Proceedings of the 1999
Program of the Research Center Administrators Society

February 1-2, 1999, Memphis, Tennessee

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Research Center Administrators Society

Annual Meeting

Memphis,Tennessee February 1, 1999

Welcome to Tennessee
Mr. Louis E. Buck, Deputy Commissioner,
Tennessee Department of Agriculture

I bring greetings this morning — greetings from our governor, Don Sunquist, and our commissioner of agriculture, Dan Wheeler. It is good to be standing in front of a group of allies. I find myself more and more — even if I'm at the Rotary Club — having to explain ourselves and what we do. So it's good to be standing in what I'm sure is a group of allies. Because, you know that more and more people don't understand what it is that we do and what it is we do in production agriculture. They certainly don't understand production ag issues, whether it's in Tennessee or throughout the South. Here in Tennessee, clear cutting of trees, is a controversial issue, but let me assure you, the Tennessee Department of Agriculture still believes that raising animals for food, spraying pesticides, cutting trees for profit are honorable professions.

We are a bit unusual within our state government operations. The Tennessee Department of Agriculture has a fairly unique relationship with our sister agency which is the economic and community development department. If we are recruiting a soybean crushing plant for Middle Tennessee, then you will see our folks on the plane along with the economic and community development folks. We have a very good and unique working relationship with the economic development side. Probably more important, these days, we have a working relationship with our department of conservation. In some states, their ag department and other departments butt heads because I know some of your commissioners in some of your states and that's firsthand. In Tennessee, if one of our farmers or one of our lawyers is in trouble environmentally and they get turned in, the first state folks that will be on that farm are our folks. You get three chances to work with us and our cost-sharing programs. If those kind of things can't convince you, we can't convince you by twisting your arm, then you go back to the environmental folks. So that's what we are about at the Department of Agriculture. We are about moving our industry forward and producing things that the market place demands, while, at the same time, finding that balance.

I was driving in last night from Nashville on I-40 and I looked down and I was speeding pretty good and I saw some blue lights going down the way. Most folks when they see blue lights, they have two reactions: They either hit the breaks or the gas pedal. It reminded me of a story of this fellow on Friday afternoon. You know about Nashville traffic. It can be frustrating. And our speaker of the House has made it his agenda to focus on the Tennessee Department of Transportation and the road projects and delays. I recall a story where a fellow was going home on a Friday afternoon and he was frustrated. He had a bad day, a bad week. Looked in the rear view mirror and saw blue lights. He said, "I don't need this." So, he stepped on it — 65, 75, 85, got right on his bumper, blue lights going. He got up to 95 and said, "I'm not going to be able to shake this guy." So, he pulled over and the trooper comes stomping up and he rolled his window down. He said, "Buddy you were doing 95 mph." So, the fellow steps out says, "Well we've both had a bad week." The fellow said, "I was going home too." Trooper said, "I have a good idea, I'm just going to lock you up and throw you in jail, unless you can give me one reason, why I shouldn't, I'm just going to haul you in." The fellow paused a minute and said, "Well, sir, six weeks ago today my wife ran off with a trooper and when I saw those blue lights in my rear view mirror, the first thing that popped into my head was, oh no, that fellow is bringing her back!"

You heard some of our state diversities in my introduction. Tennessee and Tennessee agriculture is diverse. If you're familiar with East Tennessee and places across the Tennessee River like our experiment station in Knoxville, it's rolling and mountains for the most part. Dairy country is down in the Sweetwater Valley. Beef, tobacco, and dairy products, all of that makes up about a billion dollars of our state's revenues in the Eastern part of the state. Move westward towards the Cumberland Plateau. The Cumberland Plateau is the heart of our hardwood lumber industry. It's one of those assets that's almost overlooked. We don't manage our woods on our farms like we should for revenue. We have a division of forestry at the Department of Agriculture, so we're a bit unusual in that way too. We have all of the forestry, fire fighting, and forest management responsibilities. Lumber exports out of Memphis are 22 million. That's the number one category in ag related products. As you move on into Middle Tennessee, particularly southern Middle Tennessee, in our counties like Lincoln, Giles, Maury, you have the heart of our beef cattle country. Warren County was once the nursery capitol of the South. We are trying to help make some changes to restore that. Some other states have captured some of that market share and we're working hard to get it back. If you count Tennessee and Kentucky together we have more cattle than the rest of the south combined except for Texas. We're number nine in the U.S. in terms of beef cattle. West Tennessee is our crop country, right here where you are. We're real proud that last week we passed the boll weevil eradication program by 78% approval. That is a good example of what happens when the Department of Agriculture, extension service, and the Institute of Agriculture work together because that's not an easy sell. Our farmers approved on a 78% vote to pay the whole ticket. Our farmers believe in that program and they approved it 100%. Now our job in Nashville is to go to work and get them some relief. We know that will make a big difference in this cotton industry in West Tennessee over the years to come.

Over all, agriculture represents about one-fourth of the Tennessee total economy. It certainly remains the anchor of our rural economy. Tennesseans are warm and friendly, generally, conservative and hard working. In Tennessee and Tennessee agriculture you're never very far from people and neighbors and you're never very far from water. Those are two of our biggest challenges to production ag in Tennessee. I'm going to pull a quote from Farm Journal that I saw. It says, "People living in subdivisions with fancy names don't want to smell hogs while barbecuing pork loins in their back yard." That is true in Tennessee. Let me update you a little bit because last Thursday I was with our swine producers in Jackson, Tennessee. People living in subdivisions with fancy names don't want to smell eight-cent meat while they're barbecuing three-dollar pork loins in their backyard. That makes it a little more relevant. We certainly have some challenges in the pork industry, but if you stop and think about it, there's no group I can think of that over the years, over the decades, over my lifetime that have a bigger impact on feeding and clothing the world. We would say in Tennessee that you needed to be economically viable to make a living farming. Then, it was economically and environmentally. You had to pass those two. However, now a days you have to meet environmental regulations and it has to be socially acceptable. We have some opportunities out there and there are solutions to these. We are trying to do some things, working with our partners here in Tennessee.

Three years ago, almost four now, our governor wanted a panel to make recommendations. His charge to that panel was to come up with strategic initiatives that improved the livelihood of our farmers. I can tell you that we've checked off three-fourths of those. Seventy-five percent, which is pretty good for the government. Just making promises on a lot of specifics wouldn't be relevant to a lot of people in other states. Let me just share a couple of what, I think, are in the big picture. It may be taken for granted but I think we have a good working relationship among the workers in Tennessee. All the folks in ag are working together, as well as folks that I'm around say that they ever have. That is important. There's a couple of big issues brought forth when we have public meetings in Tennessee. The biggest that we've heard is that somebody needs to do something to increase the awareness of the public about the

importance of agriculture in Tennessee. Our farmers really just didn't feel appreciated and didn't feel the importance of the contribution that they were making. That's probably true for a lot of states. Those are big issues and hard to live with in changing public opinion. We have two initiatives under way in Tennessee that resulted from that and I would like to share them with you. First, we called our public relations team. Now any time there's an idea, and a lot of people pull up scarce dollars, this tells you that it is probably a pretty good idea. Our team is developing a series of commercials which all comes together from scarce dollars to make one single point; and that point is: If you move to the countryside you want production agriculture in your community. That's going to be the sole point of the first series of commercials that will be on television probably sometime this spring. I always say when I speak to suburban Civic clubs that if you move to the country and live in a subdivision, you like looking across the road at that fellow with a red barn and maybe he's got white fences. You like looking at his cows, but when he decides he needs to grow a couple of acres of tobacco to make ends meet or maybe he needs to cut those trees that you enjoy looking at in the fall. We try to make a point that if you are not at least tolerant of some of those production ag issues, you may look across and see that guy sell out and we could have another subdivision. So, we're trying to make the point, that we've got to have a little bit of tolerance out there in that urban interface.

Our second major initiative that is just getting underway is really centered here in Memphis. We have contracted again with all of our partners up to about three hundred thousand dollars to figure out what it is that we do particularly well. I know that we do some things well. We are not quite as productive as Iowa in corn and Illinois in soybeans. We are going to look at the various parts in Tennessee in terms of what our competitive advantages are for each of those areas and then take it a step further. Knowing what we can grow, we are going to match that up with whoever in the world needs that or needs that production. Then, we will go and find a site and make it real easy for someone to come in and build that mini mill or whatever matches up with that economy. So, it's a very focused agri-business development. We are very proud of both of those and we think that it will have significant results long term.

At breakfast this morning, across the street, your colleagues from Virginia asked me to preach a little on tobacco and I won't preach long. John mentioned that I am from Robertson County, which is one of the leading counties in tobacco. I'll ask a couple of questions. Any time that I'm in front of educators, I always want to give you guys a test because that is what you did to me. Briefly on tobacco, just a couple of thoughts, my understanding on the tobacco issue just a couple of weeks ago is that a working group or sub-committee of the governor met last week to start working out some of the details. In Tennessee, tobacco is very important. We have a lot of folks that grow tobacco and grow very small acres to be able to put Christmas presents under the tree. It buys a pickup truck, and it puts a lot of kids through college. We are proud, in Tennessee, that our governor, both the Speakers of the House, and our attorney general all stayed together on this issue. We never sued Tennessee tobacco companies. We are only one of about five states that never sued. The only reason that they did is out of respect and recognition for tobacco farmers in Tennessee. They stuck together and they made a statement. Let me just read this quote: "I know that there is a great concern about the future of tobacco farming. There has been a shift in public opinion about smoking and that is fair enough, but it is not fair to punish the people who play by the rules and grow a legal crop for use in a legal product. I am interested in fairness for the farmers who grow tobacco. I am interested in getting a fair settlement for the state's cost of caring for those with smoking related illnesses. I am not interested in providing a pay day for trial lawyers and I believe that we can resolve the issue without the grandstanding that we have seen in some other places." Governor Sundquist said that this past August. I think that if you look at the settlement and how Tennessee handled the settlement, I think that he achieved those objectives.

One of the other things that we do at the Tennessee Department of Agriculture that is a little bit unique is that we have a responsibility for our youth access to tobacco law. Typically, in most states, and

we are the only state in the union, and I don't know why that we are often the only state involved in some of these things, but we are the ones that go in undercover with kids trying to see if cashiers sell cigarettes to our under age minors and you would not believe the legal obstacles that we have to go through to get to use an under age kid in an operation like this. We accepted that responsibility to decide that the dirty work needed to be done in Tennessee and we would do it. Our first assessment, about a year ago, found a 62 % violation rate. A year later, we did thousands of these things and the number is down to about 37 % violation rate. That is a 25 % reduction from the original number. The second year of that program and a lot of that is from awareness, knowing that we are out there and the industry is doing a lot of advertising to be careful and our last numbers were down to about 24 % violation. So, the majority or three-fourths are not selling to the kids. What I always say to groups, and I believe it with all my heart, we will do our job and we will drive that number down to 5 or 6 % and we will be able to document that kids are not buying across the counter, but I have no hope that it is going to make a bit of difference in kids having cigarettes on the streets. The USA Today says that when they survey kids on what is the hardest things to get that marijuana was the easiest, alcohol was second, and cigarettes was third. So, a lot of people look at the government to solve that, but the answer is at the other end of the supper table. That is a parent's responsibility to keep your kids off cigarettes not the government's. We will do our job and we will drive it down to 5 % and we will spend a lot of FDA's money doing just that.

I noticed that on your agenda that you are going to look at some technology issues. That is another one of the things that this panel of experts told us to take a look at. We are real proud that the University of Tennessee in Knoxville is going to build a brand-new $23 billion biotechnology and kinetic engineering facility. Just reading a few quotes from a recent Wall Street Journal article: "In a few decades, probably 75% of the food eaten will come from genetically engineered crops."

One of the other things that we like to do in Tennessee is make fun of some of our competitors. We seem to always pick on Auburn. Today, I told you that I would explain that "Vandy thing," let me just tell you a story. You do get to meet some interesting people when you go across town to a place like Vandy and you do need to know some lawyers and some doctors and things like that every now and then. I do recall once I was traveling with a few of my Vandy buddies up into the Midwest and it got to be lunchtime. So, we pulled off into this little market and I went in and said that I would like some maters, taters, and some onions. The clerk looked at me and said, "I bet you're a Tennessee graduate." I said, "Well, yes as a matter of fact I am. How could you tell?" The clerk said, "Well I could tell by your accent." So we got the groceries and went on. It got to be about suppertime and a friend from Vanderbilt said well let me try it this time. So, we pull off and he went in and saw the clerk. He said I would like some tomatoes, potatoes, and onions. The clerk sort of looked at him and said, "Buddy, I bet you're a Vanderbilt graduate. Aren't you?" He said, "As a matter of fact, yes I am. Could you tell by the way that I speak?" The clerk looked at him and said, "No, buddy, that's not it at all. This is a hardware store."

Let me just close with a thought. My first day at Ellington Ag Center was memorable. Our commissioner, Dan Wheeler, who is one of our senior spokesman on agriculture in Tennessee, our former commissioner, Red Moss, who is the longest serving commissioner of agriculture in Tennessee, Mr. Jess Safley, retired extension director was in the commissioner's office the first day, talking about a lot of the upcoming challenges and a lot of other things. Jess boiled it all down for us, crystal clear. He said, "Fellows, all a person really needs to have an opportunity to be successful in life is a good church, a good family, and a good education." I think as long as we keep that kind of wisdom around us, we can remain optimistic about the future. That is what y'all are about and that is what we are about and I am glad to be a part of it.

Overview of the Tennessee Agricultural Station

Dr. D.O. Richardson, Dean

Tennessee Agricultural Experiment Station

John gave me an assignment to talk to you about an overview of our research program. A couple of years ago we had the opportunity to speak to our board of trustees in the agriculture committee. I gave John the assignment of visiting somewhere in our research program. But in the process there were five different seniors before John and they all were long winded, so by the time John got up we were essentially out of time. The president of the University let us know that it was important we stayed on time. So John got up and I let him introduce the topic and I gave him the sign and jerked him out. He's been waiting for an opportunity to have revenge ever since. So I'll give the stand very quickly.

I did poke a little fun at Joe High and Dennis Onks and those that have stood up and I want to emphasize to each of you that we're very proud of our research management team and in that team we include our department heads and station superintendents. We have an extraordinarily fine group of experiment station leaders and I'll talk more about them as I go through but I want to emphasize how important they are in developing our program. Before I get into talking about giving an overview of our program I want to re-echo Louis's welcome. We're pleased to have you in Tennessee. I know that you tend to come to Tennessee often, you've been to Nashville a couple of years ago and so forth so hopefully, we don't overwhelm you with information about Tennessee and our philosophy. But I do want to re-emphasize that you are most welcome to Tennessee and I hope you come back often.

What I want to do today is talk to you a little bit and communicate. I believe very strongly that communication is whatever thought I have reaches your mind as the same thought. So, if we communicate we're ahead of the game; I saw this joke in Hoard's Dairyman, it's one that I think is appropriate because I often find it mistaken and a lot of folks find it confusing and so forth. It says, "Ok, I'll hold the post and you hold the hammer. When I nod my head hit it." So hopefully we're gonna hit the post. I'd like to start out with a little bit of description of Tennessee agriculture. I think Louis did this very well too. But I want to tell you that it's our philosophy that a land grant university sets to serve the agricultural sector of the economy of the state. Our institute of agriculture is dedicated to that principle. So I think if you're going to adjust your program and so forth you really need to look at what is your client base? What is the agriculture like in your state? And as Louis indicated we have many, many small farms. We have some large farms too, but the blend of this gives us what we have currently, about 80,000 farms at about 120 acres. We also, as Louis indicated, have a very strong forest sector. About half of our landmass is forested. Forestry is a part of our agricultural experiment station just like it's a part of the Department of Agriculture. So, we're focused on that forestry land as well. And 70% of those acres are owned by private individuals, so we're focused on applying technology that will allow them to use that land to support them.

I see that this didn't transcript very well and I also had a typo in that part so maybe it's good that it didn't. In 1997, our residual farm marketing was $2.3 billion. Fifty-six percent of that comes from crops. About 12% in 1997 were from soybeans, about 10% from tobacco, about nearly 10% from cotton and other crops like nursery crops, etc, come in there very fast. That happened to be a bad year for livestock production so it was down to about 44%. Historically, our trend has been about equal between livestock and agronomic crops. But our livestock is very heavily focused on cow/calf operations and 18% of our farm marketings were cattle and calves. Broilers have changed dramatically over the last eight to ten years. They have gone from a very minor amount up to basically the second leading commodity in the

state. So, when Louis was talking about the number of broiler houses that have sprung up across our state, this is dramatic. Dairy is sliding a little bit, and it's down to 9.8%. We don't have swine up there but swine too, is drifting down. As Louis said today, we do have a very diverse agriculture. I'd like to focus just a little bit on another dimension of our agriculture and I asked a year or so ago one of our ag econ professors to give me a statistic that's readily available as farm gate sales. But that doesn't really reflect what we define as agriculture. So I asked him to give me a good descriptor of the other and he looked at it and provided me with these resources and this happened to based on the calendar year 1994. That year the production section generated $2.6 billion which is the equivalent of the farm gate market. In his analysis, he said the processing sector from following those food components on through processing added another $11.6 billion. Forests and forest products development added another 9.3 and in our institute of agriculture program, wildlife and fisheries and so forth added another 1.3 billion. So the total impact of agriculture in that sense is $22 billion, or 9% of the total state economy. That's pretty dramatic and agriculture is important in Tennessee and consequently the Legislature and the Governor and others do focus on dealing with agricultural issues. Ag economists say you can assume it will multiply as each dollar generates a little more impact and turns over new agriculture. Back and forth, back and forth. It is, as I mentioned, the Institute of Agriculture's responsibility to focus on enhancing that industry.

Every state has a very similar mission with their land grant institution. However, each of us tend to develop and focus on it a little bit differently, and I thought I'd share with you just a little bit about how our organization is unique, how the Institute of Agriculture is unique and what the focus is.

In our case, our Institute of Agriculture is headed by a vice president. We have a new man on board, Dr. Jack Britt, who came to us last year from North Carolina State and became vice president in August. I'm sorry, it was later than August, he joined us about October or November. He answers directly to the president of the University of Tennessee, and at the same time that we have the University of Tennessee system with four campuses, we have a board of regents system that operates the regional universities and the junior colleges. So, this is one part of higher education in the state of Tennessee. Answering to the vice president of agriculture is our undergraduate and graduate teaching program, our agriculture experiment station, agriculture extension service, and our College of Veterinary Medicine. And in addition to that, two service organizations a business office and an ag development office. Now, within the agricultural experiment station we believe very strongly that our goal is to enhance the state's agriculture and developing technology. Several years ago, we went through all the procedures of developing mission statements, collectively coalescing those in terms of strategy and we collectively, including the station superintendents and department heads and others, defined our organization's mission as such that we exist to develop technology that will enhance the economy of Tennessee in a stable manner and to improve the quality of rural life.

Basically, how do we do this? We focus on solving real life problems, providing education, training students, and finding opportunities for the agricultural sector. In that process we try to find our major clientele base. I think this is what keeps us focused and drives our programs. We defined our client base as the people who would pay money for the technology that we develop. Often times our people tend to think that we work for the consumer and I think the consumer ultimately benefits from our technology. But the people that would pay money for a new soybean variety or a new herbicide control mechanism, etc, are the people producing commodities, the people processing commodities and that type of thing. So, we look at our primary client base as being operators, owners, managers of farms, timberlands, greenhouses, etc. And second are those agribusiness, supply and production firms which market or process agricultural commodities. And then we look at another important client group which is those other professionals, the extension agents, consultants, regulators, policy makers. And those are the people we think are the primary drivers to you all in technology development.

O.K. we're relatively small compared to many agriculture experiment stations. We have currently about a hundred FTEs of project leadership. Those are distributed across nine different program units. Those are the rather typical ones that you would have in land grant universities. Our branch stations you'll see later are distributed across the state. So, we tend to look at ways for them to utilize our field staff. We have beefed up our experiment stations in terms of manpower to make that process more efficient. As I mentioned, our stations are scattered across the states. Louis also referred to this in the fact that we have stations in the mountainous regions of East Tennessee, in the more grassland oriented middle Tennessee, and then have four stations in our row crop area in West Tennessee.

We have great pride, as I mentioned, in our branch station system. Each one of our branch stations is headed by a superintendent and I emphasize to you that we expect our branch station's superintendents not only to manage his stations resources but also to serve as a catalyst in developing some aspect of a research program and to serve as a form of contact for one of the many clientele groups we might have in the state. So, Phil Hunter is our strong catalyst in developing our tobacco research program. He's also one of my principal contacts with that important sector of our agriculture. Each station is expected to develop a major technology trend for production. We like to think that we do this pretty well. We're very proud, for example, of our Milan no-till field day that draws five or six, one year ten thousand people. And those are important to us as important recognitions of what our program is about. They also reflect the public's acceptance of what we are doing. We've moved away from having a lot of general field days. We tell our superintendents that when technology is available that needs to be transferred, let's develop and bring in that client group. We don't count the success of our programs by the number of people that attend but rather the quality of information that we deliver to our client group. So I believe our team is doing a great job and we appreciate the compliments that our participants have in our programs.

One of the things we try to stress as resources become tighter and the competition and utilization is becoming tighter, is we're trying to develop a specific focus for each of our branch stations to avoid having to buy a hundred and twenty five thousand dollar cotton picker for every location, this type of thing. So, we're trying to focus our program. Sometimes that's difficult to accomplish because we need to serve the local client group and they want to know how certain varieties perform in their area and so forth. But we do spend a lot of time looking at what is the most efficient way to manage our resources and get the maximum. So we're asking each superintendent to help the focus we have to maximize our resource area. A couple of things to conclude with, in our operation, we try to stress the point that the public comes to us for answers to problems. They don't come to us to find out what was the biological implications of a decision. They come to us and want a complete answer. They want to know what was the biological results, what was the economic outcome, what was the environmental consequences? So, for us to address this, we have to form collaborative teams within the agricultural experiment station to address the issues. And scientists tend to prefer to operate as individuals, so we try to create an incentive structure that encourages that kind of team building and participation. One of the ways we've done that is to focus on what I would call the research mission. We try to identify four or five topics, we add one occasionally, we subtract one, that are areas we think we can really make a maximum impact. And then we collectively try to encourage scientists across many departments to blend their talents to answering and making something happen in that area. The areas that are very high on our list that we define as initiatives at the present time include water quality, precision farming, we have one in dogwood breeding and disease control (that relates to the nursery industry.) A major problem they were having, what we call as a vegetable initiative, and frankly that's to develop diversity in our income picture particularly with the threat tobacco might have. We need an opportunity for people that were growing tobacco to have diversity in a high value crop either to compliment or replace tobacco. And in the last year we added food safety because that is a major issue particularly important in our livestock sector as well.

We're asking our scientists in particular that we put a little bit of our resources in, but more important than anything else is just standing up and saying that this is an important topic and we need your help in solving it.

Other strong collaborative programs that maybe we don't call initiatives but when you talk about collaboration you get some of these. Some of these are listed as well. Fescue toxicosis, tobacco production systems. We never formally called that group an initiative group but they were our model for what can happen when scientists work across departmental lines. We have always had a very strong group, Phil Hunter is an integral part of that, of project leaders and station superintendents working to address problems. When I look at where do we have an impact, how do we make impact as I drive across the state and I can see that group's tracks all over the state. Curing structures, production technology, marketing, etc.

As I said we're relatively small as an agricultural experiment station. This year our money mix is about a $31 million operation. You can see, in our case, most of that comes from state appropriations, 57%. Many of your states, what we call product sales off of the branch experiment stations and so forth may go back to your legislature, so I add those two together when I look at the state's input into our program. That's the reason we're focused very strongly on enhancing our state's agriculture. Most of our resource base comes from state appropriations. The federal component is gradually eroding over time.

We started with a description of our agriculture. This takes a look at one of the recent years in terms of how our research expenditures have improved our state's agriculture. If you look at that you can see that we're focused on our commodity groups, obviously livestock operations require a lot of resources the way we account for expenditures and so forth. We tend to make sure that there is some relationship with our expenditures and our state's agriculture. Then there's non-commodity research that is generic. I think it's important for us as I wrap up and close to emphasize that we're change artists. We're involved in making changes in society. Sometimes we get concerned about changes. And I thought this phrase in this interview was pretty dramatic, "A bend in the road is not the end unless you fail to make the turn." And since we're in the business of making changes I think it's a fair honor and we should not resist change. Historically land grant university system has had a remarkable set of successes. As we develop technology we have changed the way things happen. I can't think of a more dramatic emphasis of this than the ratio of the number of people fed by a single farm. That figure has drawn (this chart is a couple years old, the figure is probably higher than that now) but the reason that that has been allowed to happen is that we have been effective in developing technology and I would suggest to you that the evolution is only started. We need to continue to be effective and if we are effective we can have vibrant successful agricultural sector. Again, may I conclude by echoing Louis's comment, "Welcome to Tennessee, we appreciate you."

Institute of Food Science and Engineering and Its Programs

University of Arkansas Division of Agriculture
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The concept of the Institute of Food Science and Engineering was developed in 1994, and in 1995 start-up funding of the Institute was made possible with the use of state funds allocated by the Division of Agriculture. With the award of a Special Research Grant administered through the Cooperative State Research, Education, and Extension Service in fiscal year 1996, the administration of the Division of Agriculture of the University of Arkansas established the Institute as one of its major research and education initiatives.

Mission of the Institute

The Institute of Food Science and Engineering serves as the primary entity in Arkansas for research, graduate education and Extension to help ensure that the food supply is high quality, wholesome, palatable, safe and nutritious; that value is added to raw agricultural products to enhance economic development of the state, region and nation; and that the nutritional needs of society are understood, communicated and met. The Institute provides technical advances in food processing and packaging that foster safe, energy-efficient, environmentally responsible processing methods to assure that Arkansas and regional processors remain competitive. The Institute promotes and facilitates multi disciplinary research that will result in new value-added products and the recovery and conversion of co-products to higher-value items. Its multi disciplinary approach has successfully developed alliances between academia and industry; fostering an appropriate balance between fundamental and applied research in program areas that are critical for growth of food processors in the state, region and nation.

Structure of the Interrelated Centers of the Institute

The three interrelated centers that comprise the Institute focus upon the various elements necessary for the IFSE to meet its stated mission (see diagram below). In addition, complementary areas such as Biotechnology, Consumer Issues and Economics must be embraced for the Centers to function appropriately. Additional support will emerge from other centers within the Division of Agriculture and with other universities and state and federal agencies.

The Center for Food Processing and Engineering is the flagship center of the Institute of Food Science and Engineering. The Center for Food Safety and Quality was activated in 1997 and the Center for Human Nutrition is scheduled for activation in 1999.

Research Programs

The research program of the Center for Food Processing and Engineering has partnered with forty companies in seventeen states and four foreign countries. Center researchers are required to obtain the financial support of industry to sponsor their research. The Center's procedure is then to match the industry contribution (to a maximum of $25,000 per project). Thus far, affiliated scientists and the Institute have received $895,007 from industry, in addition to equipment contributions of approximately $434,000. The Center has been particularly successful in establishing research alliances with the rice, poultry and the fruit and vegetable processing industries.

The Rice Processing Program was formed to provide multi disciplinary approaches to directly address industry research needs. Two meetings are held each year for its fourteen corporate sponsors. These meetings are designed to communicate research results, update sponsors on overall activities including opportunities for student internships, and perhaps most importantly, to openly discuss and seek input on future direction from sponsors. Projects underway are in four main categories of rice processing research: drying/conditioning; storage; milling; and quality assessment. Projects are designed with a multi disciplinary perspective to take advantage of the full range of research capabilities and facilities at the University of Arkansas. One multi year investigation examining how to reduce rice kernel breakage has an economic impact of over $10 million annually.

n addition to performing the annual national evaluation of pickled vegetable products at the University of Arkansas, an Institute research group is actively involved in a research program directed toward increasing product value for the pickled vegetable industry and enjoys significant industry support. Research has been conducted in the areas of improvement of texture, flavor and taste. Improvements already implemented by the industry result in a potential economic benefit of $500,000 annually.

In addition, research efforts have produced a substantial improvement in the natural sweetness and overall flavor of baby food with an economic value of $2-3 million. Projects continue to increase consumer acceptability of processed vegetables, as well as to screen raw products for more consistent product quality, and to select new breeding lines for improved processing traits. One project working to improve the product quality of potato chips promises an economic benefit of $5 million annually.

A major objective of the University's viticulture and ecology research has been to develop mechanized vineyard systems that provide as good, or better, juice and wine yields and quality as hand labor. Research has shown that if grape clusters are exposed to sunlight, compounds which improve the aroma and flavor of wine are increased. This exposure can be accomplished by positioning the growing shoots and by removal of excessive leaves in the fruiting zone. The cost of performing these quality-improving operations by hand is prohibitive, and new mechanization systems have been developed to successfully accomplish these operations. In addition, machines have been developed which will perform mechanical thinning of shoots and fruit, mechanical pruning in both summer and winter, and mechanical harvesting of new trellising systems. Research has shown that implementation of these systems, not only costs less than hand labor, but can also improve fruit composition and quality. The fruition of thirty-three years of research, the Morris-Oldridge Plan is a pending patent application which is the property of the University of Arkansas. Vineyard operators all over the world have expressed a high level of interest in the systems. These systems will allow the grape industry to produce high quality value-added products and remain competitive on a local, national and global basis, with a potential national impact of reducing production costs by at least $2 million annually.

Other research projects underway include *Value-Added Edible Films from Cereals and Soy Protein, Descriptive Sensory Profiling of Yogurt Products, Prediction of Poultry Texture by Spectral Stress Strain Analysis, Ambient Temperature Separation of Rice Hull Silica and Carbon to Create New Value-added Products, Identification of the Red Pigments in Bleached Deodorized Canola Oil, Electrical Pasteurization System for Brine Chillers, Incorporating Quality Factors into a Coupled Heat and Mass Transfer Model for Cooking Poultry Meat,* and *Packing Line Vision Robotics System for Defect Removal.* Affiliated scientists have presented discussions of their work at colloquia, and refereed articles have been accepted for publication. Internships have been provided for students; several highly qualified students have received jobs in the food processing industry.

