

Dairy Cow Nutrition—Panel Discussion

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Dr. Britt. I look at myself as a veterinarian sorting out nutritional information for myself and my client.

We have a four man general practice with about 80% large animal work. Part of this is equine, but primarily food animal, and about 20% companion animal. The clinic was built in 1957. About 30% of our large animal work is "haul-in" and we see about 10,000 large animals at the clinic a year. Our dairy practice has become quite spread out. The type of clients we deal with are primarily dairy clients that have 80 cows in a loose housing situation, milking cows in primarily a herring bone parlor with free stalls. We are in an area with a good rainfall, about 48" a year, and we double crop our land. That means we can raise small grain in the spring and then that land is planted with soybeans in June to the first of July and it is harvested in the fall. That land will possibly be in winter fallow and they put it in corn the next spring. Every other year we get two crops off an acre of land. That second year we get a crop. So we are in a highly productive agricultural area. You didn't realize that Kentucky had some land like that, but we do! Our nutrition work is primarily with our dairy and hog clients. We have about 18 farrow-to-finish units, which range from 150 to 400 sows that we do monthly scheduled visits for and we have about 60 dairy herds where we schedule monthly visits.

We started in nutrition because we felt there was a demand from our clients. We were not satisfied with the other areas of advice that our clients were given. At least if we were satisfied, we weren't satisfied with the time lag. We keep records in our office for our different clients and the nutrition file is the largest file in our office at the present. We are doing active nutrition consultation with 68 herds but we have about 130 herds in our file that we have given nutritional advice for. We do other things for our clients. Embryo transfer is a big part of our practice, but only a very limited number of clients will want embryo transfer services or specialized services. But everybody that we do work for feed their animals, so everybody is involved with nutrition.

Traditionally they have received nutritional information from the extension service. It is usually good but sometimes it is slow. The extension people are not always trained in

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total animal health. The feed company is usually good but sometimes it is slow and it is always oriented toward its own product. So, if you are getting nutritional information from a feed company, it is probably good, but there might be a 2-3 week lag between the time you request the information and when you get it. Also, the company is certainly going to utilize its product. Probably the real pros in our area are the ones driving up and down the road selling minerals and they probably had a two-day training course back at the home office before they started selling minerals! And, gosh, they've been selling it for six months so they can solve all the problems! This is exactly what we are trying to eliminate, namely, this wrong type of advice to our clients.

We think the veterinarian should be the person that is giving nutritional advice, for three reasons. First of all, he is on the farm regularly. Secondly, he is trained in total animal health. And third, through organizations like the AABP we can get good nutritional recommendations to pass on to our clients. I think when we are on that farm regularly we can supervise the feeding program. We call it feed bunk management. We can make a diagnosis. May be it is a mastitis problem. It's pretty hard to get production out of a herd with a 1,600,000 somatic cell count, no matter how good their ration. I think the veterinarian, trained in total animal health, should be the person to give good nutritional advice on the farm, do a laboratory diagnosis of farm problems, or maybe it is just a breeding problem, and you can make megabucks for your clients. You can make a big impact on his cash flow by making good recommendations. If you increase his production 3 lbs. per cow per day on a 100 cow herd, or if you simply cut his feed cost, you can have almost an \$11,000 effect on his gross income in a year. I don't think any other parts of your herd health programs, with the exception of mastitis control, can have this kind of positive cash flow impact on your client.

We start with a farm survey and we look at everything that is fed on that farm. We get a herd history. We spend a lot of time looking at DHIA records and information about the herd, production curves, and things like this. We sample the feed and we even go so far as taking a pair of scales out and weighing the hay because when his wife put it up she thought it weighted 60 lbs., but it really didn't weight that much! We send our information to a laboratory. We have a good

working relationship with a feed testing laboratory. We get their results back and we use the TI-59 to do all of our rations. We use the AABP module, and we found this to be an excellent way to do dairy rations. We send them reminders and work with them on the farm. We charge them hourly when we are on the farm for doing our nutritional work. We send a form back to the client, filled out with recommendations on how he should feed the different ingredients we recommended. And finally what makes the whole thing work is feed bunk management, by making your feeding programs work while you are on the farm, observing how things are being carried out.

Dr. Harrington: First I was in practice, and as most of you know I made a change to academia. I was really enjoying it until a few months ago my wife got up one morning and I was kind of sleepy. She was up at the dressing table, and she says, "Well, I've slept with a student, I've slept with a dairyman, I've slept with a veterinarian." And of course I was kind of waking up right about then. "But this sleeping with a college professor is the dullest thing I've ever done." I decided I'd better go back into practice. I got involved several years ago, owning and operating a couple of dairy farms. Some way you will work around to having a little interest in nutrition. As most of you recognize by now, after owning and operating two dairy farms and operating a practice for awhile, I got so I could make a living, so that qualified me to teach.

All jokes aside, I really did enjoy practice a lot more when I was able to get some programs and to get nutrition going on an organized basis in our practice. The last few years I was in practice, my arm was beginning to ache a little bit. My shoulder had a little bursitis. My knees had been kicked quite a bit, so I was looking for something else other than reproductive, infertility work, as we first called it for my first few years in practice, that was herd health. There had to be a little bit more to it. So by adding a full nutrition program, we tried to go the whole gamut with nutrition, providing a service we felt our clients needed in our area. I was able to cut the number of herds about in half, do full nutrition health work and also have a little more time for mastitis work, and little more time for the family. The amazing thing to me was that it really did not affect our income that much. We had another veterinarian that took up the other herds, and for you practitioners out there, being a member of a new school, we have a few coming out this year for the first time. So maybe you had better add some nutrition and develop your practice and let them do all the heavy work and you do a little lighter work and find a place for our students to participate. I am sure they would appreciate that. So this is kind of how it fit in our practice more recently. Since I've been in academia, I've been trying to teach students the importance of nutrition and veterinary medicine, starting from the first year they are there. We have a farm so they are involved with feeding the animals. It makes them feel real good to balance all the rations and get involved with feedbunk management and all the things that make it work.

