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# SETTING PRIORITIES FOR AGRICULTURAL RESEARCH FACILITIES

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Y 4. AG 8/1:103-21

Setting Priorities for Agricultural...

HEARING  
BEFORE THE  
SUBCOMMITTEE ON DEPARTMENT OPERATIONS  
AND NUTRITION  
OF THE  
COMMITTEE ON AGRICULTURE  
HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRD CONGRESS

FIRST SESSION

JUNE 17, 1993

**Serial No. 103-21**



Printed for the use of the Committee on Agriculture

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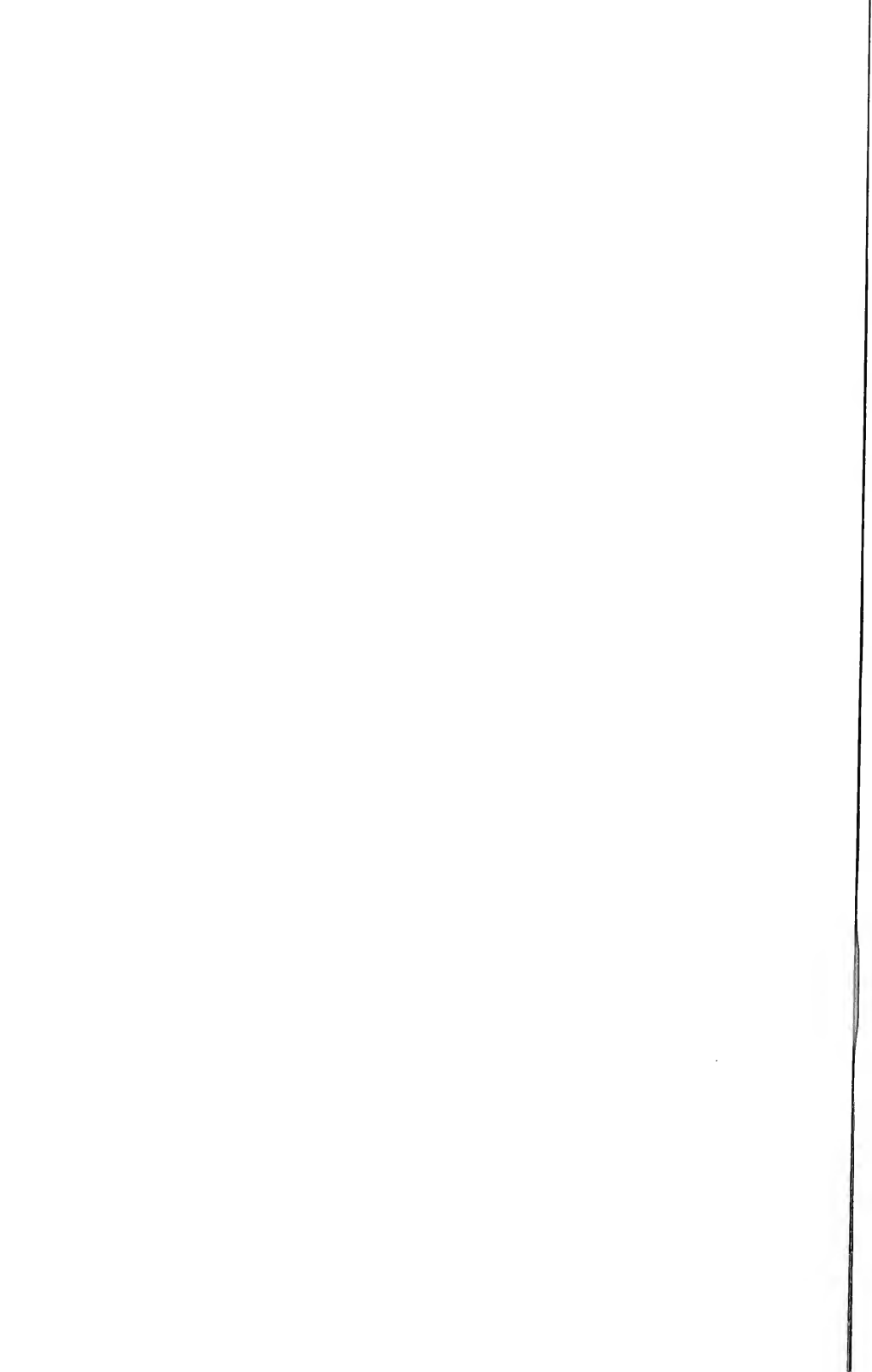
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# SETTING PRIORITIES FOR AGRICULTURAL RESEARCH FACILITIES

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THURSDAY, JUNE 17, 1993

HOUSE OF REPRESENTATIVES,  
SUBCOMMITTEE ON DEPARTMENT  
OPERATIONS AND NUTRITION,  
COMMITTEE ON AGRICULTURE,  
*Washington, DC.*

The subcommittee met, pursuant to notice, at 10:35 a.m., in room 1300, Longworth House Office Building, Hon. Charles W. Stenholm (chairman of the subcommittee) presiding.

Present: Representatives Sarpalius, Inslee, Bishop, Volkmer, Clayton, Lambert, Smith, Gunderson, Allard, and Canady.

Staff present: Jan Rovecamp, clerk; Stan Ray, Merv Yetley, and Pete Thomson.

## OPENING STATEMENT OF HON. CHARLES W. STENHOLM, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. STENHOLM. The subcommittee will come to order.

Today we continue a series of hearings looking at our Nation's agricultural research capacity. Many are suggesting that we need a new direction in our agricultural research establishment. The land-grant system, which has served our Nation so effectively in the past, needs to be reevaluated in light of the future needs of our Nation. We need to reinvigorate our research establishment to position it to most effectively serve the needs of both producers and consumers as we enter the 21st century.

Substantial evidence indicates that many agricultural research facilities are antiquated and in need of modernization. Recent testimony before this subcommittee indicates that agricultural research facilities are in severe disrepair. Repair costs alone for Agricultural Research Service facilities are nearly \$350 million. This is substantial even when compared to the current year's ARS budget of nearly \$700 million.

Many facilities are also understaffed, they have a poor ratio of support staff to scientists, and are often located in remote areas. We heard testimony indicating that the process of placing facilities is highly politicized and that no clear set of consensus priorities drives the process of facility placement. We also heard testimony calling for a moratorium on current facility construction until a national consensus of strategic priorities for agriculture is in place.

The issue of facilities is not unique to agriculture. Current estimates of the cost to modernize or replace research facilities throughout our research establishment are between \$5 billion and

\$10 billion. With numbers this large and given our Federal budget deficit, how can we avert a coming crisis in research? Given the budget deficits we will be dealing with for years to come, I can assure you that there will not be \$5 billion to \$10 billion available to build research facilities.

Certainly a facility is a priority, but the question is not whether it is a good facility or whether good research will be done, the question is whether these facilities meet priorities. At today's hearing, we hope to get answers to some of the following questions:

What is the current condition of agricultural research facilities?

Is the current system of determining where facilities are needed sufficient?

Should the Federal Government be in the business of funding facilities at land-grant colleges?

Is our agricultural research base strategically placed to meet the needs of the future?

And finally, how can we design a better system for the future?

We are also interested in how research priorities are set and the relationship with facility placement. We also hope to ask a few questions about our land-grant system, such as, why do many university administrators support merit-reviewed projects, but then actively compete for direct appropriations for facilities? We also hope to consider briefly what is the most proactive future role for the land-grant system.

The 1990 farm bill called for the formation of a Facilities Review Commission. This commission, which I consider to be similar to the base closing commission, is to review all federally funded agricultural research facilities, and with a firm set of priorities in mind, determine which should be kept, which should be replaced, and which should be consolidated or closed.

Our land-grant colleges and agricultural research are in transition. Historically, land grants have not only been effective, but have been the envy of the entire world. But we have to respond to criticisms being directed against agriculture.

We hope that these hearings will begin to provide an environment for discussing the direction of agricultural research, what are the agricultural research priorities, and how we can prepare for the challenges of the future. With your assistance, we look forward to undertaking this and other challenges with great confidence.

I recognize Mr. Smith for any opening remarks.

Mr. SMITH. Thank you. I have no opening statement.

Mr. STENHOLM. The first witness, Hon. George E. Brown, Jr., chairman of the Science, Space, and Technology Committee, a valued member of this committee, and a gentleman that has been very active in much of what I described in my opening statement. This member is indeed indebted and gratified to you, George, for your work. We look forward to hearing from you this morning.

**STATEMENT OF HON. GEORGE E. BROWN, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA**

Mr. BROWN. Thank you very much, Mr. Chairman.

I want to commend you and the members of the subcommittee for undertaking these hearings. They follow years of concerns about the kinds of problems you mentioned in your opening statement,



and concern which in fact has been reflected in very constructive legislation recommended by the Agriculture Committee and adopted by the House regarding the whole matter of the approval of facilities and the siting of facilities and the commission that you referred to calling for the review of these facilities. One of the things that I would like to recommend is that this facilities commission be funded, which it never has been up to the present time. I think this is probably the next step.

I would like to request that my full statement be inserted in the record and I will probably ramble a little bit away from the text.

Mr. STENHOLM. Without objection, your prepared statement will appear in the record.

Mr. BROWN. Let me say that the problem of earmarking funds for academic and other research facilities in agriculture as well as in other areas of agriculture has become a major problem, one sufficiently serious that we have undertaken a series of hearings in the Committee on Science, Space, and Technology dealing with this same subject and in fact had such a hearing yesterday at which Mr. Volkmer was present.

The overall nature of the problem is now running close to \$1 billion per year with earmarked funding in the various appropriations bills. The Department of Agriculture is probably not the worst offender amongst all the various Departments and the various appropriations subcommittees, but in each of these we have a responsibility to undertake some sort of review with the general idea of making sure that the taxpayers of this country get the maximum return on the investment which they are making in research facilities and research programs in general. I think that is a good standard to adhere to and I am sure that the work of this subcommittee will contribute to it.

The academic earmarks in USDA funding have been a problem for a number of years. For example, the special research grants program at USDA has been used to fund a number of narrowly focused research programs, many of which are location-specific earmarks. Similar earmarking for research and academic facilities has occurred in funding for the Cooperative State Research Service and also the Agricultural Research Service.

Historically, however, these earmarks were more of a nuisance than a major threat to the integrity of the agricultural research system. This situation changed in the mid-1980's as a result of a number of shifts in agricultural research funding. First, budget pressures began to limit the funding for research and extension at both the Federal and State level, and land-grant institutions were hit especially hard. This meant that earmarks, an excusable political cost of doing business in times of good funding, began to eat into the base funding for agricultural research and extension programs.

Second, as a result of the funding squeeze, research institutions began to use earmarking as a way of dealing with limited Federal and State funding. You can easily map the increase in academic earmarks from the mid-1980's. If you cross-reference this with the registration of lobbyists representing academic institutions, you will see a positive correlation.

In short, as some institutions were successful in playing the earmark game, others followed suit. From fiscal year 1988 to 1992 academic earmarks at the Federal level increased from about \$200 million to \$700 million and they continue to increase in fiscal year 1993.

Third, there was an increase in the need for facilities as older facilities became obsolete or in need of repair and as modern research equipment needed special facilities. Without adequate funding for facilities, the backlog began to grow, research institutions began to feel the pinch and were driven even more into the earmark game.

As these changes affected the academic institutions in the States, the same pressures began to work on the Federal research facilities run by the ARS. With budget constraints and personnel ceilings, it became difficult to adequately staff and equip all the facilities being earmarked and there was underutilization of some ARS facilities.

Consolidation of facilities, an approach supported within the administration of ARS, to relieve this problem was effectively blocked for political reasons. So some high-priority ARS needs, such as the germplasm lab at Fort Collins or the Beltsville Research Facility, languished while funding went to other more politically powerful locations.

I still remember the headlines in the Washington Post over the conditions out at Beltsville a few years ago—I am sure you remember that, Mr. Chairman—in which the investigative reporter found that the state of disrepair in the facilities out there was actually endangering the health as well as the efficiency of the workers. I think that created some attention to the problem, although I am sure that it didn't resolve the matter completely.

At this point, I think it is important to state that not all earmarks and pork barrel programs are bad. Good science can and undoubtedly has resulted from these efforts. I am not an adamant opponent of location-specific research funding. But I am an opponent of public funding decisions being made behind closed doors without benefit of merit review. This is largely what has occurred with the earmarks we have seen for academic and research facilities.

As a politician, I am aware of the fact that when you have a President of one party and an Appropriations Committee composed of the other party there is an effort sometimes to balance the equities. The attitude of an appropriations subcommittee chairman is that the recommendations coming from the administration probably have some small political content when it comes to locating facilities and it ought to be compensated by an opposite point of view from the members of the Appropriations Committee.

So you will frequently find—and I am sure you have reviewed Appropriations Committee reports on facility funding in agriculture over the years—that they take some of the recommendations from the administration and then they add to them earmarks which do not have the support of the administration. The committee generally feels these have merit and ought to be considered and funded.

So you have a combination there, and it is unfortunate that in this process there has been a tendency for the results to reflect the

views of a few of the senior members of the Appropriations Committee in both the House and Senate—which is fairly normal—but again it misses the overall intent, which is to spend the taxpayers' money as wisely as possible to get the best possible result. This is the problem to which we must address ourselves.

Rather than relying on the serendipitous results of earmarking based on political strength, we must develop a system of allocating facilities funding based upon need and merit. In the 1985 farm bill, the House Agriculture Committee took the first steps toward reforming the facilities funding process. In section 1431, we require that any ARS facility that involves planning funding in excess of \$500,000 and construction funding in excess of \$5 million must be authorized in advance. This measure was a first step in opening up the deliberations around ARS facility funding.

I must point out that only two facilities that I know of have gone through this process, and they are the ones which Mr. Stenholm, the chairman of this subcommittee, supported and I supported funding for: The Plant Stress Laboratory at Lubbock, Texas and the Salinity Research Laboratory at Riverside, California. In each case, public hearings were held, the opinions of the USDA and the research community were heard, and separate legislation was enacted based upon its merit. Only after this process was completed was construction funding sought.

I point these out because these two operated in the way that the law was supposed to operate and they are the rare exceptions to what the process actually is.

The earlier effort has two major limitations. First, it only deals with ARS facilities and not the CSRS facilities, earmarks of which now total over \$400 million if all the current earmarks are funded to completion. Second, many of the facilities' earmarks are contained in report language of appropriation bills and are thereby out of reach of points of order against projects not being authorized under section 1431.

You have already commented, Mr. Chairman, on the provisions inserted into the 1990 farm bill by Senator Leahy, which proposed a commission on agricultural research facilities. I point out again that that commission has never been funded and that it deserves an opportunity to work to see if it can't successfully resolve some of these problems. As you pointed out, the situation may be similar to what we have in the Defense Department where we set up a base closure commission to review the priority of military bases and which should be kept open or those that should be closed. I think we have reached the point in the Department of Agriculture where something similar should be done.

I should point out also in conclusion, Mr. Chairman, that there is a slow but steady increase in the amount of money being recommended by the administration—and this was through the past administration and I expect this one—for competitively reviewed research grants. That has been a slow progress, although competitive grants for agricultural research have been recommended by the National Academy of Sciences and by various other groups.

It has been slow progress because of the large amount of money going to fund existing earmarked facilities. I think it would be extremely helpful to the process of securing better research in agri-

culture if we could reduce this growth in earmarking and use these funds for peer-reviewed research grants, which I think would give us a wider range of research performers to choose from and hopefully a better quality of research in the process.

I look forward to working with this subcommittee on this project, and I know that it will be a long haul before we succeed.

Thank you.

[The prepared statement of Mr. Brown appears at the conclusion of the hearing.]

Mr. STENHOLM. Thank you very much, Mr. Brown.

Mr. Smith.

Mr. SMITH. I want to thank you for a very decisive statement.

I am interested in your suggestion—and I think we likely can all agree that some sort of merit or peer review or need ought to be the basis by which we direct research grants. Getting there is obviously the difficulty. We are not going to change the political system. That is to say, we are not going to change the political influence that some people have over the direction of these funds.

Is there any thought in your mind other than changing the system—which I think we agree is not going to happen—that we could use as an outside peer review merit system that doesn't have the cloud of political influence other than the commission that was recommended but never funded?

Mr. BROWN. I don't want to change the political system. I just want to make it work better.

Mr. SMITH. I do, but I can't.

Mr. BROWN. Let me say that I haven't given up on having the system work in the way it was intended to. The House rules prohibit legislation on an appropriations bill—the sort of thing that is generally reflected in earmarks. The rules aren't used very well. We are trying to make the rules work better, for example, to have the Appropriations Committee not make specific legislative authorizations, and that includes earmarks on an appropriations bill. I think we are getting much more support for doing that in the House Appropriations Committee.

Also, I do not hold up as an ultimate goal an absolute peer-reviewed process in every situation. I think we need to consider the needs to strengthen regional capability, for example, which may require some system for distributing research on a somewhat different than absolute peer-reviewed process. We have the mechanism to do this. It is our job to make sure that the system produces equity for all the people of this country.

So I am not trying to be a purist here. I am just trying to point out that we are out of balance at the present time, that we have allowed too much of our research resources—particularly facilities resources—to be placed, located, or funded in ways that benefit very few Members of Congress instead of going through a process in which we can all share. It is in that fashion of achieving more balanced workings of the system that I think we can lead to some improvement here.

It will not be perfect, but I don't think we can ever expect to have a perfect system.

Mr. SMITH. I am trying to support your statement. Don't think that my question was an attack. It was not at all. I am trying to

probe your thoughts as to what that would look like. Where would we go for that kind of peer review? Would somebody make up a list of the most eligible programs as the Defense Department does?

Mr. BROWN. Right now, the ARS and the CSRS both have their own internal systems for identifying what are the highest priority needs for research funding in their respective organizations. Their process—and I won't pretend to describe it in detail, you will have witnesses who can describe it—is being circumvented by the way things are working at the present time.

I am quite sure that in allocating their funds they seek the best scientific viewpoint they can get, whether it is from within the Department or outside the Department. They make up their minds, for example, to move into a new area of research—like biotechnology was a few years ago based upon the best advice they can get. And they fund new facilities for that kind of research based upon the best advice they can get.

When the Congress, in its wisdom, decides that that advice isn't very good and the Congressman from a particular district knows more about what is needed than they do at the ARS or the Department of Agriculture, they are not too happy with that situation. But there is nothing they can do about it.

Mr. SMITH. I understand. If it goes to California, it is an investment. If it goes to Oregon, it is pork. I understand that. [Laughter.]

Thank you.

Mr. STENHOLM. Mr. Volkmer.

Mr. VOLKMER. I am surely not going to respond to that, am I? [Laughter.]

Thank you, Mr. Chairman, and my other Mr. Chairman. I want to commend you for your leadership in this area and your diligence. I understand that over in the Science, Space, and Technology Committee we are going to have some follow-up hearings. Perhaps we can get the information that I am going to seek of one of our witnesses.

I was just reviewing testimony of Mr. Carlson from USDA. I think I find some things that are a little bit more than just concern as to what apparently is happening. He points out in his testimony that with the CSRS programs that are earmarked by the Congress in the appropriations process that if we provide 50 percent of the funds, those that are already on-line and in the pipeline that have been approved, between \$265 million and \$390 million would be needed to complete projects already in the pipeline with no new ones.

Mr. BROWN. That is correct.

Mr. VOLKMER. The second thing about which I have concern is that at the present time there are 72 active projects in the program. Some have been completed. In the last 3 years, an average of 16 additional projects per year have been initiated totaling 48 newly initiated projects without finishing up those previously initiated. Based on recent funding history and the number of facilities currently in the program, it could be nearly a decade before funding for projects and process are completed.

If we continue to do 16 or more per year, we could get ourselves in a bind where that \$265 million to \$390 million could go up to \$500 million to \$750 million per year. Is that correct?

Mr. BROWN. That is correct.

Mr. VOLKMER. And then I find another disturbing factor.

How do medical schools do research supporting food, agriculture, science, and natural resources?

Mr. BROWN. There are very few, to my knowledge.

Mr. VOLKMER. Yes, but I understand that the Congress is now approving medical schools as part of that research. In other words, medical schools are getting into the agricultural funds. That doesn't really make sense, does it?

Mr. BROWN. There is a common interest between agriculture and the Institutes of Health under HHS in nutrition research because there is little question but what the quality of the national food supply has an impact on health. That is the only connection that I can see between a medical school and the kind of research you are talking about.

Mr. VOLKMER. Wouldn't that be about as far-fetched, though, as if I would be—and I am not saying that I would—if someone would be able to persuade the Appropriations Committee to fund a research program for, say, forestry health through NIH money?

Mr. BROWN. That would be pretty ludicrous, yes.

Mr. VOLKMER. Isn't that a little far-fetched?

Mr. BROWN. Yes.

Mr. VOLKMER. But you wouldn't expect to use NIH research money for forestry health or, say, genetic engineering on new strains of wheat or things like that.

Mr. BROWN. You are quite correct. I don't think that the Department of Agriculture or any of the Federal Departments would encourage that kind of irrationality.

Mr. VOLKMER. I know that.

Mr. BROWN. But it happens with earmarking sometimes.

Mr. VOLKMER. That is what I am saying is happening now with the Congress doing it. That is the kind of thing that the Congress is doing because undoubtedly someone on the Appropriations Committee or somewhere is able to persuade the Appropriations Committee to take agricultural funds and use them for medical school research.

Mr. BROWN. Well, this is exactly what happened last year in the final days of the session when we had a conference report on the energy and water bill which contained in it about \$95 million in grants to medical schools and other institutions around the country which seemed to be little related to the function of the Department of Energy.

I pointed this out on the floor and offered an amendment to strike this, which was passed overwhelmingly. Then some of you will recall that a week later the same identical amendment was brought back on the defense bill, to which it has no relation whatsoever, in the defense bill, the same language, taking the money out of the Energy Department budget and applying it to hospitals and other facilities around the country.

That was the worst case of earmarking, the worst flouting of the rules of the House that I have ever seen in my 30 years here. It is the result of the succession of growth in this practice which I think must be curtailed.

Mr. VOLKMER. Thank you, Mr. Chairman.

Mr. STENHOLM. Mrs. Clayton.

Mrs. CLAYTON. Thank you, Mr. Chairman.

I am going to submit my prepared statement.

[The prepared statement of Mrs. Clayton follows.]

**OPENING STATEMENT FOR REP. EVA CLAYTON  
SUBCOMMITTEE ON DEPT. OPERATIONS AND NUTRITION**

Thank you Mr. Chairman. Allow me to begin by commending you for your leadership on this and other agricultural issues. I know that you are committed to American agriculture and confronting the issues facing the agricultural community. It is a pleasure to serve alongside you and the other distinguished members of this Subcommittee.

I'm sure we are all in agreement that if America is to maintain its competitive edge in agricultural research and development that meaningful changes are necessary. We must reexamine our agricultural priorities and the



Department of Agriculture's direction. We must provide a process by which resources are devoted in the most efficient manner possible. This entails that we make difficult decisions pertaining to the process by which we allocate funding.

I am aware of the historical problems associated with appropriating money for agricultural research. Funding for research has been subject to extreme political considerations often insulated from a rational approach. At the same time, we must be careful not to design a process by which valuable institutions are left out in attaining funds at the expense of only the most elite universities.

As a new Member of Congress, I am very interested in pursuing avenues by which appropriate research institutions receive funding to address the most critical problems facing "Rural America." In my District located in rural Eastern North Carolina, rural economic

development must be a priority. However, we must first understand the complex and interrelated problems before we can fully come up with policy solutions. This necessitates a system which rationally takes into account the research needs of the southeast region. In any case, I am hopeful that we can duplicate the efforts of the Lower Mississippi Delta Commission that was championed by the current Secretary of Agriculture Mike Espy.

Again, thank you Mr. Chairman for your efforts, and I welcome the good Chairman of the Committee on Science, Space, and Technology--Chairman George Brown--our good colleague on the Agriculture Committee. I also would like to welcome the other panelists and hope that we can address this crucial problem.

Thank you.

Mrs. CLAYTON. I didn't have the privilege of hearing your statement, but I would like to ask if there is any procedure in your mind where we not only see the reference of agricultural research being maintained, but also how we do research. The issue that I am bringing is that the elitistness of certain universities having the privilege of doing all the research where other institutions would not have it.

I am from the Southeast and obviously I am from a very rural area where maybe only one or two—but we have nine universities that could do that.

The other part of it is that all the research related to agriculture should not be university bound. So if there is a way that we can not only monitor that but also encourage for our consideration and for the Department's consideration a combination of research and empirical data that includes both major universities, others not so major, but also more importantly in the field where research happens, where people interact, where we learn a lot.

That needs to happen. The Mississippi Delta Commission is exemplary, perhaps, of the type I am speaking about. There are other examples, too, where we do demographic data on just how people interact in rural communities. I think that is also important.

Mr. BROWN. There is always the possibility that in any human system there develops a set of priorities that don't reflect the total national interest. That is, they have developed elite groups and elite institutions and others who have the attitude that they deserve the most because they have some claim to expertise.

Our concern, as Members of Congress, should be that the funds that we authorize and expend should serve the national welfare as effectively as possible. That means getting good research results. It also means developing additional research capabilities in those institutions which don't currently have it.

You will find that over the years in this committee in agriculture we have sought to do that. Perhaps not as well as we should have, but we are well aware of that and we have the same thing in the Science Committee. We have created special programs that are aimed at making sure that we have an equitable distribution of funding to those regions and institutions that may not be in the elite class.

You are quite correct in asserting the importance of doing that.

Mrs. CLAYTON. Thank you very much.

Thank you, Mr. Chairman.

Mr. STENHOLM. Mr. Bishop.

Mr. BISHOP. No questions, Mr. Chairman.

Mr. STENHOLM. Ms. Lambert.

Ms. LAMBERT. No questions, Mr. Chairman.

Mr. STENHOLM. George, in your work both in the Science Committee and this committee, particularly dealing with the Department of Agriculture, do you consider the site reviews which USDA uses before funding a special research grant or facility to be legitimately peer reviewed? Is it a model of something that perhaps we should suggest to others to look at?

Mr. BROWN. Normally, the process of site review by an expert team of some sort is a vital ingredient to the whole process regardless of whether it is in agriculture or in some other Department.

I have had some experience with site reviews, but I have not had enough to specifically comment on the quality of the site reviews conducted in the Department of Agriculture.

What little experience I have had indicates that they make the effort to provide real expertise in these site reviews and that they are useful. But I think perhaps you might want to have a more thorough evaluation of that process.

Mr. STENHOLM. How important are matching funds from local, State, or other sources to the solution to this problem?

Mr. BROWN. The general reaction that I have is that they are essential, that only when you have a program that is sufficiently important that your State and local agencies are willing to contribute to it can you be sure that you have a high quality there.

Of course, this is the basis on which so many of the Department of Agriculture programs are run. They are shared programs with the States, both the research programs and the extension programs.

Mr. STENHOLM. Any other ideas—you talked about the facility review commission idea. We recommended—as you know, you and I sent a letter to Chairman Durbin this year recommending that that be funded. I am not aware at this moment—we have been unable to find out whether they did or did not fund it.

If they don't, do you have any ideas as to how we might pursue that concept?

Mr. BROWN. Yes. I would suggest that we offer an amendment on the floor to fund it and take the money out of something else that Mr. Durbin likes. [Laughter.]

Mr. STENHOLM. That is about the most specific answer I have ever received from any witness at any time. [Laughter.]

Mr. Brown, I think we understand that one. Thank you.

Mrs. CLAYTON. Mr. Chairman.

Mr. STENHOLM. Mrs. Clayton.

Mrs. CLAYTON. I was wondering if on that peer review there is the opportunity for the historically black colleges to be represented and what the process for that is.

Mr. BROWN. Again, I cannot pose as an expert on the degree of the involvement of the historically black colleges. I can assure you of the long-standing concern of this committee that they be involved and if there is a problem, I think that we can correct that problem.

Mrs. CLAYTON. How would we get the information about the participation now?

Mr. BROWN. I think the Secretary might be willing to provide us with that information.

Mr. STENHOLM. The next witness might be able to answer your question on that.

Mr. Bishop.

Mr. BISHOP. Thank you, Mr. Chairman.

I won't belabor that point, but I have seen some figures and comparisons on all the research grants that were issued and I was looking specifically for the historically black colleges and universities and the percentage was very slim in comparison to the others. That causes a great deal of concern for me, obviously, and also for the potential research that could be spread out and help for the institution that could be spread out among the districts.

Mr. BROWN. Your constituents elected you to do something about that problem and I trust that you will do it.

You will find a great deal of support for making sure that there is an adequate allocation of research funds to the historically black colleges and to other smaller institutions around the country in order to develop research strength. I would argue against being too dogmatic about this. There is always the possibility, if you allocate strictly on the basis of the fact that the institution has been deprived of research funds that you won't get the most for your money. But you can make the research grants in such a fashion that it will develop the research strength of the institution and make it a major contributor to the whole process.

Mr. BISHOP. I think the partnering and joint venturing with the inclusion of some of the historically black colleges and universities in joint ventures and joint projects with some of the larger universities would be a requirement that would perhaps help.

Mr. BROWN. I think that is an excellent idea. If you can find some way to insert that into legislation authorizing the Department or directing the Department to establish partnering relationships between a major land-grant college and an historically black college in the same region, it might be an advantage.

We have such partnering relationships in some Departments. I am more experienced with the Department of Energy, which has made a point of seeking to develop relationships with the historically black colleges in order to develop a greater source of minority engineers and scientists, for example. And those are good relationships.

Mr. STENHOLM. Ms. Lambert, do you have a question?

Ms. LAMBERT. Yes, Mr. Chairman.

I would like to point out that we have worked some at the University of Arkansas, which is probably one of the medium-sized land-grant colleges, in working with an historically black college, UAPB, and using some of those together. The problem actually stems from having less of those represented on the peer review system. I think that is a key to point out and we would certainly like to see some adversity there.

Mr. BROWN. Arkansas has always been a deprived State. [Laughter.]

Mr. STENHOLM. I suspect that may be changing now that Ms. Lambert has joined this committee. [Laughter.]

Thank you very much, Mr. Brown, for your testimony here today and your work in this endeavor. We look forward to working side-by-side with you and look forward to joining with you on the appropriate amendment to the appropriations bill when it gets to the floor along this line. I happen to totally agree that some kind of a review right now is very important and I believe that this idea is shared throughout the community. Hopefully, we can find the proper answer to that.

Thank you for being here.

I call our next witness, Dr. Bill Carlson, Deputy Administrator, Cooperative State Research Service, USDA.

Welcome, Dr. Carlson.

**STATEMENT OF WILLIAM D. CARLSON, ASSOCIATE ADMINISTRATOR, COOPERATIVE STATE RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE, ACCOMPANIED BY ESSEX FINNEY, ACTING ADMINISTRATOR, AGRICULTURAL RESEARCH SERVICE, AND EVELYN O'CONNOR-MILLER**

Mr. CARLSON. Thank you, Mr. Chairman and members of the subcommittee. I am Dr. William Carlson, Associate Administrator of the Cooperative State Research Service. I am here this morning with Dr. Essex Finney, Acting Administrator for the Agricultural Research Service. I also have with me Ms. Evelyn O'Connor-Miller, who is Director of the Facilities Program in the CSRS.

I am pleased to appear before you today on behalf of the Secretary to discuss the processes followed by the Department to manage its facilities programs for agricultural research and education both in CSRS and ARS.

I have a prepared statement that has been submitted for the record and I will present an abbreviated form of that and be available for questions.

Mr. STENHOLM. Without objection, your prepared statement will appear in the record.

Mr. CARLSON. Thank you, Mr. Chairman.

The ARS has research facilities and field locations at over 120 domestic and foreign locations. Many of these facilities were built in the 1940's, 1950's, 1960's, and 1970's and require replacement or modernization. ARS has planning and design initiatives underway to construct or modernize a number of these facilities. The fiscal year 1994 budget proposes \$24.6 million for priority projects at five locations.

ARS uses a multiple-step process in setting priorities for improving or constructing new facilities. The ARS considers inputs from the scientists, managers, and engineers regarding space and condition of existing facilities, especially any safety and health issues. They consider input from users, scientists, managers, and executive and congressional branches of Government regarding emerging and future agricultural problems. ARS compares the cost-effectiveness of renovating existing facilities with that of total replacement using new construction.

In regard to closing and/or consolidation of facilities, ARS has closed over 30 facilities since 1979. The agency uses the following criteria in making the decision to close and/or consolidate the function with another location: Condition of facility; whether the mission of the facility has been completed; if not, if the mission can be accomplished elsewhere; whether there is a critical mass of scientists; whether the facility is cost efficient to operate in relation to its productivity and accomplishments; and whether the research is duplicative of research being conducted by other organizations. Implementation of closure actions follows Secretary and congressional approvals and user contacts.

With regard to the agricultural research facilities of the States and other institutions that conduct agricultural research, State and other non-Federal resources historically have provided the bulk of funds to construct such facilities. In many cases, the current need exceeds their capacity to respond.

To address some of their more immediate infrastructural needs, many institutions have resorted to individual funding initiatives with Congress. Although most of these requests have provided reasonable investments for individual institutions, such a process does not adequately address the Nation's overall need for modernized and expanded research infrastructure, nor does it systematically take into account national research priorities. The administration would prefer to see these funds awarded through a national competitive process.

In 1992, the National Science Foundation conducted a biennial study on scientific and engineering research facilities in many of the Nation's colleges and universities and reported that compared with other fields of science—social, medical, biological, physical, et cetera—the percentage of research space requiring repair or renovation was greatest in the agricultural sciences.

The current CSRS program operates in the following ways. Since 1986, CSRS has administered a facilities grants program from funds appropriated for buildings and facilities. Shortly after publication of the conference report of the agricultural appropriations bill, CSRS contacts each institution for which a new facility project has been designated and requests that it submit baseline information about the project. After review, CSRS appoints a team of expert scientists and administrators to conduct an on-site merit evaluation of the project.

At the conclusion of the evaluation, the team develops a report that sets forth its findings, conclusions, and recommendations. The purpose of this report is to critically evaluate the research program in relation to national needs of agricultural science, the design of the proposed facility, and its fit with the mission of the U.S. Department of Agriculture. The report is also subjected to a rigorous internal merit review.

The report then is submitted to the House and Senate Appropriations Committee. Once a project is identified for funding by the Appropriations Conference Committee, CSRS requests a fully developed proposal from the institution that is to receive Federal support. This is critically reviewed from a technical standpoint.

Also, in accordance with conference report language, all grant recipients under this program are required to provide 50 percent in matching funds. It is estimated that, if the Federal Government provides 50 percent of the funds, that between \$265 million and \$390 million would be needed to complete the projects already in the pipeline in various stages of construction.

In the last 3 years, an average of 16 additional projects per year have been initiated, totaling 48 newly initiated projects without finishing up those previously initiated projects. Although this was brought out before, I guess it doesn't hurt to emphasize it again. Based upon the number of facilities in the current program and also what would be expected as an inflationary factor, it is going to take about a decade before these projects are finished that are already in process.

Another major concern of the current program is the increasing tendency for medical schools or medical programs to vie for funding, thus foreclosing on the opportunity to provide needed infra-

structure support for food and agricultural science and natural resource systems, including badly needed ARS facilities.

In summary, at the present time there are just too many projects being initiated without sufficient funds being available to finish them. We have detailed information on projects currently underway which we can supply at the committee's request. ARS has many facilities built 20 to 50 years ago that require replacement or modernization. There are planning and design initiatives underway to construct or modernize a number of facilities after a multiple-step process to set priorities.

Again, in regard to closing and/or consolidation of facilities, ARS has closed more than 30 facilities after very careful evaluation of many factors.

At this time, I have completed my prepared remarks and would be pleased to respond to any questions the subcommittee may wish to direct toward me or my colleague, Dr. Finney.

[The prepared statement of Mr. Carlson appears at the conclusion of the hearing.]

Mr. VOLKMER [assuming chair]. Thank you very much, Mr. Carlson. We do have some questions. I think I will start.

What is the current implied dollar value? That is, how much will it cost to finish CSRS facilities which are already in the hopper at the Department?

Mr. CARLSON. We have calculated on today's prices without any inflation or anything else that it could be up to about \$390 million.

Mr. VOLKMER. Does that include just those that were earmarked by the Congress?

Mr. CARLSON. Yes, those are the ones we are talking about.

Mr. VOLKMER. Do you have any opinion as to the type of program for facilities that you would like to see?

Mr. CARLSON. The type of facilities program we think is the best—and the administration supports it—is one that is done on the basis of a competitive program for research facilities.

Mr. VOLKMER. How would that actually work? Give us an idea of how that would work.

Mr. CARLSON. We also run the competitive research grants program, which is a national research initiative, and have had a bit of experience on how those operate.

Mr. VOLKMER. Those are operational funds?

Mr. CARLSON. That is correct. But the first thing you have to have if you have a competitive program is the establishment of research priorities for the Nation. It was mentioned by Congressman Brown that there is a process that is undertaken by the Cooperative State Research Service as well as the Agricultural Research Service, although ARS does not affect this.

The process was started nearly a decade ago to develop an ongoing rolling strategic plan for priorities in research in this country. This involves the experiment stations. It involves the Cooperative State Research Service and others. When it started, initially there were 500 people who were consulted for their input. It involved users, scientists, and so forth.

I just happen to have with me the latest, which was put out in February of 1992, which was the update of the plan in 1990. It is brought out every 4 years on the full plan. There is another large



meeting coming up in August to update the strategic plan to 1994. This outlines the research priorities that the facilities program should be tied to.

We also use in this people from other agencies as well. It is not just the universities and so forth. It is also other Federal agencies. So we try to get input from all sources to identify the top priorities. And that should be the key for any competitive program.

Mr. VOLKMER. In other words, you have a large group that was actually setting out the future for agricultural research?

Mr. CARLSON. That is correct.

Mr. VOLKMER. And these are the types of research that we should be doing. And along with that program you feel—and I agree with you—that facilities construction should follow that so that it fits into it.

Mr. CARLSON. Absolutely. That is the road map, you might say, that could be followed for people to submit proposals that would fit the high priorities of and the high priority needs of agriculture. In other words, you call for proposals and it would outline in that call for proposals—“These are the high priorities. Please submit your proposals for facilities that would fit one of these priorities.” In that way you would eliminate the extraneous type of structures that we have quite a few of today.

Mr. VOLKMER. From your testimony, I believe you have a minimum of 48 ongoing earmarked facility projects.

Mr. CARLSON. Actually, we have 72. There are just 48 that were added in the last 3 years. There are 72 ongoing projects.

Mr. VOLKMER. Some of them are completed and some of them are not?

Mr. CARLSON. No, there are 72 active projects. There has been 126 altogether.

Mr. VOLKMER. So there are 72 active projects?

Mr. CARLSON. That is correct.

Mr. VOLKMER. If you could—and I hope your staff can do this within the next day or two, at least by next week—please tell me which of those 72 fit within that 1992 proposal for where we should be in research in the future.

Mr. CARLSON. We will get it to your office.

Mr. VOLKMER. Do you understand what I mean?

Mr. CARLSON. Yes, sir; I do.

Mr. VOLKMER. Tell us also which ones do not. I am sure that some do and some do not. I would like to know which ones.

Mr. CARLSON. Certainly.

Mr. VOLKMER. Then, as I understand your testimony, when a project or projects are earmarked by the Congress, you review them and see if they are appropriate, et cetera, right?

Mr. CARLSON. That is correct.

Mr. VOLKMER. And then you make a report back to the Congress on those?

Mr. CARLSON. That is correct.

Mr. VOLKMER. What is usually included in the report that you make?

Mr. CARLSON. First, we identify the type of project it is and how it fits. Then we establish a committee composed of experts in the science field or in the field related to that facility. They are sent

out on a site visit and look at what is proposed and the programs there, and so forth. In other words, the committee will then make a report, including a brief background and history of the institution and the project and how it relates to their needs, how it relates to the national needs.

Second, they will outline a careful program description showing the detail of the scientific research that is proposed.

Next we look at the impact of that project on current and future needs in the food, agricultural, and natural resources sciences. This section also addresses whether or not the project lies within the mission of agriculture, which is required of us.

The facility plan with all the cost is carefully examined. And this includes the priority of the project in the institution's master plan. That is a very important matter because oftentimes these projects really aren't in the institution's high priority master plan.

Next, we determine the institutional commitment and make sure that there is to be continued support of the programs to be housed in the facility. Incidentally, we have right now a possibility of two facilities that have been funded in the past that may not be active anymore. Those are the problems I think we will be faced with.

Mr. VOLKMER. Would you also send them to my office?

Mr. CARLSON. I need to investigate them further, but I can certainly follow up.

Mr. VOLKMER. You could just give us something that says that it is questionable.

Mr. CARLSON. We can do that.

Next we determine the alternatives considered by the institution arriving at the plan. Then in conclusion it is described as to the quality of the proposed research program, how it relates to the national needs, the adequacy of the professional staff, and whether this is duplication of other facilities elsewhere, and we make a recommendation.

So those reports are pretty frank. You can determine from that whether or not they really fit, whether there is quality there, whether it is in the needs of agriculture, and in some cases we actually recommend that it not be built.

Mr. VOLKMER. How many times out of these that have been earmarked have you, after a full review, given a negative report back to the Congress?

Mr. CARLSON. Probably about 10 percent of the time we will give a negative report. There is in addition about 30 percent of the total that have some very questionable parts of the project. Sometimes the facility may not in total be in the mission and so forth. So I would say that about 30 percent of them have some very questionable relationship to the needs, priorities, whether they have enough staff, whether they are headed in the right direction, and so forth.

Mr. VOLKMER. What happens to those?

Mr. CARLSON. That is entirely up to Congress and the committee as to whether they are funded or not, based on that report.

Mr. VOLKMER. And if the Congress goes ahead and funds it, then you go ahead and give them the money and they go ahead and build it.

Mr. CARLSON. We have no choice, sir.

Mr. VOLKMER. Do you consider these projects to be adequately peer reviewed?

Mr. CARLSON. These would not be what I call peer reviewed. These are merit reviewed. We pick the best people we know to go review the facility, but we are not comparing it to anything else. It is not on a competitive basis, but they certainly are reviewed by scientists that know what is going on. The scientists are also aware of other programs—essentially all the other programs in that field. In the report, it is clearly stated that this is duplicative of certain other areas or that the staff is inadequate or the staff is very excellent and so forth.

It is reviewed very carefully that way. There is a lot of work that goes into that.

Mr. VOLKMER. I would like to digress from my line of questioning for just a minute because there were questions brought up to the previous witness.

In the competitive grants program that you have, and in your peer review process, are the historically black colleges represented in that peer review?

Mr. CARLSON. Let me say that one of the things that we have had since the very inception of our competitive grants program is a very vigorous program to bring minorities and women into our peer review panels. We have been very successful each year to have more and more of these groups in there. I am very pleased with it. They are doing a very good job.

We also have what we call strengthening grants. This is 10 percent of the money in our national research initiative—we want the historically black colleges, the 1890 institutions, the Hispanic institutions, and the other smaller institutions to apply for these grants. We go around and present workshops on grantsmanship. I have done a number myself and my staff does it.

We specifically identify these institutions and have gone to them. We have been one of the most successful programs in going to smaller institutions, going to institutions that are historically black and the 1890 institutions.

