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# TO PREPARE FOR THE AGRICULTURAL RESEARCH, EXTENSION, AND EDUCATION TITLE OF THE UPCOMING FARM BILL

## HEARING

BEFORE THE

## COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

FIRST SESSION

MARCH 27, 2001

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# HEARING TO PREPARE FOR THE AGRICULTURAL RESEARCH, EXTENSION AND EDUCATION TITLE OF THE UPCOMING FARM BILL

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**TUESDAY, MARCH 27, 2001**

U.S. SENATE,
COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY,
*Washington, D.C.*

The committee met, pursuant to notice, at 9 a.m., in room 328-A, Senate Russell Building, Hon. Richard G. Lugar [Chairman of the Committee] presiding.

Present: Senators Lugar, Thomas, Allard, Hutchinson, Harkin, Conrad, Lincoln, and Stabenow.

## OPENING STATEMENT OF HON. RICHARD G. LUGAR, A U.S. SENATOR FROM INDIANA, CHAIRMAN, COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY

The CHAIRMAN. This hearing of the Senate Agriculture Committee is called to order.

Today the committee holds a hearing to prepare for the Agriculture Research, Extension and Education Title of the upcoming Farm bill.

We look forward to hearing about current research programs, learning about implementation of the 1996 Farm Bill and the 1998 Agricultural Research Bill and gathering recommendations for ways to strengthen and improve our programs.

For our preparation, we need to pose several obvious questions and take stock of our current situation. What is the current status of Federal research programs and funding? What gains have been achieved through implementation of the 1996 Farm Bill and the 1998 Agricultural Research Bill? Where do we go from here?

Should we have funding goals such as doubling of agricultural research, as many are now proposing? I am a proponent of increased investment in agricultural research.

Nobel Peace Prize winner and father of the Green Revolution, Norman Borlaug, whom I meet with on occasion and who has testified frequently before our committee, endorses the need to double funding. I believe this is a critical need.

But I am interested in how others have documented this critical need. While we might not be able to fully address that today, it may also be helpful to review what has been accomplished through Federal funding of agricultural research.

What are the breakthroughs or discoveries that would not have been achieved in the absence of this funding? Is U.S. agriculture losing ground against some of our competitors because Federal research funding has been flat for so long?

We will also be interested in learning more about those who are just starting out as researchers in the agricultural area.

At one of our committee's four hearings about agricultural research in 1997, the President of the National Academy of Science testified that from his interaction with scientists and graduate students, it was his view that many of the most ambitious young people who were becoming researchers were choosing to go into biomedical research rather than agricultural research because more competitive grant funding was available for that area.

As the cornerstone of the 1998 Agricultural Research Bill, I proposed a new competitive grant program initially for future agriculture and food systems. The program was funded at $120 million annually for five years. The funding was to be devoted to critically needed research in the areas of future food production, natural resource management and increased farm income.

While this new funding was intended to augment research funding provided by Congress through the annual appropriation process and not to replace it, it has been difficult to ensure that funding would be maintained for this new program. In fact, USDA was prohibited from using funds to implement the program in fiscal year 1999.

I was heartened that USDA was able to finally award the first grants under this new program last fall. There was an enthusiastic response to this new competitive grant program.

One thousand proposals involving 500 scientists and educators seeking funding of over $1.4 billion were submitted. However, the USDA was able to award funding to just 86 projects.

In the appropriation process, funding was maintained for this current fiscal year, but eligibility has been limited to colleges and universities, precluding Federal research agencies, national laboratories or private research organizations from competing for the funding. USDA is now soliciting proposals for funding to be awarded later this fiscal year.

I look forward, as do my colleagues, to hearing the testimony today. We will hear from the United States Department of Agriculture, from producer representatives, researchers, scientific societies and the land grant institutions.

I look forward to working with my colleagues on the committee and all of those who are testifying as we work toward preparing for an agricultural research, extension and education title in the next Farm bill.

I would like to call upon my colleague, Senator Stabenow of Michigan, for her opening comments.

## STATEMENT OF HON. DEBBIE A. STABENOW, A U.S. SENATOR FROM MICHIGAN

Senator STABENOW. Well, good morning, Mr. Chairman. It is wonderful to be here with you this morning and to make some opening comments regarding the research, extension and education

title of the Farm bill. I appreciate the opportunity to be here with you on this important topic.

I share your desire and statements regarding doubling of the funding. I think it is a very important priority for the Farm bill.

As you may know, Mr. Chairman, I am a product of both undergraduate and graduate studies at Michigan State University, which is a premier research and education institution. I also have to say it is a premier basketball institution. I am inviting all of you to join me in Minnesota on Saturday as we root in the Final Four. So, it carries over, the gene pool goes from agricultural research to sporting events to many other areas of our important university.

MSU has been not only my home in terms of my studies, but I represented them for many years at various levels. I am very proud of the work they do and the contributions that they make to the topic that we are talking about today.

When I was on the House Agriculture Committee, we debated the Agricultural Research Reauthorization. I think that we made a number of advances in ensuring adequate resources for agricultural research and extension activities, including creating a new ARS research initiative to battle Wheat Blight, which I authored.

I know that much more needs to be done in that area. Agricultural research and extension keep our agricultural economy armed with the tools that it needs to continue to produce the most plentiful and safe food and fiber in the world. I am hopeful that the new Farm bill recognizes the need to increase our national investment in agricultural research and extension, as the Chairman has indicated.

The research, extension and education title of the Farm bill must address the needs of agriculture in the 21st Century. New challenges in food safety and diseases require a reinvigorated approach to research and consumer education.

I also believe that biomass fuels and biotechnology hold great promise in developing new markets for agriculture, but that tremendous work is required to make this happen safely and to ensure consumer confidence.

I look forward to working with the committee to increase our efforts in research, extension and education during our farm bill debate.

Today, I would like also to welcome one of the witnesses who is a fellow Spartan, Professor Philip Robertson. Professor Robertson is the Professor of Crop and Soil Sciences at Michigan State University, a Director of the NSF long-term ecological research program in agricultural ecology at the W. K. Kellogg Biological Station.

His research is supported primarily by NSF and USDA. He has made significant contributions in the field of terrestrial biochemistry. Some of his research includes investigating nitrogen cycling in row crop ecosystems, the impact of trace gas fluxes from agricultural landscapes on global atmosphere chemistry and soil and carbon sequestration.

Not only has Dr. Robertson served as a member and chairman on a variety of national and international scientific committees, I would like to also mention that he is an active member of his com-

munity as president of the Plainwell Community Schools Board of Education, which we know also is a tough job.

So, I would welcome Dr. Robertson. It is a privilege to introduce you. I know that you will be testifying on an issue that you know a great deal about, the National Research Council's report on the National Research Initiative, as you served as a member of the council and contributed a great deal to the report that you will be summarizing today.

So, again, welcome. I am looking forward to the testimony, Mr. Chairman.

The CHAIRMAN. Well thank you very much, Senator Stabenow. It is great to have such an enthusiastic ally as yourself in this quest. We wish you the best at Michigan State, both academically and athletically as the week proceeds.

Let me say that staff has visited with our first two witnesses from the United States Department of Agriculture and indicated that that we would hope that your testimony would be given in a 10 minute period, more or less. Then, with the following two panels, that each of the witnesses would summarize in five minutes.

Your written testimony, that you have prepared will be made a part of the official record, as well as our questions and answers as we proceed.

The CHAIRMAN. It is a privilege to have as our first panel of witnesses, Dr. Colien Hefferan, who is Administrator of the Cooperative State Research, Education, and Extension Services, United States Department of Agriculture in Washington, D.C., and Dr. Floyd P. Horn, Administrator of the Agricultural Research Service, United States Department of Agriculture, Washington, D.C.

Dr. Hefferan, would you proceed, to be followed by Dr. Horn. Then we would like to have the opportunity to question you.

## STATEMENT OF COLIEN HEFFERAN, ADMINISTRATOR, COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, DC

Ms. HEFFERAN. Thank you. Mr. Chairman, Senator Stabenow, thank you for the opportunity to appear before this committee.

Today I would like to describe the steps that our agency has taken to implement the research provisions of the 1996 FAIR Act and the 1998 Agricultural Research Extension and Education Act, an act which I call "our era," a term which almost no one else has adopted.

As information technology has revolutionized the global economy and technological innovation is sweeping across the country, agricultural science and education has changed dramatically in the last decade.

The food and fiber production systems are changing before our eyes. CSREES is the agency of USDA which engages our national, widely dispersed, university-based knowledge system to develop science-based solutions and technologies to help farmers, rural communities and others remain productive and profitable in the face of these changes and helps consumers navigate the growing complexities of the agricultural system.

CSREES accomplishes its mission by supporting research, education and extension activities through peer review, competitive research and education and education and extension grants, formula-funded support for all land grant institutions, and Congressionally determined special projects.

Each of these types of work supports a broad portfolio in support of American agriculture. The formula programs provide a critical base of support for agricultural experiment stations and for cooperative extension systems. They are highly leveraged by State and local funds.

The National Research Initiative supports investigator-initiated basic and mission-focused research, which is really the seed corn from which new technology and development occurs in Agriculture. The new program established in the 1998 bill, the Initiative for Future Agriculture and Food Systems, as well as programs supported under Section 406 of that bill for integrated research, education and extension, link together on the ground in a problem-focused way the research, extension and education system. I will talk about those in some depth in a few moments.

Our higher education portfolio is designed to expand the educational capacity and address the issues that have been raised over the last decade about the future for food and agriculture as it is determined by the scientific capacity in those fields.

These higher education programs are particularly important as they support education and extension at historically Black, tribal colleges and at Hispanic-serving institutions.

A number of other programs including the Fund for Rural America research education and extension grants program and the Small Business Innovation Research Grants Program are some of the things that in collaboration with the Congressionally-targeted programs and other national programs such as Integrated Pest Management and Expanded Food and Nutrition, create the broad portfolio that brings the capacity of America's universities to address issues in agriculture.

It is through this collection of programs that we have been able to achieve important results. There are many examples of work which is funded initially through the National Research Initiative and is translated into applied problems solving through the initiative established in the 1998 bill and becomes the foundation for education and extension programs.

Our agency was formed in 1994 with the reorganization of the department. But the bringing together of research and extension was really enhanced through the 1998 Agricultural Research Reform Act. Prior to that we really had no mechanisms by which we could integrate the grants programs to link together knowledge generation and the use of that knowledge.

The law that was passed in 1998 essentially allows us and gives us the tools needed for that integration. It also places enormous emphasis on stakeholder input as the method by which we identify research priorities and establishes peer review and multi-institutional and multi-State mechanisms as the means by which we affect our goals.

Let me begin by telling you a bit about the Initiative for Future Agricultural and Food Systems, which, as you identified, provided

$600 million over a five-year period in mandatory funding to support new problem-focused work in agriculture.

In the first year in which we were allowed to administer the program, fiscal year 2000, we were only able to award grants to eight and a half percent of those who applied. Of the 1,000 proposals that we received, one-fourth of those proposals were deemed as fully fundable, excellent research. Again, of that group, fewer than 90 were actually funded.

But the work that was funded focuses on a number of critical issues, including development of biobased products for solvents, for greases and for latex substitutes. It includes a consortium of institutions in Texas, Florida and California that is looking at the reduction of microbial contamination in the production of fruits and vegetables, both the mechanisms to do that and farm worker education and other extension education.

There is a consortium of University of Tennessee and Purdue researchers which is developing natural resource management solutions for private landowners. There also are consortia of institutions that are helping producers and consumers to understand the application of new agricultural biotechnologies. One of these consortia includes 1890 land grant institutions and is focused on developing and delivering biotechnology applications for underserved farm communities.

This initiative has really resulted in a fundamental shift in how CSREES manages its portfolio, drawing upon substantial stakeholder input and bringing together in the peer review system and the merit review system scientists, educators and practitioners.

Well, one of the intents of the 1996 and the 1998 bill were to involve more stakeholders. The first line of stakeholder involvement that we have benefited from is the National Agriculture Research Extension Education and Economics Advisory Board. As Administrator of CSREES, I like to find an acronym that is more difficult than our own agency name, and that one does it.

This body is really our first contact for taking the pulse of the stakeholder community when seeking to implement new programs or taking existing programs in new directions. This group, the Advisory Board, has been critical to us in the implementation of the Fund for Rural America in providing substantive guidance as well as the Initiative for Future Agriculture and Food system.

We also have developed a number of new practices for seeking stakeholder input on each of our programs including requesting in our Requests for Proposals input on the nature of what we are asking for as well as responses.

As I mentioned a moment ago, we also have revised our peer review system, where appropriate to use not only scientific and educational peers, but lay people who have an understanding of the issues to be addressed are included in some of our programs. Each of our peer review panels is managed jointly by a USDA staff member and a nongovernment, scientific expert who work together to recruit peer panel members that represent our diverse institutions and stakeholders.

Well, let me go on to a second theme in the past legislation and that is that we focus on multi-institutional and multi-disciplinary projects. It has been clear as we look at genetics or water quality

or insect or microbial ecology or consumer behavior that no one discipline is sufficient to address the complex issues facing agriculture.

While we have had a longstanding program of multi-institutional work through the Hatch Regional Research Program, now through the 1998 legislation we are implementing a program of multi-institutional, multi-disciplinary work that is supported through the formula based programs at the Land Grant Universities. Each institution is working collectively across State lines and across disciplines and functions at their institutions to make the highest and best use of the formula based dollars.

The mandate of the law strengthens the commitment of the universities to achieving the goals of problem solving through agriculture. We have also tried to model within the agency the goals of multi-institutional and multi-disciplinary work by mounting more of our programs in collaboration with other Federal organizations.

We have strong collaborations with NSF in the area of genomics research. We are working with the Department of Energy and NSF to complete the Arabadopsis Genomic Sequencing Program and have initiated new programs with NASA, with EPA and with the Food and Drug Administration where there are clear points of tangency between the agenda of those agencies and Agriculture bringing new resources and new opportunities to utilize the capacity of the universities.

Well, let me end by reiterating that the principles of the 1996 and the 1998 legislation, including stakeholder input, multi-disciplinary work and problem-focused work has aided the agency in refocusing its programs on issues that are critical to American agriculture. But we recognize there are two things that are critical to us as we continue. That is that we need to build more collaborations with other Federal organizations to address the points of tangency between our programs and theirs, including those between agriculture and medical research, and that we need to be able to continue to work toward systems that are able to respond quickly to emerging problems where the science base needs to be applied to solving those problems.

Thank you.

The CHAIRMAN. Thank you very much, Doctor.

[The prepared statement of Ms. Hefferan can be found in the appendix on page 53.]

The CHAIRMAN. Our friend, Dr. Horn, will you give us your testimony?

**STATEMENT OF FLOYD P. HORN, ADMINISTRATOR, AGRICULTURAL RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, DC**

Mr. HORN. Mr. Chairman and members of the committee, I am Floyd Horn, Administrator of the Agricultural Research Service. ARS is the intramural research organization of the U.S. Department of Agriculture.

I am pleased to be here today to update you on our response to the directives of the 1996 Farm Bill and the 1998 Research Title and to talk about what ARS is doing for America and American ag-

riculture. First, I would like to tell the committee how ARS responded to the expanded research purposes in the 1996 Farm Bill and how we implemented the priority setting and peer review sections of the 1998 research title.

Frankly, most of the provisions of these two bills were not directed at ARS. Those sections that were, though, provided the impetus for us to take a fresh look at our programs and accomplishments to more fully engage our stakeholders and to refine our peer review processes.

This committee's interest and input into those activities is acknowledged and appreciated and I believe ARS is a much stronger organization today because of that interest.

To fully integrate the tenets of the eight agricultural research purposes into the agency's every day processes, ARS incorporated them into its strategic plan. Indeed, they are in fact the basic framework for our strategic plan.

Most importantly, ARS restructured its research programs into 22 national programs that link the purposes to the agency's objectives.

The 1998 research title made it clear, that Congress expected rigorous peer review of federally funded research for both relevance and merit. It also directed that research priorities should be established with input from our customers, our stakeholders and our partners.

In response to the latter, ARS held more than 40 national program workshops at different locations across the country. These workshops for the first time really brought ARS scientists and our national program staffers together with our customers. Over 3,000 of our customers attended these workshops, including hundreds of growers and ranchers.

During the workshops, our customers discussed their needs and problems with our scientists. Our researchers found meeting producers and consumers face to face especially helpful and quite gratifying.

In addition to producers and consumers, representatives from all of our customer groups attended the workshops. These included Federal and State partners, industry groups and businesses, nongovernmental organizations, a group that we have had very little contacts with in the past, and university researchers.

We also made a special effort to invite small and disadvantaged producers to these gatherings to be sure that we attended to their needs. We are really quite proud of these workshops. For the first time we have a major influx of information from the outside into our program priority setting process.

In addition to integrating stakeholder input into our priority setting to insure program relevance, the 1998 Research Title directed ARS to peer review each of our research projects at least once every five years. These reviews are conducted by independent and objective expert panels that base their reviews on scientific merit criteria.

In response to this requirement, ARS established the Office of Scientific Quality Review in 1999 to review each research program systmatically. The Office is headed by a senior scientist called the Scientific Officer, who selects the panel chairs from outside ARS.

There are six panel members on each panel. Each panel reviews approximately 20 projects. The panel chair selects the panelists and resolves matters relating to conflicts of interest, diversity and expertise through the Scientific Officer.

The peer reviewers are, as they should be, technical experts and good scientists with relevant knowledge and experience in the research that they are reviewing. The peer reviewers may be ARS scientists or non-ARS scientists, but the majority of the reviewers on each panel must be non-ARS scientists.

To date, we have held panel review sessions for four of our 22 national programs, but this is an ongoing process that will repeat every five years for each research project.

Since our time is limited, Mr. Chairman, I would like to now address several urgent issues that loom on the horizon. First is that of our research programs developing biofuels. The recent energy crisis in California has clearly demonstrated the nation's need for alternative energy sources.

ARS research into biofuels is aimed at developing knowledge and technologies to increase the use of agricultural crops and by-products. Our success could reduce America's dependence on foreign petroleum and reduce the net production of greenhouse gases, as well as create economic opportunities in rural America.

ARS conducts alternative energy research at four locations, in Illinois, Pennsylvania, Texas and California. We are developing methods to enable the more efficient production of ethanol using agricultural and forestry wastes, grain crops and fast-growing crops that might be grown solely for their energy production.

ARS research is also exploring the development of biodiesel from vegetable and animal fats and we are developing energy alternatives for use on the farm that involve a combination of wind, solar and biofuels.

To aid in our research efforts with biofuels, the research title offered $1.5 million for construction and design of a corn-to-ethanol pilot plant to be built in Edwardsville, Illinois. ARS is at the moment overseeing a $14 million extramural grant to Southern Illinois University for that pilot plant construction.

A second urgent issue we face regards a key mission of the ARS, ensuring a safe food supply. In recent months, to many americans having a safe food supply has come to mean preventing Bovine Spongiform Encephalopathy (BSE), also known as Mad Cow Disease, and Foot and Mouth Disease from entering the United States.

Of course, there are many other aspects in which we have significant program elements, but these are the ones that are in the news. We are fully engaged in efforts to keep these diseases out of the country. Although we have not conducted research with BSE directly, these are not new issues for ARS. We have extensive research experience and ongoing research programs both in Foot and Mouth Disease and Transmissible Spongiform Encephalopathies, known as TSE, including Chronic wasting disease and scrapie.

Current research on TSEs includes a diagnostic research program in conjunction with the Animal and Plant Health Inspection Service (APHIS) academia, and the animal industry aimed at developing new live animal and post-slaughter tests. These are major barriers to understanding this disease.

The test we are developing at the moment will detect scrapie, which affects sheep, and Chronic Wasting Disease found in deer and elk. Both diseases are found here in the U.S. Chronic Wasting Disease affects a significant number of our wildlife. So far it has not apparently transferred to domestic species.

We also conduct research into how these TSE diseases are transmitted, to better understand the fundamental aspects of Mad Cow Disease ultimately.

ARS also recently held a two-day special conference of experts on BSE research needs. Frankly, this was a result of the recent National Cattlemen and Beef Association meetings at which BSE or Mad Cow Disease was listed as the top priority.

As a result, we are prepared to initiate a research program that will address the detection of ruminant proteins in animal feeds, believed to be the source of BSE.

Foot and Mouth Disease poses a more immediate threat because it is one of the most contagious diseases of livestock known. ARS has an ongoing research program into many of the complexities dealing with Foot and Mouth Disease. Because it is so contagious, all of this work is conducted in high-level bio-containment laboratories at the Plum Island Animal Disease Center in New York.

During the past year, ARS scientists have completed important research concerning how FMD is spread and we are currently testing vaccines which induce protection against several of the Foot and Mouth Disease virus types. Incidentally, there are seven major types of Foot and Mouth Disease virus and about 70 or so biotypes. This is a reason why it is difficult to get cross-protection, for instance, from vaccines.

These vaccine candidates will allow positive differentiation of vaccinated animals from naturally infected animals, an extremely important distinction if you want to have a vaccination program.

We are also working on very rapid diagnostic tests, as well as test to differentiate animals vaccinated with existing vaccines from naturally infected animals. The validation and adoption of these tests in the field by APHIS and the international laboratories will have an impact on FMD control, hopefully in time to save the devastation that we see in Europe, but certainly, we hope, in time to save any problems that we may have here.

This concludes my testimony, Mr. Chairman. I will be happy to answer any questions that you or any other members of the committee may have regarding ARS' research and implementation of our new responsibilities as directed by the recent legislation. Thank you.

[The prepared statement of Mr. Horn can be found in the appendix on page 61.]

The CHAIRMAN. Well, thank you very much, Dr. Horn.

I would like to begin by saying that I am deeply interested, as all of us are, in American foreign policy and security policy, in addition to agricultural policy. We have come to a juncture and the last part of your testimony really shows the intersection of the two. First of all, with the bio-fuels research, our pace here I would not characterize as leisurely. But on the other hand, for at least 20 years and before that, there have been thoughts that somehow we might be at risk as a nation in terms of our fuel supplies and our

energy supplies. It would be a good idea if we took a stronger look at renewable resources, namely, things that grow every year and that are available to us.

Back in President Carter's administration, we had numerous hearings then, in the Agriculture Committee and the Foreign Relations Committee, trying to see if we could establish more independence. This has waxed and waned as times have gone on. Sometimes we have become less urgent about the situation. Even now, many Americans are not really aware of how critical a problem we may have, although increasingly they are becoming aware as crisis occur in our power grids or natural things transmission or debates over general supplies.

Having said that, it has always struck me as curious why the Nation as a whole did not see more urgency in establishing bio-fuels, leaving aside what the base would be. Those of us who are involved in corn farming have always fostered ethanol from corn. That has proceeded. But ethanol could come, as we have heard around this table, from all sorts of bio-fuel sources, as a matter of fact.

Testimony by Jim Woolsey, former Director of the CIA, has suggested that there are very promising sources in switch grasses and sugar canes and even bark on trees. A good number that might finally get us to a cost point that is equivalent or better than that of petroleum based source.

That, it seems to me, is a critical element because, essentially, our bio-fuels policy in the country depends heavily on a subsidiary or a payment or however one must characterize the difference in the cost of ethanol and gasoline that comes from a petroleum base.

It is just that simple, but that critical, that we have not narrowed that gap. I was intrigued that you mentioned that $14 million is going into another pilot project out in Illinois which I gather is state-of-the-art and will narrow the gap substantially. Some cynically pointed out last year in testimony that given the rise in gasoline price, they may overtake whatever is happening with regard to corn-based ethanol and the market may solve our problem. But I am not that optimistic about it.

What is your general sizing up, either one of you, as to the urgency or in fact some say pessimistically, that we in agriculture are always looking for the rainbow out there, some type of bio-fuel that really does measure up economically to a natural gas or to a petroleum, or what have you. It simply isn't there. In other words, they would say, you really have to recognize that it just is not there and all of these efforts, interesting as they are, are fated to finally end in a waste of time and money.

Is that to be our fate or can you give us some prognosis of this?

Ms. HEFFERAN. Well, I think the likelihood of a solution to the fuel problems for agriculture is not so much a scientific question. It is an economic one. The science has support through a number of the projects that we support and suggests that there are many alternative ways to develop fuel through agricultural products.

Last year in the New Initiative for Future Agriculture and Food Systems we supported four separate projects that focused on bio-fuels as part of a broader program in bio-based products. That is

in addition to the work that was supported through the National Research Initiative and some special focus programs.

There are a variety of different mechanisms, which are microbial in nature, looking at how microbes can change the fuel content of various agricultural products to looking at how we can overcome problems like lignin in the conversion of plant material to ethanol fuel.

So, I think the question of investment is one that we have addressed through the programs established primarily in the 1998 bill. It is an area where we are asking for new work in anticipation of growing demand as the economics of fuel changes.

The CHAIRMAN. But you believe the science is there. You don't have the money to do the things you want. How do you make this transfer, promising as this may be, to somebody's actual plant where they begin to turn out something that might be bought by a consumer somewhere? Where does the transition come and how do we get to that point?

Ms. HEFFERAN. I can give you a partial answer to that and I am sure Dr. Horn has much more to say on it as well. You know, we support activities such as the Small Business Innovation Research Grant Program, which really looks at commercializing the benefits of agricultural science, wherever it may have come from.

Within the last several years, that program also has supported demonstrations and models that look at fermentation, and that look at new mechanisms for enhancing the fuel content of biological products.

So, I think it is going to take a very deliberate effort and a continuous ramping up of our research, but I think so long as we have the knowledge base on the shelf that we can draw down as the economics becomes more favorable to bio-fuels, there are scientific solutions that can address this problem.

Mr. HORN. I would agree with this. The areas of research needed, fall into two categories: improving the efficiencies of converting agricultural materials into both ethanol and bio-diesel and developing high value industrial feed stocks and co-products from by-product streams.

We have major programs in this area at the National Center for Agricultural Utilization Research in Peoria. We also have work at the Eastern Regional Research Center in Philadelphia and the Western Research Center in Albany, California. Much of this is on fermentation chemistry, and fermentation systems that can be used to convert agricultural commodities, primarily corn, into ethanol.

We also are working, with corn residues trying to convert those into non-food biomaterials. We are also looking for ways to convert vegetable oils, such as soybean oil into bio-diesel.

At the Eastern Regional Research Center we have a number of different approaches to the production of ethanol, but one of the more interesting with regard to bio-diesel is the enzymatic process for converting animal fats and vegetable oils and already used restaurant greases into bio-diesel fuels.

At the Western Regional Research Center in Albany, California, we are looking into grain fractionation fermentation systems that could produce not only ethanol, but very high value co-products.

I do think it is a matter of economics at the moment. We have been told a number of times by economists that there are places in the country in close proximity to the source, where we could develop a profitable industry, but by and large it will always relate to the cost of available fossil fuels.

The CHAIRMAN. Let me ask, Dr. Horn, for you to work with our staff, if I may. I would like to know what is going on in each of those sites that you have named.

Mr. HORN. Very good. We also have auxiliary projects in about a dozen other locations for a total of $13.2 million in this program.

The CHAIRMAN. Great. Just one further point: On the second large issue that intersects foreign policy and agriculture, the BSE and the Foot and Mouth Disease situation.

During December I visited an agricultural laboratory, as it was so described in Russia, about 100 miles from Moscow. It was a very obscure place and rather rundown at this point. But it was interesting because they had bunkers that were supposed to protect whatever was happening there from nuclear attack from the United States in the past.

They had various supplies inside the bunker. Now, the gist of what they were about, the Director who had been there 40 years said, was to protect the herds of the former Soviet Union against a terrorist attack by the United States in which we would use Hoof and Mouth Disease and/or at least 13 other diseases that they identified to destroy the entirety of their livestock.

So, as a result, they claimed that they were building antidotes to this, various vaccines. As a matter of fact, in the past they did produce a lot of vaccine for cattle herds and have distributed this in various parts of Russia.

Interesting enough, they also brought in from Africa strains that were not native to Russia or Europe. When I queried why they were interested in those situations, they said, "Well, they thought the United States might discover those, too, and they wanted to work out some toxins in case we were that original about it."

The flip side of the coin, having seen these 14 vials of material which was kept in refrigeration there in this dilapidated structure, these were the crown jewels of the laboratory. It could go either way. Toward the building of anti-toxins or toward the use of something that would be an aggressive weapon of mass destruction.

Their claim, routinely, is that they were never involved in that, and perhaps it is so. But in any event, I mention this because others have been at work and have thought through the predicament, not of an accidental case of Hoof and Mouth Disease, but of a deliberate attempt.

This is inconceivable to most of us and we really don't want to think about it. But we are thinking about it because now at risk are the herds in this country. We are diligent at USDA, as you are every day, in beefing up at least the inspections and trying to think through, really, how do we stop it so there is not this epidemic and this plague that could visit us and change life in America very substantially.

So, I applaud you on the work that you are doing. Once again, those of us who are enthusiastic about research always ask, "Is it enough?"

Is it a question of research now or enforcement, rigorous exclusion or how would you characterize what you are up to?

Mr. HORN. Mr. Chairman, it sounds like you have been to Vladimir and perhaps to Oblensk. We have been following in some of the same footsteps and we are very, very concerned about biological weapons the former Soviet Union had.

The CHAIRMAN. In fact, I found an ARS man in Russia.

Mr. HORN. Yes, we sent him over there to see you.

The CHAIRMAN. Yes.

Mr. HORN. The ARS scientist was Dr. Rick Bennett. It was an opportune encounter. But frankly, we have been very, very worried about this for a good long time. In fact, almost every country that has had an offensive bio-weapons program has had an agricultural component to that program. The most serious was the Soviet Union where, if we are to believe the testimony that has been presented before the Congress by defectors, that of 33,000 bio-weaponeers in the former Soviet Union, 10,000 were working on agricultural issues.

Just to compare that, the total work force in ARS is about 7,500 now and we have 2,000 scientists. So, it was a huge program and we don't know where all of it is, obviously. Foot and Mouth Disease was weaponized and a number of others, may have been Rift Valley Fever, Tularemia and others. Some were zoonotic and some just against animals.

There are really four categories that we are worried about. One is animal diseases. One is crop diseases. Another is zoonotic diseases of animals that can transmit, to humans. The last is technological surprise. With new biotechnological sciences at their disposal, those interested in biological weapons can change pathogens to either get around vaccines or to make them more virulent than they would ordinarily be.

So, this is a huge issue. Zoonotic and "new" diseases that we would not normally see in this country like Glanders and Rift Valley Fever pose a totally new mission for the Department of Agriculture.

We have, as you say, been working diligently on things like Foot and Mouth Disease, Brucellosis, and Bluetongue. But there is another whole set of pathogens that our veterinarians would be ill prepared to encounter that have been prepared for use against us.

The CHAIRMAN. Well, this committee is eager to work with you in trying to inform the American people of the good work you are doing. I think this is one of these situations of extraordinary work because it was not topical. It has been unseen.

But the basis of our work, as you know, and your work every year is to provide an ongoing funding of research which is absolutely vital. Whether people have topical interests or not, these emergencies occur and we have to be ready.

Mr. HORN. We appreciate your support very much in this regard. In fact, I know you are responsible for much of the State Department activity that allows us to talk to these people and direct their activities in more peaceful ways. They are in fact, in cases that I can think of, assisting us in developing prophylactics against some of the diseases they created right now.

The CHAIRMAN. That should be mentioned. I have mentioned the sad side of it. That is potential terror, but the fact is that the cooperation now is extensive because of the fear of Russians that they themselves may make a batch of it and kill their livestock or injure their people. So, it is an urgent situation.

Mr. HORN. We are very enthusiastic about the potential to work with these former biological weaponeers.

The CHAIRMAN. Thank you.

Senator HARKIN. Thank you, Mr. Chairman. I will just ask that my statement be made a part of the record.

**STATEMENT OF HON. TOM HARKIN, A U.S. SENATOR FROM IOWA, RANKING MEMBER, COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY**

Senator HARKIN. I am sorry I was a little late, but this is a great segue into my questioning for Dr. Horn.

We have a National Animal Disease Center and a National Veterinary Biologics Lab at Ames. It has been there for over 40 years now, almost 50, I think. I visited it a number of times. I had the former Secretary of Agriculture, Glickman, out there to look at it.

I am going to hope to get Secretary Veneman out to take a look at it also. In fact, I was just there last Friday. They were bringing a number of sheep from Vermont that had TSE to dispose of them. This made quite a bit of national news. Of course, it made a lot of news in Iowa, too. A lot of people are concerned about this.

The National Animal Disease Center at Ames, after 40 some years, needs to be upgraded, not only just for the present kinds of diseases, but all the things that you just talked about with the Chairman. We don't know what is coming down the pike. We know that some of these diseases are mutating. They are becoming stronger. They are becoming more virulent. They are manifesting themselves in different ways.

