would be of value to you and then work backwards. Then you can figure out what input it takes, and if you can get that input and once you have that, then you can start looking for a programmer to help you.

I think you will get into a storm if you don't define first what you want out of it, whether or not you can get the information that is required to get the output and then if you can do all that you can get it down on paper, you can write out all your formulas, how you want to figure interest, how you want to do everything and you could give it to a programmer, you won't have any problems. It will develop fairly rapidly. One of the things I feel obligated to share with you is what it costs to do some of this programming. Programmers are just like our profession. We have some good ones and we have some bad ones and we have some inbetween. You know, the good ones may cost the least and some of the good ones may cost the most, but it can cost you a lot of money if you don't get some good ones and you don't really know what you are doing. Defining and setting up the program and everything yourself is probably the most important thing before you can go to a programmer. The better job that you can do there will save you many dollars down the road. It's going to cost you a good deal of money to develop any programs that have much sophistication to them at all. We have lots of input, we input every drug that is administered by day, by dosage to individual animals, feed input, we have a complete drug inventory system and a feed inventory system. We have lots of input and so the program is lengthy. It just does a lot of jobs of shuffling figures around here and there and it has taken a lot of money, a lot more dollars than I ever thought it would when I started, I guarantee you. So, I think in summation, the computer is a very good tool for us to use as practitioners. I think each one of us should become more familiar with it. If you are not ready to make a decision after this presentation today, to go out next week and get started, keep it at the back of your mind. Keep reading about these type of programs that Gary has, make yourself available to practitioners that have started using these particular things. Be thinking, because I feel that in a very, very, short period of time we are all going to be using them to our advantage and to our clients' advantage.

Panel Discussion

Moderator: Well, I plan on different levels of herd health management.

The cattle cycle put us out of business. When cattle prices went down to where no one was making any money they were looking for ways where they could lose less and veterinary service was one of the things that suffered. But as the cattle cycle picks up again I expect herd health management to pick up as well. This one ranch is the only one we have worked with using computers and the only computer work I've done is through Dr. Evans. I have no knowledge of computers myself. Just an abiding interest and that is the reason for the program.

Question: Do you have a record keeping system?

Dr. Bitter: As far an my own practice is concerned, none. Because each record system for each of my clients is different and all of it is based pretty much on what information they had available when I started with them and what we could prod them into. Keeping records is probably one of the hardest things I faced when I worked with clients, because I don't have time to keep their records for them. Many of these people don't feel that they have time to keep records for themselves. So, whatever information my clients have when I work with them on a herd health management standpoint we utilize and we try to enlarge upon, but one thing that I definitely try to avoid is to over burden people with records, especially in the early stages of a herd health management program because that's the first thing you can do to turn them off. You have got to work with them right where they are, and not say, okay boys here's the program and flap a book down there and say these are the things we are going to have to start doing tomorrow because they just cannot adjust that fast. I think Gary wants to add some information to this.

Dr. Evans: I would like to make one comment about the particular rancher that Dr. Bitter and I worked with. The first year that we evaluated his operation resulted in three major changes in the way in which he was managing the rotation of his grazing. We also found out that he was putting exceeding large amounts of fertilizer that wasn't buying him a darn thing. In fact, he was over fertilizing. The next time that I went out, which was two years later, all of the analysis that we had run showed that he was coming up with severe protein deficiencies. This was starting to affect his breeding cycles, as I remember. You could not get enough protein by slugging more and more nitrogen to the grass. That was not the way to go. It's wet down in that part of the country, and some of the other protein supplements that were being considered had such a short life that we started looking for ways of improving the protein quality of the pastures. With some work at one of the experiment stations, we found both the arrow leaf clover and the sub-terranean clover were becoming viable alternatives for increasing the protein quality of the particular pastures that he had available. Because of the information that we had developed, he didn't hesitate ten minutes to come back and say and where can I get the seed, when should I put it on and what kind of a management system do we need to put into this thing so that we will have the protein quality in the forage from year to year. I really feel that if we had not spent the time working with him, we would not have been able to take that step in one brief meeting. Instead of a long selling

job it was all done. All we had to do was look at the balance, look at where the shortage was and he was ready to step in there and try to correct it. It wasn't cheap for him because arrow leaf and subterranean seed is still very expensive, somewhere in the neighborhood of two to three dollars a pound. It takes about five pounds to the acre and we are talking about reseeding thousands of acres of grazing land, in order to meet the protein needs, so he was willing on the basis of that to go ahead and make that particular commitment.

