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HEARING TO REVIEW AGRICULTURE RESEARCH PROGRAMS

HEARING

BEFORE THE

SUBCOMMITTEE ON CONSERVATION, CREDIT, ENERGY, AND RESEARCH

OF THE

COMMITTEE ON AGRICULTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

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HEARING TO REVIEW AGRICULTURE RESEARCH PROGRAMS

THURSDAY, MAY 10, 2007

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON CONSERVATION, CREDIT, ENERGY, AND RESEARCH,
COMMITTEE ON AGRICULTURE,
Washington, D.C.

The Subcommittee met, pursuant to call, at 10 a.m., in Room 1300 of the Longworth House Office Building, Hon. Tim Holden [Chairman of the Subcommittee] presiding.

Members present: Representatives Holden, Herseth Sandlin, Cuellar, Costa, Ellsworth, Space, Walz, Scott, Salazar, Gillibrand, Kagen, Peterson (*ex officio*), Lucas, Fortenberry, Schmidt, Moran, and Bonner.

Staff present: Nona Darrell, Craig Jagger, Tyler Jameson, Rob Larew, Merrick Munday, John Riley, Sharon Rusnak, Anne Simmons, Debbie Smith, Kristin Sosanie, John Goldberg, Josh Maxwell, and Pete Thomson.

OPENING STATEMENT OF HON. TIM HOLDEN, A REPRESENTATIVE IN CONGRESS FROM PENNSYLVANIA

The CHAIRMAN. This hearing of the Subcommittee on Conservation, Credit, Energy, and Research to review agricultural research programs will come to order. Good morning, everyone. I would like to welcome all of you to today's hearing and I hope it will provide a useful review of agricultural research programs.

The farm bill hearings we held across the country last year showcased the importance of an increasing demand for agricultural research. Specialty crop growers called for additional and enhanced research programs to maximize their production and efficiency. Other farmers wanted more funding for research on conservation practices. Even more producers asked us for increased research and development on renewable energy. Clearly the fundamental need for research spans across several different commodities and various agricultural sectors. Currently several agencies within USDA, state partners and private organizations conduct the bulk of agricultural research. Recently revised calculations on the rate of return on Federal investment in agricultural research is estimated to be 6.8 percent per year. So these programs are not only in high demand with users, but they are fiscally responsible as well.

Agricultural research, education, and extension programs are also essential elements in increasing agriculture productivity so that farmers can continue to provide American's with a safe and

reliable supply of food, fiber and fuel they have come to expect. Advances in agricultural science are important to increasing farm profitability, continuing agricultural viability, competing in the international marketplace, improving nutrition and protecting the environment. As we write this new farm bill, we must ensure that the integrity of these programs remains intact and the organizations involved can continue their successful work.

In these times of budgetary constraints, the proposals to consolidate or rearrange programs within USDA may be very helpful in enhancing cooperation and streamlining research to save the taxpayers' dollars. But we must be cautious in these changes and ensure that the quality and function of the programs are not compromised in that process. We must be innovative in meeting all of the different research needs and adapting to the increasing demand for newer areas addressing topics like organic farming and global climate change. Research is an important investment in our future.

I look forward to hearing the witnesses' suggestions on how we can best support the agricultural research community and continue to support the scientists doing this important work.

[The prepared statement of Mr. Holden follows:]

Statement by
Congressman Tim Holden
Hearing to Review Agricultural Research Programs
Subcommittee on Conservation, Credit, Energy, and Research
May 10, 2007

I would like to welcome everyone to today's hearing. I hope it will provide a useful review of agricultural research programs.

The farm bill hearings we held across the country last year showcased the importance of, and increasing demand for, agricultural research. Specialty crop growers called for additional and enhanced research programs to maximize their production and efficiency. Other farmers wanted more funding for research on conservation practices. Even more producers asked us for increased research and development on renewable energy. Clearly, the fundamental need for research spans across several different commodities and various agricultural sectors.

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As we write this new farm bill, we must ensure that the integrity of these programs remains intact and the organizations involved can continue their successful work. In these times of budgetary constraints, the proposals to consolidate or rearrange programs within USDA may be very helpful in enhancing cooperation and streamlining research to save taxpayer dollars. But we must be cautious in these changes and ensure that the quality and function of the programs are not compromised in that process. We must be innovative in meeting all of the different research needs and adapting to the increasing demand for newer areas addressing topics like organic farming and global climate change.