Last year, out of the 777 grants that we provided in the national research initiative, approximately 125 of them went to strengthening programs for this type of institution that is those that have not been successful in the past, and I think this is probably one of the most exciting and productive new programs in getting the smaller institutions, the 1890 institutions, historically black institutions, involved in this.

Our greatest problem, quite frankly, is to get people in those institutions to apply for grants. That is our greatest problem. That is why we go out and spend a lot of time giving workshops. Where we have given workshops, we have had good success.

Mr. VOLKMER. Thank you very much. I have used up more than my time.

I now recognize the gentleman from Oregon.

Mr. SMITH. Thank you, Mr. Chairman.

Mr. Carlson, does the Department support the commission idea of review of facilities identified in the 1990 farm bill?

Mr. CARLSON. I am somewhat familiar with that.

Let me put it this way: I would support anything that would review the facilities. [Laughter.]

I think it is a commission and is something that could review the facilities. Quite frankly, I think it would be a positive thing.

Mr. SMITH. Did the Department of Agriculture support that as part of the President's budget?

Mr. CARLSON. All I can say is that that was Bill Carlson speaking. I don't know.

Mr. SMITH. Is there somebody inside the Department that is opposing it? Is that why we are not getting it funded?

Mr. CARLSON. I don't think the Department had a position on that, as far as that is concerned. I can't answer your question. I can find out and send it to you.

Mr. SMITH. I would like to know the Department's position on the commission because if the Department doesn't want it, obviously it will not get funded. You are going to whisper in somebody's ear and that is the end of it.

Mr. CARLSON. I will get that for you.

Mr. SMITH. Thank you.

Give me a percentage, if you can, of the facilities that are driven by research that are supported by the Department's findings versus those facilities that are driven by the political climate or by politics or by direction of politics. I am trying to find out how valid our yearning for research is versus the political situation here.

Do you have any idea?

Mr. CARLSON. Are you referring to those that are driven by the institution themselves through—

Mr. SMITH. Exactly.

Mr. CARLSON. I suspect that most of the facilities projects have an origination at some institution.

Did I answer your question?

We have no way of knowing, but I would assume it.

Mr. SMITH. Do you determine in the Department the direction of research and the need of the country? Do you prioritize the research needs of the country?

Mr. CARLSON. We do in our Cooperative State Research Service.

Mr. SMITH. And then when you look at the facilities, you try to match that with the need for research in a particular area, I assume.

Mr. CARLSON. Our review committees, in essence, do that as it relates to their specific research specialty.

Mr. SMITH. How many of the facilities are directed outside your priority research and needs through the political process?

Mr. CARLSON. I probably need to take a look and examine that. I looked over just my own evaluation as far as those projects that I feel are in the high priority areas, but would not include those of local interest. We feel that there would probably be about 60 percent.

Mr. SMITH. I am making the assumption that—as Mr. Brown did—that all earmarks are not necessarily just for political purposes, which means that research need and the facility match up in some. I am trying to find out how many earmarks are merely identified for the purpose of a political fulfillment that don't match up with the research priorities you have established.

Can you do that?

Mr. CARLSON. I would have to—

Mr. SMITH. Do you have courage enough to do that?

Mr. CARLSON. You bet. I don't have any qualms about that. I just need to examine it.

As I said, in just a casual observation as far as the high research priorities of the Nation versus those that are outside of that, or those that are related to local needs and so forth, I just ran through very casually at about 60 percent. But I can make a more detailed examination.

Mr. SMITH. I wish you would do that.

Mr. CARLSON. I think it is a good point.

Mr. SMITH. I think you understand it. I think it strengthens our hand in trying to remove the political influence when the real need is research. That is what we're all talking about.

Mr. CARLSON. That is right, and that is what I am talking about.

Mr. SMITH. Thank you.

Thank you, Mr. Chairman.

Mr. STENHOLM [resuming chair]. Mrs. Clayton.

Mrs. CLAYTON. You have begun to answer the question I had posed to the earlier panelist. I am pleased to know that you have had increased participation by a number of institutions that are considered minority or those who are not in that elite group.

Could you provide us a list of those participants on your peer review commission? You had indicated to a question earlier that—

Mr. CARLSON. This was on the peer review of our research grants.

Mrs. CLAYTON. Right. I would appreciate that, if you could.

Mr. CARLSON. Supply you the names?

Mrs. CLAYTON. Right, of institutions or individuals.

Mr. CARLSON. I do not know if I have that.

Mrs. CLAYTON. Could you get that for us?

Mr. CARLSON. I don't think so.

Mrs. CLAYTON. It is not maintained?

Mr. CARLSON. The way it is done, we don't maintain a list like that. That is the problem. We know where they come from, and many of our peer review scientists who are minorities are from major institutions, too.

Mrs. CLAYTON. OK.

I assume from your testimony that the research facility would not be subject to peer review.

Mr. CARLSON. Well, they are not subject to peer review on a competitive basis, but we establish a team of scientists that go out and review those facilities on a one-on-one basis. It is not compared to anything else.

Mrs. CLAYTON. So these facilities also would have that input from that diverse group, as well?

Mr. CARLSON. As much as we can. Our last group that I went out on had a very distinguished scientist minority that was just ideal.

I would like to correct something else. I can give you a list of people who are peer reviewers. That is in our red book. But I can't necessarily identify which ones are minorities and which ones are not. That is what I could not do.

Mrs. CLAYTON. I understand.

Mr. CARLSON. Every panel is approved by myself, the chief scientist, and Dr. Jordan, the number of minorities are listed. That is, there are so many minorities. But we do not identify them as such. That is what I was referring to.

Mrs. CLAYTON. On your list of criteria that you have on page 3, you have one of the bullets, "The priority of the program to the mission of the agency."

Am I to assume by that the agency has set forth priority research goals that they want to achieve before they match up with institutions?

Mr. CARLSON. I will ask my colleague, Dr. Finney, to respond to that.

Mr. FINNEY. In this case, it is the Agricultural Research Service. The testimony in that case addresses the in-house research agency where there are all Federal scientists working on problems that are regional and national concerns. And there is a 6-year plan that we have which lays out the priorities and the societal concerns that that research should address.

So the decisions, then, on allocating funds for construction, maintenance, and repairs would relate to those priority needs.

Mrs. CLAYTON. So if the institution came to you—or made a request for a facility—and their priority goals were not consistent with your 6-year plan, the eligibility threshold couldn't be made?

Mr. FINNEY. If an institution came to the Department?

Mrs. CLAYTON. Right.

Mr. FINNEY. Let me see if I can clarify something, if I may.

Mrs. CLAYTON. All right.

Mr. FINNEY. The Agricultural Research Service, as I indicated, is the in-house agency of the Department where Federal employees generally working in Federal laboratories are addressing priority needs of the Department and society.

Mrs. CLAYTON. They are doing research themselves?

Mr. FINNEY. Yes.

Mrs. CLAYTON. That is the research of the—

Mr. FINNEY. Of the Secretary. CSRS would normally be the agency, if a university were looking to get Federal support to build a new facility. They would not go to the Agricultural Research Service. They would go to the CSRS.

Mrs. CLAYTON. So my question should be, would they look to you?

Mr. CARLSON. Would you redirect the question?

Mrs. CLAYTON. If an institution came to your commission and did not have a research goal consistent with the agency's in-house research component, would it not make the threshold?

If I am a university and I come to you with a research project concerning nutrition, but it is not consistent with the in-house mission statement of your agency—

Mr. CARLSON. We are talking about the mission statement?

Mrs. CLAYTON. Yes.

Mr. CARLSON. We would point out the fact that this did or did not fit the mission statement. When that is getting into a medical area and nutrition, there is a fine line between the nutrient requirements, which is agriculture, and the disease-related nutrition.

Those would be pointed out in the report that we submit back to Congress.

Mrs. CLAYTON. Could you provide your in-house research goals? That would be helpful to some of us so that we could just review those that you have funded so that we could have that understanding.

Mr. CARLSON. This is the 6-year plan?

Mrs. CLAYTON. Yes. If you could provide the ones that you have funded, that would be helpful.

Mr. CARLSON. Certainly.

Mrs. CLAYTON. Mr. Chairman, that is all.

Mr. STENHOLM. Mr. Gunderson, do you have any questions?

Mr. GUNDERSON. I appreciate the opportunity and I apologize to all of you for coming in late.

One of the questions that I focused on you probably don't talk too much about it.

Why should the Federal Government, at a time when we have limited resources, focus as much money as we do on buildings? Isn't that really a prerogative of the land-grant institutions themselves through State budgets and university foundations? Shouldn't our money be going primarily into direct research programs rather than using part of it in the building side?

How do you all respond to that? I know the traditional way is, "I am here from my university and I have to defend these buildings and money," but take yourself out of that role for a second.

Mr. CARLSON. I am not in that role.

My role is the fact that we get the buildings in our appropriation and then we try to handle them in the most responsible way to see that they are built within the mission of agriculture and within all the rules and regulations of the Federal Government. There aren't facilities that we handle in our facilities program that are not appropriated through the appropriations process by Congress.

Mr. GUNDERSON. Let's take a look at fiscal year 1992, national research initiative. We spent \$55.9 million in buildings and facilities. We spent \$92 million on research that year. But if you go back to fiscal year 1991, it was almost dollar-for-dollar research versus buildings and facilities.

We have decreased the money that many people want in the research area. Obviously, it has been a dollar increase, but not what some people would like.

What would you say if in this fiscal environment if we said that brick and mortar is not the responsibility of the Federal Government?

Mr. CARLSON. Let me tell you this. I run the competitive grants national research initiative. That is an area that the administration has put more money, and certainly I endorse that very strongly. The facilities programs, although they are serving very useful purposes, are all put in by Congress. We do not have a request in there for any facilities other than the very badly needed Agricultural Research Service facilities.

Mr. GUNDERSON. How do you define the difference between building and facility? Do you have money in there for buildings but not for facilities?

Mr. CARLSON. No.

Mr. GUNDERSON. You are confusing me.

Mr. CARLSON. I am sorry.

All the building and facility money in the CSRS appropriation is put in by Congress. The administration has not requested any money for buildings and facilities in the request that was sent forward.

Mr. GUNDERSON. For fiscal year 1994?

Mr. CARLSON. That is correct.

Mr. FINNEY. Let me see if I can help with that point, if I may.

Mr. GUNDERSON. Certainly.

Mr. FINNEY. There may be a little bit of confusion here as far as what the administration is requesting.

Dr. Carlson is speaking on behalf of the Cooperative State Research Service, which of course provides funds for the State university agricultural experiment station system. If I understand what you're saying, it is that CSRS would not make a request for buildings and facilities. But the Department does request buildings and facilities for the Federal laboratories, which would come under the Agricultural Research Service.

Mr. CARLSON. I was only speaking for the Cooperative State Research Service.

Mr. GUNDERSON. So you would support not putting any money from this area into brick and mortar for State research programs?

Mr. CARLSON. What we have done in the past—and I would hope in the future—would be to say that the funds should be in a competitive program for the universities and so forth. We strongly support the Agricultural Research Service and its needs because that is the premier agricultural research station in the world. That really needs to be kept up and we all have a vested interest in that, and I am not with the Agricultural Research Service.

Mr. GUNDERSON. But Dr. Carlson, how does this respond to your testimony on the bottom of page 5 when you state that at the conclusion of the evaluation the team develops a report that sets forth its findings, conclusions, and recommendations. You state, "The purpose of this report is to critically evaluate the research program in relation to the national needs and the proposed facility."

Mr. CARLSON. That is the proposed facility. Prior to that—Congress asks us to prepare a report. It is in the appropriations bill. We are required to prepare a report. Therefore, the proposed facility is from the proposal that the institution sends us in order for us to prepare that report. It is not our proposal.

Mr. GUNDERSON. So you are saying that that is a part of this section that just looks at the evaluation of the buildings and facilities, correct? In other words, you evaluate the building based on the research that is being done there?

Mr. CARLSON. That is correct. Not only that, but the building and the staff that is there and the whole facility. But that is mandated by the Appropriations Committee.

Mr. GUNDERSON. And if I understand you correctly, the administration request would be that, in essence, we get rid of that?

Mr. CARLSON. There was not any money requested in last year's request from the administration for facilities. That is correct.

Mr. GUNDERSON. Is that a one-timer, or do you think that is a change in policy?



Mr. CARLSON. The administration, as far as I know, 2 years ago proposed funds for a competitive program that were put in the request, but that is the only time it has been in there for a competitive facilities program.

Mr. GUNDERSON. Thank you.

Thank you, Mr. Chairman.

Mr. STENHOLM. Mr. Allard.

Mr. ALLARD. Thank you, Mr. Chairman.

I would like to apologize to Dr. Carlson for not being here for most of the testimony. I serve on another agricultural subcommittee and we are meeting right now on a very contentious issue: Cargo preference. I felt like I had to be there.

I was interested in any thoughts you may have about the way we appropriate dollars now for agricultural research projects, and what may be done to improve the process.

Mr. CARLSON. I assume that you are referring to facilities?

Mr. ALLARD. Yes.

Mr. CARLSON. The proposal that the Department has put forward is that they recommend that the facilities program be a competitive program and that funds be put in there and then the institutions compete for those funds. I would say that there are a large number of programs that are in the current facilities program that are congressionally mandated that could compete very well in that program if it was competitive.

Mr. ALLARD. On the congressional side, that would go under the discretionary spending. Are there projects there that you think don't meet the criteria as far as congressional procedure and as far as procedure within the Department of Agriculture?

Mr. CARLSON. What we see on the projects—and again, I am really speaking from my own personal observation of them—I would feel that there are probably up to 40 percent of the projects—and that is my own opinion—that are not in the highest priority as far as agricultural research and also relate generally to just a local interest. Again, that is just my own opinion.

I think that a competitive process, of course, would sort that right out.

Mr. ALLARD. Yes, where you find the institution that is best qualified to do whatever type of research and what kind of facilities are necessary for that.

Mr. CARLSON. I would also like to say in my observation of those that are very much in the mission of agriculture and address the highest level of research, many of those are in the smaller institutions of this country as well. It is not just the big institutions. There are many of them in small institutions that are superb.

Mr. ALLARD. Thank you for your comments.

Thank you, Mr. Chairman.

Mr. STENHOLM. Dr. Carlson, you mention on the bottom of page 1, "ARS has planning and design initiatives underway to construct or modernize a number of these facilities. The fiscal year 1994 budget proposes \$24.6 million for priority projects at five locations."

Discuss with us those five locations and what caused those to be priority locations.

Mr. CARLSON. I would like to ask Dr. Finney to respond to that, if I may.

Mr. FINNEY. Thank you, Mr. Chairman.

The five priority locations that the Department sent forward for facilities in the fiscal year 1994 budget reflect the support for the programs at a number of our major Federal laboratories. One of those laboratories is the Beltsville Agricultural Research Center, which is one of the largest Federal facilities to support agricultural research for the Department.

Over the years, there has been a study done with the support of the National Users Advisory Board to look at the long-term needs of modernization and upgrading that facility. At the direction of the congressional committee in 1985, a study was undertaken in terms of modernizing and improving that as it relates to the national goals of environmental research, food safety research, nutrition programs, international markets—those were the criteria that were used in terms of continuing to provide the support for that through the budget process.

The second project we have made a major commitment to from the Federal laboratory perspective is the Western Regional Research Center in Albany, California. This again is one of the major Federal laboratories established in the late 1930's or 1940's and over the last 50 years there has been a need to upgrade, modernize, and improve the functional needs of those facilities. So we have that particular facility on the account as well.

The third project that was in the fiscal year 1994 proposal was the Poultry Disease Laboratory in Athens, Georgia. As you can appreciate, over the years there has been a need for improving that facility to address major disease problems in the poultry industry. So we included in that a request for \$3.3 million to complete that facility in Athens, Georgia.

The other facility we had on the list was the major Federal laboratory in New Orleans, Louisiana. Again, that was one of the regional laboratories constructed in 1940, and again it is a little over 50 years old. That is a part of the long-range plan of upgrading, modernizing, and bringing those facilities into compliance with the needs of safety, health, and environmental compliance issues.

Those were the facilities and the rationale in terms of the needs for the Department for modernization.

Mr. STENHOLM. Can you furnish us a current list of the total amount of facilities in both programs for the record?

Mr. FINNEY. Yes, sir, we can get that to you for the record.

[The material follows:]

1994 APPROPRIATIONS  
AGRICULTURAL RESEARCH SERVICE  
U. S. DEPARTMENT OF AGRICULTURE

Buildings and Facilities

California: Western Regional Research Center, Albany	\$ 4,700,000
Georgia: Poultry Disease Laboratory, Athens	3,300,000
Louisiana: Southern Regional Research Center, New Orleans	3,600,000
Maryland: Beltsville Agri- cultural Research Center, Beltsville	10,000,000
New York: Plum Island Animal Disease Center, Greenport	2,987,000

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BUILDINGS AND FACILITIES

- (a) A request of \$10,000,000 for the modernization of facilities at the Beltsville Agricultural Research Center, Beltsville, Maryland.

**Need for Change.** The Beltsville Agricultural Research Center (BARC) was established in 1910. Current land resources total 7,000 acres and accommodate more than 800 buildings and structures in support of the full spectrum of ARS research programs, including: natural resources and environmental sciences, plant and animal productivity, product quality, and human nutrition studies. The ARS staff at Beltsville totals about 1,500, including 400 scientists.

BARC is the largest research center in ARS and is the largest agricultural research center in the world in terms of program scope and concentration of scientists. BARC has long enjoyed a worldwide image of preeminence in the agricultural scientific community because of its long history of research quality, contributions to agriculture, and prominent scientific expertise. It is the headquarters for ARS' national program leadership. In addition, 18 Federal agencies such as FDA, EPA, FGIS, and APHIS have offices or laboratories at BARC or facilities next to the Center.

However, most of the major ARS facilities and utility support systems at BARC were built in the 1930's and 1940's. Deterioration and obsolescence of these 50-year-old facilities are hampering both the scientific research and the image of BARC as the preeminent agricultural research center of the USDA. An architectural-engineering consultant which completed a comprehensive study on BARC in the late 1980's produced a modernization plan with cost estimates of \$205 million for the total facility modernization of the Center, phased over an 11-year period.

ARS is currently implementing the BARC modernization plan which specifies the necessity to incorporate a mix of construction of new structures and renovation of existing facilities, including the demolition of over 200 outmoded structures.

The FY 1993 appropriation included funds of \$13.5 million for BARC modernization. These funds are being utilized for the construction of the BARC-West Wastewater Treatment Plant, construction of Phases 2, 3 and 4 of the Range 2 Greenhouse modernization, design of the BARC-East Water Distribution System, design of a new controlled environmental facility for use as plant growth chambers, and funding for miscellaneous projects.

**Nature of Change.** Incremental funds of \$10 million are needed in 1994 to continue with the vigorous implementation of the BARC modernization plan. The following modernization projects will require funding in FY 1994:

**BARC-WEST Electrical Upgrade.** The existing electrical distribution system at BARC-WEST is in need of major renovation/replacement based on a study conducted in FY 1992 to investigate the condition of the system. Based on the results of that study, a design was initiated in FY 1993. Construction, which is estimated at \$2.2 million, is scheduled for award in FY 1994.

BARC-EAST Water Distribution System. The existing water distribution system at BARC-East is in need of major renovation/ replacement of the distribution lines and wells and design was initiated in FY 1993. Construction, which is estimated at \$7 million, is scheduled for award in FY 1994.

API-New Animal Building. This project involves replacing several outdated animal facilities at the Animal Parasitology Institute (API). A study was initiated in FY 1993 to determine whether the existing structures should be renovated or replaced. Design, which is estimated at \$530,000, is scheduled for award in FY 1994.

Miscellaneous Projects. The design and construction of small projects included in the overall modernization plan which are scheduled for award in FY 1994 are estimated at \$270,000, and include:

- Demolition of facilities.
- Parking lot and road repairs.
- Minor facility renovations to provide swing space for personnel displaced by other modernization projects.

- (b) A request of \$8,300,000 for the modernization of facilities at the ARS Regional Research Centers: Albany, California (\$4.7 Million); New Orleans, Louisiana (\$3.6 million).

Need for Change. Outmoded facilities severely limit the ability of ARS scientists to conduct advanced research. In addition, the Agency has experienced difficulties in attracting good scientists when introduced to old, deteriorated laboratory facilities. Existing facilities also contain numerous building and environmental code deficiencies. An investment of resources is essential to enable these Centers to regain the scientific capacity necessary to deliver viable and timely research discoveries that contribute to the development of new markets at home and abroad.

Due to the advanced age of these Centers, all major building systems--heating, ventilation, air-conditioning, electrical, roofs, and infrastructures (paving, steam and water lines, and waste treatment disposal systems)--have either reached or passed their useful life expectancy. Other prevalent facility deficiencies include safety and health requirements, such as asbestos removal and correction of building code upgrade requirements.

Nature of Change. Additional appropriations are required in FY 1994 to allow the Agency to proceed with the phased modernization efforts at the Western Regional Research Center (WRRC) at Albany, California, and the Southern Regional Research Center (SRRC) at New Orleans, Louisiana. Phased construction is necessary as individual laboratories, or wings of laboratories, are renovated due to the absence of swing spaces to house displaced scientists. The major modernization projects in FY 1994 for these two Centers are as follows:

WRRC Chemical Wing. Construction of Phase 6 of modernization program--\$4.7 million. Construction will involve the renovation of laboratories, upgrading of utilities, new HVAC system, replacement of casework, upgrading of electrical systems, fire safety improvements to meet current codes, and asbestos abatement.

SRRC Chemical Wing. Construction of Phase 6 of modernization program--\$3.6 million. The modernization of the Chemical Wing will involve the renovation of laboratories, new HVAC system, new casework, electrical upgrade, fire safety improvements to meet current codes, and asbestos abatement.

- (c) A request of \$2,987,000 for the modernization of the Plum Island Animal Disease Center, Greenport, New York.

Need for Change. The Plum Island Animal Disease Center (PIADC) was established by an Act of Congress in 1954. It is located on a federally-owned 840-acre island located about two miles off the eastern tip of Long Island, New York. PIADC is the only site in the United States authorized by Congress to carry out research and diagnostic work on foreign animal diseases, which are an ongoing threat to the U.S. livestock industry; e.g., foot-and-mouth disease and African swine fever.

In 1989, ARS and APHIS began to develop an overall long-range plan for the repair and maintenance of the buildings and supporting infrastructure at PIADC. Engineering studies identified the need for repairs and improvements to correct major code violations and provide mandatory safeguards against power failures. Biosecurity depends on the proper functioning of equipment and power systems.

Based on these studies, total funding in excess of \$90 million is needed for improvements at Plum Island over the next few years to bring the facilities into compliance with existing codes, as well as provide for appropriate workspace for advanced research and diagnostic activities on various foreign animal disease threats. Given the magnitude of the cost estimates, projects which must be completed in order to provide safe facilities for continued operation of Plum Island in the near term were selected for funding in FY 1994. Longer term facility requirements will be reviewed in the context of scientific advances and other operating considerations which may provide the basis for alternatives to continued operation of Plum Island in the long term.

Nature of Change. The additional funds will be used for environmental compliance projects requiring immediate repair or replacement, in compliance with Federal, State, and local environmental laws, regulations, and standards. Problems and concerns have been identified and plans are underway to provide corrective actions. It is critical that actual implementation begin no later than FY 1994 since daily fines or other legal actions by regulatory agencies are possible.

Wastewater Treatment Plant Improvement (\$1,487,000).

The existing treatment plant is in need of repair or replacement. None of the instrumentation is working and the pond liner has become brittle. Inspections by the Suffolk County Health Department and EPA have pointed out many deficiencies. A design for the repair or replacement of the system will be completed by the second quarter of 1994.

Above Ground Fuel Tank Repairs (\$1,500,000)

The existing 210,000 gallon fuel tank need upgrading to meet current regulations. A study was initiated in FY 1992 to determine the scope of repairs.

- (d) A request of \$3,300,000 for the construction of the Poultry Disease Laboratory Addition, Athens, Georgia.

Need for Change. New demands have been placed on USDA research facilities at the Southeast Poultry Research Laboratory with the outbreak of Avian influenza in Pennsylvania, Virginia, and Maryland in 1983 and 1984. This research laboratory carries out the primary effort in ARS to solve Avian disease problems associated with pathogens of foreign origin. This facility will meet both immediate and long-range needs to allow ARS scientists to address the urgent problems in lethal Avian influenza and exotic Newcastle disease for use by action agencies and the poultry industry. The facility is of national importance since research for these two exotic avian diseases is restricted to only the highest animal containment laboratories. The addition of this facility will meet high-containment needs to house research on highly lethal avian influenza.

Nature of Change. The new facility will provide about 16,000 square feet and will be a one-story structure containing animal holding and laboratory spaces designed to safely contain the most hazardous of poultry pathogens. ARS was appropriated \$400,000 in FY 1992 for the planning and design of the facility. An additional \$677,000 was appropriated in FY 1993 for facility construction. ARS is requesting an increase of \$3.3 million in FY 1994 to provide for the balance of construction funds for the facility, designed primarily to house infected poultry as well as the necessary support laboratories to carry out essential research on Avian influenza, concurrent with exotic Newcastle disease research efforts in the present containment space. This facility would provide for a more comprehensive program of research to solve exotic diseases in poultry. The full cost of construction of this facility is projected at \$4.5 million, including the \$500,000 committed by the Poultry Association towards the purchase of necessary equipment for the new laboratory.

- (e) A decrease of \$34,514,000 to delete funds provided in the FY 1993 Appropriation Act.

Need for Change. Funds for projects contained in the FY 1993 Appropriation Act are available until expended and are not required in FY 1994.

Mr. STENHOLM. You mentioned about priority setting the importance of environmental, food safety, nutrition, and international markets. Is there any other criteria that you have delineated that would be denoted as priorities in which the Congress should take a good, hard look at as far as any recommendations that we make?

Mr. FINNEY. Of course, I mentioned earlier the priorities that drive our decisions within the Agricultural Research Service—and they are probably not too far out of line in terms of the general needs of the broad area of agriculture—relate to the concerns that have been raised by the public about the environmental concerns that the citizens of the country have. We realize, of course, that American agriculture has been under a great deal of criticism over the years, so that is an important one for us to develop the technology, to allow American agriculture to still be productive and to minimize the use of agricultural chemicals in the environment, as well as the natural resources associated with soil erosion. Those are the two major ones in that area.

The area of food safety, of course, has been a major concern as well as nutrition and health. Then the national economy or international trade the Secretary has indicated to be one of his priorities. He will take whatever efforts are necessary to maintain American agriculture as competitive in international markets.

So these regional laboratories that I mentioned in New Orleans, California, Peoria, and Philadelphia were developed originally to expand the markets and make us more competitive for our products, not only domestically, but internationally.

The last area that I mentioned, of course, is the area of biotechnology and information systems. There is a great recognition that the opportunities with genetic engineering activities, as well as the introduction of computerization into the agricultural system, offers great opportunity.

Those are the general principles that we use when we look at our facility needs in making decisions in the allocation of resources. There may be more information on page 2 of the attachment to our prepared statement, the 6-year plan.

Mr. STENHOLM. Thank you very much.

Any other questions?

[No response.]

Mr. STENHOLM. If not, thank you very much.

Mr. VOLKMER. Mr. Chairman, were you able to elicit answers for the questions that you earlier had? I failed to do one thing—and I don't know if the chairman has done it or not—on the reports that you have made already on the 72 facilities, could we obtain copies of each of those reports?

Mr. CARLSON. Yes, sir.

Mr. VOLKMER. By next Monday or Tuesday? They have to be somewhere, don't they?

Mr. CARLSON. We have them all.

Mr. VOLKMER. Surely, you have copies of them.

Mr. CARLSON. We have them.

Mr. VOLKMER. You wouldn't have to send one for each member of the subcommittee.

Mr. STENHOLM. How big a truck is it going to take?

Mr. CARLSON. It is not too bad.



Mr. STENHOLM. We would very much like to have it.

Mr. CARLSON. We will get them to you.

Mr. VOLKMER. Did you go over the impact on their own budget?

Mr. STENHOLM. No.

Mr. VOLKMER. I would like to ask that question.

Do you have any opinion—and this would be purely opinion—within ARS there are needs for facility maintenance, improvement, and construction. The Congress has always appropriated so much money for that, and that hasn't been able to support it. In my 17 years, I don't think the Congress has ever really provided the full funding of what we actually needed, so we have fallen behind.

But the Congress appropriates this other money that goes to other facilities, although I feel—maybe I am wrong, and I want somebody to correct me, agree with me, or disagree with me—that if we applied that money instead to ARS or a portion of that to ARS, wouldn't we be better off? Does that adversely impact on the amount they are getting from ARS? There is only so much money.

Mr. CARLSON. I would answer personally we are very supportive of these needs of ARS and in our reports that have been sent up in the past—we have said that. I do know those came out of the Assistant Secretary's office a number of times and I personally feel that way myself.

Mr. VOLKMER. Dr. Finney, would you like to comment?

Mr. FINNEY. Well, that is a very awkward question for the Administrator of ARS to address. [Laughter.]

I think you could probably appreciate the answer the Administrator would give to you on that issue. But these are very complex issues and I am sure the Congress wrestles with these questions quite obviously.

The agricultural research system in the United States, of course, is a very complex system. I guess it gets to the philosophy of how that system operates, how it came into being. The general impression, of course, is that the State agricultural experiment station and the universities make important contributions to the economy and the well-being in solving problems for agriculture.

The Federal Government has a role that is a little different in terms of looking at broader regional or national concerns. But the assumption is that even the State agricultural experiment stations make a contribution as well.

So it is very difficult, of course, for the Administrator of ARS to answer that question in a way that would serve ARS interests at the expense of our cooperators and partners in the States.

Mr. VOLKMER. We are not talking about anything except facility money. I understand that you don't want to antagonize people over on the Appropriations Committee, so I am going to drop it and let you off the hook. [Laughter.]

Mr. FINNEY. Thank you, sir.

Mr. VOLKMER. I am sure you are thankful for any penny you can get from them, so you don't want to antagonize them because these are their little projects and not anything else. We recognize that.

Thank you, Mr. Chairman.

Mr. STENHOLM. Let me ask that question a little differently.

You requested \$24.6 million this year for priority projects. What did you get? Have you seen the Appropriations Committee report and what did you get?

Mr. FINNEY. We saw the markup in the House. I believe it was for about \$26 million or \$27 million.

Mr. STENHOLM. So you asked for \$24.6 million and you got \$27 million?

Mr. FINNEY. Yes, sir.

Mr. STENHOLM. Then you're doing OK this year?

Mr. FINNEY. Yes, sir. [Laughter.]

Mr. STENHOLM. We thank all three of you for being here this morning. We look forward to working with you in this endeavor. We appreciate your testimony and your input. I know there is a lot going on and a lot of other questions we could have asked today.

For example, we know that the so-called Madigan report got into local offices. We also know that there has been a lot of internal looking and review in preparation for some of the activities that this subcommittee and others will be doing. At the appropriate time, we will be getting into that with you.

But we thank you for your testimony today.

Mr. CARLSON. Thank you.

Mr. STENHOLM. I call the next panel, Dr. Magrath; Dr. Phillips; Dr. Hess; Ms. Merrigan; Dr. Huffman; and Dr. Chubin.

Mr. VOLKMER. Mr. Chairman, I would like to take this opportunity to welcome the first witness on the panel, Dr. Peter Magrath, formerly president of the University of Missouri. He did an outstanding job there and is now doing an outstanding job where he is.

I am going to have to leave before this panel is over because I have other commitments. But Peter, I would say welcome.

I have already read your statement and I want to thank you for being here today.

Mr. MAGRATH. Thank you, Mr. Volkmer.

Mr. STENHOLM. Each of your entire testimonies will be made a part of the record. It is our hope that you can summarize within the 10-minute rule that we would like to utilize today, if at all possible. We will be a little lenient with you if need be.

We appreciate each of you being here and look forward to your testimony.

Dr. Peter Magrath, president of the National Association of State Universities and Land-Grant Colleges.

#### **STATEMENT OF C. PETER MAGRATH, PRESIDENT, NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES**

Mr. MAGRATH. Thank you, Mr. Chairman.

I appreciate Mr. Volkmer's generous comment. I enjoyed working with him during my years in Missouri.

I am Peter Magrath, president of the National Association of State Universities and Land-Grant Colleges. Mr. Chairman, I have testimony for the record. I also have a statement made by Charles Schroeder, a gentleman who heads up one of our citizens groups that supports agricultural research and facilities, CARET, and I would like to have that statement included in the record.

I am going to try to be economic in this period of being conscious of time and budget deficits and not take 10 minutes and just make a few observations so that you will have the benefit of comments from my colleagues on the panel.

It is obvious that we are discussing something that is terribly important to the national interest, and that is the capability of our agricultural sciences to keep America competitive in agricultural research, which is one of the fundamental things that has worked very well for our Nation and the world. We discuss facilities and buildings not because they are an end in and of themselves, but because they are a means toward an end.

I am sorry that Mr. Gunderson had to leave. The comment I would make to Mr. Gunderson—which I believe is implicit in the testimony of my association and its colleges and universities—is that you cannot have one without the other. You cannot have the kind of hard-hitting, competitive research that has been the hallmark of our agriculturally involved universities without research support, but you can't have it if you don't have the instruments, the buildings, and the facilities to deliver it. And you need to have both.

Indeed, what has happened in recent years has been a very heavy erosion of support, regardless of the source—whether Federal or State—for facilities in which many university leaders and researchers have simply had to count on maintaining and supporting their facilities so that they could maintain as much research activity as possible.

What is clearly needed is a research program. The association that I represent feels very strongly that there has to be a better way to deal with this—and this has already come out in the colloquy and the comments that have been exchanged, Mr. Chairman, by you, Mr. Brown, and others. We are well aware of the fact that a lot of proposals that may have merit in some respects are funded that are only vaguely related to agriculture and that are competing with mainstream proposals that do speak to national priorities.

About 2 years ago, my association endorsed a proposal for Federal investment in agricultural research facilities. It was based on recommendations from the USDA and an association committee of distinguished scholars and administrators. Essentially, it would have established a competitive grants program under the authority of the 1963 Research Facilities Act, and it called for collaborative priority setting involving NASULGC, my association, Congress, and the U.S. Department of Agriculture.

The experiment station directors, through their committee on organization and policy, now have put in place a mechanism, certainly one way to help identify and set the national strategic research priorities for land-grant universities in their relationship with USDA and then of course, in effect, with Congress. It is based on consensus on the part of the users and performers of research.

I personally believe that it is absolutely doable to put in place, whatever the fine print would be, a mechanism that would enable us to set up a competitive research facilities program that spoke to national priorities and needs and interests in a fashion that provided appropriate distribution of talents throughout the Nation,

but did not waste incredibly precious resources that we need so much for our research and our facilities.

My main message, Mr. Chairman, is that the National Association of State Universities and Land-Grant Colleges appreciates very much your commitment and your initiative to really plumb these issues and to see what we can do about a serious problem, which is the erosion of our facilities, which is a concern because the research outcomes are still very vital to our Nation and we must not forget that. We are very eager to work with you, members of the subcommittee, and with your staff to try to develop whatever proposal speaks intelligently and prudently to this great national interest.

Mr. Chairman, those are my comments and I would be happy to answer questions now or as you have dialog with other members of the panel.

[The prepared statement of Mr. Magrath appears at the conclusion of the hearing.]

Mr. STENHOLM. Thank you very much.

Next we will hear from Dr. Phillips, executive director of the Government-University-Industry Research Roundtable, National Academy of Sciences.

**STATEMENT OF DON I. PHILLIPS, EXECUTIVE DIRECTOR, GOVERNMENT-UNIVERSITY-INDUSTRY RESEARCH ROUNDTABLE, NATIONAL ACADEMY OF SCIENCES**

Mr. PHILLIPS. Thank you, Mr. Chairman.

I have been asked to review proceedings, deliberations, and reports of the Roundtable between 1985 and 1991 on the issue of research facility financing and also the survey data compiled by the National Science Foundation on facility needs and funding. I will go quickly through some of the highlights. More thorough treatment is in my prepared statement and in reports cited therein.

First, I will review quickly some of the NSF data on facility needs and funding—and I want to emphasize the point that these are facilities in general and not agricultural facilities in particular. They are research facilities, though, at academic institutions.

NSF noted in the 1992 survey that 40 percent of the top 100 research universities reported need for more research space. Of the agricultural science departments, 34 percent reported need for more research space. Only 27 percent of all research space at academic institutions was considered suitable for use in the most scientifically sophisticated research. As has been mentioned earlier, 49 percent of research space in the agricultural sciences requires repair, renovation, or replacement. That is the highest percentage among all fields surveyed by NSF.

NSF estimates that the total cost for performing all needed repair and renovation is somewhere between \$7 billion and \$8 billion. While they don't provide a specific number for construction needs, owing to some of the methodological difficulties in the survey, a conservative estimate would place that need at least at the level of need for repair and renovation.

While the NSF noted some increase in the indicators over the three surveys over the past 6 years, and about a 10-percent increase in research space, it is still the case that the needs far ex-

ceed the amount of funds provided for facilities from all sources. In 1990 to 1991, a total of about \$3.6 billion was provided for all facility needs. New construction accounted for most of those funds. This is against a total need of probably over \$12 billion.

The sources for facility funds varies, as you might expect, between public and private institutions and between repair/renovation and construction. In general, however, the financing sources breakout as follows:

About one-third of the funds come from State and local governments. These are total funds for repair and renovation or construction at public and private institutions. About one-fifth comes from the institutional sources—which means tuition and endowment income of universities. Just over 10 percent comes from private gifts and donations to universities. About 20 percent comes from tax-exempt bonds. And about 14 percent comes from the Federal Government. That 14 percent consists mainly of targeted congressional appropriations.

Much of the previous discussion indicated that in agriculture there is not a specific facilities grant program, in general, for the extramural research community. That is true, in large part, throughout the Federal Government. There are a few small programs and a few facilities funded through direct grants. But most of that 14 percent Federal share is from targeted congressional appropriations. I should also add that the funds that come from non-Federal sources that I have just reviewed, when they are used for Federal purposes on Federal research grants, are reimbursed through the indirect cost mechanism.

With respect to that 14 percent Federal share, many argue that it should be larger. I think no one argues that the Federal Government should pay anywhere near the total, however. It is important to remember that in the late 1960's, during the peak of Federal facilities funding, the Federal share was only 30 percent, certainly far greater than the current 14 percent but not anywhere near 100 percent.

One could get into long arguments about the exact meaning of the data. The perspective of the Roundtable was not to do that and to say that there is at least two sufficient bases for addressing significant attention to facility funding. First, there is documented a backlog of facility needs. I think that backlog indicates a deficiency in the current system. The Federal agencies in some cases blame the universities for not managing their resources well after the buildup of the 1960's. The universities in turn blame the Federal Government for not providing programs to maintain and update facilities built in the 1960's.

I think both parties are right and they are both responding to current incentives which favor short-term perspectives in funding decisions rather than long-term perspectives. As a result, facilities are low on the priority list following personnel, programs, and equipment.

Furthermore, our decentralized research enterprise, which certainly has a lot of strengths, makes it difficult to broker the relationships among the multiple-funding sources in deciding who should fund what and how much.

The second basis for need is science and it is advancing rapidly. New instrumentation, new fields of research produce new needs for research facilities. You can't carry out that state-of-the-art research without state-of-the-art facilities. In addition, regulatory and building standards have a significant impact on the cost of constructing and repairing facilities. Building new facilities is even more expensive. I think research costs increase at a rate greater than the rate of inflation and research priorities change in response to changing national goals.

So those two factors together—responding to the backlog and meeting new demands and opportunities—create a need for addressing this facility financing question regardless of the specific meaning of the data.

I will confine my remarks to Federal mechanisms. There are certainly significant and important State and university roles as well.

I won't go into detail on the targeted congressional appropriations except to say that the overriding sentiment in Roundtable discussions was that that mechanism was not a sound Federal funding approach. I think most of the reasons for that have already been put forth by other witnesses.

Other mechanisms are important and I think it is important to think of them in meeting several objectives. First, we must sustain and renew the current base of research capacity. We must be able to establish new capacities in growing fields, new institutions, and new geographical areas. We must be able to provide for the review of scientific and technical merit, as well as other considerations. An important consideration that others have alluded to is to distribute the costs and risks for financing across all sectors. The Federal Government shouldn't need to bear all of that. And we need to foster stability and continuity.

A mechanism that is used significantly now is the indirect cost mechanism. Given that those are funds that reimburse institutions as part of Federal funding for research projects, that mechanism is based on scientific and technical merit and it goes to where the needs are.

However, the mechanism is deficient in not fully covering all costs. So there have been various proposals to improve the indirect cost mechanism.

Another mechanism discussed significantly already this morning is competitive matching grants. The grants approach can meet various needs by the definition of the guidelines and it certainly balances the "those that have, get" aspect of the indirect cost mechanism.

I think it is important here to mention, as Congressman Brown mentioned briefly, that all grants programs don't necessarily have to be competitive. And it is useful to think of a Federal approach that might include formula and block grants to States to help meet regional needs.

There is a significant amount of debt financing. Universities borrow money. Federal tax policies and Federal indirect cost policies influence that borrowing. There have been proposals to pool small bond issues and to modify the authorities of the Student Loan Marketing Association and the College Construction Loan Insurance Corporation to enable more institutions to participate in debt fi-

nancing. An important aspect of debt financing is the sharing of risk between the Federal Government, State government, and universities.

To conclude, adequate facilities require sustained contributions from all sectors. No single or simple solution will meet all the needs. The needs will probably only be met by a change in facility financing practices within all sectors. Given financial constraints and other priorities, however, within the Federal system, it is unrealistic to think of a major Federal initiative meeting most of the needs for construction and renovation.

Under the assumption that little new Federal money can be expected for the science and engineering enterprise in the near term, it is clear that if more Federal funding goes into facilities, by whatever mechanism, less will be available for research projects and programs.

If one assumes that this zero sum scenario will hold, admission that facility needs are real and serious entails recognition that Federal priorities must shift to provide more emphasis on investments in capital and less on labor. Acceptance of the need for this shift in priorities is required before consensus can be reached on changes in Federal support for research facilities.

Thank you.

[The prepared statement of Mr. Phillips appears at the conclusion of the hearing.]

Mr. STENHOLM. Thank you very much.

Dr. Hess.

**STATEMENT OF CHARLES E. HESS, PROFESSOR, COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES, AND DIRECTOR, INTERNATIONAL PROGRAMS, UNIVERSITY OF CALIFORNIA-DAVIS**

Mr. HESS. Thank you, Mr. Chairman.

I am pleased to be here again as a member of the faculty of the University of California and also to return after serving as Assistant Secretary for Science and Education in the U.S. Department of Agriculture from May of 1989 to October of 1991.

Funding to construct new research facilities or to renovate existing ones has always been a challenge. It is exacerbated now by what is happening at the State level in terms of State support.

In addition, at least until very recently, the scientific community has been growing and the nature of our research has become more sophisticated as we have gotten into biotechnology, molecular biology, and related areas. They require better facilities than what we have had. Don Phillips has already referred to the annual National Science Foundation studies and pointed out, as well as Dr. Carlson, that in the 1992 report the fractions of the research space assessed as requiring repair or renovation were greatest in the agricultural sciences.

This is all taking place at a time when agriculture faces a multitude of challenges. It must produce efficiently to compete with other nations which have lower costs of production, it has to produce food and fiber in a way that protects our natural resources so that future generations will enjoy their benefits, but we also

have to handle and harvest the foods in a way that nutrition is maintained or enhanced and is safe for the consumer.

