

Pre-feeding Trials Before Entering Feedlot or Pastures

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The way I view the shipping fever or pneumonia is, I put the majority of my emphasis on stress factors. I think there are some things we can do with different vaccines, but I am of the opinion that we must improve our control of stress and prepare the animal to withstand it. I think we simply have to concentrate more heavily in this area.

In a recent research project at West Texas State University, a group of 300 calves came from Alexandria, Louisiana. Those 300 calves came from 42 different purchase points. Some of them came from the auction barn area through a commission firm and they finally arrived in Amarillo, Texas. I have included this work so as to acquaint you with the type of animal and the total stress syndrome that we are talking about. The figures show what we in the industry have to live with once we receive the cattle—an average of 40% morbidity, 5% mortality, and 1% just escape the 5% category. These figures, of course, would vary all over the place, but these are pretty good kinds of figures to get hold of. We know pretty well what some of these animals will cost us in terms of treatment, medicating, getting him in and running him through the chute and so on. Incidentally, by the time he is visibly that far gone in the feedyard or wherever, you need to get some different people—they are not doing a very good job. The 5% that wind up this way, depending upon the particular market time we're talking about, we can also put a pretty good cost figure on this. Now, the figure that we attempted to get hold of was the performance costs of the animals that do become sick during the first 30 days after arrival. I should define here how we determine whether they were sick or not. All of the research animals were rigidly observed once daily by a feedlot cowboy type individual, but very capable. Veterinarians didn't do it. The animals were pulled on the basis of visual appearance; body temperatures were taken and anything with a temperature in excess of 104°F was determined sick and went through a minimum of a three-day sick-pen treatment. From three different trials we averaged the 30-40 day performance of all of the animals that never did spend time in the sick pens compared to those that did. Those that did not during the first 30-40 days gained 232 vs. 190 for a loss of 0.42 lbs./head/day.

The next question is whether these animals compensate enough to make this up? The answer is, they do not. These animals that stay alive will perform, after they are straightened out, equal to these, but they will not compensate to make up the 10-15

pounds. So now you can put another cost figure in there and I think that a very conservative one for this shipping fever problem in the industry is \$15-20 for every calf shipped.

I thought we would go back and take you through the various parts of the total stress syndrome. We start on the farm or ranch in the Southeast. Prior to coming to this meeting I spent some time in Mobile and Montgomery, Alabama, and in the Lexington, Kentucky, area. I spent a lot of time at the auction barns and on these operations. I'm sure many of you are familiar with the fact that we are working with small operations. We are talking about an average herd size of probably ten. (I'd like to point up something that was rather ironic. Today down in the lobby you have a Georgia agribusiness counter. I think that counter exemplifies one of the reasons why we have such problems. They don't mention a word about Georgia feeder cattle. They've got peanuts there, peanut butter, eggs, nuts, everything else, but Georgia feeder cattle are not represented. I think it tells us something.)

At this point, in terms of the health of the animal I am not worried about him and I don't think you are either. He is a pretty healthy animal. Now we go to the next phase of this syndrome. From the time the small producer decides he is going to sell his animal—he may have jerked them off the day prior—they come into the auction barns. By the time he goes through the ring, he is probably going to have at least two days away from his mother. He has been taken away from a rather high quality feeding regime to where he may be getting nothing. If the calf gets anything, it is because some misinformed nutritionist or veterinarian told them to feed them low quality hay, on the assumption that we have got to get something in that gut. Now that just won't do, but that has been the recommendation you can find in print all over the place. At this time we are looking at probably two days. One of the first things I did when we were involved in this research project was to spend two weeks with the leading commission firm in the Southeast and travel to all their sales. I sorted cattle and did other various and sundry things. The point was to find out what they do. What are their problems? What is happening here? Is the auction barn really that bad? Well, the auction barns are bad. There are some things that can be done here to help, such as providing drinking water. In all fairness I think that the auction barns are doing a good job with the information that they have

available. They are also doing what we are letting them do in terms of our buying practices. I will just give you an example of some clients I work for in Kansas. We are not going to buy any cattle from an auction barn that will not give us a pen where we can put our ration in the bunk after we buy them. When we buy the animal and he goes out of the ring we want him to go into our pen with our feed. If that can't be done, we are not going to buy any cattle from that auction barn. If you think back now in terms of the size of the operations and so on, the auction market system is a very integral part and an extremely important part of the Southeastern cattle industry, whether we like it or not. But I think we need to learn to live with it and learn ways to make it work better instead of trying to go around and bad-mouth it.