Thermal Processing and Product Development

The thermal processing program is rapidly gaining momentum. In addition to applied research projects assisting commercial food processors with thermal processing and quality programs, pilot plant facilities are used to mimic retorting operations to produce benchmark results in trial runs of new products or to improve existing products. Advanced analytical equipment is also available to measure the color, flavor, texture and nutritional content of processed products. Processed products can be evaluated for quality by a trained descriptive analysis sensory panel. The Institute offers product development support for a wide range of clients.

Experienced scientists and production personnel can develop products and produce small runs of finished product for evaluation. The IFSE staff has assisted large, national food processing companies in development and quality improvement of thermally processed products as well as serving small commercial kitchens and those just beginning. The initiative to provide technical support to new food business entrepreneurs continues to generate numerous requests for assistance. In addition to offering assistance upon request, a comprehensive guide, Starting a Food Processing Business, is offered for sale. Individuals interested in starting a food processing business are provided with information on such topics as regulations, safety, labeling, ingredients and packaging. In addition, information is provided on financial aspects of starting a business and on marketing products. The free publication, Starting a Food Business, provides an introduction to the above topics and serves as a starting point for establishing a new business. Other publications include fact sheets on such topics as Acidified Foods, Processing Herbal Foods, Handling Fresh Fruits and Vegetables and others. An Institute newsletter is also published quarterly.

Our Extension Food Processing Specialist and Extension Foods Specialist, in addition to providing support for our product development program, have begun a pro-active industry outreach program. These Specialists also have supervisory responsibility for most of the educational workshops and seminars scheduled. The Institute is involved in a wide range of education and Extension activities including an annual Better Process Control School, HACCP (Hazard Analysis of Critical Control Points) System workshops, safety and sanitation seminars, etc.

Descriptive Sensory Panel

The Institute was quite fortunate in being able to acquire a trained Sensory Panel for descriptive sensory analysis, assembled and trained at a cost of approximately $200,000 by Campbell's Soup. The panel was trained by Sensory Spectrum Inc. of Chatham NJ, one of the most renowned sensory descriptive analysis laboratories in the United States, and allows for analysis across a wide range of commodities. The University of Arkansas is the only university in the nation with a Sensory Spectrum descriptive panel trained to conduct flavor and texture profiling. This asset is now self-supporting, having functioned as a "Service Center" within the University since July 1, 1997, designed to provide its services at actual cost to both industry and University researchers.

Sensory evaluation, especially descriptive analysis, is a vital part of food research. The Institute's Descriptive Sensory Panel is a highly trained group of individuals, used to qualify and quantify sensory properties of foods. Descriptive sensory evaluation has uses across a wide spectrum of activities. Examples include: 1) *Product Improvement:* Identify sensory properties that need improving and confirm that the improved product incorporates those changes; 2)*Consumer Testing:* Assist in the design of tests and interpretation of results; 3) *Process change or Cost reduction:* Confirm that no perceivable differences exist between control and test products; 4) *Quality Control:* Ensure that products sampled throughout production have consistent sensory characteristics; and *5) Storage Stability:* Evaluate sensory changes over time with respect to shelf life, processing and packaging. The professionally trained, permanent descriptive panel has the ability to precisely describe food products in terms of their

appearance, aroma, flavor and texture. The program has enjoyed great success and has done work for many national companies. Major reasons for this success is the quick turnaround time for industry R&D projects as well as reasonable evaluation rates. The panel is also involved with research projects such as evaluations of rice quality, fortified wheat flour, pickle crispness and carrot bitterness, as well as sensory profiling of southern pea pods and texture profiling of potato chips.

Sensory testing is conducted in a state-of-the-art sensory laboratory in compliance with standards of the American Society for Testing and Materials. To meet the great demand, a second group of panelists is presently being trained.

Food Safety Activities

The Arkansas researchers working in the Food Safety Consortium (FSC) are now under the auspices of the Center for Food Safety and Quality (CFSQ), providing integrated multi disciplinary approaches to research, technology transfer and education/extension activities to enhance the safety and quality of foods. At the present time, the CFSQ researchers have prepared budgets and received funding separate from the FSC.

The current Arkansas CFSQ/FSC research team is made up of three researchers from UA Medical Sciences, one physician-researcher at the Arkansas Children's Hospital in Little Rock, and eight UA researchers from four departments (Agricultural Economics, Biological and Agricultural Engineering, Poultry Science, and Food Science).

Currently, the CFSQ funding has been devoted to poultry processing, one of the largest processing sectors in our region. However, recent food safety concerns, with such fruit and vegetable products as raspberries, apple cider and sprouts, certainly indicate that the safety of these products needs to be addressed as research funds for these purposes can be secured.

FAO Center of Excellence

Activities to assist food microbiology and safety questions and concerns have recently assumed an international component. The United Nation's Food and Agriculture Organization (FAO) has designated the Institute as a Center of Excellence for Food Quality, Safety and Nutrition Secretariat, and provided funding to support this activity. The Secretariat works closely with the University of Arkansas Cooperative Extension Service, the Food and Drug Administration's National Center for Toxicological Research in Pine Bluff, Arkansas, the National Alliance for Food Safety, the Food Safety Consortium, the University of Arkansas for Medical Sciences, and other groups from around the country to coordinate and facilitate the FAO's food quality and safety work.

As a first Institute project activity with FAO under this new agreement, a "training of trainers" project for the safe production and handling of fresh produce from Mexico and Central America has been jointly developed. Plans are now underway to develop the educational materials and curriculum for the first regional training course to be held in Costa Rica in May 1999. It is anticipated that this course will serve as a spearhead to national-level training programs targeted towards specific needs in countries related to the safe production and handling of fresh produce.

Using GIS and Database Management for Agricultural Resource Management

Dr. Dean Pennington, Director, Yazoo Mississippi Delta Water District

Before I go on to some of the talk, it might help if you know a little bit of the background of where I have come. That might help some of this make more sense. Those of you from the South know that I am not from the South by listening to me this long. I am originally from Idaho. After finishing my degree in soils in Idaho, I worked for five years in the extension service at the University of Arizona. I worked for two of Jimmy Smith's predecessors at the Delta Branch Experiment Station in Stoneville for two years in research, and for the last nine years I have been the executive director of the Yazoo, Mississippi, Delta Water Management District. And just a tiny bit about the district, the delta region of Mississippi gets about fifty inches of rainfall a year but we still have more irrigated land now than Arizona does. We irrigate about a million and a half acres of land just in the delta area. So water has become very important in the Southeast, not quite the magnitude of Western states as it is in our parts of the country. And management of water and water supplies has got a lot more tension. Arkansas is going through some real misery right now. And in the new issues that just came up recently, was some of the changes that the clean water act point out the need for water quality being important issues. Our interest is dealing with water resources with agriculture, since farms are our biggest land users and our biggest water user. How are we going to put together programs to deal with water resources integrated to farming, understanding farming, understanding the land owners and how or what we need to do, and what resource management works for them and still obtain some of the goals we've got to work towards in modern resources? So that's a lot of what we work toward.

Although we're a water management district with a staff of ten located in Stoneville, we still spend most of our time, about 99% of our time, worrying about the agriculture bill. And so what I want to show you today are some of the ways that we have come up with managing a lot of the information the we have developed over the years that allows us to deal with water resource issues across the entire hill, which is six thousand, six hundred square miles (6,600 square miles) and with that same system of data management go right down to the individual fields and look at the precision farming and how that data can work. So, when I'm showing you some of the slides we're going to cover here in a few minutes, a lot of my examples are going to be regional in scale, and they're going to have mostly a water and row crop attitude toward them. If you would, those of you that don't work in those areas, you can easily substitute entomology or weed science into a lot of those that are in these areas. So, even though a lot of my examples are going to be earmarked in one direction, please keep in mind when I talk about soil sample or water negative or a field that those comply to the types of information that you work with, either at the regional level, at the farm level, the field level, or even down at the plot level, in some cases experimental plot design.

What I want to start with is to show you how we use geographic information systems and beyond that, relativity databases and global positioning systems all are fairly routinely now. As an example, we have about five GPSs in our office that each of our staff work use in the field a lot and use very routinely. And we routinely integrate that into our database system in our computer system. What we have done is that we had to have information systems since we are a fairly young organization starting from the ground up. Managing our data electronically, very early on it got to be real obvious that to handle a lot of data efficiently, this was one option that could provide a lot of opportunities. Kind of something it starts with that gets back to GIS is everything that any of us do or any experiment or any piece of infor-

mation has got to have some place and every place is unique. So, trying to deal with that issue is something that kind of works together with the GIS systems of data management. To start with, this is a map of Mississippi, and what I am showing you now comes out of our geographic information system that's fairly inexpensive (less than ten thousand dollars) and runs on PCs. So this is not big fancy main frame stuff, it's fairly inexpensive, can be easily handled by our small staff, although I will admit that I have one exceptionally good computer systems person who does a lot of fundamental setup on a lot of these things. But here's what kind of got us started. In Mississippi, those are the counties I just showed you, water use is regulated through a permit system. We don't have water rights, we have permits. In Mississippi, any permit or any water use, through a well that's six inches in diameter or larger or any surface water use, has to be basically approved through the state Department of Environmental Quality for that site. Well, this is the location of about the fifteen to sixteen thousand water use permits in the sate of Mississippi. Each red dot representing one site. We can see that about 80% of the permitted water use in the state of Mississippi is in the delta. Basically, the blocked out red area is the Delta region of Mississippi, 6,600 square miles. Tennessee is just off the top of that map, just five miles off the North end of that map. Also reference for you, Vicksburg would be near the bottom end of that solid red area. About 350 miles long. But, the water management district took over the responsibility for managing all those water use permits. Water use permits have to be managed over ten years, they have to be renewed so we're representing a huge data management system. Those permits contain a lot of very useful information that can be used in making plans and understanding how water is being used and what we can do to make improvements.

What I've done here is an example where I've zoomed in on a small area with our geographic information system and each one of those yellow spots represents a well, if you can see it, and each one of those shaded areas with the dark background is a block of land that is permitted to have water applied. When you apply for a water use permit in Mississippi, you not only show where the well is located or where you will make the diversion, but for agriculture you have to show where the land is on some sort of a map that shows the area where you'll apply the water. So, what we were basically handed in this process is a huge amount of very valuable data. We had things on this like well location, well diameter, well volume, horsepower, casing diameter. Then we had things like the land in terms of, physically where the land was located, how many acres were involved, what crop type was going to be grown on it. And you can see that if you've got all that type of information in the delta, about 13,000 water-use points, you have a couple of things; one, you have a lot of data to manage with a lot of potential for doing regional analysis and you have a lot of opportunities and a lot of responsibilities to use that information efficiently. So this is really what pushed us over the edge to get started in geographic information systems and more efficient ways of handling electronic data. You can look at where we've kind of used the delta region as our farm. Where we refer to regions the size of the delta, those could basically be planting units down to the farm or the field. Scale doesn't matter one bit. Those individual fields there that are outlined are 100 to 200 acres in size, they could be 100 to 200 miles in size and still be managed quite nicely in this system. They could be 100 feet. So this could also represent, again, not wells and land, it could represent information about insect types, weed types, weed pressure, soil types, really a whole range of issues that a lot of the times we deal with in water and crop management. And the other thing that the white bar along the right side represents is that each one of those points, each one of those fields, is not just a visualization on a map. Associated with each one of those features in this geographic information system is a wealth of text data that tells you about it. If we go to any one of those individual fields and retrieve the information from it very easily, just with the click of the mouse, it tells us who owns it, who operates it, what profits more, how old their permit is. That information is all residing very easily right behind the circuits you have for these maps. Really, the maps become your interface into managing a lot of more conventional data that might be typically placed in spread sheets or databases or research programs. But, again, think of these maps that I show you as really a very smart

interface to data that is easily organized behind it. This is another kind of a way that we look at the region in the delta. We basically recognize, as probably a lot of other areas have, that the watershed is the logical planting unit. So we have broken the delta down through use of digital elevation models and, working with other agencies, we drew up a handful of major watersheds and this is just an example, again, of some of the major watersheds in the Mississippi delta region. And again, not only do we just have the ability to draw a picture right there, but we know the boundaries and where they are geographically located and we can do things with that data set and we can overlap with other data sets.

As an example, that big blue watershed down through the middle of the delta, the Sunflower River, we could easily ask this system to show us all of the groundwater permits that are within that watershed and extract out of the whole state database, a new subset of data that has just the permits within that watershed. You're doing that by using the geographic referencing of all the data. That's the one thing that this system also does, not only gives you this presentation in a map form, it ties all your data to some place on the ground that you can identify and you know about. Once you know where something is happening, you have a better way of analyzing how it's interacting with the locations around it. We could have the data clearly worked up to show us all the Class 1 soils within that watershed. We could have it show us all the land that's permitted for cotton irrigation within that watershed and be able to analyze that data very simply and quickly. But, again, it's just a subset of the larger area and some of the ways we organize, looking at the information.

Here's another map that's just a little different presentation to give you some of the types of versatility of what's in there. This is that northern watershed. Again, we're just off the North end of that watershed, that shows the quadruple watershed with some smaller watersheds identified in it. And again, that watershed could be a farm with individual fields identified in it. It doesn't have to be on this sphere. But, this is layered on top of, what you would conventionally see as a U.S. geological survey, seven-and-a-half minute quad or 1 to 250 thousand minute quad. It allows you to combine this data in a lot of different layers to improve your ability to visually represent and to visually understand what is going on.

Here's another example of a couple more types of information we can store. One of the things we're working on is setting up, kind of what we call a conservation database, where we're going to systematically work through the region, beginning to document where water conservation practices are. Where do you have land formed fields that will irrigate efficiently? Where do you have overflow types that control the runoff in fields so that we don't have erosion problems? Where do you have grass waterways? In the example of what I've got layered out up here as the yellow area, is the boundaries of an FSA tract. For several of our counties we have all of the FSA tracts digitized and located in the system so that if we want to retrieve information by FSA tract we can retrieve data that way. The individual red boundaries, we've gone down identifying individual fields and we have individual information about them. Those black arrows indicate the direction of the slope. You could also have with that the degree of slope. Is that a .1% slope, a 2% slope? And the small green areas on the far left represent some grasses that are in these watersheds. So it gives the ability to organize the state and, again, when I make this on my computer and turn the computer off, that data isn't just a picture, it's all stored electronically with geographic references and when I go back to the system I can pull this all back in the same reference. In this particular case, that background I've got behind there is some new data that's becoming available. There's a lot of acronyms in this. Digital orthophoto quads, which are the equivalent of what you would see in an FSA office or an NRCS office in terms of, not an image but a digital data set for a region like this. We use this quite a bit as a background. This is a background that landowners are very comfortable with using. They can look at their land and they can recognize where they are so that when we're interfaced with landowners about information like this, this is the type of image we like to give them.

Here's another example, this is one that NRCS is setting up and, again, it's a lot like the previous one. Again, we have field boundaries, field numbers with stars as wells. The yellow boundaries are also field boundaries. Field numbers have tied to them information about cropping and sloping information.

NRCS is working with us to help set this up. We're hoping to work very closely with NRCS since they have so many people out across the region working for them. Here's another example, a lot like the previous one, where we've been looking at alternative water supplies. The green in this area, the green fields are areas that are permitted for water use and on top of that, we have installed underground pipes, showing whether the underground pipes deliver water either from wells or from surface water to individual fields. Because we started with that database that showed us where all the irrigated land was and where the wells are, if you know where a well is in a field, you pretty much know the direction of the slope in that field. Wells are located at the high end of the field. And if you can combine that with a map that shows your streams, you know where your water supplies are and where your water needs are. You know the distances, they're all due to reference. You can draw a line from a stream to a well and we've developed a tool that designs reliefs as fast as you can draw a line. If you've got a well that you would like to consider changing from ground water to surface water and you know where that surface water supply is, we've developed a tool with this system that, basically, you just draw a line between the two, it calculates the distance between them so you know how much pipe you need. It checks how big the field is that you're going to deliver the water to so it knows how much flow you need to bring to that field, and then it calculates how big the pipe needs to be, how big the pumping plant needs to be, so that you can design reliefs from just simple little models that allow you to develop several dozens of relief pumps in a matter of minutes. So it's the type of tool that allows you to go in and design a system one way, see what the total cost and benefits are, then go back and tweak it, design it a different way with some different fundamentals, and allows you to do a lot of "what if" planning and a lot of optimizing on a geographic scale that you really don't have in a lot of other ways. But this is one that we anticipate using quite a bit as we get a little bit further into making more surface water supplies available and gradually trying to transfer from more ground water to surface waters.

Here's a larger scale. Right now, top to bottom is about 20 miles, to give you a scale. Again, those pale pink areas are the irrigated fields in the delta where we know that we have fields we can irrigate. The dark blue at the top is an improved channel that we're looking at constructing to bring water out of one river system into another river system. The pale blue line down through the middle is the Quiver River. We're looking at using the Quiver River basically like a canal. And again, as I was talking about, we want to know what the potential is to use the river, and new supplies of water we can put in that river, as a way to change people from ground water to surface water. We have declined in our ground water, not serious, but enough that we've got to deal with it. So we're looking at ways to reduce our ground water use. That green line is a one-mile buffer around the river. Basically we just told it, "Show us the river, select the river, draw a one mile buffer around it because we want to be able to see where are the irrigation points that are within one mile of that river." And again, this might be, "Show me the occurrence of boll weevil within one mile of that river." It could be the occurrence of weeds that are within the edge of a field. So the scales can go anywhere to fit your needs. So we can now basically ask that system to tell us how many acres of land or irrigated land are within that buffer, what crops they irrigate, so that it makes it very easy for us to calculate what the potential water need and water use is in that one mile area around that stream. It's so simple that I can do a lot of the other stuff and spend just a few hours a week on this. This is pretty straightforward stuff when it's set up. I could change that to a half-mile buffer. Let's look at what we get when, instead of looking at one mile, we look at a half-mile buffer. So, there's a lot of flexibility that could be used on this.

Also, this data is used a lot in precision farming. This is where probably a lot of you have run into using GIS and GPS in precision farming. A couple of things that I got started in variability was when I was in Arizona using drip irrigation. One of the real advantages people thought drip irrigation had in Arizona about 15 years ago was improved uniformity of water application. Real scale variability is always something that has played a big part, I think, in a lot of the productivity. What we've also done is work with some of the scientists in Mississippi to look into the farming. These are some real simple ideas

that you get into that the ability to manage this type of data. Let's you do that you couldn't hardly do any other way. And that variability actually can become a benefit rather than a liability at the field sphere. And that you have the ability to use variability in an individual field, and I'm talking on the production level now, and that let's try to take advantage of variability and now having the systems to be able to manage the data that go along with it. When you think about all of the concepts of doing good field plot design, one of the main things you're trying to do with replicating field plot design is try as best you can to take the uncontrollable variability out of your results so, primarily, the objective you are looking at is the main thing that influences your output. Well, these types of systems allow you to continue to do that but they also give you the ability to use variability in this program. Just to give you some examples, this is some satellite imagery that we use. This is a land SAT. Some of the oldest satellite imagery data we have. That yellow boundary is a water shed that we have delineated. This is an area that we've worked with and some ways that we deal with it. There's a couple of ways I want to show you that we use this. You can see the individual fields. Right over there in the corner is a lake where we're having a particularly difficult time between a conflict between some duck hunters and some irrigators who irrigated out of that. Duck hunters want the water high in the winter, low in the summer. People who irrigate out of it don't care about it this time of year but they want a lot of water in that lake system during the summer. So we have a conflict between duck hunters, recreational land use, and conventional land use. That's getting to be more and more of a problem. This is a satellite image of a section in the middle of the delta.

Using GPS we have a commercial operator in the region who went out and took soil samples of these sites across that field. The red boundary in there is an area where we have an additional data set that was collected. It's an electrical conductivity of data that was collected on the surface of soil analysis rather than by conventional soil samples. But, by collection of conventional soil samples like this where you go out and you take a sample of a spot, you know where it is and you know where it is in relation to other places, you can begin to use that data a little bit differently in terms of understanding what's happening in that field. On that field we looked at the pH on those soils, and you can see that there's a definite effect or a definite pattern in the pH. The red area is where the pHs are high and for us, that's 7.2. Anything that gets up above 6 is kind of high for us. And then we have the lower pH's on, in this case, the North side of the field. And basically, what we're able to do is take that point data from those soils maps and basically create a coverage of that entire field. That's about a 200-acre field. We could do the same thing for the cation exchange capacity, the pH, the conductivity. I think those are the main ones we looked at that I have here. This type of system that allows you to take point data and now make it into coverage.

Here's an example of the soybean yields of that field that were collected about two years ago. You see again that there's a definite pattern. You see your highest yields over in this part of the field and your lower yields tend to be over in here. Golly darn! What it shows in a real big hurry is that there is a real simple straightforward relationship between pH and yield in this case on soybeans. The other thing we have that's interesting, that raises a question is, why is this part of the field different from this part? Here's something that would really open your eyes. This is a piece of equipment that measured electrical conductivity of soil on the surface being pulled behind the tractor with a GPS hooked onto it. So, about every three seconds they were measuring electrical conductivity in the soil and getting the position.

When we irrigate, our ground water is high in lime and has more salt in it than rainwater which is the alternative water supply. So what jumped right out at us on this was that we were looking at an irrigation history effect on the pH and the salinity and since the irrigation was affecting pH, it was affecting yields. We could see the relationship to yield. Now, these are all nice pictures but they don't tell you a whole lot

of the real quality of the analysis that we saw between pH and yield looking at it. So what we did was we randomly selected 500 points off of these maps from the yields, pH, and CEC so we could begin to look at that data in a little more conventional method. Here's an example of the cation exchange capacity where we took 500 randomly selected cation exchange capacities. For us, generally lower CEC soils are our most productive. Higher cation exchange capacity with a higher clay and silt generally will have less production.

So very simply what we can tell this landlord now is that parts of his field where the yield was below 5.5 we could pretty much tell him what his yield loss is and how much it's costing him. Plus, we know where it is! Now we know not only how much the yield loss was, we can come up with ways to tell him how to correct it, we can tell him just what part of the field needs fixing. That's pretty much classic efforts in precision farming, are to be able to short circuit those types of decisions and optimize for the landowner. But again, this is the same data management system that I was using a little while ago to talk about water use across the entire delta. It integrates right down the scale. Here's more electrical conductivity. You can see there's not quite as good a relationship. Where we have lower conductivities, we do tend to have a little lower yield. So, again, that's related to the pH or salts.

This is a little different project, this is one we have ongoing now. Again, this is satellite imagery of a center of an irrigated cotton field and we're collecting some information on this. Here's a map that shows you yields, pink areas are the high yields, green areas are the low yields. We are able to get map corn yields in this case. As part of the experiment with the Mississippi State University we went out with our GPS and located about 400 sites in that field that were going to be monitored during the summer. And then, an individual from Mississippi State went back there and each one of those sites across that field begin to be able to show some sort of effect of water relationships on temperatures. We can go into there using GPS and temperatures to develop this kind of information center. Now, I don't have it, but now we can also, with our yield data, we can compare this variable with the yields we got there. So now we can begin to look more, instead of relationships between pH and conductivity, yield and water relationships.

Here are some other examples, again, this is back to that similar map that we had before. Something else we've been doing on a large scale is trying to map just what's out there. When you look at data like this with satellite, it doesn't tell you where the cotton is, where the beans, and where the rice are. You need to do a little bit of ground trooping so you can tell it how to calculate where those different crops are. So what we have done for 1998 in terms of trying to map the different crops of the entire delta, we sent one of our staff out with a smart little GPS system with a data logger on it and he probed across the delta region to all those points you can see there, just down the highway. He was driving down the highway with his GPS. He would look off to the left or right and he would tell the GPS system that "I'm going north and on my left is a bean field." He would go a little further and say, "on my right is cotton." He'd go a little further, "on my left is a corn field." So that, driving down the road at about 50 or 60 mph with your GPS strapped on the top of your car, you're able to drive through there collecting crop information that you can use for ground trooping.

GPS is smart enough that you can tell it not to give you a location on the road. If you say that your left is a bean field, it projects a position about 200 meters to your left as the point you're really interested in. You don't care about the road. You tell it on the right is a cotton field, it projects a position a couple hundred yards out at that cotton field as your location. So that we're able to use that in our ground touring to do things like this. This is a map of Desoto County. This is immediately south of us in Mississippi. This is Memphis, Tennessee, right here above this. What this is, an example of how we're able to use that satellite imagery and the ground touring to map different land images. In this case, the

pink is either urban or bare soil. We weren't able to separate the reflective tops of buildings from very reflective white soil. The yellows are ag crops and the dark green is forests. And blue is water bodies. We're interested in these fairly large aspects of just telling beans from cotton from rice from forestry from catfish ponds. But you could do the same thing on a much smaller scale looking at a cotton field with a 25% canopy cover or a 75% canopy cover or a soybean field that's weed free versus a soybean field with broadleaf weeds in it or deciduous weeds growing in it because they have different canopy characteristics. This is the scale that we look at. That's about a 20- mile scale across there. It turns out, this is the area just south of Memphis, in Mississippi, that's the fastest growing area in the state just outside the water manual district. It's the fastest growing area in Mississippi, the fastest growing area in the Southeast, and the fifth fastest-growing area in the whole United States. All the construction they have going on up there is creating more than just a little bit of water quality problems.

A couple of other quick applications. Here's an example of where we've used this system for some CRP planting. We were interested in looking at what we could do, in terms of restoring the hydraulics within our CRP. This block of land, again, is about a hundred acres with a fairly conventional surveying grid so that we were able to convert those individual survey points into a map that shows blue areas the lowest and green areas the highest. And these pink areas represent where you will have to build a levy around that system to control the water the way you want it to be controlled. Another way of looking at that, here's a three-dimensional view of that same place. As you can see, the higher view around the red so that if you look at trying to restore hydraulics and you need a certain elevation, you can project it in this type of a method and see where you will have in that field different types of hydraulics.

Here's one that I think is pretty interesting too. This is a little different scale. This is the entire Mississippi River alluvial flood plain. This is the Mississippi River. Again, we're just off the north end of this. This is looking north, standing about halfway down the delta, looking at the perspective of the Mississippi River flood plain. You can see the river. Mississippi would be on the right side. This would be Arkansas over here. By looking at this elevation, you can see how you can jump out of the delta in a hurry. It's very well defined. This data set is available to the entire United States and basically on a grid over this large area, you have elevation points. It's easy to take that point data and convert it in a fairly simple little GIS system in this type of an elevation data and give it a very useful three-dimensional projection. We're going to use this data to find our watershed boundaries here. Here's another different field. This is a lake. Just about one more example. We're about done. This is a lake in the northern delta where we had some concerns about the source of the water quality problem. The major input, the lake comes from the north, in Tunica County. The lake resides in a different county. A lot of people live around this lake. It's about eight miles long. The people who live around this lake are convinced that all their problems with turbidity were caused by those farmers in the county up north of them. They wished those farmers would get their act together and solve their water quality problem. So what we did is we put our GPS on our boat and just ran out across the lake and collected data about the turbidity. Scooped up a sample and figured the turbidity on that water at about a hundred locations. We were able to show that with the inflow coming in from the top and the outflow going in right here that, yes, there does appear to be some sediment coming in from the north end of the lake but, by golly, there's just a little bit of sediment problem down here too. So we're able to get a lot of people who live around this area to understand a better definition of their problem and some practical ways of now how to deal with the problem. Not just blame someone else. There's some simpler things going on here. This is the last slide. Trying to frame some of that more in an experiment station format rather than regional water management district format. This type of system has worked very nicely for developing a long-term map of what's happening on an experiment station. Where plots are located. So you can build a history of where plots are located, what their treatments were, what their yields were. Those would all fit into a system like this very nicely. Again, variety trials. I know right now there's some private folks in Mississippi that are looking at correlating all of the yield variety trials they can, combining them into a GIS system like this and then combining that yield variety data with a simpler form with soils data. So that if you can bring in 20 or 30 yield variety trials of soybeans or cotton or corn and you can combine that with

soils data you can begin to ask some questions that are more difficult to ask. Like you could ask, 'What varieties of soybeans perform the best on certain soil types?" And you could ask that on a regional scale which is very difficult to do. I mean, you really can't address that very well when you're looking at variety trial by variety trial. Soil test correlation calibration, I think this has the potential of completely redoing the way soil test work is done. Rainfall variability and something that we found that is needed is that right now the technology to collect data has overrun the ability to analyze and organize the data. Right now, what a lot of land owners are saying that are getting involved in precision farming and the use of this type of data, they're asking not only for scientists to help them interpret what the data means but better data management systems so that you can pull these data sets together and combine them into a display so you can visualize and compare the data better. That's what I had on this. Again, we use this system at a regional scale plus down to the field scale. I think it has a lot of implication for research scientists and I'm sure that some of your scientists are using some versions of this right now. This is not particularly expensive. We're running this on upscale PCs. Not big ones. You know, $2,500, $3,000 dollar PCs. What we do have to invest a little bit more in is storage because you do store a lot of data. We're using two pieces of software for most of this that cost us probably a total of less than ten thousand dollars. Not particularly expensive. We've been doing this for about eight years now and, just ballpark guessing, we probably have about one million dollars of salary time and work invested in what you see here over an eight-year period. So, we've been just kind of chipping away at this at just one hundred thousand dollars a year or so. But over a period of time, if you can work up to it, that's a ballpark of what it's costing us to be able to do this type of work right now. And, again, we run it over a network in our office. Anybody in the office can do this who is familiar with the software. Most of the software is familiar enough that I use it about five hours a week, maybe. Maybe a little bit more. So we don't have to have people like myself who do nothing but use this software day in and day out to get productive work out of it. We do have one person who is a college graduate in data systems who basically has put this all together. We feel like that has gone a long way for us in that we didn't try to convert a good PC hobbyist, who just is good at PCs and had grown a lot in their skills. We didn't try to convert them into a data manager. We looked at someone whose formal education was in data management and brought them in here. I could easily see that for a lot of folks, training in data management could be as useful as something like training in statistics. Right now, we're sending out a new graduate with a BS degree to work back on a farm. He would probably find data management more valuable to him than a course in statistics. I think that data management is going to find it's way kind of into a comparable position to that type of discipline in agriculture research.