Then there is the whole issue of bio-terrorism that we have to be concerned about. A lot of this falls in the lap of the National Animal Disease Center and the National Veterinary Biologics Lab at Ames. They are so spread out now that they are actually doing some of this work in a shopping center. Quite frankly, I am concerned about that.

We are doing some stuff with toxins and things that are not in really secure areas. That has to be addressed. I am concerned that something might happen. The ARS proposed a plan calling for integrating and modernizing these disease facilities in Ames with the requirement that a study be completed by March first. The current facilities are grossly inadequate.

Mr. HORN. Yes.

Senator HARKIN. They need to be upgraded for the new century ahead. As I said, some of them are in a strip mall. Instead of shopping center, I should have said "strip mall."

I think the stories about animal diseases and the fact that we had to transport sheep there to be disposed of just shows that we are not out of the woods on this.

In looking at what is happening in Europe, I am told that they are losing something like $200 million a day in Europe. I think in Great Britain it has already cost them in the billions of dollars.

So, again, I guess I am just laying the ground for asking you what is the current status of the mandated report and when can we expect to see it? I would like to have any of your comments on the need to upgrade those facilities.

Mr. HORN. Senator Harkin, before you came the Chairman made some opening comments that included some discussion of the proposals that are around to double the investment in agricultural research. It is absolutely true that we have under-invested in agriculture research for some time.

It is particularly apparent with regard to the condition of some of our animal health facilities. This is the principal jewel in the crown with regard to domestic threats against American livestock and agriculture.

All of the things that you have said are very true. We have Nipah and Hanta viruses. We have things that are mutating naturally that threaten our country's huge agricultural enterprise.

We must respond by repairing those facilities. The Department of Agriculture is not seen as a "big science" agency. We have less than two percent of the Federal research and development budget. This issue must be dealt with.

I agree with you wholeheartedly. It is urgent.

We also have a sizable project there at Ames. We in ARS are in 84 different buildings on that site and APHIS is in another 25 buildings. A few years ago, the preliminary estimates for upgrading the facilities which, in a significant part, meant replacing buildings, was upwards of $400 million, a huge number in agriculture.

The report that you make reference to has gone through a couple of iterations and recently more reiterations to be sure that it is conservative, yet compelling. It is a very large project for us and we want to make sure that we get it right.

We started out in 1992 proposing separate facilities to house APHIS and ARS. More recently, we took the approach that these could be combined and coordinated in a way that would save the Federal government a considerable amount of money.

I hope that is the case. The report is pending. We expect the report to go to the Secretary for the beginning of the departmental clearance process within a week or 10 days. Our guess is that shortly thereafter, it will be presented to the Congress.

The master plan that is coming out of the combined efforts of APHIS and ARS will be completed in June 2001 or a lot of us will be asking why it isn't.

It is an extremely important project for us and I can assure you we are working with due diligence to make sure that this is an effective proposal, because we know in these economic times it is going to be difficult to get this kind of an investment. It is not the only one we have like it.

We also have the exotic animal disease issues that we deal with at Plum Island. That is another huge project. But you are absolutely correct. It is urgent and it has to be dealt with.

Senator HARKIN. Well, we have to get on with it because we have got to start laying the groundwork for the rebuilding, consolidation, and putting up a little bit more secure parameters than what we have had in the past. We must get that stuff out of the strip mall

and back into an area where it can be controlled more tightly than it has been in the past.

So, I look forward to the report and I urge you, with as much rapidity as you can, to get it to us so we can see what we are going to do here on this committee and on the Appropriations Committee to get this facility upgraded.

I just want to note for the record that the testimony of Jay Lemmermen, who will be up next, on behalf of the Animal Agricultural Coalition, spoke specifically about the need for this. He said that the existing facilities were "antiquated, inefficient, and seriously undermine USDA's role as a world leader in animal health and diagnostics."

He says, "For example, the United States currently does not meet the standards that we require of our trading partners, leading us to rely on foreign laboratories and foreign diagnostic procedures."

I just wanted to note that for the record. That is why it is so important to get moving on this.

Mr. HORN. We also have certain standards to meet with regard to the certification of our animal handling facilities and our veterinary laboratories. That is at risk as well.

Senator HARKIN. Exactly. Thank you very much, Doctor.

[The prepared statement of Senator Harkin can be found in the appendix on page 52.]

The CHAIRMAN. Thank you very much, Senator Harkin.

Senator HUTCHINSON.

**STATEMENT OF HON. TIM HUTCHINSON, A U.S. SENATOR FROM ARKANSAS**

Senator HUTCHINSON. Thank you, Mr. Chairman. Dr. Horn, it is good to see you again. For my own benefit, and I came in late and I apologize for that. If you have addressed this, then forgive me for asking it again.

But on the Foot and Mouth Disease and our national effort to prevent the spread of Foot and Mouth Disease to the United States, can you just give me an overview of how many agencies are involved in that effort, who is coordinating that effort? What is the role of ARS and the USDA and how great is the threat to United States livestock?

Mr. HORN. Well, I will do my best. This is a fairly complicated affair. Certainly, every country that we trade with, and interact with and have significant amounts of traveler exchange with, is trying to contain this disease. So, I would say that our partnerships with Europe including Great Britain, for instance, are very important deterrents to the movement of Foot and Mouth Disease to this country.

The companies that actually transport people back and forth are sensitive to this and there are a great many steps being taken by partners. But within the Department of Agriculture, clearly the key is with APHIS. APHIS is both coordinating and providing the action and regulatory responses to Foot and Mouth Disease surveillance.

The ports of entry are the points of focus. We are trying to identify and confiscate contraband materials, livestock materials, live-

stock, and livestock products that are capable of carrying the virus. We are trying to educate people as they come to our ports of entry that if they have been on a farm they need to tell us about it and we need to exercise the appropriate disinfection precautions to keep them from bringing the disease to the United States.

We are also doing what we can to help those afflicted with this problem by providing scientific expertise. This is where we begin to come to ARS. ARS is a crosscutting research agency whose primary function in the department is to provide science and technology to the action and regulatory agencies, including APHIS.

So, we would be developing the new diagnostic kits that can be used by APHIS in their effort to keep the disease out of the United States. We are field testing a kit right now that can determine a positive or negative Foot and Mouth Disease sample in 40 minutes or so, as opposed to the current 40 hours. It is also much more sensitive than the existing tests. That is important because in Europe the disease primarily being spread by sheep. Sheep don't show the symptoms that you see in cattle or swine.

So, oftentimes you can move apparently normal and healthy sheep and yet they are diseased. So, we are helping with science and technology there as well. We will probably be working also with the French.

Second, we would focus on the potential for the use of vaccines in ways that haven't been possible in the past and other technologies that might be used to understand the spread of the disease and help contain it.

Of course, there is a big issue of carcass disposal that is researchable now. It is a tremendous environmental issue. What is poorly understood at the moment, but rapidly coming to the forefront, is that the big losers in this are not just agriculture, but virtually every aspect of life in the U.K. has been affected. Tourism is down 85 percent. There are major losses to the country's economy because of Foot and Mouth Disease.

Senator HUTCHINSON. So, do you feel that the coordination in the United States is adequate and that our response has been well coordinated?

Mr. HORN. Well, unfortunately, that is the kind of question you can only answer with assurance in retrospect. The way it is is as good as it can be. I think virtually every veterinarian in the United States, livestock veterinarian, is sensitized to the need to be careful and watchful.

APHIS has been operating for some time now on an emergency basis, communicating with Europe and Great Britain and Argentina and other countries where Foot and Mouth Disease is being found.

Senator HUTCHINSON. If I could quickly move to another subject, the Chairman spoke about ethanol in our bio-fuels. I am very interested in the bio-diesel that you made reference to and its feasibility in the future.

We have a soy oil glut in the United States. I have worked with the Soybean Association on possible legislation that would do something like we currently do with ethanol. But you said that the future of these bio-fuels is really dependent upon the cost of energy out there. I think that is a fair reflection of what you said.

Do you feel that some kind of incentive program on bio-diesel could play a role as our ethanol legislation?

Mr. HORN. I don't know much about incentive programs. In agricultural research we tend to focus on making the technology available. It is clear from what we are hearing from the Economic Research Service that there are many parts of the Nation where it is close to competitive as an energy source, but it is not there.

I think as was the case with the Farm bill in the first place, that increased research was supposed to be a part of the safety net. If it is that kind of incentive that you are talking about, I believe that additional research will make it a more efficient and competitive fuel.

Senator HUTCHINSON. Thank you. One last point, in the budget blueprint that was presented, the administration says that in 2001 USDA funded approximately 300 Congressionally earmarked projects for research, education, extension grants to land grant universities not subject to merit based selection processes and therefore do not represent the effective use or limit Federal funding and that the budget proposes to eliminate funding for these earmarked projects, saving taxpayers about $150 million.

On the surface, that sounds very logical. But I am concerned that we may have made a sizable investment in a lot of these land grant universities and programs through the earmark and that to make an across-the-board elimination of those may in fact not be in the national interest or the public interest.

If you would comment on that, and is there any way that those kinds of earmarks could be subjected to a meritorious evaluation and assessment of how much value they are without a simple kind of meat-axe approach on eliminating all the earmarked funding.

Mr. HORN. Thank you for asking me that question, Senator Hutchinson. This aspect of the administration's budget, of course, will come forward in much more detail in April. It may be easier to determine exactly what process was used at that time.

But I would say this much: In prior year budgets, the process has been almost identical. Those items that have not appeared in President's budget have been slated for redirection. That process has led to debate with the Congress. In recent years, certainly most of those have been restored.

I think that is because of the sense of the Congress that there is value in many of these projects. I believe our responsibility at the agency level is to be sure that should the funds be forthcoming from whatever source, that they are used properly. I did speak earlier about the merit and relevance reviews that we go through to make sure that that happens.

So, regardless of the outcome of this particular aspect of the budget blueprint and what follows, I think that we will do our very best to assure that the money is well spent, should it be forthcoming.

Senator HUTCHINSON. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much.

Senator ALLARD. Thank you, Mr. Chairman.

Just to bring the panel up to date on my background, I am a veterinarian, so obviously, I am interested in what research you are doing right now. Is Plum Island under your jurisdiction?

Mr. HORN. Yes, the research that goes on at Plum Island is.

Senator ALLARD. The researchable problems that are out there?

Mr. HORN. Yes.

Senator ALLARD. That is what I am interested in, the research side of it. What is it that you are doing specifically on Foot and Mouth Disease research in relation to the vaccine? I have had a State veterinarian contact me about his thoughts about a vaccination program. I know that it is controversial and I kind of want to know just what it is.

He felt perhaps more research needed to be done in that area. I would kind of like to have your comments on that.

Mr. HORN. There are clearly researchable problems associated with vaccination programs and policy. Of course, there have been several problems over the years. First of all, because it wasn't possible to regulate the vaccine production industry to the level necessary, occasionally there were batches of vaccine prepared, so-called killed virus vaccines in which not all virus particles were "killed". Therefore, you could get an outbreak actually caused by vaccination, which is unacceptable in a disease that is as contagious as Foot and Mouth Disease.

Senator ALLARD. Exactly.

Mr. HORN. Second, the purposes of international trade, there have been tremendous barriers to the export and import of food from livestock or livestock themselves if a country had Foot and Mouth Disease and you couldn't tell the difference between a vaccinated animal and an exposed animal. That has changed. We have developed technology now where one can, in fact, tell the difference between the two. We did that at Plum Island.

Third, we are taking new approaches to vaccination and vaccine development. There are two promising candidates, but unfortunately neither is on the shelf today. One is a peptide vaccine and the other is made of genes taken out of the Foot and Mouth Disease virus and put into a human adeno virus.

Once these go through the proper clearances, they may be the answer because they are not the full Foot and Mouth Disease virus.

Senator ALLARD. There is just enough shared anti-genicity there that cross over?

Mr. HORN. Exactly. Our sense is that this technology is probably, under the best of circumstances, two to five years away. Excuse me. The adeno virus is the one that is probably two to five years away. The synthetic peptide, it may be possible to clear that much more quickly. We can make a synthetic peptide vaccine. In fact, these are in production right now on Long Island, and they are sold in other countries. Taiwan in particular. Taiwan had a big outbreak recently, and is consuming a tremendous amount of that synthetic peptide product.

That would simply be a process of clearing the product here, running some animal tests to provide data, to show efficacy, sensitivity and specificity, and clearing the facility that would produce it for us. So, we are working on that as well.

Then the other aspect of work that I think is extremely important is rapid diagnostics. As you may know, if you have followed this issue, it took three weeks for the British to realize that they had this disease. Great Britain has a wonderful veterinary service.

It took almost six weeks in Taiwan for them to know they had the disease, and they probably have the best vet service in Asia. Hog cholera in the Netherlands—six weeks, and so forth.

So, rapid diagnostic kits are essential. We are working on that. We hope to field test soon in the U.K. a detection test that shows in 40 minutes or so whether or not the virus is present and it is very, very specific.

So, we think these are going to be important parts of the overall strategy.

Senator ALLARD. Now, help me with your background. Are you a veterinarian?

Mr. HORN. No sir, I am an animal nutritionist and biochemist.

Senator ALLARD. OK. Now, let me move on then to the other. What is being done on research on Spongiform Encephalopathies? You know, these are the kind of diseases that have lesions like Mad Cow Disease. The media is using Mad Cow Disease-like, which I think is making everybody think that all these species of animals get Mad Cow Disease. But these are all Spongiform Encephalopathies. What kind of research are you doing on that?

Mr. HORN. It is clearly misunderstood. We have two in particular that we are concerned about in this country, Chronic Wasting Disease in deer and elk and Scrapie in sheep. We are doing work on these diseases at the National Animal Disease Center in Ames, Iowa and in our Blood-borne Disease Program at Pullman, Washington.

We are working primarily on two aspects of that problem. One is trying to find diagnostic tools that can be used in live animals. That is not easy, but we have developed an inner eyelid test for Scrapie with sheep that appears to work. One normally goes after lymphatic tissue to test for the prion that is presumed to cause these diseases. The inner eyelid test is quite good with regard to identifying the presence or absence of the prion.

We are also looking for this in blood. There is some promise to this approach, although it is still very much at an experimental level in blood.

There is no BSE in America. I think it is very important to say that. That includes in our research program. We have not worked on Mad Cow Disease in the United States because it is important to be able to say we don't have it here.

What we have decided to do, because of the urgency of this and the spread of it in Europe, is to start a new Mad Cow Disease or BSE research program. We are going to do it at the outset in two ways with the full support of the livestock industry. One is to add our talent and expertise to the efforts underway in other countries that have it.

We would presumably put American scientists in laboratories in Britain and perhaps in Canada. They don't have it in Canada, but they have studied some of the tissue samples in Canada.

Then, disabled, dead materials could be brought to the United States and subjected to research programs, probably on Plum Island. But these would be things that were inactivated and not carrying the agent.

Senator ALLARD. So, even on to Plum Island, you would be bringing in inactivated material, then. That is the plan.

Mr. HORN. That is the plan, because the perception of having absolutely no BSE in the United States is so important to the livestock industry. BSE inactivated, of course, could be handled anywhere. It could be handled at Ames or whatever. But it is wonderful to be able to say, "We don't have any BSE agent in the United States."

Incidentally, in terms of the international animal health community, Plum Island is outside the continental United States.

Senator ALLARD. I didn't know that.

Mr. HORN. Yes. It is a very important concept. It is the only place in America where we can do Foot and Mouth Disease work.

Senator ALLARD. Because technically it is outside the United States.

Mr. HORN. That is correct under the International office of Epizootics.

Senator ALLARD. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much, Senator Allard.

Let me ask a question on behalf of Senator Stabenow, who had to go to another hearing. She is concerned about Bovine TB, an issue in Michigan. Can you give us any information as to your work in that area?

Mr. HORN. Well, we are aware of this as well. Of course, it is a big problem in Michigan, a relatively virulent and antibiotic-resistant strain of tuberculosis has broken out in the deer population. There is a possibility of having it re-established in the livestock population.

Particularly it has occurred in Michigan, but there are other States as well. We are cooperating with the State University System and the Animal and Plant Health Inspection Service to evaluate the potential of controlling this disease in livestock, should it occur in livestock, and in wildlife.

In the last five years we have actually found this new TB in 12 counties in the northern part of the Lower Peninsula of Michigan. It would appear that about five percent of the wild deer are identified as TB-positive. It can also be found in other creatures that interact with the deer, coyotes, raccoons, fox, bear, feral cats, bobcats and a few beef cattle. We have had ten beef cattle test positive and two dairy cattle herds in northern Michigan.

So, turberculosis in this wildlife reservoir is extremely problematic for us and it threatens the modified—accredited status of Michigan.

What our research is going to do, and it, too, is conducted, incidentally, Senator Harkin, at the National Animal Disease Center in Ames, is lead to more sensitive and specific diagnostic tools for TB and a new set of strategies that might be more applicable to our life.

The CHAIRMAN. Thank you.

Senator Harkin, do you have further questions of this panel?

Senator HARKIN. We thank both of you for your testimony and for your extensive testimony and for your extensive questions and answers and dialog with us. We appreciate your own achievements. We look forward to visiting again soon.

Mr. HORN. Thank you very much.

Ms. HEFFERAN. Thank you.

The CHAIRMAN. The chair would like to call now a panel composed of:

Mr. Jon Caspers, board member of the National Coalition for Food and Agricultural Research and vice president of the National Pork Producers Council in Swaledale, Iowa;

Mr. Jay Lemmermen, chair of the Animal Agriculture Coalition and Director of Quality Assurance, Southeast Milk, Inc., of Ocala, Florida;

Dr. Richard Stuckey, executive vice president, Council for Agricultural Science and Technology, Ames, Iowa;

Dr. Phil Robertson, member, committee on an evaluation of the U.S. Department of Agriculture National Research Initiative Competitive Grants Program. He is from the National Research Council of the National Academy of Sciences and a Professor of Crop and Soil Sciences at Michigan State University, Hickory Corners, Michigan;

Dr. Fred Kirschenmann, director of the Leopold Center for Sustainable Agriculture in Ames, Iowa.

I want to call upon the distinguished Ranking Member, Senator Harkin, because three of this panel are in fact from his native State of Iowa. I suspect he wants to make a comment about that.

Senator HARKIN. Thank you, Mr. Chairman. I just wanted to welcome them. Jon Caspers is a very well known, very prominent pork producer. He is vice president of the National Pork Producers Council and has been very much involved in leading this new group, this Council for Agricultural Research to try to get the funding doubled over five years.

Dr. Stuckey has been executive vice president for CAST, as we call it, in Ames, Iowa. He has a broad domestic and international background in agricultural research. He is a recognized expert in plant pathology. CAST has been an indispensable resource over the years to many of us on this committee and in this room.

Dr. Fred Kirschenmann was recently appointed director of the Leopold Center for Sustainable Agriculture in Ames, Iowa. The Leopold Center is at the forefront of research into environmental and economically sound agricultural practices. Dr. Kirschenmann has been a leader in this movement for sustainable agriculture for a long time. He is a recent import to Iowa from the Dakotas and we are glad to have him there.

So, thank you very much, Mr. Chairman, for having my fellow Iowans here.

The CHAIRMAN. Thank you very much, Senator Harkin. I would like to call upon each of you to summarize your testimony in five minutes, if possible. All of your testimony will be made a part of the record in full.

We will proceed with questions and answers after hearing from all five of you.

First of all, Mr. Caspers.

**STATEMENT OF JON CASPERS, BOARD MEMBER, NATIONAL COALITION FOR FOOD AND AGRICULTURAL RESEARCH AND VICE PRESIDENT, NATIONAL PORK PRODUCERS COUNCIL, SWALEDALE, IOWA**

Mr. CASPERS. Thank you. Thank you, Mr. Chairman, for inviting the National Coalition for Food and Agricultural Research to testify at this important hearing on food and agriculture research.

I am Jon Caspers, a pork producer from Iowa, a member of the board of directors of the National Coalition for Agricultural Research and Vice President of the National Pork Producers Council.

Our Coalition looks forward to working with this committee as we seek to double Federal investments in food and agricultural research over the next five years.

I need not remind this distinguished committee that the food and agriculture sector faces many immediate issues, and yes, even crises every day. Safeguarding our borders against the introduction of the devastating BSE and Foot and Mouth Diseases, low farm incomes and consumer concerns about biotechnology are some of the urgent issues.

We believe the best long-term strategy for preventing these problems and capitalizing on the opportunities is increased support of food and agriculture research and education.

To paraphrase the old adage, "An ounce of prevention is worth a pound of cure." We believe a dollar of funds invested in research now will pay back $8 or more dollars in public benefits in the future.

Research based on technological advances such as the ability to produce higher yielding crops in animals with improved human nutritional qualities have allowed for a more abundant, safe, efficient and environmentally friendly food supply, improved human health and well-being, and yes, longer lives and lower health costs.

We want to thank the Chairman and other members of this committee for supporting programs and funding that have helped make these accomplishments possible. Yet, despite the best efforts of this committee, and the world-renowned success of U.S. food and agricultural research, Federal funding has not kept pace with inflation.

In real terms we now spend less on food and agricultural research than we did in 1978. We believe this is statistic suggestion that Federal support could be as much as a quarter century behind.

Today we spend only one dollar of Federal food and agricultural research in the USDA for each $500 consumers spend on food and fiber. Concern that this less than optimal investment in food and agricultural research will unintentionally restrict our nation's competitiveness, living standard and general economic growth and development, a new coalition has been formed, the National Coalition for Food and Agricultural Research. National CFAR is a broad-based stakeholder coalition of food, agriculture, nutrition, conservation and natural resource organizations.

Our mission is to double Federal funding of food, nutrition, agricultural, natural resource and fiber research, extension and education programs during the next five years. This is to be net additional funding on a continuing basis that will complement, not com-

pete with or displace the existing portfolio of Federal programs of research in education.

Our ultimate goal is not budgetary but the many benefits that will accrue to each American that a doubling of funding will bring about.

Currently, National CFAR has over 60 members broadly representing all phases of food and agriculture sectors. Our members include major national organizations such as the National Corn Growers Association, National Council of Farmer Cooperatives, American Dietetic Association, National Pork Producers Council, American Soybean Association, National Cotton Council, American Crop Protection Association, U.S. Rice Producers Association, Institute of Food Technologists, Wildlife Management Institute, American Farm Bureau, Ducks Unlimited and the Forest Land Owners Association.

We want to stress the continuing need to build the capacity to do quality research and education including human resources, infrastructure support, formula funds and core programs. It is important to maintain a balanced portfolio of Federal research and education programs including competitive grants, formula funds and intramural programs.

Major areas of research that have been identified by our members and related coalitions that are in need of additional funding include food security, safety, fortification, enrichment and allergens; nutrition and public health, production quantity and quality; nutrient adequacy; global competitiveness; and new market opportunities. Environmental stewardship and resource conservation and the scientific basis for public policies relating to the environment, plants and animals.

Increasing knowledge, skills and expertise, emergency preparedness for emerging plant and animal diseases and bio-terrorism; product pioneering for food, nutrition, biomaterials and bio-fuels; genetic resources, genetic knowledge and biotechnology, rural community economic vitality and education and outreach to producers, processors and consumers, including food safety, sound nutrition, conservation and management.

In conclusion, Mr. Chairman and distinguished Members, our new and growing coalition of a broad-based cross-section of stakeholders in food and agricultural research recommends that Federal investments in food and agricultural research be doubled over the next five years.

This would definitely benefit the American consumer in multiple ways. It would benefit producers and consumers of all commodities in all States and it would contribute to the United States being the best fed country with the lowest share of income spent on food. It would strengthen our competitiveness in the global marketplace while achieving the proper balance of human and environment needs.

It would enable producers to produce safer and healthier foods and it would find new uses for agricultural products and enhance the protection of our national resources.

Thank you, Mr. Chairman. This concludes my statement. I will be pleased to answer any questions at a time you see fit.

The CHAIRMAN. Thank you very much, Mr. Casper.

[The prepared statement of Mr. Caspers can be found in the appendix on page 70.]

The CHAIRMAN. Mr. Lemmermen.

**STATEMENT OF JAY LEMMERMEN, CHAIR, ANIMAL AG COALITION AND DIRECTOR OF QUALITY ASSURANCE, SOUTHEAST MILK, INC. OCALA, FLORIDA**

Mr. LEMMERMEN. Thank you, Mr. Chairman.

I am Jay Lemmermen. I am Chair of the Animal Agriculture Coalition and Director of Quality Assurance for Southeast Milk in Ocala, Florida.

The Ag Coalition is a coalition of livestock, poultry and aquaculture trade associations, the veterinarian and scientific communities that monitors and influences animal health, environment, food safety, research and education issues. AAC appreciates the opportunity to present to you and the Senate Agriculture Committee our priority items for the research, extension, and education title of the Farm bill.

Now in the prepared statement, the value of animal agriculture and the challenges facing animal agriculture and the importance and economic value of ag research is fully listed in detail. So, I would like to skip over those and just present the highlights of our priorities.

One, AAC sees the critical need for increased funding for ARS and CSREES research. As noted in the statement, this research provides the tools for APHIS which needs to protect our animal industries from both accidental and intentional introduction.

We are grateful for the 9.7 percent and 4 percent increases that ARS and CSREES received in fiscal year 2001. But these increases must be at least maintained lest they get eaten up by inflation and mandatory pay raises.

NRI needs to be funded at the full amount requested by the administration. Last year it was decreased by 10.9 percent from the previous year. It was actually 29 percent less than what was requested by the administration.

NRI is where the basic targeted research is done. It provides new diagnostics and prevention-based biologics. Right now, a critical need in this area is for an injectable euthanasia agent for Foot and Mouth Disease. Right now the agent they are using in the U.K. is useful only as an IV product requiring tight restraint of the animals which is both dangerous for the people who handle them and hard to do and time-consuming. They are getting behind just euthanizing the animals.

No. 2, facilities, adequate places to safely conduct research on large animals and dangerous biologic agents is a must. Therefore, AAC strongly supports the ARS–APHIS master plan for $440 million to rebuild the NADC, NVSL, and CVB Labs in the Ames, Iowa area.

Plum Island, New York is also in need of adequate funding, not just to repair and maintain, but to modernize and come into compliance. We need BL–4 capability there to work on large animals. We rely on Canada and Australia to work on the adena virus on swine. We can't even do it in our own country.

Three, FAIR 2002 guidelines for animal health emergency management systems. The AAC members participated actively in the food-animal integrated research conclaves and fully support the concept of coordinating research priorities of ARS and CSREES along the FAIR 2002 guidelines.

Members of the coalition also participated in the safeguarding review at APHIS and through these exercises recognized the need for an emergency management system for animal health.

The monitoring and surveillance portion is dependent again upon the quality of diagnostic tools provided through ARS and CSREES research.

Prevention is the key. The initial price of $500 million or more for these items that we have listed is a large sum of money. But compare that to the devastation suffered by Taiwan when Foot and Mouth Disease destroyed their swine industry or BSE and Foot and Mouth Disease in U.K. As the Chairman has noted, it is over $1 billion already and the damage is far from total.

To restate AAC's priorities, No. 1, increase funding for research. We are also a member of John's coalition for doubling agriculture research.

No. 2, proper facilities to do the research,

No. 3, coordinating the planning along specific guidelines to get the most research for the dollar spent with an eye on preventing the kind of animal industry disasters we have seen recently around the globe.

Speaking for the AAC, I would like to again thank you for the opportunity to share our thoughts with you as you prepare for the 2002 Farm bill.

Thank you.

The CHAIRMAN. Thank you very much, Mr. Lemmermen.

[The prepared statement of Mr. Lemmermen can be found in the appendix on page 75.]

The CHAIRMAN. I want to acknowledge the presence of Senator Conrad, who has joined us and who would like to make a comment about one of our witnesses. We will hear from that witness and then proceed back into the order.

Senator CONRAD. Thank you very much, Mr. Chairman. I thank the Ranking Member. Well, thank you for holding this series of hearings. I apologize, because of my Budget Committee responsibility I have not been as faithful an attendee as I have been in the past, but we are getting to the end of that process.

Mr. Chairman, I did want a chance to introduce one of our witnesses here this morning, Fred Kirschenmann, who is from North Dakota and someone we are very proud of in North Dakota.

Are you trying to take credit for him in Iowa? Well, that is what happens, you know, when you are a good person and have an outstanding reputation, everybody tries to take credit for you. But Fred lives in North Dakota.

He is the director of the Leopold Center for Sustainable Agriculture in Ames, Iowa. That is where Iowa gets in on claiming Fred. But he also runs the Kirschenmann Farms in Windsor, North Dakota. That is a certified organic farm, a 3500-acre farm that is really, I think, one of the show places of North Dakota.

Fred is a national leader in the organic movement. He has been on many boards and commissions. I will just mention it would to the Members here. Fred has just completed a 5-year term on USDA's National Organic Standards Board and he has been a member of the board of the Henry Wallace Institute for Alternative Agriculture since 1974. In 1997, he was its president.

We just couldn't have a better witness, one that carries more credibility than Fred Kirschenmann.

We put on an event every year in North Dakota that we call "marketplace." It attracts about 5,000 people. Fred has been a participant in that, has taught classes there. It is a joy to see him here as a witness. Again, I want to thank the Chairman and Ranking Member for permitting me this opportunity.

The CHAIRMAN. Thank you, Senator Conrad, for your testimony about our witness.

Dr. Kirschenmann, would you proceed.

**STATEMENT OF FRED KIRSCHENMANN, DIRECTOR, LEOPOLD CENTER FOR SUSTAINABLE AGRICULTURE, AMES, IOWA**

Dr. KIRSCHENMANN. Thank you very much. I was deeply honored to be invited. Now, I feel especially honored.

Thank you, Senator Conrad, for your kind comments. Thank you, Chairman Lugar. I have long been an admirer of your work and I am very pleased to be here this morning.

In my adoptive State of Iowa, we recall Senator Harkin with deep affection, so it is especially a pleasure to be here this morning with all three of you here.

As has been indicated, I am a farmer, first and foremost. I have taken an off-farm job to support my farming habit, as of November last year. So, I am now deeply involved in the research agenda at the Leopold Center.

It is very gratifying to hear the comments about support for agriculture research because as a farmer, I recognize the vital importance of our ongoing research agenda.

On the other hand, I think, again as a farmer, we have to simply recognize that our research has not done the job in terms of our farming community. The statistics simply don't look very promising right now.

Over half of our farm income now comes from direct government payments. Costs of production exceed the market price for most of our commodities.

There are now more farmers over age 65 than under age 35 in this country and we now have more prisoners than farmers. My friends ask me whether that means we have too many prisoners and not enough farmers and maybe it means both.

The farmer side of that equation, of course, is inflated because as everyone here knows, we still count everybody as a farmer that produces at least $1,000 gross income.

Our environment problems persist. In some cases they have gotten worse. Our rural communities are in a state of decline. Most States have an extremely narrow crop and income base. We have some serious problems facing us.

I think one of the things which I want to urge us to do is to think about redirecting at least a small portion of our research dollars so

that we can begin to change some of that picture which I have just described. Otherwise, we may indeed have an agriculture in this country without farmers.

Our suggestion is that we really look at three interrelated initiatives as we think about our agriculture agenda for the future. Incidentally, all of these initiatives have now been demonstrated in terms of field experience that they are effective.

The first initiative which I would like to suggest is that we take more seriously looking for solutions to agricultural problems from our natural capital, in other words, the ecological kinds of solutions. There is much evidence that indicates that these are successful approaches.

The reason that they are beneficial for farmers is that farmers can begin to achieve their production goals without as many costly inputs. It is the costly inputs which in many cases, while it may increase yield, does not increase their net income.

Of course, net income for the farmer is one of the crucial factors.

There is a recent report, which was reported in the New Scientist Magazine, a study just released entitled "Reducing Food Poverty with Sustainable Agriculture, a Summary of New Evidence." The report was put together by Jules Pretty and Rachael Hine, who are with the Center for Environment and Society at the University of Essex in Great Britain.

It is interesting. They looked at 208 cases from 52 countries where sustainable agricultural practices have been put in place. What they discovered was an overall 40 to 100 percent increase in yield by using these technologies compared to previous technologies.

The way they did it was by better use of natural capital, through introduction of new regenerative elements and through new and local appropriate crop varieties and animal breeds. It was an excellent example of this kind of research, which also appeared in Science Magazine last fall.

The study actually appeared in Nature Magazine and was reported in Science Magazine where in China they took two varieties of rice that had been locally adapted and companion-planted them. They had an 18 percent overall increase in yield and a dramatic reduction in inputs for diseases control because the varieties were adapted to those local conditions.