Now we get to the trucking aspect. Of course they will have gone through a commission yard and here they will have spent another couple of days. Now the animal is ready to be loaded on the truck, and we have probably a minimum of three days. In normal situations a maximum of five days that this animal has been going through the stress syndrome. We don't know anything to do in the areas of trucking, but I am encouraged that recently a pretty sizable group of funds were made available to do some additional shipping fever research. The major emphasis in this area is going to be some work on what is happening during transportation.

This truck has what you would call the highstack and is equal with the top of the truck. Then we have about 1-2% of the trucks that are lower where we have diesel smoke getting back in. Now, I don't really know what this diesel smoke does. I don't think anybody does and I don't think we have the information which would indicate how much of a problem it is, but I do know it is something that can be very easily eliminated. In general practice we will let a trucker deliver to us one load that comes in this way, and then he is informed that the next load that comes in this way, he is going to get them back! We will not let him unload. We don't have very many brought that way. It is just ridiculous to have that even be a major concern at this time. While we are talking about research, the University of Tennessee is also working with us on a cooperative project where we get some of these Southern selects through one of the feedyards that I work with in Kansas, and we have done some preshipment things to these cattle.

By this time, we have this animal at the end of a 4-5 day stress period and now it is too late. All we can do here is live with what we have done prior to receiving them in Amarillo. We have simply got to work on it earlier than this. Any research just done on this end that does not take into account the other parts of the stress syndrome is a waste of time and money. There has been quite a lot of work done on marketing and transportation systems. There has been very little work done that combines all the areas. It is just a little bit late by the time you get to this point but we

can work with people to initiate good livestock management.

We would be remiss if we did not say a few words about preconditioning. There are some standards to determine if it is effective. It starts to get a little stickier in terms of financial returns. Who is going to pay for it and how much are they going to pay? Can you give me enough numbers. The answer in this part of the country is NO. It is a typical occurrence in the fall of the year in the Panhandle of Texas for a million calves weighing 160 kilograms to be acquired, 83% in September, October, November for 9000 head each day! Now this is just a conservative number going on wheat pasture. These would be the smaller cattle. Personally I think this is the crux of why even though preconditioning has been around so long that it really has not taken hold. Everything is processed routinely on the other end. It is very difficult for us to pay anybody a premium on 40, 50, or 60 head of cattle when they come in and get mixed with several thousand head that we do not know what has been done to them.

Now we are getting down to the first concrete efforts in the research project. We traveled to the Lexington, Kentucky, area and purchased 40 head of fresh calves right off the farm. If you want experience, just roam the hills of Kentucky trying to buy 40 head of calves all in one place, on one farm! Well we couldn't do it. We did the best we could. That was a real education in itself. We started out with 40 head of fresh calves. We split them into two groups. Bear in mind we have 20 calves represented in one group and 20 calves in another. Now, the top group was shipped direct from the point of origin to Amarillo, Texas. The time span between being taken off the farm until they arrived at the feedlot in Texas was 30 hours. We consigned what we will call the stress group, a split off the same group, to two different sales on two different days and bought them back. Then we stopped halfway about 2:30 a.m. in Little Rock, Arkansas, and then brought them on into Texas. The time span for these cattle was about four days. At each of these points along the way for both sets of cattle, the animals were all weighed, the body temperature taken, and we bled all of them. We also drew rumen fluid to find out what was happening to rumen activity, and more importantly how rapidly the rumen activity returned to "normal." In the calves that were shipped direct, we experienced 32% morbidity and no mortality. The animals that did get sick responded very well. In the stress group, we had 60% morbidity and 5% mortality. Bear in mind we had only 20 head in each group.