So this is what I've been participating in for the last four years. Up until my wife talked to me, it had been really great!

Dr. Lesch: I practice in Belleville, Illinois. It is across the river from St. Louis, so it is in the middle of the country. My wife and I practice together, hoof and paw. I'm the hoof, she's the paw. She does all the work and I can go to meetings. We've got primarily dairy, beef, and hogs in our practice. I work on feet and everything, like you all do. But the interest I've had in nutrition, especially trying to present a lot of it in seminars to AABP, has just been trying to promote greater involvement by veterinarians in nutrition. A couple of things I'd like to say along that line, though I also work with *Animal Nutrition* somewhat. I'm not employed by them but it is a service that works with veterinarians on nutritional consultation and also work with computer software and computers with some feed mills. As a group, veterinarians should recognize that we are trained in veterinary medicine and that is our forte. When we get into some other areas and nutrition being one of them, you have to be careful that you don't come on too strong if you are not really sure what you are talking about. You can create some big problems, from the dairyman's standpoint, and also create some antagonisms, and rightly so, among other members of the agribusiness community. What I'm getting at, a little humility, at least in the beginning, is a worthwhile thing to keep in the back of your mind. It would tend to keep you out of problems. You end up getting more done if everybody is on the same team. The other thing from a nutrition standpoint, when veterinarians get involved in nutrition, it is not necessarily one of those things that will tend to generate income, at least immediately. In fact, it may cut your income if you had a person with 10 displaced abomasums (DA) in the past year and half a dozen milk fevers, you go in and correct the feeding management problems with multiple feedings of proper fiber, etc., and you cut out the DA's and the milk fevers, you are going to cut your income on that farm. But personally, I think the way to build a practice is to generate client dependency, based on the fact that you are going to become an indispensable part of that management team that helps run the dairy until you become an asset rather than an expense.

Dr. Hutjens: Basically I'm going to cover what I think are five interesting points which may cause some discussion. I think philosophically let's say three things. One of the hot ticket items we're seeing is feed form. I think if I were going to look at some problems we would be looking at form as far as ensiling some of our silage feeds. It is to the point now that we are starting to size our TMR's and measure what the physical size of TMR is, not assuming that TMR solves all problems, and how we process our grains. What is the correct form of our grain for the kind of performance and rumen function we want? No. 2, nutrients, looking at nutrient quality. I guess all of us have heard about by-pass and now the question is, what are we bypassing? In the midwest, wet and dry corn gluten feed has really focused on, maybe the stuff bypasses, but what we get past may not be

what our high producing cow needs. We are looking at that one. Another one in that nutrient quality has to do with starch, starch level and starch loading. Several feed companies in the west and now in the east are coming out with what they call non-structured carbohydrate. I think if we understand that concept it will answer a lot of questions if we should happen to be using ear corn or shelled corn or oats or beet pulp or soy hulls, why they work, and the farmer say they do work. That's a tough one. In other words, how do we adjust our computer program so that we really get the nutrient to the cow that she is going to be able to biologically utilize. The other two points are the feed systems. Total mixed ration and electronic grain feeders are really hot in the midwest. We argue that TMR is a system of choice and should be considered for stanchion barns. We have two or three that we work on closely in Illinois in which the TMR in the stanchion barn is really working well. The fourth one I want to mention is that we have two computer programs in Illinois that we want to use, myself and our County Agent, and they will not give you the right answer.

It simply says if you cannot figure out how to get the right answer, you've got no business messing with a computer that will give the right answer, because you won't recognize it if it is the right answer. This really frustrates some of our county advisors. I think you have to ask, if you just want the number to come out, or when you sit down and you identify that it is not balanced, you find out how you are going to balance it in line. I like that concept. Maybe you will want to argue that, but that is our concept. Simply, the last one, and that is your role as a veterinarian. I agree that you have an excellent role there, but there is one large feed company in the midwest that says no way are you going to get in their business. They think that is their domain and certainly I would argue that extension is not going to get in to it in Illinois. As far as dairy is concerned we are out. We don't formulate very many rations because we don't have the manpower nor the skills to do it. The producer is going to have to have it. The question is, will the feed company do it, will the private consultant do it, or will you do it. All I can say is, whoever can do it the best is probably the one who will survive wherever they are located.

Question for Dr. Lesch: Discuss the cost effectiveness of using 30 lbs. per ton of bicarbonate and 10 lbs. per ton of magnesium oxide for milk production and for fat test.

Dr. Lesch: There have been situations where the strings that ran out of bicarbonate ended up losing cows and the strings that had it in just went down in milk production; we didn't lose any. There isn't a better nutritional insurance policy that I know of than free choice bicarbonate. That is one of my strongest recommendations.

Question for Dr. Hutjens: Has zinc methionine been helpful in reducing foot problems?