New products have to be developed for agricultural commodities to add value to our bountiful harvests of grain and fiber. Investments in research and education can play a key role in addressing these many challenges. Both traditional research approaches, along with the new tools of biotechnology, can speed the development of new varieties and breeds with genetic resistance to pests. Product quality and nutritional value can be enhanced as well as the development of new value-added products. In addition to the process of discovery and technology transfer, new jobs and new businesses can be created.

It was in this spirit that the administration and the Congress launched the national research initiative in agriculture in 1990. We also appreciated the fact that as funding for that program increased to the \$500 million level authorized in the 1990 farm bill, we also had to develop the question of buildings and facilities.

In addition to the needs of the national research initiative, there was another issue we were trying to address, and that is the growth of funds for earmarked facilities. In fact, the issue was related to the NRI because as the amount of money earmarked for facilities grows, the amount of funds available for the NRI decreases. That is a question that members of this subcommittee have raised in earlier testimony.

As has also been pointed out by a number of the witnesses, the commitment to the outyears for these facilities is very large. As has been noted in the record, the current program underway—in order to complete those facilities already started—would require some \$471 million, based on CSRS figures. If the university figures were used, it would be about \$597 million. So we do in fact have a facilities program.

This challenge is not unique to the Department of Agriculture. Other Departments, such as Energy and Defense, often find unexpected appropriations in their budgets. The Office of Management and Budget and the Office of Science and Technology Policy have been concerned with the growing amount of funds that are earmarked. And a recent issue of the Chronicle of Higher Education pointed out that in fiscal year 1993, earmarked funds reached \$763 million for research projects, which was up 12 percent from fiscal year 1992.

In part, the increased earmarked funds was due to increased pressures on the part of universities to find the source of funding to construct new facilities or to renovate existing ones. If some Federal funds are available, a stronger case could be made at the State level to obtain State funding.

And though it is appreciated that the earmarking of funds from a Member's district or State is part of the political infrastructure, the matter is getting so great that even some members of the Appropriations Committee and their staffs are looking for other ways of dealing with this onslaught of proposals.

It was in this environment and in consultation with OMB that a competitive research facilities initiative was launched in the fiscal year 1992 budget proposal. The initial proposal was for a \$25 million appropriation, which was equivalent to 20 percent of the



funding level for the national research initiative. It also recommended that the facilities program would grow in subsequent years with the growth of the NRI at a level equal to 20 percent of the NRI's funding level.

We were very pleased that the Office of Management and Budget made a commitment to the out-years for both the NRI and the proposed facility program. The proposals to this program would be subjected to a rigorous merit evaluation. And Dr. Carlson described the criteria that would be used for those, so I will not repeat them. This project would be carried out under your authorization of the Research Facility Act of 1963.

The goals of this program would be to promote modernization of research and training facilities at eligible institutions. It would ensure that facilities constructed in part with Federal funds met national priority needs in food and agricultural sciences. It would provide a source of funding for universities so that there would not be so much pressure placed on Congress for earmarked funds. And it would provide Congress with an alternative to meet the growing requests for facilities funding. They would not have to say no to a constituent, they would tell them about the competitive program.

As Dr. Magrath pointed out, the National Association of State Universities and Land-Grant Colleges fully endorsed this proposed competitive facilities program. In part, the program was based on a position paper developed in 1990 by NASULGC. But most important—I must point out it really helped in our discussions with OMB—the executive committee of NASULGC—and it was later adopted by NASULGC's senate—stated that if a competitive facilities program were funded, the member universities would go the competitive route rather than putting pressure on Congress for earmarked funds.

It is appreciated that Congress does play a key role in setting priorities. The administration proposes and Congress disposes. It is also true that many of the facilities that are constructed are needed to serve State and national needs. A number of the facilities programs include areas of biotechnology. However, in the era of scarce resources, it is essential that the highest priorities are met and the current system of earmarking research facilities does not achieve that goal.

I have included in my testimony two tables which look at the amount of funding in the programmatic areas of the national research initiative. Then I have taken the current facilities program and categorized them into the programmatic areas of the national research initiative. You can see that there is a disjuncture. For example, in 1991, 19 percent of the NRI's funds went to natural resources and the environment and 4 percent of the funding went to facilities, which would support this research. In 1992, the match is a little better, but I must say that it is completely fortuitous because there is no planning which would link the NRI to the buildings which are earmarked in Congress.

Another serious disjuncture shown in table 2—if you look at the top 10 States receiving NRI funds in 1991 and 1992 and then the top 10 States receiving funds for buildings and facilities in the program underway, only 4 States which were in the top 10 for competitive grants were also in the top 10 for buildings and facilities

funding. So the funds are not going to where they are needed. I think in an environment with scarce resources we should do better.

Some could argue that this disjuncture is purposely made to even out this geographical distribution of research funds. However, it should be noted that the amount of competitive research funding to each State relates closely to the number of research scientists within each State. Many States with smaller populations or with agriculture that represents a smaller component of the State's total economy have excellent scientists which compete well, but because there are fewer scientists, the funding for these States is well below the others in total dollars.

The competitive program would reflect both quality, national priorities, and where the agricultural research is concentrated. Also, as Dr. Carlson has pointed out, the national research initiative program does provide strengthening grants to help States improve their ability to compete.

Thank you very much, Mr. Chairman.

[The prepared statement of Mr. Hess appears at the conclusion of the hearing.]

Mr. STENHOLM. Thank you.

I apologize, but we have two votes and we must recess now for at least 15 minutes. Since we have two votes, we will reconvene no earlier than 12:50 p.m. I apologize for this.

[Recess taken.]

Mr. STENHOLM. The subcommittee will come to order.

Our next witness is Ms. Kathleen Merrigan, department of urban studies, Massachusetts Institute of Technology.

Welcome.

**STATEMENT OF KATHLEEN ANN MERRIGAN, ENVIRONMENTAL POLICY GROUP, DEPARTMENT OF URBAN STUDIES AND PLANNING, MASSACHUSETTS INSTITUTE OF TECHNOLOGY**

Ms. MERRIGAN. Thank you, Mr. Chairman.

I appreciate the opportunity to testify today and to talk about an issue of vital importance to U.S. agriculture and to the Nation as a whole. I refer to the crisis in agricultural research, the most basic component of our agricultural system.

Almost everyone in the business of assessing agricultural research in this country agrees that existing research facilities are underused and rundown, that they duplicate activity elsewhere, and that the current process for establishing new projects is seriously flawed. Today, in my written testimony, I will contribute more information and analysis to this arsenal of studies that, together, describe a crisis in our research facilities system and demonstrate a real need for reform.

Each new study has added compelling details to the condemning body of evidence, but policymakers have done little to address the root cause. Mr. Chairman, 10 years have passed since the GAO first brought attention to the facilities crisis, reporting that 27 percent of Agricultural Research Service facilities operate at less than 70 percent capacity, a fact, I might note, that has not changed at all today.

Mr. Chairman, 3 years ago congressional leaders signaled a readiness to act by approving the Agricultural Research Facilities Planning and Closure Study Commission as part of the 1990 farm bill. The commission, modeled after that set up to study military base closing, as you noted in your opening statement, has never been convened.

As a student of and former participant in shaping public policy, I think the greatest lesson I have learned is that it is very tough for decisionmakers to pinpoint problems in an accurate and precise manner. Too often, problem statements are left fuzzy and we scatter about frantically trying to find a way to answer the problem. If only we would spend half as much time in building consensus on the definition of the problem as we do in trying to construct solutions, we would stand a much better chance of achieving lasting reform.

With this lesson in mind, I urge the subcommittee to spend time defining the parameters of the underlying problem in agricultural research that has created the current crisis in facilities.

I submit today that the facilities crisis is first and foremost a manifestation of the struggle between policymakers and the scientific community over the role of planning and research. It is an outgrowth of a deeply held belief that we cannot plan research. Indeed, many scientists argue that scientific breakthroughs come about by leaps in the dark by more or less blind men. It therefore follows—or so the argument goes—that policymakers should allocate research dollars with few strings attached. The only check required in this process is a competitive peer review to ensure quality control.

Mr. Chairman, I do not agree with this view. Consider the enormous publicly funded efforts invested in agricultural research and the potentially substantial impact that these efforts have on our future. It is inconceivable to me that research should remain unplanned and haphazard. Rather than defining, or even admitting to this root cause, however, interested parties have become players in what I have come to call the blame game.

The rules? Policymakers and scientists alike point fingers at one another in order to explain the facilities crisis, all the while aware of their own actions and fostering that crisis. It starts when scientists and administrators ask for a general facility fund with no strings attached. Congress responds by earmarking money for specific projects.

No one is happy with the outcome. The scientific community then blames Congress for pork barrel spending. Congress is quick to blame the U.S. Department of Agriculture Administrators for failing to make decisions. Those Administrators are just as quick to blame Congress for rewriting the Department's budget.

The general public may accept any one of these arguments uncritically. And of course the most popular these days is congressional pork barreling.

I urge this subcommittee to expose the blame game to public scrutiny. We need to know all that is happening with research facilities and ask that the players take responsibility for their actions. Most importantly, we need a process that brings together scientists, USDA Administrators, and congressional decisionmakers

into one room to come to agreement over the nature of the crisis of research facilities and develop a common solution.

There are serious consequences for failing to act. If we do not own up to the root cause of the crisis and take steps to reconcile competing interests, waste and inefficiency will dominate our agricultural research efforts. Major problems will not go away. Instead, they will be exasperated.

For example, existing labs and office buildings, many of which are very old and in poor condition, will continue to deteriorate because of inadequate funding. Many existing facilities will continue to operate at far less than capacity, and others will join them as funding for new facilities depletes.

New overly large facilities will continue to be built, stretching the Federal dollar to the breaking point. The disparity in funding between State universities and Federal facilities will continue with universities receiving the lion's share through their more powerful lobby.

Priorities in funding ongoing research and new projects will continue to be based primarily on political considerations and not on actual needs. And finally, facilities spending will consume more and more of the overall research budget, leaving little left over to hire the personnel and to purchase the necessary equipment to conduct experiments.

So what do we do? Again, we must first grapple with the essential nature of the crisis, reaching consensus on its definition, and then agreeing on how to solve the problems arising from the root cause. I do have some suggested recommendations for your consideration today.

First, I do believe that we should impose a moratorium on all new facilities spending until a solution is found, as was recommended by the Users Advisory Board in testimony before this subcommittee last March.

Second, I believe that we need to develop a consensus among congressional, USDA, and university officials regarding a responsible and reasonable research planning process, including a capital budgeting program.

Third, as Congressman Brown argued in his testimony this morning, I would hope that the subcommittee will enforce the cap established in the 1985 and the 1990 farm bills of \$500,000 for planning and \$5 million for construction for new facility projects, a cap that was put in to prevent unauthorized projects not particularly well thought out from being funded.

And finally, I urge the subcommittee to work with the administration and see that the facilities commission, passed in the 1990 farm bill, is implemented as soon as possible.

As I was walking to work this morning, I tried to think of a way of putting a human face on this problem. It is summer and we are all anxious for vacation. It brought me back to the days when I was younger and going to the lake. I would be standing there at the end of the dock with my two brothers and we would say, "Let's jump in the water. You first."

"No, you first."

"No, you first."

And it would go on and on and on until finally I would dive in or one of my brothers would dive in. The person who dived in the water would look back at the dock and see the other kids laughing and having a good time at that person's expense. The person in the water feels hoodwinked. The person feels angry. And most of all, the person feels cold and wet.

That is how people feel who have tried to exert leadership on the facilities reform problem. They have felt left out and alone swimming against the tide.

I really hope that people work together this time and really achieve reform. I appreciate the subcommittee's dedication to this issue.

I am pleased to answer any questions and to be available for your staff at any juncture as you work on this serious problem.

Thank you, Mr. Chairman.

[The prepared statement of Ms. Merrigan appears at the conclusion of the hearing.]

Mr. STENHOLM. Thank you.

Next we will hear from Dr. Huffman.

**STATEMENT OF WALLACE E. HUFFMAN, PROFESSOR, ECONOMIC AND AGRICULTURAL ECONOMICS, IOWA STATE UNIVERSITY**

Mr. HUFFMAN. Thank you, Mr. Chairman.

I am pleased to be here today to present information before your committee. Much of what I will be talking about is the result of a joint project that has been underway with Prof. Robert Evenson at Yale University. He and I undertook a major project starting in 1980 for examining the evolution, impacts, and productivity of agricultural research in the United States. Our work has most recently been summarized in a book which was just published by Iowa State University Press.

I want to first indicate a little bit of the nature of some of the findings of our work and then turn more to some implications for priority setting. I will say at the beginning that we did not primarily focus on research facilities, more generally focusing on the organization of public and private research in the United States and its impacts.

As you know, agricultural research in the United States is both a public and private sector activity. We have put together data estimating the total amount that is spent by the private sector—the data for the public sector are more accessible.

During the 1980's, we show that real public agricultural research expenditures increased by roughly 0.4 percent per year on average where private R&D expenditures for agriculture increased by 3.1 percent per year, which was much larger. We estimate in 1990 that the private sector was about twice as large as the public sector in terms of its expenditures on agricultural research.

It is true that the public and private sectors engage in different kinds of activities, and we believe that should continue. The private sector is very much in the business of R&D for profit, and the public sector is primarily not seeking profit for itself.

What did we find in the way of social payoffs to agricultural research from our work? First, we viewed expenditures on agricul-

tural research as an investment creating a capital stock of R&D that has a variety of impacts.

Second, we have primarily focused on impacts on agricultural productivity. There are other impacts that do exist but we did not primarily focus on them. When we talk about agricultural productivity, we mean the average product of resources under the control of farmers. We provide evidence that for over 100 years in the United States there has been statistically significant impacts of both public and private R&D on agricultural productivity.

We and other studies have shown a relatively high social rate of return for these investments, on the order of a 40 percent real annual rate. We did, however, disaggregate and look more specifically at the livestock sector and the crop sector as well as the aggregate. We also split agricultural research into what we call a pretechnology science and applied science components. Our view of the organization of science is that general science is at the top, pretechnology science is intermediate, and applied science is closer to the real products that farmers and other people might use.

We found a much higher social rate of return to the pretechnology science research than to the applied science research. We also found a much higher rate of return to crop research than to livestock research.

Why might some of these differences occur? We believe that the pretechnology science research, which is more basic science in nature, is one that is quite catalytic to bringing real advances in general science to the applied area and ultimately into useful technologies. If that catalytic role is missing, then applied science eventually becomes unproductive. This fits in with the problems that the public sector had in taking advantage of the new biotechnology and molecular biology in the 1980's.

Now, why would plant and livestock research be so different? We argue in our book that the biology of plants and animals are really very different. On average, plants are much more affected by the local geoclimatic conditions than livestock are. For livestock research, this means that research benefits frequently spillover quite wide areas, across State boundaries, almost nationally. In the case of crop research, we believe that much of it has very narrow impacts, but it has importance for determining the stock of relevant research.

In some livestock research areas like broilers it seems that the stock, when you accumulate expenditures across States, is a national stock. For many plant commodities it is much smaller because you have to divide by a larger number of regions to obtain the relevant stock. We also find that there seems to be stronger science linkages in crops research than in the case of livestock research.

What about the management of agricultural research and the priority setting in the public sector? R&D is a very productive activity, we believe, using specialized labor and other resources and the facilities and breeding stock are complementary to that process. We do believe that micromanagement of agricultural research is not a particularly productive activity, but there is a role for high-level decisions to be made on priority setting, some at the national level and some at the State level.

There is a history dating from the 1960's of the USDA and experiment stations cooperating to set priorities. George Norton at VPI and some others have put together a book on priority setting. It has a commodity focus and resources are allocated either based upon the value of the commodity or expected pay out. Also, Robert Evenson and Y. Kislev have developed a kind of simple congruency rule where research expenditures are allocated in proportion to expected benefits to be received from the different research areas.

These particular simple rules have some problems, sometimes, because spillover benefits are not properly taken into account across regions, or across institutions. Also, some of the interdependencies and advances in science, which we believe occur, are sometimes ignored.

Priority setting, more generally, is controversial as seen here today and I am sure in other discussions. Economists tend to use social marginal rates of return as a criteria for evaluating which is the best. People who have a broader focus in social sciences and others tend to pick other kinds of criteria. We do believe that the social rate of return is a very important criteria if you are thinking of general economic welfare. You could expand it to include some other benefits, but they normally become very difficult to quantify and to aggregate into any simple meaningful total.

We do believe that national level priorities are seen quite differently from the State level ones for very good reasons, and a lot of the conflicts that we see surfacing are due to these differences. The national level reports always call for more coordination, but the States see that coordination doesn't lead them to do the things that their local client groups are really asking them to do. At the national level, commodity program costs and advances in technology are frequently in conflict. The State governments are not engaged in commodity programs, so they don't have that problem to worry about.

A few specific implications for priority setting follow. We believe one key area, is establishing more firmly the boundary between what is relevant public and private research. In our opinion, the private sector should take on those kinds of research activities that yield products that they can sell for profit, and the public sector should largely take on those activities that the private sector is unwilling or unable to undertake. There is kind of a gray area in between.

We do not believe that the public sector should primarily be developing technology to sell for high prices. That is not the nature of "public good" aspects of knowledge. It is very difficult to market. Now, there is a role for joint ventures between the public and private sectors to try to get the private sector to help fund more of the basic advances in pretechnology and general sciences, and I think much more could be done there.

In terms of planning more generally for agricultural research, pretechnology and general sciences are important. At the national level we need to establish a firm science base for what is needed in future applied agricultural research in both the public and private sectors. These are things associated with biotechnology, environmental quality, food safety, and health, in particular. It is my

assessment that the competitive grants program, with relatively long-term projects of 3 to 5 years, can be made to work well here.

It seems to me that it is inevitable that these kinds of funds will be geographically and institutionally concentrated. A relevant issue to ask is, Did the quality and quantity of research improve as a result of that process? If funds are going to be allocated by some quota, perhaps old formulas are as good as any.

An area which we believe is quite important for serious scrutiny is livestock research, given that during the period of 1950 to 1982 there was much lower productivity in the livestock sector and much lower rates of return to investments—public research investment there. It seems that there is room for much greater cooperation and perhaps a consortium should be formed between the State agriculture experiment stations and the USDA. The group could set research priorities and coordinate a grants program.

Large animal research is relatively expensive to conduct. The benefits seem likely—at least for nongrazing livestock—to spread widely across the States. Also, livestock production tends to be more geographically concentrated than crop production and the centers of livestock production have moved overtime.

We believe that there should be much stronger incentives for the States to cooperate together and to cooperate with ARS and the USDA. We believe that there should be more scientists given access to the research facilities that are available or made available, and when new livestock research facilities are located or decisions made on renovating, a modest to small number of very high quality facilities seem likely to have a better social payoff than a large number of lower quality facilities.

Also, the locations at which facilities are renovated or where new ones are located should be ones that are complementary with many other activities associated with advances in the sciences. We believe that for applied work being close to the centers of production of the commodity or other activities that are primarily associated with it are very important for finding out about the problems, getting the technology transferred, and also for being located close to where advances in general and pretechnology science are taking place.

Also, as I have suggested, we believe that there should be much greater access given to the facilities in terms of people who have access to them, perhaps that space and time be allocated on a competitive basis for the use of the facility, and less attention given to competitiveness on its location. This would make for more general usefulness of the facilities to scientists in other States and bring potentially much greater intellectual power to the experiments being designed and not make the facilities themselves such a limiting factor.

Thank you.

[The prepared statement of Mr. Huffman appears at the conclusion of the hearing.]

Mr. STENHOLM. Thank you very much.

Mr. Chubin.



**STATEMENT OF DARYL E. CHUBIN, SENIOR ASSOCIATE,  
SCIENCE, EDUCATION, AND TRANSPORTATION PROGRAM,  
OFFICE OF TECHNOLOGY ASSESSMENT, CONGRESS OF THE  
UNITED STATES**

Mr. CHUBIN. Thank you, Mr. Chairman.

I am Daryl Chubin from the Office of Technology Assessment and Project Director for the May 1991 report, "Federally Funded Research: Decisions for a Decade," which looked across the six major Federal R&D agencies, including USDA, and examined choices for Federal investment.

I would like to highlight from this report OTA's thinking about setting priorities and establishing criteria for investing in projects, people, and infrastructure. Then I will turn briefly to the specific case of agricultural research and another OTA report, "A New Technological Era for American Agriculture," which was released last August. I would add that one OTA role, as you know, is to assist the Congress in looking over the shoulder of executive branch agencies.

Facilities funding both sustains an institution's existing capacity to do research and extends that capacity at a cost. From this perspective, a fundamental question is: How does the construction of new facilities fit into the overall USDA mission as well as its near-term priorities? What purpose shall be served by these facilities? Who is to bear the financial burden for construction and maintenance? Will this burden be shared?

The Federal research system is beset by increased resource demands and serious tensions. Among them is the tension between allocating dollars for facilities or training versus dollars for research projects, as well as the choice between promoting concentrated excellence and accelerating regional and institutional development to enlarge capacity.

In the last few years, the distribution of research funding has become an issue not only of which institutions receive funding, but for what purpose. Research goals include contributions to education, equity, and economic vitality in addition to the advance of knowledge.

A related issue is the form of allocation best suited for the purpose, such as individual investigator-initiated grants, block grants, short-term projects targeted to problem-solving and innovation, or longer-term fundamental research projects. As OTA makes clear, all areas of research are experiencing increased competition, with research institutions and Federal agency sponsors alike facing difficult choices. Of course, neither the land-grant universities nor USDA are exempt from these pressures.

Historically, the Federal share of capital expenditures for academic facilities—both research and teaching facilities—has never topped one-third of the total. For public universities, 50 percent to 60 percent of facilities funds come from the States and 30 percent from bond issues. The crux of the facilities problem is that universities always need new or renovated buildings. Even though need may not be readily quantified, demand unquestionably exists.

Should there be, then, a Federal facilities program? There are risks, even with cost-sharing, to be borne on all sides. As we are

all aware, once a facility is complete, there is a predictable drive to fill it with sponsored research.

Turning specifically to agriculture, today USDA programs continue to compete within a relatively fixed envelope of resources. The external environment provides less and less relief. OTA found that research funds are not evenly distributed to all experiment stations. The stations in 12 States account for nearly half the total research funding available to experiment stations, more than two-thirds of USDA competitive grants and nearly 60 percent of all funding from industry support and product sales.

The State agricultural experiment station system clearly contains "have-and-have-not" institutions. The "have-nots" rely primarily on the traditional sources of funding, State and USDA formula funds, while the "haves" have diversified their funding sources.

Where does this lead? OTA suggests that USDA needs to develop a comprehensive strategic plan for the whole Department, not just CSRS on the one hand and ARS on the other. This plan must take it into the 21st century. Such a comprehensive plan must include research priorities for both the short-term and long-term, including research facilities. Congress may need to mandate such a plan to be sure that USDA delivers in a timely manner.

Further, the vision projected by a USDA strategic plan and funding priorities should have significant influence on land-grant universities in the aggregate. That is, criteria for funding must be applied and not just paid lip service. The administration, Congress, or both can help at least to instill that vision.

An overarching question for the subcommittee, then, is this: How do research facilities rank compared to other funding priorities in the Department's portfolio? I have heard different answers to the question this morning.

In a funding climate in which demand is increasing faster than resources, something has to give. All deserving competitors will not be satisfied, but priorities must be established and implemented. OTA concludes that if the Federal Government supports opportunities for growth in agricultural research, it must recognize that those opportunities create additional burdens.

Finally, USDA and research institutions must plan their portfolios of activities and infrastructure, approaching such opportunities with a stronger sense of realism.

Thank you.

[The prepared statement of Mr. Chubin appears at the conclusion of the hearing.]

Mr. STENHOLM. I thank each of you for excellent testimony.

Mr. Smith.

Mr. SMITH. Thank you, Mr. Chairman.

Would you agree or disagree that the USDA has a qualified merit system of prioritizing research?

Mr. HESS. I would say that the national research initiative has a system of establishing priorities based upon information from the Joint Council, Users Advisory Board, consultation with users groups, and those priorities then form the recommendations to Congress in terms of funding in the various categories of the na-

tional research initiative, and those grants are awarded on a merit basis.

Mr. SMITH. Ms. Merrigan.

Ms. MERRIGAN. Thank you, sir.

I am going to respectfully disagree. I think that in the 1990 farm bill this committee, as well as Members on the Senate side, engaged in a very fierce debate over the setting of research priorities and put a lot of different components in the farm bill to ensure that a broader group of participants would be involved in setting those priorities. The competitively awarded grants have been shown to benefit certain groups as opposed to other groups. How do we expand the decisionmaking process so that people are involved?

In terms of priority setting, the Users Advisory Board is a very dedicated, hard-working, and thoughtful organization that has made recommendations on facilities and facilities closings for over a decade now, not all of which have been implemented by the Department of Agriculture. They are just recommendations and most fall upon deaf ears.

Mr. SMITH. Ms. Merrigan, I know your background in the Senate Agriculture Committee. Were those political decisions by the Senate Agriculture Committee, or were they based upon merit of research?

Ms. MERRIGAN. Sir, one of the things that we did in the 1990 farm bill, as you will recall, is in the national research initiative—that a lot of people have discussed here today in terms of competitive grants, merit, merit review—was to establish a program similar to the NSF EPSCOR program to put aside a certain amount of money for schools that have not been winners in the competitive grants program so that money would be disbursed to a wider variety of schools, including the historically black land-grant colleges that had been raised earlier by one of the members.

How do we get other schools benefiting in this system that has been there for a long time?

Mr. SMITH. I am trying to get at the question: Can we or can we not rely on the USDA, then we have to rely on someone else, so where do we go? If we can rely upon them, we ought to start there, I would assume. We all recognize the pork barrel atmosphere in which we are living with respect to research. I think we all agree that we ought to move away from that—establishing a commission or whatever—rather than accusing one another or defending one another.

In my limited time, tell me what you recommend that this subcommittee recommend to move us into a more improved research program in this country that is not tainted by political intrusion.

Mr. MAGRATH. I agree with Charlie Hess. I believe the NRI system has worked reasonably well. I am sure it is not perfect. I believe that if we can establish a consensus that with regard to facilities, as well as the NRI issue, that we want to use limited, scarce resources on a competitive, merit, peer-reviewed basis. If we can get that consensus with our Nation's universities, Congress, its key players, and USDA, I think it can be done. If the political will is there on all sides then I think USDA will be able to play that game effectively in the best sense.

I think it is doable. Whether it will be done, we will all stay tuned.

Mr. CHUBIN. I think it can be done as well, but I am not as convinced that a clear consensus will emerge. Therefore, there will always be gray areas which will be filled by what can be perceived or alleged to be political influence or political motivations.

If this were clearly or exclusively under the control of the Department, then I would be very much more hopeful that a merit-based system could operate, but I don't think that the Department is fully in control of its destiny. Surely, you all understand that.

I also am having trouble with a distinction that has been made continuously today between merit based on the one hand and politically influenced or earmarked decisions and money on the other hand. Something can be merit based or competed, but that doesn't necessarily mean that the appropriate set of peers have been selected to achieve the objectives of a program. I think that is the kind of fine-tuning that might need to take place even within the NRI.

Mr. SMITH. I understand the problems, but I want the answers. What is your answer?

Mr. CHUBIN. My answer would be that you could mandate a competitively based program for the award of facilities if you believe that facilities are a high enough priority in the portfolio of the Department. There are some questions about that which have been expressed today.

Mr. SMITH. Thank you.

Thank you, Mr. Chairman.

Mr. STENHOLM. I want to submit several additional questions to each of you in writing, but I want to pursue Ms. Merrigan's suggestion when you say that if only we would spend half as much time building consensus on the definition of the problem as we do in trying to construct the solution.

First of all, do each of you have any comment on any previous witness that you have sat and listened to today or any questioning by any member of this panel? Was there anything that came across your mind at the time you heard it when you said, "I wish I was at the microphone at that point in time so that I could have had some input into the process?"

Do any of you have anything you would like to share with the subcommittee along those lines?

Ms. MERRIGAN. Mr. Chairman, I will take that opportunity.

I am a free agent here today. I don't have to put my testimony through any sort of clearance process. I am an unemployed student, so I can just speak from my heart and say that I have been in meetings over my tenure as a member of the staff of the Senate Agriculture Committee where organizations represented here today who have given testimony have actually been a part of the pork barrel earmarking problem that we're talking about today.

That is why I am calling for an end to the blame game. It is not Congress' fault. It is not the Administration's fault. It is not the fault of the scientific community. In order to solve the problem, we're all going to have to join hands and jump off that dock into the cold water together. It is a big problem and it is going to require joint action.

That is why we really felt when looking at the 1990 farm bill—you worked with my bosses and I worked with your staff, but we really felt that a commission approach would bring together representatives from all sides to look at the large body of evidence that has been collected on this issue over the years and come up with a solution that is not only right on the substance, but also right on the politics. You need both components.

Mr. STENHOLM. Is there anyone at the table now that has any reservations or any suggestions of perhaps a keep-your-eyes-open nature regarding a facilities closings commission, the makeup of it, how it should proceed, or any better suggestion for us to consider as a first place to start?

Mr. HESS. I guess one prerequisite would be that it would have to be set up similar to the military base closings commission on the concept that it is a package and that you either accept it or you turn it down. If you get to a point where you are arguing individual facilities, we will be right back to square one because each facility has a constituency, and then it becomes politically very difficult to achieve a closure.

But second, I think that although the closings commission would be a good process to evaluate existing facilities and perhaps the commission could also address the question of needs, I do think that given the fact that we do have in existence a large facilities program in the Department of Agriculture that at least part of that program should be placed on a competitive basis in which priorities are based on national needs, the best quality research, and where the research is being done. All of these issues could be taken into account and provide a chance to see if we could have a better match between priorities and funding, and to see if in fact the universities will go the competitive route rather than the earmarking route.

Also this would help to take some of the pressure off Members to respond to constituents because they would have the option of saying, "Look, there is a competitive program. Go for that before you come to me and expect me to put something into the Appropriations Bill."

I think it should be given a try. The National Science Foundation had a \$20 million program a couple of years ago. Our feeling is that if a number of agencies could have such a program—like DOE, NSF, and other agencies—then you would put together a program that would have the size that could address the research university infrastructure problem.

I think Federal funding, in part, is justified because the research that is done in Texas benefits other States, the spillover effect that was referred to here. So a component of it, on a matching basis, is justified.

I would urge the committee to urge your colleagues to go ahead—at least on a trial basis—with a competitive facilities program. We have the program already and the money is there.

Mr. HUFFMAN. As an economist, I have to argue for a closings policy being tied together with an evaluation of where you are going to renovate and locate new facilities. The total amount of resources you are willing to put in both renovation and new facilities

is a constraint setting the boundary for which facilities need to be closed.

The problem with this bigger decision is that you get mired down and nothing happens. That is the reality of things. I think that if you take on closings first, the States and interest groups will see only losses. If you view it as a bigger package, looking at location of renovated and new facilities most States can see some prospective gains. Then it seems to me that you can socially have a better pay-off and have some greater reality of getting it carried out.

Ms. MERRIGAN. I would like to just quickly point out that the facilities legislation that was passed by this committee asked the commission to do both, to review existing facilities for closure consolidation and reinvestment as well as to recommend a process for future facility construction.

Mr. MAGRATH. Mr. Chairman, I don't want to prolong this needlessly. I agree with what Dr. Hess said. I think one can look at a facilities closings. I don't really think that is probably the critical issue. I think the critical issue is: Can we invest some scarce resources on a competitive basis to meet the critical national needs?

I agree with the comment I heard Mr. Smith say earlier today that not all of the projects that have been funded, even though they are the product of a messy process—they are not all bad. There are some good things being done. I think you do have to take account of geographical distribution as well as other considerations, but given the current climate—and I don't know about the blame game business. I think it is very complicated to start getting into that.

I think the issue is that we don't have a lot of resources and we have a lot of needs. The reason a lot of university presidents push for facilities—not just because they like to invite Members of Congress to come to the building dedication—it is because there are some real needs out there to be met and we have a facilities problem, but we don't have a lot of bucks.

Anything, Mr. Chairman, you and your colleagues can do to move us in the direction of real competition and setting priorities I think would be welcomed, I suspect, by just about everybody.

Mr. STENHOLM. I have been cautioned in a very positive way to make certain that what we do at the Federal level does not have an adverse impact upon State and local contributions to the process. I am very cognizant of that fact since we tend to be able to achieve national media notoriety from time to time in regard to many of these projects, et cetera, and some of it can have a very negative effect on the end result that we all see.

Therefore, the absolute importance of cooperation between local, State, and Federal entities in all of these is critical. That is one of the areas that I certainly am very cognizant of the need, and hopefully of not making any mistakes in that area. That is one area that I think each of you have testified to in different ways today, but it is something that we are very aware of.

The problem is that we have  $x$  amount of resources and we have  $x$  times 10 amount of need. I would love to see this subcommittee—and we may do this—to take a look. We get all these lists of projects, proposals, and everything, but never in one context. If we can pull together all of the projects and then have this subcommittee take a stab at prioritization, it wouldn't be a bad exercise. That

would not be a bad exercise. In fact, that is something that we're thinking about pursuing in the back of our own minds rather than passing the buck to somebody else. Really, that is what we are here for.

We have this constant opportunity between the authorizing committee and the appropriating committee in which we in the past have never really talked to each other. But I am very encouraged with Chairman Durbin's activities thus far and his staff in that I believe we are making some steps in that direction that might prove to be helpful in this endeavor.

Mr. Smith, any questions?

If not, we have another series of votes on the floor. I will submit to each of you a list of questions to which I would like you to respond in writing.

We thank you for your patience and your contribution. Your entire testimonies have provided some valuable information to this member and I believe I speak for Mr. Smith in that endeavor also. We look forward to working with you. Thank you for your contributions.

This subcommittee hearing will be adjourned.

[Whereupon, at 1:40 p.m., the subcommittee was adjourned, to reconvene, subject to the call of the Chair.]

[Material submitted for inclusion in the record follows:]

TESTIMONY OF  
CONGRESSMAN GEORGE E. BROWN, JR

Mr. Chairman, members of the Subcommittee, it is a pleasure to be here today to comment on the practice of earmarking funds for academic and research facilities in agriculture. At the outset let me say that the Subcommittee's work in this area is very important and timely. We are engaged in a similar effort in the House Science, Space, and Technology Committee and welcome the company.

Academic earmarks in Department of Agriculture (USDA) funding have been a problem for a number of years. For example, the Special Research Grants program at USDA has been used to fund a number of narrowly focused research programs, many of which are location-specific earmarks. Similar earmarking for research and academic facilities has occurred in funding for the Cooperative State Research Service (CSRS) and the Agricultural Research Service (ARS). Historically, however, these earmarks were more of a nuisance than a major threat to the integrity of the agriculture research system.

However, this situation changed in the mid-1980's, as a result of a number of shifts in agriculture research funding. First, budget pressures began to limit the funding for research and extension, at both the federal and state level, and land-grant institutions were hit especially hard. This meant that earmarks, an excusable political "cost of doing business" in times of good funding, began to eat into the base funding for agriculture research and extension programs.

Second, as a result of the funding squeeze, research institutions began to use earmarking as a way of dealing with limited federal and state funding. You can easily map the increase in academic earmarks from the mid 1980's and, if you cross reference this with the registration of lobbyists representing academic institutions, you will see a positive correlation. In short, as some institutions were successful in playing the earmark game, others followed suit. From FY'88 to FY'92, academic earmarks at the federal level increased from about \$200 million to \$700 million.

Third, there was an increase in need for facilities as older facilities became obsolete or in need of repair and as modern research equipment needed special facilities. Without adequate funding for facilities, the backlog began to grow. Research institutions began to feel the pinch and were driven even more into the earmark game.

As these changes affected the academic institutions in the states, the same pressures began to work upon the federal research facilities run by the ARS. With budget constraints and personnel ceilings, it became difficult to adequately staff and equip all of the facilities being earmarked, and there was under-utilization of some ARS facilities. Consolidation of facilities,



an approach supported within the administration of ARS, to relieve this problem, was effectively blocked for political reasons. So some high-priority ARS needs, such as the germ plasm lab at Ft. Collins or the Beltsville Research Facility, languished while funding went to other, more politically powerful locations.

At this point it is important to state that not all earmarks and pork barrel programs are bad. Good science can, and undoubtedly has, resulted from these efforts. I am not an adamant opponent of location-specific research funding, but I am an opponent of public funding decisions being made behind closed doors without benefit of merit review. This is largely what has occurred with the earmarks we have seen for academic and research facilities.

Decisions on facilities funding have been made among a select group of legislators, behind closed doors, without benefit of public hearing on merit, need, and relation to research priorities. This process is bad enough in times of plenty, but given the funding restrictions we are under in federal research and development programs, we cannot allow this process to continue. Rather than relying upon the serendipitous results of earmarking based on political strength, we must develop a system of allocating facilities funding based upon need and merit.

In the 1985 Farm Bill (P.L. 99-198), the House Agriculture Committee took the first steps toward reforming the facilities funding process. In Section 1431, we require that any ARS facility that involves planning funding in excess of \$500,000 and construction funding in excess of \$5,000,000 must be authorized in advance. This measure was a first step in opening up the deliberations around ARS facility funding.

Now I must point out that the only two facilities which have gone through this process are ones for which Mr. Stenholm and I sought funding: the Plant Stress Laboratory at Lubbock, Texas, and the Salinity Research Laboratory at Riverside, California. In each case, public hearings were held, the opinions of the USDA and the research community were heard, and separate legislation was enacted, based upon its merit. Only after this process was completed was construction funding sought.

This earlier effort has two major limitations. First, it only deals with ARS facilities and not the CSRS facility earmarks, which now total over \$400 million, if all of the current earmarks are funded to completion. Second, many of the facilities earmarks are contained in the report language of appropriations bills, thereby out of reach of points of order against projects for not being authorized under Section 1431.

In the 1990 Farm Bill (P.L. 101-624) Senator Leahy took the

next initiative against facilities earmarking by proposing a Commission on Agriculture Research Facilities to study existing agriculture research facilities, to recommend facility consolidation or closure, and to suggest improvements in the facilities funding system used currently. Working with Senator Leahy, we enacted Section 1624, but no funding has ever been provided for the Commission's operation. The next important step to take in getting a handle on earmarking academic and research facilities funding is to establish this Commission, something that Mr. Stenholm and I advocated to the Appropriations Committee this year.

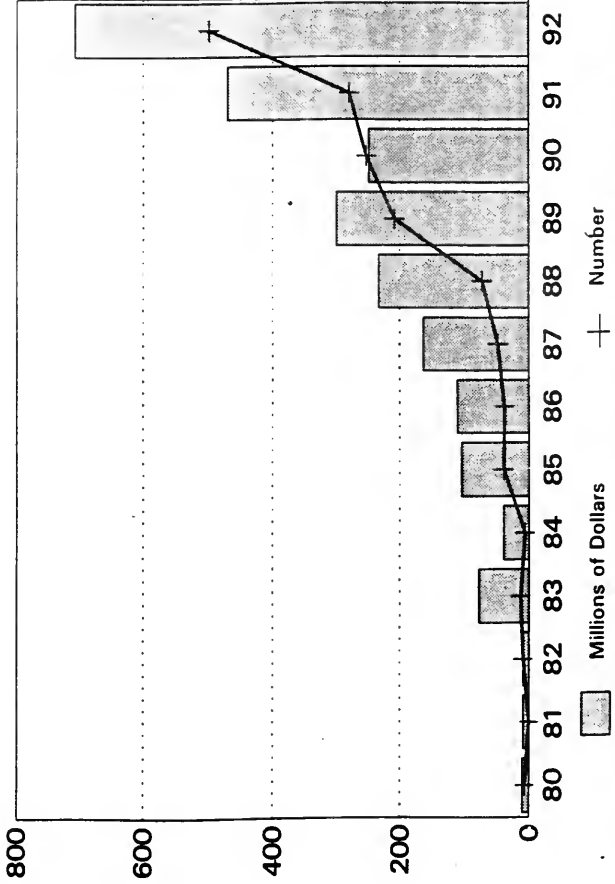
But beyond our efforts to curb earmarking, we must address some of the legitimate needs that have led to earmarking. There is a backlog of needed facilities modernization and construction proposals that have merit. There is a need to assure adequate distribution of research funding, a concern expressed by smaller and "noncompetitive" schools and an argument frequently made to support earmarking. This concern for proper geographical distribution of funding has been clearly and articulately expressed by Mr. Volkmer. There is also a need to bring some institutions, such as historically black colleges and universities, into the mainstream of science and technology. These and a host of other research policy issues must be dealt with if we are to get a handle on the practice of earmarking.

I look forward to working with the Subcommittee in this effort. My feeling is that the agricultural research system is ahead of many others in having the statutory tools with which to solve this problem. It is just a matter of our using them wisely.

(Attachments follow:)

# APPARENT FY 1980-92 ACADEMIC EARMARKS

By Fiscal Year



SOURCE: Trends in the Distribution of Apparent Academic Earmarks in the Federal Government's FY 1980-92 Appropriations Bills, Prepared for the House Committee on Science, Space, and Technology by the Congressional Research Service, the Library of Congress, September 1992

AUTHORIZATION FOR APPROPRIATIONS FOR FEDERAL AGRICULTURAL RESEARCH FACILITIES

Sec. 1491. (a) There are authorized to be appropriated for each of the fiscal years ending September 30, 1987, through September 30, 1990, such sums as may be necessary for the planning, construction, acquisition, alteration, and repair of buildings and other public improvements, including the cost of acquiring or obtaining rights to use land, of or used by the Agricultural Research Service, except that—

(1) the cost of planning any one facility shall not exceed \$500,000; and

(2) the total cost of any one facility shall not exceed \$5,000,000.

(b) Not more than 60 days after the end of each of the fiscal years ending September 30, 1986, through September 30, 1990, the Secretary of Agriculture shall submit to the Committee on Agriculture of the House of Representatives and to the Committee on Agriculture, Nutrition, and Forestry of the Senate a report specifying—

(1) the location of each building, laboratory, research facility, and other public improvement of or to be used by the Agricultural Research Service that is planned, constructed, acquired, repaired, or remodeled, with funds appropriated under subsection (a), in the fiscal year involved; and

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SEC. 1674. COMMISSION ON AGRICULTURAL RESEARCH FACILITIES.

1 USC 5927.

(a) DEFINITIONS.—For purposes of this section:

(1) AGRICULTURAL RESEARCH FACILITY.—The term "agricultural research facility" means a facility at which agricultural research is regularly carried out, or proposed to be carried out, and which is—

(A) an existing Agricultural Research Service facility or a Forest Service facility;

(B) an agricultural facility in the process of being planned or being constructed using Federal funding or a planned agricultural facility that will use Federal funding; or

(C) any other facility under the jurisdiction of the Secretary of Agriculture.

(2) STUDY OF AGRICULTURE.—The term "Study Commission" means the Agriculture Research Facilities Planning and Closure Study Commission established under this section.

(3) SECRETARY.—The term "Secretary" means the Secretary of Agriculture.

(b) STUDY COMMISSION ESTABLISHED.—The Secretary shall establish an Agriculture Research Facilities Planning and Closure Study Commission to carry out the activities described in subsection (c).

