they have given us a good response.

In closing I have a few tips in management, vaccination, and treatment. One tip that has increased our dispensing, I'm talking on both sides of my mouth, I said we do most of the work, but we are also interested in dispensing. We give a 2% cash discount on all medicines picked up at our clinic. If the order is a $100 order they get a 5% cash discount. You can't believe how many come in and if they are up to $85 they got to get something to get up to that $100 so they can get their 5% discount. We do not give this on any medicines we just take out, if we take it out to the country and dispense it, we do not give that cash discount, even if they pay. We give it only if they come into the office. We want them to come into that office. We want them in there because we think they will buy other things when they come in there.

I say we're not very big in cow-calf, but one product that is really helping in our area on our calves is Precon PH. We've had fantastic results in our calves that we have given it to and going through the weaning and stress period. We have used some syncytial virus and I would not recommend it 100%. We've had some real wrecks.

Another thing on investment of idle funds in your clinic. We have an investment account in the bank and we have a checking account. When we need the money to pay bills we roll it into the checking account and when we don't we put it into the investment account. We've been picking up $3,000 every year since we've been doing this, since those accounts came in, instead of just leaving them in the checking account where you get nothing.

Also in a large animal practice we have small animal office hours at 8:00 to 8:30 and 1:00 to 1:30. The rest of the time we're out in the country.

Metritises, bovalene, I think is our drug of choice. If an animal has been fresh for 8-10 days, along with an oxytet infusion. Autogenous bacterins, we use a lot of them, especially in swine. We keep all autogenous bacterins in our cooler. We built a walk-in cooler especially for that. If they want 30 doses of autogenous vaccine they call and get it. We try to store it and charge it only when they come in. We're getting it into our office again. Invariably they will pick up quite a bit of other stuff when they come in after 30 or 50 doses of autogenous vaccine. I guess in the grocery stores and the chain stores they call that impulse buying.

I heard some of you talking that practice is down. Our has been somewhat, except for the last 6 weeks it has not. We're coming back and going to have a good year. We're a large animal practice. We spent about $400 building shelves and decided we were going to promote Hill's dog food. We did that early this year. Unbelievable in a little practice like ours as far as the small animal, we are probably netting on our dog food since we started at least $150 a month up to $200 and talking to the Hill's people that will continue to grow for the next 4-5 years. It's something that if your cattle practice is slow you don't forget about those pets. They're real big business. Clipping, grooming, and boarding I mentioned before. We do a lot of that.

One thing I really wanted to emphasize, that in any practice you don't want to forget the lay help. They are really important in a practice and you just can't tell how they will add to your practice.

Innovations in Ruminant Nutrition

Charles Olentine, *Ph.D.*
Watt Publishing Company
Mt. Morris, Illinois 61054

Even though I am not a practicing veterinarian I would like to thank you for the opportunity to speak concerning nutrition. I think we have moved away from the concept of a nutritionist being the feed and weigh and the feeds and feeding type. We are in an era now where nutrition is really biochemistry.

We can look at research in ruminant nutrition as having traditionally gone through cycles of hot areas. The first half of this century discovery and application of vitamin research took top priority. As we learned more about the biochemical mechanisms of vitamins we came into logical transition to researching mineral metabolism, and this was popular in the 1960s. Protein and non-protein utilization became the hot topic after World War II, but it entered a rather dormant era in the 1960s. However, in the early 1970s, protein research centered on tissue requirements for amino acids and the concept of bypassed protein, degradable protein, and metabolizable protein arose. One of the pioneers, of course, is Dr. Wise Burrows in Iowa State. As a result of this type of research many feed stuffs are now being classified according to their rumen degradability and commercial formulations from feed manufacturers are reflecting these values. Thus, what was once considered to be a rather unglamorous area of research, protein research, has turned out in recent years to be very exciting. Also, concepts in energy metabolism have been revolutionized in the last 20 years. These concepts are now being fine-tuned for both dairy and beef cattle. Researchers in ruminant nutrition used to classify themselves as to specialties, such as I am a researcher in protein metabolism and energy metabolism. As we will see in this short talk, the various specialties are starting to merge, especially with the advent of biotechnology. All these

concepts are being integrated into what we call ruminant nutrition.