Dr. Hutjens: We had a seminar here several months ago that some of you may have attended. We think the zinc level is something to really watch. We have seen some herds in

which we have increased zinc levels. In some cases it is zinc methionine and in some cases it is zinc sulphate. We suggest 60 ppm total ration dry matter and some people will go with an even higher NRC, about 40. Secondly, if you look at the recent Washington State study, they didn't get a foot response, but there was not much foot problem in the herd. When they used zinc oxide and zinc methionine they got responses on both, but zinc methionine was a little better. That parameter, as most of you will recognize, was somatic cell count, which maybe we don't want to get into. The question about zinc methionine is the methionine itself. It's a sulphur containing amino acid, and that has its application in feed and legs and hoof growth as well. That is, not degraded in the rumen. Ohio State has clearly proved, if you want to call it a bypass protein, that it does get by as an organic-bound zinc particle. So at this point, my answer is, I think zinc is real. A couple of hoof trimmers, especially the one that comes to the University of Illinois, say it is real, when he picks up feet and works with herds as they go through. So I think the zinc level should be up to 60 ppm. Some universities say 80 ppm. That's an interesting question. I can't separate the two. But most commonly you see the zinc methionine going in. A number of consultants in the midwest are also pretty high on the product. I don't know if they have tried zinc sulphate or any other zinc sources to see if they would get comparable response.

Moderator: The next two questions are very similar and I'm just going to offer both of them, and they are non-specific, so any panel members may answer. First of all, how did the veterinarians on the panel get into nutritional work; when did they first start doing it? And, how did they avoid making fools of themselves? I'm not sure that is the case. And the other, very similar, what do you advise veterinarians to do that say I don't have time to learn about nutrition but I think it is important and I want to learn?

Dr. Britt: I became involved in nutrition because I realized that with our herd health programs we were not reaching all the potential in the herds that we felt we could. At one time in Kentucky we had an excellent extension program where the extension nutritionist or extension dairymen were located out in the state on regional centers and we had an extension nutritionist that was just 30 miles down the road and worked very closely with our client. Then in their wisdom, the university pulled all their extension people back into Lexington, 180 miles away, in the heart of the horse country! So it became a problem for us to get quick, accurate nutrition information to our clients. At that time I attended the AVMA meeting in Seattle and started using the TI-59 program. About the same time I went to the AABP meeting in St. Louis and took the first general nutrition seminar that was organized by Dr. Bob Keith and his group. We went from there. We started slowly with one or two herds that would let us do some work. We had some really super success in one or two herds and by word of mouth soon we were doing about all the nutrition work that we wanted. You

probably will make a fool of yourself, because there are situations where you go into a herd and you will make a mistake. I've certainly done that! You will drop production 4 or 5 lbs. per cow per day, but you learn pretty quickly and you only do that once or twice and you don't give any more nutritional advice. So I think it is like any other part of practice. There are potential risks. There are excellent CE opportunities in the nutrition field and I think AABP is the place to start, if you have any desire. The veterinary schools do not have enough room or time in their curriculum to teach adequate nutrition. So I think it is like any other part of practice. There are potential risks. There are excellent CE opportunities in the nutrition field and I think AABP is the place to start, if you have any desire. I think it must be part of our CE program to provide practitioners with nutritional information that they can use.

Dr. Harrington: I'd like to comment on mistakes. I think the most common one is that you get some way to formulate a ration and all of a sudden you think this is nutrition, especially if it is with a computer. You know everything the computer says is supposed to be correct! Mike just mentioned earlier the problems with this. The thing we've seen is, if you break the thought process down, and your first major decision is to decide what feeds to feed, the next major decision is to decide what you want to feed them to. The next major decision has got to be, once you start into a balancing mode, is the ration you are looking at scientifically correct? And then, that covers maybe 10% of it. So the next big decision, is it nutritionally sound? You could go into hours on what makes a ration nutritionally sound. But some of the common problems are, if you are coming up with a ration that is a marked change from the previous ration, it can be scientifically correct, but you're going to have problems because it's not going to work out. Obviously if cattle are being fed 4 or 5 pounds extra of grain, you probably will never get them back down to normal levels of grain until maybe they go through a dry period. Another common area that it appears you've made a mistake is to not look at the lactation curve or the average days of the cattle in milk. You remember the old story, if you're going to deworm cattle, deworm in the spring. But if you're going to go into the nutrition business, start when the average days in milk are decreasing. Another real strong area that you really have to be careful with, nutrition being about 30% science, and 60-70% art, you've got to get out and look at feed, you've got to get in the feed bunk. You've got to know what's going on. And I think that is where we have got a lot of advantage as veterinarians to get on the farm. We see manure, we palpate cattle, we know what's going on. I think a lot of your art of nutrition is right there. I just recently went down a hundred some miles to look at a herd that was way down in milk. Two or three people had looked at the ration on computers of all types and everything looked good. Of course the problem was he had silage piled up on top of the ground. He had at least a foot or a foot and half of spoiled silage all around the pile, and his hay was all spoiled. The grain mix he was trying

to feed in the stanchion barn had about 30 lbs. of bicarbonate and 20 lbs. of salt, and he wondered why the cattle would not eat it. You can't mix up junk and expect cattle to eat it, no matter how scientifically correct the ration may be. You can't feed shoe leather. You've got to feed feed.

Moderator: The next question we'll direct to Dr. Lesch. Can dairy cattle choose the mineral they lack if given the choice of several minerals? We've given salt, calcium, phosphorus, free choice, for years, yet many say cattle do not have pica for trace minerals. Of what value are clinical chemistries to balancing a ration? Certainly calcium in the blood is related to other factors besides diet level, calcium availability, bone metabolism, etc. But what about selenium, copper, etc.? What in particular is the correlation between blood selenium levels and dietary intake?

Dr. Lesch: There are 3 questions there. Why don't we hit the selenium one first. It depends on where the selenium levels are coming from, if it is an inorganic source, or if it is an organic source. Some of the inorganic sources are not quite as available as the organic sources in selenium. On the NRC or FDA the limits are a tenth of a ppm in dairy. They have seen the light a little bit in hogs and it is up to three tenths of a ppm. I used to practice in Michigan; we had a bad problem there, and we're selenium deficient in Illinois. We don't get results until we go above 3/10 of a ppm in selenium. If we have a problem, it can be reflected by blood selenium levels which seem to be good indicators of selenium nutrition from what I've seen.