So, my question is how many of those kinds of solutions are currently unknown to farmers because we haven't devoted very much of our research to those kinds of solutions.

The second and third solutions that I won't have time to go into are in the marketplace. We think there are many opportunities in the marketplace, but as long as farmers are going to only produce commodities which are essentially raw materials, there really isn't much hope for increasing their income. We have to find new markets that add value to those commodities so that there is a greater return into the farm sector of agriculture.

Then, finally, our farm policies. We think that the kind of research that the Sustainable Agriculture Research Education Program has been doing in past years, which is clearly a showcase of success in agricultural research in this country, the idea is being copied in much of our other research and policies that would sup-

port that kind of research more as well as policies that would reward farmers for doing the right thing.

Certainly, Senator Harkin's legislation entitled the "Conservation Security Act" is a prime example of that kind of research. So thank you very much.

The CHAIRMAN. Thank you very much, Doctor.

[The prepared statement of Dr. Kirschenmann can be found in the appendix on page 83.]

The CHAIRMAN. Dr. Stuckey.

**STATEMENT OF RICHARD E. STUCKEY, EXECUTIVE VICE PRESIDENT OF CAST, THE COUNCIL FOR AGRICULTURAL SCIENCE AND TECHNOLOGY**

Dr. STUCKEY. I am Richard E. Stuckey, executive vice president of CAST, the council for Agricultural Science and Technology. I am pleased to testify on behalf of CAST. CAST represents 37 professional scientific and engineering societies whose individual members exceed 180,000 scientists.

Our mission is to bring science to public policy decisionmaking. The members of CAST represent a broad spectrum of the food and agricultural sciences including rural sociology, animal science, plant science, plant protection sciences, agricultural engineering, food technology, nutrition, toxicology, veterinary medicine and many other related disciplines.

Although CAST is comprised of the various disciplines I have mentioned, today I have been asked to focus on the plant science research needs. Others on this panel have addressed animal and other discipline needs.

There are two points I would like to make. First, there is a need for significantly increased investment in agricultural research extension and education.

Second, the earth has limited natural resources. With the United States budget surplus, why not invest in the science that has helped contribute to that surplus?

There was genuine excitement in the academic community when in 1989 a new program was introduced which many of you supported, called the National Research Initiative. But the authorized $500 million never materialized beyond the approximately $100 million over the past 10 years.

A healthy agricultural system provides the building blocks for human health. We are what we eat. Today's world is becoming even more complex with more issues and more challenges to face. Simply slicing the budget research pie into more pieces is not the answer. We must make the pie larger.

The examples of funding increases at NIH and NSF over the past 5 to 10 years certainly come to mind. Our goal is to protect our environment, maintain a sustainable agriculture and food system, and provide an economic return for those who labor long hours and assume financial risks. This can be improved with increased research spending.

The approach to reaching these goals is what may differ. No longer does one size, one approach, fit all. Choices are not black and white, but rather shades of gray. For some the approach would

be highly technology driven. For others, it would rely more on human capital.

I believe this diversity in approach is well illustrated in the CAST report released yesterday on vertical coordination of agriculture in farming dependent areas. More and more we find there is no one approach or single way. Rather there are multiple approaches worthy of research and educational support.

This brings me to my second point, the earth's limited natural resources. We all know that the world's population continues to grow and is projected to add another 50 percent to six plus billion during the next 30 to 50 years.

We need to conserve existing natural resources. More food will need to be produced with the land and water that we have available today. There is no more land and water to be made. The supply is finite.

Our plant research priorities should have the preservation of natural resources a primary goal. The primary mission areas of the Agricultural Research Extension and Education Reform Act of 1998 remain priority areas today.

More specific to plant research, the Coalition for Research on Plant Systems, CROPS, was organized to determine the societal needs and to develop a comprehensive coherent natural research strategy. Recommendations from the CROPS 1999 Forum were endorsed by more than 75 organizations.

The three research priorities identified were the following: One, expand the science and application of plant genomics. Two, develop practical, sustainable production management systems for the protection of the food and fiber supply of our natural resource base. Three, develop mechanisms to enhance producer profitability while minimizing risk of financial loss and ensuring food safety and security.

Invasiveness of plant and other nonnative pests and bio-security concerns are also becoming priority issues. More public research and education dollars are needed, not only for the development of new products, but also for the safety testing of these products as they come to market.

The diminished role of the public-funded agricultural research has shifted the research heavily to the private sector for which there has been some public distrust. I often wonder how the acceptance of genetic engineering may have been different if a majority of this research had been done with public rather than private funds.

In conclusion, there is a need for greatly increasing the Federal agriculture and research budgets. The need greatly outweighs our ability to select and choose the areas for where this research should be conducted. There are simply too many choices for a stable or declining budget to address.

The world today is more complex than ever before. International travel and trade bring on new dimensions, new problems and new opportunities. We are responsible for the careful nurturing of the planet so that it benefits mankind and the creatures that inhabit it, while protecting the resources for future generations.

Thank you for allowing me to share some thoughts and this testimony on behalf of the members of CAST.

The CHAIRMAN. Thank you very much, Dr. Stuckey.

[The prepared statement of Dr. Stuckey can be found in the appendix on page 91.]

The CHAIRMAN. Dr. Robertson.

**STATEMENT OF PHIL ROBERTSON, MEMBER, COMMITTEE ON AN EVALUATION OF THE U.S. DEPARTMENT OF AGRICULTURE NATIONAL RESEARCH INITIATIVE COMPETITIVE GRANTS PROGRAM, NATIONAL RESEARCH COUNCIL/NATIONAL ACADEMY OF SCIENCES, AND PROFESSOR, DEPARTMENT OF CROP AND SOIL SCIENCES, MICHIGAN STATE UNIVERSITY, HICKORY CORNERS, MICHIGAN**

Mr. ROBERTSON. Good morning, Senator Lugar and Senator Harkin. Thank you very much for the opportunity to speak today. I am Phil Robertson, Professor of Crop and Soil Sciences at the W. K. Kellogg Biological Station, Michigan State University.

I serve as a member of the National Research Council's Committee to evaluate the USDA's National Research Initiative Competitive Grants Program, known as the NRI. I am here this morning to summarize the committee's report.

As you know, the National Research Council is the operating arm of the National Academies, which includes the National Academy of Sciences, a private nonprofit society that was chartered by Congress in 1863 to advise the government on matters of science and technology.

The study that I will address today was requested and supported by the USDA. It has undergone the usual rigorous independent review by volunteer experts, internal and external to the NRC.

It is hardly necessary to describe to this committee the importance of scientific research for providing the American public a food and fiber supply that is safe, affordable, and environmental responsible.

The fundamental success of our efforts to produce food and fiber at a rate sufficient to meet the needs of a fast growing national and global marketplace cannot be reasonably questions, not can the starring role of research in this success be underestimated.

Agriculture is more than ever a knowledge-driven industry. Advances in genetics, in field crop technology, in animal health, in food storage and processing, in pest protection and forest health, advances in all stages of the production chain are driven largely by research findings.

The NRI was launched in 1992 in response to an NRC report calling for an expanded competitive grants program to address emerging basic research needs in agriculture. Enabling legislation authorized annual spending of up to $500 million on a new competitive grants program.

Annual funding has remained at or near $100 million since 1992. Since its inception, the NRI has functioned as a pilot program to support high quality research related to the nation's food, fiber and natural resources system.

In 1998, the NRC appointed a 14-member committee to assess the quality, value and other aspects of the program and to remember changes for the future. To carry out this change, the committee

gathered data, conducted surveys and interviews and solicited testimony from industry, professional societies, farm organizations, universities and agricultural experiment stations and other Federal agencies.

Throughout this process the committee found a great deal of consistency in its findings. In general, the committee found NRI to have financed high quality scientific work within Congressional guidelines. In this sense the program was judged to be a substantial success.

The committee also found, however, that the program is in danger of languishing. The program size, the size and duration of individual grants and the low overhead allowance have led to reduced application numbers, especially from scientists outside the traditional food complex.

Moreover, the committee found that traditional stakeholders in the NRI are losing confidence in the health and direction of the program.

The committee has made 16 specific recommendations to bolster and revitalize the NRI. Many of the recommendations are structural and relatively easy to address, given administrative will and Congressional approval.

I would like here to emphasize three of the most difficult but important recommendations made by the committee.

First, the committee recommends that the NRI and other competitive USDA research programs be moved to a new extramural competitive research service that would report to the Under Secretary for Research, Education and Economics.

Second, the committee recommends the establishment of a new extramural advisory board that represents NRI stakeholders and has a non-USDA chair.

These two changes would place the NRI at a level equivalent to USDA's other main research agencies. The committee believes strongly that unless extramural competitive research is given the same organizational stature as formula-funded and intramural research in USDA with its own advisory board, that it will remain difficult for the program to achieve its mission.

Third, the committee recommends that by 2005 the NRI budget be increased to a level equivalent to the $550 million recommended by the NRC in 1989, so long as recommended changes in priority setting, documentation, and organization are put into place.

The committee believes that inadequate funding of the NRI has significantly limited its potential and placed the program at risk. A substantial increase in funding will ensure a robust and high quality public research effort that can significantly transform the nation's food, fiber and natural resources system in response to critical needs in agricultural productivity, environmental health and societal well-being.

The committee also believes that after reaching this budget level that future budget growth of the NRI should be evaluated and compared with the budgets of complementary programs in NSF, NIH, and DOE.

Allow me to conclude with a reiteration of the extraordinary importance of public merit-based, peer-reviewed research in food, fiber and natural resources.

In the opinion of the committee, which included scientists and non-scientists from both industry and the public sector, past public research and current private activities cannot meet the needs that are being created by population growth, climate change and natural resource deterioration or the challenges related to food safety and nutrition and to the growing convergence of foods and medical research.

To meet these needs requires a vibrant, reinvigorated NRI that provides consistent funding for the investor-initiated, curiosity-driven research that is the backbone of the U.S. basic research enterprise.

Thanks again for the opportunity to speak this morning. I will be glad to answer any questions.

The CHAIRMAN. Thank you very much, Dr. Robertson.

[The prepared statement of Dr. Robertson can be found in the appendix on page 94.]

The CHAIRMAN. I would pick up one comment that you made in the latter part of your statement about the merit-based aspect. This has arisen at another point in our hearing in which, as I recall, Dr. Horn was queried by Senator Hutchinson that as many as 350 projects, being done at land grant colleges or various other situations, were not merit-based, but, nevertheless.

Dr. Horn, I suppose with some sense of realism, suggested they might very well be restored by the time we are through with the appropriation process.

This is sort of a normal course for our situation. You offer some illumination because when we passed the 1998 act, the $600 million, $120 million each year, the thought was that this would be merit-based. There would be peer review. These would be something well beyond the normal funds that go to keep the doors open in a lot of our research efforts in colleges around the country.

Our House colleagues did not see as much merit in that as we did. There are legitimate differences of opinion in a democracy. As a result, nothing of this occurred, zero, really, for the first year. USDA, to its credit, has tried to revive this idea administratively, with the Secretary of Agriculture intervening. Dan Glickman, last year, found a clause that gave him the ability to go out and award 86 grants. There were 1,000 competitors.

So, the political situation is in a nutshell in this predicament, on the one hand perennially. Gentlemen such as you come before us and point out the benefits of cutting edge research, thinking outside the box, and new ways and peer-based and merit-based and all the rest of it.

But in the practical politics, as Senators look after their constituents and Members of the House likewise, sometimes this happens more or less. I would hope still that we would persist. I think there is value in what you have to say. Many of you have underlined this in various other ways.

I want to spend my time on questions and on some comments that appear on Dr. Kirschenmann's testimony because he touched upon this briefly as he had to summarize.

But essentially he says, and I quote, "The brutal truth is that if all we expect from agriculture is that it produce sufficient quan-

tities of food and fiber as efficiently as possible on a global scale, then we should get out of the farming business altogether."

He points out essentially, as I think almost anybody involved in farming would, that at least currently the return on investment from most farming operations in this country, and I presume that may be true around the world, is very low. This is sort of a dim secret that never quite bubbles up in these situations.

Just for the sake of argument, in the Farm Bureau meetings around Indiana, I point out that for my own farm, in the 45 years that I have had responsibility and by the best accounting that I have, has had roughly a four percent return on invested capital.

Many farmers say, "Well, that is far too high."

But other people looking at this who are not farmers would say, "What has been going through your mind for 45 years, with Treasury Bonds regularly, 30 percent bonds at 6, 7, or 8 percent? You know, we can see why you might indulge this for a while, but why have you persistently maintained this for 45 years at this low rate of return?"

Others would just simply say they want to know how we got the four percent. I am not really sure how that has worked out.

This is why we start each of our Farm bill debates with a business which essentially is not making very much money. Then we proceed through the processors who come before us.

We have a big argument about concentration, whether it is the stockyards or the food processors or the people who are do retail. Indeed they are concentrating because many of them are not making very much money, either.

But the Wall Street people come and say the whole industry, whether you start from the producer all the way from the time it passes out of the supermarket, is a low return business. If you were to advise clients in America who have venture capital, which have substantial amounts of capital, this would not be the place that they would put it.

So, I am intrigued by the testimony that Dr. Kirschemann is giving because he is saying essentially we have to not only market the corn, but market the farm. There are a good number of things that may need to happen.

Now, many people to stay alive on farms discovered this a long time ago, all sorts of alternative systems of income quite apart from the in-town job, but they were doing things creatively on their farms that resulted in greater income.

The question then, obviously, is how do you couple this with our reverence for the soil, for the ecology, the heritage we have? That is a very difficult situation, too, although not impossible, given the interest in conservation, not only of this committee, but of this country.

Along this combination of conservation and research, not long go after we had testimony from the local conservation people as part of the hearing, Senator Harkin, I give him credit, wanted to concentrate on conservation early on to get this started and I agree with that. I think it is a very important thing.

But I found that on my own farm, the local conservation person, now given the software that they have been able to produce, they

have coupled together all the soil surveys and as a matter of fact, all the data that they have, really, from the State of Indiana.

They can put overlays on a screen in front of you that show you what they would predict for an average year of the yield of corn literally acre by acre on the 604 acres that I have. They will show some places that I would never have thought of planting corn or soybeans or whatever else it is that you have a mind to do.

They can show what kind of retention there will be of moisture in any of these soils, what are thoroughly inapplicable for septic tank systems if you ever should think about putting housing there and a whole raft of things, just one revelation after another. All of this is available through USDA, through the Conservation Service now, through extraordinary research efforts.

This is a different kind of research in a way. It is a data collection, but it is also imaginative so that farmers such as myself or those who are helping me, can make better decisions in terms of conservation, production, maximization in terms of inputs or not inputs at all, if that were to be the decision, in ways that I could not have conceived that we would have these options even 15 years ago, maybe even five years ago.

All of this strikes me as tremendously important, if the four percent return is ever going to be something else. If we are ever to have debates on the Farm bill that are something other than a perpetual recession and how you either revive those who survive or keep a few more alive.

So, the need for research to tackle this holistic situation just seems to me to be imperative. That doesn't take away for a moment how we might make the yield of corn triple.

People like Dr. Borlaug who I cited earlier on would say that is probably necessary if the world is to be fed in 2050, hard as it may be to distribute the corn, given all the political circumstances and governments that intervene and distribution systems even within countries. But at least basically, tripling of yield has been a goal in USDA and has been achieved, say, from the 30's until the present.

Can it be achieved again is really a big question or should it be achieved? Can you stretch the wee plant that further. As has been suggested, we think about crops that we don't think about very often that are still to be discovered as commercially viable and valuable. That may be the more promising situation, but one that really stretches even beyond the energy debate we were having earlier, how you make that transition.

So, I appreciate the work that all of you have done in your testimony. I have read each of the papers. They are a composite, really, of very good guidelines of what in public policy we ought to be doing.

I just take this opportunity to sort of monologue on the problems that we face in total in this committee in trying to help the income of farmers as well as the heritage, as I say, conservation-wise and try to be prepared, really, for a day in which maybe we got the export thing straightened out in which the politics of world trade are more propitious.

Dr. Kirschenmann, since I zeroed in on your paper, do you have any comment on this?

Mr. KIRSCHENMANN. Well, I think your assessment that we really need to start looking at these things from a holistic perspective is exactly on target. The reason I made the comment in the paper about getting out of the farming business altogether, of course, that is not original with me.

Stephen Blank at the University of California suggested that in his book, "The End of Agriculture and the American Portfolio." A lot of people got mad at him for that. I personally applauded him because I think we really need to take that seriously.

You know, if all we expect of farmers is to produce raw materials for our food and fiber system, the brutal truth is that farmers in other parts of the world who have cheaper land prices and cheaper labor prices can do that more cheaply than we can. So, he is simply saying, "Let us face that fact."

Now, I think the piece that he doesn't tell us about is that farmers really do produce a whole lot more than the raw materials for food and fiber. They are major players in protecting our environment. With the right policies and the right resources, they could be more important players. They play an important role in keeping our rural communities vibrant.

So, I think that a debate which we need to have is whether or not the citizens of this country want simply the raw materials or whether they want some of the other public goods that farmers are in a position to provide. The answer to that question seems to me to be critical in terms of the future of agricultural policy.

I believe and in terms of citizens that I have talked to, that they do want these other public goods from farmers. That plays in to part of the market and my comment about marketing the farm instead of farming the market. We have a lot of things to market through our farms.

Most of the studies, the Hartman Report and others indicate that 30 percent of the consuming public today and that percentage is increasing would like to buy a food story with their food. They would like to know the farmer that produced the hogs or the corn. They would like to know the processor who processed it. They would like to know that there was good environmental stewardship. They would like to know that the animals were treated properly.

They are doing a much better job of this kind of marketing the farm where there are computer scanners in the store and you can pick your package of pork chops off the shelf and run it through this computer scanner and it will bring up the picture of the family that produced the hogs, where it was processed, how it was handled, all the way right down to the supermarket. So, the story is right there.

I think there are tremendous opportunities here, particularly for our mid-sized farmers which are the ones who are the most vulnerable now. According to the 1997 statistics, we have only 575,000 of those farms left. They are the ones that are the most vulnerable, because they are not big enough to get access to the major commodity markets and they are too big to do the direct marketing which has been the avenue that the smaller farmers have been taking. We have seen some increase in numbers now of those smaller farms.

So, I think here is a marketing opportunity. With a little bit of research and the right kind of policies that sort of put them on a level playing field and some imaginative work at the Leopold Center we intend to zero in on that and see if we can't do a hopefully successful demonstration in Iowa of how this could be done and create some new markets for these farms.

So, I think your assessment of that, looking at the whole system, is exactly what we need to do.

The CHAIRMAN. Doctor, parenthetically, I have mentioned that on Thursday the committee will hold a hearing. This is only a very small part of this problem. But we are trying to think about the potential markets to farmers for CO2 sequestration or no-till policies or the various items that are coming along, that are big concepts.

How do you work out the markets so there can be some buyers and sellers? We had testimony at one conservation hearing from the State of Michigan that they have a website now in which people on the farm who are, say, doing no till or various other practices, are in a position to sell to industrials in Michigan who have some problems right now with regard to waterways.

These credits, an actual transfer can occur. They plan to go on line with actual trading of this, which means income for the farmers who are doing the selling. This is, as I say, only a very small part of the forest, but it can become a much larger one as our negotiations continue throughout the world with regard to clean air and clean water.

Senator Harkin.

Senator HARKIN. Thank you, Mr. Chairman. It has been a fascinating discussion. I have listened intently. I am sorry that I have to leave. In fact, I have to go talk to a group about conservation.

I think, just picking up on what you just said, that a lot of times we look for the big fix and we look for something that has a universal application, whether it is in our commodity programs or whatever.

Maybe we ought to be thinking about a lot of small fixes that go to make up the big fix, rather than a big fix that you try to impose on everyone.

Yes, there are a lot of things out there. If you do one small thing, you say, well, everybody can't do that. I understand that but if you have a lot of different things out there, I think maybe that is what I think our challenge is in research.

It seems to me we have a couple of components. We have the basic research which is just "why." A lot of people ask "why." That is basic research. We have to do a lot of basic research and focus more on basic research.

Then there is the directed research; how? How do you do these things? What is the end goal you want to seek and how do you get to this end goal and more of the things that you were just talking about there, I think, Dr. Kirschenmann?

So, I think we have to look at both of these, both the basic research and some of the directed research in trying to accomplish certain societal goals that we may want. I am not certain that

there has ever really been a consensus here on what those goals out to be.

We all wax eloquently about the need for healthy rural environments, family farms, viable communities with good schools and hospitals and things like that. But then, it seems like the policies we have had in the last 30 or 40 years have made us go just in the opposite direction.

Just take for example the capitalization of land values. We had two good hearings in Iowa this weekend, Mr. Chairman. Some of the testimony from Iowa State, Mr. Duffy and Neal Harrel, talking about how our farm programs really have elevated the capitalization costs of land, and we can't just pull the plug now.

You have that all locked in so what do we do? How do we get young people who may want to do some agriculture? Maybe they don't want a farm, 3,000 or 4,000 acres of land. But they would like to do something and have a good life style and perhaps find a niche market that is out there that would provide them a good income. But there is no way they can do it with the capital cost of land right now.

So, somehow, we have to try to figure out how we address that, too. I don't have the answer. I sure have the questions, but I don't have the answers to this.

So, in other words, it was a good discussion. Dr. Kirschenmann, I look forward to working with you in Iowa at the Leopold Center on this.

Basically, I think one of the things we have to start looking at, and I will just make this last pitch, we have to look upon conservation as a commodity. Conservation should be a commodity and it should be treated as something that a farmer produces, producing conservation. But I won't get into that.

I just want to ask one question going back to what I said earlier. I was at the Ames Lab again this weekend, as I said earlier. I want to ask Mr. Caspers and Mr. Lemmermen of the various commodity and animal health groups, what is your position regarding the need to modernize the Ames ARS and APHIS facilities? Do they meet international accreditation standards and how do you feel about it?

I read your testimony, Mr. Lemmermen, and you mentioned it specifically. I just wondered how the two of you feel about how fast we have to proceed on this. Mr. Caspers.

Mr. CASPERS. Thank you, Senator. Certainly I am familiar with that project and very aware of the need, certainly because it is in my backyard, literally, but also because of the industry and my involvement with pork production.

That is a perfect example, I believe, of a facility that we need to improve the basic infrastructure for research and support for agricultural industry. But our coalition certainly cites the need to build that infrastructure around the country. That is one example of something that is desperately needed, I believe.

Certainly in other industries there are other needs also. We would like to see more emphasis and more funding put toward building that infrastructure to support research needs for ag.

Senator HARKIN. Thank you very much, Mr. Caspers.

Mr. Lemmermen.

Mr. LEMMERMEN. Well, Senator Harkin, our policy, I don't know we have a direct policy, but any time we could have had it done before yesterday would be great. When it was first proposed we were looking at $380 million. Two years later we are $440 million. By the time it is done it may be over $1 billion to get it done.

So, any time we get it done prior to yesterday is great. We need this type of facility. It supports our Yones Programs in dairy. It supported the pseudo-Rabies in swine. There are a number of things that it does and it does well because of the ability to cross-disciplinary lines with APHIS and ARS being right there together and doing these things.

One thing we have to remember that as we pass regulations, part of the thing that has hurt Plus Island and Ames is regulations were passed for, say, animal welfare. Where they used to have five animals in a pen, now you have a certain number of square feet, so there is only room for one animal in that pen.

Well, now you have to build five times the size of the facility and the money is not there to do it. I mean the regulations came alone without the money. This has put us behind. As Congress looks at regulations, they need to bring the cart along with the horse.

True, animal welfare is important. We need to take care of those animals. But we also need to take care of the industry and bring the money along to modernize the facilities so we can still do the work that needs to be done.

Thank you, sir.

Senator HARKIN. Thank you, Dr. Lemmermen.

The CHAIRMAN. Thank you, Senator Harkin.

Gentlemen, we thank you very much for coming today and offering such important testimony. Your response has been appreciated. Thank you very much.

The Chair would like to call right now a panel composed of Dr. David Chicoine, chair of the National Association of State Universities and Land Grant Colleges Board on Agriculture and Dean of the College of Agriculture, Consumer, and Environmental Sciences, University of Illinois at Urbana, Illinois.

Dr. Bobby Phills, chair of the 1890 Legislative Committee and Dean and director of Land Grant Programs, College of Engineering Sciences, Technology and Agriculture, Florida A&M University in Tallahassee, Florida.

Dr. Vic Lechtenberg, chair of the National Agricultural Research, Extension, Education and Economics Advisory Board and Dean of Agriculture, Purdue University, West Lafayette, Indiana.

Gentlemen, it is a privilege to have you with our committee this morning. As I mentioned earlier, we will ask you to summarize your testimony if possible in five minutes. Your statements will be made a part of the record in full and we will proceed with questions and answers at that point.

For those of you who are trying to gauge your time or for others who may be watching this on closed circuit television and want to come in, we will try to conclude the hearing about noon, when I understand a vote will occur on the Campaign Finance Reform Bill, an amendment being considered even as we speak on the floor.

Doctor, would you please proceed.

**STATEMENT OF DAVID CHICOINE, CHAIR, NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND GRANT COLLEGES BOARD ON AGRICULTURE, AND DEAN, COLLEGE OF AGRICULTURAL, CONSUMER, AND ENVIRONMENTAL SCIENCES, UNIVERSITY OF ILLINOIS, URBANA, ILLINOIS**

Dr. CHICOINE. Thank you, Senator Lugar. Thank you for the invitation to testify today. I am David Chicoine and I am Dean of the College of Agricultural, Consumer and Environmental Sciences at the University of Illinois and I do serve as the chair of the board on Agriculture of the National Association of State Universities and Land Grant Colleges.

Dr. Phills will speak on behalf of the historically Black institutions. I understand that the tribal colleges and the U.S. territories will be submitting testimony for the record.

We support addressing specific issues and needs of these institutions. I commend you for your support for research, extension and education that is supporting the U.S. food, agriculture and natural resource system. A special note of appreciation for the establishment and support of the initiative for future agriculture and food systems, IFAFS.

We recommend the expansion and further refinement of these programs in the reauthorization of the Farm bill. As we have heard from testimony here today and previously, there is widespread recognition of the need to increase investments in agricultural science and education.

The Board appreciates and commends the broad spectrum of interest groups that have come together to form the National Coalition for Food and Agriculture Research, the National CFAR. We support their recommendations and that of their membership for a doubling in funding for agricultural research, extension and education in five years.

To address the critical issues of the new century, we believe a strong science and education system is essential to effectively deal with all of the policy issues in the next Farm bill.

In my written testimony, we provide a number of specific examples of how the research, extension and education system can be better harnessed and coupled with the action agencies of the USDA to address all of the issues facing this committee.

This includes better support for farmers and ranchers, building international trade and market opportunities, conserving natural resources, better nutrition and health including food safety and revitalizing rural economies and their communities.

Let me comment briefly about each of these.

Better research and education support for farmers and ranchers, for example, for using the enhanced and new management tools made available by the new Farm bill have the greatest impact will be essential.

In building international trade and market opportunities, science and education are the drivers for new technologies. New technologies provide the foundation for new economic opportunities and value added activities that yield profits and positive trade balances.

Publicly funded research and development has provided the U.S. a global competitive advantage. It is essential to enhance this advantage because future growth will be in international markets.

On conserving natural resources, continuing to improve the stewardship of natural resources and the environment is a very critical issue. USDA and U.S. EPA are focused on a new approach emphasizing results-based outcomes, rather than regulating practices. Under this new approach, we can collaborate with USDA and RCS and the National Association of Conservation Districts to provide needed cutting edge research and education and outreach programs.

For nutrition and health, we believe using the knowledge system can improve this nation's nutritional programs. An example is the Family Nutrition Program, FNP, where extension staff educate food stamp program participants.

Universities can partner with USDA on enhanced nutritional research to improve understanding of consumers' behavior. Through improved diets and better nutrition, health can be improved.

Revitalizing our rural communities is essential. But little is really known about the success of various strategies to encourage long-term growth and development in rural economies and their communities.

Universities and land grant colleges are well positioned to help rural economies and their communities develop strategies and programs based on good science, sound research, and using effective extension programs to address their futures.

Research on and education programs about possible new economic opportunities based on natural resources, bio-energy and biomaterials development and new business structures for value added agriculture are needed.

New models of collaboration between university, Federal laboratories and the private sector are needed to ensure that results of advanced discovery research are commercialized into new products and activities creating jobs, businesses and economic growth.

For research, extension and education, we support the intent of Congress to facilitate greater cooperation between research and extension and between States.

We support the intent of Congress to enrich meaningful stakeholder development and recommend the reauthorization of the National Agricultural Research, Extension, and Education Advisory Board.

We endorse and recommend the continued authorization of a balanced portfolio of funding mechanisms, making it possible to address long-term needs and short-term issues. Funding from both mandated and discretionary accounts is recommended.

In summary, we are interested in tightly linking the research, extension and education system to the critical policy issues addressed throughout the Farm bill.

We believe that the increased investments in research, extension and education being called for can most effectively address challenges and add value by linking the knowledge system tightly with agencies in USDA.

By doing so the Federal agency and State and land grant universities can, as partners, better serve agriculture and rural communities.

We look forward to working with the committee and your staff on details for these recommendations.

Thank you very much.

The CHAIRMAN. Thank you, Dr. Chicoine.

[The prepared statement of Dr. Chicoine can be found in the appendix on page 98.]

The CHAIRMAN. Dr. Phills.

**STATEMENT OF BOBBY PHILLS, CHAIR OF THE 1890 LEGISLATIVE COMMITTEE AND DEAN AND DIRECTOR OF LAND GRANT PROGRAMS, COLLEGE OF ENGINEERING SCIENCES, TECHNOLOGY AND AGRICULTURE, FLORIDA A&M UNIVERSITY, TALLAHASSEE, FLORIDA**

Dr. PHILLS. Mr. Chairman and Members of the Committee, I would like to thank you for the opportunity to testify on behalf of the 1890 Land Grant Universities.

I am Bobby R. Phills, Dean and director of Land Grant Programs, for the College of Engineering Sciences, Technology and Agriculture, at Florida A&M University. I also serve as the chair of the 1890 Legislative Committee.

I would like to begin my testimony by associating myself with the testimony and remarks of my colleague, Dr. David Chicoine, who serves as the chair of the NASULGC Board on Agriculture.

There are three key issues that I would like to address. One is the critical need for increased investments. Two is equitable access. Three is appropriate funding mechanisms.

I am heartened by the recent calls to double the investment in agriculture research, extension and education. As we support critically needed investments in agriculture research, extension and teaching, it is essential that the specific funding needs facing the 1890 community also be addressed.

Chief among these is the establishment of an 1890 Land Grant Endowment Fund. The 1890's are Land Grant Universities. We did not receive funding benefits from the distribution of Federal lands, as did our colleagues in the 1862s.

Through the years the 1890 universities have struggled with inadequate funding resources to meet the especially challenging needs of the underserved communities. The proposed endowment account could be utilized to help address historical inequities of resources and to allow 1890 institutions the opportunity to build our capacity to effectively compete for other funding resources.

In the 1998 Agriculture Research, Extension and Education Reform Act, a 50 percent State matching requirement was established for the 1890's. Since passage of this act, we have made significant headway in securing State matching funds for our programs.

We are now recommending increasing the State matching requirement to 100 percent. We request that this matching requirement be ramped up over the current requirement of 50 percent with an increase of 10 percent per year over the course of five years.

We recognize that it will be harder for some of our 1890 universities to meet this matching requirement than others. We therefore ask that the Congress provide the Secretary of Agriculture greater flexibility in waiving an institution's matching requirement in response to the petition from the university.

We also recommend the reauthorization of the following 1890 programs: The 1890 Capacity Building Grant Program with a provision to include 1890 extension as an eligible participant. The 1890 Facilities Program, recognizing that quality academic, research and outreach programs demand that we have quality facilities for training and research exploration.

The Socially Disadvantaged Program for small and limited resource farmers, Section 2501 and the Base Formula Program for Research and Extension.

We further recommend that the minimum funding level or floor for both of these base programs, research and extension, be raised from 15 and 6 percent to 25 and 15 percent, respectively.

In addition to our needs for increased funding, the 1890's need equitable access to existing funding sources so as to become fully active participants in the Federal/State land grant partnership.

Currently, the 1890 universities are not eligible for formula funds targeted to forestry issues of the McIntyre-Stennis Program. Many of our institutions are located in States where forestry is a major agricultural industry. These institutions have forestry and natural resource programs that are germane to the forestry industry.

We recommend an expansion of authorizing funding for McIntyre-Stennis and increasing eligible participants to include the 1890 universities.

