mind when you look at production DHIA records on the farms. For example, on a certain record we were at 149 days and the last test was 152. They are basically the same. We expect production to be the same and indeed it is. We went from 59 to 60 lbs. and we think that's a fairly good test, technically a bit above. The herd butter fat dropped from 4.2 to 3.5. How do we adjust this? The fat can be adjusted to a standard level and those formulas are long and widely available. I prefer to adjust it over to a standard 3.5% butterfat for a standard comparison level from month to month. To show the example of how butterfat changes in terms of raw milk, I have parings of several milk weights. On the top I have 100 lbs. of 2.8 milk and the next one down is 80 lbs. of 4.2. Both of them translate over to 88 lbs. of 3.5. The next pair is 80 lbs. of 3.2 milk and 62 lbs. of 4.5 milk and they both are equal to 76 lbs. of fat corrected milk. These are significant numbers. Anyway, what it's come down to is the way I try to evaluate performance of rations to it, is to adjust raw milk and adjust it to standard days in milk and a standard butterfat. We now have a number where we can institute a change like introducing new proteins. We can introduce IsoPlus. We can introduce three times a day feedings, proper water supplies, all those sorts of feedbunk management techniques and suddenly we have a number that I think is relatively useful in evaluating health performance on a very short term basis. For those of you who have purchased these TI-59 calculators, they're gathering dust, you can program the formula

into a little card. It becomes a very quick and simple number to generate on a monthly basis. You can put the formula into spreadsheets. The other point is that the numbers have been useful for my clients. I have clients that are under a great deal of stress. They are running out of cash. They are looking at new techniques, yet they want a way to evaluate a change without suffering through it for a year. So the formula has worked.

**Dr. Harrington:** Our next panel participant is Dr. Sam Galphin. Sam graduated from Clemson with a B.S. degree and a DVM degree from the University of Georgia and then received a masters in dairy nutrition from Mississippi State and spent four years teaching at the veterinary school at Mississippi State. He is currently in a group practice in Apex, North Carolina, where he does exclusive food animal practice, which consists of about 6% ET and reproductive work, about 30% nutrition and about 20% herd health management. He currently owns and operates two dairy herds and he has another interesting in sideline, keeping up the Southern tradition of sharecropping, so he has 300 cows in other herds on a sharecropping venture. I was most impressed a couple of summers ago when I had a chance to ride with Sam in South Carolina. We visited a herd that he had started on just a little over a year before that at a little over 14,000 and that was the first herd in South Carolina that had just gone over 20,000.

**Dr. Sam Galphin:** I really feel the dairymen need us. I feel we are an essential link in the food chain, and this is one reason that I take so much time away from my family to help dairymen and their families. It is one of the driving forces that I have. With the droughts and the things we have experienced, the driving forces are not the pay checks! It's got to be something from inside the practitioner, so in 1979 I adopted this, or invented it, or plagiarized it, or whatever you want to call it, but I've simply been trying to live by this since that time. Not to belabor the point, it does keep me dissatisfied—that particular philosophy keeps me from being satisfied with anything. Every herd I have is a problem herd and because of that I'm always looking for a way to increase their production, increase their income and institute that economically significant change. Probably one of the bigger problem herds is my own herd and I'm always looking for an economically significant change there. I'm going to share one case with you. It's an unusual case, and then we'll talk about some standard feed bunk management things that I do in some of the larger herds. My average herd size is a little over 200 cows. So we do a little more group feeding and three times a day milking. The problem in the herd was death loss and increased bicarbonate consumption. I came in after the fact, so I don't have nice slides and pictures because all of the animals were in a trench by the time I got there! They lost about 12 cows during one week and as of today I'm not absolutely sure of the cause of death. It was a large herd and all the deaths occurred during one week. They were group feeding and the high cows were the ones where the death loss occurred. The recent change that had occurred prior to the death loss was that they instituted some new crop cottonseed that had been thoroughly tested over a period of a week or two weeks before I got involved. There was no aflatoxin or anything of a significant level. They had added at the same time free choice bicarbonate in all the cows' lots. Not just the high lots, but in all the cows' lots. All the deaths occurred in the high lot. The problem occurred about three or four days after the bicarbonate was added on a free choice basis and they were unable to keep bicarbonate in the feed bunks. Now I've got some figures on how much bicarbonate was actually being fed. They had a buffer in the ration and the buffer itself provided close to a quarter of a pound



of bicarbonate. They had a stress pack in there and the cows were consuming over a pound a day free choice. Now cows don't like bicarbonate that well. They won't eat a pound a day unless something is awry! That was the first clue to me as to perhaps what might be involved in the death loss, and of course the bicarbonate consumption preceded death loss by two or three days. What it turned out on examination of the ration, there was no salt in any of the grain mixes. It was all being provided free choice. The moral of the story is that the herd owner was trying to push the cows, as usual, and he had talked to three or four different nutrition consultants. One said, "Well if the butterfat is down a little bit and it is a hot summer put out some free choice bicarbonate." I agreed with that recommendation. They still have free choice bicarbonate in this herd today. The nutritionists or the company that made up the rations did not put any salt in the grain mix. They said let's feed it all free choice and by one quirk or another the cows were not receiving the ration on the paper. This is getting back to what the previous speaker had talked about.