Regarding copper, Dr. Saunders could probably answer that one better, but there seems to be some correlation between copper intake and the cellular plasmas, a copper containing protein in the blood. I did my Ph.D. work on metabolic profiling, and from what I was able to see, correlating blood, metabolic profiles to nutrition, was zip. You could see things in some herds and you could imagine things in others, but when you had thousands of cattle, thousands of samples, you couldn't get any good statistical correlation. I wish it was. It sure would have been nice. But I wasn't able to see it and I don't trust it on that line.

Regarding free choice minerals, there's another question going to come up on free choice bicarbonate also. Research has pretty much shown that cattle really can't eat their total needs. They eat the things that taste good like bentonine, but they will not eat the things that do not taste, generally. My own clinical experience on the free choice bicarbonate has been, based on the fact that you can see a difference, especially in the cows in the first two test periods on DHIA, you'll tend to see decreased drops in the fat test, especially, in those particular cows, and as a nutritional indicator again. There's no research on it. I talked to Church & Dwight about it, and because of the bad feelings against free choice minerals, they don't want to touch it because they're selling enough bicarbonate the way it is and I can see their point. So there's not anything documented on it and I doubt there will be until somebody gets a "burr under the saddle" to look at it. But I'm really all for it.

Dr. Hutjens: In Illinois if you go in, especially in the southern half of the state, and say you shouldn't do it, you'll get ridden out on a rail. Because our good producers, who really know what the cows are doing, feel strongly and it doesn't matter if it's coming out of a blue bag or a yellow bag, or where it is, they argue it really works. If you're convinced and they are saying the right cows are going there, go ahead and do it. But as Tim said, there's no research. Dr. Shultz in Wisconsin tried to do it on a milk fat depression ration, you know the diet type that's supposed to get you down to two tests. They put the bicarbonate in the stanchions, and they wouldn't eat the bicarbonate. Now either those are dumb cows and Illinois cows are a lot smarter, and that may be a possibility, but those cows, after two weeks, just would not touch the bicarbonate at all. We don't recommend it, but we do point out to the producer that a number of our producers feel very strongly that it works. Sometimes in nutrition you can't figure out why it works, but hallelujah and let them go!

Dr. Lesch: One other thing along that line. The argument can be extended a little bit more, and that is, if the cows don't eat it, it is not costing you anything. If the cows do eat it, generally there has been a problem. That's been my experience.

Question for Dr. Hutjens: Despite having done some reading about bypass proteins, I am still confused about their practical implications, especially in the light of the fact that feeding bypass feeds doesn't give the projected increases in production. I'm looking for some real practical guides to using this concept.

Dr. Hutjens: I can answer very shortly and that is very dangerous to do. Some of you sat in for an hour and heard all the ramifications of it. Here are my three guidelines for you. No. 1, you say how much protein does a cow need? The guideline, 1 lb. of dietary protein for 10 lbs. of milk. So that gives you an idea of what we're shooting for. Once you get these cows up to 18-19% protein total ration dry matter, even though the computer wants to go higher, I am not sure the cows can handle the higher levels. They tend to loosen up. We see some problems. Michigan veterinarians were concerned. So I think you have to say, if the computer says, I need, I've looked at a cow that is giving 120 lbs. of milk, she needs 12 lbs. of protein, so she's eating a limited amount of dry matter, do you run her up to 24% protein? I would, but would be a little worried. That raises one of the other questions we have here. One lb. of protein per 10 lbs. of TDN comes from the rumen microflora. Pretty good thumb rule from Georgia. So it says on a diet you can probably get 3-4 lbs. of protein coming from the rumen so, therefore, the difference, has it come from bypassed protein? The last guideline is, if you've got a very soluble forage program, like corn silage, maybe wet grass silage, probably with Holstein cows, 50-55 lbs. of milk, we're going to start swinging the bypass protein into our computer program. We have to decide. Unless you've got a really smart computer they aren't adjusting for it. You have to put it in on an ingredient speck

on some of these programs. Baled high, high quality, probably at 70 lbs., we feel that's where you start looking at putting a bypass protein source in. Those are really rough guidelines. And we could argue all afternoon on changing them. But you have to make a point. When you are working with that farmer and you say, let's bring in some brewers grain, or bring in some Agway active pro feed, at one point are you going to say, let's bring that in, I'm saying at less than 40 lbs. NPN looks super, 40-60-65 your natural protein sources probably will do a nice job, but above 60-67-70, that's where you will want to look at replacing some of your soy supplement with a bypass source either purchased, or one that you put together with your own recipe.

Moderator: How much do you charge on a prior basis for consultation?

Dr. Britt: Not enough! When we are on the farm we charge the same price as when we are doing any type of herd health work on the farm and that would be \$55-\$60 per hour, depending upon whether we have a technician come with us or not. When we are formulating rations for our herd, we usually charge \$25 for the first ration, for that same group of cows if we do a second group ration we charge \$20 and for each additional ration we charge \$15. We do some nutrition work for other veterinarians. And that's on a referral basis. We would charge the same to them and let them add on additional charge for handling their clients.

Moderator: The next question I'm going to address to Dr. Lesch. In spite of formulating dry cow rations to prevent milk fever, we continue to see instances of 20-30%. Is there new information which will help prevent this disease?

