Discussion
Livestock Production Systems

Russell Cross, USDA: Gene, I share a sense of urgency in this area, but let me ask you a very pessimistic question. Given the very traditional nature of animal science that is organized by discipline, what do you feel is the future for this type of basic growth biology research in animal science? That's one question. The second question is, where do you really think the money is going to come from: government? or industry?

Gene Allen, Minnesota: First of all, many times organizations and universities get caught in traditions. There are some traditions that are worth maintaining, while others need to be modified. My answer to your first question is that I am confident that some university animal science departments will cast aside some of the old traditional organizational patterns and there will be work in the integrated areas of growth biology. I can't speak for anything else, but I'm confident there will be resources available for growth biology. There is a rethinking of what needs to be done and a new awareness and opportunity. Since we now have a product opportunity driving some of these areas that we had never previously experienced because of new technology like recombinant DNA, I think that additional funding will not only come from government through some of our present organizational structures, such as The National Science Foundation, but there will also be a grants program at USDA and I believe there will be additional support from industry. So I'm very optimistic. But I had better be!

Joe Regenstein, Cornell University: I agree with the concept that for regional planning in an area like growth we're looking at mechanisms. However, we really should be going much further. This type of research is no longer dependent on type of breeding and is a worldwide problem. I believe coordination is the key because any duplication is unnecessary duplication unless for the purpose of proving an experiment for the second time. In terms of getting people, however, when you talk about bringing in people from outside the traditional animal science area, this is a difficult business. There are problems since these scientists cannot teach many of the traditional courses and the graduate students cannot go through the traditional requirements. Thus it takes a tremendous amount of preparation for the department to incorporate these people. The question always comes up: Do you bring them into a department or do you tap people in the traditional biochemistry, and physiology departments to do this kind of work which sometimes is actually easier to do?

Gene Allen: First of all, I totally agree with you on the planning. My only reason for saying "regional" is if that could be a starting point, it would grow from there. Second point, bringing the people in and having them work is one of those traditions. Should everyone be required to take ruminant nutrition or whatever requirements we might have? We don't happen to have that as a requirement at the University of Minnesota. My adamant answer is no. And if we maintain those requirements, we will not attract these kinds of people. The second area where we fail is that we frequently write job descriptions in a manner that are foreign language to people outside of our areas. I also have been interested in this and have followed it rather closely during the last year. Many positions in the plant sciences show up and are advertised in *Science*, but there are really relatively few in the animal science area that show up in *Science* and when they show up, they miss the goal of attracting students that are interested in basic sciences. Your third question is one that I suppose I feel rather strongly about and that is why I am concerned. If we don't do these things in animal science during the next 20 years, we will lose part of the reason for our being, because this is one of the dynamic areas that is going to be growing. It is one that is going to be influencing animal science and the argument for letting people outside of it do it without working closely with us or being a part of us is to say that other agencies or departments can do the job better. I'm convinced that, if we set our hearts and minds to it, we can do the job best because we have the animals and we know something about the production needs. All we must do is a better job of investigating the mechanistic kinds of questions.

Bob Kauffman, University of Wisconsin: I appreciate what you are saying, Gene. I would like to emphasize what you said about cooperation. I think that we have many times spent too much time dealing with the problem in which five other stations are doing exactly the same thing. All of a sudden, everyone jumps up with the same answer, none of which are really productive in the way of "conservation of our economy." I'd like to just point out a couple of things that I think you maybe already alluded to and that is the awareness of what everyone else is doing. Sometimes I get the feeling that scientists in this room and others don't really know what others are doing and really don't care to share with them, because there is fear of being scooped. I think of Clay Center and all of the marvelous things that can be done there; how we could cooperate with all those scientists that are there who have the wherewithal that we may not have. But most of us do not take full advantage of this opportunity. I can think of a similar situation at Wisconsin. We have what is known as the biotron. It's not the University of Wisconsin's, it's the United States program. I don't know one single animal experiment that has gone on in that biotron in the last 10 years that has been done by animal scientists of this group or other groups. Yet you alluded to the fact that environment is a very important factor in studying a lot of our profiles of these problems. I just think the words "awareness" and "cooperation" need to be emphasized in your discussion.

Gene Allen: Thank you, Bob. Let's make that a commitment when we go home.

Bob Kauffman: Larry, I'd like to have you go back to the fourth slide from the end and tell us a little bit more in detail what those numbers meant, because I felt that this tradeoff was more important than perhaps you indicated. At least, I didn't understand exactly how the tradeoff worked.