Dr. Garrison: I'd just like to answer another part of your question, I think you asked where these programs were available, and how many were available. In 1974 the American Association of Animal Science did a survey of this and they found that, they made a little booklet and I'm not sure where it is, I have a copy somewhere in my office, but there were approximately 500 different programs that were affected with management. The things that I was talking to someone earlier about, cow calf weaning weights, figuring this cost, which states had them, which man had, who was involved with them, that was in 1974, and now I do have copies of that, but I can tell you that it is outdated now, there are many, many much better than those. They are available. I'm not sure as an individual practitioner where you go to find these, but they are there and there are some organizations, animal science is one, that is trying to make an effort to find where they are, who has them and who can use them. So, this would be an excellent thing for an organization such as yours to find out.

Dr. Bitter: Something along these lines, that you folks may be interested in knowing is your AABP Board of Directors just as of this meeting has appointed an *ad hoc* committee to coordinate the production of software for programs that will affect veterinary medicine. These are programs that are already starting to develop around the countryside at different universities and this is an attempt to coordinate these efforts and to get input that is most useful to practitioners into these programs.

Dr. Garrison: From my prior feedlot experience and the experience that I had up until that date, I knew what specific variables and parameters I wanted to have access to in order to evaluate health performance in feedlot cattle. I knew exactly what I wanted to look at. I wanted to look at case fatality rates, I wanted to look at morbidity, I wanted to look at the average treatment cost per head, I wanted to be able to monitor drug inventories, be able to have a tool to selectively buy the drugs at the best price so that is a tremendous tool in our area where we have so many lay distributors calling on our feed yards. I was already generating these reports by hand. When I visited with Dave I told him what I wanted, how the information was coming in and that I could calculate every bit of it by hand but I just did not have the time to do it. That's when the recommendation was "well, it can be programmed, you know." You can do this, but before you even ever entertain any more thoughts you need to get a pencil in hand and say, what do I need to evaluate my client's

health performance and then you can work backwards from there. If you can't do that there is no need talking to a computer salesman or to programmers or to anyone else. You need to determine what you are going to utilize to monitor your performance. Obviously a number of veterinarians do consultant work in the High Plains region, and there are quite a few of us, but there are lots of yards up there and the majority of the yards have no veterinary service. They do not use a consulting veterinarian on a regular basis. And why not? Because we have not proved our value. We cannot prove in our service. Nutritionists have done an excellent job, of course.

Most of the outlay is feed stuffs and you know, they realize that they have to have some expertise in that area. But there is a lot of dollar outlay in animal health as well. We do not have the black and white figures to sit down and talk to them about nutritionists do and so that was our goal. This is what is happening, this what magnitude it is, this what it is costing us and we can improve this area, this area and this area and we can set some goals and we have got to have something to look at rather than just going on gut reactions. Well, I think we had a lesser rate of coccidiosis this year because we instituted this program. You will know whether you reduced it and what it cost you to reduce it and that sort of thing. I think that we as veterinarians should begin to document what we do, then we are going to have a higher level of respect with the beef industry.

Question: Are you selling programs?

Dr. Garrison: Oh, definitely, I'm not selling programs at all. It's nothing but a tool to improve your service. That's right. I'm not selling programs.

Question: What are your guidelines?

Dr. Garrison: You want to set benchmarks and lots of times you can't because you are going to get some gut reactions when you just ask them what their average death loss was for last year and their average mobidity. They can tell you their death loss but very seldom can they tell the mobidity. Most of them don't have any idea, on a percentage basis, but get the best you can and I have ways of going back. I ask them, "What was your feed bill last year?" and then I ask them what the average treatment cost was and then I figure backwards and get some idea of what their mobidity was but that is the first thing I would do in the feedlots that I am working with, whether they use my computer or not, is establish where they are right now and where they have been for the last year or so that I can start working in those areas.