We welcome the return of West Virginia State College to the ranks of 1890 land grant institutions. We recognize the need for West Virginia State to retain the base funding that was used to reestablish them. We agree that they should be eligible to participate in those programs in which the 1890 land grant institutions and Tuskegee University are eligible.

We would hope that additional resources are made available to all of the 1890 land grants and Tuskegee, such that West Virginia State's participation does not put an additional and unintended burden on their colleagues.

We would like to commend the leadership of the USDA CSREES and the land grant community for the development of the new IFAFS Competitive Grants Program. The departmental staff and others went the extra mile to make sure that our institutions were fully aware of the new program and gave us the opportunity to compete as equal partners in this process.

We have achieved some success. However, with enhanced support to increase our competitiveness, we will do even better in the future.

While we support competitive grants, we are concerned that some mistake the term "competitive" with the term "quality." The Competitive Grants Program does provide a form of quality control for awarding funds for relatively short-term projects. However, many of the programs that we provide need to be sustained over time.

Short-term competitively awarded projects do not adequately serve the longer-term needs of the underserved populations that we work with. Formula funds and endowment funds provide the necessary sustained funding that is required to truly build capacity.

Again, I would like to thank the committee for the opportunity to testify here today. We look forward to working with you and our colleagues in the land grant community as we move through the reauthorization of the Farm bill.

We urge you to use this moment, this opportunity, to invest in our 1890 universities and in the future of our communities.

Thank you.

The CHAIRMAN. Thank you very much, Dr. Phills.

[The prepared statement of Dr. Phills can be found in the appendix on page 109.]

The CHAIRMAN. It is now my privilege to introduce Dr. Vic Lechtenberg. Let me have a point of personal privilege. Earlier in the day, very much earlier this morning, as many of you will recall, Senator Stabenow of Michigan you were not here at that time Dr. Lechtenberg, but she introduced Dr. Phil Robertson who was to appear on the panel before you. She noted that Michigan State University was indeed in the Final Four. She was planning to head to Minneapolis to watch all of that.

I would mention parenthetically that Purdue University has a Final Four entry with the women's team. So, we shall be excited with you about that prospect.

Dr. Lechtenberg, in addition to being Dean of Agriculture at Purdue, has been the Chairman of the Advisory Committee on Research that was mandated by the 1996 Farm Bill. He has conducted those duties. We had a recent meeting with his panel, which was very productive, I think, for many of us.

Dr. Lechtenberg.

**STATEMENT OF VIC LECHTENBERG, CHAIR OF THE NATIONAL AGRICULTURAL RESEARCH EXTENSION, EDUCATION AND ECONOMICS ADVISORY BOARD AND DEAN OF AGRICULTURE, PURDUE UNIVERSITY, WEST LAFAYETTE, INDIANA**

Dr. LECHTENBERG. Thank you, Senator. Thank you for the opportunity to talk with you for a few minutes about the activities of the National Agricultural Research Economics and Education Advisory Board.

As you know well, the Board is a statutory committee established by the FAIR Act in 1996 to help foster a successful and healthy U.S. food and agriculture system by improving USDA's research and education programs.

Then the Research Reform Act of 1998 added some additional responsibilities. I am going to talk briefly about some of the responsibilities of the Board and some of the recommendations that we have made to the Secretary.

One of the responsibilities of the Board is to try to engage in stakeholder input activities. We have, in our recommendations, tried to reflect the collective interests of stakeholders from whom we have heard around the nation.

The members on the board come to their role from 30 specific constituencies. They really all acted, I think, in a manner that truly reflects the best interests of the entire food, agriculture and natural resource system.

They have not been advocates solely for the interests of their special constituencies, but have been effective spokespersons for the entire research and education system. This, in my opinion, has really enhanced the Board's credibility and it has made it a pleasure to serve on the Board as chair. It would have been less comfortable had they not been such good statesmen.

The recommendations that I am going to talk briefly about include several. The first three are recommendations that the Board has made very recently to the Secretary of Agriculture and previously, a few months, to the Transition Teams as the new administration was coming into office.

They deal with the profile of agriculture and food system programs. As you heard from others before the committee today and I know in discussions with Dr. Borlaug and others, the population of the world has quadrupled in the 20th Century and it is really research and technology that have made it possible for the world food system to feed that population.

We think that the challenges that we face in the next 50 years as we try to cope with environmental stewardship, with global trade, with biotechnology, emerging diseases, food safety, health issues of diverse populations and so on, are challenges that are going to be at least as great as those that this world food system has faced in the last 50 years.

As we face those challenges, we are convinced that public sector research in agriculture does not appear to have the level of national priority that we think it should have, at least not if one judges it on the basis of funding levels that have been appropriated.

The Board believes clearly that it should be a high priority, and we further believe that USDA should lead the efforts, to elevate the importance of agricultural research and education on all fronts—with Federal agencies, with the Congress, and with the public.

We think that there are phenomenal opportunities for advances across the entire food and agricultural research system and that this system merits that level of priority.

We further think that USDA, with its other agencies as partners, should determine what these research priorities are going to be. If USDA is setting these priorities and helping determine the new technologies in advance, we are convinced that they are going to have greater relevance to the world of agriculture and food systems and adoption of those technologies is going to be hastened.

We made a second recommendation in terms of communications. We believe that a proactive public communications strategy is essential to inform Americans about two things: One, the important contributions that the agriculture and food system makes to our nation's economy; and two, the importance of agricultural research and technology to the underpinning of that sector of our economy.

We think that is essential to help improve and strengthen our production and market competitiveness and to help harness these new technologies for the benefit of all society.

We further think that these communications responsibilities ought to in some way be separated a bit from the day-to-day public relations duties of the office of the Communications Director and the Secretary of Agriculture's Office.

Our third recommendation in our transition statement had to deal with partnerships. The partnership among research, education, extension, and economics, and units of USDA and the land-grant universities and colleges of agriculture is known worldwide and respected. It should be strengthened.

We believe that further incentives are needed to expand multi-institutional efforts to help foster interagency cooperation and to build the strength of the 1890 and 1994 institutions.

In that context, Senator, the 2501 Program to Minority and Small Farmers, we believe to be especially important.

In addition to those three items, we talked about peer review. The Merit Review System in USDA really needs to address two critical issues: One, are the endeavors that are undertaken relevant to solving real problems? Two, is the science of high quality?

The board believes that increasingly USDA's review procedures recognize both of these components and it has already been mentioned that the Initiative for Future Agriculture and Food Systems was, in our opinion, very well managed in that regard.

Also, ARS has revamped its peer review system this past year and a half and the Advisory Board has had significant input into that process and has been working to review that approach. We believe they have done a very good job and that that system now is very credible and we want to commend them for their efforts.

Based on our stakeholder symposia, the Advisory Board has also made some specific recommendations for priority areas for research and education. You have heard some of these words. They include some things like: added value and new use products, agricultural genomics, education and information issues, emerging animal and plant issues including the emergency preparedness and response capability, environmental stewardship, food safety, human nutrition, communications and outreach. All of these, we think are vitally important.

Then in 1998, the 1998 Reform Act added an additional responsibility to the Board to review adequacy of funding. You heard some things about that already today as well. The board believes that when we have a sector that represents 15 percent of the nation's economic output, but only 2 percent of the nation's research R&D, that it is grossly underinvested in research and technology.

We strongly support the efforts of the National Coalition for Food and Agricultural Research to expand funding and to expand broad stakeholder input into the program priorities.

We have also made recommendations to the Secretary with respect to human resources. We believe that USDA is in a unique position, with the various partnerships that it has, to enhance human capital development and building and we encourage them to do everything they can in that arena.

Other agency cooperation has also been on our radar screen and we are encouraging USDA across all the REE missions as well as other mission areas to do more to work cooperatively and avoid duplication of effort.

As we think about the future and look at some targets of opportunity, we think there should be more connections between agriculture and the food, nutrition, and health arena; between agriculture and the environmental protection and ecology; biomaterials

and bio-energy offer exciting opportunities; and the preparedness and emergency issues and defenses against bio-terrorism are critical.

Structural changes are causing upheavals across many rural communities. We think there needs to be some empowerment of rural communities in terms of developing local leadership that USDA can help foster.

Advances in other fields of science and technology are critical and we would like to see some greater effort on the part of USDA to try to capture some of those possibilities and opportunities as well.

There are several features that we think are unique to agricultural research that I have outlined in my prepared comments and I would be very happy to answer any questions about those.

Mr. Chairman, this concludes my statement. I want to thank you and the committee for your support. I would also like to take this opportunity to thank all of those across the country who volunteered to serve on the Advisory Board and who have come before the panel to offer their thoughts and comments in the stakeholder symposia and you and other Members of Congress who appeared before our session last week. We thank you very much.

[The prepared statement of Mr. Lechtenberg can be found in the appendix on page 113.]

The CHAIRMAN. Thank you very much, Dr. Lechtenberg.

Dr. Phills, I note the careful thought you have given to specific ways in which the 1890 universities could be strengthened. I appreciate that. That is important information for our committee as that portion of the Farm bill is formulated.

Dr. Lechtenberg has picked up your thoughts with regard to the Section 2501 situation and the broader Advisory Committee recognized that. There appear to be very specific funding difficulties with many of the 1890 colleges.

I just simply note without more editorial comment that I appreciate your itemizing those as completely and thoughtfully as you have because that will be helpful to us.

Mr. PHILLS. Thank you, Mr. Chairman. We just want to be a full partner.

The CHAIRMAN. You have noted historically that the 1862 Morrell Act got off on a different basis than the 1890 Act. This doesn't necessarily bring about a whole set of inequalities forever, but there are differences in the basis here. We need to be cognizant of that.

Mr. PHILLS. Yes.

The CHAIRMAN. Dr. Chicoine, the 1998 Agriculture Research Bill tried to implement a process to solicit input from those who use agricultural research. I just wondered, can you give at least some anecdotal or more systematic evidence as to how that has proceeded in the colleges of which you have some knowledge?

Mr. CHICOINE. Well, at least the institutions that I have more knowledge of than others, in fact there is has been a concerted effort to reach out again aggressively not only to the organized structure within the food and agriculture sector which are commodity groups and farm organizations, but as well into the community-based systems we serve through our extension programs.

In our own State of Illinois, there has been substantial restructuring of the relationship that we have with our customer base, our stakeholders, if you will. They have formed coalitions that we interact with on a routine and frequent basis that gets beyond the sort of the typical advisory committee meetings that typically take place.

I know others across the country are changing their relationships with the people that they work with in similar ways.

The CHAIRMAN. You described those meetings more graphically. Are they out in the field? Who are the people who show up for meetings and interacting with professors such as yourself and researchers?

Mr. CHICOINE. Literally, all of the above. Essentially, they include both on-campus experiences so that in fact we can help people understand what it means to do research, both the sort of basic research, but yet research that is applied to target specific problems.

In our case, we actually have a working group structure, five working groups that are focused on particular goals that we work toward helping achieve. There are some 60 people that are involved in each of the working groups. They meet quarterly and interact about the activities that are underway, assessing how well we are progressing in those activities as well as talking about the big picture.

It is really important when we think about research and education, the understanding of the particulars that are going on in any particular project are key, but also having guidance that is in fact more strategic and global is really important for us as we think about the challenges we face and can address those challenges with research and education.

The CHAIRMAN. Are any of these meetings covered by local press? In other words, is there some greater broadcast of this important dialogue and of research generally? Do local people find it to be helpful?

Mr. CHICOINE. Well, there is really interest in having people communicate with the press about what is going on because in fact the press likes to have the localized version of what might take place within the context of a land grant university's program.

Individuals that are involved in these working groups are very active in communicating in a broad sense within their own organization as well as through the media, about what is taking place and the confidence that they have from the interaction about the progress that we are making with them in addressing some of the issues through research and education.

The CHAIRMAN. Dr. Lechtenberg, you have complimented, and I think appropriately, the members of the Advisory Commission that you have chaired. As you have mentioned, I had the privilege of meeting with them just a short time ago, again, as they came to some conclusions, at least, as we approach the Farm bill.

Should we have a similar mandate in the next Farm bill, that is, to set up such a commission. As we head down the road again, we ought to have a broadly based group of leaders in agriculture throughout the country, very diverse constituencies sort of discuss-

ing this all the way along and then helping us as we come along in the research part of it.

We had another group that took a look at the Farm bill as a whole and we have had testimony from them in a public meeting of the committee. But in this research effort, can you offer some advice, and if not today, will you subsequently, as to how we ought to approach some thoughts about the Research Advisory Group?

Dr. LECHTENBERG. Let me offer a couple and then follow-up with maybe some more thoughtful comments. One of the important elements, I think, and one of the important features that the 1996 and modifications in 1998, those two bills, started down a path that is important is in terms of stakeholder engagement and involvement.

We have had on the Advisory Board a National Stakeholder Symposium each year after the organizational year of the Board and we have used input from folks around the country to help focus recommendations on what we thought to be some key areas.

Equally important, in my view, we have regional sessions. We have had subgroups of the Board meet in each region of the country about once a year and try to get outside this area and bring in some thoughts from folks in some focused areas.

That is one of the things that I would suggest to the committee that is vitally important, to maintain some high level of pressure for the stakeholder engagement.

As I mentioned in my testimony, I believe there are two and the Board believes there are two really important elements of research review. One is the scientific quality which peer scientists are perhaps best qualified to provide. Equally important, and perhaps more important, we are making sure that the efforts in which we are engaged focus on real issues to the food, agriculture, and natural resource system.

Stakeholder engagement is critical to achieving that. I am particularly pleased as I think about and look at the way the National CFAR group is beginning to come together and be organized that it is not just an advocacy group for the funding, but it is going to be a strong stakeholder input organization as well and help provide some of the direction for priority setting that is important.

I think that is probably the most important issue that I would flag to the committee's attention, but I will give a little more thought to your question and followup.

The CHAIRMAN. Stimulated by this invitation, perhaps your colleagues can pitch in and help you.

We appreciate very much each of you coming this morning and offering your testimony. I think we have had a good hearing with regard to research.

Again, it is the beginning of our consideration of that chapter. I would invite all of you and those who have testified before, as you have second and third thoughts, to help us, because we have time to try to do a quality job in this very vital area.

Having said that, the hearing is adjourned.

[Whereupon, at 12:05 p.m. the committee was adjourned, to reconvene at the call of the Chair.]

# APPENDIX

March 27, 2001

**SENATOR TOM HARKIN, RANKING DEMOCRATIC MEMBER**
**COMMITTEE ON AGRICULTURE, NUTRITION AND FORESTRY**
**HEARING ON AGRICULTURAL RESEARCH**
**March 27, 2001**

Thank you, Mr. Chairman. It is auspicious that we are having this hearing on research early in our work on the 2002 farm bill. Agricultural research helps us chart and then build the roads that will lead to a brighter future for agriculture and for humankind around the world. Never before have we had such ability to unlock the secrets of life to help improve our food and agriculture system.

We face many challenges that agricultural research can address. The world's population continues to grow rapidly, placing a strain on a whole range of resources, from food and water, to energy, to green spaces and our natural environment. Farmers and ranchers are being asked to produce more, yet they are also seeking to protect and restore land, water, air and wildlife resources. American agriculture faces an increasingly competitive international marketplace. Biotechnology is presenting challenges that we are just beginning to understand and address. We cannot ignore these challenges or they will cost us much more in the future if not addressed.

I have a vision for a vibrant and revitalized rural America, and it begins with research. Research into a safer food supply. Research into an agricultural system that is environmentally and economically sustainable. Research that paves the way for investments in new, value-added agricultural products that will be a boon for farmers and the environment. Research that expands trade opportunities for our agricultural products abroad. Research that promotes renewable, sustainable sources for energy. Research that moves American agriculture forward.

Europe's unfortunate news about foot and mouth disease as well as BSE highlights all too vividly the huge impact that diseases can have on agriculture and people. Unfortunately, our ARS and APHIS facilities–the front lines in the fight against animal disease–have been in serious need of major modernization for a long time.

Agriculture can also play a significant role in addressing our energy crunch. Research can help to improve the technology that will lead to greater efficiency and feasibility of farm-based energy. Such developments have already lowered the cost of producing ethanol by about one-third since 1979. Soybeans and other oilseeds promise to become a major energy and industrial product source. We are poised to make a crucial breakthroughs in converting biomass into usable energy. This is research money put to good use.

Unfortunately, the level of funding for agricultural research has been inadequate, less than it was a decade ago in real dollars. I look forward to hearing from our witnesses about these and other research needs. Thank you.

**Implementation of the Agricultural Research, Extension and Education Reform Act of 1998**

**Testimony of**
**Dr. Colien Hefferan, Administrator**
**Cooperative State Research, Education and Extension Service**
**United States Department of Agriculture**

**Before the Senate Committee on Agriculture, Nutrition and Forestry**
**March 27, 2001**

Mr. Chairman. Thank you for this opportunity to appear before the Committee. My name is Colien Hefferan, and I am the Administrator of USDA's Cooperative State Research, Education and Extension Service. Today I would like to describe the steps that our agency has taken to implement the research provisions of the 1996 Federal Agriculture Improvement and Reform Act and the 1998 Agricultural Research, Extension and Education Reform Act.

Just as information technology has revolutionized the global economy, technological innovation also is sweeping across the American agriculture and food system. As scientists race to sequence plant and animal genomes, as engineers develop technologies to utilize biobased fuels, as satellites beam site-specific yield and soil fertility information into tractor cabs, and as farmers begin to market their products over the internet, food and fiber production are changing before our eyes. We know that American agriculture also is under assault from any number of disease, insect, economic and environmental threats. CSREES is the agency of USDA which engages the national university-based agricultural knowledge system to develop science-based solutions and technologies to help farmers and rural communities remain productive and profitable in the face of considerable challenges.

CSREES accomplishes its mission by supporting research, education and extension activities through peer-reviewed competitive grant programs, formula fund support at the land-grant universities, and Congressionally determined priority projects. I would like to briefly describe how each of these components fits into the continuum of the agricultural knowledge system.

- The research and extension formula fund programs provide critical support to the Agricultural Experiment Stations and the Cooperative Extension Systems at the nationwide Land-Grant University System, and leverage additional resources from state and local governments.

- The National Research Initiative (NRI) supports investigator-initiated basic and mission-focused research related to agricultural animal, plant, environmental and economic systems. The basic understanding of biological systems generated through the NRI underlies the development of future technological innovations.

- The Initiative for Future Agriculture and Food Systems and the Integrated Research, Education and Extension Program provide support for projects which combine the functions of research, education and extension activities to link research directly to on-the-ground solutions for American farmers and consumers. These programs address critical issues such as plant and animal genomics, food safety, biobased products and natural resource management.

- The Higher Education Program portfolio builds educational capacity to train and educate future food and agricultural scientists. These programs contribute to innovations in curricula, recruiting, and internationalization of teaching programs and are especially important for improving the education and extension capabilities at the historically Black, tribal and Hispanic-serving institutions.

- The Fund for Rural America provides key resources for the development of research, education and extension applications which address critical issues of rural economic development, human capacity building and market development.

- Finally, the Small Business Innovation Research Grants Program supports the development of commercially viable agricultural technologies utilizing results of agricultural research.

These programs, together with targeted, national programs such as Integrated Pest Management and the Expanded Food and Nutrition Education Program, and Congressional priority projects form a portfolio of work that translates research from the most basic of laboratory hypotheses all the way down to the dinner plate. Take the example of food safety. In fiscal year 1999 the NRI funded research into the ways that *E. coli* 0157:H7 is distributed and transferred through the environment. This work stimulated integrated research and extension projects to reduce the risk of spreading the organism which were funded in fiscal year 2000. Taking the results of this knowledge even further, in cooperation with the Food and Drug Administration, we are funding a $1.3 million national program through the Integrated Research, Education and Extension Grant Program to educate farm-workers and consumers about safe handling practices for fresh fruits and vegetables with the goal of further reducing the incidence of microbial-based illnesses.

**THE 1998 AGRICULTURAL RESEARCH, EXTENSION AND EDUCATION REFORM ACT**

Congress created CSREES in the 1994 Department of Agriculture Reorganization Act with the goal to more closely link the results of research programs with the extension of that knowledge to the public. Until the passage of the 1998 Agricultural Research Extension and Education Reform Act (AREERA) USDA had no mechanism to promote this linkage thorough its grant programs. Enactment of this legislation furthered the 1994 vision and positioned the agricultural knowledge system for the future in several important ways.

- First it provided new programs and funding for agricultural research projects which integrate research, education and extension.

- Second, it required federally funded research, education and extension efforts to focus on issues of national priority developed through consultation with the users and performers of these activities.

- Third, it required a focus on research, education and extension activities that are peer-reviewed, multi-institutional and multi-disciplinary. I would like to address each of these

issues and briefly describe what we are doing to implement them both with our partners and in the day-to-day operations of CSREES.

**NEW MULTI-FUNCTIONAL RESEARCH PROGRAMS**

One of the most significant provisions of AREERA was the creation of The Initiative for Future Agriculture and Food Systems (IFAFS) and the investment of $600 million in mandatory funding for integrated research, education and extension projects. With the support of many members of this committee, following a 1-year delay in implementation mandated through appropriations action, CSREES first requested and awarded proposals under IFAFS during fiscal year 2000. The research, education and extension community responded by submitting nearly 1000 proposals requesting nearly $1.5 billion in support. After reviewing the proposals we awarded 87 grants covering topics ranging from plant genomics and bioinformatics, the development of biobased oils and lubricants, management techniques for private forest owners and research related to diets and nutrition. The program focused on research that was cutting-edge, multi-institutional and directly linked to producer or consumer issues through extension or education programs. Included in the funded projects were the following:

- Several projects to develop biobased products such as solvents, greases and latex substitutes and projects examining more efficient methods for converting biomass to fuels.

- A consortium of Texas, Florida and California institutions to reduce the risk of microbial contamination of fresh fruits and vegetables through a combination of basic research, extension and farm-worker education.

- A consortium of the University of Tennessee and Purdue to develop natural resource management solutions for private forest owners.

- Two consortia to develop education material for producers and consumers about the

application of agricultural biotechnology. One of these was a consortium of 1890 Land-Grant Colleges and focused on delivering biotechnology applications to under-served farm communities.

CSREES is currently soliciting proposals for the FY 2001 IFAFS competition. The Initiative for Future Agriculture and Food Systems when paired with the new Integrated Research, Education and Extension Program represent a fundamental shift in how CSREES manages its program portfolio.

**NATIONAL PRIORITIES AND STAKEHOLDER CONSULTATION.**

One of the clear intents of both the 1996 research title and the 1998 Act was to make research, education and extension activities more relevant to producers and consumers and to focus these activities on national priorities. We have made significant steps in this direction although our efforts are incomplete. We, along with ARS, ERS and NASS work closely with the Congressionally mandated National Agricultural Research, Extension, Education and Economics Advisory Board which was established in the 1996 FAIR Act. This body is our first contact for taking the pulse of the stakeholder community when seeking to implement a new program or to take an existing program in a new direction. Just last week this group spent 3 days in Washington examining issues ranging from food safety to intellectual property rights.

As mandated in the 1998 legislation, CSREES has published regulations requiring land-grant universities to develop mechanisms for assessing stakeholder priorities as a condition for the receipt of formula funds. Land-grant universities also must report to the CSREES via the "Plan of Work" as to how they intend to use the formula funds to address issues of national priority. Through these new requirements, our partner institutions are now thinking more strategically about the use of Federal money to respond to national issues.

CSREES also has incorporated stakeholder input into our standard operating procedures. The very first page of every request for proposals (RFP) published by the agency includes an official request for comments on the design of future RFPs. Before implementing a new program we hold public

meetings seeking input on the best design of the programs and the topics which should be covered in the RFP. We intend to continue this activity and expand it in the coming year.

Quality and representative peer-review is the key to the operation of an excellent competitive grant program. Each CSREES peer review panel is jointly managed by USDA scientific staff and a non-government scientific subject matter expert. We constantly seek to recruit panel members who represent diverse institutions and stakeholder communities. We actively recruit panel members who are active farmers, consumer advocates, and faculty members at eligible institutions, including the 1890, Hispanic-serving and 1994 institutions. The time and effort involved in reviewing proposals and sitting on panels represent a shared burden on the agency and the communities we serve. In the end, however, the effort is well spent if the agricultural knowledge system is more responsive to the needs of the American public and the highest quality projects receive funding.

**MULTI-INSTITUTIONAL AND MULTI-DISCIPLINARY PROJECTS**

As our knowledge of genetics, water quality, insect and microbial ecology and consumer behavior have become more refined we have also realized that single disciplines can no longer adequately address the complexities of today's scientific puzzles. Nor can a single institution hope to maintain a stable of experts in all possible subject areas. The 1998 Act saw this and mandated more cooperation among institutions and scientific disciplines. The advent of instantaneous communications technologies and the internet also makes these goals more achievable.

While there has been a long-standing system of institutional cooperation through the Hatch Regional Research Program, land-grant universities receiving formula funds must now account for regional, multi-institutional, and integrated activities in both research and extension formula funded programs. This mandate strengthens the institutions' commitment to cooperation across State and scientific lines, thereby increasing the return-of-investment for every Federal dollar spent on these activities. And as I mentioned above, institutions also are successfully responding to our new grant programs which call for multi-institutional and multi-disciplinary projects.

The agency has again incorporated these goals into its standard operating procedures. We also are operating in a multi-institutional mode. We have strong collaborations with the National Science Foundation (NSF) in the area of genomics research. Our scientific staff meets regularly with NSF staff to set joint program goals and to ensure that our genomics programs are complimentary. Just last December the two agencies, along with the Department of Energy announced the completion of the jointly supported Arabadopsis Genome Sequencing Program and we are nearing completion of the joint rice sequencing project as well. CSREES and NSF have just announced a joint IFAFS program, to support the rapidly expanding field of microbial genomics.

In cooperation with the National Aeronautics and Space Agency (NASA), IFAFS will fund projects to help producers adopt geospacial and precision technologies. We work jointly with USDA's Risk Management Agency to deliver risk management education to producers across the country. We work closely with the Food and Drug Administration and the Agricultural Research Service to set priorities for food safety research and to deliver public education. Finally we are working with National Institute for Standards and Technology and the Environmental Protection Agency to develop standards for assessing the environmental benefits of biobased products. These collaborations allow USDA to leverage the resources of other agencies to address issues of concern to agriculture through the multi-disciplinary capacity of America's universities. The Congressional support of the NRI and IFAFS has been crucial to the development and the success of these collaborations.

**FUTURE DIRECTIONS**

Clearly the impacts of the 1996 and 1998 Acts have yet to be fully felt, but it is clear that in the past 2 years a fundamental shift in the direction of agricultural research, education and extension has occurred. The system is on an excellent footing to confront the challenges that lie ahead. As we look to the future, however, there are some critical needs to address. As the medical, computer and other high-tech fields lure students and researchers to those disciplines, agriculture needs to develop the programs and resources necessary to attract the best minds to attack growing problems like invasive diseases, soil salinity, and food safety. We need to learn to make the link between

agricultural and medical research and education more explicit. We need to have mechanisms that allow the research system to respond quickly when confronted with a new challenge which requires a scientific solution or a new educational program. On a functional level, we need to rationalize the eligibility requirements, and other operating procedures of our competitive programs in order to enhance the opportunities for inter-agency collaborations.

We have an agricultural knowledge system in the United States that is second to none in terms of investment and productivity. We are ready to work with this Committee during the creation of the next farm bill to ensure that this system is fully engaged to address the entire range of production, trade, environmental and rural development issues facing the American food and fiber production system.

**STATEMENT OF DR. FLOYD P. HORN**
**ADMINISTRATOR, AGRICULTURAL RESEARCH SERVICE**
**U.S. DEPARTMENT OF AGRICULTURE**
**BEFORE THE**
**UNITED STATES SENATE COMMITTEE**
**ON**
**AGRICULTURE, NUTRITION, AND FORESTRY**
**MARCH 27, 2001**

Mr. Chairman and Members of the Committee, on behalf of the Agricultural Research Service (ARS), I am pleased to be here today to talk about what ARS is doing for American agriculture and how our agency responded to the directives in the 1996 Farm Bill (1) and the 1998 Research Title (2).

As the Department of Agriculture's in-house research agency, ARS conducts research to solve problems of a high national priority. We also provide objective scientific expertise for U.S. Department of Agriculture (USDA) regulatory and action agencies. Our science fuels USDA agencies like APHIS, FSIS, NRCS, and GIPSA as they work to create responsible policy and carry out their missions effectively. ARS also serves a number of other Federal agencies such as the Food and Drug Administration, the Environmental Protection Agency, and some components within the Department of Defense, and the Department of the Interior.

ARS maintains a balanced program of fundamental and applied research that is long-term and high risk and therefore not cost-effective for the private sector. ARS research emphasizes solving agricultural problems that are national or regional in scope and in the best interests of the Nation as a whole. And, while private sector investment in agricultural research has outpaced public investment, economic analyses have shown that public research has a greater impact.

ARS carries out its mission with a network of highly skilled workforce of scientists, engineers, technicians, and support people who can respond quickly to emerging urgent problems. ARS has the unique ability to form interdisciplinary research teams from a diverse scientific workforce with geographical and discipline expertise. Not only do we carry out and support excellent relevant science but we are also charged with providing information access and technology dissemination of the results of our research to the people who need it--American farmers, producers, consumers and other stakeholders. Agricultural research also helps America compete in the global marketplace not only by keeping our prices competitive but also by improving quality and meeting consumer demands in niche markets.

The ARS program budget for FY 2001 is $896.8 million. We have a total of 8,136 full time

1 Federal Agriculture Improvement and Reform Act of 1996 (P.L. 104-127)
2 Agricultural Research, Extension, and Education Reform Act of 1998 (P.L. 105-185)

employees, including 2,000 PhD level career scientists. We are particularly proud of the fact that only 7-8% of the ARS workforce is in administrative or program management positions–we focus most of our resources on the science itself. ARS scientists operate from more than 100 strategic locations nation-wide and from five locations overseas. These locations reflect the diverse agricultural regions throughout the U.S. and key areas of global importance to American agriculture.

What does this public investment in agricultural research and infrastructure buy for the American taxpayer? As any economist will tell you, increased productivity is the key to a growing and thriving economy and American agriculture has enjoyed a remarkable rise in productivity during the past sixty years. For example, in 1940, one U.S. farmer fed 19 people. Today one U.S. farmer can feed 129 people. This increase in productivity is, in no small way, due to agricultural research and 75-percent of the growth in American agricultural productivity is accounted for by public investment in agricultural research and development (R&D) and infrastructure.

Americans are getting high returns on their investment in agricultural research. Farmers benefit from agricultural research in the short run through lower production costs and higher profits. However, consumers benefit in the long run in terms of lower food prices and a safer food supply. This impacts lower income Americans more significantly since they spend a greater portion of their income on food. Most studies have found rates of return on the public investment in agricultural research to be between 20-60 percent(3). And while private research expenditures have increased significantly during the past thirty years, public expenditures have slowed. In contrast, the demands of our agricultural research system have grown beyond increasing productivity and reducing costs. ARS is tasked with solving broad technical agricultural problems to ensure an abundant safe food supply; to sustain a viable and competitive food and agricultural economy; and to maintain a quality environmental and natural resource base.

In recent months, two major threats to maintaining a safe and reliable food supply have appeared in the form of Foot and Mouth Disease (FMD) and Bovine Spongiform Encephalitis (BSE). ARS has extensive research experience and ongoing research programs on both FMD and transmissible spongiform encephalopathies (TSEs). BSE is a form of TSE.

Current ARS research on TSEs includes: a research program in conjunction with the USDA-Animal and Plant Health Inspection Service (APHIS), academia, and the animal industry which is resulting in a new live-animal and post-slaughter assays for scrapie and Chronic Wasting Disease (CWD) as well as documenting the potential CWD transmission from wild ruminants to livestock. Both scrapie and CWD are found in the U.S.

ARS has the capacity to expand its TSE research to complement ongoing research in the United Kingdom and European Union. While the FY 2002 Department budget will not be sent to

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3 Ahearn, Mary, et al., "Agricultural Productivity in the United States,," USDA Economic Research Service, January 1998, p. 10.

Congress until early April, the Administration's Budget Blueprint indicated there would be recommendations for strengthening plant and animal disease programs. Without going into specifics, I can say that there will be proposals for ARS to work on BSE research.

Since the 1950's, all FMD research in the United States has been conducted at the Plum Island Animal Disease Center (PIADC), located on an island 2 miles from the eastern tip of Long Island, New York. This high-level biocontainment facility is designed for the study of livestock diseases exotic to the United States.

During the past year, ARS scientists have completed important research concerning how FMD is spread. ARS scientists showed that FMD spread by direct contact between infected pigs far more effectively than by aerosol, allowing APHIS to prioritize its strategy for disease control. Additionally, ARS scientists developed an important new vaccine candidate that will not confuse diagnostic tests for FMD, and ARS is working on diagnostic tests to differentiate animals vaccinated with existing vaccines from naturally infected animals.