Are the Violins Enough or What Makes a Good Hot Dog

Dr. Ben Kittrell, Resident Director, Clemson University

Pee Dee Research and Education Center.

About three days ago, we got us a cellular phone for the first time so, man, I'm really getting all this technology! But what I like best is what is in my car. I stopped for gas in Georgia and there's a thing, a dial, that tells you how many miles you can go with the amount of gasoline you've got in your tank. So I filled up with gas in Georgia and when I got in the car I noticed that booger said 'you can go 386 miles.' You know what? After about ten or fifteen miles, that thing said, 'you can now go 400.' And fifteen minutes later down the road that thing said I could go five hundred and some miles! And it got all the way up and said you could go 620 miles on that tank of gas. Now, boy, if I could just stop right there, you talking about making money! That's cost cutting! I liked it. But I'll tell you right now that Dr. Pennington had the most extraordinary thing that I saw. I don't know whether any of you all caught it or not. It must have been a Texas aggie cropduster that was taking the pictures because they were the only ones that I know that could fly upside down backwards!

We got in here Saturday night at dark. My wife is supposed to be reading the map. Oh boy! And the only map we had was that little thing that the Peabody sent out for the confirmation. I said, "get the thing out the briefcase." She said "I don't want to read the map, I'm no good at reading maps." I said, "get it out the briefcase. I'm driving. You want to drive? I'll read the map." She said "No you're driving." So, she gets it out the briefcase and she looks at it and she says, "From the airport.." So I said, "Oh, hell, we got to go to the airport?" I don't know any other way. So we circle and circle Memphis, twice! We never did catch where they said to stop! I said, "I'm gonna turn off here even if it's wrong." You know what? It was right at the site, right where we were supposed to turn! The Lord was looking after me. Man I appreciate that. We were about to have a big fuss.

There was a man walking on the Myrtle Beach shore and he ran across this bottle and he kicked it, and out came this genie and the genie said, "I'm glad you set me free. You can have one wish. You better make it good." The man thought, he said, "gosh, I don't know what to wish." He said, "I want a bridge built across the Atlantic Ocean." And the genie said, "gosh, you've asked too much! I can't do this! Give me another wish." The man thought, he said, "help me to understand a woman." The genie said, "you want that two lanes across the Atlantic Ocean?"

Now I'm gonna tell you, there is a man pulling up to a bank to get some cash. And here's a woman. Now, there are only five steps for a man. Pull up to the drive-up ATM, insert card, enter pin and account, take cash, card, and proceed to drive away. Here's a woman. Pull up to drive-up ATM, back up and pull forward to get closer. Shut off engine. Put keys in purse and get out of car because you're too far from machine. Hunt card from purse, insert card. Hunt in purse for grocery receipt with pin written on it. Enter pin. Study instructions. Re-enter correct pin. Check balance. Look for envelope. Look in purse for pen. Make out deposit slip. Endorse check. Make deposit. Study instructions. Make cash withdrawal. Get in car. Check make-up. Look for keys. Start car. Check make-up. Start pulling away. Stop, back up to machine. Get out of car, take card and receipt. Get back in car. Put card in wallet, put receipt in check-book. Enter deposits and withdrawals in checkbook. Clear an area in purse for wallet and checkbook. Check make-up. Put car in reverse. Put car in drive. Drive away from machine. Drive three miles. Forty-one steps. Number 41 is release parking brake. Now, we've had enough fun.

We're going to get to the serious part now. My daughter had a granddaughter born this summer and the doctor had to induce labor about two weeks early. When he did all the things he was supposed to do,

we went in there trying to console our daughter and everything. The doctor came in and he said, "All right, all the grandparents get out of here. There's no turning back." So here I am, in there's no turning back and this room has just the right atmosphere and ambiance. So, here we go. For you guys in Texas, I'll start where you are and then bring you forward. That's what I learned in education. So for you guys in Texas, a violin is the same thing as a fiddle. Now, if you want to play in Texas, you've got to have a fiddle in the band. I've heard that. So, I want you to stick with me now. You've got to really pay attention because this stuff is heavy. All right now, an orchestra is made up of four sections, the strings, the winds, the brass, the percussion. Now in the strings you've got the violin. Notice they always sit near the conductor. Don't you just hate those guys that always sit near the dean or the president or someone that they think is important while the others in the back are saying, "look at John sitting up there hearing the dead beat." All right, you got the violin. They're not enough. You got the viola, you got the cello and you got the bass. And then the winds. You got the clarinet, the oboe. Hey, Dennis Onks's son plays the oboe so don't make any jokes about it. You got the bassoon and you got the flute. And then the brass. You got the trumpet, the French horn, the trombone, and the tuba. And then in the percussion you got the tympani, the snare and bass drums and the cymbals. If you can come with me and get in your mind how this all is going to fit in your station. Does every person at your station know their part? Just like each one of those strings, each one of those pieces know their part. Do they know their job, in other words? Do they know why and do they know what relation that each one of your workers has with each other? Then, if they do, they know the mission of your station. Just like all those pieces put together know the mission of that orchestra. And then, do they know really what sound they do in the orchestra? Do they know what sound they want to keep? Or in other words, do all members at your station know what they're trying to do and how far they're going to go and what sound it is? Or in other words, do they know the vision at your station? And, no orchestra can make it unless everybody practices and practices and practices. And so that means work. That means patience. That means preparation. In other words, every day on the job. And then, do all your members, all your employees have confidence in what they're doing? You know, you can't do much without confidence because you just fall apart. You can show it all over yourself if you don't have confidence and even if you have to lie to yourself, you better have confidence if you want to try to influence anybody else. And then, do they have pride in what you do? I remember Butch Withers telling me one time about an example of a person he had working with him, I believe he asked each one of his men, "look, if I put a sign up why you have done this work, will you be proud of it?" Everybody every day should be thinking about, is that what I want to be proud of what I did that day? And then, you've got to have passion for the job. You've got to feel the music! And unless every employee has that passion, what do they amount to? I don't know about you but I've got a few that, really, they're out for the paycheck, I believe. The impression I get, they are. But, if we could develop a passion for everybody so that they would feel the music that station is trying to play.

And then, how do you deal with the distractions? I don't know, my wife and I both sing in the choir. She sings soprano, I sing the bass. I try, she's a lot better than I am. But, the choir director has to get on the sopranos and altos all the time. The bass's always lose. Every time they stop to practice with one other side or section, the sopranos are always talking. It's distractions. And you hear a lot of whining. You know, I'm sure you don't hear any whining at your station but, you know, the first time we go through a piece of music the choir members will all whine. "Oh, I don't think we can do this. Oh, this is too hard for us . . ." And so forth.

I think about the guy who went to the barber and the barber said, "I hear your going on a trip."

"Yep, I'm going over to Italy."

"Really, what airline are you going to fly on?"

"I'm going to fly Delta."

"It's the sorriest airline. It's late getting down. They keep bugging you and got sorry food. Where you going to stay when you get there?"

"Oh I'm going to stay at the High."

"That's the sorriest motel I've ever stayed at. They mess up your reservation, the beds don't usually get made up. It's just a terrible hotel. What you gonna do when you get there?"

"I'm going to visit the pope."

"You talking about going out there with all those people and he stands at the window and looks at them?" "Yes."

"Man, the pope ain't going to see you out there."

"Well, I'm going anyway, and I'm going to have a good time."

So two or three weeks later he came back for another haircut. The barber said, "Did you make it out there?" "Yes, sir."

"How was the airline?"

"Whoo, Delta just was great! Man, we didn't have a bit of trouble. Smooth, got luggage, everything."

"What about the motel?"

"Oh man, they put us up. They were royal to us."

"So did you get to see the pope?"

"Let me tell you this, I was sitting there, there must have been 10,000 people out there looking up to the pope. And the pope all of a sudden, he said, "John, is that you? Come on up here!" Man, I went right up on the balcony with him!"

"You've got to be kidding! What did the pope say?"

"He said, 'Who in the hell cut your hair?' "

Now I don't know how you deal with negative things but you've got to keep those distractions away if you're going to get your mission. Now, nobody's going to have an orchestra unless they have some sort of performance. That's what all that practicing is for. O.K., on your station, what are you practicing for? Oh, you have a field day. Oh, yeah. You're going to get everything ready for the concert. So, what does that mean? Well, an orchestra is going to have the place decorated and they're going to have the chairs all set in the right place, clean and everything. You're going to get everything cleaned up. You're going to have things looking good. You want every one of those deans and everything to really be impressed with what you do. And those people on that office are going to have tuxedos on and the women are going to have gowns and, oh, you want things looking good. And they should look good, not just when you have a field day, but they really should look good all the time. Now, the thing you've got to do with every member of that orchestra has got to focus in on that conductor. Every mind zeroed.

Let me tell you about the concert we had at our church on Christmas. The choir director asked me to sing a solo. I'm not going to sing a solo here today, don't get worked up. But he asked me to sing a little solo and in a weak moment I said, "Well I'll try. You're going to help me, won't you?"

"Yeah, I'll help you some."

So he gave me a tape with the notes and a tape with the accompaniment. So I practiced with him. He said, "I believe you've got it."

We're going to give the concert on Sunday night now. And Sunday afternoon we had the dress rehearsal. Well, I thought I was going to be with the organ. You know what? The organ wasn't even going to play. Here was this violinist over there and I just started singing what I'd learned and he said, "Whoa, Ben, slow it down."

I said, "No organ is going to play?"

"No, no just the violin. Don't try to get through with it so quick."

So I said, "O.K."

So I tried to slow it down and finally, after two or three takes, we couldn't waste all our time on me so he said, "Look, Ben, just focus right on me. I'm going to say every word at the right time." And so, I

did. And I got through that thing but I had to focus. I had to forget about everything in that choir in order to focus. That's what we've got to do is make sure we focus.

And then, with the concert, enthusiasm. You've got to show enthusiasm if you want anybody else to have enthusiasm. And then, we can't forget the audience. Sometimes we think that the research station is set up to give us a job. As was talked about this morning, we've got to be able to provide something for somebody that wants something. So, that's where our evaluation comes in and our funding is, to see what we have done so those audiences, if they applaud, they like what the concert or the orchestra has done.

And then, professional development. And that's what this meeting is all about. You know, the RCAS could be the orchestra and we've added some new pieces. That's what we call you guys from Utah and Arizona and California, pieces. But y'all are new instruments. Everybody, all of us, are the same, yet all of us are different. Oh, we can learn so much from each other and just like all the pieces in an orchestra put together, give a much greater in depth sound that each individual plays in that orchestra. And that's what we're all about. In ending, let me say this. I hope that you will have joy in your heart, joy in your job. Be synergistic as you leave here and make beautiful music in the orchestra of life.

Thank you but I did forget the hot dog. Let me tell you, if some of you didn't quite read that thing right, it said "Are the Violins Enough OR What Makes a Good Hot Dog?" Now that's my next speech. I don't have time for two speeches.

ARIZONA'S CONTRIBUTION TO THE 1999 RCAS MEETING

Awards Presentation to Dr. Ben Kittrell For an Inquisitive Mind.

Dr. Dave Langston, Superintendent

Maricopa, Arizona

I was in a restaurant yesterday and the waitress came by and she said, "Are you chasing Henry?"

I said, "No, I'm not chasing Henry. I don't know who Henry is. I'm not chasing him."

And she left kind of insulted. I never did figure out why.

She came back later and said, "You guys aren't very friendly."

And I said, "What do you mean? You asked me if I was chasing Henry. I'd like to be chasing Henrietta but not Henry."

She said, "No, JASON Henry."

And I said, "Oh, I'm not Jason Henry."

So I'm really working hard at trying to catch all the languages going on and I'm learning about y'all and I'm going to practice that one today. There's a real advantage for me to give this presentation. I'm trying to find exactly what it is, but it is difficult. I'm going to be as positive as possible during this presentation, but when you consider the subject it is going to be a challenge.

Now, we went on this tour last year in California, which was the first on that we Arizona folks had attended, and we had difficulty in understanding what was being said. The accents were giving Bob some trouble. I was born and raised in Oklahoma so I could serve as an interpreter for the most part because I could fall right back into that type of speech. My main function on this tour was to help Bob in his understanding of Ben [Kittrell]. However, it took us about three days to accomplish that. All during the tour Ben wanted to see some kumquat trees, because he kept saying "Where's the kumquat trees?" I told him, " We haven't seen any yet, but we have some in Arizona." Now, Ben didn't believe us. Ben, is it true that you were so disliked as a child that your mom and dad had to tie a pork chop around your neck to get the dog to play with you? Any way, that's what I heard when I was on that tour. Something I learned on that tour was that you don't have dinner with Ben because everyone will come around and try to get you away from him so he doesn't contaminate you.

From these slides you can see that we do grow kumquats in Arizona and this is one variety. Now you have to understand, I've been an Entomologist for something like 20 years, and now I'm superintendent of the Maricopa Agricultural Center. I have been for about a year. So, this means I've been an expert on kumquat s for about four days. Now if you want to know what kind of bug is on it, I can tell you. You guys from the South you might be able to cross this with tobacco. Don't know what you'll get, but I bet you could eat it and smoke it at the same time.

The second slide shows another variety. Ben, we did this especially for you so you could see that we grow several different varieties of kumquats in Arizona. In addition to the slides we brought you a small basket of each variety, so you not getting just one kind. I also brought along a recipe on kumquats. It says right here, drop into slightly salted water, use one-third cup of salt to a cup of water. Soak overnight. The next day you pour off the salted water, cover with fresh water, and bring it to a boil. Drain, and then you throw away the kumquats and drink the water. Ben, these are for you and if you like you can pass them

around to the rest of the group. A lot of people like them. You just bite into them like this. One variety, the first bite is sweet and it remains that way. The other variety is unique, the first bite is kind of sour but it gets sweeter as you chew it. Kinda like some people I've known, they're not bad once you get to know them.

Redesigning the Land Grant System

Dr. James R. Fischer, Dean and Director, South Carolina Agriculture & Forestry Research System.

The infamous George Bush said, "Read my lips, no more taxes." The average family of four works 141 days, pays their taxes in 127 days to clothe, feed, house, and transport themselves. We're going to talk about some of these issues, today's changing trends. And in these changing trends are three areas that I'd like you to think about. We work a lot in the biological area. But we are also in the physical, and more importantly sometimes, in the social issue. John Sweeton is going to talk to you a little bit later about some of the issues. How do we deal with the issues? We'll determine if we get rain out of this storm or if we're just going to get a storm. And that depends upon, again, what we do. So what is changing? Consumer demand, information availability, biotechnology, bimolecular production, deregulation, industry consolidation, mobilization, intellectual properties, our traditional source of income is estimated to be increased by 20% by in private technology, we'll talk a little bit about that. The new production technology and the consumer will lead the change. What's the consumer doing? The purpose is for lifestyle, the value and variety that they're demanding. The nutrition and safety. Food safety. We have the safest food supply in the world. What do we hear more about than anything else? What just happened in Sara Lee? Some contaminated meat? Convenience and the health science revolution. I don't think we've seen the end of that. Some of the people have looked at this and said this isn't about ag anymore, it's about life. Our new role is to ensure the health and well-being of animals, plants, and humans on six continents. They no longer look at the U.S. The overnight elimination of old rules and players. What happened within a generation, in the time that you have your life? Think about the changes that have occurred. Any time there's change, any time there's a disruption in the status quo, there's tremendous opportunity for growth.

When I was a kid, it was pretty easy to talk about agriculture because the family farmed. You had the manufacturer, the manufacturer sold to the dealer. The family farm went through a processor, a wholesaler, or a distributor and then to the consumer, or there were some interactions back and forth. But that's basically how the system worked. When I look at the current family farm, our knowledge, our teaching, our research and extension focus on the family farm. We have all of these department heads to teach disciplines who developed them making this system. We've taken that to students who come from the family farm, our research tends to produce our professionals, extension workers for that family farmer, and we work from the public to private industry side. But that's changed. Farm dependent counties in 1950, keep your eye on the slide, farm dependent counties in 1989. So if you look at that, you see that it doesn't mean that agriculture is any less important. Because if you look at the dollar bill you can see that about 23% is spent on farms. But it's a $678 million industry that's spent in this country. Fifty-six percent of that food is at home and 44% is sent away, and is increasing very rapidly. Convenience, simplicity. More people need their car more than anything else. When mom hollers, "Dinners' ready!", most kids jump up and run to the cars. Farms get 23% of that market share of 77%. Look at the 77%, there's more in packaging, 8%, 17.4% of that is in the supply industry that beats the farm situation. And then, furthermore, what's happening is companies are coming across and they're going to build and stretch across that whole market, from start to finish. That is what some of them are doing, vertical integration. Some of it is consolidation. This slide can show you how you proceed to contract farming, the processing and the consumer. So what they're telling the consumer is, "We'll give you a nutritious end product." And then they're going back through this system, stretching across that whole food chain dollar to build that system. This is happening right now. That changes the whole commodity market.

So, you look at today's food practices and the center of it tends to be the wholesaler, the processor, and the distributor. The farmers tend to be checked. From that wholesaler, processor, and distributor you've got the consumer. The consumer looks back and sees that and they want to know why they're interested in the depreciation of the farm. Well, they don't see it. They got Tyson's chicken. The manufacturer tends to go directly to these large scale farms which leaves the dealer out which means we've got a lot of cheating in our world. The supply industry is not there. After that, exports (remember that we said six continents), and this is going to be more and more important as we go down the row of 1980 to 1992. But the beauty of what they're doing is we are making more products. We can process it here and ship it better than we can process it there. But if you look at that global market, I want to give you two slides here to think about. One is, if you look at per capita of gross domestic product, here's America, here's free trading area, and that group's over in there. Here's North America and here's Europe. Well, here's the two continents that have got the money to spend on food. But, look where the people are going to be. The people are going to be over there.

Let's look at what's happening in some of our industry. In 1988 to 1997, just a matter of nine simple years, of the hogs that were produced in '88 at 50 pounds and over and was marketed annually, was only 7% of the market. 37% of the market now. In nine years! How did that occur? What happened? Look at our pork production. Look at the farms. Fewer and fewer clientele. There's production under contract or vertical integration, you look at the percentages. You look at vegetables, turkeys, hogs, feed grains. It's coming to feed grains. It's gonna happen to feed grains, it's gonna happen. Why? Because the consumer wants quality and companies want to maintain that throughout the whole system. In the pictures that are up there, you see the percent of farms. When you get up here you get the large operation. They're technologically equipped to handle it. If you look at those that are online, it's the same difference. Look at the jump from 1995 or 1996 to 1997, it's increasing the amount of online service that's available. You think about the proceeding ag convention, you know they can talk to you via satellite in your home. Digital technology, just a couple numbers to give you an idea, not to scare you, but to give you an idea.

In August 1994, there were 3,000 Web sites. Today, there's 2.5 billion. In 1994 there were 3.2 million host computers, now 36.7 million. These are tremendous advance numbers! What's coming down the road? The largest retailer is the home shopping network. We're going to have barley stands having computers and we're going to have, for those that have not mastered the keyboard, voice recognition. And it's coming down to that in the next couple years. But, perhaps one of the biggest impacts we got right now is biotech. I think the key here is you're going to see profound turns in the entire structure of farms. And we're seeing it. Over the next decade, you will see more changes and more has been produced than we have witnessed since the beginning of civilization. You know, 72% of all the scientists that have ever lived are living right now. That's when you know there's a lot of knowledge. Biotech is a major issue. What will be in it, what's in it and what's out of it? What is out of it? Host tolerant crops, very effective pest resistance and then the BST of animal science. Look at some of the issues of biotech. We're talking about 1996, 1997 and 1998. If you look at corn, cotton, and if you look at soybeans, you can see the tiniest change that's occurring there. These are millions of acres. These are the acres planted. There are acres for herbicides, insect resistance. In a few short years, what other technology has been adopted? Look back at hybrid seed farming. When that technology came out, trying to put in on a comparison to what's happening in biotech, look at the adoption rate of biotech compared to the adoption rate of hybrid seed. Part of that is because of the fact that there's more information being transferred. People can better understand how they get there. Once again, there's going to be a continuous focus on input trades, herbicide, insect, and disease resistance. The current race that you see in some of the commodities, some of the round up ready stuff such as that, will probably go to other input companies.

You're going to see major product advancement escalating. Look at those, be sensitive to those issues when they start coming out, what's being produced that the company wants to keep control of? On the livestock side we'll see plutonium, nuclear transfer, and vaccines. Genetic engineering can help us with vaccines, especially with resistance to specific types of diseases. On microbes and enzymes. We have new production making applications, edible oils. This is where there is real opportunity. In this area, we've been seeing production of food products in tanks. This technology is so volatile it depends upon who makes what discovery where. What's going in? You have liquid fuels, chemicals, lubricants, plastics, those materials. That's what they're talking about. There's a primary plant going in, I think it's in Iowa right now or South Dakota, where they're making liquid fuel out of grasses and doing it at half the cost it does to make it out of coal. It is based on biotech. The industrial products are coming up from the farm. Pharmaceuticals are farther down the road. The major trends are very difficult to predict in this area. CEOs of bioscience departments, say we may be the last generation to possess occupations in the field known as agriculture. Agriculture will be replaced by the production of hydric materials with energy we consume at the molecular level. One of the first things to really keep in mind.

How can these companies do all this merging and buying out? There are $80 billion in this whole life science group. We have never been on the front pages. We, in agriculture, have never been in the front pages as we have been in all this. The food chain consolidation, the key players would have their solutions and market to get a return, and there will be middle industries also. It's tough for us when we're trying to help everybody in the industry. Putting the risk factor at the bottom line. Our producers are at risk, they're going to do what they need to do to minimize the risk. The first thing? Will they contract? What will they ask for? What services does the farmer receive from the processor or the contractor? Not even production prices. Seventy-two percent of them in a national survey said they would take the advice. That's one part of a business. What service would they receive from a processor? Who funds our work when you talk about ag, natural resources research and development? Do you see that the federal funds are 24%, the states fund about 16% and the private sector funds 60% of it. What's more important? Who's doing it? Well, you can see that the states really pick up about a sixteenth of the thirty-one, which means that we're building some of those relationships, we're making some of that happen. But, there's a problem. Public funded research and development. In 1985 it was a $1.68 million business and this year it's $1.48 million. And remember, I said it was $80 billion being played on the table and we're trying to work with one eightieth. What's being played by our big corporations? Private sector funding, since 1980 it's increased at a rate of 4.5% per year. Implications to us from our customers is that we are the public partnership for research spending. How many of you agree with the University of California at Berkley? Someone came into UC Berkley and said we'll give you $50 million, $25 million up front and $5 million for the next five years each year, if we can have the right to the intellectual property as developed in your department. And they agreed. That changes how we function. We used to stand alone. Our roles are changing. Will we be a player in the new order of business? The order of business is the input supplier, to which the wholesale processor and distributor are linked very tightly. You might have one company but they're all linked very tightly together. They go directly to the consumer and from there we will have some linked to the producer, but we will all not only be on the private sector with production of energy and production in the health arena for those in this whole life science region. So the big question then, in our centers, our departments, our colleges and our universities is, how do we work it in? That's why we have got to work together, because they don't want us to go away. The year 2020, life science companies, no doubt about it, we'll have to get used to the term. You've got to add 25% of the carbon-based industrial chemicals, and the government says this will happen. That's a major goal of the petroleum industry. You're going to have 10% liquid fuels and you'll have a U.S. mobile leadership providing base products. And we're doing pretty good on this. In addition to the food and fiber, we've got to look at sustainability of our system, we've got to look at the environmental issues. These are not going to be covered in all of these companies. We've got to look at the human health aspects. We have an opportunity to work in this energy arena with the private sector. And most importantly, I think we ought to start thinking about what's our total impact on the economy, 23%, and that's increased when you start thinking about the life sciences. What does this mean for you? Continue

as you are, hope to retire before something happens or dig in your heels and say, "Hell no, I won't go." I think these are kinds of the common symptoms that we have in our system. But like I said earlier, by the time the change is there, there will be a greater opportunity to make a difference. Partnerships, public and private, figure out how you can do it. One of the things we're talking about in our state is, "Why don't we have our center host, with our field day, the private sector event?" We've always been independent but if you take a look at producers, they have a limited amount of time. They're going to spend that time where they're going to get the most information and instead of us saying, "here's the public sector, here's the private sector." Why don't you say, "Come to the new center and we'll work together to give you the best information." You can do it. It takes teamwork and putting it together and it can happen! I want you to know the old song, "We've Only Just Begun." Thank you.

Overview of the Delta Council and its Relationship to Agricultural Research

Mr. Chip Morgan, Vice President, Delta Council

I looked over your agenda on the way up and of course we've had a number of people from Mississippi State here yesterday and today at the Peabody. I'm not familiar with the research center and administrators society. I do know what you people do and I know how important you are to us and the delta council and our counterparts throughout the country, and more specifically the ones I'm most familiar with through my association with the organization in Washington. First, I'd like to start by just saying that we view research and education in agriculture as the highest priorities of the folks that work at delta council. We have enjoyed a productive relationship with our federal and state partners in research and education. And while we're just only a part, as a branch station in Stoneville is of a bigger system, we've been afforded a huge place like these terms that have now become very fashionable like, partnerships and cooperation and integrated systems and all these terminologies that we here today know are really kinda just new terms for an old process that's worked a long time. And the land grant system, especially, and the federal services. And Stoneville has enjoyed a quite productive relationship with each as well as with their private partners in delta council, through all of those processes that are embraced in those terms. I'm just gonna go over a few things about delta council and our relationship very briefly and I'll be happy to try to respond to your questions. I'd love to hear your suggestions and comments that you might have about my comments or other things that might come to mind for your particular situation in your state.

We have the good fortune as a farm organization, to be located at a branch experiment station. The Delta Council was founded in 1935. As a regional organization, representing about 80% of Mississippi agriculture in the region, we obviously had the opportunity to locate near Greenville which is the largest metropolitan area or urban center or the largest cotton center in the delta, which is Greenwood, and a number of other places. But that's not where the farms wanted it to be located. They wanted to be in Stoneville. That was a wise decision. We built a new building over the years and they, once again, wanted to build in Stoneville. And we went to the University and bought some land back from Mississippi state that we had given them 40 years ago, to build where we are located today. There's something important, too, that needs to be mentioned about this because I know from traveling around the country and visiting many stations and locations, there are some that have a very compatible relationship between research and education and state and federal. There are some that have a partnership between state and federal and between research and education and there are some that have neither. And we feel that Dr. Smith and Dr. Army, their predecessors have adopted a pretty strong doctrine and that doctrine out there is firm, at the science level and at the administrator level, not to have any tolerance for a client group like Delta Council even to know that somebody at Stoneville works for them. If they're successful, Jimmy Smith and Tom Army, and they are successful, nobody at Delta Council will ever know who the plant breeders and agronomists work for. If people do know who they work for we've got problems. If you work research or extension. It's of no value to the process of moving this system forward for the client workers to know that. That's worked at the Delta Council and it's worked at the Delta branch experiment station. And those areas where I have witnessed competing interests, I usually witness a level of effectiveness that links to that. Delta Council was founded in 1935, based on three needs of our small region of the country. Of course, in 1935, the delta was literally just developing in agriculture. Most people think the delta of Mississippi as being the antebellum south and actually wasn't even inhabited until the 1920's. And the area was developed agriculturally about that same time. The Delta Council

was founded in 1935. Flood control, highway developments and agriculture were three primary reasons the Delta Council was founded. The interesting thing to me is at that time, which was within two years of the first farm bill ever being written in this country, it was not on policy that Delta Council was focusing it's energy. It was on research at that time. So, this is not new. It's not something that came with me coming to Delta Council 25 years ago. It was something that, by the time I got there, I was told this was a priority and this is a place that you will spend a lot of your time. And if you're not interested in this or you're not interested in being a component in this, you've got the wrong job. So, it's been pretty deeply ingrained in Delta Council since the beginning.

Delta Council is privately funded. We have no public funds. We are not supported by checkoffs. We're supported by a letter that goes out to people in the delta once a year just asking them to be a member of Delta Council. About 60% of our funds come from agriculture sources, primarily farmers. And 40% of them come from non farm interests in the region that feel that we do some things that interest them and also that agriculture is of value.

The first recorded action of Delta Council that we can find when it was formed in 1935 was to assess the needs at Stoneville. At the time, Stoneville had a three story brick building with approximately eleven scientists in it and four technicians. And the needs that were described were physical facilities and land. And then, beyond that, to begin building a research complex in some areas that wouldn't necessarily be duplicated on the campus with special emphasis on applied research. Because we were sitting in Stoneville, Mississippi in the center of about a 7 million-acre crop production system that was relying on research and technological breakthroughs in order to grow a crop. The first thing we did was to begin acquiring land. When we would pay it off we would deed it to Mississippi State University. And if you go to Stoneville today and look at the land records, you'll find that it's about 2,000 acres of land that over a period of time in catfish and cotton and rice and soybeans that it had on it's title Delta Council, prior to being deeded to Mississippi State University. This is not, of course, a major thing Delta Council does in research but we feel like it's a commitment of people reaching in their pockets and saying, "This is where we want to put our money first." And as a result of that, most of our scientists are not out fighting, looking for land to do research. We also play a role, of course as many other farm organizations do, of not only identifying cooperators for our off station research, but also making certain that those people understand that the role in stewardship that they've got to exhibit in order to make certain that these scientists research produces good results and results that will have impact.