Dr. Bitter: I think this is one of the most important things and something that many veterinarians might overlook going into a herd health program. If you can't show these people how far they have come, then pretty soon they are going to start looking at your expense as just that, an expense. But if you can show an increase in calf crop percentage, an increase in weaning weights, these are two of the most important things that a cow calf man deals with. I think you can also consider things just like Max did, morbidity rate, death losses and so forth. But these in turn

will be reflected in weaning weights, and calf crop percentages. So those are the two main things that you need to establish when you start a herd health program for a cow calf man is what is his production level at that given time and then you can come back and show him after a year or two year or three years. One thing I would caution people in doing is, don't be overly optimistic for changing things in a year's time. It takes so long to go through one production phase in the cow calf industry. Nine and half months from conception to birth and another seven to nine months to weaning. There is a long period of time that you have to deal with and it takes you really two or three years before you developed all the data you need on any given operation where you really have a handle on things and you know what you are doing. This was one of the biggest disappointments to me in the program where Gary and I worked together. We were just reaching the point where we really had a handle on things when the cow market collapsed and we quit and I hope now that the market is back up that some of these programs will be re-instituted again but it takes a constant continuing education program, client-practitioner realtionship to keep these things going.

Dr. Hutcheson: We at the Amarillo Center are developing soft ware packages right now. We are approximately six months to a year from having them out. They will be available through the Texas A & M Research and Extension centers here in Texas. One of them will be a complete form of accounting package with complete projections for feedlot, feeder calves, irrigation and all of this. Myself, the feedcattle specialists, Dr. John McNeal and Dr. Ray Salmons have been working on this for awhile. Its going to be administered through the extension service in our center. We have the micro computers now to do it and we are doing it on a very limited basis. I cannot tell you what they will cost. Right now, we have more or less been giving them away free just to get people to use them, who have micros. We're finding in our area quite a few people farmers coming in, and buying micros. We had a farmer come in and we told him the cost of a micro and he wanted to project using grain futures from grain prices, and we told him the price, and he said, "I'll lose that in one deal," so he went out and bought one but we think you are going to have to learn to program it yourself, or hire a programmer. Get your secretary that you have as your receptionist, make sure she can program. They are available, and then work with them but there are companies that do produce software packages. They are expensive.

Dr. Evans: Let me add a couple of points to that, One of the reasons why the list of computer programs was for only the large computers because this whole industry of the micro computers was just not quite in the public market place. Since the micro computer has hit the public market place those companies that provide the large companies, such as Hewlett-Packard and Apple and some of these that are really fairly large have broad areas of generalized computer program software available to you. But when we start talking about the specialized programs needed for

agriculture, they are being developed. I would say that better than 30 percent of all of the state experiment stations right now are in the process of putting together packages that are usable on various kinds of microcomputers so we are going to see a tremendous change in the next three years as to the kind of information that is available. Western Farm Management Company which is probably the largest agricultural management company in the United States is doing a lot of this also. Whether they are going to say, no you can't have access to our programs unless you use my whole company, I don't know, but private industry is getting into this also in a fairly big way. IBM and Control Data Corporation, Univac, at least are three of the fairly large ones that are begining to see the hand writing on the wall. Goddard Space Flight Center, trying to use examples that I thing most of you would be familiar with has been controlling all of the satellites from the United States by use of major computers. When one of these big computers would go down, they'd lose a satellite for a while. You go down there now and you will find a whole bank of mini computers controlling a particular satellite, so when you start seeing applications like this, the big companies see where they are headed, and I think we will see a lot of programs available for fairly reasonable cost for these microcomputors, in the very near future. To carry this one step further, how much does it take to learn how to program? Most microcomputers have a language called basic. It's an English level language. If you can understand the logic of the problem you want solved it does not take too much more effort to learn how to write those particular programs. It's like topsy, you get started, you build some small programs, you get a little bit of confidence and you start adding to them and enhancing them and pretty soon you build a lot of the kind of programs that you would like to use. Certainly the more complex ones you will probably have to go outside to get some sophisticated help because you are going to have to use the quirks and the idioms of that particular computer in order to solve some of the problems.

Question: What is the cost of the equipment?

Dr. Hutcheson: Let me first answer your T159 question. I doubt if you can buy a used one anywhere because even if you get it and you never use it as a program, it's not too expensive to use as a calculator. I have never seen them advertised at all. I don't really mean that they have become obsolete. I am not sure, I said that statement, but they are still tools, they are like a syringe and needle. It's what you may put in and what you may get out. You just don't go out and use them everywhere but they have some benefits. You cannot do some inventory programs, you cannot do large sort programs on them, but simple calculations like I presented today, those of figuring protein requirement, calcium, phosphorus, energy requirements, projections. They are beautiful and these are things you do by hand but it may take you a while if you have a program and you just push the button, it's nice to have and what they are best used for is for instance, let's take the pasture budget program.