Now the first area I would like to cover involves the recent publication of the National Research Council's recommendations for beef cattle. These recommendations came out in early summer this year and updates the previous edition which was put out in 1976. The primary changes that we see in this year's edition really involve the fine tuning of what we have known before. We've basically thrown out the TDN process in formulating rations and have become rather sophisticated, especially with the use of the computer. This current edition lists nutrient requirements, frame size, sex, ages of feedlot cattle. The 6 classifications are there—medium frame steer calf, large frame steer calf, and compensating medium frame yearling steers, medium frame bull calves, large frame bull calves, and compensating frame yearling steers, medium frame heifer calves, large frame heifer calves, and compensating medium frame yearling heifers. Our nutritionists are finally realizing that we should feed the animal a nutrient quantity per head per day rather than going into percentages of a ration. Growing and finishing cattle requirements in this new publication, energy, protein, calcium, and phosphorus, are presented in separate tables in amounts per animal per day. Breeding cattle nutrient requirements are expressed both as nutrient concentration in the ration and in daily requirements. As I said before we are not using TDN any more. We've got a large enough data bank where we use net energy requirements and most of the formulation we see in the near future will be using that energy for maintenance, pregnancy, or lactation. Also in this particular edition, we are finding that the feed intake equations have been presented to allow us to formulate on an animal day basis. Digestible protein is a term of the past. They propose several concepts, metabolizable protein, crude protein, etc.

With the advent of the computer era they provide a list of formulas in calculating nutrient requirements for beef cattle, and if you have basic programming you can stick these formulas in and it will give you the nutrient requirement as it relates to body size. Now one of the areas that I have seen a lot of interest in is in the preparation of stress packs and inherent in this has been a resurgence of interest in B-vitamin nutrition in both dairy and beef.

On the dairy side, much has been said in the popular press about the mode of action of niacin in improving milk production. There are a number of modes of action proposed but not clearly defined. These involve increasing availability of NED, NADP, co-enzymes. There has been some research to indicate that niacin may effect insulin levels. Of course they are proposing stimulation of rumen protein synthesis, etc. This research is still going on. There have been a number of studies showing positive results and I know of one niacin manufacturer right now who is experimenting with altering the solubility characteristics of niacin. I would expect to see a big push in the next year or two promoting niacin in dairy cattle. Several years ago I had an opportunity to go to one of the nutrition conferences and heard problems involving thiamine deficiencies. There have been several reports linking thiamine deficiency with polioencephalomelacia in feedlot cattle. In fact some studies have shown IV administration of thiamine has been able to induce spontaneous recovery to PEM. Thiamine is generally considered to be abundant in feed, so it wouldn't appear to be a very big problem. However, there are two types of thiaminases that are present and in areas of concern when we are feeding a high grain ration and we run into problems with acidosis we may run into problems with PEM. Also some commercial cocciodiostats, notably amprolium, are thiamine anametabolites. In the area of protein metabolism, we used to think just feed them crude protein and the animal would do well. I think we've disproved this in that we are looking at amino acids on the tissue level. There is considerable interest in methionine right now and most of the work done to date has involved methionine hydroxyanalog (MHA). It appears that MHA works better in early lactation as opposed to late lactation. It is best in mature cows with very little effect in two-year-old cows. However, the research is variable and it is susceptible to controversy right now. The levels being proposed for methionine are 25-35 grams per head per day. To backtrack on the niacin studies, most of the studies use 6 grams per head per day, to get the desired effect.

I would like to get a little in the blue sky area right now. I am not promoting any particular company's product but there are a couple of companies that are doing basic research that could really open up things in the near future. Eastman Chemical is currently test marketing a product called "isoplus" in Michigan. It is restricted to Michigan right now. It is not a drug. It is a calcium salt of isobuturic acid and mixed five carbon volatile fatty acids. It has been shown to increase rumen bacterial production and stimulate VFA production in the rumen and they have noted both increases of production and milk fat. In their experimental period right now they are recommending 18 pounds per ton of "isoplus" mixed in the grain ration, in the complete ration 9 pounds per ton. Their data indicated it can be topdressed at a fifth of a pound per head per day, but it does not recommend free choice. I would say they will be having more firm data in this area, probably at the beginning of the year, and if it is a viable product, I think within 2 years you will be seeing it on the market. Also they have been working on a rumen protection of amino acids, notable methionine and lysine. This is in the embryonic stages of testing, and initial reports from Kentucky and Ohio indicate that this could have applications for dairy cattle, both the "isoplus" and the protected amino acids.