Research is an important investment in our future. I look forward to hearing the witnesses' suggestions on how we can best support the agricultural research community, and continue to support the scientists doing this important work.

The CHAIRMAN. I now recognize the Ranking Member, my good friend, Mr. Lucas from Oklahoma, for an opening statement.

OPENING STATEMENT OF HON. FRANK D. LUCAS, A REPRESENTATIVE IN CONGRESS FROM OKLAHOMA

Mr. LUCAS. Thank you, Mr. Chairman, and thank you for holding this hearing. As I understand it, this hearing is the last one our Subcommittee will hold before we begin marking up the various titles of the farm bill. This should not be taken as any type of a message about where research fits into this Committee's priority list. In fact, I think I can safely say that among the various issues we deal with, research seems to be at or near the top of every list of priorities.

Agricultural research has played a critical role in the increase in agricultural productivity since the mission was first established in 1862. Advances in the basic and applied agricultural sciences are considered fundamental to increases in farm sector profitability, to competitiveness in the international agricultural trade, and to improvements in human nutrition and food-related health.

According to a recent CRS report, as the Chairman just noted, the rate of return on Federal investment in agricultural research is estimated to be 6.8 percent a year. While most of what we do here tends to focus on the big picture, it seems that every organization who expresses an interest in research tends to focus on their own interests. Even the research community itself has tended to do this. Debate over research has always been about how much money is needed for their project or program, not always about the mechanism of delivery or the structure of how we establish priorities. This Committee, however, does not allocate money for discretionary programs. That is the job of the appropriators. Our job is to design the best policy to ensure that funds made available for research are used in the most efficient manner.

I am pleased to see that we have several proposals from the research community on what they would like included in the research title of the farm bill. These are some of the most aggressive and forward-thinking policy initiatives I have seen regarding agricultural research. I am very interested in today's hearing discussions about the pros and cons of each of the proposals that have been submitted. However, we must remember that farmers and ranchers across America are the main audience for the majority of agricultural research. If we decide to proceed with any type of reorganization, then we must ensure that our farmers and ranchers continue to benefit from what is being done in agricultural research.

Once again, Mr. Chairman, thank you for holding this hearing and I yield back.

[The prepared statement of Mr. Lucas follows:]

Agriculture Committee Republicans
Bob Goodlatte
Ranking Republican
1305 Longworth House Office Building
Washington, DC 20515, (202) 225-0029
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Opening Statement of Ranking Member Frank Lucas
Subcommittee on Conservation, Credit, Energy and Research
Hearing to review agricultural research
May 10, 2007

Thank you Mr. Chairman for holding this hearing.

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LUCAS STATEMENT
PAGE 2

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The CHAIRMAN. Well, I thank the Ranking Member and the chair will recognize the Chairman of the Full Committee, Mr. Peterson.

OPENING STATEMENT OF HON. COLLIN C. PETERSON, A REPRESENTATIVE IN CONGRESS FROM MINNESOTA

Mr. PETERSON. I thank the gentleman and I want to thank him for his leadership, and the Ranking Member, on this issue and others that they have been working so diligently on, and thank you for calling this hearing.

It is not often in this business that people from all different sectors of agriculture ask us for the same thing, but as we heard from producers over and over again in the hearings around the country, a solid commitment to research is essential to their economic future. Research needed to increase competitiveness, enhance environmental stewardship and improve human health while sustaining the high quality of our food supply. As we begin to write the next farm bill, the most important thing to keep in mind is coordination. And with the budgetary restraints that we are currently facing, I am not interested in funding multiple projects with the same purpose. We need to ensure that our system fosters coordination and that everyone in the research community is working together to accomplish their goals and sharing the tools and the information that is needed to produce the best results.

One of the topics that we heard most about is renewable energy. Research is already an essential part of the growing market for agriculturally-based fuels and I would like to find new ways to produce crops that yield more biofuels per acre and fund research that will take us to the next level of efficiency for biofuel production. We need research to help us expand production on herd feedstocks to ensure that the supply of corn meets the needs of all agricultural interests, and we need to continue to improve the methods for converting switchgrass and biomass, such as wood chips, switchgrass, warm season grasses in my part of the world, into cellulosic ethanol.