What we find people using that for is they come in and say I don't know what my cattle do but I thing they might do a pound a day or they might do two pounds a day. They'll sit there and plug in all those values and then just keep changing it and look at all the different possibilities and know the range that they may get and they may or may not buy the cattle because thats the range of profit they may or may not get. So you use them as a model to look at different situations, now, I'll answer to some degree the cost of developing the soft ware programs and I'll let Dr. Garrison maybe say more about it. Soft ware programs are probably directly related in cost to the complexity, storage and what you want out of them. Now, that is not a very good answer, but let's just take an example, and I don't know whether I can give you all the details. I was talking to two fellows earlier and I'll use the same example I did with them. Let's take an example of three or four or up to a five hundred cow herd. Lets say, lets put that on a computer. We'd like to be able to get from that breeding dates back, 205 day weaning weights, all sorts of rankings and sort of a complete analysis, if you wish, from a herd breeding standpoint, whatever that may be. We would also like to have the accounting records to go on it, the dollar and cents, the pasture costs, just a complete package. That has been quoted to me, at the price to develop of seventy thousand dollars. So I have not described all of the complexities of it, I could take and do the same program for a thousand dollars not counting the hardware and the soft ware and get something out so it depends, but it is and can be expensive if you have to go and hire everything done. Now on the other hand of the scale I recently bought a sort program that will sort up to ten thousand entries, I believe it is, and it is for disc drive 48K micro computer. It was a hundred dollars. So I am going to take that program and I am going to modify it and rewrite it after looking at it to make it do some things I want it to do in a sort routine. I could have probably written a sort routine package myself, but I can buy it for a hundred dollars and I might just as well use someone else's. Their inputs and outputs are very self explanatory. There are software packs available that are relatively inexpensive if you are willing to use a general form. But if you want something specific, very specific, for a particular operation, or ranch as a specific enity, they will be expensive. The price will come down. If this place did develop this for me and then started selling the packages in a year or two then I imagine that would drop to five, ten, maybe fifteen thousand dollars. But that initial cost is astronomical. Mostly just from a trial and error that you don't get the right people in to get the answers out an the input in.

Dr. Garrison: I think another part of your question was exactly the cost of the hardware itself. I mentioned the reasonable cost of a micro computer, the particular micro coputer which was just described by Dr. Hutcheson with the printer T1810 which lets you compress print and that is why I was interested in it, it is fast enough for us, anyway the machine I have is a 64K micropolis disc drive computer. It

has four disc drives, a terminal plus the printer, and those several pieces of equipment sell for ten thousand, seven hundred and something dollars. That piece of equipment will handle up to a thirty thousand head feed yard. You can take the same piece of equipment to the printer and everything which is probably what you would be more interested in, in a private practice, and it would probably cost you around seven thousand dollars. So, you can compare it to having a terminal like Gary was talking about a while ago for three thousand dollars that about all it will let you do is talk to a big machine. This particular one you can buy that for seven or eight thousand dollars. Put a particular communications board in it, it just plugs in, take it off the top and plug it in and it works. You can talk to that installation that Gary was talking about. So, that is the price range. I was talking to an individual here awhile ago, I don't know if he is still here, that has the Radio Shack Computer, whatever the numbers are on it. His was a larger, more sophisticated one than the level 2 but you know, those things are getting cheaper, and I have heard people say they won't get much cheaper they will just keep getting better now.

Dr. Hutcheson: I might mention there are several things, I don't know if this is the proper place to discuss it but I will just throw this out. When you are deciding on a computer you have to sit down and figure out what your objectives are going to be. A TSR80 will do many things, a Vectrographics will do other things. These computers will do different things so you have to consider that there is basically the Z8080 chip which is the most universal right now. This is a chip that you can do with more periphery and I don't think the TRS80 has that chip. Phase 2 does. I read about a 6400 chip that is coming on. It is even more versitle than the Z8080. I just now got acquainted with the Z8080chip, if you wish, and so you have got to decide what you want to do. The TSR80, the TI59, the Vetrographics or the IBM 360, you are going to have to figure out your long range objectives, which is difficult and then match the computer so you do not have a dead end situation.

Dr. Garrison: I recently answered a question at a panel presentation up in Canada, and people were trying to decide the question of the whole seminar, day long seminar, does the feedlot need the computer? That was the title of the seminar. They are being hesitant in making the decision to buy one because they say in a couple of years we are going to have other chips and we will have this and this and it will be cheaper and better, so we will wait. Well, you know, if it's worth something to you now, most of this stuff is adaptable. It's getting more that way, I think. I have a dead end computer right now in my office that I would be glad to sell. But, most of these things are adaptable now, so if you could justify one now, don't put waiting two years to get involved. Go ahead and get one now and then you can upgrade it.