There were three or four different rations at that herd, and what was happening, of course, the cows were not getting salt and they were eating this bicarbonate as a salt replacement. This is the only situation I've seen that happen, but in this group of 90 cows in the high lot, the consumption was well over a pound a day. The problem was getting enough bicarbonate. They went every way they could and hauled bicarbonate in and put as much as 200 lbs. a day in that lot. They could not keep the boxes filled. What had happened, of course, was when they put in the free choice bicarbonate, the only source of salt was removed. They just took the salt out and put the bicarbonate in, and had they done what we eventually did to solve the problem, they could have probably avoided the entire incident. Now I don't want people to construe that you should not feed free choice salt or that you should not feed free choice bicarbonate from this presentation. I tried to figure out some type of pathogenesis for the problem. I think there was a salt deficiency which occurred primarily in high producers which were secreting a lot of milk. The other herds did not have as much trouble. There was an over consumption of bicarbonate but no death loss in the other groups. How this created death loss I am unsure, because I came in after the fact, did no necropsies, and everything else had been tried prior to my getting there. Vaccinations were given for various diseases. Every feedstuff was analyzed for aflatoxin intoxication but everything was negative. All I did was go through records and they had excellent records. The cows overconsumed the bicarbonate. The pH in the rumen was elevated rapidly and could have activated enough urease to create some ammonia toxicity. The pH elevation could have also caused the death of bacteria in the rumen and provided endotoxins for absorption, or we could have enough elevation in the rumen fluid, if bicarbonate consumption had been high enough in individual animals, to cause a metabolic alkalosis. Again I don't know which one of these or if all three actually did come to play at the same time. I really feel that maybe all three did, but keep in mind that the average consumption in that lot was over a pound a day free choice and it was getting about a third of a pound in the ration. I know that because the boxes were eaten clean, and it was still being done when I got there. They would feed bicarbonate and within two days it was all gone and they would have to find another 100 or 200 pounds to put out. Then they would go for a day or two without any bicarbonate or salt. You put it in there and it's all gone the first day. So individual cows were going there and the first one there could have eaten 20 pounds.

There was no way of knowing how much the individuals that died actually did eat. I want to point out that a pound of bicarbonate is not going to kill a cow but if an individual cow should go in and eat 20 pounds we don't know exactly what it would do to her. The solution—we split the mineral box the day after I went and examined the records and saw the records pointed to a lack of salt. Well the circumstances there together pointed to a lack of salt and increase in bicarbonate consumption which occurred just prior to the death losses. What I proposed to do the next morning was to split the mineral box in half with a board, salt on one side and bicarbonate on the other. On that day the consumption of bicarbonate went back down to about a normal quarter of a pound per cow and the salt consumption went back to what it was prior to the problem, about a tenth of a pound per cow a day. So we now feed free choice salt and free choice bicarbonate in the herd and have never had a similar problem and the bicarbonate consumption has been normal to this day. I do put the salt in the ration. In all my rations I feed it, but I allow them to feed free choice salt in addition so that we do not run into the same problem again. If someone should leave the salt out of the ration and the thing starts up again and I don't want it to be said later, "It was his fault because he didn't have salt in the ration." I do put salt in the ration also. The bottom line is, there were too many cooks and the person with the last say did not have experience with nutrition. The herd owner did not have experience with nutrition to realize that when he omitted one portion of the ration that it was not the ration on paper. The bottom line is to know what you are feeding. Someone there with responsibility has to be in charge of knowing what the cows are actually getting. There are a number of ways to do this. To know what I'm feeding, these are some of the things that I do. These are not just what I do, it's what all of us do in one shape or another. We monitor intake. We know what dry matter we're feeding the cows. We try to know what dry matter we're feeding. All of us have to be on a farm during feeding time to be sure this is what is happening. We monitor intake of both blended and free choice ingredients, such as the free choice salt or bicarbonate. We must know what these cows are getting. Another point on the free choice ingredients, you must monitor hay consumption. This is important in milk cows but it is extremely important in dry cows. If they are not monitoring hay consumption and cow numbers change, then you are going to end up with abomasal displacements and milk fevers, etc., because the cows will favor silage and grain mixes before hay, so be sure you monitor all feed ingredients, the intake of all feed ingredients. The other point is to make owners aware of use rates. The easiest thing to work with there is the mineral. Have him count bags, know how long they should last. If he does this on a regular basis he can find problems. I have one large herd that is milking about 400 cows and the butterfat went to nothing one month. He lost his butterfat hauling differential boost that the plant gives and it turned out that the man feeding the cows got tired of waiting on the haylage to run out of the silo, got tired of dumping all those heavy bags up on top of the mixer wagon, and he put in what he wanted to put in. The only way we could catch him was to have his wife who also worked on the farm mark the bags of minerals and found out they were not running out right. Then we were further reinforced that this was a problem when the haylage lasted about 4 months longer that it should have!—so make sure that everybody is aware of use rates. It is the easiest monitor on the farm for what cows are actually getting fed. Monitor the percent dry matter and wet feed. Everybody is aware you have to know what dry matter percent is present, particularly in your succulent forages. These will change. As

you go into a silo, more often you have to monitor the upright silos on a more regular basis, particularly if they're open top, than you do the bunker silos. But monitor them on a regular basis, analyze the ingredients, know what you're feeding. Feed for nutrient allowances, not just the minimum requirement. You have to challenge the cow somewhat. We won't get into that but we must feed for nutrient allowances rather than just requirements.