Probably the other area, broadly, that we think is real important, and it certainly has done a lot to sustain and strengthen our relationship with Mississippi State. If we could get involved in a lot of things, because the university has been very generous with us in terms of allowing us to be involved in a lot of things on campus, and in Stoneville. But really what we think our role is, is to plan and prioritize. If I could think of one thing that has generated a good relationship with the farmers in the area, it is the fact that Mississippi State has done the outreach. They don't come up with a solution and a plan and present it to us. They bring us in, and when they're going to shift priorities, we get to be a part of that process. We don't have a veto, we don't run around and campaign to put pressure on the administrators on how they run their program. But as a part of the process of bringing farmers in, farm leaders in, for issues that are so tight to weed through, like the genetic engineering issues that are on the horizon. It doesn't hurt Jimmy Smith one bit to have six to twelve farmers who will stand up at a meeting and wrap themselves around him to make sure he doesn't get the hide skinned off of him in a meeting. The reason they're willing to do that is they are informed and they're committed. In that order. And they cannot become committed if you don't reach out and bring them in as part of the planning and prioritizing of what you do. I know many of you do that well in some locations we go, I see the pain and suffering and the symptoms where that might not have happened. It's important for me to mention at this time, we draw a distinct line, in Delta Council, and always have, relative to our growth in research. While I think it's

important for administrators to understand what we view as important parts of your role in terms of bringing on cooperators like us, there's also a line we have to draw. And most of it ought to be driven by common sense. Human nature sometimes supercedes common sense, I find. We try to prioritize problems as a group in conjunction to cooperation with our administrators. But we never ask our administrators to implement it the way we want them to. One of the biggest problems we have is convincing private companies to cooperate with Stoneville services and that they cannot run the administrator's office or how researchers and scientists are gonna conduct their work. Now, at Delta Council, the farmers are not even tempted to do that because there's just been an understanding that, that's one of those lines that we don't cross. We spend a considerable amount of time each year, and it seems like it's getting lower each year, with the private companies who I call allied agriculture businesses. Many of them are strong members of Delta Council and farm groups like Delta Council. But, in most instances, these people have a real desire to try to tell the administrators how to accomplish these priorities. That becomes very complicated in an academic or an institutional situation because you folks have a lot more to consider than a CEO does at a company. Because he's got, pretty much, a totalitarian situation whereas you have considerations of faculty and staff and maintenance and grounds keepers and everybody else that has to go in to the pigs when you start stepping out and making changes around the station.

Something else, and this is really sacred with Delta Council and this is true with our work with the forest service and wildlife service in Mississippi State. We don't ask for research emphasis to be shifted. It's just off our territory. That's not our province to tell an administrator to take money that is currently put somewhere else. That's an administrative decision and, again, we can't see everything that you guys have got your hands on. Now, to do that of course we have many people in Delta Council who would like to do that, we just adopt real rigid policy relative to that and get those hands on the table before somebody else's fingers get smashed. Instead, we try to work as hard as we can and as cooperative as we can. If we've got new priorities, then that's what they are. If the administrator makes the unilateral decision that he prefers to shift resources as opposed to ask for new resources, for new priorities that's great! That makes it easier on us but it's generally not that way. So what we reserve our energies for, and our horsepower, is to address new priorities with new money. Last year, most of you know in the mid-south, we had crop shifts in Louisiana. 30% of the cotton crop went into corn. In Mississippi about 15%, maybe 18%. Arkansas, somewhere between 10 and 15%. In the delta portions of those three states. The temptation was there to reduce cotton research because we don't really know how to grow corn yet in the mid-south on a consistent sustaining basis. And we probably don't have the tools that we need to do that. So the temptation was there and we came together with research administrators by way of example and that problem is being addressed. But it is not being addressed under existing baselines of current services. I've heard this among research administrators and I've even seen this occur in the federal budget process and it disturbs me, but we just absolutely cannot figure out a way to be a distance runner by making our slice of a same size pie bigger. If we don't make the pie bigger, eventually we're going to find ourselves in a shortchanged situation. We may win sometimes because we're a little bit more aggressive and we've probably got some people who wake up earlier and go to bed later when it comes to research advocacy. But if we don't make the pie bigger, if instead we opt to do the easier thing, which is just try to get our slice bigger, that is certain to come back on us. I want to comment on an example that really happened at the national level. Some of you people may have been involved in it. But, as a delegate to the ESCOP committee, the experiment station committee on policy, and the budget process in ESCOP back in the late 1980s, an initiative came up, called the national research initiative. That's common language today. Everybody knows what it is, why it is, and how successful it's been at attracting funds. But for the first four years that, that research initiative was proposed, it was proposed to take funds out of some other base funding mechanisms. And this distressed us considerably because we could see the need for basic research, even in Stoneville where you've got mostly an applied and field research station.

You recognize the need and the huge wealth that this country was built on relative to basic biologic laboratory research. But to opt to go the easy route to let one supplant the other is foolish in our judge-

ment. It's not in the best interest of agriculture and it's certainly not in the best interest of our institutional groups like the land grant universities, ARS farm service, and others. Somethings kind of drives the philosophy of Delta Council, there are a lot of research programs in Mississippi. There are a lot of members of Delta Council saying, "That's a waste of money. What are they doing that research for? There's not even any farmers farming that crop in Mississippi." What I've found in the past 25 years is that, with very few exceptions, that if there is a research program that you don't know something about that you think probably doesn't have merit, I say this quite frequently, but you could eliminate the entire budget of the United States of agriculture and nobody would even know it in terms of deficit reduction. And if you get real patriotic and decide that you want to suck up and do away with some of your programs that you may not think merit support because they only have a small constituency, get ready for those funds to be transferred to somebody else that wants them because they're not going to be applied to the deficit. Last year the farm service corporation in Stoneville came out and had an earmark of 200,000 new dollars for this laboratory. We learned that those funds were going to have to come out from under the baseline of farm service's bigger budget. We had asked for those funds to be added to the baseline and the White House could put it in the budget. We withdrew that language and we do that every year when this happens. It often times happens because most of the time the congressional leaders from Mississippi and those states where we're trying to get funds are successfully getting those funds over the budget. But it's a dangerous precedent to set, in our judgement, to begin telling administrators that we've got $200,000 earmarked and, by the way, take it from existing resources and there's a direction on how you're going to use it and what you're going to do with it. That's another of those little boomerangs that we don't think can help us be a distance runner in terms of connecting this and prioritizing and planning research. So what's our reward been relative to this relationship we have enjoyed with Mississippi State and ARS forest service and others? It's participation. We don't necessarily get an endorsement of what we ask for, but we don't just get brought in for the slide show and a five-color brochure. We have developed the slide show and the five-color brochure. And by the time we get ready to pull the wagon, most of the horses are out in front of us.

The other thing we get, and this is really the bottom line, is we get high impact solutions to problems in cotton, rice, soybeans, and catfish. And that's really the bread and butter. About three or four years ago our state legislator asked and actually adopted the policy of asking all state agencies to submit impact budgets. The Department of Human Services, State Tax Commission, the Highway Department, and of course, even places like Stoneville. Well, the state employees union and virtually every other agency fought it. We couldn't wait to get to Council and on two pages, tell the economic impact of Stoneville in the last five years, not just the last 25 years, and what we had promised in rice, in catfish, in cotton, in soybeans to the state in terms of GNP for the state in the next twenty years. And we think there's a direct wire between the productivity in Delta agriculture in Stoneville and we rarely give an argument about that. Not to anybody. And it's because of the high impact of service that's turning over money in the economy. My last comment on this relationship issue is, this is something that's probably foreign to you people because you would never think of this today. It kind of lifts up an issue that is real important in terms of relationships and the fact that we know that elected officials, when they give you money, they're responding to some constituency. In the mid eighties, there was a request made by the national association of state universities and land grants and I attended the appropriations hearing every year with the representatives because the appropriations committee chairman was from Mississippi at that time. We went to the house appropriations subcommittee meeting and the chairman was a fine man and a good administrator and a good friend of mine personally. And we were asking for about 40 million new dollars in formula funds, hatch funds. And the chairman, in a friendly inquiry, chatted with the chairman of the committee. He said, "Well, tell us what you're going to do with that money and how it will be spent and who's gonna benefit from it." And like most committee chairman in Congress, this fellow is not a young fellow so he kind of gruffed up, but it was a friendly line of questioning. And the chairman said if he had to justify the inquiries or itemize how it would be spent there at that hearing that

day, he would just as soon get level funding.

And the chairman hit the gavel and said, "You are accommodated." Now, the reason I bring that up is because there is a perception. I don't think it's real because I've worked with enough of you people and your colleagues to see the other side. But there is a perception about public funded research, not just agriculture research, but all public. Medical research, NIH, NSL, and your research, there's a perception that you want to administer these funds and you want more funds but you don't want anybody to tell you how to spend those funds. I believe that's an unfounded perception. But I want to caution you that when I saw the subject I was supposed to talk on I wanted to bring that up because that has been the success in the Mississippi agriculture experiment station system. They're constantly wooing us and bringing us in early enough that we get to pick the color of the brochure and not just be on hand for an hour. And I urge you to study that in every day of your work because it will pay off in huge ways and it makes guys like me, who do this for a living, able to reach out and throw the net further and further from the boat and just fill the net up with folks in constituencies that are willing to go to Washington or Jackson, Mississippi or Montgomery, Alabama or wherever it might be.

Let me close by saying this. There are two things that I would like to leave with you that really probably have a lot to do with relationships in the future because they're so pressing in agriculture. One is genetic engineering and the other one is environment. And there are many other issues. Those are not the two most pressing issues on branch experiment station every day. But they are two very pressing issues on the turn row somewhere. And neither one of them are getting any attention on the turn row. Because these folks are trying to get production loans now. They're going to get the ground set as soon as it dries up. Things like this are on their minds. But I would lift up to you that in these two particular areas I think you have the most unique opportunity of anybody in the country, both the higher levels of resources and more effective problem solving. Because in the whole menagerie of those two issues, there is still a level of confidence in one source giving reliable answers based on science rather than advocacy. And I caution you also that you have some people working for you who get confused between science and advocacy when it comes to issues like this. We have in Mississippi, and it's a delicate line, but really farmers and even the public to a great extent, don't think of the land grant as just the folks who get the cat out from under the house. The land grant has the expertise and has the resources and the people and the respect in every state that I see represented out here to step forward and say, "Now this is a real risk. This is a perceived risk." The land grant can talk about what a wetland is rather than get emotional and colorful and talk about what it does. Now I challenge y'all in those two areas. The genetic engineering I won't say much about because I heard some comments in the earlier presentation, equally as divisive, equally as emotional, and probably the only other issue in agriculture other than the environment that is laced with as much commercial interest, let's say. And I challenge you, these are two areas where if you reach out and start developing priorities and planning what your role is in these two areas, both of them are going to be growth industries, it looks like, and both of them are interested in the person who has at least some of the title to the resource that they want protected. And so, Jimmy, thank you very much for asking me and I thank you folks for inviting me. I'll be happy to answer any questions.

Concentrated Animal Feeding Operations: Current Issues, Opportunities and Technologies, Overview with Examples for the Western United States

Dr. John Sweeten, Resident Director, Texas A&M Ag. Research and Extension Center at Amarillo

One thing that I wanted to pass out to all of you is a brochure that relates to our research and extension educational program up in the Texas panhandle. I'll get a lot into it and what I wanted to do is kind of show you the area that we live in from the standpoint of operations. I'm gonna kind of read you the specifics, some of the issues and problems. What I'll do is give you kind of an overview between us, kind of an East-West kind of an orientation.

It's very easy to see why the perspective is as it is, with regard to the producer as we start dealing with regulatory agencies and proper use of manures. Manure management is a key to production service as well as a quality product as it is virtually used for microbial land application in one form or fashion. Frequently, it's being composted. We're looking at kind of optimizing the management product, optimizing it's use in regard as destination and return. There's a wastewater component. These are a large earth surface open to cattle feedlots. The rainfall runoff years ago was linked with the amount of weathering, the regulations have been developed with that, essentially to contain that and put it on lands. Some of the feedlots are located in natural basins, valuable basins that are not allowed to build there anymore, but those are at the water ends. They're used to collect wastewater and, to a large extent, that material is evaporated. So, again, there's a couple of different ways in that allocation of evaporation. The background shows wastewater irrigation, agricultural land used for irrigation with fairly high alkalinity, a high nutrient product that requires pretty careful management for getting the job done without causing land problems. In the background is a small dam. We have a low economy in our region. We've become more competitive now. The other part of that is obviously air quality. If the air quality is in the form of dust, or there's dust late in the afternoon when cattle activity begins. So you have cattle dust on those hot summer days. They get up from after eating. After they eat 25 pounds of corn and other carbohydrate based products, they get up a lot of energy so they begin to work that off, and as a result of that, generate dust, and generate that past the property line. In a few minutes we'll get into dust control methods and several ways to control it.

Odors and other issues to work with. This shows the way cattle respond with odor monitoring. We're getting into that for our research. There are several sound approaches to odor monitoring. This is approved by the university. We not only have cattle, we have some swine operations. Our swine operation looks like they do in the mid-west. They are lagoon based. The swine industry has grown tremendously. This is an attempt to control odor with regard to aeration, one of the several tools we have available for odor control. We have a dry system, we have a wet system.

Who regulates and who doesn't? The state regulates. Yes, the federal government regulates odor. The federal government does not want to participate in research with water quantity. Yes, the state regulates that but no, the federal government does not. Research in water quality, yes the state and federal government are both involved in research with our water quality. Our groundwater quality, it depends on where you are. Groundwater quality, yes, they both regulate it. The bottom line is the federal government gets credit or blame for everything but really they only regulate research in water quality

and they back into groundwater quality by way of reappearing as surface water and enters back into the land. So I guess I'm going to begin to develop these things and talk a bit more about some of the issues that you look forward to and you're working with in your own state with regard to feeding operations.

Air quality is a very combustible issue and biological and wildlife issues are similar. I'll try to discuss this in terms of things like type of problems and resources and some of the things we're dealing with. More important, one of the issues of the surface water and groundwater issue, as far as the surface water, it's got Nitrogen and Phosphorus springs bacteria and viruses from point sources, that is, animal feeding operations is one of the few agriculture sources. Nitrate has always been a concern. Bacteria and viruses may or may not be a concern. What are some of the strategies that we have in place? Some of these have been around since the 1960's. Point sources, animal limitation guidelines written by USDA, last written in 1974, that's a generation ago, they simply said, "No discharge, keep the crap out of the creek." And that was about what it is. In 1976, after the Ford battle, EPA came out and defined what is an animal feeding operation. They defined it as being either 300 animal units, either beef cattle equivalent or 1000 units depending on whether there's a stream running by it, it's 300 animal units, 1000 animal units away from a stream. What's happened in the last 23 years is various state permits and programs, they form a virtual patchwork of control down there. EPA delegated their 1974 and 19'76 permit. Surface water protection and practices were written. Nitrogen based applications were measured. They checked your operation every week and would write down information. They were determined to ensure that you were doing the right things. Discharges were reported. That was a five year permit and it has expired so what is happening now is it's being revised today. It's taken them a year since March 10 of last year to get it revised [into] the latest revision. We'll set up a framework of an impaired watershed as compared to a non-impaired. Agronomic rate application with phosphorus is the basis in the impaired watershed. We've developed this, kind of, a half-half model with a risk index. It's pretty strange, I guess it gets to the point where we can't just keep adding watersheds. Also it may or may not regulate off site ranch work. This has been the main part of our cattle industry or poultry industry, where you have solid material, is loading it on the truck and hauling it out to a field. It's come down to three states. Louisiana got delegated as permitting authorities and Texas just received that last September and right now it's push and shove between the EPA section to see if we're in this or not. Chances are we will be having to enforce the EPA general permit.

What is this revision process? It actually started in May for the swine and poultry in 1998. In 1974, they brought all species under one little section. This is going to be species specific. EPA is working with specific industries — swine, poultry, dairy, beef, what have you. It will require greater storage, looking at chronic rainfall, not just the 25- year, 24-hour storm which was in the 1974 version. It may or may not have the treated release option. It may not have a place for these constructed wetlands. Research has been pretty good on that. This may bring about some additional technology, some inducement to provide additional technologies that we can economically afford to do that. You'll have some groundwater protection seepage control, probably very similar to non-hydraulic connection requirements of the EPA. Don't be surprised if you don't have about three tiers in there based on animal science where it would be size of the operation.

Another issue, to some of you would be very dear to your hearts, is total microbial loads. It is something EPA is required to do. They delayed until they got sued. Now they're forcing the station to document total microbial loads. They're looking at every watershed, at every point source in that watershed. They'd like to get in the non-point source. Environmentalists would lust after non-point source. EPA did not have the authority to do that. I think it's been decided it's important in our region. Air quality for a major area, odor nuisance. There's fears of health risk because of odors in surrealistic cases, property value, air quality, endangered species. Those are all viable competitions. Some of the producer's con-

cerns are air quality, property rights, policy developing, making secure investments we don't have to change with the operation every couple of years. These are all things that the producer is working against.

All of the politicians that put this in place will be gone before the bill comes to go ahead. It will be the year 2012 before we start having real solid, regimented type of enforcement for this new air quality. What are some research particulars? Protect the ozone. Secondary particulates is where you combine ammonium with hydrogen oxide for fertilizer and combustion sources go into the air. What is the chemistry at work here? We're very active in air quality at Texas A & M University.

Better emission factors, EPA's got some real junk in her system. We're trying to help get it out for her to get the data. There's a U.S. air quality task force established in 1996. About this time two years ago it was appointed 21 members. I happened to be privileged to serve on that group. They disbanded and our term ended at the end of this last fiscal year. We looked at the impact the EPA had on quality standards. We looked at odor — some 22 different sub-topics. We recommended $20 million base per year in additional research funding from USDA. We think that at the beginning of the fiscal year 2000, you'll begin to see research in air quality more extensively.

To talk about a fairly recent topic that's coming like a storm, wildlife biological issues are coming about and being impacted. You're going to see the fish and wildlife service more involved in your business through EPA. At one time during the last 30 years, it was a supply side issue. Engineering, animal science, well developed and broadened out, bigger ponds, bigger pumps, this sort of thing. A better flush system. Animal sciences ought to entail you to include the animal relationships produced through soil crop sciences. If both of those sectors can come to the table and do a lot more to better flake out their technology. I call it the supply and demand side. I think what we're seeing, though, is something they haven't spent near enough time on. Certainly guys like me, engineers, have just blown it off, right? Now it's commodity groups that join our table that say, "What are you going to do about this? What are you going to do about wildlife in the ponds and streams? Waterfowl and ammonia, are you going to put a net over holding ponds? How are we going to keep from shooting the birds away?" We need to have biological indicators in streams. It's very important. Not just a chemical approach. Some of the ironies, I think, we've had excessive preoccupation on getting permits and just meeting regulations, just barely. We can do better. Regulations, I think, have held us back. Regulations tend to damper or overshadow scientific development. New technologies are a bit slow to come. Custom regulations favor big operations. I don't care how tough you write regulations, and I think agencies and environmentalists don't understand this, that because you don't like big hog operations, you write tougher regulations. What happens? Only the big survive, that's the point. Last, we all have a state. We're not all engineers, not all soil scientists, not all animal scientists, not all biologists, but together, we can find the right systems approach. Stand up and speak up with ease. Even if nobody wants to hear it, you bring it anyway. You're seeing a multimedia package. Not just water, not just air, but all these combined together.

Concentrated Animal Feeding Operations: Current Issues, Opportunities, and Technologies Overview with Examples for the Eastern United States

Dr. Robert T. Burns, University of Tennessee, Department of Agricultural Biosystems Engineering.

Good morning! It's a privilege to be here. To tell you the truth, I'm a little nervous about being here for two or three reasons. Number one, as you're probably well aware, in ag engineering circles, Dr. Sweeton is probably the most respected and recognized name there, and to be on the program with him can make you a little nervous. At the same time, I also have a lot of respect for station superintendents. I don't know if you'll remember this or not but I do, I took a senior design class in ag engineering and we actually had to do a design for a station. We had to present it and we had to explain how well all this stuff worked on paper. That brought me into the real world real fast. I'll always remember that. I have an animal agriculture background. I was raised on a beef cattle and tobacco farm in Walden, Tennessee. I respect superintendents also because I look at them as professional farmers with a couple of different circumstances. They have to watch folks poking around with new odd things on their farms on one side and then they're taking directions from deans at the other side. And I think folks that can do well farming under those circumstances are good farmers. Not that there's anything wrong with deans or researchers, but I think these guys are running working farms and I think it's important to remember that. I'm going to talk about animal issues in the southeast.

To give you an outline, first I want to look at some numbers about animals in the southeast, then I want to kind of look at some of the things that shape the issues in the southeast and then I'd like to kind of look at some of those issues and where I think there's the most opportunities and technology enlargements to be working on. I'm going to talk primarily about poultry, dairy and swine because those are the three big ones that we have in the southeastern United States. Now I know there's a lot of chickens on up the east coast and I really don't know much about Delaware and those areas so I'm going to stick primarily in the primary eleven states in the southeast. We also have a lot of turkeys, meat birds. What I'm going to show you is just look at broiler birds here because that's where our biggest broad base is. Take a look at broilers across the southeast. I apologize for Louisiana numbers not being here. They absolutely have chickens. These states represented right here are the top twenty broiler productions in nine states. We'll take a look at dairy animals in the southeast. Pretty good representations all the way across the Southeast. Everybody has a pretty good representation of dairies. Swine — and I want to point out that North Carolina is not represented here and the reason is, is it blows my scale away. We look at Arkansas here pushing about a million hogs. North Carolina right now is pushing about 10 million. So we see, there are some hogs all the way across the Southeast. Let's take a look at the next one. This upper edition showing some numbers here and I thought this was an interesting graph kind of showing that swine farms are one of the larger farms. Let's take a look at where did those hogs go and this from 1989 to 1998. This is breeding hogs but that will give you a pretty good indication of where hogs are going to be finished. There are some dimensions to that but, basically, if we look at the southeast, for the most part we see that over this period our breeding hogs are way down. This is in thousand heads. 60,000 down in Tennessee. North Carolina is up 690,000 head on breeding hogs so there's that outlier in that data. That's the way things look.

How did the Southeast rank in terms of production when we look at some of the big players particularly out of added in states here, Iowa, California, Wisconsin, Pennsylvania, and Minnesota? And you can see if you look at our dairy numbers, we all have dairy but not near the magnitude of California, Wisconsin, Pennsylvania, and Minnesota. Our swine numbers, we see North Carolina having the big player numbers. You see here Iowa is still running up 14 million as the biggest one. And then broilers, we are the primary broiler production players in the southeast and there are chickens in the northeast as well. And my point on that has a couple of points. Number one you look at and say, "Well, there's not a lot of animals in the Southeast as compared to some of these other points." But we do have a lot of animals. Just to take an example, Tennessee, our farms are smaller for the most part in the southeast than some of these larger states but that doesn't mean livestock is unimportant. In Tennessee last year, livestock represented 43% of the total cash receipts from agriculture. And livestock is important to the southeast and issues that effect livestock are important to us.

If you take a look here at population density and I think you'll see that in the eastern United Sates, and this is on a square mile basis (the darker it gets, the more population density per square mile), you can see in the southeast we have a lot more population density than west of us. This population increase in the Southeast are non-farming rural type populations. So now we have folks living amongst us everywhere, where we didn't before. We're getting increasing resistance. Dr. Sweeton pointed out what happened in 1974 and 1976 and I'm glad that he pointed it out. Essentially, we were all operating in the southeast under laws in NPDS that said if you don't have a discharge, you don't have to have a permit. And discharge was illegal so we didn't issue any of these permits. And all of a sudden, out of this clean water action team and so forth, EPA is reading words in the same set of regulations that they didn't read 22 years ago. And now we're all coming under this permit situation of essentially in the southeast, I don't have time to give a rundown on all the states, but essentially at this point to get a thousand animal units by EPA's definition of animal unit, which can sometimes be a little strange. Engineers are used to working with live animal weights. You're going to be permitted and you're going to get a no discharge permit. You're not going to be allowed to permit. In the states, EPA came to individual states specifically in region four and said, "What are you doing permitting these guys?" And most of the southern southeastern states have implemented regulations that are stricter. In Tennessee we're just implementing permits that, depending on if you're an impaired watershed or not, will cover facilities down to three hundred animal units. I think North Carolina numbers go down to as low as 250 hogs. South Carolina again, I believe is stricter than a thousand.

So we're seeing regulations that are more stringent than EPA federal ones. Take the population density and then add it into surface water and you'll see this side of the map get even bluer and bluer. Not only do we have a pretty good density of folks, we have streams in a lot of the locations. This gives the potential for surface water pollution. It's not uncommon in certain areas of the Southeast to see a lot of this kind of stuff and this gives a lot of potential for groundwater concerns. We have some real short time paths in the groundwater aquifers especially in Middle and East Tennessee in my state, for example, we're in a fractured flow type system. We get in to West Tennessee and it's quite different. So, depending on where you are, this may or may not be an issue. But for a lot of the Southeast it is.

Now rainfall — this is the annual precipitation map from last year. You can see that the Southeast got 40, 60 or even higher inches of rainfall per year and west we're looking at 10, 15, 20 numbers. This is an average annual chart that shows that line real well. Because if you draw the line and split the country right here you can pretty much separate the rainfall net from the other areas and separate where the irrigated agriculture is going to be and where it's not. Up at this end I'll also point out the evaporation. You're going to get 30 or 40 inches of evaporation a year here and you're going to get 60 or 70 inches here. So that's a big difference. We've got to handle all this water some way in areas where we have lots of surface streams and potential in-ground water vats.

Where you stand in the world really makes a difference on how you see things. All three of my degrees came from the University of Tennessee. I finished my Ph.D., [and] I had some folks point out to me, that really wasn't the brightest thing I could have done academically. I could have gone off somewhere else and get a degree to get a broad view on the world, and to show you how; where you stand makes a difference. My family, on the other hand, was overjoyed! We come from a background of animal agriculture and they thought I was line bred and the rest of the world thought I was inbred! I want to point out issues from a couple of different standpoints. I want to point out issues from where I think the public looks at them and I want to point them out from where I think producers look at them. I had a good opportunity to get a feel for both of these in Tennessee because our class 200 or 300 animal unit permit was a general permit so we had public hearings on it all across the state and we had over 500 people here at the hearings on both sides of the fence making a lot of points. These were some of the issues that kept coming up over and over from the environmentalists and the public standpoint. Obviously, this nuisance odor issue has become a big one because of this close rural-urban trend if you want to call it. Environmental concerns, primarily in the areas of surface and ground water contamination. And one that kind of popped up that was outside of the box for me as an engineer was food safety concerns. This is very important. There's a lot of money being put this way right now. This is one of those issues that folks are going to have to get out there with good science and decide is this real or is this perceived and where does it stand right now? It is real because folks make an issue out of it and there's a lot of room here for work to be done on looking at it. E-Coli in manure under different handling machines and so forth. All of this is public standpoints. Let's have a look at the lobbyist and what I hear from producers working in the fields. Increase in regulations is of great concern to them. And again, we stand up and say, "Well, these rules aren't new. They've been on the books for so many years and now they're forcing them to protect the state level." We are getting lots more rules than ordinary. They're going beyond. We're seeing setbacks, we're seeing odor issues, we're seeing all kinds of things. This news with lawsuit business worries me to death. You could be there doing things like you've always done them and have somebody move in and wreck your execution. Whether they win or lose, they can still wreck you by dragging you through court with these issues, and this has been a problem. Many times the public, not only, do they not understand where food comes from, they don't understand the scientific issues behind it. Nutrient advantage. That's a primary piece of all this increasing regulation. Phosphorus is a large issue. And economically we're building solutions. There's folks popping up all over the place now overnight and they're showing up and saying, "I've got these Russian rights and some super facist is going to fix your world." There are all kinds of people that are bringing wastewater treatment and drinking water treatment technology and saying, "We can fix these problems." Sure, we've been able to do that for thirty plus years. We've not been able to do it where you can afford to go to the store and buy the groceries though, and these solutions that we come up with, have to be ones that are economical. Increasing regulation. Again, we're seeing setbacks and we're seeing issues such as reverse setbacks. If you're going to put a setback on me, that means don't let anybody build that close to me if I'm already here, and those issues have been taken. Those issues are challenges and these may seem like small topics, but I think they're things we need to solve. Dairy farmer waste water. I mentioned most dairies in the southeast in the states I covered would be what I consider small dairies. If you go look at, say, a dairy in California, Texas, or Oklahoma that may have 2,000, 3,000, 5,000 animals. Then look at Tennessee, for instance, a dairy with 500 to 700 cows is a big dairy. Most of our dairies are 200 cows to start. But dairy is a very important industry to us and I think that's similar across the southeast. But if you're in the dairy business, you're going to have a milk parlor. It may not be as big as this but you're going to wash it two or three times a day and you're going to have a drain and there's nothing you can do about that. Many of these dairies being small dairies are also old dairies in the southeast and they're dairies that were built 40- or 50-plus years ago when it was quite legal to put that parlor washer right out top until it hit a stream. And that's not what we want. You show up and work on a dairy farm, one of the quickest ways on these old spreads to get a dirty look is to start asking where the parlor wash water goes. And

they'll do a lot of things, they may not even show you. We have to think outside the box. We can treat this parlor wash water and we can discharge the stuff. I don't have any doubt about that. There's not been a lot of work toward that because we know the regulators won't let us discharge it. But I think that's a great point that we ought to be doing that research. We need to show these folks that we can do that. We need to come up with a system that allows these folks to put in something that's economical to them. Many of these old dairies are located such that they can't go in and add liquid holding systems because of proximity to streams, the area is taken up and to go in and try to do that on some of them will put them out of business economically. So coming up with solutions on the work, we have to think outside the box sometimes about what these folks will and won't let us do and show them that we've got a better way. The liquid issue is even pushing a shift possibly for dry systems. We've got a lot of folks that want to get away from these. North Carolina is a good example, I think. They're addressing the state legislature about coming up with the alternative to the anaerobic lagoon. In the southeastern states, the liquid systems are anaerobic lagoons, which are much like holding ponds. Many times we don't make that distinction in terminology but either way, folks see this liability for liquid systems and look at ways to get away from them. We're seeing new structures in hogs. They go into a dry bedding system which would be similar to the way we do poultry. Lagoon holding, there's a lot of work done on that out of Minnesota and Iowa specifically looking at barn straw, wheat straw, clay balls, just all sorts of things that are affecting us. Dust control, again touched on by Dr. Sweeton, very important. And ag business. Not only on how effective in ag but you look at the way they work and there are some scientific meanings to some of you that work to find out if you put enough of them to make it work, you probably can't afford it. But, we can't be open-minded enough that we don't miss a good idea. Along that idea, North Carolina and Iowa are both doing a lot of testing for these and we look forward to seeing the results. I mentioned anaerobic digesters. Just to punch out a couple of points about them. We're looking at them from the standpoint of over-control and we're talking about high ranked anaerobic systems now.