Now I am going to combine some of the data from the cattle I just spoke to you about with some others from another trial that was done in a similar way. We are looking at 55 head of calves; their point of origin; arrival days three and five postarrival at the feedyard in Texas. These were research conditions, keep in mind. We did have a rather significant drop in rumen

protozoa. In our work we have not seen the protozoa numbers just drop completely out, but they do become less and also recover rather rapidly particularly by day five. Rumen ammonia levels were 18 and then to 31. Here is a point. I agree wholeheartedly with the fact that receiving rations theoretically should contain no urea if at all possible. My reasoning for it is that here we have an excess of rumen ammonia and I attribute this to a breakdown of the microorganisms. So we are really not looking at a nitrogen shortage in these animals upon arrival. What we are really looking at is an energy shortage. Then we get rumen activity resumed, and this level of rumen ammonia goes down. Volatile fatty acids, which would be a function of microbial activity, drop from 55 to 41 and then jump back up. The pH, which is probably as good a parameter as any to use, and, of course, much simpler to measure, starting at 6.7 jumps up to 7.3 and you can just about depend upon this figure for cattle that have been starved for a 24-48 hour period. The pH is going to get up to about 7.3 but by day three it will drop to 6.4 and on day five to 6.3. So this happens when the animals get back on feed. The rumen is functioning very well at this stage.

I do not think there is any doubt that at the end of the starvation period, or at the end of the total stress syndrome including the 24-48 hour starvation on the truck, rumen activity is greatly reduced. That does not bother me. The part that I am concerned about then is how readily do the microorganisms come back once they are presented with substrate? Our approach to this was to take rumen fluid from stressed calves (each of these composites was composed of rumen fluid taken directly from three calves immediately upon arrival). We've got nearly 90 stressed calves represented, and also from six fistulated steers. The rumen fluid pH from stressed calves was 7.6 and from the fistulated steer, 6.9. The substrate that was used here was a ratio of about 60% concentrate and 40% cellulose. Well it wouldn't have been cellulose *per se* but it would have been a fibrous material. We found that when presented with adequate substrate, within 24 hours rumen activity will be back to at least 90% of what it was in the fistulated steers.

I am not worried about rumen activity coming back. We have got to give the rumen more credit in terms of its ability to come back. It is an unknown area. There are a lot of things we don't know. I think we need to be careful that we do not underestimate the ability of the microorganisms. Serum glucose changes occur in these heavily stressed calves. In the direct group the levels started out at 57 mg%, and on arrival it was up to 80 mg%. Day five it was 66 mg%. Bear in mind here we had 30% morbidity. In the stress group, it started out about the same figure, but by the time they came out of the second sale which now would have been a little over two days, it had dropped down to about 49.

At this point I felt if we put these calves on a good fortified ration we would not have very much trouble. During the last 15 hours of this haul, look what

happened. It dropped to 36, and by day five it was back up. This, of course, is a significant reduction. Now that does not really mean a great deal by itself but now we have to relate it to the incidence of shipping fever or pneumonia in these calves. We took all these calves and ranked them according to severity. It is interesting that the majority of reduction occurred in those that came down with a severe shipping fever problem. I have just received from the laboratory additional data on 115 calves, where we had samples taken prior to shipment and immediately post shipment. They showed the same results. We have not related it to the different severities, but we do have preshipment and post shipment figures. There was about a 40% reduction in serum glucose.