(c) GENERAL DUTIES.—The Study Commission shall—

(1) review all currently operating and planned agricultural research facilities for research importance;

(2) identify those agricultural research facilities that should be closed, realigned, consolidated, or repurposed, in order to aid in the development of the research agenda of the Secretary;

(3) develop recommendations concerning agricultural research facilities; and

(2) with respect to each such building, laboratory, research facility, and improvement—

(A) the amount of such funds obligated in the fiscal year;

and

(B) the amount of such funds expended in the fiscal year for such item.

(4) evaluate the agricultural, research, facilities, acquisition and modernization system utilized by the Department of Agriculture and recommend improvements in such system.

(d) **ELEMENTS OF STUDY COMMISSION.**—

(1) **MEMBERSHIP.**—The Study Commission shall be composed of 14 members to be appointed not later than 80 days after the date of enactment of this Act, of which—

(A) two members shall be appointed by the Secretary from among private citizens or employees of the Executive Branch;

(B) three members shall be appointed by the Chairman of the Committee on Agriculture, Nutrition, and Forestry of the Senate;

(C) three members shall be appointed by the Ranking Minority Member of the Committee on Agriculture, Nutrition, and Forestry of the Senate;

(D) three members shall be appointed by the Chairman of the Committee on Agriculture of the House of Representatives; and

(E) three members shall be appointed by the Ranking Minority Member of the Committee on Agriculture of the House of Representatives.

(2) **VACANCIES.**—A vacancy occurring on the Study Commission shall be filled in the same manner as that in which the original appointment was made.

(3) **COMPENSATION AND EXPENSES.**—

(A) **COMPENSATION.**—Members of the Study Commission who are not regular full-time employees of the United States Government shall, while attending meetings and conferences of the Study Commission or otherwise engaged in the business of the Study Commission (including travel time), be entitled to receive compensation at a rate fixed by the Secretary, but not exceeding GS-13 of the General Schedule of such schedule GS-13 of the General Schedule established under section 5332 of title 5, United States Code.

(B) **EXPENSES.**—While away from their homes or regular places of business on the business of the Study Commission, members of such Commission may be allowed travel expenses, including per diem in lieu of subsistence, as authorized under section 5703 of title 5, United States Code, for persons employed intermittently by the Federal Government.

(4) **CHAIRPERSON.**—The Secretary shall designate a member of the Study Commission as the Chairperson.

(5) **MEMBERSHIP.**—The Study Commission shall consist of the Chairperson, of a majority of the members of the Study Commission, or at the call of the Secretary.

(6) **DIRECTOR AND STAFF.**—The Chairperson of the Study Commission may appoint a Director of such Commission, and such Commission to assist it in carrying out its duties. The Chairperson may employ experts and consultants.

(e) **GENERAL POWERS.**—The Study Commission shall have the power to request and hold hearings, use the mails of the United States, and provide and acquire administrative support services.

(f) **REPORT.**—Not later than 240 days after the date of enactment of this Act, the Study Commission shall prepare and submit to the Secretary, the Committee on Agriculture and Appropriations of the House of Representatives and the Committee on Agriculture, Nutrition, and Forestry and Appropriations of the Senate, a report concerning the findings and recommendations developed under subsection (c).

(g) **APPROPRIATION OF APPROPRIATIONS.**—There are authorized to be appropriated such sums as may be necessary to carry out this section.

#### SEC. 1616. NATIONAL CENTERS FOR AGRICULTURAL PRODUCT QUALITY RESEARCH.

(a) **PURPOSES.**—The purposes of the national centers for agricultural product quality research shall be to—

(1) serve as regional or commodity specific agricultural product quality research and education focal points involving one or more university and Federal participants;

(2) take advantage of opportunities, and establish linkages between existing research and activities, with expertise, in basic biology and engineering, the development of new technology, the application of technology to practice, and related quality assurance and regulatory activities;

(3) develop and enhance explicit relationships (including the possible sharing of the cost of center operations) between the research and development community, the Department, and other Federal agencies, and with all aspects of the involved industries;

(4) provide a mechanism for dealing with the safety and wholesomeness of new food products and processes that use biotechnology (actual public information about agricultural product quality and wholesomeness on a continuing basis; and

(6) where appropriate, build on existing institutional strengths and commitments to address issues relating to agricultural product quality and wholesomeness and on demonstrated capability to effectively link with operational units of the Department, other Federal agencies, and private industry.

(b) **CHARACTERISTICS OF CENTERS.**—

(1) **REGIONAL BASIS.**—The centers shall be regional based units that conduct a broad spectrum of research, development, and education programs to address safety and modification of food through the identification, detection, and modification of potentially compromise agricultural product quality and wholesomeness.

(2) **RESEARCH APPROACH.**—The centers shall involve multidisciplinary and interdisciplinary approaches to the development of new knowledge and technology. The centers may include multi-institutional linkages between universities or related Federal laboratories.

(3) **MANAGEMENT.**—The centers shall serve as a management focal point for grants that develop high quality cultural product quality research and teaching, including the provision of mechanisms for sharing resources between cooperating institutions and laboratories.

WILLIAM D. CARLSON  
ASSOCIATE ADMINISTRATOR  
COOPERATIVE STATE RESEARCH SERVICE  
U.S. DEPARTMENT OF AGRICULTURE  
BEFORE THE  
SUBCOMMITTEE ON DEPARTMENT OPERATIONS AND NUTRITION  
OF THE  
COMMITTEE ON AGRICULTURE

JUNE 17, 1993

Mr. Chairman and members of the committee. I am Dr. Carlson, Associate Administrator for the Cooperative State Research Service (CSRS) and I am here this morning with Dr. Essex Finney, Acting Administrator for the Agricultural Research Service (ARS). I am pleased to appear before you today on behalf of the Secretary to discuss the processes followed by the Department to manage its facilities programs for agricultural research and education both in the CSRS and the ARS.

The ARS Program

The ARS has research facilities and field locations at over 120 domestic and foreign locations. Many of these facilities were built in the 1940s, '50s, '60s, and '70s and require replacement or modernization. ARS has planning and design initiatives underway to construct or modernize a number of these facilities. The FY 1994 budget proposes \$24.6 million for priority projects at 5 locations.

ARS uses a multiple step process in setting priorities for improving or constructing new facilities; ARS

- considers input from the scientists, managers, and engineers regarding space and condition of existing facilities, especially any safety and health issues.
- considers input from users, scientists, managers, and Executive and Congressional branches of government regarding emerging and future agricultural problems.
- compares the cost-effectiveness of renovating existing facilities with that of total replacement using new construction.
- reviews the current and future mission to be conducted at the facility.

The Agency initiates a budget recommendation once a determination is made that the future needs of the research program cannot be accomplished within existing facilities. The facilities requests are prioritized and submitted through the annual appropriations process. This process involves Agency, Department, and OMB approvals before the request is included in the President's budget for consideration by the Congress. This process usually takes several years to obtain the funding for design and construction of a new facility.

It should be noted that section 1431 of the National Agricultural Research, Extension, and Teaching Policy Act Amendments of 1985, authorizes appropriations for the construction of Federal agricultural research facilities.

However, the cost of any one facility is limited to \$5 million. Accordingly, when a particular budget recommendation exceeds \$5 million, ARS prepares a legislative proposal to authorize the recommended amount.

In regard to closing and/or consolidation of facilities, ARS has closed over 30 facilities since 1979. The Agency uses the following criteria in making a decision to close and/or consolidate the function with another location:

- Condition of facility.
- Has the mission of the facility been completed?
- If not, can the mission be accomplished elsewhere?
- Is there a critical mass of scientists?
- Is the facility cost efficient to operate in relation to its productivity and accomplishments?
- Priority of the program to the mission of the Agency.
- Who are the clients and can their needs be met elsewhere?
- Is the research duplicative of research being conducted by other organizations?

ARS senior managers make the decisions to close/consolidate/replace facilities using the best management criteria available to them from a variety of sources and using their experience, knowledge and judgment about the current and future research needs to sustain the food and fiber production of the United



States. Implementation of closure actions follows Secretarial and Congressional approvals and user and cooperator contacts.

### Overview

With regard to the agricultural research facilities of the States and other institutions that conduct agricultural research, State and other non-Federal resources historically have provided the bulk of funds to construct such facilities. In many cases the current need exceeds their capacity to respond. To address some of their more immediate infrastructural needs, many institutions have resorted to individual funding initiatives with Congress. Although most of these requests have provided reasonable investments for individual institutions, such a process does not adequately address the Nation's overall need for modernized and expanded research infrastructure, nor does it systematically take into account national research priorities. The Administration would prefer to see these funds awarded through a national competitive process. In 1992, the National Science Foundation conducted a biennial study on scientific and engineering research facilities at many of the Nation's colleges and universities and reported that compared with other fields of science (social, medical, biological, physical, etc.), the percentage of research space requiring repair or renovation was greatest in the agricultural sciences. Forty-nine percent (49%)

of the research institutions reported that their agricultural space required repair/renovation. Furthermore, the 100 largest research-performing institutions expressed the greatest need for more research space (40% said that their space was inadequate). A large number of these 100 institutions are agriculture-related land-grant universities and other institutions with programs in agriculture and natural resources.

#### Current CSRS Program

Since 1986 CSRS has administered a facilities grants program from funds appropriated for "Buildings and Facilities". The purpose of this program is to assist in the construction or renovation of specified facilities at colleges, universities, and other institutions, as identified by the reports of the Appropriations Committees in the annual appropriations process. Shortly after publication of the Conference Report for the Agriculture Appropriations bill, CSRS contacts each institution for which a new facility project has been earmarked and requests that it submit baseline information about the project. After reviewing this information, CSRS appoints a team of scientists and administrators to conduct an on-site merit evaluation of the project.

At the conclusion of the evaluation, the team develops a report that sets forth its findings, conclusions, and recommendations. The purpose of this

report is to critically evaluate the research program in relation to: 1) national needs of agricultural science, 2) the proposed facility, and 3) its fit with the mission of the U.S. Department of Agriculture. It is subjected to a rigorous internal merit review and then undergoes intensive administrative scrutiny. The project is also reviewed in the light of the appropriation language that requires that facilities supported under the program be necessary to carry out the agricultural research, extension and teaching programs of USDA. After all reviews have been completed, the report is submitted to the House and Senate Agricultural Appropriations Subcommittees.

Once the report containing the recommendations of CSRS has been submitted, a decision is made to either begin funding a project or to delay funding. Once a project is identified for funding by the Appropriations Conference Committee, CSRS requests a fully developed proposal from the institution designated by Congress to receive Federal support. Each year before funding is awarded to support any project, the institution's proposal is subjected to internal review to ensure compliance with Federal laws, regulations, and policies, and the dictates of sound management. In accordance with Conference Report language, all grant recipients under this program are required to provide a minimum of 50% in matching funds. It is estimated that, if the Federal

government provides 50% of the funds, between \$265 and \$390 million would be needed to complete projects already in the pipeline.

### Current Program Concerns

At the present time there are 72 active projects in the program. This includes some for which Federal funding has been completed, but the facilities themselves are in various stages of construction. In the last three years, an average of 16 additional projects per year have been initiated, totaling 48 newly initiated projects, without finishing up those previously initiated projects. Based on recent funding history and the number of facilities currently in the program, it could be nearly a decade before funding for projects in process are completed.

Another major concern of the current program is the increasing tendency for medical schools to vie for funding, thus foreclosing on the opportunity to provide needed infrastructure support for the food, agricultural science and natural resource systems. We do have difficulty fitting some of these projects, even using the broadest interpretation of the mission of agriculture.

### Summary

Scientists will continue to require state-of-the-art research facilities to help our country maintain its scientific leadership in the world community. The

present system for prioritizing new facility construction has the potential for disorder. There are presently many projects still under construction while new ones are being continually added. At the present time there are too many projects being initiated without sufficient funds available to finish them. We have detailed information on projects currently underway which we can supply at the Committee's request.

ARS has many facilities built 20 - 50 years ago that require replacement or modernization. There are planning and design initiatives underway to construct or modernize a number of facilities after a multiple step process to set priorities. In regard to closing and/or consolidation of facilities, ARS has closed more than 30 facilities after very careful evaluation of many factors. Implementation of closure actions follows Secretarial and Congressional approvals and user and cooperator contacts.

At this time I have completed my prepared remarks and would be pleased to respond to any questions which the committee may wish to direct toward me or my colleague, Dr. Finney.



United States  
Department of  
Agriculture

Agricultural  
Research  
Service

October 1991

# Agricultural Research Service Program Plan

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Implementation Plan—



Executive Summary  
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## Foreword

I am pleased to present the Agricultural Research Service (ARS) program implementation plan for the period 1992-1998. This document outlines those research programs to receive emphasis by the agency in the coming 6 years. Just as important, the plan describes the policies and strategies ARS will follow to acquire, deploy, and manage resources needed to carry out its research programs. The plan also addresses the need for human workforce forecasting and modernization of facilities to support future programs.

Today, agriculture faces a multitude of research challenges. Issues involving the environment and natural resource conservation, agricultural sustainability, food safety, human nutrition, waste management, animal well-being, and genetic resources have steadily moved to the forefront. The competitive position of U.S. agricultural products in the global marketplace must be bolstered, while demands for alternative energy sources are being raised more widely. The cutting edge of science, particularly bioscience, is advancing rapidly. ARS must keep up with that cutting edge if agriculture is to benefit from the innovations it will generate.

ARS identification of these many problems and research opportunities has emerged through joint planning and priority setting processes using inputs from numerous sources, including the Secretary of Agriculture, other USDA policy officials, Congress, research users, scientists, cooperators, and the general public. ARS program leaders have worked hard to assimilate these many inputs and reach a consensus on future program directions and areas of research emphasis within the ARS mission and available resources. The collective judgments are presented in this plan, but ARS will remain flexible so we can adapt to changing conditions and priorities, as necessary.

I want to emphasize the special working and planning relationships ARS shares with its fellow USDA agencies and with other performers and users of agricultural research in the state systems and the private sector, as we jointly plan, conduct, and coordinate our research. We have a particularly close relationship with the USDA Cooperative State Research Service (CSRS), the State agricultural experiment stations (SAES), and the 1890 Land Grant Institutions. In implementing future research, it is clear that we must all increasingly address issues of broad public and consumer concern in addition to continuing to be responsive to the needs of farmers and ranchers, the agribusiness sector, and other traditional users of agricultural research.

ARS has made considerable progress in accomplishing the goals and objectives established in the 1984 and 1986 program plans. I am convinced that ARS, with a dedicated workforce committed to scientific excellence, accountability, and public service, will meet the new challenges presented in this plan.



R.D. Plowman  
Administrator







# Agricultural Research Service Program Plan 6-Year Implementation Plan—1992-1998

## *Executive Summary*

### I. Introduction

The Agricultural Research Service (ARS) Implementation Plan is a principal means of informing ARS personnel, funders, clientele, and cooperators about the agency's research program objectives. This plan updates two previous plans covering 1984-1992.<sup>1, 2</sup> It establishes areas of research emphasis for 1992-1998 and outlines ARS policies and strategies to achieve them. This updated plan reflects changing national needs and priorities including those presented in the 1990 Farm Bill.<sup>3</sup>

As the in-house research arm of the U.S. Department of Agriculture, ARS has a mission to:

Develop new knowledge and technology needed to solve technical agricultural problems of broad scope and high national priority in order to ensure adequate production of high-quality food and agricultural products to meet the nutritional needs of the American consumer, to sustain a viable food and agricultural economy, and to maintain a quality environment and natural resource base.

ARS has primary responsibility to:

- Provide initiative and leadership in agricultural research.
- Conduct research on broad regional and national agricultural and related problems.
- Conduct research in support of Federal action and regulatory agencies.
- Provide technical expertise to meet national food, food safety, and environmental emergencies.
- Serve as an agricultural science resource to the executive and legislative branches.

ARS programs are centrally planned and coordinated. The agency manages the scientific and operational activities of 129 locations, which comprise a network of geographically dispersed national and overseas laboratories. Supported by appropriated funds, ARS provides:

- Ability to perform long-term, high-risk research.
- Ability to respond to stable and changing technical goals.

<sup>1</sup> Agricultural Research Service Program Plan, 6-Year Implementation Plan, 1984-1990. U.S. Department of Agriculture, Agricultural Research Service, 1983. (Out of print.)

<sup>2</sup> Agricultural Research Service Program Plan, 6-Year Implementation Plan, 1986-1992. U.S. Department of Agriculture, Agricultural Research Service, 1985. (Out of print.)

<sup>3</sup> Public Law 101-624; November 28, 1990. Food, Agriculture, Conservation, Trade Act of 1990.

- An organizational structure ensuring research program accountability and coordination.
- Ability to focus research on gaps in knowledge that are barriers to problem solution.
- Capability to form, disband, or coordinate interdisciplinary or multilocation research teams from a large, diverse scientific workforce of over 2,600 research scientists, including postdoctoral research associates.

## Challenges of the 1990's

Issues critically important to ARS' research mission include:

*Environment.* Public concern has increased about effects of air and water pollution on the environment, depletion of nonrenewable resources, waste management, and potential effects of global warming. At issue is the role of the agricultural sector as a contributor to or solver of environmental problems contrasted with the need to sustain supplies of agricultural products for domestic consumption and export.

*Food Safety, Human Nutrition, and Health.* Public concern over chemical and biological contamination of food during production and processing continues, with more recent concern over the safety of biotechnology products. Another concern is the relationship between diet and health, which is compounded by the complexities of nutrition.

*National Economy.* Since the U.S. share of the agricultural export market has slipped from peak levels in 1980-1981, lowering costs, adding value, and improving quality of U.S. agricultural products are potential ways to reduce the trade deficit, boost U.S. market share, and otherwise enhance U.S. agricultural competitiveness.

*Scientific and Technical Approaches.* Scientific research is changing, driven by major trends:

- Increased use of biotechnology, interdisciplinary teams, and computer automation.
- Increased dependence of the private sector on public research capabilities, particularly for fundamental and pre-market research.
- More effective transfer of new knowledge and technologies to users or further developers. Public/private sector research collaboration is a growing component of this positive trend.

## ARS Response to These Challenges— The Implementation Plan 1992-1998

The research challenges of the 1990's have critical policy, program, and operational implications for ARS. Section II broadly describes ARS progress in implementing strategies and program priorities laid out in the previous versions of the plan and profiles current (1991) ARS base resources—funding, personnel, and facilities. Program priorities are identified as areas of research emphasis in section III. Section IV describes how ARS will implement its program within the limits of its fiscal, human, and physical resources.

## II. ARS 1991 Status—Planning Base

### Research Progress

For research planning and resource allocation purposes the ARS program is divided into six areas, termed objectives:<sup>1</sup>

Objective 1—Soil, water, and air

Objective 2—Plant productivity

Objective 3—Animal productivity

Objective 4—Commodity conversion and delivery

Objective 5—Human nutrition

Objective 6—Integration of systems

The objectives are further divided into scientific approaches, then into approach elements.

### Fulfillment of Previous Implementation Strategies

Selected examples in appendix D show ARS progress in implementing the previously planned strategies, which were:

- Adhere to mission-oriented research.
- Address technical problems determined to be most critical to the U.S. agricultural sector.
- Allocate resources to solve specific high-priority national problems.
- Increase use of interdisciplinary teams in problem solving.
- Institute and expand integrative systems research.
- Augment research to increase the efficiency of production and marketing.
- Develop communication networks and data-management systems to support research and facilitate technology transfer.

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<sup>1</sup> Agricultural Research Service Program Plan. U.S. Department of Agriculture, Agricultural Research Service, Miscellaneous Publication 1429, 1983. (Out of print.)

## Current Status—Funding, Personnel, Facilities

### Funding

- Although appropriations to ARS increased by 47 percent between 1982 and 1991, the real purchasing power increased only 7 percent because of an inflation of almost 37 percent over the same period.
- Total dollar levels required for conducting research projects have increased. The 1991 figure is 67 percent higher, \$250,000 per scientist year. Thus, the ARS budget currently supports fewer career scientists and research projects than in previous years.
- There has been little change in the balance of funding between ARS research objectives, although significant changes in research direction have been made within objectives. ARS continues to respond to user expectations and be accountable for appropriations.

### Personnel

- ARS is at its currently authorized personnel ceiling of 8,200 full time equivalents, including about 2,600 permanent and temporary scientists. The ceiling has changed little since 1986, and no significant future changes are expected.
- Through normal attrition, ARS expects to turn over about 36 percent—780 positions—of its permanent scientist workforce in the next 6 years. ARS must redeploy these positions wisely.
- ARS disciplinary structure is already changing to meet the new demands of emerging programs and science. One means has been an increase in postdoctoral appointments in 1991 to 14 percent of the total ARS scientist workforce, from 7 percent in 1986 and 1 percent in 1982.

### Facilities

A forward-planning program of facilities renovation and modernization (R&M) to meet the challenge of an aging ARS infrastructure has been underway for several years. Assessment of the current situation is as follows:

- ARS' real property inventory includes nearly 3,000 separate buildings and facilities that comprise about 12 million square feet of floor space. The current replacement value of these and other capital improvements is about \$1.7 billion.
- A significant part of this real property needs renovation or replacement to adapt to safety, health, and other regulatory code requirements and to meet technical demands of future research programs.
- From 1987 to 1990, ARS allocated about \$106 million in base program and special appropriated funds to R&M (about \$26.5 million per year).
- Current plans for 1992 to 1998 project a need to double annual expenditures for facility modernization.
- ARS facility improvement priorities will be driven by program needs.

### III. ARS Program Strategy—1992-1998

Areas of research emphasis for ARS during the 1992 to 1998 period respond to high-priority problems identified by scientists, internal ARS program evaluation, users, new legislation, appropriations, action and regulatory agency concerns, and executive branch initiatives.

#### Base Program

##### *Objective 1. Soil, Water, and Air*

- Improved production systems for reducing the degradation of water quality by agricultural chemicals and controlling erosion under low-crop-residue conditions.
- Strategies for off-site control of chemical buildup in ground water.
- Technologies for improving chemical application efficiencies; using agricultural, municipal, and industrial wastes to improve soil productivity; and delineating land areas vulnerable to soil degradation.
- Methods for assessing the effect of potential global climate change on water and energy fluxes, water resources, and the health and sustainability of agroecosystems; for quantifying agriculture's contribution to the fluxes of greenhouse gases; and for facilitating conservation tillage.
- Evaluation and optimization of no-till and other conservation tillage and residue management systems to increase soil organic matter, infiltration, and soil biological activity and to reduce runoff, erosion, evaporation, and drought damage.

##### *Objective 2. Plant Productivity*

- Enhancement of plant germplasm by genome manipulation at the molecular level and of plant genetic resources to overcome productivity barriers in major crops.
- Technologies for controlling fundamental biological processes relating to productivity, market quality, and production costs; long- and short-term acquisition and preservation of plant germplasm; and detection at the molecular level of pathogens in propagative material.
- Methods for nondestructive testing of seed viability and composition and for environmentally safe pest control with acceptable health risk.
- Management systems for sound ecosystem maintenance and water use on important range, pasture, and crop lands (including horticultural crops): weed and plant disease control; and areawide control of high-priority pests.
- Development of a relational database for the National Plant Germplasm System.

- Computer simulation models for growth and development of economically important crops and weeds.

### *Objective 3. Animal Productivity*

- Means to reduce mortality and other losses from disease and parasites, improve—at the molecular level—genetic resistance to diseases and parasites, use biologically based control of parasites, control zoonotic bacteria and parasites in the live animal, increase the genetic capacity of animals for greater production, and evaluate behavioral, physiological, and productivity indicators of animal well-being.
- Elucidation of physiological processes involved in feed intake and metabolism and mechanisms by which chemical and physical composition of feed limits nutrient availability.
- Technology for nondestructive repeated measurements of body composition.
- Means to use animal wastes and means to reduce waste contamination of surface and ground water.

### *Objective 4. Commodity Conversion and Delivery*

- Means to prevent or eliminate foodborne microorganisms in animal products, prevent mycotoxins in food and feed products, eliminate insect and disease trade barriers limiting agricultural exports, meet commodity quality market requirements (physical, sanitary, performance), and extend shelf life with sensory quality retention.
- Methods for rapid, objective analysis of marketing safety and quality characteristics.
- Technologies for conversion of agricultural commodities to value-added industrial products, alternative fuels, and new fiber, leather, feed, and food products; process treatments to enhance food safety, minimize residues or additives, and retain quality; and alternative environmentally benign processes and products.

### *Objective 5. Human Nutrition and Well-Being*

- Methods to determine composition of commonly consumed foods for several nutrients and phytochemical components and to change food production and processing systems to improve food nutritional quality.
- Elucidation of role of dietary components in weight maintenance and risk of chronic diseases, adequate and safe ranges of nutrient and calorie intake, and molecular and cellular basis of human nutrition.

**Objective 6. Integration of Systems**

Areas of emphasis for objective 6 are included under objectives 1 through 5 where appropriate. Integrative systems research aimed at more general goals will be a critical component of planning and setting priorities for related implementation strategies.

**High-Priority ARS  
Special Programs****ARS Plant Genome Program/Animal Genome Program**

- Gene construction for broad genetic similarities and differences for useful gene maps of major species.
- Gene construction for important economic traits of major species for which some data already exist.
- Development of new mapping and sequencing technologies; electronic data management for data access and dissemination; and robotics and automation for new, automatic DNA processing procedures.
- Identification of genes or groups of genes responsible for desired productivity traits and resistance to diseases and parasites.
- Application of new knowledge and techniques to modify plants and animals so as to improve production efficiency, nutritional quality and safety of food, and U.S. competitiveness in export markets.

**ARS Global Climate Change Research Program**

- Climate and hydrologic systems that will affect policy responses to greenhouse and atmospheric warming, water supplies, food security, biochemical dynamics, ozone depletion, biological productivity and diversity, and forestation.
- Ecological systems and dynamics and causes and effects related to how ecosystems cause global change and how they are affected by global change.

**ARS Utilization Research Program**

- Substantial-value-added products such as chemical pesticide substitutes, edible films, biodegradable industrial and food products, industrial enzymes, and food additives.
- High-value-added products such as biomedical and veterinary products, essences, attars, and flavors.
- Moderate-value-added products such as bulk fermentation chemicals and replacements for significant imports such as latex, vegetable gums, and specialty vegetable oils.

**High-Priority ARS  
Crosscutting  
Programs****Food Safety**

- Reduction or elimination of introduced toxicants, with emphasis on chemical contaminants, mycotoxins, and toxin-producing and pathogenic microorganisms.
- Reduction or elimination of toxins that occur naturally in plants and cause stock losses in animal production, transfer to animal products, or occur in plants that are directly consumed by humans and are potentially significant to human health.

**Improved Human Nutrition and Health**

- Definition of human nutritional requirements for optimal function and safe limits of energy and nutrient intakes through the life cycle, with emphasis on infants, pregnant and lactating women, and the elderly.
- Research on molecular and cellular basis of human nutrition to yield data applicable to reduction of risks associated with obesity and chronic disease.
- Research to determine the bioavailability of nutrients important to health in agricultural products as eaten.
- Development of methods to assess marginal nutritional status under field conditions.
- Development of biotechnology, management, and processing strategies to change food production systems that will enhance the nutritional value of animal and plant foods.

**Water Quality Protection**

- Research to assess agricultural effects on water quality, with emphasis on fundamental processes affecting fate and transport of agricultural chemical contaminants and evaluation of current agricultural practices.
- Development of new agricultural practices and systems to remediate or preclude water quality problems in cropping areas and to reduce effects on other ecosystems.

**Environmentally Compatible Pest Control**

- Fundamental research to unravel complexities of microbial and other biological associations that affect efficacy of biological control agents.
- Development of new systems for pest management designed to keep pest populations below the economic damage threshold, including host genetic resistance.
- Development of crop cultural practices complementary to cultivars with genetic resistance to pests.
- Research leading to development of alternative disease management strategies.



## Section IV. Implementation Strategy 1992-1998

1. ARS will continue to carry out that research necessary to solve specific, identified problems. ARS will use a total quality management (TQM) and integrated systems-based approach to research planning.
2. ARS will continue to depend on sustained appropriated funds for its base programs.
3. ARS will aggressively seek annual budget increases to address new priority research needs and to strengthen important base programs.
4. ARS will seek outside funding support to supplement or accelerate in-house programs consistent with base-funded project objectives and the accountability requirements of the Department, Congress, and research users.
5. ARS will not depend on new or outside funds alone to address priority research, but will manage and effectively deploy its existing base resources to address its most important research objectives and approaches.
6. ARS will maintain research projects at well-funded levels adjusted for inflation (current projections are \$250,000 per year for each career scientist). Resource redeployment decisions will use established decision criteria.
7. ARS will develop means to implement long-range workforce planning to meet the challenges of projected scientific needs, increase cultural diversity and achieve other Equal Employment Opportunity objectives, and properly reward its scientists for contributions to achieving ARS' mission, goals, and objectives.
8. ARS will systematically upgrade and modernize its facilities and seek budget allocations to augment its limited base resources for this purpose.
9. ARS will develop multiyear operational planning by line (area) management and integrate its planning process into long-range strategic planning.
10. ARS will improve its support functions, especially the technology transfer operations, to achieve planned agency goals and objectives.



United States  
Department of  
Agriculture

Agricultural  
Research  
Service

April 1993

Addendum to—

# **Agricultural Research Service Program Plan**

Implementation Plan—



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## Addendum to— Agricultural Research Service Program Plan 6-Year Implementation Plan—1992-1998

### Introduction

The Agricultural Research Service (ARS) Implementation Plan is a principal means of informing ARS personnel, users, Congress, and other interested parties about the agency's research program objectives. This addendum supplements the 1992-1998 plan,<sup>1</sup> the third in a series since 1984.<sup>2,3</sup> The 1992-1998 plan and this addendum establish areas of research emphasis in response to changing national needs and priorities and outline the strategies and policies ARS will use to achieve them. The primary objectives of this addendum are to quote the purposes of agricultural research set out in the 1990 Farm Bill<sup>4</sup> and to state ARS policies that address these purposes.

As the in-house research arm of the U.S. Department of Agriculture, ARS' mission is to:

*Develop new knowledge and technology needed to solve technical agricultural problems of broad scope and high national priority in order to ensure adequate production of high-quality food, fiber, and other agricultural products to meet the nutritional needs of the American consumer, to sustain a viable food and agricultural economy, and to maintain a quality environment and natural resource base.*

ARS has primary responsibility to:

- Provide initiative and leadership in agricultural research.
- Conduct research on broad regional and national agricultural and related problems.
- Conduct research in support of Federal action and regulatory agencies.
- Provide technical expertise to meet national food, food safety, and environmental emergencies.
- Serve as an agricultural science resource to the executive and legislative branches.

<sup>1</sup> Agricultural Research Service Program Plan, 6-Year Implementation Plan, 1992-1998. U.S. Department of Agriculture, Agricultural Research Service. 1991.

<sup>2</sup> Agricultural Research Service Program Plan, 6-Year Implementation Plan, 1984-1990. U.S. Department of Agriculture, Agricultural Research Service. 1983. (Out of print.)

<sup>3</sup> Agricultural Research Service Program Plan, 6-Year Implementation Plan, 1986-1992. U.S. Department of Agriculture, Agricultural Research Service. 1985. (Out of print.)

<sup>4</sup> Public Law 101-624; November 28, 1990. Food, Agriculture, Conservation, and Trade Act of 1990.

ARS programs are centrally planned and coordinated. The agency manages the scientific and operational activities of 127 locations, which comprise a network of geographically dispersed national and overseas laboratories. As a national research organization, ARS provides:

- Ability to perform long-term, high-risk research.
- Ability to respond to both stable and rapidly changing technical goals.
- An organizational structure ensuring research program accountability and coordination.
- Ability to focus research on gaps in knowledge that are barriers to solving problems.
- Capability to form, disband, or coordinate interdisciplinary or multilocation research teams from a large, diverse scientific workforce of over 2,600 research scientists, including postdoctoral research associates.

For research planning and resource allocation, the ARS program is divided into six areas, called objectives:

Objective 1—Soil, water, and air conservation

Objective 2—Plant sciences

Objective 3—Animal sciences

Objective 4—Commodity conversion and delivery

Objective 5—Human nutrition

Objective 6—Integration of systems

The objectives are further divided into problem areas and scientific approaches.

## **Purposes of Agricultural Research**

Section 1402 of the 1990 Farm Bill (Public Law 101-624, Food, Agriculture, Conservation, and Trade Act of 1990) states:

Subject to the varying conditions and needs of States, Federally funded agricultural research and extension programs shall be designed to, among other things, accomplish the following—

- (1) continue to satisfy human food and fiber needs;
- (2) enhance the long-term viability and competitiveness of the food production and agricultural system of the United States within the global economy;
- (3) expand economic opportunities in rural America and enhance the quality of life for farmers, rural citizens, and society as a whole;
- (4) improve the productivity of the American agricultural system and develop new agricultural crops and new uses for agricultural commodities;

- (5) develop information and systems to enhance the environment and the natural resource base upon which a sustainable agricultural economy depends; or
- (6) enhance human health—
  - by fostering the availability and affordability of a safe, wholesome, and nutritious food supply that meets the needs and preferences of the consumer; and
  - by assisting farmers and other rural residents in the detection and prevention of health and safety concerns.

## ARS Policies

Congress has established the above national agricultural research purposes to ensure that ARS and other federally funded agricultural research is directed toward benefiting the public and society in its entirety, including advancing the goals of agricultural sustainability and economic opportunities in family farming and rural communities.

### Therefore:

Within the scope of ARS' mission, responsibilities, and program objectives, all ARS research projects are to be directed to one or more of these purposes.

The agency will establish program criteria related to these purposes to guide the peer review and approval processes for all new and revised research projects in ARS.

ARS scientists and program officials will classify and code all research projects according to their relevance to these purposes.

ARS scientists and program officials will interpret research findings according to their relevance to these purposes and will direct technology transfer activities to advance the goals of these purposes.

ARS program officials will set research priorities and support research projects that advance the national research purposes.

ARS scientists and research units will be recognized and rewarded for their achievements in advancing the goals of the purposes through established mechanisms for personnel and program evaluation.

1. **What is the current implied dollar value? That is, how much will it cost to finish CSRS facilities which are already in the hopper at the Department?**

According to CSRS records, it will cost \$264.9 million to complete these facilities. According to institutional records, it will cost \$390.4 million.

2. **What kind of facilities program would you prefer at the Department? Would you prefer some kind of competitive program? Please describe what you envisioned the competitive facilities grant program proposed in 1992 would become.**

We would prefer a competitive facilities grant program such as the one requested by the President in the FY 1992 budget proposal. This would:

- force our systemwide partners to address national or regional issues rather than local ones and promote regional and national collaboration among these institutions. This approach also would allow institutions to find their own niches of excellence rather than trying to develop expertise in every arena.
- improve institutional and national quality by forcing them to operate within a scientifically competitive, rather than a political framework.
- restore equity to the system by ensuring that all applicants are accorded the same treatment.
- allow the most meritorious projects to be funded as determined by panels of renowned scientists using program-related criteria.
- permit the award of federal matching support at the outset of a project rather than providing incremental support over a number of years. This will avoid a potentially large outyear commitment.

The program would operate under the authority of the Research Facilities Act of 1963. This statute authorizes grants program for the construction and remodeling of laboratories and other facilities and the acquisition of scientific instrumentation to enable eligible institutions to more effectively conduct research in the food and agricultural sciences.

The program would be carried out in two phases. The first phase would involve a pre-screening of proposals. Applicants whose projects are judged to be the

most competitive would be invited to submit fully developed proposals for a second round of merit review.

Within the context of available funding, the most meritorious projects would be selected for funding.

Both phases would be subjected to rigorous merit evaluation using established criteria:

- Degree to which the programs to be housed in the facility address high-priority national needs for the food and agricultural sciences as identified in the systemwide strategic plan, the Joint Council, and the U.S. Department of Agriculture.
- Expected contribution of the facility toward meeting national, regional, and institutional research and research training needs in the food and agricultural sciences.
- Quality and experience of the scientific staff to be housed in the facility sufficient to carry out the research proposed.
- Evidence of the institution's commitment and capacity to provide the faculty and staff, operating funds, and graduate students necessary to support a quality program in the proposed facility over an extended period.
- Qualifications and experience of key project personnel to plan and manage the construction effort, including near-term occupancy.
- Reasonableness of the budget request and evidence of the applicant's ability and willingness to provide matching funds.

Post-award administration would be accomplished through performance reports and periodic on-site visits.

3. According to your testimony, Congress requests that a report be submitted prior to the appropriation of funds for any project. What is included in these reports?

- Brief background and history of the institution and project.

- Program description outlining the research, education, and/or extension effort proposed.
- Impact of the project on current and future needs in the food, agricultural, and natural resource sciences. This section includes whether or not the project lies within the mission of USDA. This is a statutory requirement that is articulated in the annual appropriations language.
- Facility plan. This includes the priority of the project on the institution's master plan, site plan, facility layout, and space allocation plan.
- Breakdown of project costs.
  - Federal and non-federal shares.
  - Source of non-federal matching.
  - Post-occupancy operating costs.
- Timetable for facility completion.
- Institutional commitment, including assurance of continued support for programs to be housed in the facility.
- Management structure.
- Alternatives considered by the institution in arriving at present plan.
- The institution's contingency plan in case federal funds are not appropriated.
- Conclusions.
  - Quality of proposed research program.
  - Relationship of project to national needs.
  - Adequacy of professional staff.
  - Duplication of other facilities elsewhere.
- Recommendation.



4. When you do site reviews how frequently are negative reports sent to Congress? What proportion of projects where you do site reviews do you reject?

To date, approximately 10% of reports submitted to Congress have been negative. Another 15-20% of projects have had major deficiencies.

5. Do you consider these site reviews to be legitimately peer reviewed?

Yes, we do. Members of all site visit teams are chosen based upon their demonstrated expertise in the field of science represented by the individual project to be evaluated or upon their administrative knowledge. They are also selected for their familiarity with the mission of USDA and their broad knowledge of national needs as articulated in our strategic plan.

6. Can you please give us some examples of recent negative reports?

The following negative reports were recently forwarded to Congress:

- Wellness Center at *Wallace State Community College*. This project involves the construction of a physical education building to support the college's physical education and athletic program. It is clearly outside the mission of USDA.
- Center for Rural Health and Epidemiology at *Georgia Southern University*. This project involves the construction of a facility designed primarily to support medical and non-agriculture programs. As their match, they plan to use a performing arts center, which is not acceptable because it is clearly outside the scope of the project and the mission of USDA.

7. Matching federal funds with institutional funds appears to be a good way to assure partnership under the Buildings and Facilities Program. Would you outline how the matching requirement is administered?

In accordance with Conference language, we require grantees to provide at least a 50/50 match from non-federal sources and have made it clear to grantees that cash is the preferred method of matching. We specify acceptable matching contributions in our annual program guidelines, which are provided to all grantees. Each grant award specifies the donations that are allowable under the individual project.

We require verification of all matching contributions. For example, if a State appropriates funds, we require a copy of the appropriations language; for in-kind donations, we require a certified copy of the independent appraisal. Costs that cannot be validated are unallowable. Follow-up is provided through post-award site visits and audit.

8. We have heard that medical schools have been using the Buildings and Facilities Program to build medical facilities. Can you give some examples of this?

Several medical schools have applied to this program for funding to construct medical facilities. For example:

- The *University of Texas Southwestern in Dallas* applied for support in FY 1989, and an initial \$950,000 was appropriated by Congress to begin the planning phase. This project consisted of a referral tertiary care teaching hospital for the university's Bowman-Gray School of Medicine that was 82% complete at the time of the on-site merit evaluation. Funding was not continued and the original appropriation was redirected.
- *Wake Forest University* applied for support in FY 1990, and approximately \$2.8 million was appropriated to start the process. The project consists of an addition to the university's Bowman-Gray School of Medicine. A portion of the program deals with nutrition research, but the primary thrust is on chronic disease prevention in humans, primarily heart disease, cancer, and stroke.
- The *Medical College of Wisconsin in Milwaukee* applied for funding in FY 1991, and an on-site merit evaluation of the project was conducted in the Spring of that year. The College requested funds to build a new library-type facility to house programs in informatics, medical services evaluation, bioethics, and academic support systems. The thrust of the program was to link rural health care providers through information systems. Funding was never provided for this facility.
- The *University of North Dakota School of Medicine at Grand Forks* also applied for funding in FY 1991, and almost \$2.9 million was appropriated to begin the effort. The purpose of the program is to train third- and fourth-year medical students to serve as family practitioners in small communities. The distinguishing feature of this program is its focus of providing 45 health

care centers in small communities to train medical students, one of the most viable means to sustain rural America. In addition, on nutrition and safety issues relating to farmers and other rural residents was addressed; consequently, a positive report was submitted for this project.