Right now these high rate systems I'm speaking of are pretty much lab scale. If you want to look at full scale anaerobic systems, you go back and see some of the old flood flow and suspended growth systems that came out in the seventies when we're looking at methane generators. And there are some of those out there. California, New York, and places where the meter department is a little bit different than here. There's not a whole lot of expense to generate methane for energy when it's $.06.5 per kilowatt hour and gasoline is $.85 a gallon. It all depends on what the alternative energy costs are. But, I think we're going to see the future of these type lab scale systems going online on farms as full-scale system.

Nutrient management, a big topic. Traditionally, we based our nutrient management plans on nitrogen. It looks very apparent that phosphorus limits may be very likely introduced. Several pumping associations in Tennessee are nonprofit farm organizations and are doing a good job. One of our best points in Tennessee. Over a four-year period, about 40 systems a year are being pumped, half of them being swine and dairy. We went through and just took the average out of this data, just to kind of get a sample off. If you look at the average hydrogen and phosphorus here as it's being applied, how many thousands of gallons of this material would you have to put down per-acre to meet the nitrogen requirement for a 150 bushel corn crop or whatever you want to equate that to? I outpost the averages to just about 18,000 gallons of this dairy flurry and about 22,000 gallons of swine flurry unique primarily to poultry farmers. If you turn around and say ok, now let's bounce this same crop up to plant phosphorus uptake. Let's assume that there's a need of about 56 units of phosphorus for this corn crop. The numbers slide down to about 4.3 thousand gallons, or 4,300, or about 2,500 gallons of swine. Again the swine is so much higher quality. Here's the real punch. And again, these are average values. If you've been on a dairy and you were growing this crop with this average nutrient value every year and then balancing on that and somebody walks in and says now you have to balance on crop uptake in phosphorus, you're going to need about four times more land than you're currently applying to. And that can really get scary when you've had all this rural-urban infringement I'm talking about. Land that you used to apply to is

now standing with sub-division houses. This could be a problem. For swine we're looking at about nine times your current land requirement to ship phosphorus. One of the opportunities I'm going to mention on this slide or the one after is equipment. I want to point out right here that these are liquid systems that we're using and our primary plates of land to apply this stuff. We use Cornell 4 and HDH pumps and we run about 800 gallons per minute through Neslon SR 200's. We can't go this way with that equipment. Six or seven thousand gallons a minute is about as low as we can cut those down to. And there's a couple of things happening when you do that. Number one, we can't get as long as these target numbers here and number two, the cost to apply goes up greatly because these units, if you're running from an association ring especially, you're charged by the hour.

Phosphorus movement. There's some work being done there now and some things going on in Tennessee where we're actually taking the swine rates and we're forcing removal of phosphorus about a fifteen minute reaction and we can drop out all those insoluble phosphates. The big question is, can we do it economically? One of the hot topics in our area, and I think throughout the Southeast, is probably cows in the creek. I didn't mention beef cattle here because they're not confined per say but there's all kinds of folks that want to see cows brought out of streams particularly. When I was a kid growing up you couldn't sell a farm if you didn't have good water. They'd write right there on the sign in front, say, Good Water. Now, some of those same streams are liabilities to folks. The place I grew up on, we watered right out of a little river that was called the sinking stream and there's was lots of animals drinking out of it so that's something that some people want away. Other opportunities, poultry waste is cattle feed to me. I'm not an animal scientist but to me, boy, this makes sense. There's energy in this stuff, that's a great value added way to do it. Feed poultry manure to beef cattle. The beef cattle folks, I know in our state that the cattle association essentially would not endorse this. I think it was a public reception deal. I also think we have a lot of people doing this and they just won't talk much about it. But it's good management. Dr. Sweeton mentioned PNBL. They're fixing to drive everybody's life, I think. In Tennessee on these lower number avenues were derived out of, "Are you on an impact stream or not?" And this stream impact list came off of dealers which you guys are probably familiar with. EPA requires the states to generate a list of impacted streams on a two-year site. And it has such categories on it as on the ones that are listed. Which is, the package had to have a permit if you were on a stream with pasture land, is one of the topics. And would it be operations for agriculture in general. And if you go to folks that make this list and look them right straight in the face and ask them exactly how they made it. And what exactly does pasture land mean and what does that have to do with animal feeding operations, they get this deer-in-the-headlights look. They'll give you a number of what agriculture's impact is but I don't think we have a handle on that number or really know where it comes from. We need data handling for a couple of reasons that better quantifies ag impact on water quality. We have some impact, we recognize that and we've been good to fix it. If we know even more about what that might impact we can do two things. We can control it better and also we can tell a true story to the public and get better public reception and image because farmers do a good job. Back to this public reception idea, again, there's a lot of educational opportunities out there and extension agents talk with a lot of different folks, not all of them farmers. It will really surprise you sometimes, to find out that people have no conception of how we produce food and fiber in this country. They all think it comes from Krogers. And doing a little information sharing there will help us.

The management that we develop has got to be economical to farmers and sustainability is a two-edged sword. It's got to be both environmental and it's got to be economical. If we come up with a fix that is good for the environment but the farmer can't implement it, we have to fix that thing. The second is, the methods that we come up with have to be socially acceptable and that can seem pretty obvious, I guess, but sometimes it will catch you by surprise. Dr. Sweeton mentioned wetlands. We've got a strong wetland research program going on in Tennessee right now getting some numbers out of it but the thing

that kind of surprised us all, he set these wetlands up and we were getting great removals in nutrients but what we didn't expect was we grew enough mosquitoes to carry off most of those folks. We caused a mosquito problem that was something else. Most of these environmental folks that want to bug you to putting in a wetland but buddy, if you put it in next to them and they had mosquitoes, they wouldn't be happy long. These are issues that we've got to handle. Some of them are not real clear. And with that I'll wrap up and give an opportunity for any questions, corrections, comments and again, thank you for the privilege of being here today.

Research Verification Program

Dr. Jim Barrentine, Department Head and Section Leader, Agronomy, University of Arkansas.

I kind of wanted to welcome you from the University of Arkansas. Things will be better next year. We just signed a good running back and hopefully we'll be at an area where we'll be able to participate with you Tennessee guys next year. Anyway, we look forward to it. The program we will talk about today is the Arkansas research verification program. This program is funded by the commodity research boards, the cooperative extension service and experiment stations. The history started back several years ago. When you drive around the state you'll see signs like this that advertise our program. This happened to be one on wheat and this happens to be one on soybeans. It's one of those tangible things that come out of programs like this. This is a good source of advertising for the University of Arkansas and some of the things that contribute to our enrollment. The history of this started back in 1980 with Dr. Maline who was our interim head, who had the vision that says we're having some problems with our cotton yield. They're low and there has to be something done. Are we doing the right kind if thing at the grower level? Are we assuring that all growers are really integrating all the recommendations in their programs? So this started the trial. The trial was designed to really implement and demonstrate the supply to you after all the technology and recommendations we had. Now this group isn't deemed very successful.

In 1980 our crop reported a yield of 816 pounds versus 230. Well, if you go back and recall in 1980, probably throughout the delta there was really a yield drag on planting cotton. A lot of people thought they had to do the variety selection. A lot of people thought they had to do the herbicide evaluation. One of the things that really came out of that, is once you implement recommendations that could impact, it could give yields that were significantly greater.

Instead of cotton, in 1983 the rice and the soybean boards supported and took out funds for those crops. Some of the objectives, there's about six of them, really are pretty basic. It is to go into the field, verify, make a recommendation of optimizing the yield and develop a way to use the analysis in the computer systems management programs to really aid the searches in identifying areas in which we should be doing research and improve what we're tying to do in our current recommendations. In some cases we find that these recommendations really aren't valid. They sometimes need to be corrected, verified and refined. One thing is to utilize and incorporate the data you find in your research verification programs into our education programs at the county and state level.

You always have some organization charge regardless of how you show this. The success of this program really depends on how well you use the input in this program, how well it's implemented, and how well you communicate those findings as you go through. We have a coordinator for all four of these crops who have the responsibility of coordinating and implementing programs. We have some important district directors and you really have to have that to get the county agents involved. How we do all this is that the county staff selects some cooperative farms. And of course this one must be willing to commit land and all the resources we need here and be willing to say I will do this when the recommendation is there. You'd think that's kind of easy to do but when land preparation gets involved and planning gets involved the result of the overall operation is farmed. At the same time it's very difficult to say you need to irrigate this in order to get it to do this. So that part is extremely important, getting the right farmer cooperating who's willing to spend his time fixing these issues. Field time depends on what we're looking for: 20 to 100 acres. We like the soil type of that county representing a majority of that area. We

have problems with fields that recommendations can drop or go down. You really don't want a field that has so many problems, it's very difficult to manage, especially in a two year period. So, we're trying to not get the worst case scenario just like anybody else. When you look at the new products sometimes, you like to go on first feel. It also puts you at a disadvantage because it is the worst case scenario.

Agents, generally, and the coordinator make weekly visits to that field along with the farmer. They get in there and look at the field, make any necessary assessments or recommendations that need to be implemented at that given time. And then are able to relate that back to us on the corporate level. Sample fields and soil sampling is relevant to that. Selected variety in many cases is usually replicated from what we have or, in some cases, we use computer programs to make recommendations for variety selection, and irrigation. And of course we always record maintenance fuel operations and equipment utilization time. Of course we obtain, or we're there when we harvest the crop to get harvest information. One of the things we need to do is to have some feedback for the program is to get some evaluations. This year we went back, modified our evaluation system so that we would get feedback across all of our verification programs so we can develop a database that can be used across all of them. As I said, the success of this program really depends on county agents and the coordinator. Those people are communicating effectively, understanding what the needs are and the requirements for the programs to be successful. That's a must. These people really have the communication and are willing to move along by recognizing the importance to the community. Now we're looking at some of the results in our research verification. This shows the twelve-year average for each of the WR research verification programs, the average since 1987. Even though the trends are the same, it's just that we've had a slight yield increase since the verification program has been in place. Look at the average 12 years, 129 fields, 29 counties. An average of 58.2 bushels on the verification program compared to our 44 as a state average. That's about a 14-bushel per acre increase. And in 1999 we intend to have more fields. This year we have about 14 fields throughout the state. Each year we can go through and do a break-even analysis each year across all our locations and give some indication of how many dollars we have to generate to have a break-even point. The same thing with soybeans and the same thing with cotton. Looking at rice, of course rice is one of our most important crops. We anticipate maybe 1.7 million acres in 1999. The crop is of considerable interest to us, generating over $400 million in income. One that we've spent a lot of time on. Also one that probably has the most diverse cost relative to production, comparing to cotton or even soybeans. But looking at the average in a fifteen-year period, you'll note our research verification program is somewhere in 30 to 40 bushels per acre area. Since about 1988, we reached up around 120 bushels per acre. I'm not certain about all the details and whys. Look at the data, in those fifteen years, we've had about a twenty-bushel increase in yield. Again, I'll show you a few specifics in a minute relative to some things that we've done to make it generate these differences. Cotton of course, there was a difficult problem in 1998 just at the standpoint of input costs. It was one that looked at irrigated fields across the state. Maybe not as drastic, but if you look at 1980 which shows that drastic change, really I'm not certain that you could note all the work that has been done since 1982, looking at our state average, that it has significantly been increased since 1980. Some suggest that maybe some of those recommendations have been accepted and also been implemented. And looking at the average of 19 years, which is our longest database on any crop, you have an average of 9% of the pounds compared to 803 or about 170 pounds per acre. We had a break-even cost of $.71 a pound. So, you know, with cotton around 62 or 63 we saved dollars. We had some costing as high as $123 to break even. We had one grower down in Southeast Arkansas who you might say is very resourceful. He put his cotton at $.76 cents. He had a cost of production at $.50 a pound. So it was done in 1998 but, of course, as I said the rain at average was significantly higher than what we get in Arkansas. But again, we anticipate having ten fields in 1999. Look at soybeans, of course our largest crop in the state of Arkansas with over 3 million acres. This shows a dry average soybean yield from 1985 to 1998. We did implement a soybean research verification program on dry conditions in 1988. I think you'll see that we kind of go up and down, we're slightly higher above compared to the state average, but over that period of time, the state average has been about 27 bushels compared to the dry land part research verification program is about

18 bushels. Look at irrigating between two seasons substantially increases yields even across the state average we're getting, somewhere around the 30-bushel range compared to about forty to forty-five. Pair all that together, looking at 16 years, a hundred and ninety fields, we have an average of 46 bushels per acre compared to the state average of 34. I'd like to mention that the state average in 1998 was down to 25 bushels. The weather really had an impact. We did have a yield increase of 12 1/2 bushels in 1999. We had 15 fields under irrigation. Another nine under, you might say, dry weather. Let me just give you the scope of the soybean research verification program in 1998. It shows we had 24 fields in 21 counties. We had production in early season and early bird type soybeans. We had full season dry land in four, we had full irrigation in eleven, we had double crop dry land and double crop irrigation in five, we had six where we were going out to get sampling. We also had yield monitors that were really trying to correlate the field. We had 20 conventional type and we had four no-till tilling systems. We had round up ready varieties in seven of our trials. So a really diverse program trying to implement most of the technology that is available to us and also trying to represent production systems as well as the type of tillage that one might be using. Pretty diverse, and also trying, again, to cover a lot of bases and trying to emphasize an area which represents the growers in which our resources are promised. Probably one way that you measure how effective you are is getting feedback from growers. One of the ways we do that is getting some feedback from one of our county coordinators, Mike. William Johnson is the state rain specialist for Arkansas. Of course Wade went out and said, "Let me show you how you can grow 80 bushels per acre." Mike kind of laughed him off. Really what happened, on 105 acres he yielded 95 bushels. And it really had to do with, of course, making sure we had good drainage.

One of the things that changed is the timing of that fertilizer nitrogen to February instead of March. It really significantly impacted the yield. On cotton, this guy said, "I farmed all of it the way that Don Plunkitt, who is a cotton research coordinator, indicates then I've made over 200 pounds higher across my whole acreage." Again, just a good way of getting feedback and seeing how the program works. From a soybean standpoint, he indicated he understands how soil tests exchange and he was one that believed in taking soil samples but really just demonstrated the value of doing it each year. And again, he's very particular with the programs he does on his farm.

Some of the benefits that we see from the program include, of course validation of recommendations. Validation from the standpoint that the recommendation either works or it doesn't work or needs refining. Cost of production database that we are generating at least on an annual basis. It really does provide an opportunity to identify our research needs because, in most cases, the researcher in soybean varieties or a soybean agronomist is out looking for these trials. I think one of the most significant things is awareness. Awareness of what the land grant institution is providing to the grower. I think we really don't do a good job of advertising our benefits of what we do and I think this is one area that does really advertise that this is a system that's generated and funded by U.S. growers but yet, here's the cinch, we're doing the work. It's an excellent way to adopt new technology at a time that maybe it's just beginning or even at a time that maybe we're late adapters but we have an opportunity to do that. Of course, one of the real benefits is explaining to agents assuring that they have an opportunity to learn about crops and crop production. I don't know about other states but our young county agents coming from, maybe not from that farm background that we're used to, and that he or she really doesn't have good understanding of crop production and this is really a good way of doing it. Of course, other benefits, collaboration and communication assuring that people in this area do communicate, collaborate and talk about how to improve on yields, how to improve on harvesting, what ever it might be across our universal systems. Changes we see in cotton; we have better nitrogen management. We have a integrated pest management program that is improving our harvest efficiency. Soybean, early season production, irrigation scheduling. Rice, several things, integration of our immediate program, soil fertility, our variety selection, our water management which is probably one of the most important things and also

being able to look at first sight inputs. How can we produce them and still get effective control? Wheat, of course, we always talk about including drainage in variety selection. Extremely important, then of course, nitrogen management and one thing we've also looked at is how do you really treat the fungicides. We really can't afford it so we've really looked at ways to look at our levels and be sure that when we need a fungicide that we in fact do.

We've already integrated precision ag. I think it's one area that, from a land grant standpoint, we really need to get more involved in. It's difficult, from the standpoint of being able to get the right equipment to do that and it's costly to think about precision ag. We've been able to do a little of it but we really need to be a little more adept in doing this. Of course, incorporation of new technology, it's just a natural thing to do that. Building database on conservation tillage system. This is an area that we looked at the farm bill and things that were going to reduce cost and conservation tillage is one of those ways that I think is coming in there.

The grower used to plant cotton-cotton-cotton, of course occasionally he might have a little corn or he might plant rice-rice. Now he might go rice-soybean-rice or maybe it goes rice-rice-rice. But, again I think we need to integrate those. And the other thing is to include specific replicated research. We do know that there's opportunities to go in and going to utilize a recommendation for a given year. You can go in and put small replicated research in that same field. Replicate it and help you validate that particular recommendation, just research, and we intend to do all that as well. With that, I'll leave her be. Thank you.

MARICOPA AGRICULTURAL CENTER MEETING BUDGET CONSTRAINTS

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Resident Director
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University of Arizona

The Maricopa Agricultural Center (MAC) is a 2,100-acre research and demonstration farm located 30 miles south of Phoenix and 90 miles north of The University of Arizona Campus in Tucson. Acquired in January 1983, the Center consolidates the activities formerly conducted at the Cotton Research Center in Phoenix and the Mesa Experimental Farm in Mesa. MAC is an integral and essential part of the research, extension and teaching resources for the College of Agriculture. The main crops grown are cotton (short and long staple), alfalfa, grains (durum wheat and barley), new crops; such as guayule, hesperaloe, lesquerella, and jojoba, and some vegetable crops. Laboratories and offices for housing resident faculty, staff, cooperating USDA scientists and industry scientists are available on site. An Irrigation Research Laboratory, Short and Long Staple Cotton Gins, Cotton Fiber Laboratory, Cold Storage Facilities, Greenhouses, Equipment Repair and Fabrication Shop, Dormitory, and numerous storage facilities are located at the Center.

The Center is located at an elevation of 1,175 feet where the annual rainfall averages about 7-inches per year. The wettest month is August with 1.15-inches and the driest month is May with 0.14-inches. About 45% of the precipitation occurs during the summer months and 55% during the winter months. The growing season is typically 240 days where the average high and low temperatures for July would be 107°F and 76°F and for January it would be 65°F and 33°F. Annually there are more than 100 days when the temperature is above 100°F.

MAC is unique among other Arizona research centers in that it is divided into two farms, a 500 tillable irrigated acre Research Farm and a 1,600 tillable irrigated acre Demonstration Farm. The best technologies and cultural practices developed on the Research Farm are used to demonstrate to growers their economic and practical potential under normal commercial practices on the Demonstration Farm. The combination of these two farms has increased the speed to transfer new technologies from research to the agricultural industry. The Research Farm is supported by state and federal funding while the Demonstration Farm receives no state or federal research funds. The Demonstration Farm is funded by the sale of commodities and from farm programs available to any commercial grower.

The University of Arizona provides funds to the Research Farm for supporting staff, operations, and capital expenditures. The support staff typically includes one technician for each resident faculty, secretarial and accounting personnel, maintenance personnel, farm management, and farm attendants for conducting normal farm practices.

All University scientists desiring to conduct field trials, greenhouse studies, or use any of the Center facilities must fill out a request. These requests are normally completed biannually, in January prior to cotton and spring vegetable plantings and July for the fall vegetables, alfalfa and grain crop plantings. Research Farm management review these requests and verify that the Center can fulfill the experimental objectives and than make land assignments accordingly. The Research Farm has the responsibility to provide all normal farm practices at no cost to the scientists. If the request requires variable precise

applications of water, fertilizers, herbicides, etc. then these requirements and any field measurements become the responsibility of the scientist. The Research Farm will provide equipment for harvesting, however, all plot measurements must be recorded by the scientist. Seed costs for planting are paid by the scientists, since seed costs can be very expensive, especially for some vegetables.

The Research Farm has the responsibility to maintain all equipment for conducting field research, maintain and repair all buildings, offices, laboratories, and support facilities. In addition the Center provides telephone service, copying, faxing, and related services to all resident faculty. Thus begins the problem of trying to meet budget constraints as inflation and requests increase the operating costs of the Center.

The financial support for staff salaries at the Center is determined by the state legislative process. All staff positions are hard line and any salary increases are approved and funded by the legislature. The difficulty occurs if we want to make changes in our programs or add more staff. This can only be accomplished by changing the assignments of current staff members and/or as staff leave through retirement or termination we can change responsibilities and develop new positions. Our support staff positions have remained relatively constant over the last five years. However, we did lose some staff positions during the early 1990s when state funding was reduced.

Maintaining a high level of productivity is difficult because budgeted, operational funds are less than the operating expenses for the Research Farm. Table 1 shows the budgeted operational funds for the Research Farm and the operational expense for the same period of time. The budgeted funds received increased from 1991 to 1993 and then remained constant until 1996 when they started to decrease. The decrease in 1997 and 1998 was during a period when state legislators were concerned about reducing taxes and University costs, even though the State has had a revenue surplus each year. Operational expenses during this same period increased from 1991 to 1993 and then have remained relatively constant during the remaining years. The increase in expenses from 1991 to 1993 resulted when our irrigation water source changed from ground wells to surface water. Because our ground water levels were rapidly decreasing, a large canal system was built to bring Colorado River water to Central Arizona. Our water costs increased from $25/ac-ft. for pumped ground water to nearly $50/ac-ft. for surface water. The surface water costs were determined by the expenses to build the canals and control structures. The surface water costs have gradually decreased to about $35/ac-ft. in 1998 because farmers couldn't afford these high water costs at depressed commodity prices. The decrease in surface water costs has helped to keep our operational costs from skyrocketing.

During the 1991-1998 period we have consistently over spent our budgeted operational expenses by an average of $125,000 each year. One possible solution would be to reduce our expenses. Table 2 lists the average distribution of our expenses for this same time period. Our biggest expenses are utilities, irrigation water, and farm and shop supplies. Utilities include electricity, natural gas, and telephone. Electricity accounts for more than 75% of all utility costs and these normally occur during the summer months for cooling offices, laboratories, and other facilities. Currently our offices and laboratories are controlled with a computerized environmental system that automatically adjusts the temperatures in different parts of the building depending on the time and day of the week. Irrigation water is a necessity for crop production in an arid environment. Water costs could only be reduced by limiting research acreage. Any acre reduction wouldn't fulfill our obligation to the agricultural community and scientists. Farm and Shop Supplies also account for almost 20% of our total expenditures. Since the Research Farm provides normal farm practices, it will be difficult to reduce these expenses without affecting those experiments that require higher expenditures. Typically vegetable crop production can cost three to five times more than growing a grain crop or two to three times more than producing a cotton crop. Capital funds have only averaged $46,000 a year. These funds are used to replace farm equipment, but all office,

laboratory, and other facility equipment. As a result, we have been unable to replace farm equipment, tractors and vehicles used on the Research Farm. Operating older equipment has increased our expenses. Until capital monies become available, these costs will continue to increase. Fuel costs include all gasoline, diesel, and oils needed to operate the equipment on the Research Farm. Maintenance expenses are related to repair of all existing buildings and related facilities.

Since MAC was built during the period of 1983-1988, maintenance costs haven't been a major item. However, these expenses will increase as these facilities age. All other expenses are relatively small, less than $20,000 a year, and it is doubtful that any reduction would offset our deficit. It is apparent that the operational costs could increase in the future.

Obviously the Research Farm can't continue to operate with an average annual deficit of nearly $125,000 a year. Since we couldn't reduce expenses, something had to be done to maintain our research level. Historically, all farm crop sales produced on the Research Farms were sold and the receipts were forwarded to Campus. These monies were divided equally between the President and the College of Agriculture. There wasn't any incentive for the Research Farms to harvest these crops, and there weren't any financial payments for the harvest expenses incurred. Obviously, the Research Farms weren't harvesting all of the potential crops that could generate revenues. The Director of the Experiment Station was able to institute a new policy in 1992 that allowed the Center to retain 80% of all revenues generated with the remaining 20% being retained by the Director. The funds retained by the Director can be directed to any Research Farm, other College programs, or for capital purchases. The problem with farm sales is that they are dependent on the current agricultural markets and vary annually. Table 3 shows the farms sales generated at MAC for 1991-1998. Sales typically have increased over this period of time except for the last three years which show a decrease. This was caused by lower cotton and wheat prices. This new policy has encouraged the Research Farm to grow cover crops which can be harvested and sold. The Center cannot only increase revenues but it allows the Center to establish a better crop rotation and remove soil variations caused by variable fertility, water, and other chemical treatments applied to research plots.

In addition, the Director of the Experiment Stations was able to develop a procedure that allows the Research Farm to conduct research for non-University scientists. The University lawyers developed a two-paged Facility Use Agreement document that describes in simple terms what the Research Farm will provide, what the cooperating agency will provide, the length and terms of the contract, and a page of legal terms that describe how any claims will be handled. The cooperating agency must also carry a one million-dollar commercial liability insurance policy. These agreements have allowed for a unique partnership between the Center and any other agencies, organizations or agricultural industries to encourage collaborative research projects with the faculty. It also provides the industry the opportunity to conduct their own proprietary research without disclosure or indebtedness to the University.

The Facility Use Agreements not only provide land for research plots but also can be used for any of the other facilities at the Research Farm. The first requests received from outside agencies were for conducting replicated research studies by the chemical agricultural companies. Not only did all requests differ in requirements for conducting the studies on similar crops but the requests also required different crops. It was apparent that billing for all of the associated costs was going to become a complicated situation. A simple approach was taken. All operational and salary costs associated with the Research Farm were added and the total was divided by the Research Farm acreage. After averaging it was determined that the cost for conducting one acre of research would be $2,000. The minimum acreage was set at one acre or $2,000. Again, the Research Farm provides all normal farm practices for this fee.

All companies who use these facilities find that University Research Farms are better equipped to provide this service than working with commercial private farms. Table 3 shows the revenues developed from the land use rentals for the period of 1991-1998. The demand continues to increase for agricultural companies involved in plant breeding, developing new crops, and testing new equipment and products. At this same time our own University and USDA scientists are also encouraged to include land use costs with grants that are submitted for funding. Most granting agencies will support land use fees for conducting research.

As companies became involved in conducting their own proprietary research on the Research Farm, they then started to request the use of other facilities. These included office, laboratory, greenhouse, cotton ginning, dormitories, storage, space for mobile storage units, etc. Charges for using these facilities were based on commercial rent fees and other information that were available. Space Use revenues are shown in Table 3 for the period of 1991-1998. These revenues have remained relatively constant over the past six years because we have a limited number of offices, laboratories, dormitories, greenhouses, and storage facilities. It is expected that these will remain constant unless there is a change in our occupancy.

The number of agricultural tours has been increasing annually during the winter months and most of these tours arrive in large commercial buses. These tours are promoted by commercial companies who charged each participant a fee for a Southwest trip. The companies were also willing to pay a per-head fee for each participant, which helped offset our costs for conducting these tours.

Companies involved in airplane noise testing can have problems when conducting studies during the winter months. Typically these tests are conducted areas where the planes are manufactured. However during the months of November through February there can be weather related problems in these areas that aren't conducive to noise testing. These tests require at least a section of land (640 acres) to place the microphones and related equipment, and not close to an urban area. Our Center fits these requirements. These tests involve large commercial aircraft that will make many different approaches and accelerations at different power settings and rates of climb. Basically these companies are renting our air space for a fee.

Historically we had been returning unused equipment to our University surplus property. On one occasion a semi-truck load of old parts was shipped to University surplus and the Research Farm received a check for $5.48. It became apparent that we weren't getting the full value for our surplus. The University also allows us to use old equipment as trade-in for the purchase of new or used replacement equipment. We have found that this has increased the value of our unused surplus equipment. Some of our older farm equipment has greater value as an antique and can be difficult to get the full value through the normal University bidding process. Farm equipment dealers will offer a higher price when this equipment is used as a trade-in. Arizona can also get higher values because of our proximity to Mexico. The federal surplus screening program has also helped us in obtaining equipment that we never could have obtained for financial considerations. Equipment such as crawler tractors, farm tractors, forklifts, backhoes, excavators, trucks, pickups, and shop tools have helped improve our revenues by reducing our need to spend other monies.

We are using our own State insurance program to offset losses that historically we didn't consider. These can range from tractors or other agricultural equipment that may be damaged or destroyed by fire, or some other act. This can include damages to crops from hail, or other events. This has helped us repair or replace equipment that would have been lost and has become more critical recently when capital monies have been almost non existent.

As we looked around our Center we found facilities that were built and weren't being utilized. In 1983 the Center spent half-a-million dollars to build a state-of-the-art, small-scale, short and long staple cotton ginning facility. At that time, we had several cotton breeders who needed these facilities. However, these positions weren't filled after these scientists retired. Thus, we have a half-a-million dollar dust collector. We are currently modifying the short staple gin to be GLP (Good Laboratory Practices) compliant. This would allow us to provide a service, at a fee, for ginning cotton samples that require the GLP standards. We also have a complete chemical analysis laboratory that isn't being utilized at this time. Again we are looking at developing certain GLP chemical analysis that we can offer for a service fee. Thus we are taking two facilities that aren't being utilized at this time and finding ways that they can produce revenues to help support the Center.