At this point, we could not wait for all the lab data, which happens so many times, so we had to decide what we could do to affect serum glucose if this is a factor? I am sure what cause and effect relationship there is yet, but at least it was the best clue we had to go on at the time. When you think about it, what can you do with serum glucose? You can give them some intravenously but that is not going to last very long. The best route is to take a look at how they are being fed. Here again we think in terms of our long time recommendations of low quality hay. It will not work. In three different trials run in October, November and December with similar calves in three different loads (over a 100 head in each load) we compared the hay feeding system, which is about the best that is done in a lot of cases, to feeding the other half of these calves a fortified ration. It is important that you know how this study was conducted. In all studies, the calves were purchased, part of the calves were delivered to the commissioned firm on Thursday, part on Friday, part on Saturday and then they were shipped early Sunday morning, so that each third that came in was split equally—half into the hay group and half into the ration group. When that load was put together half of those calves had had ration, half had had hay. They had had it for as long as three days and for as little as 12 hours. The key factor we were trying to do here was to keep it within the normal marketing and transportation channels. Everything we did here is something that could be done in the industry today. That was very important to us. The ration we used was not a great deal different from the one I referred to earlier. The ground corn ration was about a 40 megacal ration—call it a 55% concentrate. We used cottonseed hulls as the base roughage not because they have such a super nutritive value but they are very palatable, and I'll guarantee that these little cattle like them, which is half the battle at least. I too would prefer cottonseed meal to soybean meal. I was not worried about protein because I knew that during the in-transit period I was going to have an excess of nitrogen in the rumen relative to the energy that was available. So I was more concerned about the energy standpoint. Mineral is half a percent salt. I think this is very important. Molasses in low levels. Another ration had 5% propylene glycol, thinking in

terms of the ability to affect blood glucose. I think it is a very important point that we forget some of our old schooling that we don't have to worry about B vitamins. I think you do because we do not know exactly what levels are needed. We also had a high level of antibiotic. The ration was formulated for every four pounds consumed; there were two gms of antibiotic intake. We were really conducting an anaplasmosis study here and using the maximum legal level of antibiotic. With all these ingredients—propylene glycol, B vitamins, trace minerals and antibiotics—will they eat the ration? They will. I have combined all three of these trials. The preshipment intake was 5.9 lbs./head for those on the ration vs. 5.7 for those on hay. Bear in mind this would reflect some that had access to it for three days, some for two days and some for 12 hours. So this got us by one of the first arguments that we had to contend with and that whether they would consume it. These pens were small and they did not have a lot of room. They could not go clear back into the north corner of a 10-acre pasture and lay down! They were bumping into either water or feed troughs.

The postshipment intake for the first 30 days after arrival after the stress syndrome was 11 pounds for the ration cows and 10 pounds for the hay. This was very consistent in all three trials and the majority of this was the result of higher consumption during the first 14 days after arrival. The daily gains during the first 30 days were 2.3 vs. 2.1. I had not really expected this response in gain, and I don't think it is the most important factor. I think the health aspect of this is more important than the gain. I would have been happy with a standoff in terms of gain, but in every trial we saw a consistent improvement in performance of about 0.2 lb./day which was significant. We had a 25-30% reduction in morbidity which was significant. Was it due to the propylene glycol; the antibiotic; the energy; or a combination of all of them? I am not sure. The ration had everything in it. The objective of that ration was to hopefully get us started in an area so that we could refine it. Mortality rate trends were in the same direction in all three trials. The number dead—4 vs. 11. It was true in every trial. The animals responded better and so on. I think that this points up something that can be done. I am using it in my business in Kansas and we are having some good results. We have had some cattle that we thought should have been wrecks but were not. These are difficult things to measure under those conditions. I am seeing some results in the field that indicate it is beneficial. We have used it also on some big cattle. Here you have to reformulate a little by using a little more hay, etc.

Now let's put this in a different light. Let's look at receiving rations. California workers use a 70-72% concentrate ration (about a 45 megacal) which they consider optimum for receiving light weight calves. We didn't disagree with this but we set out to use Texas commodities. We set up a trial where we looked at 30, 50, 70 and 90% concentrate rations using milo

hulls, alfalfa hay, cottonseed meal and a commercial premix. Our findings in terms of animal performance agreed with theirs—the 70% ration was giving the best performance but when we looked closer and tried to find out why the 70% did better, we found that the majority of this response was during week three and four, not during weeks one and two which are most critical. Furthermore, when we were using this 70% concentrate ration we drew rumen fluid from about 40 calves and on the 70% concentrate ration we had 25% of those calves that had rumen pHs of 5.5 or below. That is a danger level in my book. We then used a 60% concentrate ration; sampled another 40 animals over two or three different trials, and all rumen pH values fell into the range of about 6.5. This is the reason in our recommendation we will not go to 70% concentrate. I think that is a little too high.