On three time a day milking, and I see this maybe a little bit more than some of the Northeastern people, and group feeding, you must be aware of body condition. If you allow the dairyman to encourage you, allow the dairyman to cut those low producers back to the level of milk they are actually producing, you're going to reduce their body weight during three time a day milking. The next lactation they will not milk the way they did the previous lactation. You've got to dry these cows off in good body condition in order to get milk the next lactation. It is a particular problem in the Southeast when these low producers are not being fed enough and they also have a depressed intake from the summer heat—so body condition is important. Have experience with the ration balancing program you're using or have someone check your work. I do just like everybody else, I use other people's programs. I am not a computer whiz. I have been using one program for many years. I have a lot of confidence in it. I know how to monkey with it and make it do what I feel it needs to do, so I have not gone to a lot of trouble to get expensive equipment and high priced programs. I am scared of them because I do not have any experience with them. When you are stealing something, know what you are stealing.

You need to formulate a balanced ration for all nutrients. Don't assume that commercial products provide everything. They make mistakes also. I've been involved in some lawsuits and they make mistakes just like we do. So go back through all nutrients periodically. Quality control should be a big part of your ration program. Monitor milk production, butterfat intake levels, complete feed sample analysis. If taken correctly it's a fairly good monitor. The health of the herd is a good monitor. Ration costs, periodic ingredient analysis, especially the forages, blood work (question mark). I'm not sure I believe blood work is the best monitor, particularly at different times of the year. I know in the Southeast this year the heat and drought were so tremendous that we got 80% at best of our predicted dry matter intake. Any time you take blood samples under those conditions you are going to find shortcomings in blood values. Regardless of what the ration is built for, if the cows don't eat it you can't measure it. Beware of possible feed damage—toxins, etc. We have found a lot of nitrates in Southeastern forages this year and mycotoxins. We've had farms with commercial feeds that have had a high level of toxins that caused an abortion storm in the lactating herd. They've already paid the dairyman for the problem. They didn't even question it when the laboratory work came back, so periodically when you have problems with health, or whatever, go a little further, test for toxins, etc. Don't forget other management tools, through space, fresh feed, feed mixing order. Some mixer wagons have pockets near the doors. If you put grain mix in first they will not blend with the silages and you can have two or three cows periodically that will show a diarrhea or acidosis problem from knowing that the first feed out of that wagon is high in grain and she'll go down there and eat that every day. Be aware that mixing order in some of these mixer wagons can cause feed problems, a delivery problem or feed bunk management problem. This summer the heat and humidity in the Southeast was tremendous. Some of the herds in South Carolina experienced 60 days in

heat of over 95 degrees with humidity about 98. There were 20 days in a row that were over 100 degrees! When you pack 200 cows into a holding pen to be milked twice a day or three times a day with that kind of heat and humidity, they will not eat, and it is best to look at environmental stress as one of the problems with the ration intake. Not the ration itself, but split these groups into smaller groups, place fans in, sprinklers. I know I personally installed sprinkler systems and fans in herds this summer. I got out there myself with nails and hammers and helped hang them up. It made a big difference in those herds that were able to do it and did it in time. If you wait until the cows are stressed they don't recover. It has been a severe problem. Of course mastitis is another big problem. I use a DHIA summary sheet primarily. The dairyman has information at his farm. He can look at it himself and I write on it. Month to month I go there and I say these goals are what we are looking for, and I write on the sheets. It is simple for me and it is being generated by input that together we give the DHIA. The monitoring programs are excellent tools, however most of the dairymen that we have in our area would get lost on a lot of those, so we stick with some of the key or primary things on DHIA.

**Dr. Harrington:** Our next panel participant is Dr. Tim Lesch. Tim graduated from Michigan in 1972, spent a few years in practice between California and Maryland and then did some post-graduate work with Dr. Fred Troutt at VPI working in the area of nutrition. Currently he is operating a mixed practice with his wife in Bellville, Illinois.

**Dr. Tim Lesch:** I'll just give some nutrition practice tips and a couple of practice tips. When Sam was talking about the problem he had on this one herd and I hadn't seen this or even talked to him about it at all, I've got one real strong recommendation that I hope everybody does take home! **Free choice bicarbonate always with free choice salt.** Just like always having free choice water. Those are some constants. One thing I've seen a couple of times and I would almost bet this was also a contributing problem in this one particular herd, when you start feeding byproduct feeds, it helps to get into the byproduct feed manufacturing and processing a little bit because one thing we've seen with cottonseed a couple of times has been arsenic. There is an arsenical compound that is illegal to use, it's a defoliant, but when cotton prices are down and you have to get cotton off and you don't have any money and nobody maybe checking, this one particular defoliant will be used and you'll end up with high arsenic level in the cottonseed. And when you feed that cottonseed, and you always see it with the new crop cottonseed when cotton prices are low, you'll get this exact same problem. Everybody was getting fed exactly the same feed and one group ran out of bicarbonate for example and the others didn't and we had a *Clostridia* type problem. You end up with diarrhea and you lose cows. All I'm getting at is the byproduct feeds can sometimes have some problems just because the original manufacture was not to make cottonseed but it's to produce cotton. So if you're really strapped you may use something that is an illegal product because it is cheaper. That is just one little aside, so it is really helpful to learn your byproducts. Once you do, like in our area in Illinois we grow a lot of corn, of course, and we have some alcohol plants and one thing I've really started to use a lot of because it's extremely cost-effective in our area and increases the income over feed very effectively, is wet distillers. Once you get into learning the byproducts like we use it in, actually even use it in our liquid hog rations and our total mixed dairy rations, as an example, and it's just an excellent feed stuff. Just looking at nutrition in general, the one major factor that needs to be