9. **Can you please send us a current list of the facilities in the program for the record?**

The list is as follows:

Cooperative State Research Service  
United States Department of Agriculture

**ACTIVE FACILITIES PROJECTS**  
(\$000)

<u>Facility/Institution</u>	<u>Total Cost</u>	<u>Fed. Approp. To Date</u>	<u>Federal Funding Source</u>
Center for Food Animal Production, Research and Service Tuskegee University	6,671	6,671	ARS/CSRS Bldgs. & Facilities
Wellness Center Wallace State Comm. Coll. (Alabama)	2,950	(a)	CSRS Buildings and Facilities
Environmental Stress Laboratory University of Arizona	4,000	1,200	CSRS Buildings and Facilities
Ctr. for Alternative Pest Control Research University of Arkansas	5,000	1,731	CSRS Buildings and Facilities
Livestock Research & Activity Complex University of Arkansas	4,245	(a)	CSRS Buildings and Facilities
Poultry Center for Excellence University of Arkansas	22,000	9,989	CSRS Buildings and Facilities
Poultry Disease Research Center University of Arkansas	1,530	1,409	ARS/CSRS Bldgs. and Facilities
Rice Germplasm Evaluation and Enhancement Center University of Arkansas	5,208	1,654	ARS Buildings and Facilities
Alternative Pest Control Containment and Quarantine Facility University of California	35,000	385	CSRS Buildings and Facilities
Grape Importation and Clean Stock Facility University of California	6,515	3,216	CSRS Buildings and Facilities

<u>Facility/Institution</u>	<u>Total Cost</u>	<u>Fed. Approp. To Date</u>	<u>Federal Funding Source</u>
Animal Reproduction and Biotechnology Laboratory Colorado State University	6,658	(a)	CSRS Buildings and Facilities
Poultry Biocontainment Laboratory University of Delaware	7,000	(a)	CSRS Buildings and Facilities
Agricultural Biotechnology Institute University of Florida	11,986	5,986	ARS/CSRS Bldgs. and Facilities
Center for Rural Health & Epidemiology Georgia Southern University	35,600	(a)	CSRS Buildings and Facilities
Center for Advanced Water Technology and Energy Systems Savannah State College	2,715	512	CSRS Buildings and Facilities
Biocontainment Research Center University of Georgia	16,000	3,919	ARS/CSRS Bldgs. and Facilities
Environmentally Sound Production Agriculture Laboratory University of Georgia	6,736	3,368	CSRS Buildings and Facilities
Vidalia Onion Storage Research Fac. University of Georgia	838	419	CSRS Buildings and Facilities
Center for Tropical and Subtropical Agriculture University of Hawaii	28,728	13,999	CSRS Buildings and Facilities
Agricultural Biotechnology Facilities University of Idaho	12,153	1,521	CSRS Buildings and Facilities
Biotechnology Center Northwestern University (Illinois)	24,400	1,117	CSRS Buildings and Facilities
National Soybean Laboratory University of Illinois	11,150	5,160	ARS/CSRS Bldgs. and Facilities
Indiana Inst. for Molecular & Cellular Biology Indiana University	12,810	6,405	CSRS Buildings and Facilities

<u>Facility/Institution</u>	<u>Total Cost</u>	<u>Fed. Approp. To Date</u>	<u>Federal Funding Source</u>
Nat. Center for Food and Industrial Agriculture Products Iowa State University	28,000	14,728	ARS'/CSRS Bldgs. and Facilities
World Food and Agriculture Capitol World Agric. Dvlpmt. Found. (Iowa)	296,258	(a)	CSRS Buildings and Facilities
Plant Science Research Center Kansas State University	23,800	11,016	ARS'/CSRS Bldgs. and Facilities
Alternative Fuels Testing Facility Pittsburg State University (Kansas)	3,372	50	Special Research Grants Program
Further Processing Facility Northwestern State Univ. (Louisiana)	12,000	(a)	CSRS Buildings and Facilities
Red Meat Processing Facility Northwestern State Univ. (Louisiana)	185	(a)	CSRS Buildings and Facilities
Bldg. Consolidation (Aroostook Farm) University of Maine	3,704	926	CSRS Buildings and Facilities
Masardis Research Farm Maine Dept. of Agriculture	382	271	CSRS Buildings and Facilities
Wood Processing Facilities University of Maine	5,460	(a)	CSRS Buildings and Facilities
Institute for Natural Resources and Environmental Science University of Maryland	21,100	1,862	CSRS Buildings and Facilities
Center for Hunger, Poverty, and Nutrition Policy Tufts University (Massachusetts)	28,272	1,046	CSRS Buildings and Facilities
Food Toxicology Center Michigan State University	48,596	24,298	ARS'/CSRS Bldgs. and Facilities
Biological Technology Center for Water and Wetlands Resources University of Mississippi	6,600	186	CSRS Buildings and Facilities

Facility/Institution	Total Cost	Fed. Approp. To Date	Federal Funding Source
Ctr. for the Technological Development of Natural Products University of Mississippi	26,335	19,057	ARS/CSRS Bldgs. and Facilities
Biosciences Research Center University of Missouri	57,456	(a)	CSRS Buildings and Facilities
Meat Science and Safety Center University of Missouri	4,856	(a)	CSRS Buildings and Facilities
Bioscience Research Center Montana State University	16,000	3,524	ARS/CSRS Bldgs. and Facilities
National Ctrs. for Advanced Technology University of Nebraska	28,300	12,212	ARS/CSRS Bldgs. and Facilities
Center for Molecular Biology Rutgers University (New Jersey)	84,600	8,600	ARS/CSRS Bldgs. and Facilities
Biochemistry & Biology Field Research Station University of Nevada	930	465	CSRS Buildings and Facilities
Center for Arid Land Studies New Mexico State University	19,112	(a)	CSRS Buildings and Facilities
Library/Herbarium New York Botanical Garden	26,000	5,047	CSRS Buildings and Facilities
Research Greenhouse Cornell University	1,576	750	CSRS Buildings and Facilities
Center for Research on Human Nutrition and Chronic Disease Prevention Wake Forest Univ. (North Carolina)	99,577	8,362	CSRS Buildings and Facilities
Institute for Agricultural and Rural Human Resource Development Minot State University (North Dakota)	10,300	2,179	CSRS Buildings and Facilities
Animal Care Facility North Dakota State University	10,000	250	CSRS Buildings and Facilities

<b>Facility/Institution</b>	<b>Total Cost</b>	<b>Fed. Approp. To Date</b>	<b>Federal Funding Source</b>
Seed Research and Regulatory Facility North Dakota State University	2,000	931	CSRS Buildings and Facilities
Food Processing Pilot Plant Northern Crops Institute, NDSU	1,478	750	CSRS Buildings and Facilities
Institute for Agricultural Health Sciences and Rural Medicine University of North Dakota	19,574	9,137	CSRS Buildings and Facilities
Lake Erie Soil and Water Research and Education Center University of Toledo	5,600	(a)	CSRS Buildings and Facilities
Plant Sciences Research Facility University of Toledo	1,024	512	CSRS Buildings and Facilities
Animal Care Facility Oklahoma State University	1,100	571	ARS'/CSRS Bldgs. and Facilities
Beef Cattle Research Facility Oklahoma State University	1,420	(a)	CSRS Buildings and Facilities
Seafood Research Laboratory Oregon State University	4,360	2,041	CSRS Buildings and Facilities
Center for Food Marketing St. Joseph's Univ. (Pennsylvania)	25,600	5,646	CSRS Buildings and Facilities
Coastal Institute on Narragansett Bay University of Rhode Island	41,194	2,835	CSRS Buildings and Facilities
Northern Plains Biostress Laboratory South Dakota State University	12,600	6,139	CSRS Buildings and Facilities
Horticulture Public Service Research and Education Center Middle Tennessee State University	600	(a)	CSRS Buildings and Facilities
Nursery Crop Research Station Tennessee State University	3,400	1,288	CSRS Buildings and Facilities



Facility/Institution	Total Cost	Fed. Approp. To Date	Federal Funding Source
Agricultural, Biological, and Environ. Research Complex University of Tennessee	38,500	1,722	CSRS Buildings and Facilities
Center for Southern Crop Improvement Texas A&M University	14,106	(a)	CSRS Buildings and Facilities
Institute of Biosciences and Technology Texas A&M University	25,000	12,472	ARS <sup>1</sup> /CSRS Bldgs. and Facilities
Biotechnology Laboratory Utah State University	7,113	1,702	CSRS Buildings and Facilities
Agricultural Biotechnology Facility Virginia Polytechnic Institute	9,000	3,081	ARS <sup>1</sup> /CSRS Bldgs. and Facilities
Animal Disease Biotechnology Facility Washington State University	50,762	5,588	CSRS Buildings and Facilities
Research Greenhouse Madison, Wisconsin	323	323	ARS Buildings and Facilities
Agricultural Biotechnology & Genetics Facility University of Wisconsin	27,745	12,796	ARS <sup>1</sup> /CSRS Bldgs. and Facilities
Natural Resources Building Addition University of Wisconsin	9,650	86	CSRS Buildings and Facilities
Environmental Simulation Facility University of Wyoming	<u>18,863</u>	<u>931</u>	CSRS Buildings and Facilities
<b>Total (72 projects)</b>	<u><u>1,453,676</u></u>	<u><u>252,041</u></u>	

**Footnotes:**

(a) Report requested by Congress; no funds appropriated.

<sup>1</sup> Funds appropriated under ARS Buildings and Facilities Account; project administered by CSRS.

**Facilities That Support High-priority Research Needs  
of Agriculture, Food and Natural Resources**

University of Arizona - Environmental Stress Laboratory  
University of Arkansas - Poultry Center for Excellence  
University of Arkansas - Center for Alternative Pest Control Research  
University of Arkansas - Poultry Disease Research Center  
University of Arkansas - Rice Germplasm Evaluation/Enhancement Center  
University of California - Grape Importation/Clean Stock Facility  
University of California - Alternative Pest Control Containment/Quarantine Facility  
Colorado State University - Animal Reproduction and Biotechnology Lab  
University of Delaware - Poultry Biocontainment Lab  
University of Florida - Agricultural Biotechnology Institute  
University of Georgia - Environmentally Sound Production Agriculture Lab  
University of Georgia - Biocontainment Research Center  
University of Hawaii - Center for Tropical and Subtropical Agriculture  
University of Idaho - Agricultural Biotechnology Facility  
Northwestern University (IL) - Biotechnology Center  
University of Illinois - National Soybean Laboratory  
University of Indiana - Indiana Institute for Molecular and Cellular Biology  
Iowa State University - National Center for Food and Industrial Agriculture Products  
Kansas State University - Plant Science Research Center  
University of Maryland - Institute for Natural Resources and Environmental Science  
University of Mississippi - Center for Technological Development of Natural Products  
University of Mississippi - Biological Technology Center for Water/Wetlands Resources  
Montana State University - Bioscience Research Center  
Rutgers University (NJ) - Center for Molecular Biology  
New Mexico State University - Center for Arid Land Studies  
Cornell University (NY) - Research Greenhouse  
New York Botanical Garden - Library/Herbarium  
North Dakota State University - Seed Research and Regulatory Facility  
University of North Dakota - Institute for Agricultural Health Sciences/Rural Medicine  
Oklahoma State University - Beef Cattle Research Facility  
Oregon State University - Seafood Research Laboratory  
University of Rhode Island - Coastal Institute on Narragansett Bay  
South Dakota State University - Northern Plains Biostress Laboratory  
University of Tennessee - Agricultural, Biological, and Environmental Research Complex  
Texas A&M University - Center for Southern Crop Improvement  
Texas A&M University - Institute of Biosciences and Technology  
Utah State University - Biotechnology Laboratory  
Virginia Tech - Agricultural Biotechnology Facility  
Washington State University - Animal Disease Biotechnology Facility

University of Wisconsin - Natural Resources Building Addition  
 University of Wisconsin - Agricultural Biotechnology and Genetics Facility  
 Barley/Malt Lab, ARS/USDA - Research Greenhouse  
 University of Wyoming - Environmental Simulation Facility

**Facilities That are A Lower Priority, of Local Support Primarily,  
 or Those That Only Partially Address the Mission of the USDA**

Tuskegee University - Center for Food Animal Production, Research and Service  
 University of Arkansas - Livestock Research and Activity Center  
 Savannah State College (GA) - Center for Advanced Water Technology/Energy Systems  
 University of Georgia - Vidalia Onion Storage Research Facility  
 Pittsburgh State University (KS) - Alternative Fuels Testing Facility  
 Northwestern State University - Further Processing Facility  
 Northwestern State University - Red Meat Processing Facility  
 Maine Dept. of Agriculture - Masardis Research Farm  
 University of Maine - Building Consolidation  
 University of Maine - Wood Processing Facilities  
 Tufts University - Center for Hunger, Poverty and Nutrition Policy  
 Michigan State University - Food Toxicology Center  
 University of Missouri - Biosciences Research Center  
 University of Missouri - Meat Science and Safety Center  
 University of Nebraska - National Centers for Advanced Technology  
 University of Nevada - Biochemical and Biology Field Research Station  
 Wake Forest (NC) - Center for Research on Human Nutrition/Chronic Disease Prevention  
 North Dakota State University - Animal Care Facility  
 Northern Crops Institute (ND) - Food Processing Pilot Plant  
 University of Toledo (OH) - Plant Sciences Research Facility  
 Oklahoma State University - Animal Care Facility  
 Middle Tennessee State University - Horticulture Public Service Research and Education  
 Tennessee State University - Nursery Crop Research Station

**Facilities That Are Not in the Mission of USDA**

Wallace State Community College - Wellness Center (physical education building)  
 Georgia Southern University - Center for Rural Health and Epidemiology  
 World Agriculture Development Foundation (IA) - World Food and Agriculture Capitol  
 Minot State University - Institute for Agricultural/Rural Human Resource Development  
 University of Toledo - Lake Erie Soil/Water Resource and Education Center  
 St. Joseph's University (PA) - Center for Food Marketing

BY

**DR. C. PETER MAGRATH**  
**PRESIDENT,**  
**NATIONAL ASSOCIATION OF STATE UNIVERSITIES**  
**AND LAND-GRANT COLLEGES**

Mr. Chairman, distinguished members of the subcommittee, I am C. Peter Magrath, President of the National Association of State Universities and Land-Grant Colleges (NASULGC). I am pleased to submit this testimony to emphasize again the critical national problem of the erosion suffered by our national agricultural research infrastructure due to funding neglect over the past two decades.

In my statement today, I will (1) summarize the current status of the problem, (2) comment briefly on the present methods of appropriating funds for agricultural research facilities, and (3) summarize the earlier proposal made jointly by USDA and NASULGC for a competitive grants program to partly fund such facilities.

**The Problem:** Modern agriculture is science-based. Just as our current capacity to produce rests on knowledge developed in the past, the ability of American agriculture to meet the future challenges of nature and global markets will depend on the quality, quantity and availability of new research knowledge. And, just as current knowledge and technology were achieved through prior agricultural science and education investments, future knowledge will depend on the investments we make now and in the near term. These investments include support for ongoing and future agricultural research, the training of talented agricultural scientists, and for the research tools -- laboratories and equipment needed by agricultural scientists to conduct relevant quality research.

Unfortunately, every analysis of the national effort in agricultural science and education concludes that we are underinvesting in all three areas of education, research and extension. Here, I will focus on the special problem of research infrastructure -- the buildings, facilities and equipment that are requisite for quality research. Clearly, the condition and capacity of the national research infrastructure is a major factor in the efficiency and effectiveness of research and in recruiting quality graduate students. **Major investments are needed now to assure future research capacity as well as to secure a strong and vital education effort for the future.**

Both the condition and the capacity of our national research infrastructure are in need of immediate attention. The general underinvestment in agricultural research for the past two decades has forced university research administrators to use their scarce resources to sustain research programs, often at the expense of the maintenance of the research infrastructure. Nearly every agricultural research facility in the nation has a backlog of needed facility renovations and new research facility construction projects that they have had to defer.

**Current Appropriations:** To address this growing problem, many universities have resorted to individual funding initiatives with Congress. A sharp increase in such activities has occurred over the past several years. Many, if not most, of these projects are reasonable investments when considered in isolation. However, there are a growing number of proposals for facility projects which are only vaguely related to agriculture and that are competing with mainstream proposals. There is not a method currently in use to assure an effective linkage between strategic national priorities for new knowledge and technology and decisions on federal funding of new facilities and equipment. Additional funding of almost \$500 million would be required to fully fund (as requested) all the projects which have already received some federal funds for planning, design or initial construction.

**The Previous Proposal:** Two years ago, NASULGC endorsed a proposal for federal investment in agricultural research facilities that was recommended by a USDA/NASULGC committee of distinguished scholars and administrators (attachment 1). This plan would establish a competitive grants program under authority of the Research Facilities Act of 1963, as amended, and called for a collaborative priority-setting effort involving NASULGC, USDA and the Congress. However, the Strategic Research Plan of the Experiment Station Committee on Organization and Policy and the Cooperative State Research Service is now in place and is the functioning mechanism for establishing national strategic research priorities for the land-grant universities in their relationship with USDA. It is based on a broad consensus among both the users and performers of research. I believe this can be used to establish priorities for facilities and equipment needs of the system. Using this as the mechanism for identifying priorities, I would commend the earlier NASULGC/USDA proposal to the committee as one mechanism for providing federal support.

Finally, Mr. Chairman, I respectfully request that along with my statement, you receive a written statement for the record from Mr. Charles Schroeder of Nebraska. Mr. Schroeder is a dedicated member of our citizens' advocacy group called "CARET" and he presents some observations on the state of university research facilities from the perspective of an "end-user" of agricultural research. I hope that you will agree to accept Mr. Schroeder's written testimony for the record.

Mr. Chairman, I want to express deep appreciation on behalf of NASULGC for your initiative to address the serious problem of eroding agricultural research facilities. To be sure, there are creative ways to approach this situation other than those that I proposed here today. But the important point is that it is in the nation's interest to act quickly to correct the current practice of random congressional initiatives and get onto a planned program based on long-range national planning and priority-setting. Thank you for giving me this time before you today.

ATTACHMENT**"RESEARCH FACILITIES PROGRAM - A PROPOSAL**

It is proposed that Congress establish a competitive facility grants program under the authority of the Research Facilities Act of 1963, as amended. The program should have two major components:

- I. Competitive facility grants open to all eligible cooperating institutions. The larger component of the program would be allocated 80% of the available funds.
- II. Competitive facility grants for smaller or emerging cooperating institutions. This component would be allocated 20% of the available funds. Institutions within this program would only compete with similar institutions; however, the procedures and other requirements would be the same as for the above component.

The total program should be a coordinated federal/state effort with an open, competitive selection process that will embody the following principles:

- The program should include a system for establishing priority research areas and issues.
- Solicitation of grant proposals should provide equal opportunity for all eligible and qualified institutions.
- Selection should be on a competitive, merit review basis to assure scientific quality and evidence of the institutional capacity and commitment.
- All grants will require an equal match of non-federal funds.
- Provision to assure that smaller or emerging institutions are not excluded from the program is made as noted in II. above.
- Because of the diversity and geographic distribution of agriculture, consideration of unique commodity and geographic factors may be considered in establishing priorities and selection of projects.

To implement the program within the above principles, it is proposed that:

1. The Secretary of Agriculture, in consultation with the Joint Council on Food and Agricultural Sciences, shall develop a ranked list of priority research areas in which there are significant shortages of research facilities or equipment in the system.

2. The list of priority research facility needs would be made available to eligible institutions annually.
3. Institutions submitting proposals for facility grants under the program should submit the following information:
  - a. Evidence that the research program to be conducted in the proposed facility is consistent with the institution's current and projected research program.
  - b. Evidence that the proposed facility, research program, and building design have been approved by the institution's central administration.
  - c. Where applicable, evidence that the state will accept the increased costs and support associated with maintenance of the proposed facility.
  - d. Evidence of the institution's commitment and capacity to provide the faculty, support staff, operating funds, and graduate students (as appropriate) necessary to support a quality program in the proposed facility.
  - e. An outline of the proposed administrative structure and environment to encourage the formation of cross-disciplinary teams necessary to address priority research problems.
  - f. Certification that the institution can and will meet the non-federal funds matching requirement of grants under the program and identify the source of the matching funds.
4. The Secretary of Agriculture, in consultation with the President of the National Association of State Universities and Land-Grant Colleges, shall name Merit Review Panels to review and rank submitted proposals for funding. The panels should consider the following:
  - a. Whether the outlined research programs and the identified facility needs fit the priority research area under which the proposal was submitted.



- b. If the proposed research program/facility have technical merit and whether the proposed research is appropriate for the institution's research objectives.
  - c. The national level of funding available from public sources for the proposed research program. (This is to guard against over investment in some areas.)
  - d. Determine the projected benefits that will result from the proposed research activity, including contributions to regional and national agricultural growth and adjustment.
  - e. Determine, in the case of smaller or emerging institutions, the acceptability and reasonableness of the proposed method of matching the federal funds.
5. The Secretary of Agriculture shall institute an independent process to conduct feasibility studies and on-site evaluations of all proposals recommended for funding. The costs incurred for such feasibility studies and site evaluations shall be borne by the applicant. Successful applicants may apply such costs as part of their required non-federal match.

### CONCLUSION

The overriding objective of this proposal is to specify ways to improve the research and graduate student training capacity of the public agricultural research system to ultimately improve the competitive position and profitability of U.S. agriculture. Improved coordination and enhanced efficiency in the use of federal and state research facility funds will result in a more effective research response to the increasingly complex problems facing U.S. agriculture. National investment in agricultural research facilities will assist agriculture in cost control, product and market development, and the safer, more effective use of our resources. All are essential if the United States is to have a viable, sustainable, profitable agricultural industry in the 21st century."

Copies of the original report of the Special USDA/NASULGC Committee entitled "American Agriculture in the 21st Century Depends on Current Research Investments" are available from:

NASULGC Board on Agriculture  
Suite 710  
1 Dupont Circle, NW  
Washington, DC 20036-1191  
Telephone: (202) 778-0858

Questions and Answers  
Re  
Testimony on

**Setting Priorities for Agricultural Research Facilities**

June 17, 1993

Answers Prepared by

C. Peter Magrath, President  
National Association of State Universities  
and Land Grant Colleges

1. **Who or what is responsible for our current facility dilemma?**

As presented in my testimony, many of the facilities for conducting agricultural research in our system were built more than thirty years ago and must either be replaced or refurbished to provide the capability to conduct modern agricultural research. Similarly, cutting edge research in agriculture, as in other areas of science, requires a new level of sophistication with equipment that must often be replaced as often as every five years to maintain the state of the art. Most state budgets for agricultural research have undergone substantial reductions, a situation which has prevailed in some states for many years and has become much more wide spread in the last three years. Responsibility for the "dilemma" must be shared by many. Both federal and state funds have been inadequate to maintain ideal programs of repair and replacement in many institutions, resulting in a bow-waving of deferred maintenance that compounds with time. Similarly, programs to replace aging facilities have been deferred and the need to provide new facilities for a more sophisticated kind of agricultural science has not been adequately met. One overriding problem is that there has not been in place a program to provide funds for agricultural research equipment and facilities that provided a mechanism for the federal government to provide its share of support for this part of the total program.

2. **Why is it important to balance facility funding with the National Research Initiative Competitive Grants Program?**

The growth of the NRI should not be the sole criterion for determining the need for new equipment and facilities for agricultural research, nor should it be the only program in USDA that relates to the facilities issue. The rationale is simply that, if the federal government intends to sponsor an increased scope of effort in agricultural research, on balance, it should share in funding the needed expansion of facilities in which this research will be done. This connection was first proposed when it was the recommendation of the

Administration, as authorized by the 1990 Farm Bill, that the NRI would grow over the next few years to be funded at \$500 million per year. If this occurs, as is still proposed by the new Administration, then the NRI would certainly represent one of the largest growth areas in the university based resources for agricultural research.

3. **How much of a priority should be placed upon renovation of existing facilities as opposed to new construction?**

I am not aware of an inventory of existing facilities for agricultural research done on a national scale that would allow one to provide a quantitative answer to this question. Historically, universities have tended to do minor maintenance and refurbishment of facilities with their own core resources, seeking special funding from either state or federal sources for major modification of existing structures and new facilities. Recognizing that the federal government will be limited in total resources for facilities, it would seem to me that the Congress should continue to place priority on supporting either major modifications or new construction. On a "per square foot" basis, renovation usually is less costly than new construction. New construction adds "total square feet" of research capacity. If I were asked to express a subjective judgement, I would answer by saying about two-thirds to three-fourths of available federal facilities funding should be directed to new construction.

4. **Without infusion of facilities funds at USDA, do we have a solid enough base currently to handle full funding of the National Research Initiative Competitive Grants Program at levels authorized by the 1990 Farm Bill?**

When individuals and institutions propose to conduct research for the USDA, they explicitly state that they have the capability to perform the research, or they identify in their proposal those supplies and equipment that must be purchased by the USDA (as part of the research grant) to perform the proposed research. The NRI Competitive Grants Office tells us that they receive a very substantially larger number of proposals than can be funded with existing funds, based on both on merit and relevance of the proposals. In my judgement, if full funding at \$500 million per year were available through the NRI, there would be sufficient research capacity in the total system to spend the money on research of high priority and quality. However, if this were the case, I would predict that there will be a substantial uncoupling between the capacity to continue the programs of more traditional research and that needed to do the NRI programs of more fundamental research. This would have a negative impact on the process of taking early breakthrough discovery to application. NRI research, in this situation, would tend to be conducted in larger more affluent institutions. Less affluent, more widely dispersed, institutions would be at a competitive disadvantage and the process of technology transfer through geographic coupling would be diminished. In answering the question this way, I do not mean to imply that facilities grants should not be awarded to larger universities, nor to say that technology transfer is not a mandate for large as well as less affluent universities. Perhaps the most probing question that could be asked is "would you favor taking funds from research grants to support research facilities grants?" I expect if you polled my peers, you would get a variety of answers, but I firmly believe that

the majority would not favor this trade-out.

5. **What do you feel will happen to our agriculture research facility base if we don't properly infuse either state or federal money into the system?**

The impact of continued deferred maintenance, inadequate replacement and failure to provide expanded facilities for programs that can and should grow creates two consequences: (a) exponential increases in the ultimate "get-well" costs—exemplified by the cost of replacing rather than repainting a structure and (b) the cost of "lost opportunities"—research and education that should be done but which cannot be done without adequate facilities. Most policy and decision makers at the state level do not regard the present stressful financial situations to be transient, rather they expect a long term down-sizing of support for public education. We are seeing some innovative relationships emerge between industry and universities that include development of facilities either on or at the edge of academic campuses. Perhaps this paradigm will spread, but I do not believe it will replace the need for government support of facility acquisition. Absent the kind of support that has been called for in our testimony, I expect a continuing decline in the agricultural research capacity of this country, a resulting decline in agricultural research productivity and an impact on the food, agriculture and natural resource system that will have lasting negative long term consequences.

6. **Why should the Federal government be funding Agriculture research facilities in the first place?**

The federal government has assumed a historic and fundamental role in sponsoring the development of new knowledge and technology that will improve the quality of life for its citizens and enhance economic and environmental health of the nation. Over time, federal policy has varied on the kind of science that it should support. Sometimes decision makers tend towards supporting research of more immediate application; this is certainly the attitude of many state legislatures today. At other times, policy makers at the federal level opt to support the kind of research that will not be affordable in either industry or state supported programs, but which is believed to have major down-stream benefits. The space program, the superconducting supercollider, and the human genome project are illustrative. Agricultural research has a demonstrated record of achievement in all the areas that have been judged to fall in the domain of federal responsibility. In all these cases, the federal government has recognized its responsibility in enabling research; responsibility which has involved development of (a) human capital, (b) facilities and equipment and (c) operating costs. Failure to address the needs in any of these three vital components of research assures overall failure of the enterprise.

Sometimes when policy makers in government consider support for research, they make a distinction between (1) what the government asks industry or universities to do for government and (2) what industry or universities want to do and ask the government to support. It is our contention in the case of agricultural research that this distinction is not

very meaningful. We have an established university-government partnership in agricultural research. We operate on the basis of an established strategic plan that is embraced by both USDA/CSRS and the universities. We have a common understanding both about what we need to do and what we want to do.

One aspect of the dilemma which has perhaps not received sufficient emphasis in our testimony is the need to meet rapidly expanding facility mandates related to experimental animal care, environmental safety and human safety. If federal and state regulations (appropriately) require new standards for public research facilities, it does not seem inappropriate to provide the shared resources needed to provide these facilities.

Statement of

Don I. Phillips

Executive Director  
Government-University-Industry Research Roundtable

National Academy of Sciences  
National Academy of Engineering  
Institute of Medicine

My name is Don Phillips. I am the Executive Director of the Government-University-Industry Research Roundtable, sponsored by the National Academy of Sciences, the National Academy of Engineering and the Institute of Medicine. Between 1985 and 1991 the Roundtable convened several meetings and published four documents on academic research facility financing.<sup>1</sup> My testimony is drawn largely from these discussions and materials. I also have been asked to review data on facility needs and funding contained in the results of the National Science Foundation (NSF) surveys conducted in 1988, 1990, and 1992.

Condition, Adequacy and Funding of Research Facilities

Results of the 1992 NSF survey<sup>2</sup> that help to characterize the needs for more and better research space include:

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<sup>1</sup>National Science Board, Office of Science & Technology Policy and Government-University-Industry Research Roundtable, *Academic Research Facilities: Financing Strategies*, Report of a Conference; National Academy Press. (Washington, D.C., 1986)

Government-University-Industry Research Roundtable, *Perspectives on Financing Academic Research Facilities: A Resource for Policy Formulation*; National Academy Press. (Washington, D.C., 1989)

Government-University-Industry Research Roundtable, *Synthesis of Options for Academic Research Facility Financing*; (Washington, D.C. 1990)

Government-University-Industry Research Roundtable, *Research Facility Financing: Near Term Options*; (Washington, D.C. 1991)

<sup>2</sup>National Science Foundation, *Scientific and Engineering Research Facilities at Universities and Colleges: 1992*, NSF 92-325, (Washington, D.C., 1992).

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- Forty percent of the top 100 research universities reported the need for more research space.
- From 25 percent of mathematics departments to 45 percent of engineering departments need additional space; 34 percent of the agricultural science departments reported such need.
- Only 27 percent of all research space was considered suitable for use in the most scientifically sophisticated research ; 34 percent was effective for most uses; 23 percent required limited renovation; 13 percent required major renovation; and 3 percent required replacement.
- 49 percent of research space in the agricultural sciences requires repair, renovation, or replacement—-the highest percentage among all fields.
- NSF estimates that the total cost of performing all needed repair and renovation of existing academic research space is in the range of \$6.8 billion to \$8.1 billion.
- Owing to methodological difficulties in collecting survey data, NSF provides no current estimates of the total need, either in terms of space or dollars, for construction of new facilities. On the basis of anecdotal evidence, however, a conservative estimate of the cost for needed new construction would be equal to

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that of repair and renovation.

Over the period of the three surveys, NSF reports improvements in the indicators of the status of research facilities and about a 10 percent increase in the total amount of research space at the nation's research performing academic institutions.

The needs, however, still far exceed the current amount of funding for academic research facilities. The current funding picture is presented in Tables 1 and 2 and summarized here:

- Total spending at doctorate granting institutions for construction and renovation in 1990+1991 was about \$3.6 billion with an increase to \$4 billion projected for 1992+1992.
- New construction accounted for the bulk of expenditures.
- The use of funding sources varies between public and private institutions and between construction and renovation. Tables 3-6 provide the detail. In general, however, facility financing sources breakout as shown in Table 2:
  - About one-third of the funds come from state and



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local government; eventually, these expenditures will be partially recovered through indirect cost reimbursement for federally-sponsored research.

- A little over one-fifth of funds are provided by institutional sources, such as tuition and endowment income; while these expenditures are eligible for indirect cost reimbursement only a portion are recovered.
- Just over 10 percent of the funds come from private gifts or donations to institutions; these expenditures are also eligible for reimbursement as indirect costs but again are only partially recovered.
- About 20 percent of the spending on research facilities is financed by tax exempt bonds; interest and principle payments are eligible for indirect cost reimbursement.
- Direct funding from the federal government provides about 14 percent of the costs; most of these funds come from targeted congressional appropriations; small amounts come from narrowly defined grant programs and direct charges to grants; federal funds used to finance research facilities cannot be recovered through indirect cost reimbursement.

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While many argue that the federal share should be larger than the current level, no one expects that it should cover anywhere near the total costs. It is important to recall that even at the peak of direct federal support of academic research facilities in the late 1960's, federal funds never accounted for more than 30 percent of science and engineering facility funding, and those funds included support for instructional as well as research buildings.

#### The Basis for Action

One can get into prolonged debates about how to interpret the needs indicators and funding trends. To be sure, there is no accepted method for determining what percentage of facilities should be state-of-the-art, what extent of need for renovation is unacceptable, what is an excessive amount of need for additional space, or how much funding should be provided for construction and renovation on an annual basis.

The sense of the Roundtable discussions was that there are compelling reasons to improve the financing of research facilities regardless of the exact meanings of the needs and funding indicators.

- First, there is a back log of facility renewal needs resulting from inadequacies in current practice. Universities blame the federal government for expanding

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research capacity in the 1960's without adequately addressing the question of long term renewal and replacement. For their part, federal agencies blame universities for failing to develop the capital reserves necessary to renovate and replace buildings on a logical timetable. To some extent both are right, but the incentives are not there for either party to behave differently. As a result, funding decisions are made from a short term perspective, which places facilities low on the list of priorities after personnel, programs, and equipment. Furthermore, the decentralization of the research enterprise compounds the difficulty of formulating a long-term national strategy. There is no mechanism for brokering the extent or type of support each sector (states, universities, federal government, industry) should provide for long term capital investments.

- Second, there will be ongoing needs for construction, renovation, and repair of academic research facilities resulting from new demands and opportunities, such as rapid changes and advances in science and engineering research, including new developments in instrumentation; the impact of regulations and other requirements on building standards; the high cost of

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constructing sophisticated research facilities and of upgrading older buildings; and changing research priorities in response to changing national goals.

The concern of the Roundtable, therefore, was with approaches to financing—how they are best put in place and kept responsive—not with the exact magnitude of the need. The perspective emerging from Roundtable deliberations is that no one sector, nor single funding mechanism can meet the variety of research facility needs; a comprehensive approach is required involving all concerned sectors and a range of funding mechanisms.

I will confine my remarks here to federal mechanisms. Possible funding approaches by state governments and universities themselves are included in the Roundtable reports cited above.

#### Targeted Congressional Appropriations

The overriding sentiment in Roundtable discussions was that targeted congressional appropriations for facilities at specific institutions, in the absence of merit review, is not a sound federal funding practice. No one questions the prerogative of Congress to appropriate funds as the majority sees fit. No one doubts the authority of Congress to preempt competitive merit

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review processes. Nonetheless, there are two ways in which earmarking works to the detriment of careful funding decisions: the absence of competitive merit review, and the inappropriate division of labor among Congress, the executive agencies, and the science and engineering community. I will discuss each in turn.

1. Absence of Competitive Merit Review. The qualities of competitive merit review that promote careful allocation of funds are the evaluation of proposals against technical criteria that contribute to national priorities debated and agreed on by Congress, the comparison of proposals to determine which best meet those criteria. Because both of those qualities—technical evaluation and competition—are absent in the practice of earmarking, there are serious concerns about whether we are allocating scarce federal resources to meet the most pressing needs and opportunities or to serve some secondary objectives or parochial interests. With earmarking:

- The nature and quality of proposed projects are outweighed by the lobbying resources of their proponents and the seniority and committee assignments of members.
- Actions often are cloaked in secrecy until the eleventh hour.

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- The process is ad hoc.

Many, if not all, of the projects that have received earmarked funds have some merit. That is not the issue. The issue is that earmarking does not allow for the determination of whether they are the best vehicles for achieving national objectives.

2. Inappropriate Division of Labor among the Congress, the Executive Agencies, and the Science and Engineering Community. Earmarking skews the effective interaction among Congress, the executive agencies, and members of the science and engineering community that has been so essential to the success of the research enterprise.

While the agricultural research community argued vigorously for the establishment of the National Research Initiative, the decision is one that belongs to Congress, and no one in the science community thinks otherwise. It is only in the political arena of Congress that broad national priorities and resource allocations can be debated and established.

By the same token, the executive agencies of government are best equipped to judge which specific activities and projects most effectively service the objectives established by Congress.

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The agencies that fund science seek the advice of acknowledged experts as they manage their programs just as Congress seeks the advice of experts as it develops policy. But ultimately it is the agencies that must decide what projects to fund, just as it is Congress that must decide what broad programs to establish and what level of funds to allocate to those programs.

These tiers of decision-making allow each body to contribute its unique expertise. Earmarking places all of the responsibility in the hands of Congress and thus asks Congress to make decisions it is ill-equipped to make. Earmarking also subjects members of Congress to unending pressures to confer similar benefits on other institutions and researchers.

#### Federal Funding Mechanisms

I turn now to a review of the mechanisms most often discussed by the Roundtable as possible federal contributions to facility funding. The mechanisms, taken together, can be used to achieve multiple objectives:

- Sustain and renew the base of research capacity created with previous investments
- Establish new capacities in growing fields, new

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institutions, and additional geographic areas

- Provide for review of scientific and technical merit, as well as other appropriate considerations
- Distribute the costs and risks across all sectors
- Foster stability and continuity

For discussion of the many factors that must be considered in implementing these mechanisms, I refer the Subcommittee to the Roundtable reports cited above.

Indirect costs. The relationship between indirect cost reimbursement and sponsored research activity gives this mechanism special significance for sustaining and renewing the base and for review of scientific and technical merit. Because indirect cost reimbursement is a component of federal financial support for research projects, it flows to institutions in director proportion to the intensity of the sponsored research activities and to their degree of success in the competitive project grant system; that is, institutions most active in federally sponsored research receive the largest amounts of indirect cost reimbursements. Thus, there will be a good match between the institutions with large renewal needs and those with steady inflows of indirect cost reimbursement.

Under current practice, however, indirect cost reimbursement generally covers less than the full cost of the use of space and,



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thus, generates insufficient funds for sustaining and renewing base capacity. To correct this deficiency, there have been repeated proposals to increase the facilities use charge in the indirect cost pools from 2 to 5 percent. In addition, there have been proposals to scale use charges to the different rates at which different groups of facilities deteriorate. In this approach, sponsored research that depends upon expensive facilities carries its proportionate share of the costs. As an alternative to the use charge, it has been suggested that the charge for rent of research space be an explicit component of federal R&D grants and contracts to universities.

Competitive Matching Grants. The ability of grants to be targeted for special purposes, and the fact that they can provide dollars to institutions who find it difficult to raise facilities funds through other means, make this mechanism especially well suited for establishing new capacity. The grants approach balances the "those that have, get" aspects of the indirect cost reimbursement mechanism. Cost sharing requirements and specific merit review criteria are easily included. In addition to competitive matching grants, the federal government could consider formula, or block, grants to states to assist them in creating or renewing regional capacities.

Competitive Debt Service. An intriguing new idea for

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federal facilities financing, a competitive debt service support program, was suggested as a way to remove facilities support from the politically charged debate about indirect cost rates and to more equitably distribute risk of facility investment between the federal government and the research performing institutions. The principle features would be:

- Establish a federal competitive program to support facility related debt held by institutions.
- Provide support for debt over a 20 year period on the condition that the supported space is used continuously for research in federally designated areas of inquiry and that the institution maintains its overall research effort.
- Require commitment of matching funds as a condition of the debt service awards.
- Exclude debt service supported by competitive federal programs from calculations of institution's indirect cost rates.
- Provide government funds for debt service support program either 1) through interest from a trust fund or 2) by annual appropriations
- Criteria for awarding debt service support could target various objectives, e.g., addressing the backlog of facility needs in specific fields, renewing and

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sustaining capacity, and stimulating selected growth in research capacity. Similarly the criteria could target the needs of various types of institutions.

Debt Financing. Debt financing can be a useful mechanism for sustaining research capacity and creating new capacity. Furthermore, the university itself shares in the risk. Through indirect cost reimbursement and tax policies, the federal government already influences this funding mechanism. Pooling of small bond issues and modifying the authorities of the Student Loan Marketing Association and the College Construction Loan Insurance Corporation were additional federal steps suggested to increase the ability of colleges and universities to use debt financing.

#### Conclusion

Adequate facilities funding requires sustained contributions from all sectors. There will be no single or simple solution. All partners in the research enterprise must be involved in developing a comprehensive approach, and all sectors must be committed to changing their current facilities financing practices.

Given financial constraints and other priorities, it is unrealistic to think of a major federal initiative meeting most needs for construction and renovation of research facilities.

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Under the assumption that little new federal money can be expected for the science and engineering enterprise in the near term, it is clear that if more federal funding goes into facilities, by whatever mechanism, less will be available for research projects and programs. If the zero-sum scenario holds, admission that facility needs are real and serious entails recognition that federal priorities must shift to provide more emphasis on investments in capital and less on labor. Acceptance of the need for this shift in priorities is required before consensus can be reached on changes in federal support for research facilities.

(Attachments follow:)

Table 1. Trends in expenditures for capital projects to construct or repair/renovate academic research facilities, by expenditure type and institution type: 1986-93

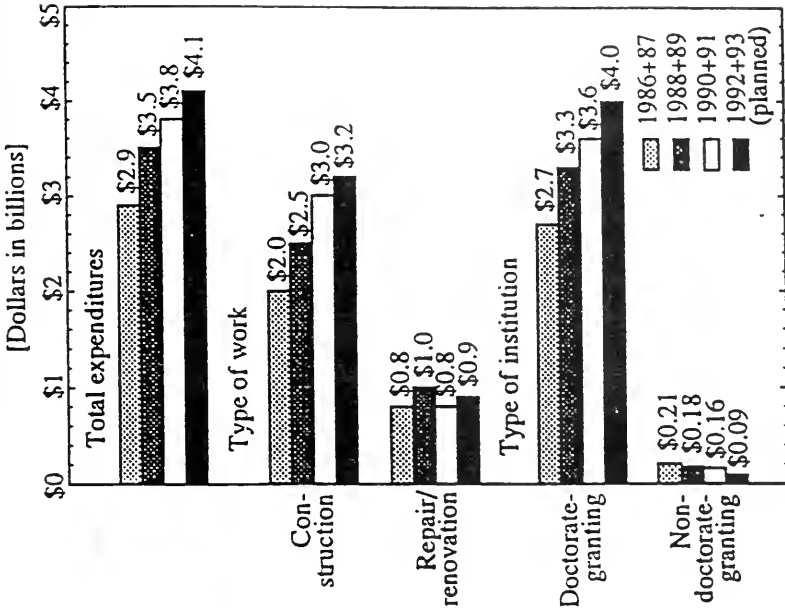


Table 2. Trends in source of funds for capital projects to construct or repair/renovate research facilities at doctorate-granting institutions: 1986-91.

[Dollars in millions]

<i>Source of Funds</i>	<i>Doctorate-granting</i>			<i>% of Total 90-91</i>
	<i>1986+ 87</i>	<i>1988+ 89</i>	<i>1990+ 91</i>	
Total	2,681	3,294	3,641	100%
Federal Government	153	395	514	14%
State/Local Government	892	1,034	1,175	32%
Private Donations	562	454	446	12%
Tax-Exempt Bonds	412	390	690	19%
Other (Institution Funds, etc.)	661	1,020	817	22%

NOTE: Because of rounding, components may not add to totals.

SOURCE: National Science Foundation/SRS, *Scientific and Engineering Research Facilities at Universities and Colleges: 1992*, Appendix Tables 4-1 to 4-4.

Table 3. Public institutions' sources of funding for construction of new research facilities: 1986-91

Index and time period	Total	Funding source						Other/ unknown
		Government		Private donations	Institution funds	Tax- exempt bonds	Other debt	
		Federal	State/local					
Dollar contribution:		[Dollars in millions]						
1986-87	\$1,355	40	754	259	109	190	2	<1
1988-89	1,727	274	838	193	256	154	8	1
1990-91	2,020	388	809	139	270	399	8	7
Relative contribution:		[Percentage of total funding]						
1986-87	100%	3	56	19	8	14	<1	<1
1988-89	100	16	49	11	15	9	<1	<1
1990-91	100	19	40	7	13	20	<1	<1

NOTE: Because of rounding, components may not add to totals.

SOURCE: National Science Foundation/SRS, *Scientific and Engineering Research Facilities at Universities and Colleges: 1992*, Appendix Table 4-4

Table 4. Private institutions' sources of funding for construction of new research facilities: 1986-91

Index and time period	Total	Funding source						Other/ unknown
		Government		Private donations	Institution funds	Tax- exempt bonds	Other debt	
		Federal	State/local					
Dollar contribution:		[Dollars in millions]						
1986-87	\$696	105	25	228	181	124	1	32
1988-89	738	78	52	266	88	166	88	<1
1990-91	956	88	147	214	124	329	28	26
Relative contribution:		[Percentage of total funding]						
1986-87	100%	15	4	33	26	18	<1	5
1988-89	100	11	7	36	12	22	12	<1
1990-91	100	9	15	22	13	34	3	3

NOTE: Because of rounding, components may not add to totals.

SOURCE: National Science Foundation/SRS, *Scientific and Engineering Research Facilities at Universities and Colleges: 1992*, Appendix Table 4-3

Table 5. Public institutions' sources of funding for repair/renovation of research facilities: 1986-91

Index and time period	Total	Funding source						Other/ unknown
		Government		Private donations	Institution funds	Tax- exempt bonds	Other debt	
		Federal	State/local					
		[Dollars in millions]						
Dollar contribution:								
1986+87 .....	\$436	13	227	15	155	26	<1	<1
1988+89 .....	699	31	229	22	404	7	5	0
1990+91 .....	449	25	234	44	135	12	0	1
		[Percentage of total funding]						
Relative contribution:								
1986+87 .....	100%	3	52	3	36	6	<1	<1
1988+89 .....	100	4	33	3	58	1	1	0
1990+91 .....	100	5	52	10	30	3	0	<1

NOTE: Because of rounding, components may not add to totals.