Many times we are asked, "Are you sacrificing your own resident scientists research projects for the sake of a few dollars?" Had we not developed additional revenues we would have had to reduce our resident scientists research programs by an average of $125,000 per year. By developing additional revenue sources we are able to offset this deficit and generate additional funding. This has allowed us to purchase new tractors, and other related farm equipment to improve our efficiency and provide better service to the resident scientists. We have also used some of these funds to upgrade our computer and laboratory facilities. The resident faculty are able to work with the Center to help improve their research programs. It might appear that only the resident faculty are getting any benefits from these additional revenues. This past year the staff were allowed to suggest improvements to the facility. The staff met and decided that they would like to have a recreational exercise room. The staff selected, purchased and installed the equipment. This has improved morale and everyone feels that they are sharing in the revenue funds generated by the Research Farm.

TABLE 1. Operational Funds ($1,000)

YEAR	BUDGETED	SPENT	DEFICIT
1991	394	426	- 32
1992	435	497	- 62
1993	451	626	-175
1994	451	555	-104
1995	451	521	- 70
1996	449	605	-156
1997	426	590	-165
1998	404	611	-207

TABLE 2. Distribution of Expense

Utilities	24.1%
Irrigation Water	23.3%
Farm and shop supplies	19.6%
Fuel	8.9%
Maintenance	8.5%
Office/Administrative	3.1%
Contract Labor	2.9%
Computer	2.3%
Other(field days, lunches, travel, etc.)	7.3%

TABLE 3. Revenue Dollars Generated

YEAR	FARM SALES	LAND USE	SPACE USE	OTHER	TOTAL
1991	0	0	0	0	0
1992	40,000	66,000	12,000	4,400	122,400
1993	83,900	55,100	55,500	3,000	197,500
1994	80,000	75,200	41,100	46,100	242,400
1995	75,300	137,900	58,300	43,900	315,400
1996	161,700	120,700	59,000	37,500	378,900
1997	136,100	104,400	37,300	40,200	318,100
1998	118,500	168,500	53,600	23,500	364,100

The Implementation of a Career-Ladder for Non-Classified Support Personnel

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University of Arkansas

Southwest Research & Extension Center

The University of Arkansas Agricultural Experiment Station for many years (prior to 1996) had approximately 230 permanent career professional positions. Individuals occupying these positions were research assistants and possessed either a B.S. or M.S. degree with a few holding a Ph.D. degree. These individuals are the backbone of our research program at all on- and off-campus units/departments. Research assistants had no mechanism for advancement within the system. In late 1995, Dr. Charles Scifres, Dean of the Dale Bumpers College of Agriculture, Food and Life Sciences and Associate Vice President for Agriculture - Research, formulated a committee to develop a Career-Ladder for these employees with three goals:

1. Develop a framework for meaningful evaluation & performance.
2. Recognize & reward excellence & performance of assigned duties.
3. Encourage continued achievement and service.

The guidelines for these policies are in the following pages.

Initially, the appointed committee gathered advancement and evaluation criteria from a number of land grant universities. A plan was developed from Purdue University and Texas A&M University to fit our needs. The positions developed are based upon work experience and college degree(s) obtained. For example, and individual possessing a B.S. degree with no work experience would enter the career ladder as a Research Specialist I. This and all other positions are tied to performance, accomplishments, and responsibilities in order to be considered for promotion. At present, the career ladder for non-classified personnel is in its infancy (about 18 months), but is working well.

Policy and Management Guidelines PMGS-96-2 Division of Agriculture
PMGS-96-2
Issued Aug. 13, 1996

CLASSIFICATION AND PROMOTION CRITERIA:
NON-CLASSIFIED RESEARCH SUPPORT PERSONNEL
ARKANSAS AGRICULTURAL EXPERIMENT STATION

This policy describes the nature of appointments and opportunities for non-classified research support personnel within the Arkansas Agricultural Experiment Station. Administrative support personnel are not included in this policy. The purpose of this document is to: 1) provide a framework for meaningful evaluation of performance; 2) recognize and reward excellence and performance of assigned duties; and 3) encourage continued achievement and service.

Categories for non-classified research support personnel are Research Specialist and Research Associate. The first six months of appointment are probationary for all categories, and continued employment is contingent upon performance and availability of funding.

No minimum time in rank is required for an individual to be eligible for promotion, nor is there a maximum time an individual may remain in a given rank. These guidelines suggest time in rank before promotion, but promotion is based primarily on performance, accomplishments and responsibilities. Time and work experience do not have to be with the University of Arkansas Agricultural Experiment Station for an individual to be considered for promotion.

RESEARCH SPECIALIST

The primary duties of a Research Specialist are to assist in conducting research in accordance with his/her job description. Research Specialists will be expected to follow research guidelines developed by Project Leaders and/or other supervisors. Education and/or experience should be in an appropriate field.

Research Specialist I

Persons initially appointed must have a Bachelor's degree.

Research Specialist 11

Persons initially appointed or promoted to Research Specialist 11 must have a Master's degree or Bachelor's degree with 2 to 5 years of work experience and must have demonstrated the ability to manage day-to-day activities for which he\she is responsible.

Research Specialist III

Persons initially appointed or promoted to Research Specialist III must be mature professionally with documented accomplishments and exhibit a high level of achievement in the area of appointment. Suggested educational background and years of work experience are a Bachelor's degree with seven to 10 years of experience or a Master's degree with two to five years of experience.

RESEARCH ASSOCIATE

Research Associates operate in a more independent, decision-making role in the planning and execution of research than Research Specialists. Work objectives are coordinated with Project Leaders and/or other supervisors, but implementation and management of projects are primarily the responsibilities of the Research Associate. Education and/or experience should be in an appropriate field.

Research Associate I

Persons initially appointed or promoted to this rank must have demonstrated competence to independently manage programs. Suggested education requirements and minimum work experience are a Bachelor's degree with seven years of experience, or a Master's degree with five years of experience.

Research Associate II

Persons initially appointed or promoted to this rank must be mature professionally with a sustained record of independent program management. Suggested education and work experience requirements are a Bachelor's degree with 12 to 15 years of experience, or a Master's degree with 10 or more years of experience.

Senior Research Associate

Persons initially appointed or promoted to this rank must have a long-term record of professional excellence and sustained independent program management. Suggested education and work experience requirements are a Bachelor's with 25 years of experience or a Master's with 20 years of experience. The number of persons holding the rank of Senior Research Associate will be limited to 10% of the total number of Research Specialists/Research Associates within the Agricultural Experiment Station.

DEGREE-SEEKING FULL-TIME POSITIONS

M.S. Track- Research Specialist I - DT

Persons holding this rank must have a Bachelor's degree. The appointment letter will indicate that continual satisfactory progress toward a Master's degree must be made and that the appointment terminates when the degree is received.

Ph.D. Track: Research Specialist 11 - DT

Persons holding this rank must be actively pursuing a Doctoral degree. The appointment letter will be as specified above.

POST DOCTORAL ASSOCIATES

Post Doctoral Associates must hold a Doctoral degree. Normally these positions will be for a short period (one to three years) with responsibilities assigned to a specific research project.

EVALUATION

Annual performance evaluations are an integral component of professional development. The following evaluation procedure is intended as a tool to assess performance and is structured to ensure that the incumbent fulfills his/her potential and perform at a level commensurate with his/her rank. Annually each research support person will be evaluated by his/her immediate supervisor using the non-classified research support personnel performance rating form.

EVALUATION PROCEDURES

No later than 30 days after the initial appointment, each non-classified research support person shall be advised in writing by his/her supervisor of the criteria, procedures and instruments that are to be used in assessing his/her work.

Probationary Period

The probationary period for new employees shall be six months.

Evaluation Schedule

The evaluation process for non-classified research support persons will be as follows:

1) First-year employees will be evaluated by the immediate supervisors during and/or at the end of a first six months probationary period using the non-classified research support personnel performance rating form;
2) Each employee will be evaluated on an annual (calendar year) basis;
3)Major responsibility areas of each employee will be defined by the supervisor in conjunction with the employee at the beginning of the evaluation period and placed on file;

4)Each employee will complete applicable portions of a non-classified research support personnel performance review form summarizing the previous year's activities for submission to his/her immediate supervisors;
5)The supervisor will complete a standard rating form and discuss results with the employee;
6)An employee may attach comments regarding the evaluation;
7) Evaluation documents will be reviewed by the next higher official to the rating supervisor (reviewing official) or designated official and placed in the employee's permanent file; and
8) Evaluation documents will be included in materials presented to committees) for promotion consideration.

Development of a Job Description and Position Announcement

A job description will be developed prior to advertisement of a position. This description will include the major areas of responsibility and qualifications for the position. A position announcement will be developed based on this job description.

Development of a Job-Specific Personnel Performance Evaluation Document

At the beginning of each calendar year, or within 30 days after initial appointment, the supervisor, in consultation with the employee, working from the job description, will develop a list of major responsibility areas (two to six) on which the employee's performance will be evaluated. Major responsibilities should be broadly enough defined to accommodate variations and flexibility in specific schedules and activities,

yet specific enough to the job assignments to allow objective review by supervisors and peers. The supervisor may provide more detailed specifications for completion of specific tasks within each responsibility area. Those should be referred to in a statement of responsibility areas but should not be included in the submitted evaluation documents. An estimation of annual percentage time allocation for each activity will be indicated next to each responsibility area. The document listing responsibility area descriptions for evaluation will be signed by the employee, the immediate supervisor and appropriate reviewing official, and a copy will be placed in the employee's personnel file. Changes of assigned responsibilities will be made in writing by the supervisor to the employee within four weeks of change, The list of major responsibility area assignments will be included in the completed standard performance evaluation form at the end of the year and serve as a basis for evaluation.

Evaluation Process

Prior to the end of the six-month probationary period and at the end of each calendar year, each employee will complete all applicable portions of the nonclassified research support personnel performance review form summarizing activities during the past year. The completed form will be submitted to the immediate supervisor(s) for review and performance ratings. The employee will document: 1) activities and progress in major responsibility areas, in other projects to which contributions were made and other supporting roles; 2) supplemental information on meetings attended, presentations, papers, creative endeavors, team efforts, research grants received, awards and certifications, skills acquired, training received and services rendered; and 3) a summary of major contributions and future goals.

Performance Review and Rating

The immediate supervisor(s) will review the non-classified research support personnel performance review form and complete a performance rating form. A non-classified research support personnel performance rating form will then be completed by the immediate supervisor(s) utilizing the submitted information. If an employee is assigned to more than one supervisor, it is required that rating forms be completed by each supervisor and averaged numerical ratings (weighted average based on percent allocation to each supervisor) will be summarized on a separate form. Supervisor ratings will be made on the following basis:

1 . Performance of the employee in his/her job assignment, as documented at the beginning of the evaluation period.
2. Ratings should be made against a reasonable standard of acceptable performance. Raters should not be influenced by personal compatibility issues, previous records, unrealized employee potential, recent events or isolated cases. Neither extremely high supervisor expectations nor negative feedback from the employee should be a part of the evaluation process.
3 . Raters should indicate any areas of superior performance relative to the general responsibilities and specific duties of the position. In addition, raters should indicate areas that need improvement. After the supervisor has completed the rating form, he/she will review the performance rating form with the employee and allow the employee to attach comments regarding the rating. Forms will be signed by the employee and immediate supervisors, then reviewed and signed by the appropriate reviewing official and placed in the employee's permanent file. The performance forms will be included in materials submitted for promotion consideration.

PROMOTION

Consideration for promotion will occur each year coinciding with the requests for faculty promotion. At this time research support personnel are invited to apply for promotion.

PROMOTION PROCEDURES

An application will consist of a promotion document submitted to the local Department/Unit committee to which the applicant is attached. The promotion document will follow the format of the annual Performance review document but will cover the period since the initial appointment or the last promotion. The unit committee will be made up of at least three people appointed by the Unit Administrator. If the unit committee recommends consideration for promotion, supporting letters from the immediate supervisor, Unit Administrator and all documentation will be forwarded to the Research Support Personnel Promotion Committee (RSPPC). If the local committee does not recommend the applicant for consideration, the applicant may appeal directly to the RSPPC.

The RSPPC will be appointed by the Dean/Associate VP for Agriculture and will consist of seven regular members representing on- and off-campus units (two Research Specialist 111, two Senior Research Associates, one Off-Campus Unit Administrator, one On-Campus Department Head and one Project Leader) and two alternates. The alternates will serve in the absence of regular members or in the event that a committee member is under consideration for promotion. The chairperson will be elected by the committee members. An individual committee member will serve no longer than three years. Terms of the committee membership plan will be staggered to ensure continuity. The committee will forward to the Dean/Associate VP for Agriculture the documents of those individuals recommended for promotion.

Nonclassified Research Support Personnel Performance Review Form
(to be completed by employee)

Name: _____Calendar Year: _____

Department:_____Location:_____Date_____Employed:_____Present

Rank:_____

Date Achieved Present Rank: _____

A.. Major responsibility areas [List major job responsibility areas with percentage time allocated to each. This is the list of responsibilities developed with your supervisor at the beginning of the rating period. See Attachment A for examples of responsibility areas.] A current job description for this position may be attached as a substitute for this item.

B. Documentation of progress and activities in major responsibility areas [Refer to job assignments (A.) in completing this section. Summarize activities and progress in each area. Include information concerning employees supervised. Provide evidence of willingness to accept additional responsibility, of cooperation with other personnel, of initiative and resourcefulness in solving problems, of skills employed and of contributions made. Indicate an estimation of percent time actually spent in each area.

Suggestion: Create a subheading for each area/project and briefly summarize activities and related information. Optionally provide a more detailed activity list. If responsibilities were undertaken that aren't included in major responsibility areas or in the supplemental information, below, include under "other" responsibilities.]

C. Supplemental Information

1. Professional Skills Acquired, Training Received, and Meetings Attended -See Attachment A for examples
2. Creative Endeavors -See Attachment A for examples
3. Presentations, Papers and Publications and related activities [Indicate authors, date, title, and publication or audience.] See Attachment A for examples
4. Research Grants Received by You or by Your Efforts [Indicate project name, principal investigators, duration, and amount]
5. Interdisciplinary Team Efforts -See Attachment A for examples.
6. Teaching and Teaching Assistance [Indicate course name and number and instructor. See Attachment A for examples.
7. Professional Service -See Attachment A for examples.
8. Professional Awards and Certifications.

9. Other - See Attachment A for examples.

D. Summary

1. Major Accomplishments in Past Year
2. Goals/Objectives for Next Year
3. What can the Department, College, Division and/or University do to enhance your research role?

The above information is an accurate representation of my job activities during the past year.

Signature of Employee _____ Date _____

I have reviewed the above information presented by the employee.

Signature of Immediate Supervisor _____ Date _____

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Attachment A

Section A. Major Responsibility Area Examples

Research
Experimental Design
Plot Management
Data Collection
Analysis of Data
Report Preparation
Presentation of Results
Classroom
Laboratory
Logistical Support
Trouble-shooting and User Assistance
Equipment Installation and Maintenance
Records Maintenance
Budgeting/Purchasing
Facilities Planning

Personnel
Management
Hiring
Training
Supervision
Evaluation
Teaching

Section C. Supplemental Information Examples

1. Professional Skills Acquired, Training Received and Meetings Attended. Include professional meetings, workshops, field days, short-courses and seminars attended, courses completed, self-education efforts and techniques or skills acquired or improved.
2. Creative Endeavors
   Include techniques and methodologies developed, software developed, patents or copyrights received, products developed, displays prepared, shows produced, etc.

3. Presentations, Papers, Publications and Related Activities
   Include journal articles, AES publications, papers and/or posters presented at conferences, written reports prepared for agencies, user's guides, operations manuals, workshops and seminars implemented or presented, radio/TV appearances, acknowledgments in publications, unpublished papers prepared, project or year-end reports prepared, tours conducted, field day activities implemented, etc.
4. Interdisciplinary Team Efforts
   Include team or cooperative efforts with personnel in other departments and agencies.
5. Teaching and Teaching Assistance
   Include assistance in preparation or presentation of labs and classes; personnel or student training.
6. Professional Service
   Include only service involving professional competence and related to but not involving teaching, professional performance of assigned duties or research or creative activities. Include club advising or support, committee assignments, presentations to community groups, etc.

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Nonclassified Research Support Personnel Performance Rating Form
(to be completed by supervisor)

Type Review: Annual __ or Probationary __

Name: _____ Calendar Year _____

Department: _____ Location _____

Date Employed: _____ Present Rank: _____

Date Achieved Present Rank: _____

(1) How well has the individual met expectations relative to each major job responsibility area? Rate each area's performance from1 = weak to 5 = strong.

Area 1 Description:	strong		average		weak
	5	4	3	2	1
Fulfillment of Assigned Duties					

Area 2 Description:	strong		average		weak
	5	4	3	2	1
Fulfillment of Assigned Duties					

Area 3 Description:	strong		average		weak
	5	4	3	2	1
Fulfillment of Assigned Duties					

Area 4 Description: 5 4 3 2 1	strong		average		weak
Fulfillment of Assigned Duties					

Area 5 Description: 5 4 3 2 1	strong		average		weak
Fulfillment of Assigned Duties					

Comments: _____

_____

(2) To what extent has the individual exhibited or demonstrated superior performance of assigned duties as described in the documentation of activities? Rate from 1 = weak to 5 = strong (if not applicable, indicate N/A).

5 4 3 2 1	strong		average		weak	
Professional growth						N/A
Initiative/innovation						
Efficiency/productivity						
Creativity						
Communication -written						
Communication - oral						
Cooperation						
Commitment						
Dependability						
Leadership						
Attitude						
Other						

Comments _____

_____

_____

_____

(3) How well has the individual met expectations relative to overall job performance?
Rate from 1= weak to 5 = strong.

strong average weak
5 4 3 2 1

Overall Job performance					

Overall comments: _____

_____

My supervisor and I have reviewed my performance evaluation. My comments on the evaluation are attached (optional).

Signature of Employee _____

Date _____

Note: Signature does not necessarily mean agreement

My employee and I have reviewed the employee's evaluation and all attachments.

Signature of Reviewing Official _____ Date _____

Pluses and Minuses of Two Agencies at the Same Location

Merritt J. Taylor
Oklahoma State University
Wes Watkins Agricultural Research and Extension Center
Lane, Oklahoma

Background

The Lane Ag Center is located in the Southeastern part of Oklahoma in the largely cow-calf rural community of Lane, Oklahoma. The center was developed due to influences by the U.S. congressman from the area with active support of several movers and shakers from the area and in the state. Data indicated that the area was one of the least developed in the state. There was high unemployment, little industry and agriculture had very low returns. Experts had recommended that an agricultural research and extension center be established to evaluate and recommend alternative cropping systems for the area. Horticultural crops were deemed by these "experts" to be the most promising alternative crops. Thus the responsibility for staffing the center fell to the Horticulture Department at OSU and to Horticulture scientists at USDA. The Horticulture Department sent a horticulture extension scientist to handle the details for OSU and USDA sent a man who was then Research Leader of a vegetable research center in Charleston, North Carolina

Most felt that the pressure to establish a research center in Southeastern Oklahoma would disappear in a few years. In fact, the USDA Research Leader didn't sell his house back in Charleston for the first couple of years because it was rumored that the idea would be scrapped in a year or so. To assist with the farming operation a farm superintendent was hired. With political pressures being exerted there was a need to have a crop planted to demonstrate progress and to have something for visitors to see. The first year there were no funds allocated for equipment. The first crop was literally put in with sticks.

The USDA and OSU were both pressured (from national levels by those controlling funds) to send scientists to the area. Neither agency wanted to establish the Agricultural Research Center at this location and actively fought to prevent its inception. Departments from the University did not want scientists physically located at the center and neither did USDA want to establish another vegetable research facility.

With such a beginning, the Lane Ag Center has developed into an agricultural research center that is the envy of most center directors and research leaders. The two agencies have official names for their respective groups. The OSU name is the Wes Watkins Agricultural Research and Extension Center. The USDA name is the South Central Agricultural Research Laboratory. The Lane Ag Center is comprised of 257 acres of land, office space for 50 people, 18 green houses, 10 fully equipped laboratories, a modern post harvest facility, a storage condition analysis facility, and a state of the art computer network system connected to the world wide web via high speed T1 lines. The Lane Ag Center houses twelve research scientists with their accompanying technicians and support personnel. The farm has a farm supervisor, two farm workers and a mechanic. The scientists from Lane are recognized worldwide for the excellence in research and the extensive extension programs that have evolved from the work.

The road from humble beginnings through highly political times to the current extremely effective and cooperative group of scientists from two different agencies has been exciting and sometimes rocky. These times included growth from three people to fifty full-time and fifty part-time and summer workers.

This paper will first look at some of the minuses or negatives of two agencies working together. These will address perceived problems and actual problems. Secondly, some of the pluses of two strong groups working at the same location will be discussed. Finally, I will address some recommendations for reducing growing pains and conflicts between the two agencies as they work together for a common goal.

Minuses or Negatives

Decision Making Authority

As with any management issue, the resolution of any required decision is easiest when there is a sole and final authority responsible for the decision. With two decision-makers the question arises as to who has the authority and who will make the decision. To maintain harmony a conference is required with a compromise made that will satisfy both parties. This is time consuming but necessary. With two agencies involved this harmonious decision may be (and most likely will be) effected by the two sets of different regulations binding each agency. When two different agencies are using the same materials, fields, buildings, and equipment conflict is inevitable.

Different Regulations

If one of these two agencies has regulations that hinder or prevent certain activities of the other agency the situation is ripe for strife, jealousy or job dissatisfaction, especially if the people involved are unaware of the other's regulations. An example of regulations that caused problems due to people being unaware of the different regulations concerns including technicians as authors on research documents. Universities traditionally have encouraged rewarding graduate students and technicians by not giving them an increase in salary but by including their names on research publications that resulted from work in which they have participated. USDA regulations restrict and limit any but the primary scientist from being listed as the authors or co-authors of a scientific publication yet routinely award support staff with cash bonuses.

Long-Term Focus and Direction

Different methods of guiding the two agencies and funding the work can create strife and resentment. USDA research scientists work under a management scheme much different than that of a university. In USDA the scientists work under guidance from National Program Initiatives. These programs are the result of recommendations from all levels beginning at the field scientist all the way to the national program staff and the USDA administration. Once these programs are defined the scientist is given guidance as to the parameters within which he or she is to work and the project is funded for around five years. Annual progress reviews determine continuation of financial support with possible small tweaks to the direction of the project. The OSU scientists all work under joint appointment with both a research and extension appointments. The funding for these two areas comes from two distinct sources, which require separate administrative efforts. These two sources provide strictly base funding for salary and a small working fund. The research funds are developed by the scientists through the Hatch proposal he/she writes defining a specific area of research deemed needed by the scientist and verified by outside reviewers. Additional research funds need to be obtained through extensive research grant proposals

written by the individual scientists and presented to the various granting agencies. These proposals require considerable time by the scientists to develop proper format and procedures, writing the actual proposal and routing it through the university channels before submission to the granting agency. This time spent writing proposals reduces time available to do research, analysis, and to write publications. This results in less publications written by the university scientists than USDA scientists (for the same time spent at the office). Some university scientists attempt to make up the difference by putting in longer hours. The difference in numbers of publications can become an issue of derision and or self-doubt if not handled properly.

Salaries and Benefits

While salaries are supposed to be personal all salaries are public knowledge. For those who wish to compare salaries the information is readily available. USDA publishes a document that defines salary ranges for different pay grades. All OSU salaries are available for perusing at the main library on campus. The word out in the coffee room is that USDA technicians make more than the OSU technicians do for doing the same job. This knowledge can cause jealousy and stress. On the other hand, the OSU technicians have much better benefits and retirement program.

Disagreements

Disagreements between people in the two different agencies can easily evolve into a "Hatfield-McCoy" type feud with a "he did xxx therefore I have to do . . . ". People naturally tend to support the organization they work for even when perceptions have distorted the facts and have become "reality". This develops into a need to support "MY" agency. Disagreements between technicians, scientists, or the two research leaders become a bugle call to fall in line with support. Perceptions become reality. One of the more basic needs is the psychological perception of who gets top billing. An example of how to resolve this question is noted at the entrance to the Lane Ag Center. The entrance to the Research and Extension Center has signs on each side of the entry road that are reverse images of each other. On one sign the USDA name is over the OSU name with the logo of one of the agencies on each side of the sign. The other sign across the entry road has the OSU name over the USDA name with the logos on the sides reversed. Both signs have the Lane Ag Center home page address (lane-ag.org) at the bottom. Even the home page address was an attempt at an acceptable compromise. USDA Internet addresses usually end in .gov while most university addresses end in .edu. The .org ending provides an acceptable joint address for both agencies.

Agency Controlling Resources Controls

USDA has a long-term lease on five acres of land at the Center where they have constructed the office spaces, laboratories, and green houses. The office buildings and laboratories built by USDA were designed by architects and engineers complying with strict federal regulations that required redundancy and over-kill in safety components. This included a single pass through air system which makes utility costs extremely expensive. In the same manner, OSU purchased land for the experimental plots that was extremely over priced for the area. Both conditions were out of the control of the lab leaders on-site. Since then, the annual operating and maintenance costs have been borne by resident programs and project funds. Resentment continues (in both agencies) regarding having to pay for what is perceived as unnecessarily excessive operating costs.

"Working Together" Creates Problems or Conflicts

Supervision of Technicians and Short-Term Employees

When two agencies work apart there is no problem when determining who is supervising whom. Once the two agencies decide to work together in a cooperative effort who is in charge?

Safety

Safety is a factor that must be continuously monitored. Federal and state regulations may mandate different training and compliance. The leaders of the two agencies must agree on how to comply. Separate training sessions drives a wedge between the workers.

Liability

When dealing with people involved in any activity there is always the question of liability. This becomes particularly acute when dealing with part-time and teenage help. If an issue arises in the office or on the farm, who is liable? Is it the agency for whom the employee works or the agency that controls the resource? USDA prohibits teenagers from operating any vehicles. The University allows teens to operate vehicle under certain conditions.

Purchase of General Use Equipment or Materials — Who: Controls It? Repairs It? Maintains It?

As the two agencies work together there is frequently funding for general-use equipment that can be used by both agencies. This reduces the need for duplicate purchases thus releasing funds for different purchases. Some of the general-use purchases could include tractors and equipment; irrigation feeder lines, pipe and equipment; building components such as offices, labs, general storage spaces, special chemical storage, and shop facilities. Who controls the use of the equipment? Is it the agency that purchased it? Should the scientists of the purchasing agency have preference in its use? If the item is damaged or needs regular maintenance who should bear the cost? Should the purchasing agency be responsible? Should costs be allocated based on usage?

Problems in the Fields: Perceived or Actual?

Field Space

How is field space allocated? Who should get the best land or preferred fields? If a scientist leaves should his/her fields be re-allocated based on "seniority" (what does this mean?) or up for grabs by the "old" scientists (of either agency) or should the plot be reserved for the new replacement scientist from the respective agency?

Irrigation

Irrigation scheduling can create conflicts between projects and agencies. Whose field gets irrigated first? How is the schedule determined? Should the field with the greatest "need" be watered first? Is "need" based on value of the research results or the crop that is suffering from water shortage the most? Should other scientist's plots be penalized if a project leader fails to properly plan the irrigation schedule? Drip irrigation requires lower pressure than the big guns or standard rain birds. If using the same delivery system, which type should be scheduled first? Does it matter what time of day the irrigation is

scheduled? Is irrigation during the heat of the day as effective as in the early morning? Frequently the wind is higher in the afternoon than in the early morning.

Who pays for the irrigation materials? Who buys the irrigation pipe and the fittings? Should they be available for all projects? Drip irrigation uses less water but the equipment costs more. Who should pay for the equipment such as lay flat pipes and "T" tape? What about plastic mulch? Big gun nozzles use too much water and the pressure frequently falls reducing the effectiveness of smaller nozzles. If special nozzles are desired for a research project who should buy them?

Specialized Equipment

If specialized equipment is required for a particular project who should pay for it? If this equipment is found to be especially helpful should it be made available for all projects? An example is a home-made design for filtering water in a drip irrigation system. How should the cost of the equipment's maintenance be allocated?

Field Operations

How are field operations coordinated? Who should purchase the tractor(s)? Who maintains and or repairs the tractor and equipment? Which projects get to use the tractor and equipment? Who gets to drive the tractor? Should summer workers be included as operators?

Greenhouse Space

Who pays for the working materials for the greenhouse? These may include tables, hoses, insect cages and timers. Of major concern are the costs of water and electricity. How are these costs allocated between agencies?

Allocation of Office Space and Laboratories are Traditional Places for Conflict

Regardless of the circumstances the allocation of office space and laboratory space is an issue for personal contention between scientists. This occurs within all agencies and at all universities and businesses. With two agencies sharing the same facility there is more than double the opportunity for perceived favoritism and misallocation of space. When two agencies share the same facilities the questions arise as to how to allocate the utility costs, who maintains the building, who buys furniture, who maintains the network server?

Solutions

The preceding list includes many items that arose in the past as the two agencies at the Lane Ag Center worked together in developing the center for research excellence. Most of the solutions were very straightforward and relatively easy to resolve. In most cases where there was a need to allocate the costs of resources that were jointly utilized the decision was made to cost it out based on the percentage of usage. Office, laboratory, and green house space usage was based on percentage floor space utilized. Original furniture allocation was made by USDA. Laboratory equipment and green house equipment is purchased by the projects using the space.

The farming operation costs have been more difficult to allocate. OSU and USDA both provided funds for development of the irrigation system as it evolved. OSU currently provides a farm superintendent and two farm workers. One of these farm workers is responsible for the majority of chemical

applications for the entire farm. Both agencies have purchased tractors and farm equipment over the years. Both agencies have a shop and a mechanic/service person. Maintenance and operation of the equipment largely is done by the agency of ownership. Basic land preparation and irrigation labor for moving pipe is provided by OSU with USDA providing considerable labor assistance in high usage irrigation times. Projects that have special needs and those that utilize drip irrigation usually provide the funding and labor from the project for these activities.

Recommendations

Much conflict has been resolved through agreements negotiated between the two leaders. Once the agreements have been reached, the two leaders need to communicate the agreement to their respective personnel and maintain a strong unified front before all the people. The agreement must be perceived by the personnel as if there was only one agency. The scientists, technicians and support personnel from both agencies must all feel that their agency is taking a lead in the decision.