Dr. Lesch: That is not an easy question. First off, one thing with any ration that is formulated, it can be the best, arithmetically correct, and even a nutritionally correct ration, is that you always have to keep in mind what is given to the farmer on a piece of paper, namely, here's what you feed. You've got to make sure it is getting in there. If it is not being delivered, what may appear to be a balanced ration, isn't. Let's assume for the moment that that ration was a balanced ration. Some things that one could say, well, if it was a balanced ration based around alfalfa hay, for example, and assuming the decreased availability of the calcium in the alfalfa hay, and we had, let's say, marginal or low calcium requirement, low calcium and phosphorus requirements for the dry cow ration, with the decreased availability of the calcium, she may have an inverse calcium-phosphorus ration and that could look good on paper, especially on the low calcium rations, and you could be causing a lot of milk fever. Another thing that could happen, concerning the binding of the minerals, specifically if you had some feeds that were high in phytate phosphorus, for example, some of the wheat brands which I like to use, red wheat brand in dry cow rations to help control udder edema, you can't count the phosphorus in that source is available as inorganic phosphorus for sure in most other organic forms because it is just not available. And if you balance on analytical values,

you end up really in hot water. The situation, let's say bran, with high phytate phosphorus, you would have a really wide calcium to phosphorus ratio, and the other way you could have an inverse calcium to phosphorus ration. What I'm getting at is that it really takes a knowledge of the feed greater than what analyzed values would be. That, plus feeding management.

Dr. Hutjens: Tim and I talked this one through because neither one of us wanted to answer it and I won and he got to answer! Let me add two other points. One is a bunk, a cow side one. Some of our dairymen have a super dry cow ration and a week before they calve they put it to the low group and you go out and calculate what is in the low group and we had one low group at 90 grams of phosphorus. In other words, the dry cow group was super, except he was switching them, instead of a warm up group he put them in there. And so, basically we argue if we can get out of milk fever by playing and working with cal-phos ratios using some of the California and Iowa work in four days, I argue we can get in trouble in 4 or 5 days as well. So with this question, it is hard to see what is going on. But look to see when they are making the shift, if that may be a potential problem. And, of course, the only other thing that is relatively new is that the high phosphorus levels will tie up some of the 120, 125, 124 colicalciferols. When I was in school we always said at least 40 grams of phosphorus and now at least we're saying don't go over 40 grams because you will have some of this conversion of the active forms of Vit. D. interfered with. If you're not aware of that, be really cautious. If you've got them up to high levels of phosphorus and it is available, you get yourself in trouble.

Moderator: While we're discussing dry cow nutrition, I have another question here for Dr. Lesch or Dr. Hutjens. What special feed additives would you put in the dry cow ration if the dry cow is too fat and possibly prone to fat liver disease? Have you used yeast cultures as feed additives?

Dr. Lesch: In addition to the theoretical statements, one on the free choice bicarbonate, another one will be liberal use of live culture yeast. I'm using BV yeast, it comes out of Cedar Rapids, Iowa, and it is a readily available source. It is very well marketed. I can't tell you how it works exactly, but we have used it in situations where we have had fat cow syndrome. That is not necessarily fat cows, but fat cow syndrome cows. Adding 2-3 pounds of yeast per cow per day, that's a lot of yeast, only costs about 20 cents a pound. And so for 50 cents a day, most dairymen, for a week before, let's say, for \$5.00 they would have no problems with helping cows. It is a very good source of B-vitamins, a combination of B-vitamins; more than likely the major factors would be niacin, choline, methionine, and biotin would be high on the list. It is also an excellent source of other vitamins, because there are some added in there. The live yeast culture may be doing nothing more than helping the rumen to stay in good fermentation state so the cow will stay on feed. That may be it. It is a good source of B vitamins by itself, but being a live

yeast culture it replicates in the rumen and would tend to become a better source of B vitamins just because of the fact that the yeast produces it. I carry a bucket of yeast in the truck all the time and if I have any off feed cows, for whatever, I pump a lot of yeast, most of the time we give 5 lbs. or so. You need a McGraph pump to do it, but that's one of the best tools I've got in the trunk, that and the yeast. I am a very strong proponent of yeast as a therapeutic level in the ration for those fat cows. In the regular dry cow ration we generally put about a quarter pound of yeast per day just as an insurance. It won't cost you that much, only about a nickel. I can't document its effectiveness, but I've got real strong feelings on it.

Dr. Hutjens: The only two comments I would add is on the niacin. Maybe we are a little biased but we are pushing niacin for those herds that are having problems, either having cows that are slow starters and are ketosis-prone. We're suggesting about 6 grams, starting about 10 days prepartum and running it out to about 10 weeks post-partum, 6 grams per day. If the cow gets in trouble, using some of the Wisconsin work, taking them post partum up to 12 grams of added niacin. The other comment would be, we're watching the yeast. Academically you would know exactly what I'd have to say, and that is, I can't recommend it. If you look at herds, over 20,000 pounds of milk, surveyed in 1983 across the United States, 17% were adding yeast. That is interesting. And I don't disagree with what Tim has said. But the problem we have is that we have no research to back it up. The research done on yeast was done on cows with 40-50 lbs. of milk in mid and late lactation. You have to ask yourself, is that apples and oranges? So I made that comment on yeast, maybe I am more on his team than on the academic team.

Question: What is your recommendation?

Dr. Hutjens: Our suggestion is to start about 10 days prepartum with 6 grams and that can be mixed in a quarter of a pound of a top dress. That's how we got it in. A lot of people indicate they won't eat it straight. It's very bitter. And then we carry it out to about 10 weeks postpartum. If I had a herd doing 20,000 lbs. of milk I would tend to put it in. The only precaution is, the preliminary work shows that if you have thin cows you'd better not mess with it. And I think we just spotted a herd in Wisconsin today, in the milk diversion program, he's really cut back on feed and he put niacin in and he's having some problems. The cows just don't want to milk. Both Illinois and New Hampshire had two studies that said score two cows were down to about 6-10-12 lbs. of milk, because niacin is in there, and I can't explain why. Both universities found it in close to a thousand cows.