above all others is income over feed cost. That is the one thing you need to monitor, and that is a thing that you can show increases in the effectiveness of any nutrition program, or if you screw up, decreases! Milk production, everything, is always related to income over feed cost. The thing about water availability, water is probably the most overlooked nutrient of all. It is the cheapest and probably has a greater effect on dry matter intake than any other single nutrient. If you decrease water intake, dry matter intake will decrease, or conversely, if you can do anything to increase it. A couple of things we've done that for us have been real successful is that in all the dairies, having a water supply available immediately after the turn line to have either a tank, or better yet a Richey waterer or something on the order that would not be a large volume of water setting to get stagnant, but we put water meters in a couple of the dairies I work with to try and assess the effect of different changes in water supply. We put water inside the parlor . . . just let me give you a little bit of history. We had this one particular dairy at 60 lbs. right now, and we started at about 50-52 lbs. We just kept making a little change at one point and tried to assess the effectiveness. We put a water tank outside the parlor, the biggest water tank we could get and put a water meter on it to try and get a measure. A week after we put the water tank outside and put a water meter on it we increased our production just above two pounds. It was fairly dramatic. Obviously there was probably not enough water availability in that particular situation to start with. But if you look at most dairies you only have one or two waterers in a group of 50-60 cows. That's generally the way it works. It is really interesting. All the cows come out of the parlor, the whole group stops there and drinks and the tanks we put in are big enough so one side of the parlor can drink. Every time they come out we get about a ten gallon intake. Just taking that a step further, you've heard people talk about it and you think, it would be obvious that another logical extension would be to put water inside the parlor. So we modified the feeders. It was not a very expensive thing to do the way we did it. We put the water meters on there to find out what happened, and we only had about a gallon intake in the parlor. It has been that way ever since and I have talked with several people that have done exactly the same thing and they had exactly the same result. I don't know why, but they will not drink the water inside the parlor like they will when it is outside the parlor. It is a whole lot cheaper to put it outside so a recommendation would be, put a tank outside the parlor for those cows to drink and keep that water clean. A real easy way to keep the water in these tanks clean is to put some bleach in the tank a couple of times a week. The tank will be clean enough to drink out of. If you have the ability to put a chlorinator in the system which all the hog farms I deal with have done, keep about a 3 ppm free chlorine in the water and you will increase their water intake by higher quality water. I know we can do it on our hogs and since we have started using water meters a lot more, I really recommend people start using water meters. We are talking about dry matter intake all the time. Very few of us think in terms of water intake. You must have a water meter to check it. They only cost about \$30. The information you can get off the water meter is very interesting.

Another thing that has been researched, especially in Michigan, has been the effect of light. In this one particular herd I deal with they're sort of nice because you only mention anything and they will try it and they have fairly good records. One thing we ended up doing was putting some mercury vapor lights over our feed bunks to keep it light at night, because looking at most of the research you need about eighteen hours of light a day. If you increase your light to 18

hours a day you will increase your growth rate of heifers. We also had about a pound of milk increase just by increasing the feed intake due to those lights. The cost of the lights was insignificant. It paid well for itself. Another little thing, this has to do with cow behavior, I'm just giving some nutrition tips here, is that one of the major advantages of the California lock-out systems is not necessarily just in the ability to lock the cows up, but in that it prevents any particular cow from hogging a bunch of bunk space, because she can't move, she can't slide up and down the bunk, and it is especially important when you have a high amount of heifers in a herd. Another recommendation I have made and it has really worked out well is to put dividers on the bunks; just bars going up and down the bunks and you cannot have a boss cow dominate a bunk, especially scaring those heifers away. The results will be an increased peak milk generally in heifers. That's another real simple little tip. For the people with stanchion barns, the feeding order is very important. Always be sure to feed your roughages first, and then your grains. It does not sound like much but you would be surprised at the difference it will make in production both in intake and fat test. In some herds that would just make sure they would feed their roughage, the silage and the hay, before they feed their grain, just that little thing. And just taking that a little step further, it's the grind on these grains, let's use oats as an example. I'm a big believer in high fiber grains and oats is one of those magic feeds, but simply grinding that same ration verses having a rolled oat or even cracked corn verses ground corn will make a difference in the fat test and the stability of rumen fermentation. So feeding order and the consistency of those feeds are a couple of things that are real important to remember. Another little tip is on forage sample, we're talking about the analysis all the time. Everybody has microwave ovens now, and for the people that are using the total mixed rations, which is where the dry matter is much more important than the people feeding by volume, one scoop full of haylage, or one pitch fork full, or one bucket full of haylage or corn silage will tend to have approximately the same amount of dry matter. They may be different weights but they will be a lot closer. If you were feeding strictly by volume, your attention to dry matter is not nearly as important as when you are switching to total mixed rations. You are talking about weights, then you'd better be really cognizant of your dry matter in these roughages. Since everybody has microwaves now it's real easy for anybody to dry matters at the house. In fact that's the way we do it. I just use a paper bag, cut it off so you can have some room, stick about a quarter of a pound, roughly, you weigh it going in and turn it on low and it takes about 20 minutes. You dry it down without burning it. You can weigh it before and after and that's pretty simple. For the total mixed ration people that's a really important thing to do. Most of the people will just do it in the house now and it is pretty easy. If you don't do that it does not take very much of a change, especially in the upright silos when you go from a haylage let's say that has been harvested at a fairly wet moisture and then you go to one that is at a fairly dry consistency and you keep the same amount of pounds of that dry one going in as the wet one and you'll end up with a less dense ration and you'll end up having a lot of problems. But this dry matter is very important on total mixed rations and it is real easy for anybody to do. Another thing on forage sampling, a lot of people hate to take forage samples because of the physical labor involved. I use a chain saw with a drill adapter on it and it really is neat because it makes it so easy to go into these bales or bunks or whatever you want to go in and you can make quick work of forage sampling. It is very easy to do. You can get these adapters at almost any place that



handles chain saws. It just makes forage sampling really easy and if anything's easy it tends to get done. That is just a generalization.