Baldwin used an all-concentrate ration. In our work with a 90% ration the only significant differences we had was a significant increase in percent morbidity and in percent dead. Other than that there really was not a great deal of difference. If we think we know what energy level we want, what commodities do we want? We have a choice of an all-dry ration made up of various ingredients (we used hulls in this ration) compared to corn silage at 40:40 on a dry basis. We also used corn bran because it is a high energy wet feed but it is not fermented. We used a dry ration, a wet ration with fermented roughage and a corn bran ration that was wet but nonfermented. Incidentally, all of these receiving rations did have aureomycin.

The 28-day performance in this study was as follows: The initial weight was about 350 lbs. Daily feed for the 28 day period, 12.1 vs. 9.2 vs. 7 for the three rations. Significant differences here. They simply consumed more of the dry ration. The daily gains were 3.1, 2.7, and 2.4. Again these were all significant differences. The morbidity differences were not significant, nor were the mortality figures. There is a lot of variability on the animals on corn silage. My personal feeling is that I want to minimize wet commodities in my receiving rations. You give me an all-dry ration and over the long haul I will give you superior performance. I think this is a big part of it. The daily intake during the first 28 days on the dry ration was 12.1 and on the wet ration 8.1. In practice in my consulting business, I can't always have just exactly what I want so I try to dry it down just as much as we can and still fit within the means of our yards.

What about rations for cattle that go into the sick pen? I see hay racks in sick pens; I see all kinds of things. This is an area that really has not been looked at, so we set out and did a cafeteria-type study on a separate load of cattle. At the end of 30 days we had 30% mortality, and we had essentially 100% morbidity in this load of calves. It was a good load of calves to check sick-pen rations. The administrators didn't think too much of what it did to the budget, but we kept reminding them they were there for research purposes, but somehow that didn't go over real big!

Rations one and two were similar in terms of energy and minerals, the difference being ration one had a very low level of corn silage in it, while ration two had none. During the first week the cattle were in the sickpen, of the total consumed, only 7.6% of this was ration one. They stayed away from the silage when they had a choice. Of ration two they consumed 29%; calf manna 26% and prairie hay, 37. The animals showed a preference for the higher energy feeds over a high energy feed with silage or over the prairie hay. I think hay makes us feel better than it does those cattle! We simply use too much hay in my opinion. I think we have to use some on receiving and also in the sickpen, but we need to use it to appeal to the animal behavior standpoint more than we do to count on it to do us any good.

From a nutritionist's standpoint, I feel it is extremely important that the veterinarian and I work very close. I have not always been able to get around so often and make a point of this, but I feel that this is extremely important in the overall industry. These feedlots need the complete team approach and if the nutritionist and the veterinarian cannot get together, then neither one of us can be nearly as effective.

If we look in terms of the percent of the total averaged over both weeks, you can see that it comes out to be just about the same. Incidentally these rations were rotated every other day so the animals couldn't get used to going to any one spot.

If you have an opportunity to have any input into a shipping fever research project, I would urge you not to limit it to any single aspect of the total stress syndrome. If we cannot look at the total picture by cooperating with other institutions, then I think we are just spinning our wheels. In terms of rations, it is a key factor that we get away from thinking and depending so heavily on hay. Hay is a necessary item in our feedyards, but when we receive a set of cattle, hay should be used to draw them up, to get them on the ration. We can formulate our rations so that we are not going to have an acidosis reaction. That can be done. Use hay for the animal behavior aspect. The ones that will not eat the ration can have a little bit of hay. Let us not count on these big racks of hay and let us think more in terms of complete rations.

(This paper was prepared from a tape recording of Dr. Koers' presentation.)