Dr. Lesch: Just one other thing to keep your eye on in the next few years, B vitamins are one of the hottest research topics now as buffers. Things tend to cycle. On the assumption that the rumen can produce as much B vitamins as she needs, it is probably true at 40 lbs., but not in our high multiples of intake above maintenance, cows in about the

80-100 lbs. level. They are closer to monogastrics than they are to ruminants.

Moderator: I believe we have a follow-up question to that from the floor.

Dr. Lesch: In Cedar Rapids, Iowa it is Diamond V Yeast Culture. And I'm sure their advertising budget is equal to what the product costs to make. So any feed company, feed distributor, feed mill in the nation has probably got DV yeast culture on their premises. If you get out west there is Western Yeast Culture, but in the midwest DV is the big one.

Dr. Hutjens: The question there is, what about the score two cows? That's the VPI score system, that's your thin cow, that's not your bag of bones, but she is thin, she is "not a 3" which is considered average, whatever that means, good condition. The research indicated that if you fed the recommended amounts of niacin in the first 8 weeks postpartum, our cows in Illinois in 6 herds, roughly 400 cows, those cows in that category, were below the controls by about 10-12 lbs. of milk, as I recall. We didn't know what to do with it but it was still published and it got to the reviewers and everybody is saying explain it or take it out, and lo and behold New Hampshire reported the same thing in their big field study! And so his question is, why, and isn't that a good question? We think that niacin affects lypolysis, so do we want to mess with that system on thin cows? I don't know. Maybe someone else wants to speculate.

Moderator: The next question involves the use of the TI-59 calculator. I'm going to direct this to Dr. Harrington. Do you think the use of the TI-59 will continue, or will it be replaced by computers? Is it worth learning TI-59 or go right into the computer?

Dr. Harrington: Well, let me give a little background. The basic reason that Tim struggled for years and I think finally developed a very useful tool for us was from an educational standpoint. You know from the very origin of this that it was to be used in teaching bovine practitioners nutrition, and we still feel it is a good tool. As all of you I'm sure are aware, Texas Instruments is no longer producing the TI-59 or the printer. A couple of years ago when this happened, everybody said we will not have a seminar anymore. But it appears to us that there is not a real economical, portable, small, that is, a programmable calculator, not really a computer, (it does as much as most computers, though, the way Tim has it programmed), to take on the farm, throw it in your truck, and to do some nutrition. It was a very economical way to go. In the recent seminar we had one fellow that purchased one for \$50 and we also had a couple of fellows, I was a little surprised, I didn't know quite how to react, that were buying TI-59s and in their practices they had \$24,000 and \$30,000 computers and they were a little frustrated in trying to do nutrition with those. So I think it still has a place. Our contract with AABP was a renewable, annual contract. The agreement was that we would provide the TI-59 seminar as long as someone wanted it. So it is scheduled again, as far as I know, next year. We will not

have an update. We apparently got everybody updated. I don't know which way, so we will offer it again next year if there are enough people that sign up. If there is not enough interest it won't be given. We do have quite a few at pretty economical prices. Hardware is still not a problem. I don't think it's going to be a problem for awhile because, you know, everybody is going micro, great. So that's the way it stands right now.

Moderator: Discuss the protein levels needed to meet the requirements for 100 lbs. of milk production, per day, in the first 100 days of milk without causing diarrhea or infertility.

Dr. Hutjens: I think we touched briefly on that one. We're saying as a guideline roughly, this is for 4% fat corrected milk by the way, one pound of protein for ten pounds of milk, so you're looking at 100 lbs. of milk I'd say you ought to be shooting for ten pounds, and then you have to decide if you want to go up into the 20% protein total dry matter. I don't have any data to say you can't do that but I would want to be cautious because of some of the field experiences I've run across.

What about the effect on fertility? We think there is. I was talking with Jimmy Clark and Larry Chase, two good protein metabolists here in the U.S. We think it is there. Most of the work has been done in about 10-20% above requirement. That's an interesting point. Then the question is, what is the real requirement, especially in this early lactation cow? I think there is enough Israel data and a couple of U.S. studies that do show a relationship. In a review that was in the *Journal of Dairy Science* last year, it said it is probably there. We think there is a possibility. It may be just the ammonia. BUN levels may be a factor or maybe some of the metabolism to try to get rid of some of that extra nitrogen at a cellular level may be important. Now you like to tie that in with the 10 lbs. of protein I want to feed in early lactation, which maybe metabolically my cow can't handle, which gets me up to 10-20% above requirement even though she is giving that much, she is not handling it correctly. Is that right? That's a good combination to think about. I can't answer it.

Dr. Lesch: Just one other little thought on that. As you increase protein, especially one could think you would tend to have higher rumen ammonia levels and you need to get rid of it, that's an energy intensive process and so you can actually accentuate a negative energy balance through too much protein if you've got too high rumen ammonia levels, because that's going to cost energy. So one could actually increase a negative energy balance by increasing the protein, just to get rid of it chemically because the urea cycle is not free, it costs.

Dr. Hutjens: If you could figure out the bypass numbers that would be your only answer and you're saying if I could get that amino acid and not get that high ammonia in the rumen or digestion in the cellular level I think you could have your cake and eat it. But I think you've got me in a real jam and I can't get out of it!

Moderator: The next question is directed to Dr. Britt. Would you elaborate on the relationship between the copper level in a ration and the level of heel warty sensitive growth and infections in the dairy herd in a total mixed ration, free stall-style barn? Evidently this question is in reference to an article you had in *Dairy Herd Management*.