**Dr. Jenks Britt:** I want to ask Ken Norland, I practice in West Kentucky and West Tennessee and we have no consistency in our butterfat samples coming back from our state DHIA labs. Tennessee samples go to Virginia, so I would expect Virginia wouldn't have any consistency either. Do you use your DHIA butterfat test, or do you use your milk plant test? I have two other questions while I am here. The second deals with clients that ask, "we make a feeding change and we see more grain coming through the cow in the manure. Is that a significant problem?" The third question I have is if any of you have some comments on electronic feeders? or electronic disasters might be a better term!

**Dr. Norland:** On the first question regarding butterfat, whether I use plant or DHIA, I use the DHIA numbers. I understand that this formula has been developed in the Southeast I think because of some complaints. Dr. Ken Braun says that they have removed the butterfat component from that formula and that it may be instituted after DHIA has looked at it for awhile, a year or two, yet in my experience with small herds management changes in terms of total grain going in sometimes changes dramatically. They just feed more aggressively, handfed cows. We do see these butterfats that move from 3.3 to 4.0 in a single month and it is reflected in the plant milk as well. I personally have a greater degree of confidence in butterfat than I'm sensing you do, Jenks, in the Southeast, yet I feel that butterfat is an important part of my nutrition work in the sense that very frequently the rations that I institute are dealing with fiber problems. Overfeeding of grain is very common in corn country. Sometimes I'll introduce a ration change and milk flow does decrease. I hate to be judged on that totally. I usually get butterfat increase with that. The formula is designed to pat myself on the back. The other question about grain in the manure I think is related to the comments I just mentioned. Overfeeding of grain is a very common problem in the corn belt. One of the common problems I see in small Midwestern dairies is well schooled dairymen. They have heard for about 10-12 years that we have got to deal with the negative energy balance of fresh cows. Dairymen know what to say. A very useful technique in stall barn herds is to find the cow, whether you're doing a herd check or whatever, and she may be in ten days after calving and you walk past her and you may ask how much grain she is getting. There are a lot of dairymen that push cows on grain so fast that it is not unusual to find in my country 35 pounds of high moisture shelled corn in a cow ten days fresh. They'll eat it; it's a very attractive. With major reductions and with tremendous amounts of grain coming through, consider the problem. The other problem is that I see a fair amount of barley and high moisture barley and with the hull on barley that has to be processed specially, particularly if it is going in and mixed with other grains it almost has to be processed separately to get an adequate crush barley comes through very easily. The other comments about electronics I would like to refer to someone else.

**Dr. Sam Galphin:** I've had a little experience. I just gave a deposition in a court case concerning that. The electronic feeders will work. The problem is right now, I think a lot of the people that are selling them and putting them in do not know enough about cow flow at that particular farm to do a good job, and they don't have enough instruction on how to set them up and install them. If you are looking for recommendations on putting these in or handling them, the first thing not to do is put your feeding stations in your holding pen. All the cow's concerned about when she's in the holding pen is going in the barn, just like the water consumption. They are not

going to consume feed in that holding pen when somebody comes out every two or three minutes with a stick running them in the barn. Of course this is going to vary from one herd to the other, but they are not going to walk up into this little metal trap with somebody coming out of the barn running other cows in. If the only time they're exposed to the feeders is in the holding pen, and this is what was happening in the herd I was talking about, the only time they were exposed to feeders is in that holding pen, you are not going to get feed consumption. The other thing that I've run into twice with computerized feeders is that the feeding rates were set too low. I had one place that feeding rates were set to the point that they were feeding something like 2/10 of a pound a minute and a cow had to stay there almost an hour to get her daily intake. That meant if you are feeding 25 cows at that station, somebody was going to be shorted if you're going to feed 20 pounds of grain per cow. If you feed more than 20 pounds of grain it is physically impossible for cows to get their intake, and that is if the feeder was used every minute during the day. So make sure the feeding rates on these machines are correct. If I am not mistaken all the feeders on the market are set up to feed so many pounds, but it is on a volume measure. It is not weighed, and there is a little timer in there. You have to put in how much the feed weighs per unit of volume, and then it calculates, of course, the number of pounds per minute. I have had one problem with the scales sent with the computer feeder from the manufacturer. For three months these scales were not accurate. Every time they went out and calibrated the scales of the feeders, and this was in a large herd, some 280 cows, for the new batch of feed, they were doing things correct. They calibrated the scales again, or the feeders. Every time they calibrated they did it wrong. And he happened to step on this himself. I don't do the nutrition program at that herd. I was doing reproductive work and the problem was brought to me. My client happened to notice the problem himself when he was putting out oats one day with his feeder and he got through with half a feeding and all his oats were gone. He said "I had my feeder set putting out two pounds per acre, whatever it was, two pounds per acre rather than one pound per acre, and he went back and got the scales and went to a local grocery store and put it on the platform scales, those things were off by at least 25 percent. He had been doing this incorrectly for three months, so the electronic feeders have their own set of problems. If you have people in your area using electronic feeders, look for some of these problems. The most common is improper placement of the feeders. You have to have them on the exit alleys, in an uncrowded, unimidating spot for the cow and it should be close to a water source or source they go to on a regular basis without being driven into a lot to get consumption of it.