Question: How do you select a computer?

Dr. Garrison: I'll tell you exactly as a practitioner how I handled it and I went through the same thing you did. It just so happens that we are very close to a very good research

extension center and those guys have researched the market and I said, "What did you come up with?" and they told me, and I asked them why and they told me and I made the decision. I don't know what state you are from or whether your extension center does something like that, whether they looked into it, but I have got very confused as a practitioner. You can say well, I just really have settled on a Vetrographic and I can go over and talk to somebody else and they will tell me everything that is wrong with the vetrographic and why their's is better and I don't have enough knowledge to judge what he is saying so I am totally confused. So, generally what you end up doing is buying a computer from the best salesman you know, no necessarily the best computer.

Question: Why did you select your particular computer?

Dr. Garrison: Well, one of the things that Dr. Hutcheson just touched on a while ago is, when you start selecting you want something that, expecially if you are looking at it for a wide range of uses, which I think a practitioner would, would probably do some accounting system and other things. You would want a micro computer that is versatile, that you can use for a lot of other things that have already been developed and that's the reason that we chose the one that we have because it is the most versatile and the best price and the most storage. Just to give you an idea, the first micro that we put in our center was a Sol48K machine. It has a G. E. television for a video on it, it has a TI810 printer and it has a micropolis disc drive and it is strung all over the place. But it works and it is functional and now you can get that in a much neater package but we have tried to build so that we don't get closed off at the pass. Now, you have to define your objectives, if you need something that has 400 hundred K you don't need a micro computer. If you can do it under a 128 K you can use micros. Most of them will go to 64 or 128 and they will start out at 12.

Dr. Evans: I think one way to answer your question, "How do I get started in this thing?", is to get background information about the various kinds of micro computer systems that you are interested in. Do as Max said, develop the specifications, such as what do you want this for to start with? Don't talk to a computer salesman, but try to find some of the computer consultants in the area and talk with them. These are people that are indifferent as to the kinds, I mean they don't have a vested interest in the various kinds of micro computers. They also have the ability to talk in English as well as computerese. Sometimes it is difficult to bring them back into English but it can be done and they can help you identify the kind of package that you put together, its like going to a lawyer for some consulting work, it's, "well, what kind of law suit is this going to be?" You are

asking the computer consultant what kind of computer or what kinds of computers should I be looking at. You have the specifications or the capabilities of the various micro computers. They love to give you this kind of information. I agree with you, if you can read fifty words you're lucky. Because it's all in the computer lingo but this I would say is the best way, the safest way to get into it because they provide you with information that will allow you to grow, the kinds and pieces of computer equipment that allow you to expand the system in the future. There are many of them and they learned this from IBM. Many computer systems, micro computer systems available today that if you want to expand you have to buy only their equipment or if you want to expand you have to completely get rid of the piece you have and get a whole new one. That's not a good way to do business. The SOL, the Apple, The Fairchild, some of these, well, Radio Shack are smart enough to see that the future is going to be in providing compatible pieces and there are several of these available that do have compatible pieces but you are not going to be able to evaluate all of it so go talk to somebody who is making his living at it.

Dr. Garrison: This is like the rancher trying to develop his own animal health program. He had better talk to his veterinarian!

Question: How can I get started?

Dr. Evans: Where are you from? I can provide you with the tape of the entire computer program and copy of the user's manual and a set of forms and if you are in good with someone in a computer center you can take it from there. I have Copan working on nine different computer systems and IBM is not one that it will work on. Yes, it will work on PDP and it will work on Univac, Zerox, Burrows, CDC. We finally cracked the problem, and I figure in another six months it will be operational on IBM systems so if you want to play with it until we get the revised version out, just give me your name and address and I can arrange for you to have a tape, and the tape is very well documented, I have been told by several people that we have on of the best documented computer programs in existence. If you have access to the computer wizards, at the installation where you want to run it they can get it running for you fairly easily. It takes a minimum of a hundred and twenty, roughly a hundred and twenty eight thousand bites and it goes from there up to the limits of the computer.

Question: How was the program funded?

Dr. Evans: The program was developed with funding from the National Science Foundation so it is public, it's a public program.