Regular interaction by the two leaders has created solutions to problems to make the working environment at the Lane Ag Center much more pleasant and less contentious over the years. Most of these solutions were arrived at through negotiation, cooperation, and often compromise by one or both of the agencies. The main driving force was the attempt to provide a wholesome environment for the personnel of both agencies to work. When the time comes for new administrators to take the reins of the respective agencies they will want to continue the amicable working agreements of their predecessors. For this to occur there is a need for clear written documentation of past agreements. The most critical item for continuity and harmony is to get everything on a memorandum of agreement. This will assist succeeding managers to have less confusion regarding what has been done is the past. This will also reduce the possibility of conflict developing between the two decision-makers.

Pluses

Notwithstanding the potential problems mentioned above that must be faced by the leadership of the two agencies there are tremendous positive aspects associated with having two different agencies located at the same agricultural research and extension facility. Most agencies tend to place a minimum of scientists at a particular location. This frequently provides such a small number of scientists that a complete approach to a problem cannot be addressed. The opportunity to co-locate two different agencies provides a critical mass of intellectual power to address problems and issues. This critical mass provides a larger base for interaction between scientists. Co-locating scientists from USDA and a university provides an opportunity for producers cooperating with extension programs to interact with both university and USDA scientists. It also enhances the opportunities for USDA scientists to be directly involved with their ultimate customers. The cooperation between the USDA and university scientists as they jointly work with producers provides a quick, direct transfer of research knowledge to the producer. The larger number of people with differing interests provides greater opportunities for cooperation and collaboration between scientists. The larger number of people provides more opportunities for excellence in research that will ultimately result in positive recognition and publicity for the scientist and the Center. This increases the reputation of the Center. All scientists benefit from this publicity regardless of the agency they work for. In fact, most people outside the Center don't differentiate between the two agencies. The Center has the reputation for excellence.

The two co-located agencies provide a unique opportunity for the scientists to work together and to qualify for research funding. It is only through regularly working together that scientists become comfortable enough with each other to strike out on a joint venture such as a research proposal. The current research funding structure favors proposals that include multiple disciplines and multiple agencies. A

research center with two agencies co-located has the potential to develop a much higher rate of accepted and funded proposals than most single agency facilities.

The two agencies arrive with their separate budgeting and financial support. With cooperation and collaboration there are more opportunities for diverse equipment and vehicle purchases. There are more opportunities for sharing equipment thus increasing professional productivity and reducing costs.

Summary

Two research agencies co-located at a single facility create many potential problems (real or perceived). These problems must be addressed by the leadership of the two agencies and equitably resolved. As with most successful cooperative and or collaborative endeavors both sides must feel that their concerns have been listened to and considered in the decisions. An analogy is that of a successful marriage. Both partners must feel that they have contributed to the relationship and that the other partner appreciates their contribution. In the final analysis the success of a joint venture such as two agencies co-locating at a single facility depends on the personalities of the leadership and the rest of the scientists, technicians and support personnel. The leadership of the two agencies set the tone for all the rest of the people in the facility. A friendly, cooperative attitude by both leaders with a definite attempt at using the strengths of the two agencies to enhance the goals of the Center will smooth differences and provide an environment for excellence in research.

These agreements between decision-makers must be put into writing so the next generation of managers can benefit from previous experiences.

Two research agencies co-located create many potential opportunities for collaboration, cooperation and extramural funding. The leadership must recognize these opportunities and provide a stimulating working environment such that the Center scientists will benefit from the association of the other scientists.

Can Research Center Effectiveness be Improved Through Downsizing and Reorganization?

Dr. Paul Sebesta, Superintendent,

University of California, Desert Research & Education Center.

Can research center effectiveness be improved through downsizing and reorganization? Within several impromptu conversations with many of you over the course of the last three years, we've gotten involved in discussions about the organizations you have with your research extension centers and how these discussions have progressed. So we're going to go through those today and see how we have, hopefully, successfully dealt with those.

There are pictures that I have selected from our recent tour of the Fresno area and things that we encountered there. I think you will recognize certain things. As you can see from this slide, this is the research and extension center where I'm currently employed. For those of us who have worked at our universities for many years, we realize that universities typically do not review thing unless they have some type of a problem, and then they study it to death. You can understand that my center was also known as the Imperial Valley Ag Center. In 1989 they started to do a review and things got worse in 1994 and I will put it bluntly, I started in July of 1995. In 1994, things went from bad to worse, they had two reviews. One was on management and the other was operations. And this is what they found.

A complete breakdown of management, oversight communication, and coordination of the facility management program. Individuals were setting their own agendas, blaming others, and collecting pay-checks. I will put forth one other disclaimer. That is, the allegations against the first superintendent were not proven. He was innocent of all the charges. Essentially, the operational problems centered around almost every aspect of operations at the center. Poor management, communications, accountability, lack of trust, poor staff morale and the appearance of our center. A key thing was the lack of satisfaction and the most important component was the lack of commodity support. When that made it up to the vice president's office, that's when things started to change. I look back on those days and I say where in the world was I during the interview process? These things started to be uncovered one at a time and I thought good God, what have I done? I have relocated my family, I have sold my house and all this kind of stuff. So what can you do to bring that transition point. You start picking down through these problems one at a time and answer them and that's essentially what we did. But I will say that my mandate was very clear from my superiors and that was; I was to clean up the Desert Research Extension Center and position it to be an institution of agriculture. Hopefully we have successfully done that.

The first thing I did was set about some special edition news. And as you can see they're centered around each aspect of the operations of the Desert Research Extension Center. Improve the facilities, improve the plot land, restore the equipment, clean up the environment, and finally, address the human resource issues. So we set about those tasks. In addressing the human resource issue, the first thing I did was to define it. One of the key factors in the reviews is that there was a lack of trust with the center of leadership. So one of the most important things I had to do was regain the trust of the employees, and regain the trust of the P.I.s, and the commodity groups that supported research at our center. That was one of our primary processes. We, like a lot of you people at your centers, have imaginary boundaries that exist between some of the components of our research centers. We had barriers that existed between our physical plant and our fuel support operations. Those people were not talking to one another. There was no communication between groups, no coordination. So I tried to fight the boundaries and I also

established what I call our care program. I want to make sure that our employees are supporting staff, communicate with one another, coordinate their activities with one another, that they were accountable for their actions and they were responsible to each other for their actions. And then also I want to regain confidence from our research center P.I.s so they would essentially come back to the center and we would support their research in a beneficial manner. One of the first things I did was embark upon some one on one conversations with the entire staff and with every PI that operated at the Desert Research Extension Center. This was a very important thing because the communication did not exist. In those one-on-one conversations, other personnel problems began to surface. We had to deal with that set of problems because personnel problems are over and above all those other problems we had on our first account. To deal with that we determined, we, being myself and our supporting staff, determined that we ought to initiate a layoff of this particular individual. So I developed the layoff plan and implemented that plan. Once implemented, that layoff immediately started a violent workplace issue. A gentleman came into the front office and started threatening to start shooting people. That was brought to my attention by one of my custodians who just happened to be in my office and said, "Oh, by the way, we may have a problem."

One of the things I'll point out is being in the back of the bus is really important for somebody who's moved to an organization like this, because being in the back of the bus goes far. Being in the back of the bus, you get all this information. Those of us who have dealt with human resource issues have found that sometimes we're stuck between the University and the employee's lawyer and the grievance process. We handled that investigation immediately. That investigation was done internally at the Desert Research Extension Center. I notified the entire staff about the residencies of the P.I.s. I notified the dean's office. I conducted my own investigation. And we had a member of the police force down there. That gentleman published a report. That was what was circulated in our office. This was over in the course of about six months.

I put in this slide because I think it's important for all of us who are in management to know that human resource management issues really are relevant. Sometimes we deal with them every day, and you have to get good at it. So the thing is that in this particular slide, nobody is smiling. And that's the way it is with human resource management. To deal with it you really have to be in the proper training market. You have to be properly trained to talk about these to deal with human resource issues. But they really are fun and they're challenging. At our center, it's about time that a decision needed to be made. How do we straighten out this center? We had gone on for about six to eight months, nothing was happening, things were getting worse. My boss, Harry, who was here last year whom many of you met, asked me, how we're going to deal with this. And I told him, "Harry, I can do it. And here's how I'll do it." It was a telephone conversation on Friday afternoon. "All we have to do is close the center, terminate all the research at the center, lay off all the people, take that salary savings and put that into our resource base; then improve our facilities, improve our land, improve our equipment, restructure and revise our organization, rehire some of the best people and let the rest of them go; then hire some new employees. That's how we get from point A to point B in the quickest amount of time." Over the phone there was this dead silence. Harry said, "Well . . ." Then I jumped in and I said, "I understand that we cannot do that, being a part of the University and having research you have to support, etc, etc, etc." But, the other alternative was to work within the existing system to improve the facilities, equipment, and essentially do a reorganization of the staff. That is the choice that we made, however, two or three months down this road, Harry called me. He said, "We're going to close the center." And I said, "Sir, you can't do that. We are making progress and here's how we're doing it." But we essentially adopted the second alternative. We developed in July of 1996 our reorganization plan. It was agreed upon between July and September of 1996. In August we had a lot of meetings with our staff. We had all of our support staff unionized for the most part so we had to go through documentation and do those kinds of things. Receive approvals up and

down the chain before I implemented that reorganization plan. Before it is completed I have a question. When you embark upon the reorganization should you ever complete that reorganization? Because you always want to do a little more and a little more and a little more so there has to be a plan.

The plan: We had some really good leadership in developing this plan, similar to the people who are listed on this slide. We wanted to make sure that our initial personnel problems were not intermixed with our reorganization. We continued with our personnel actions. We also wanted to see how this reorganization can impact our budget. If we sustain reorganization, if we brought in new people, how would we pay for them? If we lay people off, what happens to those funds that were available for the layoffs. So we developed a budget plan. We decided that we wanted to have a new position and we wanted to fill that position as quickly as we possibly could, with the best person that we could get. We knew that through our reorganization there was a potential in downsizing some of our oldest staff. We knew that there were at least two positions that we wanted to eliminate completely. We also knew that most all of our position descriptions of our staff needed to be reviewed, revised, rewritten, and changed. We knew that once we did that, as those positions surfaced up to our classification office that there would be a potential of some reclassifications downwards, also some freezing of salaries. And then we also wanted to review our progress, looking at the components of our reorganization planning. That plan was implemented on October 15, 1996. That was a Tuesday morning I believe. It was about nine in the morning. The staff had no idea this was coming. All of a sudden, Harry and our personnel manager, Davis, and I walked in the door and everybody said, "Whoops, what's going on?" We called two people who were to be laid off and notified them, then immediately we have a meeting with the entire staff so the we could keep the rumors down. We wanted everybody to know what was going on and what was going to happen in the future. One of the most important things that we did in this notification process occurred the very next day. We had a group of people from our Davis office specializing in human resource management, compensation, and benefits, providing counseling to the staff that was laid off, as well as the rest of the staff. We wanted to make sure that the people who remained felt comfortable, felt secure, felt completely notified of what was going to happen. And they all took advantage of that counseling and that was a very important thing for us to do. A new position was created. This position was assistant to the superintendent. Essentially his responsibility was to manage the day to day operations at the center so I could go out and do a lot of the things that you guys do in community relations. He also managed some of our new additions relative to improvements of our center. His chief chore was to improve that communication between our staff and to improve the coordination. And we did not know how well this was going to work so we initially set this person as a temporary employee. If we did not hire the right individual, we could eliminate or terminate that position immediately, or rehire another person. We want to keep that like that for about two years to see how this works. That has worked very well. We will be doing full recruitment for this position so if any of you know anybody who wants to move to the desert, then please let me know so I can get them an employment package for this position search.

This is the terrain around the center when you get away from the water. There were some reassignments in our reorganization of two people, the plant manager and our field crew manager who initially reported to me. Now they report to the assistant superintendent. They looked at this as a demotion so we had to instill in them that this really wasn't a demotion, they just had a new boss. They were still doing the same things. This helped improve the communication, coordination and the accountability between those two offices. And all of a sudden they were starting to develop a team. We'll talk about layoffs for minute.

There were two positions we identified for laying off. That was our staff research associate, and this person had responsibility in our environmental health and safety area. But we determined we could bypass those responsibilities and filter them throughout the remaining staff. So that position was elimi-

nated in our mechanical section. It was more cost effective for us to take that equipment and have it repaired. These layoffs, in our system, have serious ramifications because of the grievance process, age discrimination and race discrimination.

The position descriptions for the remaining staff had to be reviewed. We did the manager's position descriptions first. We wrote those, negotiating with the staff and managers on position descriptions. And then, once we had those done, we did the rest of the staff using the managers as the front person to do that. A key thing that we did was to inform the staff about position descriptions, how they're written, what they're used for, the appraisal process and all that. They didn't know how position description and appraisal went hand in hand. And so we had a training session where we brought position descriptions specialists from Davis. They sat with our staff and we had training on writing position descriptions, how positions are used in appraisal, the development of employee expectations. Then we broke up into teams and had mock position description and a mock appraisal process. And it was very beneficial to our staff and they have a much better appreciation for how the appraisal process is supposed to work. All of our position descriptions were reviewed for compensation. We were unsure about reclassifications. We are now over the hump and our employees are now writing their expectations for future use in the appraisal process. All we have left to do is wrap up like the spider is doing to the grasshopper. We wanted to make sure that it works, so we did an internal review. Jimmy did the internal review and he had one on one conversations with the staff. It's really important to bring somebody from the outside to look at these kinds of things after you've done reorganization because there's still that lack of trust in center management. There's still that morale problem out there and Jimmy identified those two areas in his report that needed to have additional work. So we're working in the trust and morale issues right now.

Progress has been made in our center management, it's going to take a long time for wounds to be healed for substantial progress to be made. But we have improved effectiveness of the Desert Research Extension Center. We have improved the communication and coordination at all levels at the research and extension center. We have improved our teamwork and have physical plant and field people teaming up on certain projects. The most important thing, though, is that we have increased the number of research projects that we have at our center, indicating that we have improved the confidence of our researchers. Another important thing is that we have regained that confidence with our commodities. They had representatives there about six weeks ago looking at our research plots and they are now fully funding the research at our center and they were very pleased to see what has transpired at our center over the last two years. When embarking upon any kind of human resource activity, I think it's important for you to keep a guiding philosophy in mind. It's really important that you begin to keep resource issues because these things need some documentation. You say what you're going to do and do what you're going to say and record what you did by all means because those documents are very, very important to the grievance or the discrimination process. You also need to check your results by completing the review and act swiftly on these differences. One thing too, that you need to keep in mind, is whether or not you're goal oriented or process oriented. A lot of your resource people are more process oriented. The plan says you're going to do this and that but all of a sudden, midway through the plan, you have achieved your goal. What do you do? And finally, one of the most important things to do is develop a need for community. I found out later on, and I accept this philosophy that a reorganization is something that you do with people, not to people. And to be successful at that, you need to communicate on all levels and you need to communicate frequently.

Southern Piedmont Agricultural Research & Extension Center: Transitions and a Look to the Future

Dr. James Jones, Director,

VPI Southern Piedmont Agricultural Research & Extension Center.

It is a pleasure to have this opportunity to talk with you a little about our agriculture programs and the college of agriculture. And also to tell you a little bit about what's going on in our research center. When John Robinson called me the other day he caught me in at a weak moment, because I don't know what I was thinking about. I told him to give me a topic and I'd address it. Don't ever do this again!

Virginia covers a very diverse geographic area of about six different climatic zones, six major soil associations and five general agriculture production areas. We have twelve research extension centers scattered across the state and attempt to address the various issues of the agricultural industry. These twelve sites total about 4,300 acres of land that are owned or leased by the university. Six of our large centers have resident faculty and six have faculty on campus who conduct programs. All of our centers work extremely close with extension agents and extension personnel. I'll address that in just a minute. This station is centered in an urban state but agricultural developers are still the number one industry, with farm values of about $2.4 or 2.5 billion annually. Our major farm enterprise is, in order of importance, milk, cattle and calves, turkeys, tobacco, corn, soybeans and hogs. Agriculture generates approximately 35.9 billion dollars in total sales in the state or about 12.3% of all the sales. Farming, or agriculture in general creates approximately 418,000 jobs and nearly 15% of our total jobs statewide. Just as the face of agriculture has changed over the years, we've undergone a transition from a resource-based industry to an information or science-based industry. Farmers have expanded their production in the last four decades by 63%. All the land and labor used has been reduced by 47 and 89%, respectively. A lot of these changes that we see certainly have been brought about by agricultural research and extension. We like to think we've made a significant contribution to that change.

This morning the changing research agenda was addressed very well. They talked about things that we're facing today that will happen in agriculture and land grant universities. I think the biggest thing is the shift away from production agriculture issues, like trying to increase yields and reduce cost of production, even though that's generally important. Some of the major issues now, are consumer-oriented issues. Water quality, environmental issues, food safety, and on and on. The biggest thing that's complicated our situation in the '90's are the serious severe budget cuts that threatened our ability to provide the agricultural industry with information that they need.

We lost about $12 million in our base state budget. January of 1990 to June of 1996, we lost 280 faculty and staff. We had layoffs, we had buyouts, we had early retirements. Our operating dollars were cut.

On December 8, 1994, our dean said this is the worst thing to happen to this college. We have got public criticism. We've been doing strategic planning and trying to just serve the agriculture industry.

That's about the time I started as director at the Southern Piedmont. It seems like when I came in everything went bad. I hope I didn't have anything to do with it. But we did make some changes. We certainly had to shift our funds and management to redirect our resources and tie more to our industry use. Every commodity wanted to get their share of the resources so people had to identify only the

essential faculty expertise. An example of that is that during the serious reductions of personnel, my own department of agronomy had 35 faculty, we lost seven, which happened to be controlling the entire forage program, both the research and extension programs. We lost the whole program.

We had to reduce administrative costs and that was one thing the state legislature seemed to pick up on with too many administrators and I think even the administrators agree with that. We did away with some, we had some retire. Most of those have been refilled by state adjustments since then. We then decided we wanted interdisciplinary interstate programming. Some had been successful, some didn't work quite as well. The breaking down of our disciplinary defined departments like poultry and animal science. We really had to find an extension to serve from an agency standpoint, define one agency for the benefit of reducing administration costs and the cost of doing business. The next item back there, next to the last is to increase the faculty to extension field offices and agricultural research and extension centers across the state. And that sort of amazed us. That's kind of what was coming down from the state legislature to the leadership at the university and colleges. We got their attention because we are closest to the university from their viewpoint. We ended up restructuring a strategic plan to solve that area to serve agriculture.

Really, this plan is an established plan with input from clientele groups, industries of agriculture as well as the faculty and the administration at the college. They picked up what they considered to be a critical level of staffing to carry out these programs to serve the institute of agriculture. And what we're trying to do is not replacing every position. We wanted to try to create a new, what we call a new college, a new century for new agriculture.

So we've had to sell this program to our clientele as well as the state legislature. We were very successful! For the off campus locations, the first piece of that puzzle took place in 1996 with the members of the general assembly who get in touch with the dean and ask him what it would take, with twelve off campus centers, faculty and staff, in operating dollars to properly serve agriculture in their geographic area. The director scrambled around and came up with some numbers of faculty. Something like $4.4 million was requested. That first year we were seeing 1 million dollars earmarked for off campus facilities. The other money goes to campus. That was the beginning of rebuilding the college to the position it's at now.

We have sort of gotten the lines clear in these positions since 1996. These positions were identified as being critical to establish the college in order to get our jobs done. Many of these positions have already been refilled or are scheduled to be. The one there on top is a position at the station where I'm at that will be filled after July. There's a possibility of a position at the seafood station in Hampton, the swine position at the Diehard station. A Soil scientist position has been advertised and there's a position in beef. We were able to displace our burley tobacco position. That position is a non-campus one.

We talked a little bit about what's happened to our particular center. We were staffed to serve, essentially, 21 counties in the central part of the state. We also have advocated work in burley tobacco in the southwest corner of Virginia as well as cotton and small fruits. The Southern Piedmont area of Virginia is about a quarter of the land area and is basically a happening area. Agriculture is dominant. There was specialized agricultural research in this area of the state. We started in 1906 when the general assembly appropriated $2,500 to support research stations. Since that time we have made some progress. We established the Southern Piedmont center in 1972. It was a very small station that moved programs and faculty from campus. We created new positions. Basically, consolidation of tobacco service, at that point in time. Tobacco was our major emphasis. Since then, we've been able to upgrade the center building, laboratories, greenhouses and putting in ponds. A significant thing happened to us about 1996,

the army decided to close. That's the army base that the university and the army operated jointly for 25 years and I'll talk a little bit about that in just a minute. That was very significant for us.

We've been doing a lot of program planning too, because you know about the situation with tobacco and we have a lot of resources in chewing tobacco. It's sustained cash crop value is somewhere around $200 million, 98% of it is grown in the region. Its profitability can match any other farm enterprise we've looked at. We've been searching for so-called alternative, supplemental crops to replace tobacco and so far we've not been successful. Our climate and soil conditions are perfect for tobacco production. We have the richest tobacco heritage, the best quality men in the world right? Most of the farms of our relatives are small and it takes a lot of acreage to make a difference in field cotton and some of these other crops, whereby, tobacco, you can do pretty well on smaller acreages. Certainly we have problems. We have all kinds of health issues and product lawsuits, various taxes and various costs to the products, and expanding world competition. The industry is declining in domestic consumption which leads to declining acreage which leads to decreased income for our producers. They're concerned, we're concerned. What happens to our programs at the research and extension center? About 75% of our resources has traditionally been used for tobacco research and extension. We have four faculty at the present time that works exclusively with tobacco. We have some others that spend a great deal of their time on tobacco. We have excellent support of our program, both in funding and human support. It's still a legal crop and it's the number one cash crop in the state. A few years ago, the federal funding for research of tobacco was dwindling. What do we do? We can turn our back and go on with our research and extension programs or completely abandon it. We can ignore the situation, going along with business as usual. Would we rather expand and diversify our research and extension programs such that they include tobacco? We have essentially done all of these things in recent years. We have downsized. We've reduced our faculty by two. We combined that knowledge with research and extension. We had two positions, it was combined into one. e had a physiology of tobacco position that we eliminated. We have the potential to do the kind of work that our producers need, and not ignore the situation. We were able to provide the research and extension program. We have been able to expand and certainly diversify our research programs. We're researching something like 32 different crops now at the research center, instead of basically doing a tobacco type operation. But we were also able to obtain about $200,000 from our last general assembly. We 're looking for alternative uses for tobacco. We're looking at the use of pharmaceuticals produced in tobacco.

In 1994, tobacco took one of its news dips and the dean said, "Look, you've got to take part of it into your programming". I want you to put together a task force and study the agriculture in Central Virginia and the programs at the center and come up with a recommendation on where we're going with research and extension in the next five years. So I did. I put together a task force to represent the agriculture across central Virginia. Farmers, agribusiness representatives, people in tobacco, the Agribusiness Council, Farm Bureau, the faculty and administration at the university. After studying the situation, this is what was recommended. First of all, they thought tobacco was too important to ignore and the number one recommendation was maintaining the extension and research programs in tobacco. Also suggested was beef cattle management with programs is all areas. We have a pretty strong small fruits program, and we attended to that. Increased efforts with specialty crops makes most people think of vegetables and other things because tobacco is a high value, small acreage crop. Vegetables are a hot substitute. Personally, I don't think that's the answer. We need an increase for small grain, grain sorghum and forestry programs. We also have a committee in Virginia to study the tobacco situation and made a couple of recommendations for legislation, a sub-committee of the general assembly with their first recommendation was to ensure that the latest technology in tobacco production will be available for those farmers who manages base yields. It sort of dictated that they stay in the tobacco business. The second recommendation was to ensure that the acreage of all farms were aligned with enterprises with a maximum chance of profitability. It will be available to farmers who wanted to save the family farm industry.

After the plans were put together, after all the studies for the task force groups, all the recommendations and suggestions, this is what we finally ended with as far as staff at our center. Eleven faculty, 18 staff. It includes three agronomists, a plant pathologist, and entomologist working on tobacco. A horticulturist working with roots and plant humus. It also provides a laboratory for other research programs. A cotton specialist. At the present time we have 12 faculty on board. To give some idea of where we've been in staffing at the center. In 1978, we had twelve faculty, fifteen technicians, three secretaries and a custodian. In 1991, because of cutbacks and buyouts and so forth, we had seven faculty, nine technicians, two secretaries and a janitor. We've recovered some and increased to nine faculty. Now we have eleven technicians and two secretaries. The janitor took another job and we decided not to fill that position. We're now hiring part time custodians.

Let's talk about the Army base closing and the consequences of that. After 25 years, you've already decided to close and they declared the land surplus or excess. And certainly the university is putting in a quest to obtain the land so we can have what we call local land reuse authority, consisting of three to a group. We were trying to decide what to do with this land. We had to sell our value in work to the people. They wanted to develop this land. They wanted to bring in General Motors or Motorola, all kinds of jobs for people. And besides that, there was one-and-a-half-million dollars worth of timber on the land. So we wanted to move the land through a park investigation. The local land reuse authority decided to give it to us through an economical developing base where they would retain all the land and use the money that came for the timber and they just let us use it until something better came along. We didn't like that idea. Thank goodness. There's a lot of money in those trees and I think we have been able to, thanks to the support of our clientele, support of our state legislature, support of our U.S. senators and congressmen, who finally persuaded the local land reuse authority to grant the land to us through a education conveyance. It took about two years for the entire situation to be investigated in the newspaper. It was some tough times. It was not real pleasant.

That's down to where we are with the center. We do plan to clear about 800 acres of the land. We're going to try to continue to do production research on major crops grown in the Southern Piedmont of Virginia, whatever they may be, whether it's tobacco, cotton, whatever. One of the established details in the management program is that we will need to clear additional land and thank you to Tim McClain for being able to do that. Sustainable land for high value specialty crops, we're working on that. Developing alternative uses for tobacco, we have money from the state legislature in support of our genetic engineers on campus to do that. We wanted to develop an agri-forestry program with campus faculty and if we can, cooperate with other universities. Distance learning, we don't know where we're going with that. We have one degree program at our off campus location, horticulture. We are wired at our center for two-way videos and we're receiving some pressure from campus for our faculty. I think the main thing is that we're going to try to maintain flexibility in our local camps. I think as long as you have the support of your clientele, even if the best things give, you still have a valued chance to make some progress and I think we've sort of turned that corner. At least I hope so.

Research Center Administrators Society

Fall Executive Board Meeting

September 28, 1998
Fresno, California

Findlay Pate opened the meeting held at the Kearney Ag Center, Parlier, California.

Those in attendance included: Randall Rawls, Alabama; Bob Roth, Dave Langston, Arizona; Ed Colburn, John Robinson, Larry Earnest, Arkansas; Zak Mousl, Paul Sebesta, California; Findlay Pate, Will Waters, Florida; George Granade, Dennis Thompson, Phil Utley, Georgia; Lyle Lomas, Kansas; Mason Morrison, Donnie Davis, Bill Peterson, Kentucky; Ron Robbins, Jere McBride, Louisiana; Jim Smith, F.T. Withers, Mississippi; Richard Crawford, Missouri; Clyde Bogle, Joe French, North Carolina; Merritt Taylor, Mike Bourne, Oklahoma; Ben Kittrell, Jack Davis, South Carolina; Dennis Onks, John Hodges III, Phil Hunter, Tennessee; John Sweeten, Joe McFarland, Texas; Ray Cartee, Utah; Bill Wilkinson, Jim Jones, Virginia.

Paul Sebesta welcomed everyone and asked everyone to introduce themselves. He introduced Fred Swanson, Director, Kearney Ag Center, who welcomed us and gave a history of the Kearney Ag Center. Paul went over the agenda for the next two days.

Findlay Pate opened the Business Meeting. Dennis Thompson passed out the minutes of the previous Executive Board Meeting (February 1, 1998) and Annual Meeting (February 3, 1998). George Granade moved that the minutes be approved as written. The motion received a second, and both sets of minutes were approved.

Jere McBride presented the Treasurer's Report. Dennis Onks moved that the Treasurer's Report be accepted, and it was seconded and approved.

COMMITTEE REPORTS

RCAS Expansion: (Ben Kittrell)

Ben explained why we need to consider expansion – 1) we hold a planning meeting and a main meeting each year; 2) SAAS is getting so large that there is only a few (perhaps three) areas which can host the meeting, and this limits us as to what we can do on tours, etc; and 3) perhaps we should consider moving toward a national meeting. He presented five scenarios for us to consider:

4) SAAS-RCAS annual meeting with papers and tour
RCAS planning meeting and tour

5) SAAS-RCAS annual meeting with more papers, no tour
RCAS planning meeting and tour

6) SAAS-RCAS planning meeting
RCAS annual meeting w/o SAAS, with papers and tour

7) SAAS-RCAS planning meeting + papers 1-2 days or 1-day papers & 1-day tour
RCAS annual meeting w/o SAAS, with papers and tour

8) Complete break away from SAAS

Much discussion followed, both pro and con. The Board decided immediately to eliminate scenario #5 as an alternative. Perhaps we should not call a meeting such as this one a "planning meeting" but rather an "annual meeting". John Hodges pointed out that they might have problems finding new tours near Nashville. Because SAAS meets in February, it is not an optimum time for many possible tours. Another point made was that small groups such as RCAS could go almost anywhere for meetings whereas the size of SAAS limits the sites to only a few places. There are tradeoffs. Phil Hunter stated he would not go to SAAS unless RCAS met with them. We probably need to check our by-laws (written by John Hodges) to see what they say about meeting separate from SAAS. Most agreed that we modify our meeting and probably have a main summer/fall meeting with papers and tours along with a planning session and at the SAAS meeting, have some papers with perhaps tours and a planning session for the summer meeting. It was also suggested that we expand the Sunday afternoon executive meeting to include a planning session. John moved, Joe McFarland seconded, and all agreed that we have a 2-day event and call it a "leadership workshop" instead of a "planning meeting" in the summer/fall of 1999.