**Dr. Harrington:** Arden would like to comment on the grain in the manure.

**Dr. Nelson:** Getting back to the three rations that exist on every farm. As a veterinarian, if you are doing rectals on a farm you have the inside track compared to anybody else when it comes to grain in the manure. There is nobody else as intimately involved with that cow as we are. The only point I want to make about grain in the manure is that it is a terrific way to get your foot in the door to talk about rations. You don't need a computer, you don't need an ability to do rations, just a little bit of understanding about what is going on in the cow. In our part of the country we see high moisture corn coming through the cow. We want to think about things such as forage intake, but a lot of times if you look at that corn and you have whole kernels, you can decide whether it is high moisture corn or

corn silage if both of those are in the diet. Sometimes it is as simple as turning down the roller miller a little bit if it is high moisture corn to get that cracked a little bit finer. Some of these things are very simple and all we have to do is set our mind so that our eyes and our fingers are looking for those things. We don't see anything we don't look for.

**Question:** I'd like to ask the panel if they have had any experience feeding whole shelled corn to the replacements on the farm. In our part of the country, getting back to Tim's point about profitability, they are paying \$20 a ton just processing charges. Can we save that kind of money where we need to basically supplement energy to our young stock by feeding them whole shelled corn? Can they handle it without terrific losses or can they handle it without big palatability problems?

**Dr. Lesch:** I do some beef work too and a common system for feeding a lot of beef cattle in certain areas is a whole shelled corn system. It's a whole shelled corn mixed with a pellet of an appropriate size and it won't separate out and these are fed in free-choice feeders. For beef cattle it is not really a bad way of doing things and actually the whole shelled corn has more effective fiber. It is really a decreased rate of carbohydrate solubility in the rumen because it is protected by the shell on the corn rather than being ground and it does not work very bad at all. The only problem that you have to remember is that in order to feed it you have to be able to mix in your supplement. If you were going to mix your own with soybean, etc., it needs to be stored or mixed very frequently because it separates so bad and you can't feed that in a free choice feeder very well. The bottom line as far as feeding whole shelled corn is that it really works pretty good. There is an awful lot of beef cattle that are fed that way, especially out on the Plains, and there are a lot of commercial pellets that are formulated so that the pellet is the same size. It is the large pellet the same size as the corn so you can mix the corn and the pellet together and feed them in free-choice feeders even from feedlots. It is rather an expensive way to do it but it is something that works.

**Question:** Extreme wet fall, 18-30 inches of rain in 30 days, corn silage put up very mature and dry, all corn grain mature and whole in silage, what is utilization when there is all whole corn in manure? What can you do to correct the condition? In effect, it is over dry corn silage.

**Answer:** In practice, for the dairy cow we have high dry matter intakes and high throughputs put and we have a rather lower retention time compared to lower dry matter intake. Having this unprocessed corn can be a problem. The only way I know how to increase the digestibility of the corn silage at that point is to run it through a roller mill and there are roller mills made for handling corn silage. One firm makes one that's probably sort of a defacto standard. And it does a pretty good job. In practice if you could handle most feeds, most grain and corn silage through the roller mill that would be dry, it would increase digestibility. That's the only way I know how to do it, namely to increase the digestibility of the corn grain itself. Ammonia being added to corn silage to increase the digestibility of the fiber but that is a little bit different situation. There are not a lot of those roller mills being used on corn silage but those people that do, use them a lot. You have to have a big roller mill, though. You have a lot of feed going through them.

**Question:** The feedbunk is a little bit small and there are many cows. The question is, if you were to purchase a microcomputer program, which one would you buy?

**Answer:** That sounds like a cop out to the person that asked the question. There are a lot of programs that will do a very adequate job

for 99 percent of the problems out there that cost next to nothing. The most important that is what Sam alluded to before and that's to get a program that you can use and you understand. And when you are in the process of learning it you have somebody to ask, exactly how does this program work? Because what you'll find is, the easier the program is to learn, the sooner it wears out its usefulness if you are using it every day. A correlator to that would be that you have to understand what the program's worth and what it is not worth and how to cheat in a sense. If you get an answer you don't like, how are you going to fix it so you can get another answer? I think having a computer to do the rations is probably the least of your worries. With a four function calculator, as a veterinarian on the farm, if there are some analyses there you can do a tremendous amount to fix some of these problems and it doesn't have to be down to the 9th degree down on a piece of paper. If somebody afterwards wants to ask individually what programs we're using I think that would be fine, but there are many, many good ones.

**Dr. Galphin:** I have a real good question. Following up this summer's heat in the Southeast, it says do you increase the nutrient density in heat stress periods and I say, yes, I do. We have tremendous dry matter intake problems when it is hot and humid in the Southeast. If you're not monitoring dry matter intake you are going to get caught. You need to be sure that these cows, if you project they're going to eat 90 pounds as fed, then they need to be eating close to 90 pounds as fed. If they're eating 70 pounds as fed, the nutrient density is going to have to be increased in order to get the protein and energy in them. There is a line that I personally will not cross as far as fiber is concerned in increasing the nutrient density. This will be different in different areas. If you are experiencing cool nights and hot days, this will be different than when you're experiencing hot nights and hot days. So some of the things we do, we lower the fiber and increase the energy in the rations. We increase the protein slightly in the ration. What we try to do when we are looking at heat stress, will deal with these percentages as we want 17 percent protein in ration or 16 percent protein in a ration. We will accept those in cows that are eating what we project. We'll just monitor percentages a lot of times. But in the summer time we have to go back to that thing that the cow makes milk on pounds of protein and megacalories of energy. And if we're not getting enough intake of the total ration that our percentages will work, then we have to go back and say, well, they've eaten 70 pounds at 16 percent protein, then we're so many pounds short on protein. Then we start boosting some of these nutrients to increase the nutrient density of the ration to account for what dry matter is not being eaten, and we go back to the pounds. They're not really making milk on percent of protein or megacalorie per pound of ration. They are making it on megacalories of energy and pounds of protein. So we go back to the rule that we try to get back to the basics of what they are really eating and not what we say they should be eating. Also we increase the number of times that we feed. We try to feed later in the night, early in the morning, and even though it is inconvenient we also try to put shades over the bunks, sprinklers, and fans to encourage the cows to come to the feed trough. We've got to do anything to get intake during that period.