Larry Cundiff, USDA-MARC: This slide provides an estimate of the pounds of retail product. That's steaks, roasts and lean trim produced per M calorie of feed consumed by cows and their progeny to these two end points. One was the age end point (15 months) and the other was to (marbling

end point) the USDA low Choice or Small degree of marbling. I think that the tradeoff, if you go to an age end point as far as lean growth potential or size is concerned, is about an even thing. That is what I was trying to point out for the Charolais versus the Hereford-Angus dams. If we really insist on this high level of marbling, which I feel is unjustified, then there would also be a disadvantage to that end point. The data refers to progeny out of these kinds of cow types. Maybe I didn't make that clear. If we just use Charolais as sires on Hereford-Angus, then quite the opposite is true. We are increasing the retail product produced per unit of feed consumed. That's exploiting complementarity and that's why it's important.

Gene Allen: Larry, let's assume that we wanted to work out the mechanisms for the differences in retail yield and we had to pick some animals to work with. From a genetic point of view, what risk do we run in choosing Jersey and Charolais, because they are the furthest apart and therefore we might be able to find differences and identify them the most easily?

Larry Cundiff: I think the biggest risk would be attributing all the difference to lean tissue growth potential when there would also be other differences that have resulted from differences in selection for milk production or lactation potential, etc. So I think that those are two good examples to include, but I think in this kind of study we maybe should work with several types that present an array. In fact that's really a lot of the philosophy of why we try to sample such a wide range of biological types in some of the characterization work.

Al Pearson, Michigan State: In the first slide, the end point was constant age. Sirol and Graham in Australia a number of years ago published compositional charts which compared breeds at the same composition, of course they took a percent composition. They fit each breed to the same place on the growth curve. I was wondering why we always use a weight or age constant instead of trying to take the same place on the growth curve?

Larry Cundiff: In my opinion, these end points are very important in determining outcomes. But there is no one best end point. Composition end point has the same problems as the marbling end point. What we found, at least to a 19% fat trim end point, was that if we wanted to look at efficiency to that end point, the breeds that reached the end point the soonest were the most efficient (less feed per unit of gain). I think the differences are less at a composition end point perhaps than at a weight constant end point, certainly in terms of composition. But basically we're dealing with bimodal and trimodal distributions. It's just a matter of how you want to slice the pie. I don't agree that composition end points are any more valid for some purposes than age or weight end points. We might have a reason for good debate here, but that's the way I assess it at this point.

Al Pearson: Another question I wanted to ask was that you looked at the Jersey breed and I assumed you picked them out for a specific purpose, but you never looked at the Holstein. I was wondering if you'd comment on that?

Larry Cundiff: We did look at the Holstein. We looked at them as three-way crosses and compared them to Hereford, Brahman, Devon and Angus when they were mated to those F_1 cows of those seven sire breeds. That data has been published and we kept Holstein cross females until they were five years old and evaluated their reproduction and maternal performance. They have been very outstanding producers in terms of output. We did not involve them in any of our input studies, but based on work at Oklahoma and Pennsylvania, certainly Oklahoma and also at Wisconsin, we would anticipate that the extra outputs are at least offset, if not more than offset, by the extra feed inputs required. There is a series of papers coming out this year on a study we've done cooperatively with Wisconsin in this area (Ed Houser's work).

Tom Bidner, Lousiana State University: Mike, I was interested in that one big graph you put up where pigs are getting bigger and bigger and they were still becoming more efficient from the dollar standpoint. What about from a lean meat production standpoint?

Mike Tess, North Carolina State: Maybe I didn't make that clear. That graph was the efficiency of producing lean, and not the efficiency of producing weight. The interesting thing about that is that even though the animal is getting fatter and we're thinking about all the energy we're wasting depositing fat, when we consider just the efficiency of producing the lean, we are still doing a better job by letting it grow to heavy weights.

Tom Bidner: Where would the end point be? Those hogs were about 300 pounds and the curve was still going down.

Mike Tess: Well, the curve was beginning to flatten out. Much beyond that weight, I think, our model is really out of its limits.

Gene Allen, University of Minnesota: Mike, this is a broader question than you discussed today, but I'd be interested in knowing what's going on. You addressed the animal system and what I'm interested in knowing is whether there is any work going on in modeling relative to the total system of considering the land values for alternate production systems. Questions we could get from the people outside of animal agriculture in terms of economics of producing animals. Are there people working in the modeling area that are considering this total kind of picture and are they economists or do they know something about animal-plant agriculture?

Mike Tess: We are not looking at this problem at North Carolina State. We are using the assumption, if it's for tobacco, it's going to be used for tobacco. If it's fit for corn, it probably will be used for corn. We're looking at mostly land that's only usable for cattle. However, the modeling effort at Kentucky, which is more of a cow/calf system, might be considering some tradeoffs in terms of land, because they do put in their model land that's used for the production of hay. But I really don't know if there has been any evaluation in terms of deciding what's the best use of a given piece of land. We're not doing that.