The 1996 Farm Bill set a new direction for American agriculture by beginning the process of phasing out farm subsidy payments based on production levels and introducing free market disciplines. The effect of this legislation and the 1998 Research Title was to heighten the importance of agricultural research as one form of a safety net beneath producers and ranchers. To help ensure a strong safety net, the two bills updated and expanded the purposes of agricultural research and lifted the bar higher than ever before regarding priority setting and validation of our research programs.

Mr. Chairman, at this time I would like to tell the Committee how ARS addressed the eight expanded purposes in P.L. 104-127 and how we implemented the priority setting, and relevance and merit sections of P.L. 105-185. Other provisions in these two bills impact ARS but these are the authorities requiring new or improved direction.

To fully integrate the tenets of the agricultural research purposes into the Agency's processes, ARS incorporated them into its strategic plan, which is the basis of our budget development and response to the Government and Performance Results Act. More importantly, the program structure of the agency was reorganized into 22 national programs that link the purposes with the agency's objectives and ultimately our accomplishments. The following are a few examples of our research and accomplishments as they relate to the eight purposes in the 1996 Farm Bill:

*"Enhance the competitiveness of the United States agriculture and food industry in an increasingly competitive world environment."*
ARS research has been instrumental in many areas at reducing trade barriers. A notable example is the development of a Pest Risk Assessment (PRA) system developed for wheat dwarf bunt fungus by ARS and industry researchers. This risk assessment system resulted in a 57-page report used by U.S. trade officials during negotiations with China to ease restrictions on U.S. wheat imports. The negotiations centered on China's concern that accepting grain with dwarf bunt fungus could spread the fungus to their domestic wheat crops. The fungus, Tilletia

controversa Kuhn (TCK), sporadically infects winter wheat crops in the Pacific Northwest, but poses no human health risk. Under certain conditions, it damages the wheat kernel. With the pest risk assessments, our trade negotiators were able to present compelling scientific evidence showing TCK poses a negligible risk to China's domestic wheat crop from U.S. grain imports. The PRAs have also proved invaluable in similar negotiations with India, Brazil and Mexico.

As part of the agreement signed with the United States on April 10, 1999, China eased its zero-tolerance policy. According to USDA estimates, that opened the door to $150 million worth of possible U.S. wheat exports.

The PRAs draw on more than 10 years of laboratory and field research on TCK's genetic variability, geographic distribution, spore growth, virulence and survival under various crop-production practices and grain handling regimens.

During the past three years ARS scientists played a pivotal role in fighting and winning a major victory for American agriculture. Our scientists took an active part in devising the legal strategy used to prove the U.S. case against Japan in the first ever suit over quarantine issues at the World Trade Organization.

ARS scientists testified for the U.S. and provided scientific data confirming that ARS-developed procedures to prevent codling moths from hitchhiking to Japan on American apples, cherries, nectarines and walnuts regardless of the specific variety. ARS research helped open up previously closed markets, in Japan and other countries, representing millions of dollars to the American agricultural industry.

Critical research that is competitiveness-related is the work our scientists are doing to find alternatives for methyl bromide. Methyl Bromide is a tremendously valuable chemical having both pre and post harvest uses as a pesticide and herbicide. However, it contributes to the depletion of the earth's ozone layer with potentially significant environmental consequences worldwide.

Through international agreements, the U.S. is scheduled to ban the production and importation of methyl bromide on January 1, 2005, so the race to find alternatives is an agricultural imperative. Currently, ARS research on methyl bromide includes evaluating potential alternatives and the development of a trapping and recycling system that may allow the continued use of methyl bromide. This research has tremendous potential for growers, processors and packers.

Another significant achievement has been the modernization of sulfur dioxide fumigation technology used to control a form of fungal root rot in table grapes. Through efforts in collaboration with the University of California, this research will help growers maintain the quality of grapes and help increase their marketability in a competitive $700 million dollar industry.

*"Develop new uses and new products for agricultural commodities, such as alternative fuels,*

*and develop new crops."*
USDA and the Department of Energy developed joint Bioenergy Initiatives for fiscal years (FY) 2001 and 2002 and have worked together to develop technologies and processes to increase the use of biobased fuels. This improved interagency coordination is a result of an initiative launched by former President Clinton in 1999 and Chairman Lugar's bill, the Biomass Research and Development Act of 2000

ARS research is focusing on the development of industrial and bioenergy products that offer an opportunity to meet environmental needs, replace exports and petroleum-based products, and expand market opportunities.

Another area addresses the development of advanced materials and manufacturing technologies in the conversion of plant and animal products to biobased plastics, biofuels, soy ink, fiber products, biopesticides, and ingredients for lubricants, specialty chemicals, paint, and health care industries.

Enhanced production, harvesting, and handling of crops that are feedstocks for production of biofuels is also an area of ARS research.

More rapid production of environmentally friendly ethanol at less cost.

Separation of the corn kernel and hull in the current corn milling process requires large quantities of sulfites, which can produce serious environmental and health risks. ARS scientists at the Eastern Regional Research Center in Wyndmoor, Pennsylvania and collaborators from the University of Illinois have successfully demonstrated a new corn soaking process, using enzymes to reduce or eliminate the need for sulfites. In addition to environmental and health benefits, preliminary cost estimates indicate the new process cuts steeping time in half and reduces the cost of producing fuel ethanol by several cents per gallon.

Process to convert ethanol byproducts to coatings and films.

The volume of byproducts from ethanol production exceeds the demand for use as animal feed which is a barrier to reducing the cost of fuel ethanol. These byproducts contain zein, a major corn protein that has market potential. ARS engineers at the Eastern Regional Research Center have shown by use of laboratory and computer modeling techniques that a production scale continuous process for extracting zein from ethanol byproducts is realistic and economical. This process will result in expanded use of zein for industrial coatings and films and effectively lower the cost of producing fuel ethanol.

*"Maintain an adequate, nutritious, and safe supply of food to meet human nutritional needs and requirements."*
ARS' food safety research program assesses the safety of animal and plant products and develops methods to control potential food contaminants. ARS' human nutrition research program looks to establish the relationship between diet, nutritional status, and health throughout life and the

contribution of diet to disease resistance and the reduction of disorders related to nutrition. The human nutrition program develops methods for determining food components and maintains national food composition databases. The outcomes of these efforts are a safe and nutritious food supply, and a knowledge base that enables humans to make healthful food choices.

ARS' research has found: zinc levels are predictive of mood disturbances and behavior problems in school aged children, flavonoids inhibit glucose uptake, early nutritional deficits impair learning ability, gender affects heart disease, calcium absorption and bone calcium deposition are most significant during early puberty, and conjugated linoleic acid does not have beneficial effects as previously thought.

*"Increase the long-term productivity of the United States agriculture and food industry while maintaining and enhancing the natural resource base on which rural America and the United States agricultural economy depend."*
ARS research in natural resources seeks to develop a comprehensive understanding of soil, water, and air, and their interactions with plants and animals, so that new and appropriate technology can be developed for responsible, economically viable, and environmentally sound farming systems.

ARS scientists have developed an environmental alternative to petroleum-based inks. Inks made from 100 percent soybean oil have characteristics that either meet or exceed industry standards for product functionality. The patented technology has been licensed to Franks Research Inc. of Oklahoma City. ARS is also negotiating a license with Quincy Soybean Inc. of Quincy, Illinois to provide a new industrial market for agricultural commodities. In addition to the technology's environmental benefits, 100 percent soy inks have low rub-off characteristics, compared to conventional inks. Degradability of inks made from 100 percent soy oil exceeds inks that are made using blends of soy oil and petroleum resin.

ARS' research accomplishments include: corn and barley with greater nutritional value, a method which separates solids and liquids from swine wastewater, chemicals that destroy harmful bacteria and reduce manure odors, switchgrass buffers which reduce leaching of pesticides into groundwater, polyacrylamide and riparian buffers which limit water pollution, a deer treatment device that reduces ticks which transmit lyme disease, a wetland/reservoir subirrigation system which minimizes sediment and nutrient loading of streams and rivers, and a blowing dust warning system that alerts individuals with health problems.

Another example of how ARS research benefits the environment relates to reducing the amount of phosphate generated by poultry production. High levels of phosphorous in poultry manure create an adverse environmental effect from poultry production. However, reducing nutritionally available phosphorous in the diet generally reduces production performance of broiler chickens. ARS scientists have determined that the level of phosphorous can be reduced in broiler rations when phytase is included to make the phosphorus more available. Thus, adverse effects on growth, feed efficiency or bone strength are avoided and the total amount of phosphorus excreted in the manure is reduced. This discovery will enable the poultry industry to reduce the amount of

phosphorus generated from poultry production operations, while maintaining a profitable production system.

*"Improve risk management in the United States agriculture industry."*
ARS research addresses the multifaceted risks that are inherent in the U.S. food and fiber production and processing systems. They can have economic, environmental, and human health components. The risks associated with weather extremes, such as droughts and floods; often result in serious economic losses and major environmental damage. Serious crop and animal losses can also result from temperature extremes, hail, and other weather conditions. Crop and animal producers frequently suffer severe economic losses from diseases, insects, and other pests. Our objective in this area is targeted towards minimizing and, where feasible, eliminating the impact of these risks through development of better animals and plants and improved production and processing systems.

*"Improve the safe production and processing of, and adding of value to, United States food and fiber resources using methods that maintain the balance between yield and environmental soundness."*
ARS research develops new and improved management practices, integrated pest management strategies, and integrated sustainable agricultural production systems to enhance the safety, quality, and productivity of the U.S. agricultural production and processing systems, while protecting the Nation's environment.

Development of integrated pest management (IPM) technologies and management strategies for large-area application.

ARS has implemented area-wide IPM projects in partnership with other Federal and State institutions and the private sector that have been highly successful in reducing pesticide usage. These projects include: (a) mating disruption for codling moth on tree fruits in the Pacific Northwest, which has resulted in an 80 to 100% reduction in organophosphate pesticide use; and (b) the use of attract and kill technology in the Midwest for corn rootworm that reduces populations by greater than 90 percent with less than 10 percent of the chemicals used in current corn rootworm control regimes. The success of these projects have attracted national and international attention because they point the way toward overcoming barriers to applying IPM practices over very large agricultural areas.

New model systems for controlling soil and water erosion.

ARS scientists have developed erosion prediction models, including the Revised Universal Soil Loss Equation (RUSLE), the Revised Wind Erosion Equation (RWEQ), and the Water Erosion Prediction project (WEPP), that will help reduce soil erosion in the United States and elsewhere. Soil erosion lowers the productivity of our agricultural lands and creates water quality problems. These erosion prediction models are being used on a national scale by the Natural Resources Conservation Service to help farmers and land use planners select land management practices that minimize soil losses by wind and water.

*Conduct "agricultural research . . . to promote economic opportunity in rural communities and to meet the increasing demand for information and technology transfer throughout the United States agriculture industry."*
ARS integrates basic long-term research and targeted short-term research to develop new technologies, practices, and production enterprises that increase profits, enhance the farm ecosystem, and develop small-scale processing technologies to create value-added products from agricultural commodities. In addition, ARS has improved access to research information, targeted information dissemination, and transfers technology more effectively, as well as enhanced exchange of problem-solving information with domestic and international research organizations. While the introductory focus of our goal in this area is expanding economic opportunities, ARS interprets the information and technology transfer provisions to apply across the board to all areas of agricultural research.

*"Support higher education in agriculture to give the next generation of Americans the knowledge, technology, and applications necessary to enhance the competitiveness of United States agriculture."*
ARS has a limited role to play in directly supporting higher education. The agency provides training opportunities for graduate and postdoctoral students, enabling them to gain valuable knowledge and experience. Some of these scientists are eventually hired as full-time employees where they serve to maintain and enhance the agency's core scientific capabilities. Most go on to serve U.S. agriculture in other Federal, State, and local agencies, private industry, or academia.

ARS, through the programs and services of the National Agricultural Library, provides access to information for institutions of higher education, their faculties, researchers, and students. In addition, ARS supports public information, outreach, extension, and educational activities.

Mr. Chairman and Members of the Committee, the message was very clear in the 1998 Research Title that Congress expected rigorous peer review of federally funded research and that research priorities should be established with input from our customers, stakeholders, and partners. Indeed, at its first research title hearing in March 1996, Representative Wayne Allard, Chairman of the House Agriculture Subcommittee on Resource Conservation, Research and Forestry and now Senator Allard who serves on this committee, said that improving accountability through the establishment of a coordinated advisory and priority setting mechanism was probably the most important objective of the hearings.

In response to the mandate for external input in the establishing research priorities, ARS has conducted more than 40 national program workshops, held in locations all over the country. The workshops brought scientists and national program staffers together with our customers–over 3000 of them. Particularly important to us was talking to producers directly. These workshops featured hundreds of growers and ranchers, who discussed with our scientists the problems and needs they face on the farm or ranch. Together we worked to understand the information or tools that will help them succeed. Representatives from all our customer groups were represented at the workshops, including federal and state partners of ARS, industry groups and businesses, non-

governmental organizations, and university researchers. A special effort is made to invite small and disadvantaged producers to these gatherings. We are proud of our workshops - the feedback has been overwhelmingly positive.

After the workshops, our scientists develop *action plans* for each national program designed to solve the problems or fill the needs of our customers. These national workshops are not only helping us to be more responsive to our customers, they are increasing coordination and cooperation across our one hundred locations and our varied scientific disciplines, bringing a more integrated approach to bear on problems of a high national priority. In this way, we strive to meet the needs of the people who use our research directly, targeting our coordinated and cooperative efforts at the problems of our customers.

The 1998 Research Title also directed the Secretary to establish procedures to ensure scientific peer review of all research activities conducted by the Department. The statute requires a review panel to verify, at least once every five years, that each USDA research activity has scientific merit and relevance.

In response, ARS established the Office of Scientific Quality Review in 1999 to manage the agency's research project peer review system. The Office includes a senior scientist called the Scientific Officer who selects a Panel Chair for each six-member panel to review about 20 ARS projects. The Panel Chair and majority of panel reviewers must be non-ARS scientists. Ultimately, each of the approximately 1,100 research projects will be reviewed at least once every five years by a panel comprised of independent and objective subject matter experts who base their evaluations on stringent criteria and relevance to the mission and objectives in ARS' 22 National Programs.

To date, panel review sessions have been held for projects in four of our National Programs, where the majority of our projects are found to require only minor revisions. And I would add that ARS has worked very closely with the National Agricultural Research, Extension, Education, and Economics Advisory Board regarding the establishment and progress of our peer review system.

I want to thank the Committee again for the opportunity to be here today. I hope my testimony conveys the message that the Agricultural Research Service takes great pride in its many achievements on behalf of American agriculture and the American public. With your support we will continue to ensure that America remains a land of plenty--a land with a growing and thriving agricultural economy, abundant in natural resources, a land with a plentiful supply of safe and nutritious food for its people and with the greatest agricultural system in the world.

This concludes my testimony, Mr. Chairman, and I will be happy to answer any questions you or the other Members of the Committee may have regarding ARS research and implementation of our new responsibilities as directed in the 1996 and 1998 legislation.

# National C-FAR

National Coalition for Food and Agricultural Research

*Teaming Together For A Better Tomorrow*

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## Testimony by Jon Caspers On Behalf of the National Coalition for Food and Agricultural Research

## Before

## The United States Senate Committee on Agriculture, Nutrition and Forestry

## On

## March 27, 2001

Thank you, Mr. Chairman for inviting the National Coalition for Food and Agricultural Research (National C-FAR) to testify at this important hearing on food and agricultural research. I am Jon Caspers, a pork producer from Iowa, member of the Board of Directors of the National C-FAR and Vice President of the National Pork Producers Council. Our Coalition looks forward to working with this committee as we seek to **double federal investments in food and agricultural research over the next 5 years.**

**Introduction**

I need not remind this distinguished committee that the food and agriculture sector faces many immediate issues, yes, even crises this very day. Safeguarding our borders against the introduction of the devastating BSE and foot-and-mouth diseases, low farm incomes, and consumer concerns about biotechnology are some of the urgent issues that require priority attention today. What I come here to recommend may not provide a quick fix to these pressing problems, but it is what we believe to be the best long term strategy for their prevention in the future – increased support of food and agriculture research and education.

To paraphrase the old adage, an ounce of prevention is worth a pound of cure. We believe one dollar of funds invested in research now will pay back eight or more dollars of public benefits in the future. Investments in U.S. food and agricultural research and education have already paid huge dividends to the United States and the world, especially in the latter part of the 20th century. Research based technological advances, such as the ability to produce higher yielding crops and animals with improved human nutritional qualities, have allowed for a more abundant, safe, efficient and environmentally friendly food supply, improved human health and well-being, and yes, longer lives and lower health costs. New discoveries are advancing our understanding of the relationship between food and health—another rationale for investment in research. Only research can provide the answers and identify the types of changes that need to be made to effectively provide the food supply with optimal nutrition for the future.

We want to thank the Chairman and other members of this committee for supporting programs and funding that have helped make these accomplishments possible. Yet, despite the best efforts of this committee and the world-renowned success of U.S. food and agricultural research, federal funding has not kept pace with inflation. In real terms, we now spend less on food and agricultural research than we did in 1978. We believe this statistic suggests that federal support could be as much as a quarter century behind. Today we spend only $1 of federal food and agricultural research in the USDA for each $500 consumers spend on food and fiber.

Concerned that this less than optimal investment in food and agricultural research will unintentionally restrict our nation's competitiveness, living standard and general economic growth and development, a new coalition has been formed – The National Coalition for Food and Agricultural Research (National C-FAR). This testimony outlines the purpose of our coalition and summarizes major research and education needs and opportunities for the future.

**National C-FAR**

National C-FAR, is a newly organized broad-based stakeholder coalition of food, agriculture, nutrition, conservation and natural resource organizations. Our mission is to **double federal funding of food, nutrition, agricultural, natural resource, and fiber research, extension and education programs during the next five years.** This is to be net additional funding on a

continuing basis that will complement, not compete with or displace the existing portfolio of federal programs of research and education.

While our coalition is initially directing our collective efforts on securing a doubling of federal food and agricultural research funding, our ultimate goal is not budgetary, but the many benefits that will accrue to each American that a doubling of funding will bring about. We believe increased funding of food and agricultural research will result in:

- Safer, more nutritious, convenient and affordable foods
- More efficient and environmentally friendly food, fiber and forest production
- Improved water quality, land conservation and environment
- Less dependence on non-renewable sources of energy
- Expanded global markets and improved balance of trade
- More jobs and sustainable rural economic development

At National C-FAR's inaugural meeting less than two months ago on January 31, 2001, here in Washington, D.C., 100 leaders in the food, agriculture, natural resource organizations and key federal officials heard a speech by Dr. Norman Borlaug, the Nobel Peace Prize award winner, and fellow Iowan, who started the "Green Revolution." The Green Revolution expanded food and agricultural production and saved one billion people from starvation. Dr. Borlaug noted: "Few industries have been as productive and innovative as agriculture during the 20th century." Yet he cautioned, "Despite the successes of the Green Revolution, the battle to ensure food security for hundreds of millions of miserably poor people is far from won. ... Continuing research breakthroughs will be needed." Borlaug also noted "Agricultural productivity increases, made possible through research and new technology development, spared an area slightly greater than all the land in 25 states east of the Mississippi River for other uses."

Currently, National C-FAR has over 60 members, broadly representing all phases of the food and agriculture sector. Our members include major national organizations such as the National Corn Growers Association; National Council of Farmer Cooperatives; American Dietetic Association; National Pork Producers Council; American Soybean Association; National Cotton Council; American Crop Protection Association; U.S. Rice Producers Association; Institute of Food Technologists; Wildlife Management Institute; American Farm Bureau Federation, Ducks Unlimited, and Forest Landowners Association. We have held discussions with Secretary Veneman and other top officials in USDA, Deans of Agriculture, Directors of Extension, Directors of Experiment Stations, University Presidents, Congressional Members and their staffs, 1890 Land Grants, scientific and professional associations, officials at the White House, and the National Science Foundation.

The formation of our Coalition has been well received and our membership is growing. Our President Terry Wolf, a central Illinois grain and soybean producer, currently on a Grains Council mission in China, emphasizes that "National C-FAR is a nonprofit, nonpartisan, stakeholder-driven, and consensus-based coalition focused on food and agricultural research funding and priority setting." Coalition membership is open to those who support the objectives of (1) enhancing federal investments in U.S. food and agricultural research and extension and (2) expanding participation by stakeholders in funding.

National C-FAR is dedicated to fostering public confidence in food, agricultural, nutritional and natural resource research through public participation in planning and evaluating the process and impact of research activities.

**How Should the Additional Funds Be Spent?**
While National C-FAR does not have a list of research project recommendations, through our members and their association with other related coalitions, we are well aware of urgent research needs to address and opportunities to explore. Several coalitions, committees and scientific societies including the ones listed below have identified these needs and opportunities:

- Coalition for Research on Plant Systems - CROPS '99
- Food Animal Integrated Research for 2002 --FAIR 2002
- Institute of Food Technologists –Food for Health Research Needs
- Council on Food, Agricultural, and Resource Economics --Economics and Research Priorities for an Efficient and Sustainable Food System
- American Society for Nutritional Sciences
- National Agricultural Research, Extension, Education, and Economics Advisory Board
- American Dietetic Association

Members of our Research Committee have presented to our Board a compilation of these studies. While several emerging needs and opportunities have been identified, we also want to stress the continuing need to build the capacity to do quality research and education, including human resources, infrastructure support, formula funds, and core programs. It is important to maintain a balanced portfolio of federal research and education programs, including competitive grants, formula funds and intramural programs. Agriculture is a biologically based industry and many of the problems are site specific. Hence, we need to maintain a diversified research and education system. Major areas of research that have been commonly identified by most, if not all, of the related coalitions that are in need of additional funding include:

- Food security, safety, fortification, enrichment and allergens
- Nutrition and public health
- Production quantity and quality; nutrient adequacy; global competitiveness; and new market opportunities
- Environmental stewardship and resource conservation and the scientific basis for public policies relating to the environment, plants and animals
- Increasing knowledge, skills, and expertise
- Emergency preparedness for emerging plant and animal diseases and bio-terrorism
- Product pioneering for food, nutrition, biomaterials and biofuels
- Genetic resources, genetic knowledge, and biotechnology
- Rural community economic vitality
- Education and outreach to producers, processors and consumers including food safety, sound nutrition, conservation, management, and new technology

Our coalition arose from a shared mutual concern about the capacity of our agricultural research system as a whole to meet the future demands and capitalize on emerging opportunities. We will need a research system that simultaneously satisfies needs for food quality and quantity, resource

preservation, producer profitability and social acceptability. This coalition will be working on ways to help assure these needs are met.

**In conclusion, Mr. Chairman and distinguished members, our new and growing Coalition of a broad cross-section of stakeholders in food and agricultural research recommends that federal investments in food and agricultural research be doubled over the next 5 years.** This objective translates into roughly an increase of 15% per year of the research, extension and education in USDA and other federal agencies or about $500 million increase per year for 5 years. This is a small investment compared to the $1 trillion dollar size of our food and agricultural sector. However, we believe it is a strategic and wise investment that would benefit the American producer and consumer in multiple ways: 1) benefit producers and consumers of all commodities and all states; 2) contribute to US remaining the best fed country with the lowest share of income spent on food; 3) strengthen our competitiveness in the global marketplace, while achieving the proper balance with human and environment needs; 4) enable producers to produce safer, healthier foods; 5) find new uses for agricultural products; and 6) enhance the protection of our natural resources.

Thank you, Mr. Chairman. This concludes my statement and I will be pleased to answer any questions.

**Testimony of**

**Jay Lemmermen**

**Before the**

**Committee on Agriculture, Nutrition and Forestry**
**United States Senate**

**Concerning**

**The Research, Extension, and Education Title**
**Of the Farm Bill**

**Presented**

**March 27, 2001**
**Washington, DC**

**On Behalf of the Animal Agriculture Coalition**

American Feed Industry Association
American Sheep Industry Association
American Society of Animal Science
American Veterinary Medical Association
Animal Health Institute
Association of American Veterinary Medical Colleges
Federation of Animal Science Societies
Holstein Association USA, Inc.
National Aquaculture Association
National Cattlemen's Beef Association
National Chicken Council
North American Elk Breeders Association
National Milk Producers Federation
National Pork Producers Council
National Turkey Federation
U.S. Animal Health Association

Mr. Chairman, I am Jay Lemmermen, Chair of the Animal Agriculture Coalition (AAC), and the Director of Quality Assurance for Southeast Milk, Inc. in Ocala, Florida. The AAC appreciates the opportunity to present to you and the Senate Agriculture Committee our priority items for the Research, Extension and Education title of the Farm Bill.

The AAC is a coalition of livestock, poultry and aquaculture trade associations, and veterinary and scientific communities that monitors and influences animal health, environment, food safety, and research and education issues.

The AAC has four primary goals: 1) revitalizing APHIS; 2) increase animal agriculture research funding; 3) increase involvement and influence regarding international sanitary/phytosanitary standards (SPS); and 4) enhance animal agriculture product safety and quality.

**Value of U.S. Animal Agriculture**

In 1999, crop, livestock and poultry cash receipts were $190 billion, of which $100 billion can be attributed to animal agriculture. The U.S. animal agriculture industries are an extremely important part of our nation's economy, accounting for almost 24 million jobs and 13% of the gross domestic product. Total cash receipts from animal agriculture represent only a small portion of the overall value we bring to the economy. There are many sectors of the food industry rely on animal agriculture, such as suppliers, veterinarians, transporters, distributors, food processors, exporters, and restaurants.

**Challenges to U.S. Animal Agriculture**

The U.S. livestock, poultry and aquaculture industries have become very efficient in producing a safe, nutritious and high quality product at a low cost. Currently, U.S. consumers spend only 10.4% of their per capita disposable income on food, the least amount of any country.

The U.S. animal agriculture industries are under constant risk from the introduction of a foreign animal disease (FAD) that could devastate our industries and the effects ripple down the entire food chain. The increases in global trade of agriculture products and passenger travel provide greater opportunity for an introduction of a FAD.

The current outbreak of Foot-and-Mouth Disease (FMD) in the United Kingdom and other countries in the European Union and the spread of Bovine Spongiform Encephalopathy (BSE) across the European Union have reinforced the need for prevention efforts in this country. The total economic impact of the current FMD outbreak in Europe is yet to be known, but will likely amount to billions of dollars with many hundreds of thousands of animals being destroyed. The total economic impact of BSE in the U.K. is still mounting, but

currently totals $8 billion. An outbreak of Classical Swine Fever in the Netherlands in 1997 left $2.3 billion in economic damages with 8 million hogs destroyed. Also in 1997, an outbreak of FMD spread rapidly in Taiwan causing some 8 million hogs to be destroyed and $8 billion in economic losses.

U.S. animal agriculture must continue the development of new methods and technologies to provide a safe, nutritious food supply while protecting our environment. Healthy animals make safe food and we are committed to working to maintain a stable research and inspection infrastructure to protect animal agriculture.

**Importance of Agriculture Research**

The U.S. public investments in agriculture research, development and technology transfer have been cost effective in that they have guaranteed safe and wholesome food at a reasonable cost. An Economic Research Service (1999) comprehensive literature review found that studies consistently show a high rate of return (40-60%) for public investments in agriculture research and development. Further investments will continue to provide a high rate of return on investment.

Research plays an extremely positive role in enhancing livestock, poultry and aquaculture producers' opportunity for profit, while at the same time assisting them in the production of high quality, safe, and nutritious products that are desired by consumers worldwide. It has helped eradicate and control diseases, improve genetics and increase feed efficiency. In order to build on these accomplishments and be globally competitive, additional research which benefits the animal industries must be conducted and its results made readily available to producers nationwide.

The science behind animal agriculture affects America's international trade balance, our environment, our neighbors, local economies and individuals. Competitive farmers and ranchers with the right knowledge and tools can ensure that U.S. livestock, poultry, and aquaculture enterprises thrive; consumers get safe and nutritious food; and wildlife benefit from improved animal health and enhanced environmental stewardship. Food animals fare better in the care of knowledgeable producers and processors, and communities reap financial rewards from food processing industries.

Gains such as these require public investments in research and education that, in turn, fuel the creation of industries and export profits that sustain communities and rural economies across the country. Keeping that edge will require a clear vision for the future and a strategic plan for research investments to attain the next generation of innovations.

**Priorities for Animal Agriculture**

## I. Increase Funding for Agriculture Research

The U.S. must have a comprehensive nationwide biosecurity or infrastructure system to prevent the introduction of foreign animal diseases. We rely on the Animal and Plant Health Inspection Service (APHIS) to provide the veterinary infrastructure to protect and promote the animal health of the U.S. livestock, poultry and aquaculture. However, the funding for APHIS has been decreasing over the past decade. We are weakening the very infrastructure that can prevent, diagnose and respond to a disease introduction and outbreak. We cannot become complacent; these efforts need to be fully funded to protect the U.S. animal agriculture industries.

Research conducted by the Agricultural Research Service (ARS) and the Cooperative State Research, Education and Extension Service (CSREES) provide the basis for the system to protect and promote the animal agriculture industries. Research is the vital component for proper disease diagnosis and surveillance. Funding needs to be increased in ARS and CSREES to meet the needs of animal agriculture with emerging, domestic and foreign animal diseases, food safety, nutrition, environment, genomics, germplasm preservation, animal production and technology transfer.

We would like to thank the Congress for the increases that ARS and CSREES both received in research funding in Fiscal Year 2001; 9.7% and 4.0% respectively, and also for funding the Initiative for Future Agriculture and Food Systems (IFAFS). However, one important program, the National Research Initiative (NRI) in CSREES still received a 10.9% decrease. The NRI provides a wide spectrum of basic research needs and will result in future practical outcomes for U.S. agriculture and needs to be funded properly.

## II. Research and Diagnostic Facilities

Research and diagnostic facilities are a vital component to the biosecurity infrastructure, which protects animal health. Currently, we have facilities such as the APHIS and ARS facilities in Ames, Iowa and Plum Island, New York, that are in dire straits, they are in need of proper maintenance and repair or need to be rebuilt. These facilities limit the research that can be conducted and the development of new diagnostic technologies that would further protect our animal health.

The AAC supports proper funding for the ARS and APHIS Foreign Animal Disease Diagnostic Laboratory at Plum Island, New York to maintain the site as it conducts the important work of foreign animal disease research and diagnostics.

The AAC supports the proposed ARS and APHIS Master Plan for $440 million to rebuild the National Animal Disease Center (NADC), the National Veterinary Services Laboratories (NVSL) and the Center for Veterinary Biologics (CVB) laboratories in Ames, Iowa. The existing facilities are antiquated, inefficient and seriously undermine USDA's role as a world leader in animal health and diagnostics. For example, the U.S. currently does not meet the standards that we require of our trading partners, leading us to rely on foreign laboratories and foreign diagnostic procedures. This new facility is urgently needed to meet the national needs for research, diagnosis and product evaluation related to animal health in order to protect the $100 billion U.S. animal agriculture industry.

**III. Implement the Goals of FAIR 2002**

The Food Animal Integrated Research (FAIR) 2002 is the outcome of the second national conclave to establish consensus on animal agriculture research and education priorities for the 21st century. More than 250 leading veterinarians, animal scientists, farmers, ranchers, environmentalists, animal welfare proponents, commodity group representatives, government staff, rural advocates, and agribusiness and food service representatives gathered to determine the most pressing research and education needs of the animal industry.

Six goals became the foundation for FAIR 2002's research priorities and objectives, the necessary steps to ensure we raise the best quality animal products in ways that are economically competitive, environmentally friendly and socially acceptable.
They are:

- **Strengthen Global Competitiveness**
- **Enhance Human Nutrition**
- **Protect Animal Health**
- **Improve Food Safety and Public Health**
- **Ensure Environmental Quality**
- **Promote Animal Well-being**

These goals address the emerging issues and competitive gaps in a national strategy to keep the American animal industry on top. A listing of the specific objectives under each goal is attached in Appendix 1. Tomorrow's problems cannot be solved with yesterday's thinking. Success will require the continued public investment in U.S. academic institutions and government laboratories whose record of achievement is the envy of the world.

The AAC member organizations took active roles in defining the FAIR 2002 goals. The AAC is also working to develop an initiative that would increase funding for animal agriculture research and educational programs in ARS and

CSREES focused on the FAIR 2002 goals and also Animal Health Emergency Management. We ask that the FAIR 2002 goals be used for coordination and prioritization of animal research between ARS and CSREES.