**Question:** Electronic feeders. How many meals a day do you feel would be best?

**Dr. Galphin:** Again, it's a cow flow problem of the herd. If anybody puts one of these feeders in without going to the herd and seeing the cow flow, they are going to do it a disservice. To just make a blanket statement, you need 16 feedings per day, the cow has been

getting along with two feedings per day, if she's been eating grain in the barn. I would like to increase it to at least four, but, if you can increase it to 16 you would probably be better off. You need to work it so that you get the most feedings that you can, but you have to get that intake in a cow and you need to monitor it. Of course, the computer's set up to do that. If you find out after two weeks that the cows are not doing it, we've had some tremendous problems with some of these feeders. You put them in the wrong places and you end up having to push the cows in with ropes and they won't go in those little traps if they are in the wrong place, so you bring them on gradually, you put them in a dry cow pasture and make sure that is the place to introduce to them and they know what they are when they come in the milking herd. These herds do not work overnight and cow flow at the individual farm is what you have to pay attention to. As many feedings a day as we can get would be ideal. I like to see a minimum of four feedings.

**Question:** In family dairy farms where they grow all feeds except supplemental protein, how do you figure income over feed cost?

**Dr. Nelson:** Calculating income over feed cost has been built up as something that, if you're doing nutritional work, you have to do. I may be in the minority here, but I have not found it to be a particularly useful number because of these questions. My clients are not that concerned about it as such, but there has been this idea that somehow you calculate income over feed cost this year and you watch it for several years and yet what really happens is that a year and a half or two years later the price of milk has changed, the price of production has changed, and the price of all feeds has changed. So you calculate a new number and you say, well, we have a new number here and it looks better or it looks worse but you have to remember that the price of milk went down, but then the herd's doing better but the price of soybean is down, and... it really doesn't mean much in my situation. On the other hand, I do think it is useful in a very short term basis if we are going to evaluate a new product or a new bypass protein or something like that, and establish it before the program begins. If you are purchasing only proteins and say, we're looking at a new protein or we are looking at IsoPlus or something else, then I think we can set up the ration as it has been and as it is going to be, take current prices out of several of the journals, list current hay prices, current commodity prices, and you can simply put those in and then put in the purchase feed prices and watch what happens to production and feed cost over a one or two month period. I think in that sense it has been useful, but the idea of calculating it year after year for my clients and making something out of it has simply been, in my experience, something you can talk about how tough times are getting.

**Dr. Galphin:** I'd like to comment on income over feed cost. We purchase all the feeds at my farm. It's an important figure to me but I don't do much to control. I can't. We have to buy the feed. The best thing I can do is try to buy a cheaper source of cottonseed or whatever to affect mine. The income figures just recently have been affected more by politics than they have anything I've done in the herd, so I monitor closely in my own herd, but I have some other dairymen that monitor a different range of things. They look at all farm feed costs and they try to limit that by increasing the amounts of feed they can grow for themselves. There are a lot of monitors and I think you have to tailor this to the production situation. It's important in my herd. It is not so important in some of the larger herds that produce a lot of their own forages. They are more interested in how the cash flow is going and how much they have to purchase off farm.

**Dr. Lesch:** Let me just extend that income over feed cost just a little

further than I did. It is more than just purchased feeds. For example, one decision we made with a couple of the farms in the last couple of years was involved in this income over feed cost. If you want to look at it, was using forage drying agents economically feasible? Was that a worthwhile thing to do? We evaluated that. In fact it would decrease our income over feed cost if we did use the forage drying agents because of the increased leaf loss and the increased protein availability that you end up getting out of the hay. So it is more than just figuring purchase feeds. A *question is*, what do you think of chelated minerals? Do we use them and what guidelines do you use? Chelated minerals basically are microminerals which we are primarily talking about, chelated to a protein source. The whole purpose of it is that when amino acids would get absorbed or go through the intestine they would carry those minerals through so you don't have to compete with an extra mineral absorption process. That is the logic behind it. The big ones that are really on the market they hear a lot about would be Zinpro when they look at the chelated zinc. How valuable they actually are for the bulk of the feeding systems situations I really can't say. I use them because we use A and I products which have a lot of chelated minerals in them and I have a gut feeling that in high production dairy cows, incoming feeder cattle, and starting hogs, they probably play a role. After that I don't really know. There's not any real good research that I know of and I've been talking to the people at Zinpro, it's really hard to do this mineral research. The bottom line is, I don't think it is probably as big a factor as some people may have pushed it in the past, especially if you have high enough levels. We are talking about zinc as an example, high enough levels of that micro-mineral. Another one that is probably real important along that line is selenium. The chelated selenium or the natural selenium sources appear to be a lot more available than like sodium selenite as an example. There's a lot I don't know but I wish somebody had all the answers. But in general use, to use chelates or not use chelates, I would think that if you have your levels high enough you would probably be economically efficient and it would not be necessarily using the chelates.