SOURCE: National Science Foundation/SRS, *Scientific and Engineering Research Facilities at Universities and Colleges, 1992 Appendix Table 4-6*



Table 6. Private institutions' sources of funding for repair/renovation of research facilities: 1986-91

Index and time period	Total	Funding source					Other/unknown		
		Government		Private donations	Institution funds	Tax-exempt bonds		Other debt	
		Federal	State/local						
<b>Dollar contribution:</b>									
1986+87 .....	\$402	14	7	86	173	112	4	7	
1988+89 .....	311	30	5	30	167	63	11	5	
1990+91 .....	376	24	10	57	221	54	8	3	
					(Dollars in millions)				
<b>Relative contribution:</b>									
1986+87 .....	100%	4	2	21	43	28	1	2	
1988+89 .....	100	10	1	10	54	20	4	2	
1990+91 .....	100	6	3	15	59	14	2	1	
					(Percentage of total funding)				

NOTE: Because of rounding, components may not add to totals.

SOURCE: National Science Foundation/SRS, Scientific and Engineering Research Facilities at Universities and Colleges: 1992, Appendix Table 4-5

Subcommittee on Department Operations and Nutrition  
Committee on Agriculture  
United States House of Representatives

Response to Supplemental Questions Submitted to

Don I. Phillips

Following the Hearing on Agriculture Research Facilities  
June 17, 1993

1. Why should the federal government be funding agriculture research facilities in the first place?

The federal government invests in agriculture research to contribute to the missions of the Department of Agriculture and to the nation's economic and social goals. Facilities are a vital component of the nation's agriculture research enterprise. If investigators are the heart of the enterprise, facilities are its backbone. High quality, state of the art research requires high quality, state of the art facilities.

University agriculture research facilities often contribute to objectives shared by the federal government, state government, industry, and universities themselves. It is appropriate, therefore, that the costs of these facilities be shared by all of the parties of interest.

2. When facilities need renovation and scientists need more space, what is the solution? Especially when it all costs more money.

In recent times the solution has been to not respond to all of these needs. Scientists work in cramped quarters in less than desirable space. To improve these conditions requires money. It should come from all the parties of interest. There are two ways to obtain the needed additional funds-- increased appropriations for the agriculture research enterprise and/or reallocation of funds within current appropriations from labor to capital.

3. Given the recent trend of the National Science Foundation data which you presented, please speculate as to what the future results might be?

I have not been sufficiently involved in the collection, analysis, and interpretation of the data to feel qualified to respond to this question.

4. Are there any effective models, such as the NSF competitive facilities program, which we could use as models for planning a facility program?

Federal support for science and engineering facilities was at its peak in the late 1960s. Two of the largest programs were the National Institutes of Health's Health Research Facilities Program and the National Science Foundation's Graduate Science Facilities Program.

Facility funding by private foundations was also at its peak in the 1960s, with the most prominent program being the Ford Foundation Special Program in Education. In recent years, the Kresge Foundation has operated a facilities program.

All of the above are competitive grant programs. In thinking of facility financing, it is important to consider the full range of mechanisms, including indirect cost reimbursement and debt financing, as well as the roles of the states and the universities themselves.

5. Why do you feel that universities compete for direct appropriations to have their facilities needs funded? Do you agree with the argument that limits on indirect cost reimbursements have led to this phenomena?

The major reason that universities seek direct appropriations for facilities is the lack of organized federal programs in the agencies to provide funds for facilities construction and renovation. The fact that full depreciation of facilities is not reimbursed through the indirect cost mechanism is part of the problem, but in the current environment of a large backlog of facility needs, the absence of any grant programs is probably a more central cause. A robust set of facilities financing arrangements, including multiple sectors and funding mechanisms, would go a long way toward decreasing the practice of direct appropriations.

Another cause of direct appropriations for facilities is the increasing centrality of science and engineering capacity to local, state, and regional economic development strategies. Obtaining federal funds for a research building or other visible local initiative is an effective means for universities and elected representatives to demonstrate their contributions to these strategies. Such practices are likely to continue at some level even if new federal funding programs are established.

TESTIMONY BEFORE  
THE HOUSE AGRICULTURAL SUBCOMMITTEE  
ON DEPARTMENT OPERATIONS AND NUTRITION

June 17, 1993

PRIORITY SETTING FOR BUILDINGS AND FACILITIES

Charles E. Hess  
Professor  
University of California  
Davis, California

My name is Charles E. Hess. I am a member of the faculty of the College of Agricultural and Environmental Sciences at the University of California - Davis, and Director of International Programs for the College. From May of 1989 to October of 1991 I served as the Assistant Secretary of Agriculture for Science and Education at the United States Department of Agriculture.

Finding funds to construct new research facilities or to renovate existing ones has always been a challenge, now exacerbated by declining funds at the state level. At the same time, at least until very recently, the scientific community has grown and the research has become more sophisticated and requires state-of-the-art facilities. The annual reports of the National Science Foundation on Scientific and Engineering Research Facilities at Universities and Colleges provides an indication of the needs. Although the net square feet (NASF) suitable for the most scientifically sophisticated research increased from 26.7 NASF in 1988 to 32.7 NASF in 1992, the universities still reported that the percent of their total space suitable for use in most scientifically sophisticated research increased from only 24% in 1988 to 27% in 1992. In 1992,

35% of the space was reported effective for most uses, but not scientifically sophisticated research, and 39% of existing space required repair or renovation.

Because agricultural research facilities at the Land Grant Universities and in the Agricultural Research Service are among the oldest research facilities, the needs are even greater. As pointed out in the 1992 edition of the NSF report on Scientific and Engineering Research Facilities, "The fractions of research space assessed as requiring repair/renovation were greatest in the agricultural sciences (49 percent), the social sciences (40 percent) the medical sciences (39 percent) the biological sciences (39 percent) and the physical sciences (38 percent)."

Agriculture faces a multitude of challenges. It must produce efficiently to compete with other nations with lower costs of production. It must produce food and fiber in a way which protects our natural resources so future generations will enjoy their benefits. It must harvest and handle foods in such a way that nutrition is maintained or enhanced and is safe for the consumer. New products must be developed from agricultural commodities to add value to our bountiful harvests of grains and fibers. Investments in research and education can play a key role in addressing these challenges. Both traditional research approaches, along with the new tools of biotechnology, can speed the development of new varieties and breeds with genetic resistance to pests, product quality and nutritional value can be enhanced, as well as the development of new, value-added products. And in the process of discovery and technology transfer, new businesses and jobs can be created. It was in this spirit that the administration and Congress launched the National Research Initiative in Agriculture, Food and the Environment (NRI) in

1990. We also appreciated the fact that as research funding increased to the \$500 million level authorized in the 1990 Farm Bill, we also had to address the question of buildings and facilities.

In addition to the needs of the NRI, there was another issue that we were trying to address. That was the growth of the amount of funds earmarked for facilities. In fact, the issue was related to the NRI because as the amount of money earmarked for facilities grew, the amount of funds available for the NRI and other administration priorities decreased.

The commitment to the out years was impressive because facility proposals are not completely funded in one year. Therefore there are a substantial number of facilities under various stages of study and/or construction. If all the facilities which are currently under way were to be completed, \$264,867,000 would be required in addition to the \$207,075,000 already appropriated for study or construction. That would mean that the total commitment of the Buildings and Facilities Program currently underway would be \$471,942,000 according to Cooperative State Research Service. If the university's statements of funds needed were used, the total federal commitment would be \$597,518,000. The challenge is not unique to the Department of Agriculture. The Departments of Defense and Energy, to name two, often found unexpected appropriations in their budgets. The Office of Management and Budget (OMB) and the Office of Science and Technology Policy both have been concerned about the amount of funds that were being earmarked.

In part, the increase in the earmarked funds was due to increased pressures on the part of universities to find a source of funding to construct new facilities or to renovate existing ones. If some federal funds were available, then a stronger case could be made on the state level to justify an appropriation. Although it is appreciated that earmarking funds for a member's district or state is part of the political infrastructure, the demand was getting so great that even some members of appropriations committees and their staffs were looking for alternative ways to deal with the onslaught of proposals.

It was in this environment, in consultation with OMB, a Competitive Research Facilities Initiative was launched in the FY 1992 Budget proposal. The initial proposal was for a \$25 million appropriation which was equivalent to 20% of the funding level proposed for the National Research Initiative. It was also recommended that the facilities program would grow in subsequent years with the growth of the NRI at a level equal to 20 percent of the NRI's funding level.

Proposals would be subjected to rigorous merit evaluation based upon reviews by USDA Competitive Grants Office staff and external peer panels. The following criteria would be used:

- \* Degree to which the program(s) to be housed in the facility address high priority needs in the food and agricultural sciences, as articulated in the NRI.
- \* Expected contribution of the facility toward meeting national, regional, and institutional research and education needs in the food and agricultural sciences.

- \* Evidence of the institution's commitment and capacity to provide the faculty, support staff, operating funds, and students necessary to support a quality program in the proposed facility.
- \* Qualifications and experience of key project personnel to plan and manage the construction effort, including occupancy in the near-term future.
- \* Reasonableness of the budget request and evidence of applicant's ability to participate in project costs.

The program would be carried out under the authority of the Research Facilities Act of 1963, as amended (Pub. L No. 88-74), and would be administered by CSRS. The statute authorizes a competitive program to assist eligible institutions in the construction, acquisition, and remodeling of buildings, laboratories, and other capital facilities to more effectively conduct research in agriculture and related sciences by means of matching Federal Grants. State agricultural experiment stations, Colleges of Veterinary Medicine, Schools of Forestry, and the 1890 Land-Grant Institutions and Tuskegee University would be eligible to compete for the funds. Full 1:1 matching of Federal Funds with non-Federal funds would be required.

The goals of the competitive facilities program would be to:

- \* Promote the modernization of research and research training facilities at eligible institutions.
- \* Ensure that facilities constructed in part with Federal funds met national priority needs in the food and agricultural sciences.



- \* Provide a source of funding to universities so that they would not pressure Congress for earmarked funds.
- \* Provide Congress with an alternative to meet the growing requests for facilities funding.

The National Association of State Universities and Land-Grant Colleges (NASULGC) fully endorsed the proposed competitive research facilities initiative and the proposal was based in part on a position paper prepared in 1990 by NASULGC entitled Agricultural Research Facilities: A Proposed Plan for Needed Investments. Most important, however, was a resolution by the Executive Committee of the NASULGC, adopted by NASULGC's senate, that if the competitive facilities program was funded, the member universities would enter the competition for facilities instead of attempting to obtain Congressionally earmarked funds.

It is appreciated that Congress plays a key role in setting priorities. As Allan Bromley, the former Science Advisor would say, "the Administration proposes and Congress disposes." It is also true that many of the facilities which are constructed are needed and serve state and national needs. However, in an era of scarce resources, it is essential that the highest priorities be met. The current system of earmarking research facility funds does not achieve that goal. As shown in Tables I and II there is a disjuncture in the funding appropriated for the NRI and for buildings and facilities. For example in 1991, 19 percent of the NRI funds went to Natural Resources and the Environment; four percent of the building and facilities funding went into this category. In 1992 the match is fortuitously improved, although funding for facilities for Animal

Systems continues to be considerably below the percentage allocations for the NRI. However, the more serious disjuncture is shown in Table II which shows the ten top states receiving NRI funds in 1991 and 1992 and the top ten states receiving funds for the Building and Facilities Program currently underway. Only four states which were in the top ten for competitive grants were also in the top ten for building and facilities funding. The funds are not going where they are needed. In an environment with scarce resources we should do better.

Some may argue that the disjuncture is purposely made to even out the geographical distribution of research funds. However, it should be noted that the amount of competitive research funding to each state relates closely to the number of research scientists within a state. Many states with smaller populations or with agriculture representing a smaller component of the state's total economy, have excellent scientists that compete well but because there are fewer scientists, the funding for these states is below others in total dollars. A competitive program would reflect both quality and where the agricultural research is concentrated. In addition, the NRI program does provide strengthening grants to help states improve their ability to compete.

(Attachments follow:)

TABLE 1

Cooperative State Research Service  
Awards Statistics

Fiscal Year 1991

	<u>National Research Initiative</u>		<u>Buildings and Facilities</u>	
	Dollars	Percent	Dollars	Percent
Natural Resources and the Environment	13,272,000	19%	2,354,190	4%
Nutrition, Food Quality and Health	3,792,000	6	7,275,00	12
Animal Systems	18,960,000	27	7,901,135	13
Plant Systems	26,137,636	48	31,008,475	53
Markets, Trade and Policy	-		3,017,670	5
Process for Value-Added Products	-		7,663,000	13
<b>TOTAL</b>	<b>69,204,000</b>	<b>100%</b>	<b>59,219,470</b>	<b>100%</b>

Fiscal Year 1992

	<u>National Research Initiative</u>		<u>Buildings and Facilities</u>	
	Dollars	Percent	Dollars	Percent
Natural Resources and the Environment	17,007,853	18%	5,772,470	10%
Nutrition, Food Quality and Health	6,141,725	7	6,160,470	11
Animal Systems	23,622,019	26	8,105,320	15
Plant Systems	37,795,230	41	31,304,810	56
Markets, Trade and Policy	3,792,000	4	-	
Process for Value-Added Products	3,779,523	4	4,575,490	8
<b>TOTAL</b>	<b>92,138,350</b>	<b>100%</b>	<b>55,918,560</b>	<b>100%</b>

**TABLE II**  
**Ranking by State of**  
**the Top Ten Recipients of Competitive Grants and Funding**  
**for Buildings and Facilities**

(All Figures in Thousands of Dollars)

<u>Competitive Grants</u>		<u>Buildings and Facilities*</u>
<u>1991</u>	<u>1992</u>	
CA \$8,231	CA \$11,647	MI \$24,298
NY 6,938	NY 5,638	MS 19,057
WI 3,991	TX 5,369	HI 13,999
TX 3,623	WI 5,246	ND 13,247
IL 3,132	IL 4,802	WI 12,882
WA 2,613	NC 3,479	TX 12,472
NC 2,488	MI 3,337	KS 11,061
MI 2,207	GA 3,107	AZ 9,989
OH 2,181	MO 3,003	NJ 8,600
IA 2,018	AZ 2,826	GA 8,218
<b>TOTALS</b>	\$37,422 (63% of total funds)	\$48,454 (53% of total funds)
		\$133,823 (65% of total funds)

\*Figures from Buildings and Facilities Program, projects currently underway.

**Response to Questions submitted to Charles Hess  
by The House Agricultural Subcommittee  
On Departmental Operations and Nutrition**

1. Why should the Federal government be funding Agricultural research facilities in the first place?

The research sponsored by the Federal government, particularly within the framework of the National Research Initiative, addresses high priority research areas of national interest. Economists have shown that there is considerable "spillover" of research results that go far beyond the state borders of a particular university or agricultural experiment station. It is appropriate that the Federal government share in the cost of the facilities in which to conduct research as it currently does in the support of the costs for the research itself.

2. When facilities need renovation and scientists need more space, what is the solution? Especially when it all costs more money.

One solution is to have a competitive facilities program requiring a one-to-one match with non-Federal dollars. By default we already have a facilities program which is funded somewhere between \$50 and \$70 million a year and whose current total commitment is somewhere between \$471 million and \$597 million. As I have indicated in my testimony, there is not a good match between the research programs funded by the NRI and the facility program, nor is the funding for facilities going to locations where the research is being conducted. With a competitive facilities program, funds would go to build or renovate the highest priority facilities. By having a matching requirement, you can be assured that the state making the proposal will be making a substantial commitment to the project and will be interested in seeing that the project is a success. If other agencies such as the National Science Foundation, Department of Energy, and the Department of Defense were encouraged to have competitive facilities programs, then there would be enough funding to really begin to address the US research university infrastructure problem identified in the NSF studies on facilities.

3. Why do you feel that Universities compete for direct appropriations to have their facility needs funded?

The need to find funding for the construction and renovation of facilities is becoming more and more serious, particularly as the sophistication of the research increases as in recombinant DNA or biotechnology research. Funding at the state level also has become highly competitive. Finally, some states have been very successful in obtaining direct funding. Scientists in other states are putting pressure on their administrators to do the same. We are experiencing a "snow ball" effect.

4. Please explain what you envisioned the competitive facilities grants program would accomplish?

The goals of the competitive facilities program are to:

- \* Promote the modernization of research and research training facilities at eligible institutions.
- \* Ensure that facilities constructed in part with Federal funds met national priority needs in the environmental, food and agricultural sciences.
- \* Provide a source of funding to research universities so that they would not pressure Congress for direct appropriations.
- \* Provide Congress with an alternative to meet the growing requests for facilities funding.

5. Why is it important to balance facility funding with the National Research Initiative Competitive Grants Program.

The National Research Initiative provided a new source of funding to do high priority research in the national interest often at the cutting edge of science. In order to ensure that there are modern facilities, either new or renovated, in which to conduct the research, it was proposed to provide facilities funding in an amount that would be equivalent to twenty percent of the NRI. As I have stated, we already have a direct funded facilities program. Part of those funds could be used in a program which is associated with the NRI to ensure that recipients of research grants also have the opportunity to compete for facilities in which to conduct the research.

6. How much of a priority should be placed upon renovation of existing facilities as opposed to construction of new?

The decision to allocate funds for new construction versus renovation of exiting facilities has to be done on a case-by-case basis. In the competitive process, one criterion may be how much net assignable square feet will be obtained from the proposed investment. In some cases renovation of an existing facility may be cost effective. In other cases, it may be best to reassign exiting space to non-science disciplines and build new space for research, particularly where there is a high demand for utilities.

7. Without infusion of facilities funds at USDA do we have a solid enough base currently to handle full funding of the National Research Initiative Competitive Grants Program at 1990 Farm Bill authorized levels?

Yes. Currently we still fund a relatively small percentage of the grants submitted and the duration is still under three years. One the goals of the NRI was to raise the percentage of proposals funded and to fund for a longer period of time, for example, for five years rather than less than three years. The other point which I have made above is that we do have a direct-funded facilities program. The argument that I wish to make is that the current program could be more effective if it were run on a competitive basis and used the priorities similar to those used for the NRI.

# GETTING BEYOND THE BLAME GAME

Testimony before the Subcommittee on Department Operations  
and Nutrition of the U.S. House Agriculture Committee

Presented by Kathleen Ann Merrigan, Ph.D. Candidate  
Environmental Policy Group  
Department of Urban Studies and Planning  
Massachusetts Institute of Technology  
Former Staff Member, U.S. Senate Committee  
on Agriculture, Nutrition and Forestry

June 17, 1993

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## I. INTRODUCTION

Almost everyone in the business of assessing agricultural research in this country agrees that existing facilities are under-used and run down, that they duplicate activity elsewhere, and that the current process for establishing new projects is seriously flawed.

Independent reviews by the General Accounting Office (GAO), Office of Technology Assessment, the National Academy of Sciences, the National Science Foundation, the National Association of State Universities and Land Grant Colleges, the U.S. Department of Agriculture Users Advisory Board, and the U.S. Senate Agriculture Committee all document these and other problems.

Today, I will contribute more information and analysis to this arsenal of studies that, together, describe a crisis in our research facilities system and demonstrate a real need for reform.

Each new study has added compelling details to the condemning body of evidence. But policy makers have done little to address the root cause. Ten years have passed since the GAO first brought attention to the crisis, reporting that 27 percent of Agricultural Research Service (ARS) facilities operate at less than 70 percent of capacity -- a situation that remains unchanged. Three years ago, congressional leaders signaled a readiness to act by approving the Agricultural Research Facilities Planning and Closure Study Commission in the 1990 farm bill. The Commission, modeled after that set up to study military base closing, has never been convened.

As a student of and former participant in shaping public policy, I have learned that the greatest challenge facing decision makers is to pinpoint problems in an accurate and precise manner. Too often, problem statements are left fuzzy as we scatter in all directions frantically searching for answers. If only we would spend half as much time building consensus on the definition of the problem as we do in trying to construct solutions, we would stand a much better chance of achieving lasting reform. With this lesson in mind, I urge the Subcommittee to spend time defining the parameters of the underlying problem in agricultural research that has created the crisis in agricultural research.

Determining the root cause. I submit that the facilities crisis is first and foremost a manifestation of the struggle between policy makers and the scientific community over the role of planning in research. It is an outgrowth of the deeply held belief that we cannot "plan" research. Indeed, many scientists argue that scientific breakthroughs come about by "leaps into the dark by more or less blind men [sic]." It therefore follows, or so the argument goes, that policy makers should allocate research dollars with few strings attached. The only check required in this process is a competitive peer review to ensure some level of quality control.



I do not agree with this view. Consider the enormous, publicly funded efforts invested in agricultural research and the potentially substantial impacts those efforts have on our future. It is inconceivable to me that research should remain unplanned and haphazard.

Rather than defining, or even admitting to, this root cause, interested parties have become players in what I call the blame game. The rules? Policy makers and scientists alike point fingers at one another in order to explain the facilities crisis, all the while aware of their own actions in fostering that crisis.

It starts when scientists and Administrators ask for a general facility fund -- no strings attached. Congress responds by earmarking money for specific projects. No one is happy with the outcome.

The scientific community then blames Congress for pork barrel spending. Congress is quick to blame U.S. Department of Agriculture (USDA) administrators for failing to make decisions. Those administrators are just as quick to blame Congress for rewriting the department's budget. The general public may accept any one of these arguments uncritically -- and the most popular by far is congressional pork barreling.

I urge this Subcommittee to expose the blame game to public scrutiny. We need to know all that is happening with research facilities and ask the players to take responsibility for their actions. Most importantly, we need a process that brings scientists, USDA administrators, and congressional decision makers into one room to come to agreement over the nature of the crisis in research facilities and develop a common solution.

## II. DESCRIPTION OF THE FACILITIES CRISIS

Research is the cornerstone of the federal agricultural program. It is a proud tradition, deemed extremely useful by law makers and the public. Its importance in the larger scheme of things was most recently demonstrated in the 1990 farm bill, where research issues consumed more pages than farm subsidy supports, pesticide recordkeeping requirements, and commodity check-off programs combined.

In fact, the U.S. Department of Agriculture (USDA) was originally conceived as a research facility. Two of our earliest, and arguably greatest, Presidents -- George Washington and Thomas Jefferson -- were deeply involved with agricultural experiments at Mount Vernon and Monticello, respectively. Neither was successful in obtaining congressional support for a national program, however, and it was left to Abraham Lincoln to establish the USDA in 1862. Located on the mall where the Smithsonian Institution sits today, the USDA was our first official national agricultural research station. Still, it was many years later -- not until 1938 -- that Congress was ready to build facilities outside the Nation's capitol, initiating one regional laboratory in each of the four major farm-producing areas of the country to develop new uses for agricultural crops.

Research has greatly expanded since the Depression Era, and today the federal government supports two kinds of agricultural research facilities. First are the Agricultural Research Service (ARS) facilities, found at 126 federally owned and operated sites. This sounds like a small number of facilities, but there are usually several buildings at each site -- more than 3,000 ARS facilities altogether. ARS simply refers to each site as a single facility since the research occurring at each location is overseen by the same administrators.

ARS facilities include a wide spectrum of research enterprises, ranging from very large operations such as the national laboratory in Beltsville, Maryland and the four new uses regional laboratories to very small labs with less than five scientists at work in places like Lewisburg, Tennessee and Woodward, Oklahoma. Facilities not generally associated with "mainstream" agricultural research, such as the National Arboretum and outposts in France and the Virgin Islands, are also ARS facilities. It is the diversity of ARS facilities that makes the task of evaluating them very difficult. Site visits are often required to understand fully the various operations.

Several years ago, Congress also began funding universities, primarily but not exclusively land grant universities, to assist in the construction of agricultural research facilities on school campuses. Each year, the proportion of overall facility funds dedicated to new university facility construction has increased.

Since the beginning of our national agricultural research program, there has been a strong link between federal and state activities. Currently, the Cooperative State Research Service (CSRS) works with land grant universities and State Experiment Stations to conduct research; thus facility funds are funneled to the states through CSRS. With few exceptions, states are required to match the federal funds dollar for dollar. Unlike ARS facilities, once these university facilities are constructed, it is the responsibility of the states to operate and maintain them.

#### A. Problems at Existing Facilities

Many existing ARS and university facilities are old and poorly maintained. During this Subcommittee's March 25, 1993 hearing, Dr. Dr. James Kloeck, Chairman of the National Agricultural Research and Extension Users Advisory Board (UAB) highlighted many problems with existing ARS facilities. My analysis of the data, some of it

undertaken while I served on the staff of the Senate Committee on Agriculture, Nutrition and Forestry Committee, echoes Dr. Kloek's testimony.

Facilities are falling apart. In preparation for the 1990 farm bill, the Senate and House Agriculture Committees requested an estimate from USDA for renovating ARS facilities to meet basic health and safety regulations (e.g., new fume hoods in the laboratories) and to make the minimum repairs necessary to keep the facilities fully functioning. Little has been done to fix these facilities since this data request. Thus the USDA figures for Fiscal Year 1990 still provide an accurate and shocking glimpse of a decaying facilities system.

USDA estimated that ARS would have to spend an additional 76 cents for every dollar spent on research to repair facilities. As Dr. Kloek pointed out, the total cost for repairs at the time of the estimate was \$348,434,000 -- a staggering sum considering that the total operating budget for ARS that same year was \$456,434,000.

The needed repairs are not limited to just a handful of facilities. To the contrary, USDA indicated that in 1990 nearly 80 percent of all sites required basic repairs and safety adjustments. The estimated repair, maintenance, and renovation costs were greater than the annual research budget at 21 sites and more than double the annual research budget at 13 sites, including five locations within one state.

Most of the attention on facilities repairs has been directed at ARS. But university facilities are also showing the signs of age. In 1988, the National Science Foundation reported that 20 percent of existing university agricultural research space needed major repair or renovation; an additional 26 percent required limited repair or renovation.

ARS facilities are not operating at full capacity. ARS has more than 12 million square feet of facility space, a total of 1,500 square feet per employee. Such capacity may be more than necessary and is certainly more than can be utilized unless the ARS staff is increased.

That many ARS facilities are not operating anywhere near full capacity was the subject of a 1983 GAO report cited earlier. The chart below compares the 1983 findings with the Fiscal Year 1990 data submitted by USDA to the House and Senate Agriculture Committees.

CHART 1

PERCENT OF USE	PERCENT OF FACILITIES: 1983 GAO REPORT	PERCENT OF FACILITIES: FY1990 DATA
Under 50	6	9
50 to 59	10	7
60 to 69	11	11
70 to 79	11	8
80 to 89	20	12
90 or more	42	53

The chart indicates little improvement was made during the years between the two reports. In Fiscal Year 1990, 18 states had at least one facility operating at less than 75 percent capacity, and five states had more than one facility operating at less than 70 percent capacity, including one state with two facilities operating at less than 50 percent capacity.

#### B. Problems with New Facilities

Despite the crying need to reinvest in existing facilities, the current spending trend is to build new facilities. And it is an accelerating trend. From 1960 to 1986, the average number of newly funded facilities projects was 6 per year. From 1987 to

1993, that average number jumped to 47 per year. For Fiscal Year 1993, Congress appropriated funds for 74 separate new facilities.

New facilities are too big. The current formula for constructing new facilities is to provide 1,000 square feet per scientist at a cost of \$200 to \$300 per square foot. This space allotment does not include greenhouses, fields, or other non-laboratory space that is part of every research station.

The rationale for such generous space allotment? It is better to build a facility once and make sure that all the space that will ever be needed is secured from the start. This sentiment is especially strong because since there is no planning process for facility construction, and administrators are unable to predict when funding might come their way a second time. But the result is the existence of almost empty new structures that we cannot afford to staff, equip, or maintain adequately.

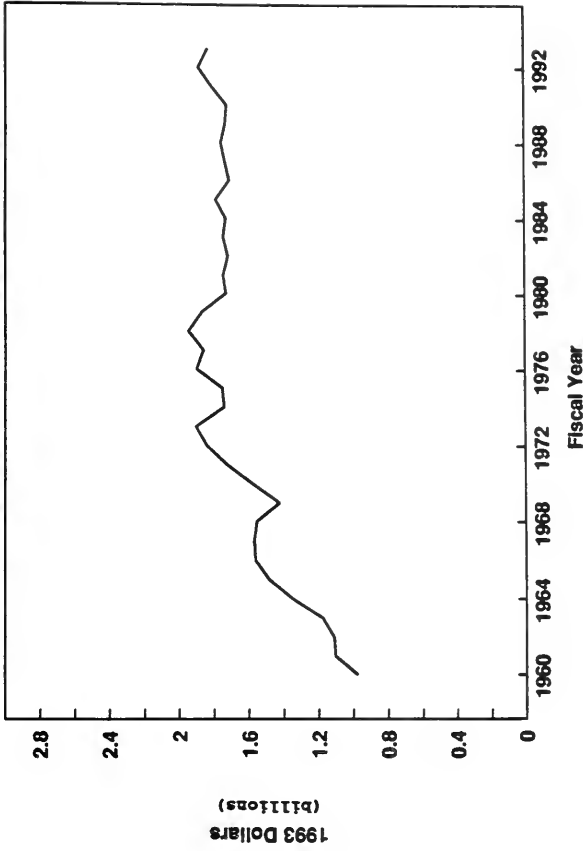
Federal obligations will soon be impossible to fulfill. The emphasis on new facilities while existing ones languish is even more egregious when one considers the limited growth in funding for actual research over the past three decades. (Graph 1, page 9). What growth has occurred is dwarfed by the increases provided to other science and education agencies of the federal government. Simply put, competition for money is getting tougher among agencies. What agricultural research does not need is increased competition within the Science and Education Administration of USDA itself.

For several years, agricultural researchers and their supporters argued that it would make all the difference in the world if \$500 million new dollars were invested in agricultural research. Congress responded with a \$500 million pledge and is slowly increasing funds to meet that goal, viewing the "National Initiative" as a critical investment for the future.

GRAPH 1

# RESEARCH AND EDUCATION BUDGET

Without Facilities Construction, in Constant, 1983 Dollars



Source: Author's calculations from USDA Office of Budget and Planning Data

At the same time, however, the federal government continues to commit huge sums of money to new facilities. Today, it will cost the federal government more than \$700 million to complete facility projects already in the construction pipeline. With the public demanding that every tax-generated penny be tightly pinched, Congress still has not struck an appropriate balance among new facilities, existing facilities, and actual research.

C. Facility Expenditures Have No Connection to Research Priorities.

As you stated in your hearing notice, Mr. Chairman, it is essential that research facility investments be consistent with the needs of producers and consumers. Unfortunately, there is little coordination between established research priorities and expenditures for facilities. The needs of the overall system are lost in the eagerness to meet demand for any particular issue or commodity that finds favor in a given year. Most facilities money is used to build structures for duplicative projects to serve the popular cause of the moment. This hurts diversity of research enterprise, as well as reinvestment in important national labs such as Beltsville and the Germplasm Laboratory in Fort Collins, Colorado.

Winners and losers in the funding battle. A very important aspect of setting and funding research priorities is the growing disparity between university and federal facilities. Vernon Ruttan, in his seminal book on agricultural research, maintains, "A major issue facing the U.S. Agricultural Research Service system in the future is the appropriate division of responsibility for agricultural research among the federal, state, and private systems."

To most of us, it makes little difference whether agricultural research is carried out at federal or state laboratories, just so



long as it is done. But in the fierce battle for facility funds, the state universities are clearly in the lead. The vast majority of facility projects funded over the last seven years have been on university campuses.

The important question raised by Ruttan has not been answered; we have not determined the appropriate funding mix for state and federal facilities. Universities are getting an increasingly larger share of the pie, but not because there has been a proactive decision to fund state university projects in preference to federal laboratories based on merit. Instead, the state universities have been more effective in their lobbying efforts for appropriations.

Policy makers may opt to continue the current trend. If so, they need to understand that a dramatic shift in research from federal to state laboratories will necessarily occur, leaving the viability of the long-standing federal system in question.

They may also wish to examine more closely how the decisions to fund state universities are made. During your March hearing, Dr. James Savage showed that from Fiscal Years 1980 to 1992, approximately \$2.5 billion was earmarked for research-related academic facilities at some 234 universities and colleges. Forty-eight percent of all earmarked dollars were appropriated in Fiscal Years 1991 and 1992. Nearly a third of all earmarked dollars went to five states, while half of the dollars went to ten states.

Specific to agricultural research, Don Hadwiger showed that between 1958 and 1977, close to 50 percent of new research facilities were placed in districts of Members sitting on the House and Senate Appropriation Subcommittees. He exclaimed, "The demand for state laboratories has obliged the federal ARS to operate a 'traveling circus,' operating new locations in current Senate constituencies, while closing some in states whose senators are no longer members of the Subcommittee."

Applying Hadwiger's analysis to the years 1977 to 1993, a modest increase in earmarking is seen. There is still uneven distribution of funds to the 50 states and the District of Columbia. In fact, over this time period, the top four states received more than \$48 million each while the bottom four states received no funds at all (Chart 3, page 13). The chart on the following page indicates the funding provided to each state in ranked order.

And the amount of earmarking is on the rise. Examination of the past seven years shows the percentage of facilities in districts of appropriation subcommittee members is

#### CHART 2

##### THE CONGRESSIONAL APPROPRIATIONS SUBCOMMITTEE

##### Placement of Agricultural Research Facilities Projects

Decision to Locate	Projects 1958-1977	Projects 1987-1993
In districts of members of House Approp. Subcommittee	4%	16%
In states of members of Senate Approp. Subcommittee	34%	36%
Jointly in both districts and states of sitting members	10%	5%
Not located in districts or states of sitting members	51%	42%

Source: Information for 1987 through 1993 is based on author's calculations from USDA Office of Budget and Planning and congressional committee documents. Information for data 1958 through 1977 comes from, Don F. Hadwiger, The Politics of Agricultural Research (1981).

CHART 3

# RESEARCH FACILITY SPENDING BY STATE IN RANK ORDER

Total, Fiscal Year 1960 through 1993

State	(dollars)		
1 Texas	84,049,000	27 New Jersey	8,600,000
2 Maryland	63,266,928	28 Virginia	8,455,000
3 North Dakota	55,113,500	29 DC	8,335,000
4 Washington	48,098,500	30 Florida	8,086,000
5 New York	47,229,506	31 Arizona	7,646,000
6 Illinois	39,685,900	32 Alabama	6,686,800
7 Nebraska	37,309,000	33 South Dakota	6,164,000
8 Oregon	36,595,000	34 Idaho	4,616,600
9 Iowa	34,584,000	35 Montana	3,228,000
10 Massachusetts	33,739,748	36 Tennessee	3,026,000
11 Mississippi	28,359,000	37 Rhode Island	2,862,000
12 Michigan	24,760,000	38 Minnesota	2,625,000
13 Pennsylvania	24,093,700	39 Maine	1,885,000
14 Wisconsin	23,752,500	40 Missouri	1,834,000
15 California	22,601,000	41 Utah	1,729,000
16 Hawaii	21,051,000	42 Wyoming	1,218,702
17 Arkansas	15,267,000	43 South Carolina	1,185,000
18 Colorado	14,866,000	44 Ohio	873,000
19 West Virginia	14,833,000	45 Delaware	516,000
20 Kansas	14,551,000	46 Nevada	465,000
21 Louisiana	13,748,000	47 New Mexico	116,000
22 Georgia	13,088,500	48 Connecticut	0
23 Oklahoma	12,496,000	49 Kentucky	0
24 Vermont	11,292,000	50 Alaska	0
25 North Carolina	11,239,000	51 New Hampshire	0
26 Indiana	11,155,000		

**U.S. Total: 836,995,884**

Source: Author's calculations from USDA Office of Budget and Planning Data

### III. SCIENCE AND PLANNING

It only takes a quick glimpse of the history of agricultural research facilities funding to understand that it has been erratic, plagued by lack of planning (Graph 2, page 15).

Since the mid-1960s, numerous external and internal reports have urged federal and state agricultural research programs to undertake more effective planning and coordination. In 1981, the GAO reported that long-range planning could greatly improve the efficiency of agricultural research and development. Beginning in 1982, the UAB has repeatedly urged greater planning of research, especially of research facilities.

But the science community continues to resist. Speaking for many, Michael Polanyi, argues that "any authority which would undertake to direct the work of a scientist centrally would bring the progress of science virtually to a standstill."

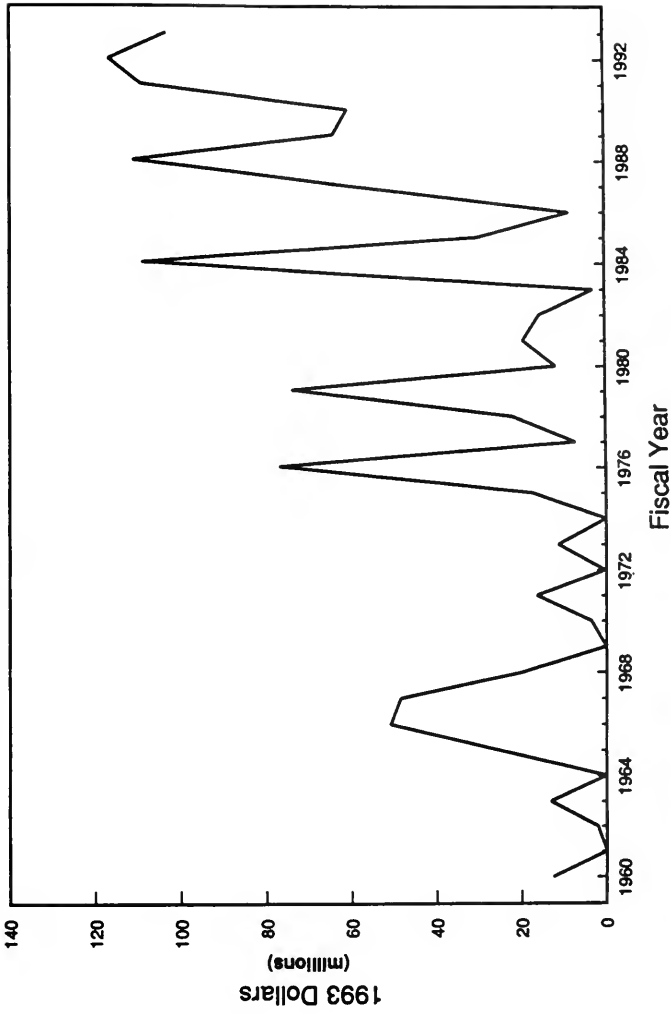
While the scientific community contends that science cannot be planned, several observers suspect that part of the opposition to planning comes from a reluctance of opening the research process to scrutiny and shared control of the agenda. Ruttan asks, "Should research be planned? The answer to this question often depends on the interpretation that the respondent attaches to planning. The response is frequently confounded by the respondent's perception to the second question: Who will have the authority for research planning?" Hadwiger concurs with this view and argues that "Lofty national research missions have to be reconciled with mundane human and organizational needs:"

Behind the arguments over the virtues of coordinating management were struggles over who should control agricultural research. After 1972 there were several new legislative directives, new machinery for planning and coordination, agency reorganizations, and new legislative mandates.

GRAPH 2

# RESEARCH FACILITIES APPROPRIATIONS

Fiscal Years 1960-1993, in Constant, 1993 Dollars



Source: Author's calculations from USDA Office of Budget and Planning Data

Virtually all of these were perceived by the congressional appropriations committees, by the state experiment stations, and by agribusiness groups as efforts to centralize power in the national executive branch.

Agricultural research is important -- people should have a say in how money is spent. Both the House and Senate Agriculture Committees have been involved in discussions over research priorities. It is important to look at the facility problem, not just as a capital planning challenge and political challenge for that matter but also as a visual manifestation that is measurable with all of agricultural research.

#### IV. THE BLAME GAME

It is fair to ask why anyone would adhere to and promote a theory that he or she knows to be insufficient for solving a problem. First, because such theories mask the responsibility of the people involved from the outside world. Second, and of equal significance, such theories help hide the confusion, frustration, and hopelessness many people feel when confronting facilities reform. Not knowing what to do, one must come up with a reasonable explanation for the mess and possible solutions.

##### A. Argument 1: Congress is Responsible

Interesting to this discussion, the terms "earmarking" and "pork barrelling" are terms appropriated from agriculture. Both are often used to describe the federal budget process, which has served agriculture well. Don Hadwiger lists these positive virtues:

We should instead give considerable credit to pork barrel politics for several fortunate developments in agricultural research. In proliferating research locations, for example, Congress has helped unlock high-potential regions such as the

High Plains. Moreover, pork barrel politics have sustained experiment stations in poor states which in some ways has helped alleviate poverty and malnutrition there, as in the introduction of "greens" into diets.

Pork barrel has also, quite typically, permitted scientists to pursue long-range goals of their own choice which might not otherwise have achieved political support, and example being the human nutrition research laboratory located in North Dakota. The influence of pork barrel may also help to account for the extraordinary specialization at the state level, the benefits of which may largely accrue to the nation and the world, an example being the research on wheat breeding, milling, and baking done at Kansas State University.

But the amount of earmarking, or pork barreling, that takes place today has serious consequences, particularly when viewed in the context of a rising national debt and other fiscal constraints. Part of the reason it continues is the pressure exerted on Members of Congress by universities and the USDA, despite public statements from these entities to the contrary. As a Senate staff member, I attended numerous meetings where I witnessed scientists lobbying for facilities projects to the dismay of many congressional members who do not want to engage in earmarking but are driven to it by relentless constituents and Administration priorities.

**Pressure from universities.** Universities across the country are hiring high-priced lobbyists to win appropriations for research facilities. Although members of the scientific community openly criticize earmarking in national forums, back home they nevertheless participate -- even pressuring members who resist earmarking on philosophical grounds.

When told that the funds for facility construction will be deducted from funds available for competitive research grants, university administrators nod in approval behind the scenes. Hadwiger described it this way: "The Administration did not provide increased institutional funding at the level anticipated. So the state experiment stations and extension services organized

their own lobby, in the interest of increasing their share of the budget at the expense of proposed competitive grants funding."

**Pressure from USDA.** Some time ago, many USDA administrators decided that they might as well go along with the earmarking system and try to secure the funds necessary for research in whatever manner possible. Today administrators identify powerful Members of Congress and work with the local ARS laboratories and universities to secure pork barrel appropriations.

Ernest Moore has described the deliberate scheming of certain administrators. He reports that beginning in 1960, ARS officials started laying plans to establish large laboratories in Arizona, Georgia, Florida, Missouri, Mississippi, North Dakota, South Dakota, and Texas -- the home states of several members of the congressional appropriations committees.

Even when the Administration proposes facility closures, administrators do not always support their own budget proposals. USDA personnel cite instances when they have tried to close certain facilities, only to be overruled by Congress. As a result, the administrators say they see little reason to engage in the political battles necessary to clean up the system; it is hopeless, they contend.

But it is not always that simple. For example, Moore describes a conflict between the Johnson Administration and Congress in Fiscal Year 1966, the first time an Administration proposed facility closing. The Administration's budget called for closing 20 ARS field stations and reducing spending for the Beltsville facility. In the end, Congress restored 75 percent of the budget. The justification? An ARS administrator admitted to a congressional committee that he did not agree with the proposed cuts, thus undermining the Administration's position and leaving Congress with mixed signals.