**Conclusion**

Mr. Chairman, the AAC urges the Committee to strongly protect and increase the federal investment in agriculture research and education programs and facilities. This will ensure our society maintains an affordable, safe and high quality food supply, while protecting our environment and keeping our farmers and ranchers globally competitive. Making federal investments in agriculture research and facilities is investing in the future of U.S. animal agriculture.

The AAC appreciates the opportunity to share our thoughts with you on agriculture research and education as you prepare for the 2002 Farm Bill.

## Appendix 1

### FAIR 2002

### Goals and Objectives

### 1. Strengthen Global Competitiveness

**Develop the systems to keep American animal agriculture competitive in the global marketplace.**

Objectives:

- Enhance production efficiencies and economic strategies at the farm and ranch level.
- Develop innovative animal products for specialized markets and new uses to boost local economies.
- Position producers and processors of animal products to succeed in a global market.
- Help producers, policymakers and other stakeholders decide what Agriculture will look like in the 21st Century.

### 2. Enhance Human Nutrition

**Improve animal food products to help people live better, longer.**

Objectives:

- Research the contributions of meat, eggs and dairy products to healthy, balanced diets.
- Create and identify functional foods from animals.
- Determine how production and processing practices affect food quality.

### 3. Protect Animal Health

**Develop strategies and technologies to prevent, diagnose and treat animal diseases**

Objectives:

- Detect and control animal diseases that threaten the food supply
- Develop optimal production practices that promote animal health
- Improve capacity to deal with new and re-emerging animal disease threats

### 4. Improve Food Safety

**Safeguard public health and reduce the risk of food-borne disease.**

Objectives:

- Develop and demonstrate control procedures to eliminate health hazards in food production from the farm and ranch to the grocery store.
- Increase the accuracy and speed of pathogen detection systems
- Improve the effectiveness of pathogen destruction technology
- Reduce the threat of antibiotic-resistant bacteria in animals to public health

## 5. Ensure Environment Quality

**Devise animal production systems that sustain or improve the environment**

Objectives:

- Develop better scientific measures and diagnostic tools of water, soil and air quality
- Design and demonstrate production systems and management practices that reduce the adverse affects of animal agriculture
- Invent technologies that capture value from manure and processed by-products.

## 6. Promote Animal Well-being

**Enhance animal well-being throughout the food-production cycle**

Objectives:

- Develop better scientific measures to assess animal well-being including pain, stress and behavioral needs.
- Determine the impact of current and alternative production systems on animal well-being and food quality including handling, transportation and slaughter.
- Explore ethical issues in animal production and research.

**Senate Agriculture Committee Testimony**
**Frederick L. Kirschenmann**
**March 27, 2001**

Thank you for inviting me here today to comment on research needs in agriculture. My name is Fred Kirschenmann and I am a farmer from North Dakota and since November, 2000. I have been the Director of the Leopold Center for Sustainable Agriculture at Iowa State University.

**Current Situation in Agriculture**:

- Over half of farm income comes from direct government payments.
- Costs of production exceed the market price for most commodities.
- There are more farmers over the age of 65 than there are under the age of 35.
- There are more full-time prisoners than there are full-time farmers.
- Environmental problems persist and worsen.
- Rural communities are in a state of decline.
- Most states have an extremely narrow crop and income base; 92 percent of Iowa's cropland is in corn and soybeans; 89 percent of the cash sales are in just four commodities.
- Concentration plagues all sectors of agriculture; production, processing and retailing. In Iowa 50 percent of the farmers have sales less $50K, another 37 percent have sales between $50K and $250K, and the remaining 13 percent have sales over $250K

*Is this a problem?*

Many in our society would argue that while the environmental problems noted above are indeed critical, the declining farm numbers are not. The brutal truth is that *if* all we expect from agriculture is that it produce sufficient quantities of food and fiber as efficiently as possible on a global scale, then we should get out of the farming business altogether. This is a legitimate scenario, but not without great risks. The tightly coupled, complex systems needed to accomplish this end are subject to catastrophic failures in safety and health. I see this system promising unprecedented prosperity and economic growth--and providing a reality of degraded farms and watersheds, polluted air, food safety fears, failing farm families, and perishing communities. I believe we need farmers in the United States, and the rest of my remarks today are about the types of research and inquiry that will encourage this.

**Background**

The Leopold Center last summer invited some of the best agricultural and social systems thinkers from around the country to begin developing a new vision for agriculture. Their thinking formed the basis for the Center's evolving three-fold vision for agricultural sustainability: a dynamic view of economy, ecology, and community. The components are not new, but what we propose IS new: interdependence in research and thought rather

than tweaking of isolated components.

The Center then held "listening sessions" around Iowa, the final one just a week ago. We invited people from all walks of life, farmers, conservationists, urban consumers, and educators. We listened to what the people had to say about agriculture and how to make it more sustainable into the future.

Here's what they told us. For the most part, there was general agreement with our approach. A major recurring theme was the call for more research into alternative policies and the effects of current economic policies: not just farm policies, but food, processing, tax, conservation, land use and other types of general policies that impact agriculture. People talked about greater crop diversity, conservation, communities, and local and regional markets.

**Research Needs**

Let me focus more on what kind of research we need to be looking for to meet these needs. First, sustainability cannot be defined by a single action or element --if we focus only on one piece of the puzzle, economic oversimplification for example --the system falls apart, as we are seeing now. Multidisciplinary research was a good start but it has to be made interactive, interdependent, and responsive to reality in order to actually create change.

*The research should consider three interrelated aspects:*

Economics and Policy: This is one of the key areas of concern cited in our listening sessions. People are extremely concerned that policies increasingly ignore the human element; that policies encourage profitability based solely on short-run economics without considering community and ecology. Concept: Identify and quantify ways to incorporate the external costs and benefits into our decision making, and integrate this into our policy making. How: To work in these areas, first answer the question "What probable impacts will this work have on the vitality of ecosystems, including the human community, for which it is proposed?" Research ideas: (1) Explore non-market factors and how to quantify them in economic modes. (2) Look at *systems* that will ensure that farmers receive a better return on their investments and protect the natural resources on which farming depends. (3) Investigate and reward the farmer's role in providing a public good. (4) Design policies and economic systems that help maintain vibrant rural economies. Selling one item to 10,000 people is not the same as having one person buy 10,000 items. (5) Investigate substituting labor for capital.

Ecological Elegance: Concept: make both agriculture, and the ecologies in which it exists, more robust and resilient. How: To work in these areas, first answer the question "How will the agricultural practice, resulting from this research affect the health of the ecosystem, including the human community, for which it is proposed?" Research ideas: (1) Rethink agriculture to take advantage of the free ecosystem services offered by

regional ecology. Example: Two types of rice, *adapted to local growing conditions,* were seeded together, replacing the practice of rice monoculture planted with genetically uniform seeds bred for universal application. The result was an 18 percent increase in overall productivity and a dramatic reduction in the need for potentially environmentally harmful inputs - meeting both ecological and production goals *without* burdening farmers. (*Science*, 2000) (2) Investigate the roles of millions of living microbes in soil. (3) Identify adaptive management strategies for farmers. (4) Make waste in our farming systems food for something else in the system. Examples: Composting, nutrient management. (5) Increase biodiversity in all farming systems. Examples: Identify viable third, fourth, fifth crops. What causes rotational yield boosts? Reward other land uses. (4) Plan for all the energy used in our farming systems to be current. Examples: Electro-farming, energy alternatives.

Community and Markets: Concept: Market the farm instead of farming the market. How: To work in these areas, ask the question, will the proposed activity increase the farmer's share of the economic value generated by the activity? Research ideas: (1) Activities, policies, and practices to increase value retention by the farmer. (2) Adaptive management strategies for farmers. (3) Profitable diversification through new uses and alternative crops. (4) Applying new information technologies in innovative ways to support farm marketing and management. (5) Identify and reward public goods that farmers supply for communities and landscapes.

*Examples of on-the-ground sustainable research*

Hoop houses for swine production. Pigs are raised in a covered facility that is open on both ends, using bedding materials such as straw or corn stalks. The hoops have lower operating costs, but also lower rates of gain. The trade-offs are about equal for farmer profitability.

There are, however, many aspects to consider in evaluating hoops:

- Impact on environmental quality from using solid as opposed to liquid manure;
- Impact on the number of pigs a farmer can raise; impact on the soil from applying composted versus raw material;
- Impact on neighbors and rural communities where odor issues are very important; and
- Animal welfare issues for hoops vs. hog confinement operations.

These are just some of the researchable questions that follow from the systems approach outlined above.

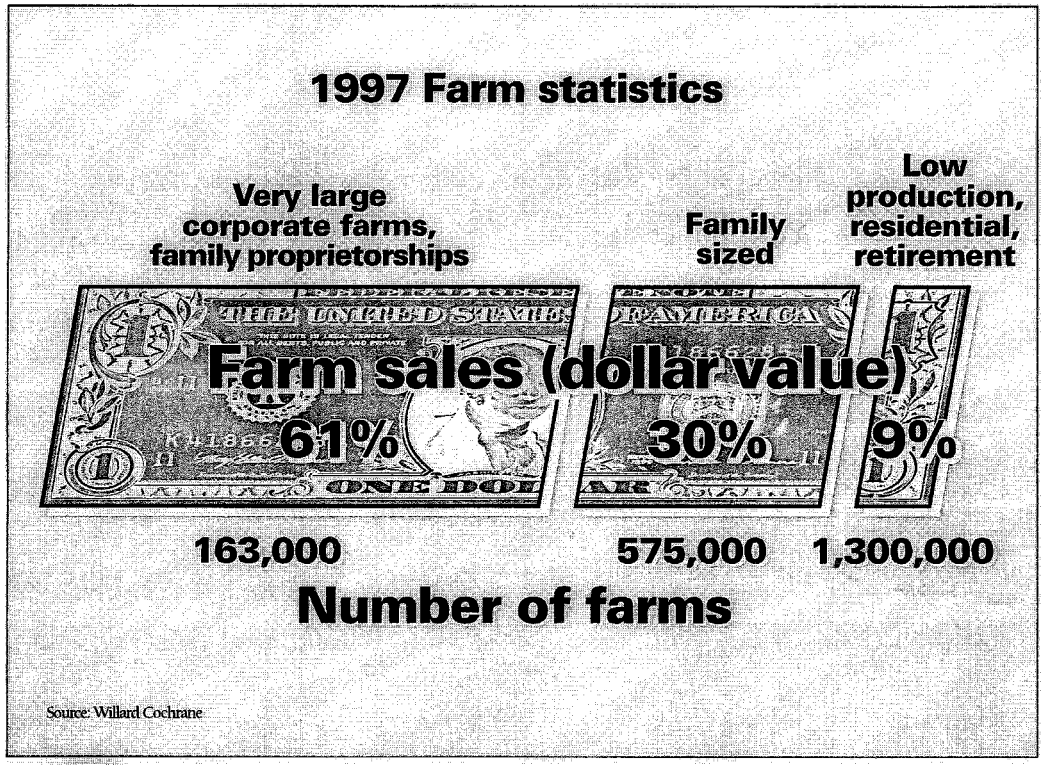
Buffer strips. Riparian buffer strips have become a popular means of controlling erosion.

- What is the impact of these structures on farmer profitability?
- How does the strip width change the economic analysis?
- What is the impact on wildlife?
- What is the impact on aesthetics and landscape?

The list goes on, but these are possible questions that reach beyond the issues of profitability or environmental impact.

**Conclusion**

The new farm bill should require that all research be put to a sustainability test. How does the proposed work integrate the three primary areas of communities, ecology, and economics? What are the probable impacts of the research in these areas? If it does not pass muster, the researchers must explain why not, and show why it should be funded anyway. We have looked at "sustainable agriculture" research as a separate category long enough. We have looked at agriculture itself as a separate entity from the rest of the world for long enough. 'On the ground' measurable results for agricultural research must include more than the productivity in a single growing season. Truly sustainable systems will result only when we are willing to integrate people and ecology into our thinking.

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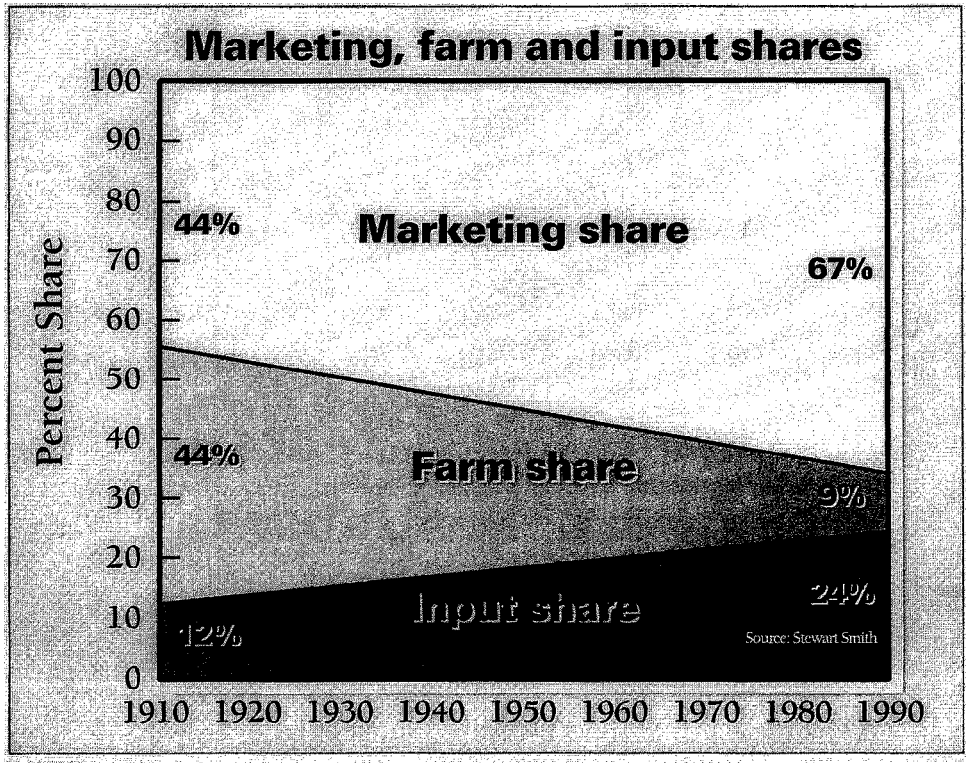


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## Current situation

1. More full-time prisoners than full-time farmers.
2. Farmers > age 65 outnumber farmers < age 35 by three to one.
3. Farmers 5 times as likely to die from suicide than farm injuries.
4. Fifty-five percent of farm income comes from government payments.
5. Mergers and alliances developing into 2 or 3 'food clusters.'
6. Rural communities are deteriorating.
7. The ecosystem is deteriorating.
8. Loss of consumer confidence: agriculture no longer a 'public good.'

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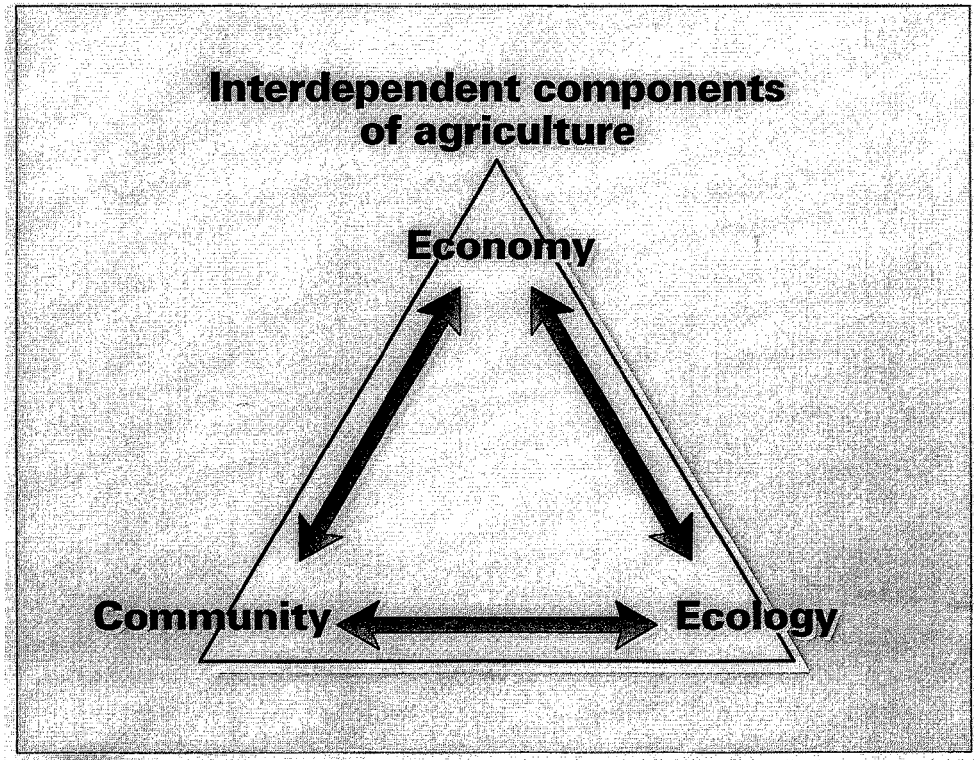


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**Testimony of**
**The Council for Agricultural Science and Technology**

**Before the**

**Committee on Agriculture, Nutrition and Forestry**
**United States Senate**

**Concerning**
**The Research, Extension, and Education Title**
**Of the 2002 Farm Bill**

**Presented by**
**Richard E. Stuckey, Ph.D.**
**CAST Executive Vice President**

**March 27, 2001**

Thank you Mr. Chairman and members of the Senate Committee on Agriculture, Nutrition, and Forestry. I am Richard E. Stuckey, Executive Vice President of the Council for Agricultural Science and Technology (CAST). I am pleased to be invited to testify on behalf of CAST on the agricultural Research, Extension and Education title for the 2002 Farm Bill.

CAST represents 37 professional scientific and engineering societies whose individual members exceed 180,000 scientists. Our mission is to assemble, interpret, and communicate science-based information regionally, nationally, and internationally on food, fiber, agricultural, natural resource, and related societal and environmental issues to our stakeholders legislators, regulators, policy makers, the media, the private sector, and the public. The members of CAST represent a broad spectrum of the food and agriculture sciences, including rural sociology, animal science, plant science, plant protection sciences, agricultural engineering, food technology, nutrition, toxicology, veterinary medicine, and many other related disciplines.

Although CAST comprises the various disciplines just mentioned, today I have been asked to focus on the plant science research needs. Others on this panel are addressing animal research needs.

Two points I would make and then provide further elaboration are these: First, there is a need for increased investment in agricultural research, extension, and education. Second , the earth has limited natural resources.

The United States has a budget surplus why not invest in the science that has helped contribute to that surplus and that has been underfunded the past 10 years? Let me give an example of that underfunding. There was genuine excitement in the academic community when in 1989 a new program was introduced, which many of you supported, called the National Research Initiative. I recall testifying before Congress on this initiative eleven and a half years ago on behalf of the cereal commodity associations. But the authorized $500 million never materialized beyond the approximately $100 million over the past 10 years. A healthy agricultural system provides the building blocks for human health: We are what we eat.

Today's world is becoming even more complex, with more issues and more challenges to face. **Simply slicing the budget research pie into more pieces is not the answer; we must make the pie larger.** This does not preclude prioritizing areas for funding research and educational programs, it simply means that without increased support, we will not be able to come close to achieving what is possible  more environmentally friendly, sustainable, and globally competitive farming practices. There is a significant return on your investment of agricultural research dollars.

Although obtaining the full consensus of CAST s 180,000 scientists is impossible, a majority concur that increasing the size of the pie is desperately needed. Following the examples of the National Institutes of Health and the National Science Foundation funding increases over the past 5 to 10 years would greatly assist in development of new technologies that help not only farmers but also local communities and people around the world. Opportunities to better protect our environment, maintain a sustainable agriculture and food system, and provide an economic return for those who labor long hours and assume financial risks can be improved with increased research spending. These are goals to which most scientists would subscribe.

The approach to reaching these goals is what may differ. No longer does one size, one approach fit all. Choices are not black and white, rather shades of gray. For some, the approach would be highly technology driven, for others it would rely more on human capital. I believe this diversity in approach is well illustrated in the CAST report released yesterday on "Vertical Coordination of Agriculture in Farming-Dependent Areas." More and more we find there is no one approach or single right way. Rather, there are multiple approaches and all are worthy of research and educational support to learn in precisely what settings and situations each will work best. It will take increased federal support to achieve these efforts.

This brings me to **my second point: the earth's limited natural resources**. We in the United States are part of a global environment; the world s population continues to grow and is projected to add another 50 percent onto the existing population of 6+ billion during the next 30 to 50 years. We need to conserve existing natural resources. If the world is to have enough food and water to feed itself and the United States is to play a major role, then more food will need to be produced with the land and water that we have available today. There is no more land and water to be made the supply is finite.

The recent electric power blackouts in California and those in past years in Chicago and on the East Coast serve as painful reminders of how close we are to tapping out the energy system. How do we conserve energy? Some may propose we go back to the good old days of the less efficient energy practice of the horse and plow. Agricultural producers in many parts of the developing world are still using the oxen or water buffalo as the chief source of energy. But draft animals require water, feed, housing, and care. Technologies have been developed to produce greater abundance in less time and with less effort. Is this all good? It depends on one s perspective. However, only through research will new discoveries be made that hold promise for our future. Careful use and employment of these discoveries will preserve our natural resource base, our quality of life, and global stability.

**Our plant research priorities should have the preservation of natural resources as a primary goal.** The priority mission areas of the Agricultural Research, Extension and Education Reform Act of 1998 remain **priority areas today.** Those areas are

A) Agricultural Genome
B) Food Safety, Food Technology, and Human Nutrition
C) New and Alternative Uses and Production of Agricultural Commodities and Products
D) Agricultural Biotechnology
E) Natural Resource Management, Including Precision Agriculture
F) Farm Efficiency and Profitability, Including the Viability and Competitiveness of Small- and Medium-sized Dairy, Livestock, Crop, and Other Commodity Operations.

More specific to plant research, The Coalition for Research on Plant Systems (CROPS) was organized to **determine societal needs and to develop a comprehensive, coherent national research strategy**. Recommendations from the CROPS 99 forum were endorsed by more than 75 organizations, representing agricultural and commodity groups, scientific societies, industry, and government agencies. **The three research priorities identified were the following**:

1. Expand the science and application of plant genomics, which will provide the basic knowledge and technology required to increase the productivity and usefulness of plants.
2. Develop practical, sustainable production management systems for the protection of the food and fiber supply and of the natural resource base.
3. Develop mechanisms to enhance producer profitability, while minimizing risk of financial loss and ensuring food safety and security.

Invasiveness of plant and other non-native pests and biosecurity concerns are becoming priority issues. Genetic engineering is a powerful tool being used now and in the future, not only in production, but also in health, nutrition, and well being of plants and animals. Genetic modifications of seeds are being made to include specific traits, built-in pest defense mechanisms, and modified moisture and nutrient requirements. Plant seeds of the future will become little factories, enhanced by the genetic mapping of plant species. Yet one also can argue effectively that genetic engineering is not a silver bullet nor will it hold solutions to all existing problems. Genetic engineering is biological, and therefore it requires care and caution in its use, just like any other new technology. Genetic engineering, when used appropriately, has the potential to contribute to protecting the environment and helping to provide the required food supply for an increasing population.

More public research and education dollars are needed, not only for development of new products but also for the safety testing of these products as they come to market. **The diminished role of public-funded agricultural research has shifted the research heavily to the private sector, for which there has been some public distrust.** I often wonder how the acceptance of genetic engineering may have been different if a majority of this research had been done with public, rather than private, funds.

**In conclusion, there is a need for greatly increasing the federal agriculture and research budgets. The need greatly outweighs our ability to select and choose the areas for where this research should be conducted there are simply too many choices for a stable or declining budget to address.** The world today is more complex than ever before, and international travel and trade bring on new dimensions, new problems, and new opportunities. Given the population that exists today and that is forecast in the future, we cannot let the entire world return to a native state unless we want to again be hunters and gatherers. We are responsible for the careful nurturing of the planet so that it benefits mankind and the creatures that inhabit it, while protecting the resources for future generations.

Thank you for allowing me to share some thoughts and this testimony on behalf of the members of CAST.

Testimony of

G. Philip Robertson, Ph.D.
Member, Committee on An Evaluation of the
U.S. Department of Agriculture National Research
Initiative Competitive Grants Program
National Research Council/National Academy of Sciences

And

Professor, Department of Crop and Soil Sciences and
W.K. Kellogg Biological Station
Michigan State University

before the
Agriculture, Nutrition, and Forestry Committee
United States Senate

March 27, 2001

Good morning, Senator Lugar and members of the Committee. Thank you for the opportunity to speak to you today. I am Phil Robertson, Professor of Crop and Soil Sciences at the W.K. Kellogg Biological Station, Michigan State University. I served as a member of the National Research Council (NRC) Committee to Evaluate the U.S. Department of Agriculture National Research Initiative Competitive Grants Program (known as the NRI program). I am here this morning to summarize the findings and recommendations of the NRC committee's report, *National Research Initiative: A Vital Competitive Grants Program in Food, Fiber, and Natural-Resources Research (2000).*

**Introduction to the National Research Council**

Let me briefly describe how the NRC works, because it is important for an understanding of the value of the committee's recommendations. The NRC is the operating arm of the National Academies, which is composed of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine. The National Academy of Sciences is a private, non-profit society that was chartered by Congress in 1863 to advise the government on matters of science and technology. Advice is provided through the National Research Council, using thousands of experts from academe, industry, and other organizations who volunteer their time. During any given year more than 6,000 scientists, engineers, and health professionals participate in NRC activities, most of them at the request of the federal government. The NRC actively strives for a balance of views among its committee members and subjects them to a conflict of interest review.

The NRC product is typically an independent consensus report. From initial approval of a study to this final report, every project is subject to oversight by boards and divisions within the NRC whose members are, again, volunteer experts--often members

of the Academies. The final step in the rigorous quality-control process is a review by outside experts who are anonymous to the study committee at the time of review but whose names are published in the final report. The sponsoring federal agency has no role in the process and does not see the report until it is ready for public release. The study that I will address today was requested by and supported by the U.S. Department of Agriculture's Cooperative State Research, Education, and Extension Service.

**The Importance of Agricultural Research**

It is hardly necessary to describe to this committee the importance of scientific research for providing the American public a food and fiber supply that is safe, affordable, and environmentally responsible. The fundamental success of our efforts to produce food and fiber at a rate sufficient to meet the needs of a burgeoning national and global marketplace cannot be reasonably questioned.

Nor can the starring role of research in this success be underestimated. Agriculture is more than ever a knowledge-driven industry: advances in genetics, in field crop technology, in animal health, in food storage and processing, in pest protection and forest health – advances at all stages of the production chain are driven largely by research findings.

**The USDA National Research Initiative Competitive Grants Program (NRICGP)**

The USDA spends about $1.7 billion per year on research, of which about $0.1 billion is spent on merit-based peer-reviewed research funded by the NRI Program. The NRI is the nation's primary merit-based, peer-reviewed research response to challenges to its system of food, fiber, and natural resources. The potential for disease transfer between animals and humans; the use of crops as substitute sources of petroleum-based products; the advent of nutraceuticals; the environmental impacts of farming, food-processing, and forestry; and the improvement of the vitamin and mineral content of widely grown grains are just a few examples of important emerging research issues directly relevant to USDA's mission. Merit-based peer-reviewed research on such issues could have profoundly beneficial effects in the United States and the rest of the world.

The NRI was launched in 1991 in response to an NRC report calling for an expanded competitive grants program to address emerging basic research needs in agriculture. The 1990 Food, Agriculture, Conservation, and Trade Act authorized annual spending of up to $500 million on a new competitive-grants program. Annual funding has remained at or near $100 million since 1992. Since its inception, the NRI has functioned as a pilot program to support high-quality research related to the nation's food, fiber, and natural resources system.

**The NRC Committee to Evaluate the USDA NRICGP**

In 1998, at USDA's request, the NRC appointed a 14-member committee to perform a retrospective assessment of the quality and value of research funded by the

program, to determine if the science and technology priorities within the major NRI programs are defined appropriately, to assess how NRI activities complement other research programs, and to recommend the nature and content of changes for the future.

To carry out this charge the committee gathered qualitative and quantitative data on the performance of the NRI. The committee conducted a series of surveys and interviews and solicited testimony from expert and stakeholder groups. Deans and directors of land grant and non-land grant universities, former chief scientists, and successful and unsuccessful applicants to the program were surveyed to assess the functioning of the NRI. The committee also received testimony from interested stakeholder groups, many represented at this hearing, including industry, professional societies, farm organizations, universities and agricultural experiment stations, and other federal agencies. Throughout this process the committee found a great deal of consistency in its findings.

**Findings and Recommendations of the Study Committee**

In general, the committee found the NRI to have financed high-quality scientific work within congressional guidelines. In this sense, the Program was judged to be a substantial success in having met its congressional mandate.

The committee also found, however, that the program is in danger of languishing. Program size, the size and duration of individual grants, and a low overhead allowance have led to reduced application numbers, especially from scientists outside the traditional food complex. Moreover, the committee found that traditional stakeholders in the NRI are losing confidence in the health and direction of the program.

Uneven and at times opaque internal procedures, funding allocation processes, and priority-setting patterns have reduced the desirability of the program in the eyes of potential applicants. Perhaps more importantly, expectations of increased funding for the NRI generated by the 1990 congressional authorization have not been met, and this has generated frustration in the food, fiber, and natural-resource research community and has had an adverse effect on the acceptance of the NRI as a strong research program.

The committee made sixteen specific recommendations to bolster and revitalize the NRI. Many of the recommendations are structural and relatively easy to address given administrative will. I would like here to emphasize three of the most difficult but important recommendations made by the committee:

***The committee recommends that the NRI and other competitive USDA research programs be moved to a new Extramural Competitive Research Service (ECRS) that would report to the Undersecretary for Research, Education, and Economics***

This would place the NRI and other competitive programs at a level equivalent to USDA's two main research agencies (ARS and ERS). The committee believes strongly that unless extramural competitive research is given the same organizational stature as

formula-funded and intramural research in USDA, it will remain difficult for the program to achieve its mission.

***The committee recommends the establishment of a new Extramural Advisory Board (12-14 members) that represents NRI stakeholders and has a non-USDA chair.***

In the committee's opinion, an external Advisory Board is critical to the successful functioning of the NRI. Stakeholder contact, the advocacy of extramural research inside and outside USDA, measurement of research outcomes, and continuing evaluation of NRI operations (including the peer-reviewed project-selection system) would ensure thoroughness, objectivity, and transparency.

***The committee recommends that by 2005 the NRI budget be increased to a level equivalent (adjusted for inflation) to the $550 million recommended by the NRC in 1989—but only if recommended changes in priority setting, documentation, and organization are put into place.***

The committee believes that inadequate funding of the NRI has significantly limited its potential and placed the program at risk. A substantial increase in funding will ensure a robust and high quality public research effort that can significantly transform the nation's food, fiber, and natural resources system in response to critical needs in agricultural productivity, environmental health, and societal well-being. The committee believes that after reaching this budget level, the future growth of the NRI budget should be evaluated and compared with the growth in the budgets of complementary research programs in NSF, NIH, and DOE.

Allow me to conclude with the committee's reiteration of the extraordinary importance of public, merit-based peer-reviewed research in food, fiber, and natural resources. In the opinion of the committee, which included scientists and nonscientists from both industry and the public sector, past public research and current private activities cannot meet the needs that are being created by population growth, climate change, and natural-resource deterioration, or the challenges related to food safety and nutrition and to the growing convergence of foods and medical research. To meet these needs requires a vibrant, reinvigorated NRI that provides consistent funding for the investigator-initiated, curiosity-driven research that is the backbone of the U.S. basic-research enterprise.

Thank you again for the opportunity to speak this morning. I will be glad to answer any questions.

*Testimony of*
**Dr. David Chicoine**
**Chair of the Board on Agriculture**
**National Association of State Universities and Land Grant Colleges**
College of Agricultural, Consumer & Environmental Sciences
University of Illinois at Urbana-Champaign

***Review of the Research, Extension and Education Title of the Farm Bill***
**Senate Agriculture Committee**
SR-328A Russell Senate Office Building.
March 27, 2001

Mr. Chairman, I would like to extend my thanks to you and the Committee for the invitation to testify here today. I am David Chicoine, Dean of the College of Agricultural, Consumer and Environmental Sciences at the University of Illinois. I serve as Chair of the Board on Agriculture of the National Association of State Universities and Land Grant Colleges (NASULGC). Founded in 1887, NASULGC is the nation's oldest higher education association. A voluntary association of public universities, land-grant institutions and many of the nation's public university systems, NASULGC campuses are located in all 50 states, the U.S. territories and the District of Columbia. As of October 2000, the association's membership stood at 212 institutions. This includes 75 land-grant universities (of which 17 are the historically black public institutions created by the Second Morrill Act of 1890) and 28 public higher education systems. In addition, tribal colleges became land-grant institutions in 1994 and 30 are represented in NASULGC through the membership of the American Indian Higher Education Consortium (AIHEC). My colleague, Dr. Phills, will be speaking on behalf of the 1890s and I understand that the Tribal Colleges and the U.S. territories will be submitting testimony for the record. The 1890s and the Tribal Colleges are represented on our Board on Agriculture and have participated in the development of the positions that I will speak to today. As well, the Board supports addressing the specific issues and needs of the 1890s, the Tribal Colleges and the U.S. territories.