What causes this butterfat protein inversion? In effect, we're getting a real low butterfat in relation to protein. Most of the time your butterfat problems will be related back to the viability of the bacteria in the rumen that produce the acetic acid, which is what makes the butterfat. When you look at things that disrupt that, for example, if you're feeding high fat, those long chains actually act as an antibiotic, upset the rumen microflora. It is like feeding Rumensin. You know you can drop down to two, 1½ percent butterfat fast when you get over 5-6% fat in the total ration because you are upsetting the acetate-producing bacteria, so all I'm getting at is this, is he looking at an antibiotic or a microflora modifier like the fats or the ionophores or real low fiber, of course, which increases the amount of soluble carbohydrates which is what the propionate producers really like? That will all cause a real low butterfat and if you have enough bypass protein going through, then you will keep your milk protein up and then you will get that inversion. The other question is that we also have to be concerned about protein in the milk and that is going to be more important in the future. Most of the time it is related to the amount of protein that probably is absorbed post-rumenally. We talk about bypass protein a lot and there are some situations where you would be feeding distillers whole seeds, high bypass protein sources, and you switch from a normal corn silage, alfalfa haylage-type of system to a real dry haylage, all dry hay, and you may, in fact, have some deficiencies in rumen-degradable proteins. It is probably not going to happen in most



situations, but when you would get to that point it would be advantageous to be having some extra rumen-soluble sources. In practice, soybean is generally fairly soluble.

What's new in the area of bypass proteins? I'm not an expert on it, but in practice probably the biggest new thing is that everybody is using a lot more of the byproduct feeds that you can use in the total mixed rations or you're using a lot more distillers. We are using at least four pounds of distillers which is one of those magic feeds in my book. In my particular case I'll take liquid distillers over dry distillers because I don't believe the protein has been degraded at all since it has never gone through the heat.

**Question:** Proper bunk height. Do you get an increase in saliva production by using bunks at ground level?

**Dr. Lesch:** I can't say that I have personal experience that having the bunk height at ground level will produce any more saliva production. From a management standpoint, it appears that if it were a little bit over straight ground level, 4-6 inches, in practice it's easier if you have a flat bunk, the feeds don't get as wet. It is more on your barn design. From what I have seen, it should always be 4-6 inches above the ground or you know where the cows' feet are. I can't say if you get any more saliva production.

**Question:** I have two questions here. The first question is, how useful is nutritional information on DHIA records, especially income over feed cost?

**Dr. Galphin:** My personal opinion is I never look at them. I gave them up about eight years ago because at least my dairymen and the supervisors we work with did not put emphasis on getting that right. I quit pushing it and I tried to get some other things right. If I were concerned about income over feed cost, we would wait until the end of the year and use the checkbook or the accountant's worksheet.

**Question:** What are your recommendations on protein level in the total ration relative to reproduction? The rest of the question has to do with the especially high producing cow and high levels of protein.

**Dr. Galphin:** There has been a lot of research on protein as it is related to reproduction, protein in the diet. It boils down to basically this. If you have excessive levels of rumen degradable protein, accompanied by energy deficiencies, you will have cows that will not conceive but we do not know why! But they don't conceive if those levels are high enough. A good thumb rule is that if you have a BUN, which is an easy test and most of us can run it in our clinics, on a cow above 23-25 milligram percent, that cow probably does not have a very good chance of conceiving at that breeding. What this really boils down to is, you need to have a repeatable system to balance rations for degradable on degradable protein. NRC requirements for dairy cattle will be coming out hopefully this year. The initial deadline was 1985. The committee on animal nutrition for

AFIA is really wrestling with that, with the protein system. We would have the requirements if it were not for the protein system that is being discussed. Research is not complete and we will probably have a new protein system to use. Once we do this, I think we'll gain a true appreciation for the more immediate effects of nutrition on reproduction. I have seen this in two herds so far where the excessive degradable protein levels were causing cows in the high group to not settle, period. Once we start applying some of the science and a lot of the art that we have when it comes to feeding protein, we can help that situation. I think it is really nifty that we can feed a cow today and it will influence her reproductive performance tomorrow! Finally it is a close one on one relationship between nutrition and reproduction. It's not this feed the cow today and six months later you reap what you have sown in terms of nutrition. It's an exciting thing, the answers are starting to unfold, and the BUN test is a quick way to monitor that. I have given some thought to incorporating that into a total monitoring program for these herds where we're really pushing cattle. And that would simply be pull some BUNs when you're there and have the dairyman pull some samples on those cows when he breeds them. I think as long as we don't get carried away with it, it can be very useful.

**Question:** . . . on amounts of water intake.

**Dr. Lesch:** A general thumb rule is that roughly the cows will consume 10-15 times as much water as they produce milk, depending on the weather condition. It would be interesting to see how much information you will get if you put water meters on, they're so cheap. It depends on how you have your water supply system hooked up. Another question had to do with the availability of first limiting amino acids like methionine and lysine for example in bypass proteins. Just a general recommendation here that has served nutrition since the early 1900's, that is, the more feedstuffs you have in a ration, generally the more successful those ration will be. It is more important in this bypass protein business because we are talking about what is the first limiting amino acids?—like methionine with milk production, and lysine, and we are talking about these bypass protein sources being absorbed. We are really talking about amino acid nutrition. We have to be thinking more in terms of hogs. Once you are past the rumen you just switch species, and all I'm getting at is that anytime you have a mix of protein sources, most of the time we're looking at corn type byproducts or enhanced bypass soy products. The odds of your increasing the amino acid balance will be higher, so anytime we can use more protein sources or more feedstuffs the better it is. That is just a generalization that has held true for anybody feeding cows for a long time, but I don't have any good numbers on it and I don't know anybody that does right know.