**B. Argument 2: Scientists Are Responsible**

Congress blames the bureaucracy for living in the dark ages and resisting new research priorities. Some Members of Congress argue that building facilities in their districts does not detract from the overall purpose of the research agencies. Rather, they say, it assists science by providing funds that would not otherwise be available. But convincing data show that efforts by university scientists and USDA personnel to improve the system are ignored in favor of placing new and retaining old facilities in the districts of powerful congressional members.

The value of some research defies measurement. The scientific community argues, and rightly so, that Congress demands much of research that is simply not possible. Basic research, for example, is difficult to evaluate for its immediate applicability to the farmer in the field. As well, some of the spending Congress cites as inefficient is important to the scientific process. Hadwiger states, "Indeed, the spectacular successes in research often come from intense competition among scientists who are chasing the same hound in similar laboratories, a phenomenon which budget-cutters may see as wasteful. But in the 'compete and communicate' style of public research, these laboratories replicate and leapfrog one another in their rush to success."

## **V. VICTIMS OF THE BLAME GAME:**

### **FAILED REFORM EFFORTS**

**Base closing commission.** Section 1674 of the 1990 farm bill mandated the Secretary of Agriculture to establish an independent, Agricultural Research Facilities Planning and Closure Study Commission to be disbanded after eight months of work. The Commission, composed of members appointed by the Administration and

the Chairmen and Ranking Members of the House and Senate Agriculture Committees, was supposed to:

- (1) review all currently operating and planned agricultural research facilities for research importance;
- (2) identify those agricultural research facilities that should be closed, realigned, consolidated, or modernized, in order to aid in carrying out the research of the Secretary;
- (3) develop recommendations concerning agricultural research facilities; and
- (4) evaluate the agricultural research facilities acquisition and modernization system utilized by the Department of Agriculture and recommend improvements in such system.

The Commission was modeled after the military base closing commission, but in the end was not given the same decision making power. Amendments to the original legislation in the Senate Agriculture Committee reduced the authority of the Commission from mandating closures to recommending them. Nevertheless, it was an important first step.

The Administration refused to implement the Commission, arguing that it was unnecessary -- USDA was well aware of which facilities needed to be closed. When asked to produce a list of such facilities, the Administration stalled. A year after passage of the farm bill, the congressional appropriations committees did not fund the Commission. This was especially easy to do because the Commission was not in the President's budget request.

**Competitive grants.** The National Association of State Universities and Land Grant Colleges has proposed establishing a \$100 million annual competitive facility grants program. The National Academy of Sciences has also recommended a competitive grants program for facilities, but it does not address problems within the current system, e.g., the difficult and politically dangerous issue of facilities closing. Instead, it deals only with

new facilities, calling for an amount of money nearly four times the current average annual facilities construction budget. Subsequently, in the 1991 Fiscal Year budget, the USDA proposed a competitive grants program for facilities, only to see Congress discard it and use the freed-up funds for more earmarks.

**USDA "SWAT" teams.** In response to congressional pressure to reorganize USDA, former Secretary of Agriculture Edward Madigan established a number of "SWAT" teams to review the field structure of the Department. Despite the fact that other field agencies had thousands of offices as opposed to less than 200 research sites and despite the fact that problems in research facilities triggered the entire review, USDA provided data to Congress on everything but research.

USDA did establish criteria with which to evaluate all federal agricultural field locations, including ARS sites. Upon applying these criteria to ARS facilities, USDA personnel identified 52 facilities -- nearly half of all ARS locations -- as suspect and requiring careful scrutiny by the agency administrator. Although this review was due to be completed and presented to Congress, despite repeated requests for the information, to date no formal submission of the data has been made.

## **VI. RECOMMENDATIONS**

I know this Subcommittee is committed to facilities reform. While the underlying debate regarding science and planning must be resolved, I offer four specific recommendations to curtail further erosion of our facilities system:

- Impose a moratorium on all new facility construction until a long-term solution is found as recommended by the Users Advisory Board in testimony before this Subcommittee last

March.

- Develop a consensus among congressional, USDA, and university officials regarding a reasonable facilities planning process, including a capital budgeting program.
  
- Enforce the funding cap established in the 1985 and 1990 farm bills which requires any facility construction exceeding \$500,000 to be authorized by legislation passed through this Subcommittee.
  
- Implement the Agricultural Research Facilities Planning and Closure Study Commission as authorized in the 1990 farm bill. The Secretary of Agriculture has the authority to convene such a commission even as we speak.

In the long term, what to do? Again, we must grapple with the essential nature of the crisis, reaching consensus on its definition and then agreeing on how to solve the problems arising from the root cause.

One of the first efforts at reviewing research facility needs was undertaken by USDA in 1973. At that time, the Agricultural Research Facilities Review Task Force called upon the Secretary of Agriculture to bring together interested parties to work together in planning for research:

The Committee anticipates that only very limited funds will become available in the foreseeable future for construction of new agricultural research facilities. Therefore we strongly recommend close federal-state-public and industry coordination in planning any new federal or state facilities and the programs to be conducted in them.

USDA cannot achieve reform acting alone. The scientific community cannot achieve reform acting alone. And, the Congress

cannot achieve reform acting alone. If the facilities system is to be reformed, it will happen only by working together and negotiating a consensus on an appropriate solution. It has been two decades since the 1973 Commission called for a coordinated problem solving effort. And all this time lost, not heeding such good advice. It certainly is time to move beyond the blame game.

Answers to Questions Submitted to  
Kathleen A. Merrigan

1. What did you envision that a Facilities Review Commission would accomplish? Please refer to both ARS and CSRS facilities.

I envisioned that the Facilities Review Commission would accomplish three goals.

First, the Commission would take a look backwards and review every existing federally-owned and USDA-operated research facility, including those of the ARS and the Forest Research Service. This review would also encompass facilities in the process of being constructed, thereby capturing some projects under CSRS. The result of the Commission's review would be a series of location specific recommendations regarding facility closure, consolidation, and reinvestment to be forwarded to the Congress and the Administration for action.

My personal expectation was that such a review would result in closure recommendations for dozens of facilities. However, I also anticipated that the Commission would find a large number of facilities to be of critical importance but in such serious disrepair as to hamper the production of good research. My view was that the money saved from closing some facilities would be needed to modernize remaining facilities. In other words, I did not anticipate this to be a budget-saving measure, but rather a good science policy measure.

Second, the Commission would look forward and propose to the Congress and the Administration a better system for the future allocation of research facility funds. Such a system would necessarily apply to both ARS and CSRS. Many of my colleagues at your hearing focused on the desirability of a competitive grants program for facility allocation -- this was among the options we hoped such a Commission would consider.

Third, we anticipated that the Commission would present a politically digestible package of recommendations since such a Commission would be viewed a neutral promoter of good science.

2. Do you view it to be similar to a base closing commission?

Yes, very much so. In preparing the initial legislative draft for consideration by the members of the Senate Committee on Agriculture, Nutrition and Forestry and their staffs, I collected the various military base closing commission bills and committee reports so to have a model upon which to base my efforts.

However, the bill that became Section 1624 of the 1990 farm bill (PL 100-624) differs in one very significant way from the military base closing commission. The Agriculture Research Facilities Commission is a study commission only. It is empowered to make recommendations to the Congress and the Administration -- recommendations that could be ignored. As you know Mr. Chairman, the military base closing commission recommendations carry more weight as they require the Congress to vote yea or nay on them in their entirety without amendment.

I should also tell you that the legislation originally proposed by Senator Leahy in Committee deliberations did include the "teeth" of the military base closing commission--forcing the Congress to act on a package of recommendations identical to the military base closing commission process. However, this bill version did not prevail in Committee. In the end, the legislation was, in my view, watered-down.

If I had a magic wand, I would certainly amend the Facilities Commission legislation so that the Commission recommendations carried the force of law as originally drafted. I would also alter the membership so to give the Chairmen and the Ranking Minority Members of the House and Senate appropriations committees Commission appointments in addition to those of the Secretary of Agriculture and the Chairmen and Ranking Minority Members of the House and Senate agriculture committees.

3. What would it take to get this Commission up and running? Would it have to be funded or could the Secretary do it on his own? I expect that there is no shortage of information already in place about this issue.

I do not believe it would take much energy or resources to get this Commission up and running. As I noted in my testimony, there are numerous reports that exist that tell much of the facilities story. In fact, as I failed to include a bibliography with my original paper, I submit such now at the close of these questions in order to provide a resource for any person, agency, or (hopefully) commission studying this issue.

I have been told that, in response to Senator Leahy's request to Secretary Madigan for a review of research facilities, a USDA SWAT Team did develop a ranked list of facilities for possible closure. As far as I know, that list has not been shared with Senator Leahy or distributed publicly. However, such a list would surely be of interest to this Subcommittee and provide some groundwork if the Facilities Commission is appointed.

Allow me explain what little I know about the appropriations process as it pertains to the Facilities

Review Commission. As it currently exists in law, the Commission falls under the Federal Advisory Committee Act (FACA). As you know, the agriculture appropriations bill includes funding for advisory committees that fall under FACA. This FACA account is listed under "Department Administration" in the agriculture appropriation bill. The FACA account lists suggested line item amounts for certain committees. These line items are merely suggestions; the Secretary of Agriculture can reallocate funds within the account as he sees fit. In other words, if the overall appropriation in the account is \$1 million, despite suggestions on how that money could be dispensed, the Secretary may shift the funds between committees; in fact, this occurs on a regular basis.

Since Fiscal Year 1991, the FACA account has had certain restrictions placed on it in response to what the appropriations committees perceived as a proliferation of advisory committees in the 1990 farm bill. As a result, current language in the agriculture appropriations legislation prohibits the Secretary of Agriculture from diverting any funds into the FACA account. This means that, if funded, the Facilities Commission faces stiff competition for funds -- there are too many committees competing for too few dollars. Nevertheless, the Facilities Commission is among the most important of these committees and I would hope the Secretary would see the importance of diverting money to its administration.

The overall sum necessary to fully fund the Facilities Commission is in the range of \$100,000, although this would vary depending upon the availability of USDA staff to assist the Commission. The Commission is limited, by law, to 240 days. The costs for the Commission would largely be: (1) travel -- to view facilities first hand; (2) public hearings -- to allow public discussion of pending closures; and (3) publication of the final report.

4. What do you think has led to our current facility problems?

The most essential element -- and one which I discuss in my written testimony at some length -- is the lack of consensus on whether it is possible to plan research. This stems from a basic disagreement over the control of research and who should rightfully share in facility decisionmaking. Not only has this disagreement led to a messy facilities system, it has also resulted in failure to achieve reform.

Someone, somewhere needs to take the first step and deal with these problems. The Congress wants the Secretary of Agriculture to take the first politically risky step. The Administration wants the Congress to face the political heat and take the first step. Democrats point to



Republicans and Republicans point to Democrats. And all the while the science community whispers in the dark, bringing mixed messages to their political representatives while trying to escape blame themselves.

My message here today is that we all share in the blame for the facilities crisis. And, realistically, reform will require that all the concerned parties develop a joint plan of action and take that first step together.

5. Given current trends, what do you project will be the condition of agriculture research in this country without changes in the ways in which we set priorities and fund agriculture research?

I am an ardent supporter of agricultural research Mr. Chairman, but I see the writing on the wall. This is a time of belt-tightening not of increased budgets. The agriculture research system will have to learn how to better shift funds within their current program levels in order to get resources to critical needs and new initiatives.

A first test of how well the agricultural research community will meet this challenge is in the facilities system. They -- we -- will have to devise a way to cut out low priority facilities in order to reallocate resources to high priority areas.

If the agricultural research community cannot meet this challenge, I would rather not speculate on the disastrous results that surely await.

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June 14, 1993

Agricultural Research and Education  
Priorities and Technology Transfers:  
Suggestions for Congress

By Wallace E. Huffman\*

As requested by the Committee, my primary objective will be to address the role of priority setting at USDA research agencies, ARS and CSRS, and criteria for placement of agricultural research facilities. This will be undertaken in the following sections of my report. The initial sections will, however, provide some background for my later recommendations.

A Brief Historical Description of the U.S.  
Agricultural Research and Extension System

Research and development, leading to advances in science and technology, have been and continue to be important public and private sector activities in the United States. This is in contrast to the situation in the developing countries of the world and Eastern Europe where these activities are almost totally conducted in the public sector.

Robert Evenson and I (Huffman and Evenson 1993, p. 96) estimate that public agricultural research expenditures were larger than private R&D expenditures during 1905-1950, but private agricultural R&D expenditures pushed

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Testimony prepared for the House Agriculture Subcommittee on Department Operations and Nutrition. The Honorable Charles W. Stenholm, Chairman.

ahead of public agricultural research expenditures about 1950 and have continued to grow more rapidly. From 1980 to 1990, total public agricultural research expenditures grew at an average annual rate of 0.4 percent (in constant prices) while private agricultural R&D grew at 3.1 percent. For 1990, we estimate that private R&D was about twice as large as public R&D. As a consequence, a good picture of U.S. agricultural research cannot be obtained by focusing only on the public component.

Of course the U.S. public and private sector research activities are generally different, and we believe they should not compete directly. In fact they should be complementary activities with the public and private sectors engaging in research for which they have a comparative advantage. The public sector R&D activities are heavily focused on advances in science or knowledge. The new information is largely published in professional journal articles, scientific bulletins, and books and recorded in other materials, e.g., plant variety protection certifications, patents. Some of this material is protected by copyrights, PVPCs, patents, but much is not. Historically the public sector has made innovations available to users at minimal cost. Intellectual creativity and imagination are required for university scientists to have long-term productivity. These characteristics are partially innate ability and partially skills created by investing in human capital. Economic incentives and institutional factors appear to play a major role in affecting the productivity of public (and private) R&D.

Private sector firms tend to be engaged in R&D activities only to maintain a competitive edge over other businesses. They frequently develop new products and processes that they can sell commercially or have the potential to be licensed for profit to others, e.g., new genetic materials, new crop varieties, agricultural chemicals, pharmaceuticals, machinery,

computer software. The private sector has generally been more strongly interested in strong property rights to its intellectual property than the public sector. Establishing and enforcing property rights in intellectual materials is costly because of associated transaction costs. When transaction costs are extremely high, few new technologies are privately developed. This is a major reason that private firms undertake very little research in the general and pretechnology sciences.

In the U.S., the institution of patenting has existed for over two centuries, and during the past 25 years, new legislation, judicial decisions (e.g., Diamond v. Chakrabarty and ex parte Hibberd court decisions) and technologies of enforcement have strengthened property rights in intellectual materials (also see OTA 1992; Huffman 1992). This has improved the profit potential for much of private R&D and has contributed we believe to the relatively rapid growth in private R&D expenditures and demand for scientists and technicians (see Huffman 1993). In general, skills for successful private sector scientists are similar to those of university and USDA sciences, except that ability to cooperate across fields of science and technologies and to stay focused on potentially profitable innovations are more important.

#### The Social Economic Payoff to Agricultural Research

Expenditures on agricultural research (public and private) represent largely an investment which creates an R&D stock. Economists have frequently used statistical techniques to identify the impact of research and extension stocks (and other policies). This is their equivalent to the biological scientists' controlled experiments. For example, Huffman and Evenson (1993, ch. 7) summarize empirical evidence showing positive impacts of public and private R&D on U.S. multifactor agricultural productivity covering more than

100 years. By multifactor productivity I mean the aggregate average product of all inputs under the control of farmers. As is suggested by my statement, public and private R&D, which are not under the direct control of farmers, have been one important source of U.S. multifactor agricultural productivity increases. Let me hasten to add that the uses of new technologies may have effects on the environment that are negative and that could be viewed as partially offsetting some of the productivity gains. Also, although additional farm output is generally evaluated at market prices, market prices may overvalue the marginal social benefit of farm output when government surplus stocks of commodities exist. Research is underway to fine-tune productivity estimates for some of these effects.

What do multifactor productivity gains mean? When multifactor productivity is faster in the farm than in the nonfarm sector and a large share of consumer expenditures are for domestically produced products, the consequence is that the real price of farm output decreases. In other words, agricultural products become relatively inexpensive. For example, Jorgenson and Gollop (1992) present empirical evidence for 1948-89 showing that multifactor productivity growth has been on average 4 times faster in the U.S. farm sector than in the nonfarm sector. This is an outstanding achievement for the farm sector that has enhanced its relative comparative advantage in international trade. Furthermore, with a large amount of competition in the U.S. economy, these differences in productivity rates have shown up in different trends in U.S. prices. The price of farm output has fallen by 2.5 percent per year relative to all goods and services purchased by U.S. consumers.

One way economists summarize the benefits of agricultural research is the internal rate of return on the investment. This is a cost versus benefit



comparison, adjusted for differences in the timing of benefits and costs. The returns are consumer and producer surplus, and we have just stated that these benefits go largely to consumers (not producers). It is easy to compare internal rates of return on investments of different types. In general a real rate of return larger than 5 percent is good. Our economy as a whole has not been able to sustain a rate of real income growth nearly this large. (Note that GDP can be viewed as the average rate of return on an all inclusive capital stock.)

Our research, as well as several other studies, shows a marginal social rate of return to public R&D of about 40 percent. This is unusually large. As a further comparison we obtained a lower social rate of return for public agricultural extension of about 20 percent. We have, however, added more dimensions to the calculations by considering rates of return to pretechnology (an intermediate level of science) versus applied research and to crop versus livestock research. Our findings are that the marginal rate of return was significantly higher for public pretechnology than applied research and for public crop than livestock research over the period 1950-1982.

What are some of the reasons for these differences? Pretechnology sciences are an intermediate level of science between general and applied sciences. These pretechnology sciences include plant physiology, plant genetics, phytopathology, environmental sciences, animal and human physiology, animal and human genetics, animal pathology, nutrition, climatology, soil physics and chemistry, applied economics, statistics and econometrics, and sociology. They provide productive linkages that help speed the transformation of advances in general science into useful technologies and of problems of applied scientists to general science. Pretechnology sciences and applied sciences are optimally organized for the long term when they are

complementary in their effects on productivity. However, since 1950 the public agricultural research system has been underinvesting in pretechnology sciences relative to applied sciences. This became especially apparent during the 1980s when public agricultural research was slow to adopt general advances in molecular biology and microbiology.

The biology of plants are more dramatically affected by geoclimatic conditions than are (nongrazing) animals, so new plant technologies are generally more location-specific in their useful application than are new livestock technologies. This has important implications for measuring the relevant size of agricultural research. Most advances in livestock research are applicable to a large share of livestock producers across the United States. Stated another way, the benefits of advances in livestock research in one state can and do spillover widely to many other states' producers. (Sometimes local modification must be made before it will replace existing technology.) The interstate spillovers complicate the organizational problems for livestock research by USDA and SAES system more than for crop research, and we suggest that the outcome was an overinvestment in livestock research. Also, we have some evidence of a need for livestock pretechnology and applied science research to be reorganized so that they become more complementary and less in the way of duplicative. The primary way that this would come about is for applied livestock research to build from advances in pretechnology sciences and for pretechnology sciences to look to applied livestock research for some of its research problems.

#### **Management of Agricultural Research and Priority Setting**

R&D for agriculture is a productive enterprise that uses as inputs highly skilled labor or human capital, scientific laboratories, experimental

farms/materials and previously created stocks of knowledge some of which are available in libraries. Scientists, technicians, and research assistants have completed more than 16 years of formal schooling. In addition, scientists today are a very specialized type of labor having acquired 4 to 6 years of highly technical but narrowly focused post-graduate education. Furthermore, regular on-the-job research experience augments their skills, which further adds to their human capital stock for current and future research. Laboratories are complementary with competent and creative scientists' time, but they are not good substitutes.

Priority setting and management of public agricultural research are important but controversial areas. Systematic attempts to plan agricultural research go back to the 1960s when the land-grant universities and the USDA initiated the use of scoring or ranking methods in planning U.S. agricultural research. These efforts to plan for agricultural research were summarized in A National Program of Research for Agriculture (USDA and NASULGC 1966). As part of this activity, the Iowa Agricultural Experiment Station prepared a long range plan for its 19 major areas of research; 8 focused on specific agricultural commodities, 6 on resources or inputs, and 4 on management and marketing. A panel of scientists and administrators for each area prepared a list of research opportunities and then ranked them according to their expected contribution to economic growth. Although the process resulted in a long range plan that was used in making project funding decisions over the next decade, it was not viewed as being successful enough to continue.

Some of the more recent advances in long-range agricultural research planning are presented in Norton, Pardey, and Alston (forthcoming). They suggest that a research institution should define its objectives, which are frequently multiple and embody trade-offs. They also suggest that efficiency

or productivity impacts and distribution consequences are important parts of these goals. In their approach, agricultural commodities are generally given preeminence in research priority setting. The priorities when established, most likely by a research team, tend to be implemented by "top down management."

Evenson and Kislev (1975) have developed a model of the discovery process for innovations that fits into the Norton et al. priority setting process. (See Huffman and Evenson 1993, p. 227-8 for a summary.) Evenson and Kislev assume a particular specification to the search function where the likelihood of innovations are independent across research commodities or activities, and each innovation is related linearly to the real research expenditures on the research commodity or activity. Given that an expected value can be placed on successful innovations and that research administrators attempt to maximize the expected value of all research discoveries subject to a budget or resource constraint, the model leads to the conclusion that research funds should be allocated in proportion to the expected value of their discovery. For example, if the expected value of an important discovery in corn research is worth twice as much as an advance in soybean research, then twice as much research money should be allocated to work on the discovery in corn relative to the advance in soybean research. This is a type of expected benefit-research expenditure allocation "congruency rule."

There are some important qualifications to this rule. First, when this rule is applied by a particular research station or agency, the decisions tend to be made myopically. Administrators generally ignore research benefits that may spillover to other regions or to other research enterprises and they tend to ignore the existence of potentially duplicative research conducted elsewhere. Second, we believe that advances in science are best described by a building block approach within multilayered and interconnected levels of

science stretching from general to applied science and technology development. This means that the production of innovations or the discovery process generally have an aspect of interdependence that is ignored by the congruency rule. Third, the timing of research expenditures needed for research breakthroughs might be quite different for different innovations.

Priority setting schemes assume that research administrators or government administrators are behaving as benevolent public servants in the sense of trying to optimize some overall social objective. Frequently, economists assume that for practical purposes, the objective can be reduced to a social cost-benefit analysis of research projects. One useful summary statistic from this process is the marginal social rate of return on the research projects. Projects that have the highest rates of return would be given highest priority, and the available research budget exhausted on them.

The primary reason social cost benefit analysis is controversial is that there is not much evidence that research administrators or government officials behave this way in making research funding decisions. This conclusion arises from empirical evidence that competing interest groups affect research investment decisions in ways that deviate greatly from those suggested by socially efficient allocations.

Priority setting at the national level for agricultural research raises conflicts between exertion of useful "central leadership" and "decentralized" control. As a result of some critical assessments of public agricultural research, e.g., the Pound Report (1972), Winrock Report (1982), OTA Reports (1981), the federal government has attempted to take greater responsibility for "coordinating" U.S. public agricultural research. The most effective mechanisms have been by altering the financial incentives contained in federal

funding of agricultural research (e.g., special grants, competitive grants, earmarking funds).

SAES units have generally been wary of federal attempts to control or guide their research agendas through leadership. They frequently point out that state agricultural problems are primarily local problems, and these local problems must be given highest priority. National research agendas frequently have short lives because of sudden changes in the political climates. State governments do not engage in agricultural commodity program policies to any significant extent. At the national level, however, agricultural research policy and commodity program policies frequently are in conflict. These are some of the main reasons that states tend to see their agricultural research agendas as uniquely different from the national agenda. The national government can, however, point to many examples of duplicative research in SAES units especially in livestock research.

Third, with reduced real resources for public agricultural research, research administrators tend to focus more intensely on locating new sources of funds and prioritizing research. This focus frequently leads to tighter control over research projects undertaken. Some new evidence is emerging on the likely effects of alternative management and structural approaches to agricultural research in the states. Huffman and Just (1993) have examined the effects of different organizational and management structures for public agricultural research on state multifactor productivity. They found that tighter control over research problem choices by directors and department heads may enhance applied research productivity but significantly reduce the productivity of pretechnology science. They, however, show that it is important for public agricultural research in the pretechnology sciences to be oriented to relative external downstream influences. This is best described

as a "concern" for practical problems of clientele groups and applied researchers and not focused solely on current fads, journal articles, or personal enhancement of reputation.

They also show that the current shift of SAES units to competitive grant and contract funding, as opposed to formula funding from federal sources and regular state government appropriations, reduced the productivity of public agricultural research, measured as the impact of research on state agricultural productivity. It is possible that other socially valuable research outputs are produced in large enough quantities to offset these lower local productivity effects, but these other effects have not as yet been quantified.

Furthermore, the Huffman and Just (1993) study concludes that one of the most important long term agricultural research management strategies is to maintain a vertically integrated agricultural science establishment. In the short run, pretechnology sciences and applied sciences may seem to be somewhat independent. In the long term, technological progress can only occur when vertical linkages across the layers of science and technology exist and function well. Pretechnology scientists are more productive when they are aware of practical needs, and applied scientists are more productive when they are informed and literate in the parent sciences. Historically, the applied sciences in agriculture have frequently become disconnected from the parent sciences due to increased specialization of efforts and growing scientific sophistication of general and pretechnology sciences. For example, agricultural faculties of land-grant universities and USDA research agencies were poorly prepared in the early 1980s to assimilate new scientific advances in molecular and microbiology leading to the new biotechnology.

In the pretechnology sciences, scientist-directed research programs are more efficient than administrator-directed ones. Predicting advances in most

areas of science and technology are difficult. This means that micro-management of R&D is most generally an unproductive activity, and research management approaches that follow a research priority setting methodology are likely to fail because they ignore the realities of the scientific discovery process in these areas.

Although the production of scientific discoveries is uncertain, it is unreasonable to assume an equally likely probability of discovery in all areas. Working scientists are the best judge of their own ability to make breakthroughs in various areas. Research administrators, recognizing these realities, can effectively set some general priorities including the "riskiness" of the research enterprises but place most of their efforts on setting appropriate monetary incentives for producing generally useful outputs for their scientists.

#### Implications for the Debate about Priority Setting and Location of Facilities

Several issues are developed here. First, the single biggest issue facing priority setting is the definition of the boundary between public and private research and establishment of new and useful public-private collaborative relationships to advance the technology of agriculture. Shrinking real public resources for agricultural research, strengthening intellectual property rights, and changes in federal policies on ownership of intellectual property from federally funded research are major contributing factors. I believe that it will ultimately be self defeating for the public sector (including the USDA and SAES) to attempt to sell intellectual property rights in the same fashion that private companies buy and sell (or license) intellectual property among themselves. The reasons are that a long and



legitimate tradition has been established for public (both at the federal and state level) support of research because of the generally weak private incentives for innovations in general and pretechnology sciences and in some types of applied research. Furthermore, implicit contracts have frequently been worked out whereby private firms have donated useful germplasm and other resources to the public sector for its research activities in return for small favors. The attempt by the public sector to regularly sell or license intellectual property for "high prices" undermines the basic foundations for public support of research and previously established traditions for cooperation with private firms. This is especially questionable behavior when the revenues from these sales will be small relative to the size of the cost of general and pretechnology scientific research. In addition, private sector firms that find themselves in direct competition with public sector firms for development and sale of intellectual property can legitimately complain of unfair competition because public resource, which their tax revenues go to support, are being used to undermine their potential profitability and longevity.

In my opinion, the proper role of public sector research is to undertake research that the private sector finds unprofitable to conduct but which the private sector needs for its long term development or availability of new products, processes, and technologies. I hasten to add that some may believe that private R&D largely creates only private sector profits and social "bads", but Evenson and I have evidence showing that private R&D does increase agricultural productivity. Also, we show that firms only capture about one-half of the social benefits from their research. The remainder of the benefits go more generally to consumers and other producers. The main reasons are

imperfect property rights in intellectual property, including limited patent life, and the simple economics of optimal pricing for this property.

Considerable opportunities exist for more collaboration and joint ventures between the public and private sectors for the development of new innovations. This is an area where care is needed so that general public support and confidence in the system will not be undermined. Nevertheless, joint ventures that share costs and benefits have the potential for engaging the private sector in supporting advances in pretechnology sciences that are needed for new technologies. These joint venture agreements need to be carefully considered because the private sector can equally draw the public sector into supporting research that the private firms would undertake anyway. Even in a well drawn contract, the sharing of benefits is an important issue. Cooperating firms can reasonably expect exclusive licenses, but the public can reasonable expect some limits to be placed on pricing of commercialized products resulting from the projects. Another alternative to restrictions on the price of new innovations would be the possibility of sharing profits on the new innovations with this money going back into an unrestricted fund for public agricultural research. These joint ventures hold considerable potential for speeding the development of important new technologies, e.g., pharmaceuticals for the treatment of human and animal diseases, technologies to enhance environmental quality.

Second, I recommend that efforts to set national priorities for agricultural reseach be limited primarily to establishing or insuring the general science and pretechnology scientific base for future applied public research and private R&D. These are areas where the pure public good justifications for public provision and national planning are strongest. This includes the scientific base for biotechnology, environmental quality,

food safety, and health-related research. Furthermore, it seems that the competitive grants program (as generally envisioned where all legitimate research institutions are eligible but the best scientific proposals are funded, irrespective of locational concentration of funds) would be the best funding arrangement for carrying out these plans and priorities. Proposals should be for reasonably long term (3-5 years) projects, and proposal review panels should be comprised of scientists from land-grant and nonland-grant institutions in order to help insure ties to the frontiers of science.

Third, I believe that a new research consortium should be established in applied livestock research for the SAES and USDA research system to set research priorities and to administer a grants program. This is an area of public research where it seems to me that the efficiency resource use can only be increased by establishing very strong incentives for SAES and USDA researchers to work together, reduce duplication, and conduct research leading to definitive results. My reasons are (1) livestock production for broilers, swine, dairy, and cattle finishing have become quite concentrated geographically over the past 40 years, (2) large animal livestock research requires a relatively large and sustained investment in animals, their care, and facilities and (3) livestock research results, at least for these commodities, spillover relatively widely in usefulness to large geographic areas. (See Huffman and Evenson 1993, Chapter 7.) These reasons follow largely from production of these commodities not being closely tied directly to land area, as opposed to range livestock and all field crops. Furthermore, part of state livestock research is conducted at SAES and part by veterinary medicine schools and attempts to reduce research costs for large animal experiments can easily lead to sample sizes that are too small for reaching any definitive conclusions.

Given the current geographical location and trends in production, these arguments lead me to think of groups of states working together. This is especially true for the stations in New England and the Great Plains where the size of stations is small. The Regional Research Program, which was established as a mechanism to coordinate and fund research involving common problems of two or more states, has failed. New economic incentives are needed, at least for applied livestock research, to increase research productivity.

We can think of applied livestock research being scientists and experimental animals and facilities, including their care. Currently in livestock research, each scientist tends to have his or her own animals and facilities. With large animal research, this tying of scientists and animals-and-facilities together in rather rigid proportions makes research advances unduly expensive. An alternative scheme would be to make experimental animals for breeding stock and facilities a "national resource", e.g., like the national atom accelerator and telescope facilities, and available to scientists who write exceptional research proposals for their use. Scientists, working at a base institution without these livestock herds, then could specialize in writing innovative proposals for using these experimental animals and facilities but need not go about the expensive activity of acquiring and maintaining their own. When their proposals were accepted, they would be given the opportunity to visit the animal research facility to supervise conducting their experiments. After the experimental data were obtained, the scientist would return to his or her institutional homebase and continue with data analysis, interpretation of results, and writing. Other scientists would follow at the animal research facility with their experiments. The federal

government in cooperation with the states would provide the funding for these experimental animals and facilities.

Major federally supported research facilities for livestock research should be located near complementary activities. Most important are closeness to the geographical center of production for the particular livestock being researched and to a strong land-grant university. Locating major research facilities where production is concentrated also has the advantages of most easily getting farmers' input about production and marketing problems and of most easily transferring technology back to farms. Associations with universities have a major advantage over more isolated intellectual locations for research facilities because the cost of getting and keeping excellent scientists and technicians is generally reduced when they are part of a university. In addition, access to advances in good general and pretechnology sciences and to low cost graduate student research assistants are greater at major universities.

In thinking about location of experimental animal research facilities, I suggest something along the following lines. For dairy, I recommend not more than four. Possibly, one each for the (1) Corn Belt and Lake States, (2) Northeast and Appalachia, (3) the Southeast, Delta States, and Southern Plains, and (4) the West (Pacific, Mountain States, and Northern Plains). For swine, I recommend one probably located in Iowa. For cattle finishing, I suggest not more than two: one for the High Plains Region (Texas, Oklahoma, Kansas, Nebraska, and Colorado) focused on very large feedlot operations (in excess of 2,000 head per year) and another for other states having significant cattle finishing and concentrating on small feedlot operations (less than 2,000 head per year). For broilers, I recommend one, located in Arkansas, Georgia, Alabama, or Maryland.

Given that the existing Regional Research Programs seem to be an ineffective mechanism for strengthening the organization of applied livestock research, I am recommending that federal funding of scientists' livestock research be administered as competitive research programs that encourage pooling of scientific talent and sharing research results. The general research priorities should be set by a panel of modest size containing USDA and land-grant scientists, livestock producers and processors. Research proposals should be evaluated by a separate panel of scientists. The projects should contain funding for 3-5 years to aid continuity. (It would be reasonable for some participating states to share in the cost of these projects by contributing state money to the pool of resources going into the competitive grant program even if their scientists do not compete for the research funds.) This system would most likely channel research funds into the geographical areas where a commodity is important and to scientists or institutions that show excellence in the needed research. All research advances should be made immediately available to all cooperating institutions. This process would lessen the need for every state to have expertise in each livestock area through pooling of funds for research and scientific expertise.

For plant research, I do not recommend any particular dramatic change in the priority setting, planning, or conduct of research.

Finally, I do not recommend extensive micro-management of research in the USDA research agencies or SAES system. Clearly, all research institutions need some clearly stated general objectives and some financial rewards for productivity toward meeting these objectives, but it is very easy for institutional rewards to be distorted so that they kill creativity and long term productivity. The private sector has generally found that rewarding contributions to profit works well, but many other schemes are unsuccessful.

Although public institutions do not have a profit motive and should not adopt one, I see a reasonable mixture of short term and long term rewards for scientists as holding the best promise for short- and long-term productivity of public sector scientists.

The productivity of public agricultural research may be increased by a new business-industry extension service. This could be patterned after the agricultural extension service but have as its clientele small and intermediate sized firms that are in the business of commercializing agricultural technologies. The purpose of this B-I extension service would be to enhance the rate of technology transfer from the pretechnology and applied scientific research into useful technologies for agricultural producers.

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Huffman  
7-14-93

**Written Responses to the  
Subcommittees Written Questions**

Q1. What should be most effective for public sector research? For private sector research? Answer: I believe that the number of new nationally assisted agricultural research facilities should be kept small in number and of high quality. A large number of poorly located and mediocre facilities will be largely a waste of public funds. New facilities should be ones that facilitate development of the general and pretechnology scientific base needed for future U.S. applied agricultural research and technology development. Also, facilities for applied research that have national applicability, e.g., dairy, broiler research, seem to me to be next in priority. Public facilities that support only local needs and interests should be of low priority for federal funding.

Private sector research facilities should be located wherever the private sector wants to place them and without direct federal financial assistance.

Q2. You have presented data about the returns to agricultural research investments. Do you have any figures comparing the effects of facility placement to returns on other investments. Answer: We have not conducted any research on the rate of return to investments in public agricultural research facilities separate from other inputs going into public agricultural research.

Q3. How do you suggest we can better evaluate research quality? What role should Congress play in this process? Answer: The quality of agricultural research, like the quality of other goods, is difficult but not impossible to evaluate. I suggest that emphasis be placed on multiple indicators of research output: number of professional publications, patents obtained, and graduate students trained or supervised. Some quality indicators that might be used are frequency of citation of publications and patents in later scientific publications and patent applications and frequency of scientists' participation in programs of national and international scientific meetings.

It is my assessment that Congress should encourage better research quality evaluation primarily through inclusion of "quality" as one characteristic on which research is to be evaluated. This is an indirect approach, but it will create incentives for some researchers to do work to improve measurement of research quality. Congress could also assign the Office of Technology Assessment the task of reviewing indicators of research quality and making recommendations about their adequacy for evaluating research quality.

Q4. Given recent budgetary pressures, how do we determine which universities should be our research intensive universities? Clearly they cannot all be. Answer: In my opinion, the designation of a major research university is one largely of ranking institutions by their past performance and then picking the best ones as the research intensive ones for the future. It does seem to me, however, that there is an important distinction between those that excel in advancing the state of knowledge (i) in general sciences and (ii) in applied sciences and technology development. Few universities excel in both areas, but they are both important to long term useful technology development.

Q5. You mention a system of limiting livestock research facilities to certain regions; how do you foresee this concept fitting into our current Land Grant

system of allocation? Answer: In my opinion, the Congress should establish stronger economic incentives for groups of states to cooperate in conducting livestock research. Congress can assist this process by taking a position that it will assist with the financing of only a few high quality facilities. Furthermore, Congress can establish incentives that make these facilities available for use by scientists that reside primarily in states other than the one where the facility is located. If, however, a State wants to put its own and/or local interest group funds into a local livestock research facility, Congress cannot prevent it. Congress can insist that it will not invest resources in these facilities, and this will make the task of building them more difficult.

Q6. How do we balance centralized national planning with local interests, given the nature of the Land Grant system? Answer: One way to balance central national planning and local control of agricultural research is through a selective approach to planning. National planning is economically important in areas of research leading to a large share of pure public (or generally useful) rather than locally useful knowledge or information. For example, most advances in general and pretechnology sciences fit into the pure public good category. Advances in applied sciences generally contain a much larger share of locally useful advances in knowledge or information. Thus, conflicts between the national and local interests can be reduced when the national planning deals largely with issues of establishing the general and pretechnology sciences base for agricultural technologies of the future. The States should largely decide the direction or plan most of the applied research leading to locally useful technology or information. Applied livestock research in the nonforaging animals, however, should be coordinated across regions.

**OTA TESTIMONY**

**The Federal Role in Agricultural Research Priority-Setting**

Statement of

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Office of Technology Assessment  
Congress of the United States

*Hearing on Current Agricultural Research and Education Priorities*  
Subcommittee on Department Operations and Nutrition  
Committee on Agriculture  
U.S. House of Representatives

June 17, 1993



Congress of the United States  
Office of Technology Assessment  
Washington, DC 20510-8025

Mr. Chairman, thank you for the opportunity to appear today before the Subcommittee. I am Daryl Chubin, a senior associate at the Office of Technology Assessment and project director for the May 1991 report, *Federally Funded Research: Decisions for a Decade*.<sup>1</sup>

OTA's testimony first provides a framework for thinking about setting priorities and establishing criteria for investing in projects, people, and infrastructure, based on the 1991 comprehensive assessment of federally funded research. Then it turns to the specific case of agricultural research and addresses these questions through the findings of another OTA report, *A New Technological Era for American Agriculture* (August 1992).

Before recounting the findings most relevant to this hearing, I remind the Subcommittee that facilities are "enabling technologies;" they both sustain an institution's existing capacity to do research and extend that capacity—at a cost. From this perspective, the fundamental question is how the construction of new facilities fits into the overall Department of Agriculture (USDA) mission as well as its near-term priorities. What purpose shall be served by these facilities? Who is to bear the financial burden for construction and maintenance? Will this burden be shared? Answers to such questions—and corresponding investments—flow from a coherent mission statement and strategic plan that articulate priorities in support of research.

#### Findings From *Federally Funded Research: Decisions for a Decade*

The strength of the Federal R&D system is its "pluralistic" structure; the system meets the needs of each mission agency and its clientele. Each research agency also has its own culture, with programs designed to achieve specific objectives. How to preserve this strength through diversity in a climate of budgetary constraints is a continuing challenge to policymakers.

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<sup>1</sup> The findings of this report, which looked across the six major research and development (R&D) agencies, offer a perspective on choices for Federal investment, including the role of research facilities in the Federal R&D portfolio. U.S. Congress, Office of Technology Assessment, *Federally Funded Research: Decisions for a Decade* (Washington, DC: U.S. Government Printing Office, May 1991).

The Federal research system is beset by increased resource demands and serious tensions.<sup>2</sup> Among them (see exhibit 1) is the tension between allocating "dollars for facilities or training" versus "dollars for research projects," and the choice between promoting "concentrated excellence" and accelerating "regional and institutional development (to enlarge capacity)." In the last few years, the distribution of research funding has become an issue not only of which institutions receive funding, but for what purpose. Research goals include contributions to education, equity, and economic vitality, in addition to the advance of knowledge. A related issue is the form of allocation best suited for the purpose—e.g., individual investigator-initiated grants, block grants to centers, short-term projects targeted to problem-solving and innovation, or longer-term, fundamental research projects.

As OTA makes clear, all areas of research are experiencing increased competition, with research institutions and Federal agency sponsors alike facing difficult choices. Neither the land-grant universities nor USDA are exempt from these pressures. OTA suggests attention to four issues: setting priorities for research; coping with changing expenditures for research; adapting education and human resources to meet future needs; refining data collection and analysis to improve research decisionmaking (see exhibit 2). For this hearing, the first issue is key—setting priorities for research.

#### Priority-Setting

The Federal Government faces two major problems in setting priorities for research. First, criteria used in selecting research areas for emphasis are not explicit in either the President's budget or the congressional process. Second, there is no mechanism for evaluating the entire Federal research portfolio in terms of meeting national objectives. Both executive agency and congressional (authorizing) committee jurisdictions prevent effective crosscutting analysis. The Office of Management and Budget, itself fragmented and not inclined to crosscuts, serves as final arbiter in negotiations with the Office of Science and Technology Policy. Then the appropriations committees

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<sup>2</sup> Ibid., pp. 6-7.

enter the fray. Coordination among these organizations is difficult at best. And while research communities set priorities within their areas, peer review (to cite the premier quality control mechanism) is not suited to making judgments across scientific fields, much less among agency missions or national goals. **The point is that there is no accepted model for setting priorities across the Federal research system. Each agency determines what to support and sets priorities through a changing interpretation of the agency's mission.**

OTA concluded that although scientific merit and mission relevance must always be the chief criteria used to judge an agency program's potential worth, they cannot always be the sole criteria. Two other criteria would help meet the Nation's future research investment needs: strengthening education and human resources at all stages of study (e.g., increasing the diversity and versatility of participants); and building regional and institutional capacity (including economic development by matching Federal research support with funds from other sources).<sup>3</sup> Facilities are a prominent feature of this latter criterion.

Historically, the Federal share of capital expenditures for academic facilities (which include both research and teaching facilities) has never topped one-third of the total. For public universities, 50 to 60 percent of facilities funds come from the States and 30 percent from bond issues (see exhibit 3).<sup>4</sup> **The crux of the facilities problem is that academic centers always "need" new or renovated buildings. Even though need may not readily be quantified, demand unquestionably exists.**<sup>5</sup>

The wisdom of investments in research infrastructure could be determined by analysis of the research to be conducted in each new facility. Unfortunately, there is no acceptable method for

<sup>3</sup> Ibid., pp. 15-16.

<sup>4</sup> Michael Davey, *Bricks and Mortar: A Summary and Analysis of Proposals to Meet Research Facilities Needs on College Campuses* (Washington, DC: Congressional Research Service, 1987).