Dr. Britt: When we worked with that article we were trying to find out an answer to some of these heel and foot problems and through the work of Don Sanders in Ohio, we tried some different copper levels in our rations and really haven't affected the foot problem significantly, the type of foot problems we are seeing. We went as high as 25 ppm on copper and depending on the literature you read, copper may become toxic at that level or it might not become toxic until 250 ppm. We have not significantly affected our foot problem by going to 25 ppm copper in the total ration.

Moderator: I think I'm interpreting this question correctly. What if any changes need to be made in rations with 10 lbs. or more whole cottonseed?

Dr. Lesch: I'll hit that one from the west coast standpoint. First, most people don't feed up to 10 lbs., mostly at 6 or 7 or 8 lbs., but one of the things you have to worry about with whole cottonseed, which is one of those magic feeds, high energy density and effective fiber together (you don't get that in many feeds) with that high fat content, is that you will have to increase your bivalent cations, calcium and magnesium, specifically, because as you increase the fat you will increase soap formation. We have seen herds that are feeding 10 lbs. and have not increased their calcium and magnesium, where you can induce some hypomagnesemia problems just because the magnesium tends to be tied up more so than the calcium and that may only be because it is at a lower level to begin with. You have to increase those because of the increased soap formation. Generally if you are looking at normal magnesium levels of .2 and let's say normal calcium levels of, depends on who you are talking to, but I will say .7, in the high cottonseed rations, we'll jump the magnesium up to .3 and the calcium up to .8 or .9, depending on whether it is a legume or legume-corn silage mix. It is interesting to note that is the only manure that will foam. It will get soap bubbles on it. You can see it.

Moderator: Dr. Harrington, why do cows eat dirt?

Dr. Harrington: This is quite interesting to us. Several years ago we had a lot of herds on what we thought were balanced rations and at that time, and of course all around the cement lots and everywhere, they were just eating dirt. I think the highlight was one farm that I never got a chance to do any work for, but I had a call out to treat the wife's horse, and of course the cows had eaten the horse's tail off, and the problem we saw instead of usually, of course possibly a mineral deficiency, the cattle eat in free stall housing, they eat a lot of dirt around the edge, and they even eat the front of the stalls when the fiber level gets real low. I think if you're having this as a problem you'd better look at your effective fiber level. Get a little long-stem hay in there. For us, along

with buffering with bicarbonates, we were able to stop the problem with the herds we were working with. Someone else with a little more knowledge in mineral metabolism might want to comment also.

Dr. Hutjens: I like Jim Crowley's answer in Wisconsin. They've got a dirt requirement. You've just got to feed them some dirt!

Moderator: Dr. Hutjens, while you've got the microphone, would you discuss the criticism of the NRC phosphorus requirements?

Dr. Hutjens: My suspicion is, and I'm not sure who wrote it, that they think they're too low. That's my guess. We're suggesting to increase about 10% above the current NRCs. If you're looking at a high group of cows, current NRC is .4 percent total ration dry matter. We're saying .44 and .45. Michigan State, by the way, is in the same area. According to the inside work on NRC they aren't going to mess with phosphorus. So if you're mad now you'll stay mad and for another six years! They aren't going to change that one too much. But we're increasing and the reason we're increasing is based on some word from Washington that says some of the phosphorus is found in the ADF and NDF fraction of the plant material. If you think NDF and ADF are less digestible, then you have to speculate some of the phosphorus may not be available to the animal. If that is our logic, then we're saying, well we're increasing 10%. It seems our producers are having a little better performance, maybe in milk or maybe reproduction. But that's testimonial and that's dangerous.

Let me say a quick word about calcium. NRC has a biological availability of calcium, if you want to use that term, at 45% of what is in the diet. So it says if you need a hundred grams we're going to feed 45% of that. To get to a hundred we've got to feed 200 and some grams to get a hundred. Do you understand what I'm saying? You divide .45 into 100 grams, that's in the milk and that's what you should have in the diet. That's what is sitting in NRC. Now what about your feeds? In some of your alfalfa, that number may be as low as 20%. It's really low. Some of your grains probably sit right around that 45 and 50 percent level. And your dicals and your supplements are sitting probably around 65 or 75 percent available. Therefore what's happening, and this probably will happen, is that they are saying that 45% is probably too high. We are going to see it go down to somewhere around 37-38%. That is what some of the computers are doing now in the midwest. They have increased the calcium requirement by 25% above current levels. In other words, if you need a hundred grams the computer calculates internally, we want 125. Basically what they're doing is adjusting for less availability in the calcium, especially in our forages. Another way, if your computer can't cheat, that is instead of putting calcium in alfalfa let's say at 1%, you discount it at 40% and you put it in as .6, and that has about the same net effect. Don't do both because then you hit them twice. That's one thing I would

recommend in dry cows. And that's the third question we don't have to answer then. We do not do any of that manipulation with dry cows. We just look at total dietary grams of calcium and grams of phosphorus and hit the levels as suggested by Iowa State and Wisconsin. We do not play that game in terms of the dry cow ration because we think the numbers we have seem to be good, so why put a fudge factor in to try to get our dairymen to relearn, 35-40 grams of phosphorus and 60-80 grams of calcium. Why give them another set of numbers? It's tough enough with the ones we have right now. And then maybe another question, is what about the trace minerals? What about them, as far as biological availability? What about chelated minerals?.

Dr. Lesch: Just let me mention one other thing along that line. The horse people have been doing a lot more work on available phosphorus because all a horse has is its wheels and these two-year-olds, especially trying to get them running fast, they're a lot more attuned to calcium-phosphorus availability than most other groups. The next thing we'll see probably in the standard lab analysis, first crude fiber, then ADF, then ADF nitrogen, is, the horse people are looking at ADF phosphorus as a way to judge unavailable phosphorus. The other thing that Mike just mentioned, you can either increase your requirements or in effect put in a balance on available phosphorus and available calcium. Most of the time I think it is better to change your requirements based on the roughages you're using, feeds you're using, so if you take an analysis of the total mix you can determine whether you are balancing right or not, otherwise if it is all available it is very difficult.