I want to thank the Chair and this Committee for the leadership and the commitment you've shown to research, extension and education that supports the U.S. food, agriculture and natural resource system. We understand the extraordinary efforts that you've undertaken to establish new funding opportunities for research, extension and education to address the critical issues facing farmers, ranchers and rural communities. We particularly want express our appreciation for the establishment and support of the Initiative for Future Agriculture and Food Systems (IFAFS) and the Fund for Rural America (FRA). These new programs focus the research and extension talent of the land-grant and state university system on critical national issues at the local level.

***We recommend the expansion and further refinement of the IFAFS and FRA programs in the reauthorization of the Farm Bill.***

***We recommend that increased funding for these programs be factored into the calculation of the level of funding necessary for the agricultural base line.***

**Funding Needs**

The IFAFS and FRA programs have proved a wise investment, and yet, there is so much more that needs to be done. As we've heard from the testimony here today and in other hearings in the

Senate and House, there is widespread recognition of the need to reinvest in our agricultural science and education foundation. We have witnessed decades of level or declining funding in agricultural science and education, while the needs of farmers and ranchers, our communities and consumers have only increased. The Board on Agriculture appreciates and commends the farm, commodity and other interest groups that have come together to form the National Coalition for Food and Agricultural Research (N-CFAR). Our Budget Committee and the Board on Agriculture have endorsed and support their recommendation for doubling agricultural science funding.

***We support the recommendation of a doubling in funding for agricultural research, extension and education programs over the next five years.***

We also appreciate the testimonies submitted by the leadership of major farm and commodity groups that call for this doubling effort. We look forward to working very closely with these groups to develop and support new programs that will aggressively address their highest priority needs and to do so in a timely and accountable manner.

**Addressing critical issues for the new century**

When we come to the reauthorization of the research, extension and education title of the Farm Bill it has been usual for us to make specific legislative recommendations for this title. However, we wish to take a very different approach in this Farm Bill. As you have heard from others, we firmly believe that a strong science and education foundation is a necessary and critical component to effectively deal with *all* of the policy issues included in the Farm Bill.

- Given current market forces and the coming changes in farm support programs, how do we re-tool research, extension and education programs to better meet the current needs of farmers and ranchers? How do we increase "value-added" opportunities to farmers and ranchers and their new business entities, thereby enhancing the economies of their communities?

- How can we respond more quickly to emerging public concerns about the safety of our food products and processes? How can we better under gird our trade and marketing objectives with sound science, drawn from cutting edge research programs, and delivered through the most effective education outreach efforts?

- How do we link research, extension and education programs to address conservation and environmental issues being faced by producers and processors?

- How do we foster a new model of cooperation between the federal laboratories, the universities and the private sector as the genomes of plants and animals are sequenced and a new generation of functional genomics emerges? What programs need to be in place to assure the public that adequate safeguards are in place as new products emerge from this technology?

- How do we better link our science and education capacities to meet the nutrition and public assistance responsibilities of the Department?

- How do we better link our distributed research, extension and education system to meet the needs of our rural communities?

Programs that address these challenges are in other titles of the Farm Bill. We are very interested in assuring that there are clear linkages between the research, extension and education system addressed in the Research, Extension and Education title of the Farm Bill and the other titles of the bill. Our goal is to work with you and our constituents and stakeholder organizations to insure that our programs are closely connected to the critical policy issues and needs being addressed in the rest of the legislation. In the following testimony, I review some ways research, extension and education may be directed to the critical issues facing this Committee.

***Supporting farmers***

Farm Subsidies

In the course of the current Farm Bill Hearings, recommendations for changing the farm support programs are emerging. Most of these proposed changes imply some type of revenue assurance or insurance as the tool of choice. The idea is to pay the farmers in periods of low prices and yields, but not in times of high prices and/or yields. The 21st Century Commission describes this new counter cyclical program as Supplemental Income Support (SIS). It is related to a similar proposal by Congressman Stenholm, the Supplemental Income Payments for Producers (SIPP). Analyses of these and related possibilities suggest that with a somewhat more sophisticated approaches, based on simple principles of insurance, the cost of the government program for agriculture could be greatly reduced. It is certainly possible that the 2002 Farm Bill will include the ideas of revenue insurance and counter cyclical payments.

Possible issues for the land-grant colleges and state universities include:

- Research and education to assist farmers in using the new risk management tools that will be available in the 2002 Farm Bill. These provisions may place added responsibility on producers to be effective risk managers--using market and government tools.

- Expansion of the coverage of the risk management tools in the 2002 Farm Bill to farmers that are producers of animals as well as crops. This could counter a longstanding lack of attention to livestock producers, and is now more an issue with the increasing specialization of farmers.

- Targeting the needs of small farmers. We support enhancing and expanding the abilities of the 1890s, the Tribal Colleges and the U.S. territories to provide programs to small and underserved producers and their communities.

- Research and education to improve the design and implementation mechanisms, revenue and other insurance tools, private and public.

- Programs to help agriculture producers "transition" to other occupations, providing particular attention to those farmers that have managed to stay afloat only through the availability of high subsidies. If there is a reduction in payment programs and a move towards assurance/insurance programs, the levels of government subsidy for these producers will be lower.

- Research and education to support a better understanding of the role of the farm subsidies and the delivery mechanisms for the economic welfare of rural and tribal communities.

- Developing approaches to the increasingly segmented or differentiated markets for agricultural products, including pre and post farmgate value-added business opportunities. Premiums for these products and processes will be important to farm income as the blanket subsidy levels fall.

- Linking value-added agriculture activity with the servicing of segmented markets for agricultural products.

Additional activities by the state universities and land-grant colleges could be:

- Exploring ways to better use private land in support of the development of rural areas, recreation and amenity production as compared to crop/animal production, and being sure that the subsidy delivery structure does not disadvantage the producers that peruse these avenues.

- Stressing the importance of alternative uses of agricultural commodities, e.g., for sustainable energy production, and assuring that the necessary research and education programs are in place to develop the associated production, processing and distribution systems.

- Helping the public and the farmers understand the incidence of subsidies and the incidence of the benefits, e.g., for FY2000, the estimate is that about $13 billion of the total farm expenses will go to rental paid to off-farm owners. This is more than 5 percent of total farm expenses.

- Development of systems of quality management and electronic marketing that provide opportunity for increased product differentiation and improved returns to farmers and others by better servicing consumers.

Check-off Programs

The so called "check-off" programs for many of the major and minor commodities that are in place provide significant support to research, education and extension as well as other activities. The state universities and land-grant colleges play an important role in these programs. At the same time, producers are questioning these programs. There are many questions about the effectiveness of check-off supported promotion programs that are generic or commodity based. How can these programs be improved to more effectively address the needs of producers?

Opportunities and challenges for the state universities and land-grant colleges include:

- Independent research to assure producers that check-off programs are in their interest and add value beyond their cost.

- Assessing the value of generic advertising. Perhaps these funds would yield a higher return if they were redirected to activities other than direct promotion of generic commodities.

- Linking the promotion programs to branding and other similar activities that take advantage of increasingly segmented markets for agricultural products.

It is not clear whether the current check-off programs adequately address quality management systems and electronic marketing to differentiate products and serve increasingly segmented consumer markets. Perhaps check-off funding could be directed to support these new marketing systems rather than to generic commodity-based promotion. If this change were made, the state universities and land-grant colleges could be effective cooperators with the commodity associations in carrying out the research and education to assure effective implementation of programs to take advantage of new technologies to support product differentiation and increased returns to farmers.

Credit

It is possible that credit issues will need to be addressed, due in part to the adjustments in the private banking/credit sector that are coming with the implementation of reforms authorized by the Gramm, Leach, Bliley Act of 1999. Specific linkages to research, extension and education could include:

- Serious analysis to identify the market failures that the government intervention is designed to correct, and their successes.
- Expanded collaboration between the banks and the Extension system to provide financial management education and outreach programs.
- Expansion of the Beginning Farmers and Ranchers Program to more specifically involve access to the capacities of the state universities and land-grant colleges.
- Credit might be more fully opened to non-farm enterprises in rural communities as a developmental tool, complementing the programs under Title VII.

***Building international trade and market opportunities***

Questions have been asked about the effectiveness of some of the trade and market programs authorized in the Farm Bill. There have not been adequate linkages between these provisions and the science and education components of the Farm Bill. Countless studies have shown that investments in science serves as a "discovery engine" that drives the development of new technologies, which in turn provides a foundation for value added products and processes that provide profit and positive trade balances.

- New technologies, new processes and new practices are necessary to maintain and enhance our global competitiveness.
- New technologies need to be developed that focus on providing value-added opportunities for U.S. producers and processors, technologies that provide enhanced income though better identifying and meeting diversified customer demands.
- Publicly funded Research and development been provided the U.S. a competitive advantage through the years. It is economically essential that we retain this advantage.
- Future market growth for U.S. agricultural products remains in the global market. The expertise of our international agricultural scientists and educators need to be more

effectively utilized in helping our producers respond to the global dimensions of agriculture.

- Our agricultural classroom curriculum and coursework needs to be retooled to better prepare our students to compete in a global economy. Students, scientists and educators need enhanced opportunities to study and participate in agricultural programs abroad. The 1998 AREERA includes authorization of GASEPA (Globalizing Agricultural Science and Education Programs for America). We recommend the reauthorization of this program and its full implementation.

A criticism that has been raised regarding some of the trade and marketing programs authorized in the Farm Bill is that there is a lack of analysis to show how the programs have benefited targeted countries or U.S. producers. Possible actions are:

- Developing better strategies for export promotion, and demonstrate their success as measured according to agreed on criteria.

- Utilizing the concessionary exports to accomplish broader global and recipient nation development objectives compared to market development.

- Acquiring a better understanding of the implications of the market development strategies and concessionary exports for the recipient countries, and the dumping practices they were, in part, designed to counter.

Additional activities that could be addressed by the state universities and land-grant initiations include:

- Greater participation in the use of local currency funds (Section 416 (b)) to support internalization of the agriculture curriculum and youth programs.

- Enhanced linkages between the PL 480 and international agricultural science and education programs. As a model, there is an IPM CRSP grant that has made good use of PL 480 resources in Guatemala to support an applied research activity to enhance the development of nontraditional export crops in that nation. This benefits the U.S. though enhancement of our own domestic markets for these crops during the off season when US sources are not available.

- Development of "food grant universities." The idea is to make long-term commitments to food deficit nations and use the local currency generated by monitization to support the development of land-grant like higher education initiations. U.S. state universities and land-grant colleges would be paired with the developing country institutions.

- More direct participation in the Farmer-to-Farmer Program, perhaps expanding it to include undergraduate and graduate students in College of Agriculture programs.

- Development with FAS on a cooperative foreign technical assistance program. The state universities and land-grant colleges have a great capacity to partner in this new program.

Existing agricultural trade and development mechanisms can achieve expanded objectives. Most of the export increases have been related to price and increased incomes in developing nations.

Education is broadly accepted as a key to development. Economic development is well established as a key factor in growing the total export market for agricultural commodities. The food grant university, undergraduate and graduate foreign study/exchange, and FAS cooperative proposals have the U.S. exporting what it does well.

***Conserving natural resources***

Continuing to improve the stewardship of natural resources and the environment is one of the most critical and pressing issues facing farmers and ranchers, and our nation. Agriculture is seen as a major source of the nonpoint contamination of surface and ground water in the United States. Agriculture is also an issue for air quality and for the larger concerns about global warming. Environmental groups are impatient with agriculture; there is frustration with the perceived failure to achieve measurable improvements. This impatience is reflected in the development of regulatory solutions, Total Maximum Daily Loads (TMDL's), nutrient standards for surface water, and AFO/CAFOs, for animal waste management.

Cooperation between USDA and the USEPA has resulted in a new approach that emphasizes results-based outcomes and de-emphasizes regulating the practices that lead to these measurable outcomes. If this approach continues to emerge, there will be an increase in the need for federal and state staff for technical assistance and for monitoring and compliance. The U.S. research, extension and education system will have a unique and essential role to play in the emergence of a new, results based approach to environmental management. These challenges transcend national boundaries; our international agricultural research and education programs will allow us to draw on discoveries and techniques emerging in other countries. Research is needed for developing new production management tools and assessment systems. Extension should be fully utilized to work in collaboration with USDA/NRCS and the National Association of Conservation Districts (NACD) to develop the education and outreach programs that will be necessary for success.

State Research and Extension need to be fully integrated into the Conservation Reserve and Wetlands Protection Programs, the Environmental Quality Incentives Program (EQIP), the Wildlife Incentives Program, and other mechanisms that feature whole farm participation in conservation programs. As well, there should be clear linkages to science and education in the following programs:

- Highly Erodible Land Conservation (Conservation Compliance)
- Wetlands Memorandum of Agreement (MOA)
- Environmental Conservation Acreage Reserve Program (ECARP)
- Conservation Reserve Program (CRP)
- Wetland Reserve Program (WRP)
- Environmental Quality Incentive Program (EQIP)
- Conservation Farm Options
- State Technical Committees
- Forestry and Forest Incentives Program
- Conservation Activities of the Commodity Credit Corporation
- Floodplain Easements
- Resource Conservation and Development Program
- Flood Risk Reduction Contracts
- Grazing Lands Conservation Initiative
- Wildlife Habitat Incentives Program

- Farmland Protection Program
- Interim Moratorium On By-Pass-Flows
- Everglades
- Task Force on Agricultural Air Quality

Conservation and environmental issues facing agriculture are complex. There is a need for dramatic investments in the science base underlying the programs that are developed to protect the environment. There is a great need for increased education and outreach efforts. There is an immediate opportunity for greater and value adding collaboration between CSREES, ARS, NRCS and the state universities and land-grant colleges.

***Better nutrition and health***

The Food Stamp Program changed significantly with the welfare reform initiatives of the 1990s. Other domestic programs as well, have felt the effects of the devolution implicit in welfare reform. These reforms have mostly occurred in the context of the growing economy, a condition that may shift in the months leading to the 2002 Farm Bill legislation. As well, the "bankable" part of the three-year grace period for most current welfare program participants is running out. In short, there is a possibility for adjustment in the nutrition and food programs as the economic conditions change and as the participants transition off the programs--all of which seem to imply increased federal expenditures.

These food and nutrition programs are now widely used by rural and tribal community residents, and especially by their aging populations. Both make this legislation important to the state universities and land-grant colleges that are in rural states and/or depend on rural constituencies. The foreign food assistance programs (PL 480 and GSM) continue at high budget levels (almost $2 billion). The state universities and land- grants have, to a large extent, not participated in the use of the in-country funds generated by these programs. With the interests of students and their employers in international experience and related education, there is opportunity for gain and more effective use of the resources from these programs.

There are significant research and education activities related to Department's nutrition programs. The Family Nutrition Program (FNP), which uses Extension staff to educate the Food Stamp Program participants, is an example of how CSREES and the state universities and land-grant colleges can cooperate to effectively do the business of USDA.

Issues for the state universities and land-grant colleges in relation to this title include:

- Regularizing the educational transfer that is associated with food and nutrition programs.

- Enhanced partnerships between the Department and the universities for nutrition assessment and research. With block grants, programs are becoming more adapted to state specific needs. Assessment and education programs are needed that can facilitate sharing the lessons learned in one state with others.

- Added emphasis in prevention. The land-grants are poised to develop expanded outreach and education activities in this area. As well, the youth programs that are operated by Extension should be major participants.

- Enhanced support for Extension nutrition assessment and outreach programs. Enhanced collaboration between EFNEP and WIC education efforts.

- Cooperation in Community Food Projects: these food projects provide a major opportunity for supporting the development of local markets and farm diversification.

- Provide better access to locally grown products for school feeding programs.

There are great opportunities for enhanced cooperation and coordination with the state universities and land-grant colleges. There are clear opportunities to increase program efficacy and efficiencies by greater collaboration between the universities and colleges, the Food Stamp Program, the Community Food Projects, the Commodity Supplemental Food Program (CSFP) and the Food Distribution Program on Indian Reservations (Commodity Distribution Program).

***Revitalizing our communities***

Rural areas continue to fall behind compared to urban and non-metro areas (CSRA 2000). There is more and more attention given to the economic and other interests of the rural areas in the Congress. The emergence of the Rural Caucus is an example. The last session of Congress saw the introduction of numerous bills targeting the improvement of the economic status of rural America.

Issues to explore in supporting rural communities:

- Tax credits may be an underutilized tool, and there may be unique opportunity with the tax reduction legislation under consideration. If tax incentives are utilized to address rural community needs, we need to be sure that there are adequate education and training programs in place for local community leaders to learn how to make use of these new tools.

- Distance education and connectedness are reoccurring issues in the rural economy legislation introduced during the last Congressional Session. The state universities and land-grant colleges are naturally positioned to help remote communities develop strategies and programs to meet their telecommunications needs. Extension can expand its efforts to assist small businesses access "e-commerce" opportunities.

- As part of "block granting," many government management responsibilities have moved from the federal and state level to county and local governments. Most local officials have not had the background or training to manage these new responsibilities. Extension has been actively involved in providing leadership development programs and specific training for these officials. These programs need to be strengthened and enhanced and coupled with a strong research base.

- The research base (the new economic geography) for rural development or community vitality needs serious attention. Surprisingly, little is known about the success of various strategies for growth and development in rural economies and their communities. Related education programs must develop as well. This could come in a process to reform and reenergize the Fund for Rural America.

- Research on and educational programs about improved economic opportunities through natural and agricultural based enterprises such as bioenergy and biomaterials developments combined with new business structures of growers for value added agriculture to serve differentiated markets.

- Development of new models for the universities and federal laboratories to work together with the private sector, to insure that the results of discovery research are sufficiently captured and developed such that research results can reach commercial development. Many states have developed new and exciting structures that provide for more effective research and development investments and collaboration.

**Research, Extension and Education**

In the 1998 AREERA, new provisions were established regarding joint research and extension projects and multistate efforts. We support the intent of Congress to facilitate greater cooperation between research and extension. We support the intent of Congress to facilitate greater cooperation among the states, so that we can better coordinate our efforts and target scarce resources. We support the intent of Congress to enhance and enrich meaningful stakeholder involvement in setting priorities and in program development for research, extension and education. We commend the Congress for establishing the National Agricultural Research, Extension and Education Advisory Board (NAREEAB) and we recommend its reauthorization.

Technical questions have emerged in the implementation of AREERA on how some of our joint efforts can or should be reported. We believe that most or all of these issues can be sorted out in discussions among the universities, the Department and your Committee staff, which we hope to do in the near future. The bottom-line is that we want to increase the efficiency of our reporting and accounting procedures and to make best use of current technologies.

***Funding Priorities***

The Research, Extension and Education Title of the Farm Bill provides a balanced portfolio of funding mechanisms, including formula funds and competitive grants. We endorse and recommend the continued authorization of this portfolio of funding mechanisms, which makes it possible to address both long-term program needs and short-term, quick responses projects. We support and endorse the continuation and enhancement of the IFAFS program and the FRA, funded through the mandatory accounts. We support and endorse the continuation of the programs authorized in this bill and funded through the discretionary accounts. We look forward to working with this Committee and the Congress to determine the best balance between these funding mechanisms, with the goal of sustaining critical federal investments in priority research, extension and education programs.

As I have stated previously, we are very interested in tightly linking the research, extension and education system to the critical policy issues addressed throughout the farm-bill. High priority issues include:

- Enhancing production, processing and trade;

- Improving targeted market opportunities, at home and abroad;

- Developing and applying the next generation of value-adding tools and processes to generate enhanced income opportunities;
- Creating new opportunities for biomass, biomaterials and bioenergy products;
- Applying the best scientific assessment procedures to assure the consuming public and customers that our food products are safe and wholesome;
- Creating new connections and relationships through advanced science and effective education between food, nutrition and the health and well being of all people;
- Generating the next generation of environmental management tools and techniques to protect our countries natural resources while producing food and fiber that is safe and affordable; and
- Harnessing our science and education system to meet the diverse needs of our rural economies and communities, providing leadership in developing the next generation of leadership skills and telecommunications capabilities.

***Improved Linkages***

In this testimony, I have stressed the need for increased federal investment in the agricultural and natural resources research, extension and education system. This increased funding is necessary to support farmers and ranchers, processors, our rural communities, and the consuming public as they meet the challenges of the 21st century. We recommend that increased investments in research, extension, and education programs can most effectively address critical challenges by more tightly linking with the science and education needs of the action agencies in USDA, so that the federal agency and the state and land-grant universities can as partners better serve the U.S. food, agriculture, natural resource and rural community sectors in the challenging years in front of us. We look forward to working with the Committee and your staff to work through the details of these recommendations.

*Testimony of*
**Bobby R. Phills, Ph.D.**
**Chair, 1890 Legislative Committee**
**National Association of State Universities and Land Grant Colleges**
Dean & Director, Land Grant Programs
Florida A&M University

***Review of the Research, Extension and Education Title of the Farm Bill***
**Senate Agriculture Committee**
SR-328A Russell Senate Office Building.
March 27, 2001

Mr. Chairman, members of the Committee, I would like to thank you for this opportunity to testify on behalf of the 1890 Land Grant Universities. I am Bobby R. Phills, Dean and Director for Land Grant Programs, College of Engineering Sciences, Technology and Agriculture at Florida A&M University. I serve as Chair of the 1890 Legislative Committee.

I would like to begin by associating myself with the testimony and remarks of my colleague, Dr. David Chicoine, who serves as the Chair of the Board on Agriculture of the National Association of State Universities and Land Grant Colleges (NASULGC). The 1890s are members of the Board on Agriculture and we have played an active role in the development of the Boards policy recommendations. We endorse his statements regarding funding needs and the need to better integrate science and education programs into all of the action and policy activities of the Department. We also recognize the importance of our international Land Grant programs in research, academics and extension and urge continued support for these programs as they help to maintain the competitiveness of American agriculture. Building on Dr. Chicoine's testimony, I will focus on some additional issues of concern to the 1890s in this legislation.

**Key Issues for the 1890s**

There are three key issues that I would like to address:

1. The critical need for increased investments;
2. Equitable access; and
3. Appropriate funding mechanisms.

**The Critical Need for Increased Investments**

I am heartened by the recent calls to double the investment in agricultural research, extension and education. It is remarkable that so many diverse interests are coming together with an understanding of an urgent need to reinvest in the science and education base serving our farmers and our communities. The 1890 universities look forward to working with all of the farm and interest groups who are working to enhance our abilities to serve their needs. As we support critically needed investments in agricultural research, extension and teaching, it is essential that the specific funding needs facing the 1890 community also be addressed. At this time, I would like to convey some of our specific recommendations to meet the unique needs of the 1890s and the communities that we serve.

***Establish an 1890 Land Grant Endowment fund***

We recommend establishing an 1890 Land Grant Endowment fund at a funding level of not less than $20 million per year. The current legislation includes authorization for Centennial Centers; regrettably, these Centers were never funded. Since funding action was not taken on the Centennial Centers, we recommend striking this language and updating it with an endowment fund for the 1890s, modeled after the language in the 1998 Agricultural Research, Extension and Education Reform Act (AREERA) that establishes an endowment account for the Tribal Colleges.

While the 1890s are Land Grant Universities, we did not receive funding benefits from the distribution of federal lands, as did our colleagues in the1862s. Through the years, the 1890 universities have struggled with inadequate funding resources to meet the especially challenging needs of underserved communities. The proposed endowment account could be utilized to help address historical inequities of resources and to allow our institutions the opportunity to build our capacity to effectively compete for other funding resources. This endowment fund would be targeted to jump-start new initiatives on our campuses, particularly developing resources to support graduate and post-doctoral work by minority students.

***Increase state matching requirements for 1890 formula funding***

Most 1862 Land Grant universities receive more funding from their state governments than they do from federal funding. Accordingly, 1862s usually do not have difficulties in matching federal funds with required state dollars. Unfortunately, the 1890s have not enjoyed the same level of state support in the past. In the 1998 AREERA, a fifty percent (50%) state matching requirement was established for the 1890s. We appreciate and support the determination by Congress that state funds should be available to match, at least in part, the funds provided by the federal government. Since passage of AREERA, we have made some significant headway in securing state matching funds for our programs.

We now recommend increasing the state-matching requirement to a hundred percent (100%). We request that this matching requirement be "ramped-up" over the current requirement of fifty percent (50%), with an increase of ten percent (10%) per year over the course of five years. This "ramping-up" phase will allow our universities and the states to adjust to this increased requirement over time. In addition, we ask that the Congress clarify that the state funds that are used to match federal funds should appropriately come from state research and extension funds, rather than from general education accounts.

We recognize that it will be harder for some of our 1890 universities to meet this matching requirement than others. We therefore ask that the Congress provide the Secretary of Agriculture greater flexibility in waiving an institution's matching requirement in response to a petition from the university.

***Reauthorize the 1890 Capacity Building Grant Program***

The 1890 Capacity Building Grant Program has played a critical role in helping us build our capacities in research and teaching. This program has allowed us to attract new faculty, enhance our ability to conduct quality research, and has enabled us to carry out needed curriculum development programs. Unfortunately, the authorization for this program has not included the extension arm of our programs. We recommend expanding the eligible participants in this

program to include 1890 Extension. We also recommend that the authorized funding level for this program be increased to $25 million per year.

***Reauthorize the Socially Disadvantaged Initiative Program***

We recommend reauthorizing the Socially Disadvantaged Initiative (Section 2501) Program at a level not less than $10 million per year. This program allows the 1890 universities and other Community Based Organizations to work directly in a sustained way with small farmers. We provide training in cash flow, farm management and alternative market development. We train small farmers to access new and alternative markets for their crops and animal commodities. This program has had a dramatic impact on increasing the economic viability and sustainability of these small and limited resource farmers. This critical program should be sustained and strengthened and other small farm programs should be established as a safety net for all such farmers in this category.

***Reauthorize the 1890 Facilities Grant Program***

We recommend reauthorizing the 1890 Facilities Grant Program (Section 1447) at a funding level of $25 million per year. The 1890s have a clear and immediate need to improve our physical facilities. Years of limited resources have taken their toll and needed improvements cannot be delayed forever. Meanwhile, new technologies require new resources and modifications to existing facilities. We urge your support of increased authorization for the 1890 Facilities Grant program.

**Equitable Access**

In addition to our needs for increased funding, the 1890s need equitable access to existing funding sources so as to become full and active participants in the federal/state Land Grant partnership.

***Raise the funding base of 1890 formula funding***

We support increased formula funding for both 1862 and 1890 institutions. The amount of formula funds available to the 1890s is smaller than the amount of these funds available to our colleagues in the 1862s. Currently, the legislation requires that the funding base of 1890 formula research funding (Section 1445) be set at an amount equivalent to not less than 15% of 1862 formula funding (Hatch funding). We recommend that this percentage be increased to an amount equivalent to not less than 25% of Hatch funding. Similarly, 1890 Extension formula funding (Section 1444) is currently set at an amount equivalent to not less than 6% of 1862 Extension formula funding (Smith –Lever funding). We recommend increasing this amount to 15% of Smith-Lever funding.

***Provide access to McIntyre-Stennis (Forestry) funding***

Currently, 1890 universities are not eligible for formula funds targeted to forestry issues (McIntyre-Stennis). Many of our institutions, however, abide in states where forestry is a major agricultural industry and these institutions have forestry and natural resource programs that are germane to the forestry industry. We recommend an expansion for authorized funding for McIntyre-Stennis and increasing eligible participants to include the 1890 universities.

***Include West Virginia State College***

We welcome the return of West Virginia State College to the ranks of Land Grant institutions. We recognize the need of West Virginia State to retain the base funding that has reestablished them and we agree that they should be eligible to participate in those programs for which 1890 Land Grant Institutions and Tuskegee University are eligible. In each instance, of course, we would hope that additional resources are made available to all of the 1890 Land Grants and Tuskegee, so that West Virginia's participation does not put an additional and unintended burden on their colleagues.

**Appropriate Funding Mechanisms**

We would like to commend the leadership of USDA/CSREES and the Land Grant community in the development of the new IFAFS competitive grants program. The Department staff and others went the extra mile to make sure that our institutions were fully aware of the new program and gave us the opportunity to compete as equal partners in the process. We achieved some success, however, with enhanced support to increase our competitiveness we will do even better in the future.

While we support competitive grants, we are concerned that some mistake the term "competitive" with the term "quality." The competitive grant process does provide a form of quality control for awarding funds for relatively short-term "projects" However, many of the programs that we provide need to be sustained over time. Short-term competitively awarded projects do not adequately serve the longer-term needs of the underserved populations that we work with. Formula funding and endowment funds provide the necessary sustained funding that is required to truly build capacity. There are many ways of insuring that long-term projects have adequate quality control mechanisms in place. Indeed, the "merit review process" developed in the 1998 AREERA provide the kinds of oversight and review that are necessary. Again, we support competitive grants, but it is not the only funding tool and it is not always the most effective mechanism to meet our needs.

**Investing in the Future**

Again, I would like to thank the Committee for the opportunity to testify here today. We look forward to working with you and our colleagues in the university community as we move through the reauthorizing of the Farm Bill. We urge you to use this moment, this opportunity, to invest in our 1890 universities and in the future of our communities.

**NATIONAL AGRICULTURAL RESEARCH, EXTENSION, EDUCATION, AND ECONOMICS ADVISORY BOARD**

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# Statement of Victor L. Lechtenberg, Chair, National Agricultural Research, Extension, Education, and Economics Advisory Board

## Before the Senate Committee on Agriculture, Nutrition and Forestry

March 27, 2001

Mr. Chairman and Members of the Committee, I am pleased to appear before you today to discuss the efforts of the National Agricultural Research, Extension, Education, and Economics Advisory Board of the U.S. Department of Agriculture in fostering a successful and healthy U.S. food and agricultural system.

**Background**

The role of the Advisory Board is to advise the U.S. Department of Agriculture (USDA) and its land-grant university partners on research, extension, and education policies and priorities, and to advise on the effectiveness of those policies and priorities, including economics. The 1998 Agricultural Research, Extension, and Education Reform Act broadened the Board's obligations with respect to stakeholder input, priority setting, and accountability. The Board strives to reflect the ongoing and collective interests of stakeholders nationwide and to provide advice vital to the current and future success of the food, forestry, and agricultural research system. This October, the Board will have completed five years of its mandated duties.

The Board is a statutory committee established by the Federal Agriculture Improvement and Reform Act of 1996 (referred to as the "Farm Bill"). Membership represents 30 constituent categories that are defined in the Farm Bill. Members are appointed by the Secretary of Agriculture to serve staggered 3-year terms. One-third of the members rotate off the Board each year. Also by statute are the following ex-officio members: the Secretary of Agriculture; the Under Secretary of Agriculture for Research, Education, and Economics; and respectively, the Administrators of the Agricultural Research Service, the Cooperative State Research, Education, and Extension Service, Economic Research Service, and National Agricultural Statistics Service. Existing farm bill authority for the Advisory Board is scheduled to terminate on September 30, 2002. The make-up of the Advisory Board enables it to truly function in the national interest.

Each member brings the perspective of the constituent group he or she represents, but also comes to the table to speak with a unified voice for the betterment of publicly funded research, extension, and education. A list of members for fiscal year 2001 is attached.

Two or three full Board meetings are held each fiscal year. One of these is a National Stakeholder Symposium that solicits stakeholder input from across the country. In addition, special focus or regional listening sessions are held at regular intervals to gather stakeholder input and aid in priority setting.

The Board held its March National Stakeholder Symposium last week, titled *Reinventing Agriculture in the 21st Century through Research and Education*. We were honored to have distinguished members of the U.S. Congress, including you Mr. Chairman, as well as senior staff from Senate and House agriculture committees, provide views on the role of federal research, extension, education, and economics in helping agriculture meet the challenges posed by a rapidly changing global economy. The meeting also initiated discussions among the broad stakeholder community on critical needs in food, forestry, and agriculture that will help shape future Farm Bill legislation as it relates to research, education, extension, and economic opportunities. Comments by the stakeholder communities at this meeting showed renewed and common interest in elevating the visibility and support for agricultural research and education to keep the U.S. agriculture economy strong and provide maximum benefits to society. Stakeholders voiced the importance of agricultural research in its link across all sciences and as the foundation for American health.