<sup>5</sup> For example, when the National Science Foundation (NSF) solicited proposals for a \$20 million program in 1989 to fund facilities needs, it received over 400 proposals totaling \$300 million in requests. Jeffrey Mervis, "Institutions Respond in Large Numbers to Tiny Facilities Program at NIH, NSF," *The Scientist*, vol. 4, Apr. 16, 1990, p. 2.

measuring improvements in the quality or quantity of research that might have been generated by funding of "missed" research opportunities. Congressional earmarks increase research capacity in an ad hoc way, and also increase the future costs of maintenance. That is, new construction of academic facilities solves one problem while creating another—the eventual need for facilities renovation funds.

### Research Facilities

Should there be, then, a Federal facilities program? The prospect is attractive on its face, but OTA concluded that such a program—a "pay now" strategy—would undoubtedly eat into operating funds for research. A "pay later" strategy would shift the burden to research institutions, who would try to recover a portion through indirect costs. Thus, there are risks, even with cost-sharing, on all sides. As we are all aware, once a facility is complete, there is a predictable drive to fill it with sponsored research.

Congress is not of one mind on earmarking: while many congressional representatives favor it, others are steadfastly opposed.<sup>6</sup> Within the scientific community, academic earmarking is seen as circumventing peer review, politicizing science, and reducing the quality of research by diverting funds that otherwise would be awarded competitively for facilities and projects. However, no one claims that merely because a project is funded through earmarking it will automatically produce bad science.<sup>7</sup> Opponents argue that, given limited Federal resources, many worthy projects are likely to be denied funding. And staff at all six of the R&D agencies interviewed by OTA stated that earmarking disrupts budgeting. If additional money is not set aside for earmarks, then funds planned for new or continuing programs must be adjusted to cover the congressionally mandated expenditures.<sup>8</sup>

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<sup>6</sup> OTA defines an academic earmark as "... a project, facility, instrument, or other academic or research-related expense that is directly funded by Congress, which has not been subjected to peer review and will not be competitively awarded." Office of Technology Assessment, *op.cit.*, footnote 1, p. 87.

<sup>7</sup> Indeed, there is evidence, cited by representatives of the Department of Energy and the Department of Defense who OTA interviewed, that some earmarking has led, ostensibly, to highly regarded research centers.

<sup>8</sup> Office of Technology Assessment, *op. cit.*, footnote 1, p. 88.

Congress' concern with equity in funding has two components—geography and institutional development. With geographic equity, each region has the opportunity to develop centers of excellence and compete for Federal research funds. If the goal is institutional equity, each institution would have an opportunity to rise to prominence through Federal funding. There are 1,300 colleges and universities that award science and engineering degrees: 100 institutions capture the lion's share of Federal R&D obligations (85 percent) and produce most of the new Ph.D.s. Clearly, the Federal Government is unable to increase the budget for every deserving institution in a system of this size (see exhibit 4).

Congress can choose to build on existing strengths among research institutions and concentrate Federal dollars accordingly. Or recognizing the diversity of opportunities and expertise embodied by universities, Congress could distribute its resources widely and more evenly. There are good arguments for both propositions, many of which derive from different philosophies about the appropriate Federal role in research. No single model of research support will serve the needs of both the Nation and research institutions. Not every institution can, or should be, a "research-intensive university."<sup>9</sup> These decisions should reflect long-term agency and national goals.

OTA's 1992 report, *A New Technological Era for American Agriculture*, extends many of the conclusions of *Federally Funded Research*, but focuses specifically on agricultural research.

#### Findings From *A New Technological Era for American Agriculture*

Agricultural research is embedded in the "Federal research system." The current funding climate tilts the system away from fundamental research and toward technology, particularly toward linking economic incentives to Federal policies. Thus, USDA should be well-positioned to serve both the Nation's rural economy and the agricultural research community.

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<sup>9</sup> Ibid., pp. 198-199. This view was underscored last year by the President's Council of Advisors on Science and Technology, *Renewing the Promise: Research-Intensive Universities and the Nation* (Washington, DC: U.S. Government Printing Office, December 1992).



Most of USDA's Cooperative State Research Service (CSRS) support is from formula funds appropriated by acts of Congress. Special Research Grants consist mostly of line-item appropriations, which also require oversight by CSRS. The competitive Research Grants Office holds national competitions for awarding basic research funds in specific fields. The National Research Initiative (NRI) would enlarge the Grants Program, but the pace has been slower than prescribed by the National Research Council.<sup>10</sup> The NRI would also emphasize research on sustainable agriculture, welcoming proposals that are "... single or multidisciplinary, fundamental or mission-linked."<sup>11</sup>

Congressional intervention in USDA's portfolio has been used to hasten the Department's response to new research priorities. For example, in the 1980s USDA was slow to initiate research that would reduce the use of chemical pesticides and fertilizers in agricultural production. Congress saw this as a lack of concern for environmental quality and sustainable agriculture. Through earmarking of research funds and legislative mandates, the Department addressed these emerging priorities.

#### USDA and Agricultural Research Funding

Today, USDA programs continue to compete within a fixed envelope of resources. The external environment provides less and less relief. OTA found that:

Although total research funding for the State Agricultural Experiment Stations (SAES) has increased slightly over the last decade, in general agricultural research is underfunded. The States provide the majority of the funding for research at the SAES, and through the 1980s, State support increased by 58 percent [see exhibit 5]. However, the recession of the early 1990s has constrained State budgets, resulting in few increases and in some cases declining State support for agricultural research.

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<sup>10</sup> Philip H. Abelson, "Agricultural Research," *Science*, vol. 257, Aug. 28, 1992, p. 1187.

<sup>11</sup> U.S. Department of Agriculture, Cooperative State Research Service, National Research Initiative Competitive Grants Program, "Program Description: Guidelines for Proposal Preparation and Submission," unpublished document, 1993.

The USDA is the second largest single contributor to SAES research funding . . . . USDA funding has basically stagnated and barely keeps up with inflation. Increases in USDA funding primarily reflect congressional earmarking of special grants for such areas as water quality, nutrition, and integrated pest management and biological control research.<sup>12</sup>

To complicate the picture, according to OTA, research funds are not evenly distributed to all experiment stations (see exhibit 6). The SAES in 12 States (California, Florida, Iowa, Illinois, Indiana, Michigan, Minnesota, North Carolina, Nebraska, New York, Texas, and Wisconsin) account for nearly half the total research funding available to the SAES, more than two-thirds of USDA's competitive grants, over 60 percent of all competitive funds obtained from Federal agencies other than USDA, and nearly 60 percent of all funding from industry support and product sales. The SAES system clearly contains "have" and "have not" institutions. The have nots rely primarily on the traditional sources of funding (State and USDA formula funds), while the haves have diversified their funding sources.<sup>13</sup>

Funding, of course, is an "input" issue. On the output side of the equation, OTA observed:

It is widely presumed that the research supported via a competitive grant mechanism is of higher quality than that funded by formula funds . . . . However, it is also possible that competitive grants distort the research mix favoring disciplinary research over problem-solving research . . . . [R]ecent research completed by OTA and the University of Minnesota suggests that the most appropriate policy is a mixture of formula and competitive grants, with different funding mechanisms potentially more appropriate for different functions and goals of land-grant universities . . . . [see exhibit 7].

If the goal is to increase cutting-edge research, competitive grants might best be emphasized. If the primary goal is to enhance research applicable to problem solving (more development and adaptive research and technology transfer) or to train future researchers, the more stable and locally controlled Hatch funds may be the more appropriate mechanism. . . . [T]he two types of grants depend on the priority system given to the multiple missions of the experiment stations.<sup>14</sup>

<sup>12</sup> U.S. Congress, Office of Technology Assessment, *A New Technological Era for American Agriculture* (Washington, DC: U.S. Government Printing Office, August 1992), p. 412.

<sup>13</sup> *Ibid.*, pp. 412-413.

<sup>14</sup> *Ibid.*, p. 422.

### Federal Leadership

The changing environment in which the agricultural research system operates requires more than increased research funding to achieve desired results. "Funds also need to be reallocated from current projects to research that reflects new needs. The appropriate allocation of resources will depend primarily on what society wants the system to accomplish. Resources cannot be allocated appropriately unless priorities are determined and goals established."<sup>15</sup>

OTA sees the need for better and more consistent goal-setting. Stepping back from agricultural research and considering all the R&D agencies, principles of decentralization and pluralism dominate Federal research funding. Recent strategic planning exercises at the National Institutes of Health and the National Science Foundation, for example, are responses to demands for managing scarce resources while making research more relevant to industry, linking research to technological innovation and its transfer, and enhancing U.S. economic competitiveness internationally. Often prompted by authorizing committees, such strategic plans signal a rethinking of agency missions in terms of national needs—especially the needs of research for consumers as well as producers.<sup>16</sup>

**USDA needs to develop a comprehensive mission statement that will take it into the 21st century, as well as a strategic plan for how that mission will be accomplished. Such a plan must include research priorities for both the short and long term—a blueprint of essential needs for the conduct of research, including research facilities. Congress may need to mandate this to assure that USDA delivers in a timely manner.**

A former university chancellor recently noted that:

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<sup>15</sup> Ibid., p. 419.

<sup>16</sup> For example, see U.S. House of Representatives, Committee on Science, Space, and Technology, *Chairman's Report: Report of the Task Force on the Health of Research*, 102d Cong., 2d Session (Washington, DC: U.S. Government Printing Office, July 1992).

The professional leaders of the land-grant universities surveyed in 1992 downplayed the importance of Federal Governmental leadership and felt that college leadership, and to a certain extent campus and departmental leadership, would be the important factor in precipitating change within their own colleges. Their viewpoints suggest that the time has come for land-grant colleges of agriculture to reduce their dependence on the USDA and their national organizations and seize the opportunity to develop pertinent and rational missions that undergird their own teaching, research, and extension programs. . . . The development of leaders and colleges with the vision and ability to create an environment for both short- and long-term responses to societal concerns will be critical for the survival of these land-grant colleges of agriculture.<sup>17</sup>

Of course, land-grant universities have a responsibility to serve their constituencies in new ways. As they cope with multiple missions, accepting the financial burden that accompanies the construction of new facilities would seem short-sighted and ill-advised. At a minimum, we should expect a careful campus plan that targets areas both for growth and for consolidation.

But there is a unique Federal responsibility as well. The Federal Government could choose to exercise the leadership that comes from a "bully pulpit." There is sufficient leverage at the margin to make a difference in funds allocated to universities. The vision projected by a USDA strategic plan and funding priorities would have significant influence on land-grant universities in the aggregate. The Administration, Congress, or both can help to instill that vision.

### Conclusions

An overarching question for the Subcommittee is this: How are USDA's goals articulated in their criteria for decisionmaking? Specifically, how do research facilities rank compared to other funding priorities in the Department's portfolio?

In a funding climate in which demand is increasing faster than resources, "something's gotta give." All deserving competitors will not be satisfied, but priorities must be established and implemented. OTA concludes that if the Federal Government supports opportunities for growth in

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<sup>17</sup> James H. Meyer, "The Stalemate in Food and Agricultural Research, Teaching, and Extension," *Science*, vol. 260, May 14, 1993, p. 1007.

agricultural research, it must recognize that those opportunities create additional burdens. The fit between the construction of facilities and the pursuit of research objectives must be part of an overall plan.

In sum, the decade of the 1990s requires better planning and use of resources to achieve national research goals. Federal support will be constrained, but dollars alone do not define leadership. Thus, USDA and research institutions must plan their portfolios of activities and infrastructure--and approach such opportunities tempered by realism.

(Attachments follow:)

## Exhibit 1

Table 1-1—Tensions in the Federal Research System

Centralization of Federal research planning	←→	Pluralistic, decentralized agencies
Concentrated excellence	←→	Regional and institutional development (to enlarge capacity)
"Market" forces to determine the shape of the system	←→	Political intervention (targeted by goal, agency, program, institution)
Continuity in funding of senior investigators	←→	Provisions for young investigators
Peer review-based allocation	←→	Other funding decision mechanisms (agency manager discretion, congressional earmarking)
Set-aside programs	←→	Mainstreaming criteria in addition to scientific merit (e.g., race/ethnicity, gender, principal investigator age, geographic region)
Conservatism in funding allocation	←→	Risk-taking
Perception of a "total research budget"	←→	Reality of disaggregated funding decisions
Dollars for facilities or training	←→	Dollars for research projects
Large-scale, multiyear, capital-intensive, high-cost, per-investigator initiatives	←→	Individual investigator and small-team, 1-5 year projects
Training more researchers and creating more competition for funds	←→	Training fewer researchers and easing competition for funds
Emulating mentors' career paths	←→	Encouraging a diversity of career paths
Relying on historic methods to build the research work force	←→	Broadening the participation of traditionally underrepresented groups

SOURCE: Office of Technology Assessment, 1991.

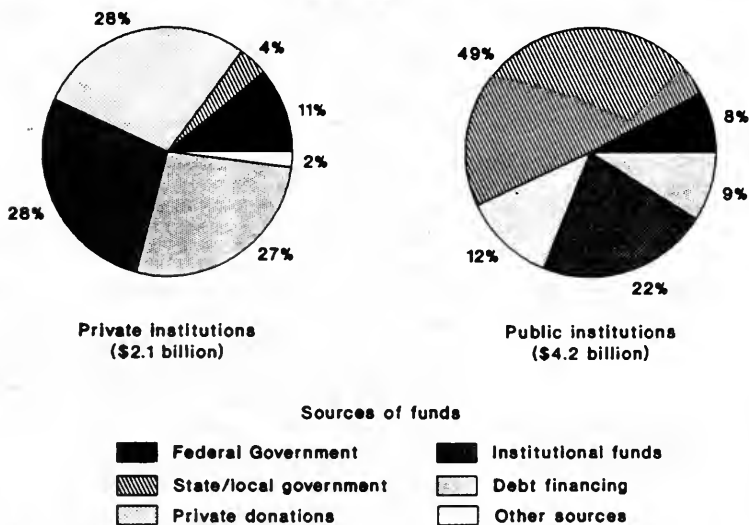
Table 1-3—Summary of Issues and Possible Congressional Responses

Issue	Possible congressional responses
Setting priorities for research	<p>Hearings on crosscutting priorities and congressional designation of a body of the Federal Government to evaluate priority setting.</p> <p>Application of criteria to: a) promote education and human resources, b) build regional and institutional capacity in merit-based research decisionmaking, and c) balance little science and megaproject initiatives.</p> <p>Oversight of agency research programs that focuses on strategies to fulfill the above criteria, and on responses to priority setting.</p>
Coping with changing expenditures for research	<p>Encouragement of greater cost-accountability by the research agencies and research performers (especially for indirect costs, megaprojects, and other multiyear initiatives).</p> <p>Allowance for the agencies to pursue direct cost containment measures for specific items of research budgets and to evaluate the effectiveness of each measure.</p>
Adapting education and human resources to meet future needs	<p>Programs that focus investment on the educational pipeline at the K-12 and undergraduate levels.</p> <p>Attention to diversity in the human resource base for research, especially to the contributions of underparticipating groups.</p> <p>Incentives for adapting agency programs and proposal requirements to a changing model of research (where teams are larger, more specialized, and share research equipment and facilities).</p>
Refining data collection and analysis to improve research decisionmaking	<p>Funding to: a) augment within-agency data collection and analysis on the Federal research system, and b) increase use of research program evaluation at the research agencies.</p> <p>Encouragement of data presentation and interpretation for use in policymaking, e.g., employing indicators and other techniques that measure outcomes and progress toward stated objectives.</p>

SOURCE: Office of Technology Assessment, 1991.

## Exhibit 3

Figure 6-5—Relative Sources of Funds for Research Facilities: Academic Capital Projects Begun in 1986-89



NOTE: Percentages may not total 100 due to rounding.

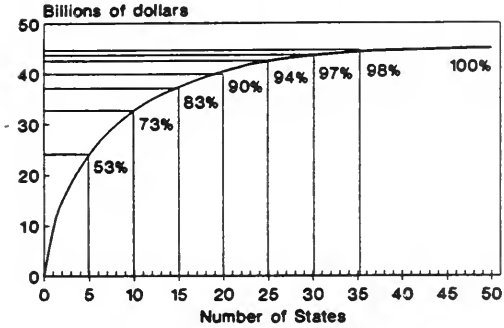
SOURCE: National Science Foundation, *Scientific and Engineering Research Facilities at Universities and Colleges: 1990*, final report, NSF 90-318 (Washington, DC: 1990), chart 6.



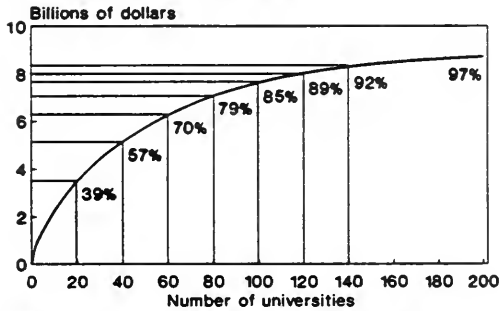
## Exhibit 4

Figure 1-6—Federal R&D Obligations by State (1985)  
and at Universities and Colleges (1989)

Cumulative distribution of Federal R&D  
obligations by State: 1985



Cumulative distribution of Federal R&D  
expenditures at universities and  
colleges: 1989



SOURCE: National Science Foundation, *Geographic Patterns: R&D in the United States*, Final Report, NSF 90-316 (Washington, DC: 1990), table B-5; and National Science Foundation, *Selected Data on Academic Science/Engineering R&D Expenditures, Fiscal Year 1989*, NSF 90-321 (Washington, DC: October 1990), table B-35 and CASPAR database.

Table 16-6—Research Funds for 12 Largest State Agricultural Experiment Stations, 1989

	USDA <sup>a</sup>	USDA competitive <sup>b</sup>	Other <sup>c</sup> Federal	State <sup>d</sup>	Private <sup>e</sup>	Other <sup>f</sup>	Total
Total funding for 12 SAES <sup>g</sup> (\$ million) .....	69.4	15.0	80.0	399.8	107.5	58.0	724.6
Percent of total funding by source .....	9.6	2.1	11.0	55.2	14.8	8.0	100.0 <sup>h</sup>
Percent of total SAES funding captured by 12 SAES .....	35.8	68.5	61.3	48.3	58.5	43.9	48.6

<sup>a</sup>USDA includes Hatch, McIntyre-Stennis, Special Grants, Evans-Allen, Animal Health, and miscellaneous other funds administered by the Cooperative State Research Service.

<sup>b</sup>USDA competitive is the USDA competitive grants program.

<sup>c</sup>Other Federal includes funding from Federal agencies excluding USDA and includes funding from NIH, NSF, AID, DOD, DOE, NASA, TVA, HHS, PHS, etc.

<sup>d</sup>State is State appropriations.

<sup>e</sup>Private includes industry support and product sales.

<sup>f</sup>Other includes funding from nonprofit organizations, and contracts and cooperative agreements administered by USDA.

<sup>g</sup>States include California, Florida, Iowa, Michigan, Minnesota, New York, North Carolina, Texas, Wisconsin, Indiana, Illinois, Nebraska.

<sup>h</sup>Due to rounding, the total figure may not add to 100 percent exactly.

SOURCE: Cooperative State Research Service, *Inventory of Agricultural Research*, U.S. Department of Agriculture, Washington, DC, various years.

**Table 16-4—Research Funds for State Agricultural Experiment Stations, Selected Years\***  
(in millions of dollars)

Year	USDA <sup>a</sup>	USDA competitiver	Other Federal <sup>d</sup>	State <sup>e</sup>	Industry	Product sales	Other <sup>f</sup>	Total
1982	161.3	5.5	77.6	522.2	57.0	58.5	70.0	952.3
1984	174.9	6.1	61.7	591.4	64.1	61.3	79.8	1,059.3
1986	174.4	11.8	110.8	704.3	76.1	82.9	89.8	1,232.1
1987	175.8	16.8	114.9	732.5	87.4	68.4	104.2	1,299.8
1988	187.0	19.3	115.0	770.0	91.2	77.8	114.1	1,374.2
1989	194.0	21.9	130.4	827.6	101.2	82.4	132.1	1,469.8
1990	203.6	20.0	143.9	877.9	113.8	91.6	145.7	1,596.5

\*Funds are for State Agricultural Experiment Stations only and do not include the 1890 universities, the Schools of Veterinary Medicine, or the Forestry Schools. Funding is in current dollars.

<sup>a</sup>USDA includes Hatch, McIntyre-Stennis, Special Grants, Evans-Allen, Animal Health, and miscellaneous other funds administered by the Cooperative State Research Service.

<sup>b</sup>USDA competitive is the USDA competitive grants program.

<sup>c</sup>Other Federal includes funding from Federal agencies excluding USDA and includes funding from NIH, NSF, AID, DOD, DOE, NASA, TVA, HHS, PHS, etc.

<sup>d</sup>State is State appropriations.

<sup>e</sup>Other includes funding from nonprofit organizations, and contracts and cooperative agreements administered by USDA.

SOURCE: Cooperative State Research Service, *Inventory of Agricultural Research*, U.S. Department of Agriculture, Washington, DC, various years.

**Table 16-5—Distribution of Research Funds by Source for State Agricultural Experiment Stations,  
Selected Years\***  
(in percent)

Year	USDA <sup>a</sup>	USDA competitiver	Other Federal <sup>d</sup>	State <sup>e</sup>	Industry	Product sales	Other <sup>f</sup>	Total
1982	16.9	0.6	8.2	54.8	6.0	6.1	7.4	100
1984	16.5	0.6	7.7	55.8	6.1	5.8	7.5	100
1986	14.2	1.0	9.0	57.2	6.3	5.1	7.3	100
1987	13.5	1.3	6.8	56.4	6.7	5.3	8.0	100
1988	13.6	1.4	8.4	56.0	6.6	5.7	8.3	100
1989	13.0	1.5	8.8	55.6	6.7	5.6	8.8	100
1990	12.8	1.3	9.0	55.0	7.1	5.7	9.1	100

\*Due to rounding, the total figure may not add to 100 percent.

<sup>a</sup>USDA includes Hatch, McIntyre-Stennis, Special Grants, Evans-Allen, Animal Health, and miscellaneous other funds administered by the Cooperative State Research Service.

<sup>b</sup>USDA competitive is the USDA competitive grants program.

<sup>c</sup>Other Federal includes funding from Federal agencies excluding USDA and includes funding from NIH, NSF, AID, DOD, DOE, NASA, TVA, HHS, PHS, etc.

<sup>d</sup>State is State appropriations.

<sup>e</sup>Other includes funding from nonprofit organizations, and contracts and cooperative agreements administered by USDA.

SOURCE: Cooperative State Research Service, *Inventory of Agricultural Research*, U.S. Department of Agriculture, Washington, DC, various years.

**Table 16-14—Mean Values of Selected SAES Output by Grant Type**

	Hatch	Competitive	Other
Citations per article <sup>a</sup> . . . .	1.70	3.98 <sup>g</sup>	1.82
Articles per grant . . . . .	2.47	2.14	2.24
Weighted articles per grant <sup>b</sup> . . . . .	4.83	8.33 <sup>f</sup>	4.74
Journal publications per grant <sup>c</sup> . . . . .	4.70	4.52	3.68
Weighted publications per grant <sup>d</sup> . . . . .	7.07	10.62 <sup>g</sup>	6.58
Degrees per grant . . . . .	0.45 <sup>e</sup>	0.18	0.25
Bulletins per grant . . . . .	0.35	0.09 <sup>e</sup>	0.28

<sup>a</sup> Articles are articles published in peer reviewed journals.

<sup>b</sup> Weighted articles are published articles weighted by citations.

<sup>c</sup> Journal pubs are published articles, articles submitted, articles in press, and abstracts in peer reviewed journals.

<sup>d</sup> Weighted pubs are articles submitted, articles in press, and abstracts in peer reviewed journals, and published articles weighted by citations.

<sup>e</sup> Significantly different from other two groups at 95% confidence level.

<sup>f</sup> Significantly different from other two groups at 94% confidence level.

<sup>g</sup> Significantly different from other two groups at 92% confidence level.

SOURCE: Marie Walsh, "Factors Affecting the Cost and Productivity of Biotechnology Research at the State Agricultural Experiment Stations", PhD thesis, University of Minnesota, in progress.

**Responses to Follow-up Questions  
House Agriculture Committee Hearing (6/17/93) on  
Priority-Setting and Agricultural Research Facilities**

*Daryl E. Chubin  
Michael J. Phillips  
Office of Technology Assessment*

July 6, 1993

**1. How do you suggest we can better evaluate research quality? What role should Congress play in this process?**

Although books have been written on the subject of "quality," we have gotten little beyond the maxim "I know it when I see it." As OTA points out in *Federally Funded Research: Decisions for a Decade*, the elusive nature of research makes measuring its outcomes very difficult (pp. 242-247). OTA also notes that Congress ideally needs information to guide its investments, i.e., to decide in advance about research quality and other outcomes.

Congress could follow either or both of the following approaches to improve matters: fund research on "evaluation" and "assessment" of research programs and projects; and/or ask the agencies to develop criteria to measure outcomes of the research they support. The National Science Foundation modestly supports such investigations, while the National Institutes of Health reserve up to 1 percent of each institute's annual budget for evaluation activities. The General Accounting Office (GAO/PEMD-93-13) just reported, however, that the evaluation set-aside at the Public Health Service has not worked to inform the Congress as intended.

Any grants-making agency that employs peer review in the award of research monies might be expected to have, or to develop, a system for measuring the outcomes of that support. While it remains hard to determine the returns on investment in research, some accountability is necessary. Congress may need to remind the research agencies that it is important to find creative ways of demonstrating the quality of the work they support.

**2. Given recent budgetary pressures, how do we determine which universities should be our research intensive universities? Clearly they cannot all be.**

Depending on how one counts, there are 150-200 research-intensive universities in the U.S. However, the support is even more concentrated, with 20 universities accounting for almost 40 percent of Federal R&D expenditures, 60 accounting for 70 percent, and 100 accounting for 85 percent. To reiterate from OTA's *A New Technological Era for Agricultural Research* (p. 412), experiment stations in 12 States account for nearly half the total research funds available to experiment stations, more than two-thirds of USDA's competitive grants, over 60 percent of all competitively-awarded funds from Federal agencies other than USDA, and nearly 60 percent of all funding from industry. In short, we know where the research action is. Very little change in rank occurs among the top 50; the scramble to become major players is among the next 50 institutions.

In *Federally Funded Research*, OTA warned about the "research university" model dominating the growth strategies of many institutions (pp. 198-199). For the foreseeable future, strategic planning by universities will decide the fit between their capabilities and their aspirations. Each clearly cannot afford to do everything. This is where the Federal Government can be helpful. The more Federal policies are selective in creating infrastructural burdens, i.e., planning new construction of buildings where research would be conducted, the better. Selectivity can be promoted if an agency looks across its current research performers nationally. By identifying who is doing what, the agencies can discourage duplication of facilities and programs that will continue to require Federal support for an indefinite time.

3. Since the placement of facilities is actually a method of setting priorities, how effective would you say our priority-setting has been?

Because of pressures for decentralization and a recognition of local needs, research facilities have mushroomed during the last half-century. In terms of setting priorities, the placement of facilities can hardly be called rational. It has certainly been effective in bringing expertise to local problems and resident populations. Now is the time to stand back and ask "what have we wrought?" and "can we bring it under control?"

One answer to the latter question (to which the Subcommittee already seems favorably disposed) is a body, e.g., a Facilities Review Commission, that would look at all the existing facilities, ascertain their condition and operating costs, and recommend whether: (a) they are achieving their objective, (b) they are in need of a new objective, (c) the state of the infrastructure warrants renovation, and (d) they are obsolete due to shifts in local population, i.e., agricultural needs elsewhere appear more pressing. USDA might also have some solutions that balance the need for renovation against the emerging need for new construction.

4. Since there is no currently good model for determining the placement of facilities, what would you suggest?

If CSRS and ARS are indeed developing and revising strategic plans, they should have a sense of what is best for agricultural research as administered by USDA. At the hearing, the intramural and extramural needs of the Department seemed to proceed separately, so that we heard not one voice but two. There is need for a single strategic plan recommending what the Department intends to do. Such a plan would provide a framework that articulates a set of criteria for research decisionmaking. Included in this framework would be a rational planning process for the placement (renovation, closure, and creation) of facilities. A merit-based process is surely preferable to a political one. In the latter, the criterion of local need is favored in the name of "geographical balance"; how this need fits with existing priorities and the distribution of facilities nationally is seldom considered. This perpetuates the "ad hoc-ness" of the system and contradicts rational planning.

It is worth noting that earmarking has traditionally been associated -- rightly or wrongly -- with agricultural research. Now that other research areas and academic institutions have sought direct appropriations for research, there is an opportunity for agriculture to shed the stigma of supporting "second-class" or "tainted" research by formulating a strategic plan that sets forth some "ground rules" for the renovation and construction of USDA facilities. Even if these ground rules are not emulated by other agencies, USDA will be recognized as dealing with the facilities issue head on, i.e., trying to get a handle

on its capabilities both intra- and extramurally. In short, besides improving the planning and budgeting of the Department, a Facilities Plan would have significant symbolic value.

**5. How do we balance centralized national planning given the decentralized nature of our Land-Grant College (LGC) system?**

National planning at the Department in no way violates the decentralized nature of the Land-Grant College system. Each institution is responsible for a portfolio of activities; the Federal Government is just one patron among many. The institution must decide what it wishes to pay for outright, cost-share, or decline to fund altogether. The question is one of the appropriate Federal role. What should USDA support that is in the Nation's interest?

A subset of national planning must focus on underparticipating institutions. As raised at the hearing, historically Black, other minority, and smaller institutions require provisions that will allow them to cultivate their talented populations. A 10 percent set-aside in the National Research Initiative (NRI), as claimed by USDA in the hearing, is a modest amount (ca. \$10 million in FY 93). Partnering relationships with research universities can help. An Experimental Program to Stimulate Competitive Research (EPSCoR)-type program is another viable approach (see *Federally Funded Research*, pp. 131-132). However, there is a tension inherent in all these efforts to promote the support of "have-not" institutions, namely, if they succeed, they build more capacity into the system and create a cadre of competent researchers who will compete for scarce Federal research dollars. This increases the pressure on USDA and the other research agencies. From the agencies' perspectives, this is a no-win situation; some institutions will be disappointed. Institutions ineligible to compete for the set-aside will likely lack enthusiasm about the "diversion" of NRI funds.

Whereas the Federal Government wants to increase research competence wherever possible, it does not seek to increase the number of dependents on Federal research funding. A way out of this dilemma is to reexamine how the goals of the LGC system articulate with the goals of USDA. How has the mission of the agency changed? All of this could proceed against a backdrop of streamlining the Federal research enterprise, promoting cost-sharing, and distributing research performance by various merit-based regional or other funding formulas. No single R&D agency has tried such a drastic intervention; rather, each continues to respond to demand from "the field" within its portfolio of resources.

BY

CHARLES P. SCHROEDER

DELEGATE

COUNCIL FOR AGRICULTURAL RESEARCH,  
EXTENSION AND TEACHING (CARET)

Chairman Stenholm and members of the subcommittee, I am Charles Schroeder from Lincoln, Nebraska. I offer testimony to this important subcommittee as a close-range observer and long-time beneficiary of our nation's agricultural research enterprise. With it, I encourage your support for a coordinated, priority-based system for restoring and strengthening our infrastructure for agricultural research. To provide context for my perspective, I would report that my family and I have been in the ranching, farming and cattle feeding business in southwest Nebraska for three generations. I was in the public sector during the mid-1980s as Nebraska's Director of Agriculture, and now serve Nebraska's land-grant institution as Executive Vice President of the University of Nebraska Foundation. As an outgrowth of these professional activities related to agriculture and my rural state, it has been my privilege to serve in a volunteer role as President of the Heartland Center for Leadership Development, a small nonprofit dedicated to enhancing the success of rural communities, and as delegate to the Council for Agricultural Research, Extension and Teaching (CARET). CARET is a national grassroots organization made up of farmers, ranchers, homemakers and rural entrepreneurs; agribusiness and commodity organization leaders; state and local officials and members of various agricultural advisory groups. Its delegates are volunteers appointed by the Vice Presidents and Deans of Colleges of Agriculture across the United States who work cooperatively under the umbrella of the National Association of State Universities and Land-Grant Colleges (NASULGC). CARET was established in 1982 as a mechanism through which citizen support could be expressed for agricultural research, extension and teaching programs. Its mission is to enhance national support and understanding of the land-grant university's involvement in the food and agriculture system.

For the last four years, I have been CARET's liaison to the USDA Users Advisory Board. In that capacity, I've had the opportunity to see agricultural research facilities at USDA and land-grant university sites from California to New York, Alaska to Georgia. Our mission in visiting those many and varied research sites was to observe the nature and output of the investigative work being conducted there and provide user feedback as to its relevance and perceived value to agriculture and the food system. The experience has been both fascinating and frightening.



From new discoveries at the most fundamental levels of molecular biology to the advanced development of fat substitutes that could revolutionize our diets, the products of USDA-supported agricultural research continually impressed our group. I can assure this subcommittee that the quality, vision and value of your investment returns are quite high. Naturally, there were exceptions that did not escape the scrutiny of this group. Those concerns and recommendations for change are well documented in the reports submitted to Congress and the administration by the User Advisory Board annually. By and large, however, one must conclude that the nation's research relating to agriculture and the food system, the bulk of which is conducted in a long-standing partnership between the states and the federal government, is in the hands of people whose combined technical expertise and sense of mission are exceptional.

But there is a dangerous problem. While being a first-hand witness to the marvels of discovery being generated by these scientists, one could not escape the coincidental observation of the decaying facilities in and around where this work was being conducted. The level of disintegration and disrepair was so striking that its memory causes me a very palpable feeling of queasiness and anxiety as I prepare these remarks. As I repeatedly observed outmoded equipment and literally crumbling laboratories, some finally abandoned as concerns for safety surpassed the intense desire for laboratory space of any kind, the vision of agricultural research facilities in the communist bloc countries of eastern Europe sprang from my memory. As a college student in the early 1970s, I found the condition of research operations in Poland, Hungary, Czechoslovakia and East Germany laughable because I knew my would-be competitors in their agricultural sector would never catch up with the flow of technology I would be able to apply in managing my livestock and grain operation in Nebraska. When I now see my own nation's research infrastructure floundering toward obsolescence, I am not so amused.

What happened? I need go no further than the land-grant university for whom I seek private sector support each day to find answers. As state budget allocations have steadily tightened, particularly over the last decade, maintenance has necessarily been deferred, updating and renovation have been rare and even relatively newer buildings (under 20 years) remain marginally equipped. In the case of older facilities, the result of extended deferred maintenance was predictable. Over a period of a few years, not only were they unsuitable for the sort of research demanded to address the natural and economic challenges of modern agriculture, they became almost uninhabitable for any purpose. With each year that this cancer grows, and it infects every state and region in the United States, the cost and unlikelihood of successful remedial action become higher; the morbid outcome for the nation becomes increasingly predictable.

As legislators, you know the historic popularity of criticizing public sector employees for their wastefulness, ineptitude and lack of concern for the taxpayer. I must report to this committee that my observation of the men and women populating our tax-supported and assisted agricultural research programs leads to a fully contrary conclusion. They have made remarkably creative use of facilities that are clearly substandard for the sophistication of their

research efforts. They have stretched available resources to transparent thinness, sometimes cutting telephone service and the purchase of pens and pencils, as well as gifting back a portion of their own income, in order to sustain their projects. All of this is done in order to add one more small increment to the base of knowledge that the rest of us might use to make our businesses more competitive, our communities more liveable and our nation's food and agriculture system more viable. Our failure to adequately support their efforts is a tragically cynical response to a looming national crisis.

The historic obligation of the states to provide and maintain the buildings, including research facilities, at their land-grant colleges and universities is clear. However, their ability to fulfill that obligation has been heavily impacted by rapidly escalating mandated expenditures imposed by the federal government. With the fiscal restructuring now underway at the federal level, a state-federal partnership program ought to be struck to provide both a remedial and long-term proactive response to a deteriorating agricultural research infrastructure at our nation's land-grant institutions.

An organized national approach, including a peer review process as proposed by the special USDA/NASULGC committee, makes great sense to me. That proposal which I have reviewed in its fundamental outline aims to create a competitive grants program under authority of the Research Facilities Act of 1963 as amended, and includes a collaborative priority-setting effort involving NASULGC, the USDA and the Congress. I offer my endorsement of such a plan, at least in principle, in order that we might set a course for the survival and superiority of American agriculture. The details of that plan are available from NASULGC and I know its president, Dr. C. Peter Magrath, would be happy to discuss them with you.

For all of the problems our country faces, most of which are catalogued daily in the popular press, this relatively unnoticed point of decay concerns me more than most. The long-term ramifications of allowing our agricultural research infrastructure to collapse leads to the most certain downtrend in our society that I can imagine. I very much appreciate this subcommittee's attention to the issue and hope it leads to prompt action.

Thank you.

- TESTIMONY  
PRESENTED TO  
THE SUBCOMMITTEE ON DEPARTMENT OPERATIONS  
AND NUTRITION  
OF THE  
COMMITTEE ON AGRICULTURE  
U. S. HOUSE OF REPRESENTATIVES  
BY  
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STATEMENT TO THE SUBCOMMITTEE  
ON DEPARTMENT OPERATIONS AND NUTRITION

AGRICULTURE COMMITTEE  
U. S. HOUSE OF REPRESENTATIVES

Chairman Stenholm and members of the subcommittee, I am Charles Schroeder from Lincoln, Nebraska. I offer testimony to this important subcommittee as a close-range observer and long-time beneficiary of our nation's agricultural research enterprise. With it, I encourage your support for a coordinated, priority-based system for restoring and strengthening our infrastructure for agricultural research. To provide context for my perspective, I would report that my family and I have been in the ranching, farming and cattle feeding business in southwest Nebraska for three generations. I was in the public sector during the mid-1980s as Nebraska's Director of Agriculture, and now serve Nebraska's land-grant institution as Executive Vice President of the University of Nebraska Foundation. As an outgrowth of these professional activities related to agriculture and my rural state, it has been my privilege to serve in a volunteer role as President of the Heartland Center for Leadership Development, a small nonprofit dedicated to enhancing the success of rural communities, and as delegate to the Council for Agricultural Research, Extension and Teaching (CARET). CARET is a national grassroots organization made up of farmers, ranchers, homemakers and rural entrepreneurs; agribusiness and commodity organization leaders; state and local officials and members of various agricultural advisory groups. Its delegates are volunteers appointed by the Vice Presidents and Deans of Colleges of Agriculture across the United States who work cooperatively under the umbrella of the National Association of State Universities and Land-Grant Colleges (NASULGC). CARET was established in 1982 as a mechanism through which citizen support could be expressed for agricultural research, extension and teaching programs. Its mission is to enhance national support and understanding of the land-grant university's involvement in the food and agriculture system.

For the last four years, I have been CARET's liaison to the USDA Users Advisory Board. In that capacity, I've had the opportunity to see agricultural research facilities at USDA and land-grant university sites from California to New York, Alaska to Georgia. Our mission in visiting those many and varied research sites was to observe the nature and output of the investigative work being conducted there and provide user feedback as to its relevance and perceived value to agriculture and the food system. The experience has been both fascinating and frightening.

From new discoveries at the most fundamental levels of molecular biology to the advanced development of fat substitutes that could revolutionize our diets, the products of USDA-supported agricultural research continually impressed our group. I can assure this subcommittee that the quality, vision and value of your investment returns are quite high. Naturally, there were exceptions that did not escape the scrutiny of this group. Those concerns and recommendations for change are well documented in the reports submitted to Congress and the administration by the User Advisory Board annually. By and large, however, one must conclude that the nation's research relating to agriculture and the food system, the bulk of which is conducted in a long-standing partnership between the states and the federal government, is in the hands of people whose combined technical expertise and sense of mission are exceptional.

But there is a dangerous problem. While being a first-hand witness to the marvels of discovery being generated by these scientists, one could not escape the coincidental observation of the decaying facilities in and around where this work was being conducted. The level of disintegration and disrepair was so striking that its memory causes me a very palpable feeling of queasiness and anxiety as I prepare these remarks. As I repeatedly observed outmoded equipment and literally crumbling laboratories, some finally abandoned as concerns for safety surpassed the intense desire for laboratory space of any kind, the vision of agricultural research facilities in the communist bloc countries of eastern Europe sprang from my memory. As a college student in the early 1970s, I found the condition of research operations in Poland, Hungary, Czechoslovakia and East Germany laughable because I knew my would-be competitors in their agricultural sector would never catch up with the flow of technology I would be able to apply in managing my livestock and grain operation in Nebraska. When I now see my own nation's research infrastructure floundering toward obsolescence, I am not so amused.

What happened? I need go no further than the land-grant university for whom I seek private sector support each day to find answers. As state budget allocations have steadily tightened, particularly over the last decade, maintenance has necessarily been deferred, updating and renovation have been rare and even relatively newer buildings (under 20 years) remain marginally equipped. In the case of older facilities, the result of extended deferred maintenance was predictable. Over a period of a few years, not only were they unsuitable for the sort of research demanded to address the natural and economic challenges of modern agriculture, they became almost uninhabitable for any purpose. With each year that this cancer grows, and it infects every state and region in the United States, the cost and unlikelihood of successful remedial action become higher; the morbid outcome for the nation becomes increasingly predictable.

As legislators, you know the historic popularity of criticizing public sector employees for their wastefulness, ineptitude and lack of concern for the taxpayer. I must report to this committee that my observation of the men and women populating our tax-supported and assisted agricultural research programs leads to a fully contrary conclusion. They have made remarkably creative use of facilities that are clearly substandard for the sophistication of their

research efforts. They have stretched available resources to transparent thinness, sometimes cutting telephone service and the purchase of pens and pencils, as well as gifting back a portion of their own income, in order to sustain their projects. All of this is done in order to add one more small increment to the base of knowledge that the rest of us might use to make our businesses more competitive, our communities more liveable and our nation's food and agriculture system more viable. Our failure to adequately support their efforts is a tragically cynical response to a looming national crisis.

The historic obligation of the states to provide and maintain the buildings, including research facilities, at their land-grant colleges and universities is clear. However, their ability to fulfill that obligation has been heavily impacted by rapidly escalating mandated expenditures imposed by the federal government. With the fiscal restructuring now underway at the federal level, a state-federal partnership program ought to be struck to provide both a remedial and long-term proactive response to a deteriorating agricultural research infrastructure at our nation's land-grant institutions.

An organized national approach, including a peer review process as proposed by the special USDA/NASULGC committee, makes great sense to me. That proposal which I have reviewed in its fundamental outline aims to create a competitive grants program under authority of the Research Facilities Act of 1963 as amended, and includes a collaborative priority-setting effort involving NASULGC, the USDA and the Congress. I offer my endorsement of such a plan, at least in principle, in order that we might set a course for the survival and superiority of American agriculture. The details of that plan are available from NASULGC and I know its president, Dr. C. Peter Magrath, would be happy to discuss them with you.

For all of the problems our country faces, most of which are catalogued daily in the popular press, this relatively unnoticed point of decay concerns me more than most. The long-term ramifications of allowing our agricultural research infrastructure to collapse leads to the most certain downtrend in our society that I can imagine. I very much appreciate this subcommittee's attention to the issue and hope it leads to prompt action.

Thank you.

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