It was pointed out that we need to develop a mailing list including other areas of the country although perhaps this might be somewhat difficult. It was suggested that someone could contact the USDA Director-at-Large for each region, and they should have much of this information. Ben Kittrell moved that Paul Sebesta work with Phil Hunter to develop a mailing list. This was seconded and passed.

Financial: (Jim Jones)

Jim gave a report on printing expenses for the Proceedings. After a brief discussion, Jim Jones moved and all agreed that Carl be asked and, if he wished, that the society reimburse his office for the printing expense ($519) of the RCAS Proceedings which will be ready for the February meeting. The motion was seconded and approved. The question arose regarding the publication of the Proceedings only on the Internet. Dennis Onks pointed out that the Proceedings need to be sent to libraries across the country. Mutual agreement was that a hard copy seemed to be needed by most members. It was suggested that we use a digital camera and put pictures of officers in the Proceedings along with some pictures of awards, tours, etc. Joe McFarland is responsible for putting the Proceedings on the Web site.

Membership and Internet Services: (Joe McFarland)

Joe McFarland talked about creating sites of agricultural interest on the Internet. Joe agreed to put together a list of list servers which we might like to be on. Joe agreed to send the list server information to each state representative on the executive committee. If we have a list server, we need to do the input ourselves on any topic we feel the group might benefit from such as "beaver control," "deer control," etc.

The Web page can be used for information, directories, and position announcements. Each state would provide their research center information if desired.

The announcement was made that Jerry Akins, Phil Hunter, and Jim Smith are on the SAAS (Sustainable Agriculture) committee.

Awards: (John Hodges)

John moved and all agreed that Dr. John Sewell (Associate Dean, Tennessee Agricultural Experiment Station) be the recipient of the RCAS Distinguished Service Award for this coming year. Findley Pate seconded, and the motion approved.

Nominations: (Ben Kittrell)

Ben reported that the committee recommends the following nominations:

John Robbins - President
Dennis Thompson - Vice-President
Carl Tart - 2nd Vice-President
Lyle Lomas - Secretary
Jere McBride - Executive Treasurer
Dennis Onks - Proceedings Editor

Ben moved that the nominations be accepted. It received a second and was approved.

Arrangements: (Phil Hunter)

Phil reported on several potential sites as tours for the upcoming SAAS-RCAS meeting on February 1-4, 1999. The Ames Plantation (quail research center) would be the most likely pick. He suggested the tour be on Monday, February 2, in the afternoon. The Ames Plantation is approximately 1 hour and 15 minutes out of Memphis. It was suggested that the tour last 2-3 hours ending up at the Quail Museum for the social hour and banquet (catered locally – excellent!). For approximately 100 people, buses would cost $1,155; museum $200; dinner $5.75-$9 each. There is a Web site (Jim Anderson) for the Ames Plantation, and information can be found on "station security" and "beaver control."

Program: (John Hodges)

John is to make arrangements for the Monday morning, February 2 welcome to the group which is to include the Dean of the Tennessee Agricultural Experiment Station and Jack Britt, Animal Science and Vet School, NCSU.

Suggested topics for upcoming meetings were discussed for the next period of time. Everyone had some excellent ideas and should have given John Robinson a great list to choose from.

It was suggested the need of one hour for a business session, and it can be worked around any of the five sessions. Sessions will be approximately two hours each in length with four-to-five papers per session and a breakout session. The Board meeting will be held on Sunday afternoon.

Stoneville, Mississippi, September 26-28, 1999 was selected as the place and date of the Leadership Development Workshop in Fall, 1999. Workshop planning would take place on Monday, September 27 with the tour on Tuesday, September 28. The attendees decided that we need to plan the program for the Stoneville meeting while at the Memphis meeting. People can stay in Greenville, Mississippi, which is six miles from Stoneville and about two-and-a-half hours from Memphis.

A standing invitation was issued for Amarillo at any time.

The meeting was adjourned.

The California delegation put together an outstanding tour for the group. They should receive a standing ovation!

Research Center Administrators Society

Executive Committee Meeting
January 31, 1999
Memphis, Tennessee

Attendance: Alabama-Mr. Randall Rawls Arkansas-Dr. John Robinson, Arizona-Mr. Bob Roth California-Dr. Paul Sebesta Florida-Dr. Findlay Pate Georgia-Mr. George Granade Kansas-Dr. Lyle Lomas Kentucky-Mr. William Peterson Louisiana-Dr. Allen Nipper, Dr. J.A. Musick, Dr. Jere McBride Mississippi-Dr. Jim Smith, F.T. Withers North Carolina-Mr. Carl Tart, Mr. Dennis Thompson Oklahoma-Dr. Merritt Taylor, Mr. Mike Bourne South Carolina-Dr. Ben Kittrell, Dr. Jack Davis Tennessee-Dr. Phil Hunter, Dr. Dennis Onks, Dr. John Hodges III Texas-Dr. Joe McFarland, Utah-Dr. Ray Partee Virginia-Dr. Jim Jones

Opening Remarks

The meeting was called to order by President Findlay Pate at 2:30 P.M. in the Peabody Hotel in Memphis, Tennessee. President Pate welcomed everyone to the meeting and commended everyone on what looked to be an outstanding program for the next two to three days. President Pate asked everyone to stand and introduce themselves and give their location and any pertinent factors that they wish to offer to the group.

Research Center Directories

Dr. Phil Hunter passed out information to each delegate pertaining to the research center directories in each state. He asked that everyone please give a cursory review of those while at the meeting, note any changes needed and provide them to him before leaving Memphis, if possible. If not, he encouraged everyone to please send him an update of changes needed to be made in their listing within a three to four week period after the conclusion of the meeting in Memphis. President Pate thanked Phil for all the time and effort he puts toward putting together this directory. It has been a very useful tool in trying to locate individuals. Many positive responses were given about having the maps in the directory. When traveling through other states this was most useful.

Secretary's Report

Carl Tart, Secretary, reported that seventy-one individuals have preregistered for the meeting in Memphis. From discussion with others it was noted that this was a record number to preregister for a RCAS meeting at SAAS. Carl stated that with this large preregistration and anticipating those who would be registering tomorrow morning prior to the opening session we possibly would have a record attendance. A packet would be handed to each individual the next morning with their receipt for payment of registration, tour and meal tickets, and their nametags. Dr. Phil Hunter moved that we dispense the reading of the minutes taken in Fresno, California. Dr. Lyle Lomas seconded the motion and it was approved.

Treasurer's Report

Dr. Jerry McBride was called to make the Treasurer's report. Dr. McBride passed out a detailed transaction report which provided a listing of all receipts and debits that had occurred from January 1, 1998 through January 26, 1999. The net balance in our account at this time is $5,977.49. Dr. McBride

also passed out an itemized category report which noted interest earned, bank charges and some other isolated expenditure items. Dr. McBride felt good about the financial situation. Everyone seemed pleased with the status of things at this time. Dr. Ben Kittrell moved that the Treasurer's report be accepted. Mr. Randall Rawls seconded the motion and the vote was in favor of this.

Memphis Program

Dr. John Robinson announced that they were excited about the upcoming program for the next couple of days. He thought there were some topics that were most relevant to research center administrative concepts as well as interesting presenters of each. Dr. Robinson announced that a special presentation would be held in the main ballroom of the Peabody Hotel at 4:00 this afternoon to celebrate the 100 years of SAAS. They have some excellent keynote speakers that will highlight the history of this organization.

Dr. Dennis Onks asked everyone try and remind program presenters that you contacted to give a draft of their talk to be used in putting together the proceedings. The sessions would be recorded, but it makes it a lot easier if a draft copy, and certainly even on a computer disk, can be provided.

Dr. Dennis Onks also reported on the local arrangements committee. He reported that we would visit the Ames Plantation, which was approximately 75 miles out of Memphis. It is one of the outlying units of the Tennessee Agricultural Experiment Station System. This large land facility was donated to the University. They have a bird dog museum at this location, which we will visit, and annually the National Field Trail and Bird Dog Association meeting is held there. The buses will leave the Peabody Hotel promptly at 1:00 for the tour. The dinner will be held at the Ames Plantation and will provide both steak and chicken. The President of the Bird Dog Association will be the featured speaker that evening.

Dr. Onks and Dr. Phil Hunter reported that the ladies should gather in room 303 of the Radison Hotel tomorrow morning for a tour of the Memphis area.

Dr. Pate commended Dr. Dennis Onks and the entire Tennessee staff for hosting a tour for our group.

Awards

Dr. John Hodges reported that Dr. John "Ike" Sewell, Associate Dean of the Tennessee Experiment System will receive the Outstanding Service Award. Dr. Hodges expressed the plaque would be presented at the dinner at the conclusion of the tour.

Membership and Home Page

Dr. Joe McFarland gave an update on membership services through internet capability. He requested that everyone please subscribe to our hookup. The address is "majordomo@tae001.tamu.edu". Dr. McFarland requested that everyone in the state needs to subscribe. It's a great tool to share thoughts and ideas on management of research station centers.

A couple of projects that he plans to continue to develop we list servers that we could possibly use and to develop resource guides for station heads or superintendents.

Proceedings

Dr. Dennis Onks stated he would try to get the proceedings put together by the next Fall meeting. Carl Tart stated that it's always a problem trying to get them printed by that time due to other activities going on in the Department that puts a heavy load on their print shop. It should not be too long after the Fall meeting that this could be put together. Dr. Onks, again, asked that everyone please ask presenters that they were responsible for to provide drafts or even better computer disks of their presentation.

Newsletter

Mr. Denny Thompson stated that the newsletter went out in January. He has received a lot of positive response. He offered sincere thanks to everyone who had provided information to him to use in the newsletter.

Other Business

Dr. Ben Kittrell brought up for discussion the possibility of forming a national society of research center administrators. There was quite lengthy and good discussion on this issue. The first attempt to involve the western states did not draw a lot of response, but Dr. Kittrell and Dr. Hunter asked that we keep working and driving on this. There was discussion as to whether the Fall meeting could be used for a Leadership Development Conference instead of a planning meeting for SAAS or at least have a combination meeting where both activities could be accomplished. Dr. Pate stated that some time of the Fall meeting would have to be dedicated to planning the meeting for SAAS if we were going to continue to be involved.

Dr. Kittrell and Dr. Hunter will continue to work on a mailing list to expand our organization. Dr. Onks asked the potential of seeking a list of private research organizations to see if they may have an interest in our group also. There were pros and cons to this idea.

Some discussion developed over how we could better publicize our organization. Dr. Jerry McBride suggested maybe $5.00 be included in registration for proceedings and the money from this be used for the development of promotional material. It was suggested that certainly the homepage on the world wide web and the newsletter were good tools that were already in place.

Fall Board Meeting

It was announced that the Fall Board Meeting would be held September 26 through 28 in Stoneville, Mississippi. Dr. James Smith stated that there were three new motels in the Greenville area that would be utilized for the meeting as well as another on the west side of town. Details pertaining to this would be provided to the group in the near future. Some tours had already been set. At present, a catfish production unit as well as processing plant had been arranged and a catfish lunch. Other activities with grower groups and key people in the Mississippi area would be orchestrated. Also, spouse activities were being planned for the event.

There became a lot of discussion on the structure of the Fall meetings as to whether to invite others outside of the Executive Committee. Even though several mentioned that they could not send large delegations to two out of state meetings annually, it was decided to invite everyone in the society. Again, it was stated that some of the meeting would have to dedicated to planning the meeting at SAAS; however, a certain portion would be dedicated to leadership activities. It was suggested that the meeting

should start on Sunday afternoon and end Tuesday night. The Mississippi delegation will structure activities around this suggestion.

With no further discussion Dr. Findlay Pate adjourned the meeting so that everyone could attend the 4:00 program on the 100-Year Celebration of SAAS.

RCAS Annual Business Meeting

February 2, 1999

Memphis, Tennessee

Opening Remarks

President Findlay Pate called the Annual Business Meeting to order at 10:50 a.m., February 2, 1999 in the Venetian Room, Peabody Hotel, Memphis, Tennessee. President Pate encouraged everyone to become more active in the organization and to solicit more members from each state.

President Pate asked if anyone would like the minutes from last years meeting in Little Rock read. Dr. John Hodges made a motion to dispense the reading of the minutes. The motion was seconded by Mr. George Granade and a unanimous vote by acclamation was made in favor of the motion.

Secretary's Report

Mr. Carl Tart reported that he had mailed out approximately 275 invitations to attend this meeting. Mr. Paul Sebesta had provided him a list of many of the western region research centers. The final registration was 77. This, of course, did not include spouses. Our expansion has now included the states of California, Maryland, Illinois, Arizona and Utah. Carl announced that there were plenty of proceedings left if anyone needed additional copies. As it related to the proceedings from this meeting, the same process would take place this year. Dr. Dennis Onks would compile and edit the proceedings and Carl Tart would be responsible for printing and distribution.

Treasurer's Report

Dr. Jerry McBride reported that the RCAS group was in the best standing in several years showing a balance of $5,977.49. He discussed the itemized transactions with the group. There was much appreciation shown for the outstanding status of our society.

Dr. McBride did request that in the future all who register for RCAS to be encouraged to register for SAAS also. It is so much simpler and easier to handle this at the time of our preregistration.

Membership

Dr. Joe McFarland gave an update as it relates to membership activities. He requested assistance in ways that we cannot only expand to additional states, but how we could expand within our own states to get more active membership. Dr. Jim Smith will be responsible for developing a web page. If you have any ideas or thoughts, please pass these on to Jim.

The use of a list server for communication on management ideas was discussed. Ideas such as how to catalog resource guides, listing surplus property items, predator control and other issues have already been topics discussed through use of the list server system. Everyone was encouraged to become an active part of this.

Reorganization

Dr. Ben Kittrell opened the floor for discussion as it relates to RCAS going to a national level. Dr. Kitrell moved that the RCAS go national and the motion was seconded and approved. It was decided

that the Fall meeting would still serve as the planning session for the meeting to be held in February in conjunction with SAAS. It was also suggested that we visit areas that we have not been to in previous years. The thought of visiting in some of the states that are coming into the society would be a good idea to get some exposure to that area. Some stated the problem of sending large delegations to a meeting that was just serving as a planning session. It was suggested that the Fall meeting would also incorporate into it what is called a, "Leadership Workshop", to offer information that would aid center administrators with management of facilities to anyone who would attend. This concept should be put into place at the upcoming meeting to be held in Stoneville, Mississippi.

Nominations

The nominating committee made the following committee report as recommendations for a slate of officers for the upcoming year. Dr. John Robinson, President, Mr. Denny Thompson, First Vice President, Mr. Carl Tart, Second Vice President, Dr. Lyle Lomas, Secretary. Dr. Jere McBride would remain as Treasurer. The floor was opened for other nominations. Mr. George Granade moved that the nominations provided by the nominations committee be elected by acclimation. It was seconded and a unanimous vote was made in favor of the motion.

Directory

Dr. Phil Hunter stated that he had sent out some information related to changes to be made to the state membership list so far as updated the society directory and would like to get the information put on the RCAS web site. This information was to be forwarded to Phil by the state representatives.

Other Business

There was some discussion on how we may go to other meetings and provide displays concerning RCAS and what we are about as a public relations tool. It was suggested that everyone give thought to this to discuss at later meetings. It was noted that brochures would be available on the table when leaving relating to the Bluegrass State as the next SAAS meeting would be held in Lexington, Kentucky.

Roy Cartee invited the RCAS group to meet in the Fall of 2000 near Logan, Utah. He stated there were a lot of festivals and activities during that time of year that would be appealing to everyone and the Ag. Day at the University was held during September.

Dr. Findlay Pate gave special thanks to the officers for everything they had done during his tenure as president. He related the importance of the organization to him personally and his desire to see the society grow nationally in years to come. He also commended the entire Tennessee group for being an outstanding host at the meeting all the way from the hotel arrangements to the tour and other activities. Many accolades were presented. Dr. Pate turned the gavel over to Dr. John Robinson the incoming president. Dr. Robinson presented Dr. Pate a plaque for his outstanding leadership and sincere guidance of this organization through the last year. Dr. Robinson stated he looked forward to serving this group and would do everything in his power to continue the legacy of the outstanding presidents that had served before him.

Mr. George Granade told of the "loss" of Mr. Denny Thompson to the state of North Carolina and encouraged anyone who would have interest or know of someone that possibly would be interested in that vacancy to please make contact with the Georgia Branch Station system.

Mr. Bill Peterson would be local arrangements chairman next year at SAAS as we visit the state of Kentucky. Other committee members would be appointed at a later time. Dr. Robinson again thanked everyone that had a part in putting the program together. The meeting was adjourned.

BY•LAWS
OF THE RESEARCH CENTER ADMINISTRATORS SOCIETY

Article I
Name

The name of this organization shall be "Research Center Administrators Society" and for the purpose of this document shall be frequently referred to as "Society".

Article II
Objectives

The objectives of the Research Center Administrators Society shall be to hold educational meetings; to provide opportunities for interaction with colleagues; and to enhance the profession within the scientific community.

Article III
Members

Section 1

The membership shall include superintendents, resident directors, center directors, and other individuals with various titles having administrative responsibilities involving a field station, branch station, research station, research center, or other branch research facility of a state agricultural experiment station or any other public or private agricultural research organization.

Section 2

The membership shall be composed of regular and active members. Any unit head of a branch research facility in any participating state shall be considered a regular member. Any individual, with administrative responsibilities involving a satellite research facility, who pays the designated membership fees shall be an active member with all rights and privileges afforded by the Society.

Article IV
Officers

Section 1

The officers of the Society shall be a President, a First Vice-President, a Second Vice-President, a Secretary, an Executive Treasurer, and a Society Proceedings Editor. These officers shall perform the duties prescribed by these By-Laws and by the parliamentary authority adopted by the Society.

Section 2

The officers shall be elected by the membership to serve for one year or until their successors are elected, and their term of office shall begin at the close of the annual meeting at which they are elected. The Executive Treasurer and the Society Proceedings Editor shall serve at the pleasure of the Executive Committee and the Society for a specified term announced upon the election of the officer. Additional terms may be served if deemed in the best interest of the Society.

Section 3

No member shall hold more than one office at a time, and no member shall be eligible to serve consecutive terms in the same office. The Executive Treasurer and the Society Proceeding Editor may serve more than one term upon recommendation of the Executive Committee and approval of the Society.

Section 4

Duties of the President shall include:
~ Serve as overall coordinator of Society activities;
~ Preside at annual meeting;
~ Prepare letters for distribution to State Agricultural Experiment Station Directors requesting them to invite and to encourage attendance of membership from their state at annual meeting;
~ Appoint Nominating Committee in accordance with By-Laws;
~ Appoint Local Arrangements Committee Chair;
~ Serve as a member and attend Executive Committee meetings;
~ Appoint all other committees as needed;
~ Serve as Executive Committee Chair.

Section 5

Duties of the First Vice-President shall include:
~ Serve as Chair of the Program Committee;
~ Mail copy of program to Secretary-Treasurer of the Southern Association of Agricultural Scientists at designated time;
~ Mail copy of program to all Society officers;
~ Serve as a member and attend Executive Committeemeetings.

Section 6

Duties of the Second Vice-President shall include:
~ Serve on Program Committee;
~ Perform other duties as President assigns;
~ Serve as a member and attend Executive Committee meetings;
~ Assist Secretary in registration at annual meeting.

Section 7

Duties of the Secretary shall include:
~ Following the annual meeting, report new officers to Secretary of S.A.A.S.
~ Responsible for registration at annual meeting;
~ Collect fees at annual meeting;
~ Prepare minutes of all business sessions; prepare attendance roster from registration cards; and send copies of each to incoming and outgoing President and Executive Committee officers;
~ Mail programs and other appropriate information to membership;
~ Serve as a member and attend Executive Committee meetings.
~ Maintain contact with S.A.A.S. Secretary throughout the year on appropriate matters.

Section 8

Duties of the Local Arrangements Representative:
~ Survey assigned meeting room well in advance of annual meeting and decide if adequate;
~ Set up and arrange for banquet and/or social;
~ Arrange for coffee breaks at annual meeting;
~ Arrange for visual aid equipment and other needed equipment at annual meeting;
~ Coordinate all of the above with other Program Committee members;
~ Shall have the option to solicit additional assistance from the membership as needed;
~ Attend the Executive Committee meeting prior to annual meeting at the invitation of the President.

Section 9

Duties of the Executive Treasurer shall include:
~ Maintain the Societies' banking accounts, fiscal records, prepare financial statements and provide such statements to the Executive Committee and the membership at the annual meeting;
~ Issue checks for payment of invoices as submitted by members of the Exécutive Committee;
~ Represent the Society when designated by the President;
~ Maintain current Membership List;
~ Maintain current copy of By-Laws;
~ Maintain liaison with S.A.A.S Secretary-Treasurer on matters of interest to the Society;
~ Serve as a member and attend Executive Committee Meetings;
~ Maintain past copies of Society Proceedings.

Section 10

Duties of the Society Proceedings Editor shall include:
~ In association with the First Vice-President, assemble all program presentations of the annual meeting and edit for publication;
~ Publish approved minutes of annual meeting and Executive Committee Meeting as provided by the
~ Procure all needed publishing materials and report cost to the Executive Committee for approval;
~ Serve as a voting member and attend Executive CommitteeMeeting.

Article V
Meetings
Section 1

The annual meeting of the Research Center Administrators Society shall be held in association with the Southern Association of Agricultural Scientists, unless otherwise ordered by the Society or by the Executive Committee.

Section 2

Special interim meetings can only be called by the President in conjunction with the Executive Committee.

Section 3

Active members in attendance at any annual or special meeting shall constitute a quorum.

Article VI
Executive Committee

Section 1

The Executive Committee shall consist of current officers, the immediate past President, and one representative from each participating state.

Section 2

The Executive Committee shall have general supervision of the affairs of the Society between annual business meetings, make recommendations to the Society, and shall perform such other duties as are specified in these By-Laws. The Committee shall be subject to the orders of the Society, and none of its acts shall conflict with action taken by the Society or the Southern Association of Agricultural Scientists.

Section 3

The immediate past Society President shall serve as an advisor to the President and voting members of the Executive Committee.

Section 4

State Representatives shall be selected by the regular Research Center Administrators Society membership of their respective state.

Section 5

The Executive Committee shall meet at least twice annually. One meeting will be held during the summer or fall and one meeting will be held the day prior to the annual meeting.

Section 6

Duties of the Executive Committee Chair:
~ Preside over Executive Committee meetings;
~ Set date, time, and place of all Executive Committee meetings;
~ Establish program agenda;
~ Provide committee members with agenda 30 days prior to meeting;
~ Appoint Executive Committee sub-committees.

Article VII
Committees
Section 1

A Program Committee shall be appointed by the President to be headed by the First Vice-President and to include the Second Vice-President and the Local Arrangements Representative. The duties of the Committee shall be to plan the annual program of the Society and submit annual program to S.A.A.S.

Section 2

The President shall appoint a Nominating Committee consisting of three immediate past Presidents that are still active in the society. The Nominating Committee shall be appointed during the annual meeting. It shall be the duty of this committee to nominate candidates for the offices to be filled except for the office of Executive Treasurer and Society Proceedings Editor. The Nominating Committee shall report during the business session of the annual meeting and prior to the election of officers. Before the election, additional nominations from the floor shall be permitted. An Executive Treasurer candidate and a Society Proceedings candidate shall be selected by the Executive Committee prior to the annual meeting, and the appointment shall be recommended to the Society for approval. The Society may also make nominations from the floor.

Section 3

Special committees shall be appointed by the President as the Society or the Executive Committee shall from time to time deem necessary to carry on the work of the Society. The President shall be ex-officio member of all committees except the Nominating Committee.

Article VIII
Parliamentary Authority

The rules contained in the current edition of "Robert's Rule of Order Newly Revised" shall govern the Society in all cases to which they are applicable and in which they are not inconsistent with these By-Laws and any special rules of order the Society might adopt.

Article IX
Amendment of By-Laws

Section 1 - Amendment by Active Membership

The By-Laws can be amended by a two-thirds vote of the active membership during the business session of the annual meeting. Notice of the proposed change must be given to the Society President and Executive Committee members one week prior to the annual meeting. The notice shall include the full text of the amendment and the President will make such amendment available to the entire membership at least 24 hours prior to the Annual Business Session.

Section 2 - Amendment by Executive Committee

The By-Laws can be amended by action of the Executive Committee provided strict procedures are followed. A member proposing the amendment shall provide the Executive Committee Chair with the full text of the proposed change. The Chair shall distribute copies of the full text to the committee members 45 days prior to the voting deadline. Voting may be by letter, telephone with confirming letter, or by roll call if taken during an Executive Committee meeting. State Representatives of the Executive Committee are to review the amendment with their respective delegation and cast one vote reflecting the delegation's view. A two-thirds vote of the Executive Committee members voting is required for adoption of an amendment. The Chair shall announce the voting results, and should the proposed amendment pass, revise the By-Laws to include the amendment and distribute the revised By-Laws to the Society membership.

Revised 10-1-85
Revised 2-5-88
Revised 2-6-92
Revised 1-29-95

1999 DISTINGUISHED SERVICE AWARD RECIPIENT

Dr. John I. "IKE" Sewell
Associate Dean
Tennessee Agricultural Experiment Station
Knoxville, Tennessee

Dr. Sewell is recognized this year by the RCAS membership for his distinguished service and support of the Society's mission of improving the administration of the represented agricultural research units. This award has been earned by his encouragement of the Tennessee superintendents and others in the Southern region to become active participants of the society, participation in the programs and attending the annual meetings, and by promotion of the Society to the Agricultural community.

He began active participation with the Society with his membership in 1978. With the many SAAS meetings being held in Tennessee over this period of time, he assisted the local arrangements chairperson in providing research tours for the society and contacting commodity leaders to address the society and be a part of the meeting tours.

Ike Sewell was born and raised in Georgia. His family has agricultural roots through row crops and livestock. He attended the University of Georgia and graduated in 1954 with a B.S. in Agricultural Engineering. He was named the Outstanding Graduate in Agricultural Engineering by the University in 1954. He entered graduate school at North Carolina State University and received both the M.S. (1958) and Ph.D. (1962) in Agricultural Engineering. After receiving his PHD, he was hired by the University of Tennessee as an Assistant Professor. In 1974, he was named Professor and associate department Head in the department. He became Assistant Dean of the Experiment Station in 1977 and retired as Associate Dean after 22 productive years.

During his tenure he molded agricultural research all across the South by participating in management of regional research activities, by serving as a member of the Committee of Nine and chairing the Southern Regional Research Committee. He has served as Administrative Advisor for sixteen regional research projects and information exchange groups. This dedication has been recognized for distinguished service by many commodity and academic groups in addition to this award by the Research Center Administrators Society.

RCAS Committee Assignments 1998-99
Local Arrangements (Memphis, TN)

Phil Hunter, Chairman
John Hodges, Tennessee
Dennis Onks, Tennessee
Robert Freeland, Tennessee
Blake Brown, Tennessee

Awards

John Hodges, Tennessee, Chairman
Randal Rawls, Alabama
Bill Peterson, Kentucky

Nominations

Ben Kittrell, South Carolina, Chairman
Butch Withers, Mississippi
Jim Pitts, Alabama

Membership

Joe McFarland, Chairman
Phil Hunter, Tennessee
Jerry Berggren, Louisiana
George Granade, Georgia
Mike Phillips, Arkansas
Rick Matheson, Oklahoma

Proceedings

Dennis Onks, Tennessee, Chairman
Carl Tart, North Carolina
Lyle Lomas, Kansas

Financial

Jim Jones, Virginia, Chairman
Jere McBride, Executive Treasurer, Louisiana
Malcomb Pegues
Jim Smith, Mississippi
Jake Fisher, Missouri

RCAS Expansion

Ben Kittrell, South Carolina, Chairman
Paul Sebesta, California
Jere McBride, Louisiana
Butch Withers, Mississippi
Joe McFarland, Texas
Findlay Pate, Florida
Dennis Thompson, Georgia
John Robinson, Arkansas
Dennis Onks, Tennessee
John Hodges, Tennessee
Lyle Lomas, Kansas
Carl Tart, North Carolina
Jim Pitts, Alabama
Jim Jones, Virginia

Past Recipients of the Distinguished Service Award for service, leadership, and outstanding contributions to RCAS over an extended period of time.

YEAR AWARDED	RECIPIENT
1987	John Ewing
1988	Robert "Bobby" Moss
1989	Joe High, Jr.
1990	Wallace Griffey & Bill Webb
1991	Norman Justus
1992	Gene Morrison & Jere McBride
1993	William Loe & Howard Malstrom
1994	James Hill
1995	Edward Worley
1996	Robert Freeland & Will Waters
1997	Joe Musick
1998	Dennis Onks
1999	John 'Ike' Sewell

PAST PRESIDENTS, RCAS

YEAR	President
1969 - 1970	Robert Moss
1970 - 1971	Preston Reed
1971 - 1972	Charles Douglas
1972 - 1973	Charles Douglas
1973 - 1974	D. M. Gossett
1974 - 1975	Henry Marshall
1975 - 1976	Tom Corley
1976 - 1977	H. Rouse Caffey
1977 - 1978	E. G. Morrison
1978 - 1979	Robert Moss
1979 - 1980	Joe High, Jr.
1980 - 1981	Julian Craigmiles
1981 - 1982	Freddy Peterson
1982 - 1983	Wallace Griffey
1983 - 1984	Bill Webb
1984 - 1985	Gary Elmstrom
1985 - 1986	Norman Justus
1986 - 1987	Robert Freeland
1987 - 1988	Jere McBride
1988 - 1989	Howard Malstrom
1989 - 1990	Bill Loe
1990 - 1991	Edward Worley
1991 - 1992	Will Waters
1992 - 1993	James R. Hill, Jr.
1993 - 1994	Joe Musick
1994 - 1995	Dennis O. Onks
1995 - 1996	Jim Pitts
1996 - 1997	F. T. Withers
1997 - 1998	Ben Kittrell
1998 - 1999	Findlay Pate