The Executive Committee of the Advisory Board consists of the Board Chairperson, Vice Chairperson (currently Ron Warfield, President of the Illinois Farm Bureau), and seven additional members. The Executive Committee officers and members are elected annually by the Board from its membership. The role of the Executive Committee is to work with the Secretary and officials of the USDA to summarize and disseminate the recommendations of the Advisory Board. This Committee meets monthly by conference call to facilitate activities of the Board.

As needed, the Board establishes Ad Hoc Committees and Working Groups to facilitate Board activities. The Ad Hoc Committees on Public Communication and on Small Farms Research and Education are two examples.

The Advisory Board develops documents in the form of widely circulated special publications and annual reports, as well as recommendation letters to the Secretary of Agriculture. The Board's most recent *Transition Report* was sent to members of the transition team in early December and to Secretary of Agriculture Ann Veneman shortly after her appointment by President Bush. This report is attached for the record. It makes three recommendations which the Board believes would result in a flexible and responsive agricultural research and education enterprise with the capacity and focus to respond effectively to the needs and opportunities of producers and consumers, both at home and abroad.

**Board Accomplishments**

Mr. Chairman, during the last five years the Advisory Board has tried to address several important issues facing our country's agricultural research system. I'd like to talk briefly about several of those.

**I. Communications**
In a 1997 white paper on *Improving Public Understanding and Appreciation of Agriculture* and in the January 2001 *Transition Report*, the Advisory Board made a number of recommendations for improving communications, public information, and public education about agricultural issues. These documents are attached for the record.

An effective communication strategy should emphasize: 1) the importance of U.S. agriculture in the 21st century global economy, and 2) the importance of research and education in strengthening U. S. agriculture production and worldwide competitiveness. Past research and extension have harnessed new technology for the benefit of all society, made food safer, and developed new products. Potential for future advances is phenomenal through additional research and technological development.

**II. Key Priorities**
In September of 1997, the Research, Education, and Economics (REE) mission area of the U.S. Department of Agriculture completed a 5-year national strategic plan. The plan was written in response to the Government Performance and Results Act of 1993. It lays out the mission and national outcomes for the REE mission area and its respective agencies. This REE Strategic Plan incorporated advice from the Advisory Board, which was partly the result of stakeholder input at a Board-sponsored National Stakeholder Symposium and Regional Listening Session. The REE Strategic Plan was incorporated into the USDA-wide Strategic Plan for fiscal years 1997-2002.

A key accomplishment of the Advisory Board is a set of core priorities that address the REE Strategic Plan's national outcomes. Again, the Board solicited input from all segments of our food, forestry, and agricultural industries and from citizens concerned about the environment, rural America, human capacity building, advancing technologies, and a variety of other issues. These core priorities span a wide range of agriculture and food system issues and include:

- Added Value & New Use Products
- Agricultural Genomics
- Education and Information Access
- Preparedness and Response Capability to Emerging Animal and Plant Issues
- Environmental Stewardship
- Food Safety
- Human Nutrition
- Public Communication & Outreach (as an overarching priority)

In the following two years, special areas of emphasis were developed from these core priorities to assist USDA in its annual budget development for the Research, Education, and Economics mission area. The Advisory Board feels that the core priorities and subsequent areas of special emphasis track well with initiatives of USDA. Copies of these priorities are attached for the record.

**III. Peer Review**

The Agricultural Research, Extension, and Education Reform Act of 1998 required that the Board provide advice to the Secretary of Agriculture on several research, extension, and education activities that required peer and relevance review. They included Sec. 401 - Initiative for Future Agriculture and Food Systems; all competitively awarded extension or education grants administered by the Cooperative State Research, Education, and Extension Service (CSREES); and the Agricultural Research Service peer review system for intramural research.

The Board feels that merit review at USDA must address 1) the relevance and importance of the research to real world problems and issues, and 2) the quality of science proposed to address those issues. We believe that USDA's peer review process has shifted significantly over the past five years and now embraces both of these components. Over the past year, ARS has revamped its peer review system. The agency has been highly responsive to the Board's input and has invited Board members to observe panel reviews. The Advisory Board commends the ARS leadership for the development of a credible and impressive peer review process.

**IV. Stakeholder Input**

Continued stakeholder input ensures broad and diverse representation from the agricultural community on the goals and plans for USDA's Research, Education, and Economics mission area. By proactively soliciting and listening to the concerns of stakeholders, the Advisory Board has been able to provide sound, high-quality advice to the Secretary of Agriculture. Through symposia and listening sessions organized by the Board, USDA will continue to gain stakeholder input to identify the top priorities in agricultural research, education, extension, and economics.

The Board publishes and broadly disseminates the Proceedings of symposia and listening sessions to reflect stakeholders' views, needs, and visions for a successful research system. Both written and oral input are sought in this priority setting process.

**V. Adequacy of Funding of REE Portfolio**

The 1998 Agricultural Research, Extension, and Education Reform Act requires that, on an annual basis, the Advisory Board review the relevance of the REE priorities to the funding of all agricultural research, extension, or educational activities conducted or funded by the Department. This will be the third year for the Board to conduct this analysis and provide recommendations to the Secretary. The Board's findings clearly show that the REE funding level is not keeping up with agriculture's prominence as one of the largest sectors in the American

economy. Agricultural research is less than 2% of the overall federal R&D funding, yet more than 15% of the Gross Domestic Product (GDP) is derived from the agriculture, food and natural resource system.

The Board's review of Sec. 401, *Initiative for Future Agriculture and Food Systems,* of the 1998 legislation has been extremely positive. Sec. 401 demonstrates a proactive research and education approach to important problems and emerging issues, including priority areas such as: agricultural genomes; food safety and technology; human nutrition; new, value-added and alternative agricultural products such as bioenergy and nutraceuticals; agricultural biotechnology; forestry and natural resource preservation and sustainability; and farm efficiency and profitability. The program facilitates multistate, multi-institutional, and interdisciplinary partnerships. It helps leverage funds for the 1890, 1994, and other institutions that have not previously been successful in obtaining competitive grants. A summary of the USDA projects funded under this initiative is provided by CSREES for attachment to the record.

The Advisory Board is very supportive of this important program and has advised the Department to provide ongoing support and leadership in its funding, implementation, and accountability. The Board also strongly recommends that there be open competition across the broad science arena to attract the best and brightest scientists and technology available. This program epitomizes 21st century agricultural research and is a positive step forward for the public good.

The National Coalition for Food and Agricultural Research (National C-FAR) is a not-for-profit organization that is steadily growing in interest and membership. Terry Wolf, President of this coalition and guest speaker at the Board's National Stakeholder Symposium last week, has been instrumental in bringing together a diverse array of stakeholders, organizations, and societies in food, agriculture, and natural resources with the objective to *double the food and agricultural research funding*. This effort is patterned after the Illinois C-FAR. There is a high degree of commitment among this broad group of national stakeholders to speak with a single voice to increase public support for agricultural R&D. The Advisory Board fully supports the C-FAR effort.

**VI. More Interagency Cooperation in Research and Education**

The Advisory Board encourages USDA to continue developing partnerships across agencies within the Research, Education, and Economics mission area, across mission areas, and with other federal science agencies. This long-term effort will facilitate the sharing of knowledge and expertise and the leveraging of funds, as well as renew the balance of R&D opportunities across the science arena. Our March 2001 Stakeholder Symposium identified many agencies within USDA (such as the Natural Resources Conservation Service, Food Safety and Inspection Service, and Forest Service) as well as external government agencies (National Science Foundation, National Aeronautics and Space Administration, Department of Energy, and others) that are collaborating to generate the best science for the public dollars invested.

**VII. Human Resources**

U.S. agriculture takes pride in building human resources as part of its mission. The use of knowledge developed through research and education has been the key to American competitiveness in the global economy and to our quality of life. The land-grant university system is the primary source of the next generation of the agricultural workforce and public education about agricultural issues.

USDA is well-positioned through its partnerships with land-grant institutions, federal, state and local governments, community development organizations, and other groups to invest in human resources to advance our food, forestry, and agriculture system. USDA can assure human capacity development by providing Americans with new opportunities for lifelong learning, and by giving them the ability to access, manage, and use technologies for better decision making. Individuals of all ages and economic sectors (including under-represented groups, minorities, and at-risk families) need the educational opportunities to retrain and retool.

The Board continues to recommend that the 1890, 1994, and other under-represented institutions be included as strategic partners in agricultural research and education. It advised the Secretary to support the 2501 Program for its full funding authority of $10 million based on the program's tremendous success in assisting minority and other under-served groups in rural America. The Board has also strongly encouraged workforce preparation in its consultation to the Secretary.

**Unique Features of Agricultural Research**

The agricultural research system has three characteristics that make it unique among the research activities that are supported by the federal government. First, agricultural research involves very significant public goods — not only our food and fiber, but also the protection of our physical environment and the strength of our rural and export economies.

Second, there are severe geographical limits on the adaptation of agricultural innovations—what academics refer to as a limited sphere of inference. While agricultural research may pursue national goals, the results of soybean research in Michigan aren't necessarily going to be valid for soybean farmers in Mississippi. This requires a decentralized system that is in close communication with local users and clients.

Finally, advances in agriculture involve a high level of integration between basic and applied research, adaptation and development, and continuing support for producers and processors. This requires a unique degree of continuity and coordination among the research, extension and education functions of USDA.

**Issues**

These unique characteristics of the agricultural research system are reflected in the central issues that have emerged from the Advisory Board's deliberations. The first issue is the critical need to maintain and strengthen the core infrastructure of agricultural research. This involves not only the facilities and equipment that are the "bricks and mortar" of the enterprise, but also the partnerships between USDA and the land-grant universities that are its institutional foundation.

A related issue is to ensure that we have the human resources we need to conduct research and interpret and apply the results. Internships and summer fellowships can increase interest in agricultural research among high school students. Science majors from non-land-grant universities are an untapped pool of potential agricultural researchers.

Finally, it is critical that stakeholders have a prominent, ongoing role in setting priorities of agricultural research. This is clearly the best way to assure that the research, extension and education programs address critical needs and that they are accountable to users.

**Targets of Opportunity**

Several areas represent targets of opportunity that should be included in any set of future research priorities. These include the connections among food, nutrition, and health and the link between agriculture and environmental protection. A third target is the area of biomaterials and bio-energy. Another is preparedness, both for emerging infections and as a defense against bio-terrorism. There will be advances in other fields of science and engineering that can and should be applied to agriculture. A final target of opportunity is the whole question of consumer behavior and decision-making, which have broad effects on prices and markets. Support for data acquisition on food consumption and consumer behavior is especially important.

**Limitations**

The Advisory Board has also identified several ways in which USDA might change the way it currently does business. One suggestion is to provide greater flexibility in moving funds between programs as new priorities or opportunities emerge. A second is to increase the amount of interagency cooperation, both between USDA mission areas and with other research agencies such as NASA, NSF, and NIH to address areas of shared concern.

Mr. Chairman, this concludes my statement. Thank you and the Committee for your time and for the opportunity to be here today.

## DOCUMENTS SUBMITTED FOR THE RECORD

MARCH 27, 2001

**Statement by Senator Pat Roberts**
**Senate Agriculture Committee Hearing on Agricultural Research**
**March 27, 2001**

Mr. Chairman, I want to thank you for holding this hearing today. We often hear from many of our farm organizations and constituents regarding the importance of commodity and conservation programs to their operations. But, we cannot overlook the importance of agricultural research in today's world of agriculture.

Bottom line: U.S. agriculture today is a modern day miracle. We are producing more food and fiber on less land each year. At the same time the world's population continues to increase. If we are going to continue feeding a troubled and hungry world, we must continue our efforts in agricultural research.

We must also spread the important study that agricultural research is more than just increasing crop yields. It also entails developing new ways to improve the environmental friendless of farming activities, whether it is through the use of fewer pesticides, fewer fertilizers, or reduced tillage techniques.

Mr. Chairman, the task ahead of us in the area of agricultural policy is not easy. We are facing many short term needs that must be addressed. However, in our efforts to address problems in the near term, we cannot ignore the long term needs of agriculture as well. If we do not focus on important areas for the years ahead, what we do for today will not matter.

Agriculture research is one of the areas we must

continue to focus on for the future. Mr. Chairman, you have always been a strong supporter of continued agricultural research and I look forward to continuing to work with you in this endeavor.

Thank you.

OPENING STATEMENT
SENATOR THAD COCHRAN
March 27, 2001

Mr. Chairman, thank you for the opportunity to hear about agriculture research programs from our witnesses today.

The Senate Agriculture Committee has authorized all of the existing agriculture research programs. These programs are very comprehensive and have been very successful in promoting agricultural advances. However, I believe that some of our research programs are fragmented, and at times, are duplicative between agencies, as well as within agencies. We have a constricted amount of funding that can be spent on agriculture. In order to spend this amount wisely, the Agriculture Committee must study all of these programs, especially those authorized in the Agricultural Risk Protection Act of 2000 and the Agricultural Research, Extension and Education Reform Act of 1998.

I think it is advisable that we take this time to analyze all of the authorized research programs as we prepare to write the 2002 farm legislation. If the committee finds any duplication in these research programs, we will be able to address it at that time. We must use our limited government dollars effectively so that the future of agriculture is protected and our nation continues to benefit from these valuable research programs.

I welcome our witnesses here today and look forward to hearing their testimony.

*Testimony of*

**Jeff D. T. Barcinas, Ph.D.**
Chair, Federal Relations for the American Pacific Land Grant Institutions
Dean, College of Agriculture and Life Sciences
University of Guam

**Review of the Research, Extension and Education Title of the Farm Bill**
Senate Agriculture Committee
SR-328A Russell Senate office Building
March 27, 2001

Mr. Chairman, members of the Committee, I would like to thank you for the opportunity to submit written testimony on behalf of the land grant universities and colleges in the U.S. Territories of American Samoa, Guam, the Commonwealth of Northern Mariana Islands, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands. The College of Micronesia Land Grant Program is also included with our group. It serves the independent and freely associated nations formed from the former Pacific Trust Territories of the United States: the Federated States of Micronesia, the Republic of the Marshal Islands and the Republic of Palau.

I would like to begin by associating myself with the testimony offered by my colleague, Dr. David Chicoine, Chair of the Board on Agriculture of the National Association of State Universities and Land Grant Colleges (NASULGC). The Territories are members of the Board on Agriculture and we support the Board's policy recommendations. I also support the testimony of Dr. Bobby Phills, Chair of the 1890 Legislative Committee in regard to the need for increased investments for the minority serving institutions.

**Land Grant Colleges in the U.S. Territories**

Our universities and colleges became land grant institutions in the 1970s. We could be called the 1972 institutions, to distinguish us from our colleagues of the 1862, 1890 and 1994 institutions. In regards to general governing authorities, we are classified as 1862 land grants. With regards to our focus on the needs of minority communities, underserved populations, and our comparative lack of critical resources, we are more like the historically black 1890s institutions and the 1994 Tribal Colleges. However, because each of our territories has a unique set of relationships with the U.S. Federal Government, we face pressing challenges and needs that set us apart from all of our colleagues.

Moreover, there are several commonalities that differentiate and unify our group. First, we are all located in the tropics, and are therefore the only U.S. land grant institutions that serve a populace in a truly tropical setting. Residing on islands, we are geographically dispersed with vast distances separating us, which stretches the capabilities of our programs. Second, none of the economies in which we exist have reached developmental parity with the 50 States. Third, the populaces we serve have very different cultural and linguistic histories from the 50 States. Finally, we have no elected representation in the Senate and only a non-voting presence in the House of Representatives. We generally rely on NASULGC and the generosity of certain members of the Universities in your various states to speak for us in the Senate. We are sincerely grateful for our opportunity to provide this testimony. We thank you.

**State Matching Requirements and the U.S. Territories**

In the passage of the 1998 Agricultural Research, Extension and Education Reform Act (AREERA), provisions were enacted that required the land grant universities to match federal formula funds with state-based funding. The 1862 institutions were required to provide a one-to-one match. Since most states provide several times the level of federal funding to their land grant colleges, this was not a hardship for most institutions. The 1890 institutions, however, have historically enjoyed less support from their state governments and a one-to-one match was seen as both a challenge and an opportunity. The opportunity was that the 1890s might be able to leverage this requirement into increased state support for their programs. The challenge was that if an 1890 university failed to obtain this match, they could loose even their federal support. The solution in 1998 was to require that the states ramp-up to providing a 50% funding match for their 1890 institutions. The Secretary of Agriculture was allowed under defined conditions to waive this matching requirement at the beginning of the new program.

This state matching requirement proved a great challenge for many of the Territorial land grants. Under our authorizing legislation, we are considered as 1862 institutions, but the one-to-one match was simply impossible for most of us. As we understand it, language was provided in a subsequent appropriations bill that stated that for the purposes of matching requirements, our institutions in the U.S. Territories would be treated as 1890 institutions. Accordingly, we were required to ramp up to a 50% match rather than a 100% match. Some of our institutions have been able to meet the 50% match, for others it has been a great hardship.

Our potential difficulties are compounded by the 1890 proposal to ramp up their state matching requirements over the next five years to a one-to-one match We recognize that this proposed increase in state matching requirements may help the 1890 institutions leverage state resources. However, the economies of U.S. Territories are generally small in scale and struggling. We have reviewed the circumstances of each of the Territorial land grants and we find we have three distinct situations. We have two colleges that are able to make the one-to-one match. We have several colleges that can make a 50% match, but cannot make a one-to-one match. And, we have several colleges that cannot make the current ramp-up requirements to a 50% match. The colleges that cannot make the one-to-one match, or even the 50% match, will be in severe peril under the proposed increase to a one-to-one match. If no additional matching funds become available, their programs stand to loose one-half of their federal funds, equaling 33% of their base budgets. A reduction of this magnitude would result in severe cutbacks of personnel and services and would jeopardize the integrity of their programs at a time when the communities that they serve are in vital need of the new technologies and skills provided by the land grant system.

We support the principal of matching federal funds with local funds. However, because the economic resources of U.S. Territories are very different from one Territory to the next, we ask that the Congress consider a two-level matching system. The first level would require a one-to-one match and the second level would require at 50% match. In addition, we recommend that the Secretary of Agriculture be allowed to waive the matching requirement all together under special circumstances. The level of the matching requirement and the possibility of a waiver would be determined by some calculation that would take into account the amount of local funds available to the College. We would be happy to work with the Congress and the Department of Agriculture to work through the details of this proposal. The advantage of this proposal is that it does support local matching funds to the maximum level that is possible, while allowing enough flexibility to adapt to the realities of local circumstances. We request your serious consideration of this proposal.

**Capacity Building**

Similar to the Tribal Colleges and the1890 institutions, we have a tremendous need for capacity building and sustained program funding to address the unique needs of the communities we serve. We support competitive grants, but our institutions must have resources and time to build a true capacity to compete at the national level. In the meantime, we must conduct research and education programs designed to meet the unique environments and social conditions on each of our many and varied islands.

***Facilities and Equipment***

We request the creation of a Facilities and Equipment grant program to enable us to address our unique facilities and equipment needs in the U.S. Territories. This program could be modeled after the 1890 Facilities Grant Program. We recommend authorizing this new program at not less than $8 million per year. This program would assist us in upgrading and rehabilitating the physical facilities of our institutions that have suffered from years of benign neglect.

***Human Capacity Building***

We recommend establishing a Capacity Building Grants Program for the Territorial Land Grant Universities and Colleges at a funding level not less than $4 million dollars per year, modeled after the 1890 Capacity Building Grant Program. This program will allow the territories to improve the educational attainment of our existing faculty and to attract new faculty. It will aid us in improving the quality of our research, extension and teaching programs for the benefit of our citizens and clientele.

***Long Distance Education***

Lastly, we recommend creating a Long Distance Education Grants Program for the Territorial Land Grant Universities and colleges at a funding level of not less than $4 million per year. Such a program would have immediate impact. For the first time in our history, the territorial land grants would be able to deliver adequate educational opportunities at an affordable price to people living in very isolated areas. Our institutions have a unique and obvious need for enhanced long distance education capabilities. We need funding support to acquire enhanced satellite and Internet-based telecommunications capabilities. We need funding support to develop program content that addresses our unique geographic, biological and cultural conditions.

**Looking Ahead**

Again, I would like to thank the Committee for the opportunity to provide this testimony. We look forward to working with you and our colleagues in the university community as we move through the reauthorization of the Farm Bill. We urge you to consider continuing your long-term investment in the unique programs and services provided by your land grant universities in the U.S. territories.

*For the Directors of the Land Grant Programs at:*

American Samoa Community College
College of Micronesia Land Grant Program, *which includes:*
College of Micronesia, Federated States of Micronesia
College of the Marshall Islands

Palau (Belau) Community College
Northern Marianas College
University of Guam
University of Puerto Rico at Mayaguez
University of the Virgin Islands

# STATEMENT OF
# THE AMERICAN SOCIETY OF PLANT PHYSIOLOGISTS
# BEFORE THE
# COMMITTEE ON AGRICULTURE, NUTRITION AND FORESTRY
# UNITED STATES SENATE
# MARCH 27, 2001 COMMITTEE HEARING ON
# THE RESEARCH, EXTENSION AND EDUCATION TITLE OF THE FARM BILL

Mr. Chairman, the American Society of Plant Physiologists representing 6,000 plant scientists, appreciates this opportunity to submit comments to the Committee for its consideration in reauthorization of the Research, Extension and Education Title of the Farm Bill.

The current Research Title authorized by the Committee and Congress has proved essential to meeting the increasing needs of Americans and our trading partners for food and fiber. Reauthorization of the National Research Initiative Competitive Grants Program (NRI) in the current title has provided the agricultural research community with a highly acclaimed program that determines awards through a rigorous peer review process.

The National Research Council Board on Agriculture and Natural Resources committee report on the NRI last year strongly endorsed support for this competitive grants program. The NRC committee "found the NRI to have financed high-quality scientific work within congressional guidelines....The committee reiterates the extraordinary importance of public merit-based peer-reviewed research in food, fiber and natural resources. In the committee's opinion, past public research and current private activities cannot meet the needs that are being created by population growth, climate change and natural resource deterioration or the challenges related to food safety and nutrition and to the growing convergence of foods and medical research."

The NRC committee recommended that a major emphasis of the NRI continue to be the support of high-risk research with potential long-term payoffs. Much of this research would be classified as fundamental in the traditional use of this term. The NRC committee also recommended a more than quintupling of support for the NRI to better meet the nation's growing demands on agriculture.

A major conclusion of the NRC committee was that, "Without a dramatically enhanced commitment to merit-based peer-reviewed, food, fiber and natural resources research, the nation places itself at risk."

In addition to the direct benefits to farmers and consumers that result from the-leading research discoveries sponsored by the NRI, increased support for the program would help maintain the strength and vigor of the nation's agricultural research community. In the competition to attract students completing undergraduate programs majoring in the life sciences, graduate programs related to agriculture in the plant sciences and other life science disciplines must compete directly with graduate life science programs receiving substantial medical research support.

The more than $20 billion in research support awarded by the NIH in Fiscal Year 2001 serves as a powerful magnet attracting life sciences students, some of whom had

considered pursuing a career in research related to agriculture. Pursuit of a career in any science discipline is made possible by availability of funds to conduct research. The President's requested increase for NIH for Fiscal Year 2002 is $2.8 billion and the Congress may exceed this request. We applaud Congress for this strong support for medical research sponsored by NIH.

In comparison, the NRI is funded at $106 million in Fiscal Year 2001. Despite the 200 to 1 ratio of disparity in figures between support for the NIH and NRI competitive grants programs, the existence of the NRI offers students considering careers at universities in agricultural research some hope that they still may be able to compete for grant awards and pursue research in agriculture.

It is not known how future growth in the ratio of federal dollars supporting competitive medical research over agricultural research will affect recruitment of life sciences students to graduate programs related to agricultural research, but a look at projected ratios could help in drawing assumptions. Some project that the ratio of disparity in funding for NIH and NRI may grow to 230 to 1 for Fiscal Year 2002. If past research budgets are indicative of future budgets, the ratio of disparity in funding between the NIH and NRI may grow to well over 260 to 1 the subsequent fiscal year. With each increase in the multiple of disparity in support for medical research competitive grants compared to agricultural research competitive grants, the power of the magnet attracting undergraduate students in the life sciences to careers in medical research likely becomes that much stronger.

There can be more hurdles, however, with pursuing a career in agricultural research based on hope for needed competitive grants support. For example, there are times when scientists survive intense competition to win an award from the NRI only to find that their university administrators ask that they not accept the award because it does not cover the university's indirect (overhead) costs for the research. Some administrators with limited budgets of their own note they are forced to "find some way to eat the costs" if the NRI award is accepted.

Fortunately, in many cases, the administrators do find ways to cover the indirect costs not covered by the NRI grant and the meritoriously awarded research is conducted. Students at the time they are considering selection of graduate programs in the life sciences related to agriculture are generally unaware that they may one day survive intense competition to win an NRI grant award that their administrator will subsequently ask them to refuse because it doesn't cover overhead costs. If this fact became more widely known, even more life sciences students would likely opt instead for careers in medical research or other areas outside of agriculture. Students are aware that promising new research careers at universities can end unceremoniously when research grant funds are not obtained.

ASPP strongly supports the NRC committee recommendation that overhead cost limits for NRI awards be increased in the revision of the Research Title above the current 19 percent to levels used by other federal research agencies. The NRC noted that it is not aware of any other federal merit-based, peer-reviewed research program with such a congressionally mandated limit on overhead rates found at the NRI.

More than a generation ago, students could enter graduate study in life sciences disciplines related to agriculture at land grant colleges and receive needed support to conduct research. Reduction in real dollars in formula funds support and increasing costs

of conducting modern research require scientists at land grant colleges and other educational institutions to win support in the form of competitive grants or in some instances, cooperate with interests seeking special federally sponsored grants. Competitive grant awards selected on the basis of merit as determined by peer-review panels results in the best research being conducted. We encourage the Senate Committee on Agriculture, Nutrition and Forestry to continue its leadership in support of the NRI.

The science community appreciates the leadership of the Senate Agriculture, Nutrition and Forestry Committee in supporting merit-based research sponsored by the NRI. We strongly urge the reauthorization of the NRI in your considerations of the Research Title.

The Committee on Agriculture, Nutrition and Forestry made a major contribution to strengthening the nation's agricultural research community with the inclusion of the Initiative for Future Agriculture and Food Systems (IFAFS) in the current Research Title. IFAFS has provided grants at levels that enable scientists of different institutions and disciplines to work together in addressing important research questions. Priority areas of study in genomics and biotechnology supported by IFAFS will allow plant scientists and other scientists to take new more effective approaches to addressing problems facing agriculture. ASPP urges the Committee to include IFAFS and IFAFS priority areas of research such as plant genomics and plant biotechnology in the Research Title revision.

As sought by the Committee, increased emphasis on merit review procedures for research has been followed by the Agricultural Research Service (ARS). The ARS continues to address effectively many important research questions for American agriculture. American farmers and consumers are well-served by the large number of successful research efforts of ARS scientists. Continued support for a balanced research portfolio in the Department including intramural and extramural research is needed to address the many and sometimes devastating problems farmers face in growing crops and livestock.

ASPP supports the request of the National Coalition for Agricultural Research (National C-FAR) to double support for agricultural research over five years – a rate of increase averaging more than 14 percent a year. We encourage the Committee to include this goal to double support for agricultural research in the Research Title. The rewards to American farmers and consumers would be much higher than the $2-billion increase over five years such a doubling would bring.

What could be done with this requested increase in funding? In the plant science area alone, we know that extraordinary advances can be achievable with sufficient support and time. Increased funding can be expected to shorten the time in which advances could be made. The age of genomics and biotechnology has brought revolutionary new tools to plant scientists to better serve the needs of agriculture. Following this paragraph is a look back to what has happened in agriculture in the past century to offer some guideposts for a look ahead to the new century before us. The look ahead includes projections of what may be expected to be achieved earlier or later in this new century depending upon levels of support. We appreciate the assistance of ASPP Education Foundation Chairman Bob Goldberg, Professor at the University of California, Los Angeles, and founding editor-in-chief of the widely cited science journal, *THE PLANT CELL*, for his contributions to this following look back and ahead for plant science and agriculture.

Starting with the year 1900, we find that Mendel's laws of genetics were not widely understood. The tools and knowledge base of those studying plants at the time are now seen as quite primitive. The study of Botany focused more on the classification of species of plants. The study of plant physiology within Botany to learn more of the structure and functions of plants would not emerge as a strong separate discipline until the end of the first quarter of the century.

Despite the modest state of plant science and agriculture in 1900, the ensuing 100 years reaped increases in crop yields in the range of 300 percent. In addition, the number of Americans needed to work on farms to produce food for the rest of us dwindled from one in two people to nearly one in 100.

Along the way, developments in the area of plant breeding, genetic engineering, genomics, irrigation, use of fertilizers, computers, and other advances helped transform plant science, American agriculture and the nation itself.

For the 21st Century, plant scientists predict even more impressive gains – gains for which there is a definite need. In the next 50 years , we will have to produce more food than has ever been produced in the collective history of people on earth. On a world scale, agricultural productivity on a per capita basis is on a decline as we begin the 21st Century. Today we have hunger even in parts of prosperous nations like the U.S.

At the same time, the world is near the limits of available land and other resources for agriculture. More environmentally benign agricultural practices and more productive plants will be needed. In addition to demands on cropland for food, there will be increased demands on farmers to grow energy feedstocks. Some plant scientists predict that plants will rival petroleum for the production of industrial chemical products such as polymers, polyurethane, nylon and other materials. New high value energy crops will provide new profitable markets for American farmers who will become less dependent on government subsidies.

Major crops will be genetically modified to fix nitrogen as is now found in legumes, leading to less use of applied fertilizers and a cleaner environment. Dead zones in the Gulf of Mexico and other cases of contaminated waterways reportedly linked to agricultural runoff would be remedied through use of engineered crop plants that can fix nitrogen.

The lines between agricultural research and medical research will blur as advances in plant science will address nutritionally related human health diseases on a mass public health scale. Calcium deficiency is common in the diets of American adolescents, particularly girls, leaving many with less dense bones more susceptible to fracture and osteoporosis later in life. Foods commonly eaten by children will be engineered by plant scientists to contain higher levels of calcium. A number of common mineral and vitamin deficiencies in diets causing various maladies for people here and abroad will be addressed by enhanced foods engineered by plant scientists. Anemia, the most widespread ailment related to nutritional deficiency in the developing world, will be addressed by a new "Golden Rice" with higher levels of usable iron. This rice will also contain higher levels of *beta carotene* which converts to Vitamin A after human consumption. This enhanced rice could prevent 500,000 cases of child blindness annually.

Millions of Americans and many more people overseas have allergies to proteins in widely consumed existing foods such as wheat and milk. ASPP Past President Bob Buchanan of the University of California, Berkeley, who was honored with the opportunity to testify before this Committee in October of 1999 on his research, is already finding success in laboratory experiments that are eliminating allergens in wheat and milk. He has identified a number of other foods that could be made safer for consumption through this research using biotechnology. Millions of cases of allergic reactions to foods will be averted through these genetically enhanced foods. High value, allergen-free wheat and other commodity products will be grown by American farmers who will find new premium markets for their products.

Plants have long been a major source of pharmaceutical products. As plant scientists combine use of modern transformation technologies with increased knowledge of plant genomes, many more life saving medicines will be developed. Some of these plant-based pharmaceutical products will take the form of edible vaccines – such as bananas genetically engineered to produce a vaccine for hepatitis B or deadly infant diarrhea.

Genomics will help in understanding hybrid vigor to produce enhanced, higher yielding crops. Plant scientists will learn how to change the size and number of plant seeds and organs. The earliest events controlling plant reproduction will be understood.

Scientists may learn how to engineer plants that will better capture higher levels of carbon dioxide in the atmosphere for use with the sun's energy in photosynthesis, leading to faster growing plants and possibly an additional harvest season for some crops.

Plants engineered to tolerate higher levels of salinity will help farmers salvage more of their crops in dry seasons. Increased tolerance of future engineered plants to environmental stresses of cold and freezing will be a boon to the horticultural industry and other growers. The federal government will experience savings in emergency spending for crop disasters – some disasters that will be avoided through use of new, enhanced plants.

Just as we found in the century past, the advances in the 21st Century will transform plant science, American agriculture, the nation and world our grandchildren will inhabit. Indeed, this transformation will have to occur because the well-being and even survival of many in future generations will require it.

Again, thank you for this opportunity to submit comments to the Committee. We appreciate your strong leadership on behalf of farmers and the six billion people of the world who benefit from agricultural research you make possible.

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