On the ionophore section, we have seen quite a bit of success with Rumensin and Lasalicid. Keep your ears open. Salidomycin could turn some heads if it ever gets approved. There was a paper given at the animal science meeting this past August and it speaks favorably of both Lasalicid and Rumensin.

One of the areas, the glamour area right now is biotechnology, particularly with regard to growth hormone of both growing animals and dairy animals. At the recent Cornell Nutrition Conference, a researcher cited three studies whereby dairy heifers showed an increased rate of gain, wether lambs showed increased rate of gain and increased protein deposition. In another study he cited there was a decrease in fat. Right now Monsanto is very active in this area, and they are trying to fine tune the biotechnology, the fermentation processes whereby this can be an economically viable product as with any type of hormone you have administration problems and possibly down the road we'll be looking at implants for growth hormone.

Also there has been quite a bit of study as to how we can administer compounds to affect growth hormone secretion and research to date indicates that what's good for the chicken may now be good for the sheep, which may not be good for the cattle. I would anticipate we will be seeing some biotechnological products coming out in the next few years. I think we're several years down the road from growth hormone. Probably the biggest factor we're going to have to deal with is how does FDA clear this product and right now they're having jurisdictional problems with FDA and USDA. We don't even know the criteria by which they will be judged.

Finally in conclusion, one thing that is very active in the press right now is what is going to happen with therapeutic levels of the tetracyclines and penicillin. I'm going to editorialize here. I think we don't have to worry too much with the FDA at this juncture. We've got to worry more about the legislature. I think we will see action sooner from Congress than we will from FDA. The people I've talked to at FDA say it will probably be the first of the year before they announce hearings and it will be a long, protracted process. However there were several bills introduced at the end of the last session of congress and what happens in the near future is really conjecture.

Question: Is the bypassed protein concept economical for feeding dairy cattle?

Answer: I think it depends on your area. The feed manufacturers that are promoting it have access to grain processing facilities and can economically get the bypassed protein. Agway and Kent Feeds are two that I think are doing good jobs providing economical bypass proteins.

Some Observations on Field Use of BVD Vaccines

Kurt Wohlgemuth, *D.V.M.*
Extension Veterinarian
North Dakota State University
Fargo, North Dakota 58105

I am not here to pass a judgment. I'm here to relate to you some numbers. And remember, numbers or figures never lie! Liars figure!

We do have what we consider a relatively successful preconditioning program. It's about five years. It has been steadily growing. And among the requirements, 30 days before being sold are weaning, dehorning, castrating. And at least three weeks prior to being sold we require ectoparasite control. And among the vaccinations which are mandated in our program we have BVD, we have IBR, PI_3 and clostridia, at least your 5-6 way is also mandated. We used to have the pasteurella bacterin as mandatory. I guess we're close enough to Canada to listen to what they are telling us. But anyway, the practitioners there decided that it's not mandatory now. They set the requirements.

What I have done with our practitioners, we have attempted to keep accurate records on the program, see if it is working, see what it is doing, see if we can make sense out of the exercise. So the data I'm giving you evolved from that. Now, BVD vaccination has been mandatory since 1980. That was the year they made it optional in Iowa. So we figured if it was optional there we figured that was good enough for us to make it mandatory!

Now, specifically the program on our certificate says you can either use a modified live vaccine in which case one inoculation is required, or you can use a killed one. We happen to read labels, . . . that would require two inoculations. I went through all our records and these are the vaccinations practitioners have used over these last forty years.

I went through the records and found out when these BVD vaccinations had been administered. I don't have the total percentage. However, on practically many occasions administration took place 2-3 weeks prior to weaning. There were those instances whereby BVD vaccination and other procedures were administered at weaning. There are cases where it took place later.

North Dakota has very good cattle. We have good programs. I can tell you, when you deal with cattle, with cattle producers, it is a lot easier to face life and imply that they will come to us and tell us when there was an adverse reaction. They don't call us in the middle of the night and say,