Moderator: This one for Dr. Harrington. How do you formulate rations in a string where the cows weigh between 1,000 and 1,500 pounds?

Dr. Harrington: This brings up a little discussion about grouping. I really think if I had that situation, I would probably be grouping for something other than nutrition. I think we can group in two ways for nutrition, but one of the things we need to be aware of is a problem in groups where the size range is too great and with, especially first calf heifers being pushed out of the feed bunk, and basically what we do—three ways to feed cattle—all in one group, you can break them out into several groups, or of course we can use grain tapes and feed them individually. So with a string that had that much variation in it, the only thing I would like to do if you don't want to regroup them, would be to take the mean of the group, balance the ration and use a chart to come up with, this was a mixed ration they were talking about, so this would be total MR.

Moderator: I'm going to direct this to Dr. Hutjens. Would you like to make any comments on corn gluten feeding?

Dr. Hutjens: First off, it would be good that everybody understands the corn byproducts. In practice there are corn gluten feed, corn gluten meal, or the byproducts of corn shucks manufacture and then corn distillers grains and corn distillers with solubles which are the byproducts of alcohol

manufacture from corn. Those are the big two processes. The corn distillers with solubles, whether it's wet like we have in dairies in our area that are feeding the wet feed and it looks like molasses, generally runs around 32% protein on dry matter basis, is very high in fat. It is guaranteed at 10, it is about 12%. All of the byproduct feeds tend to be good phosphorus sources because you have to remember that if it is destarched corn, if you take all the starch out of it, which is roughly two thirds of the grain, multiply everything by three, depending on the dry matter, that's what you end up with. The distillers products tend to be very high in B vitamins also because of the fact the bacterial yeast process that does the distillation that makes the alcohol. The corn is ground up, the yeast added, it's fermented, centrifuged or separated, the solids are separated out, the liquid or the soluble part is distilled, the alcohol is distilled off. Then, depending on whether you are after the regular grains or grains with solubles, it is either dried down all the way or they're added back together again and dried down all the way or it is dried down somewhat and left wet which is the wet product. It is a very good source of bypass protein. Again, in all corn silage rations where you're feeding corn, we have to worry about the lysine problems like we talked about a little bit, we're feeding more monogastrics. The corn gluten, with corn starch manufacture, is the combination of the hulls and then the germ back together. You've got corn gluten meal and corn gluten feed. The corn gluten meal is just the germ and that's about 60% protein. It's just the straight germ. Then if you add the corn hull back with it then you have corn gluten feed and that generally runs 21-24%, it depends on the plant it is coming from. One problem we've had is wet corn gluten feed. It is not a very consistent product, at least from the plants we've had, and it is a little bit of a problem. The dry tends to be a much more repeatable product as far as analysis goes.

Dr. Hutjens: Just three comments. If you're going to use a wet gluten, if you're in Illinois and Iowa you might write it down. Our research with dairies says 25% total ration dry matter when it is fed on a heavy corn silage diet, and that is perhaps the toughest test. And watch also the rations, don't go over 50% water, meaning if you have real wet rations then you are going to have some dry matter problems. On the dry feed we are suggesting and this is based on feed companies, that if you quote more than 40% of the dry product in a grain mix, and you feed it as grain, not as TMR, they back off because of a gluten odor in the feed. In other words they will smell it. It is a very fine particle size. Now if you get it pelleted, which is available that way, then you will overcome that problem. In a TMR you could probably go a little bit higher because you could hide that or if you bring them on gradually. Last point is, on high producing cows, no more than half of the extra protein would come from a corn gluten source. The other half would have to come from soy bases and that is because of protein quality in the high producing cow. Wisconsin has some work to say that if you go to all corn and all corn byproducts on high producing cows, you

will pay the price in the bucket.

Dr. Lesch: That's probably primary lysine deficiency. So we're just back to hogs again.

Moderator: Do you dispense microminerals and vitamin premixes under your own label as part of your program? If so, how do you formulate these premixes?

Dr. Lesch: I am not raking it in, let's put it that way. There are a couple of different ways for veterinarians to get involved in nutrition. One is strictly service, and the other would be getting involved in the supplying of materials, whether antibiotics, or premixes, feedstuffs, I think they are in the same category. A lot of veterinarians would say, we want to be unbiased and so we won't get into dispensing anything. Now you can buy all the mastitis tubes, and penicillin and tetracycline and CAP, etc., but you won't get into minerals. One thing that you are doing, I do it, and other people do it, is mainly as a service. I am not mixing up any of my own micromineral mixes. I buy them through Animal Nutrition. But that is a source of microminerals and vitamins that they have to get from somewhere. If you are

going to be involved, I think it is your responsibility, from a practice building standpoint, to get yourself as involved as possible and it will also keep you a lot more interested, especially if you can be making a little bit of money. I don't think anybody should be gouging anybody here, but if you are financially interested in that dairy and the more you are involved the more you will be cognizant of what is going on in the dairy. The more you get removed, the farther you get removed from whatever aspect of management and the less you will become interested in that dairy. That's how I get involved.

Dr. Britt: I did dispense some formulated minerals that we purchased from Animal Nutrition, but currently we have about two or three different micronutrient producers that will make large volume micronutrient mixes for our clients, usually ton mixes. We formulate the micronutrient package that goes in there, depending on what area these clients live in. We have done some sampling in the different areas and there is not very much difference. We do not make any additional charge to our clients for that.