I look forward to hearing today from the witnesses on how our research programs can continue to find new and improved ways to provide America with a safe and abundant supply of food, fiber and energy. And I thank the witnesses for being with us today.

[The prepared statement of Messrs. Peterson, Goodlatte, Walz, and Kagen follow:]

Rep. Collin C. Peterson
Opening Statement
Hearing to Review Agricultural Research Programs
Subcommittee on Conservation, Credit, Energy, and Research
May 10, 2007

Thank you Mr. Chairman, and thank you for calling this hearing.

It's not often in this business that people from all different sectors of agriculture ask us for the same thing. But as we heard from producers over and over again in the hearings around the country – a solid commitment to research is essential to their economic future.

Our research is needed to increase competitiveness, enhance environmental stewardship, and improve human health while sustaining the high quality of our food supply.

As we begin to write the next farm bill, the most important thing to keep in mind is coordination. With the budgetary restraints that we are currently facing, I'm not interested in funding multiple projects with the same purpose. We need to ensure that our system fosters coordination and that everyone in the research community is working together to accomplish their goals and sharing the tools and information that they need to produce the best results.

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I look forward to hearing from the witnesses on how our research programs can continue to find new and improved ways to provide America with a safe and abundant supply of food, fiber and energy.

Opening Statement of Ranking Member Bob Goodlatte
House Committee on Agriculture
Subcommittee on Conservation, Credit, Energy, and Research
Hearing to review agriculture research
May 10, 2007

Thank you, Mr. Chairman, for convening this hearing.

As I understand it, this will be among the last hearings the Agriculture Committee will hold before we begin marking up the various titles of the farm bill. This should not be taken as any type of message about where research fits on this Committee's priority list. In fact, I think I can safely say that among the various issues we deal with, research seems to be close to the top of everyone's list of priorities.

Debate over research has seems to be more about "who gets what" rather than the mechanism of delivery or the process used to establish research priorities. This Committee does not allocate money for discretionary programs; that jurisdiction falls under the domain of the Appropriations Committee. Our job, as Members of the Agriculture Committee, is to design the best policy possible to help ensure that the funds made available are used in the most effective manner.

I am encouraged that the individuals within the research community have developed some of the most aggressive research policy initiatives that I have seen.

While I am very interested to hear today's discussion on the pros and cons of each of the proposals that have been submitted, I am curious why we are not hearing from the end users of the research product.

After all, if this Committee proceeds with a dramatic reorganization of the research infrastructure without the benefit of hearing how it might impact farming in practice, it is farmers and ranchers who stand to lose the most. I hope in the coming days that the farm groups will weigh in on their hopes and dreams and fears about these research title proposals. And if they do, Mr. Chairman, I hope you will consider an additional hearing so that their positions can be properly vetted by this Committee.

Mr. Chairman, thank you again for holding this hearing. I yield back.

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WORD COUNT: 321

Statement for the Record for Congressman Walz

Mr. Chairman, Ranking Member Lucas, I want to thank you for holding this hearing today into such an important area.

American agriculture is successful in part because of the robust investments into agricultural research that our country makes. And I believe that's what this spending is: an investment. In many cases, public funding for vital agricultural research has given our producers access to new crop breeds, new planting strategies, and new technologies that have made the American farmer the most productive and efficient in the world.

An important partner in this research have been our public universities, particularly the land grant schools. Our land grant schools have a long history of supporting American agriculture and they should be very justly proud of their role.

I want to point out one particular research project to emphasize what I'm talking about.

Because of soil conditions, soybeans grown in the U.S. tend to be lower in oil and protein levels than soybeans grown in South America. Researchers have been trying to improve protein and oil levels through breeding, but they've found that improving one trait usually leads to a decrease in the other trait. That is, through breeding they can get the oil to go up, but the protein goes down.

At the University of Minnesota's Agricultural Research Service facility, they are conducting research into the genome of the soybean. If they can crack the secret of the genome, then they can learn how to develop a soybean breed with high levels of both oil and protein. That makes American producers more competitive with South American soybeans, particularly for important international markets.

This is the type of research that goes on each and every day at our ARS facilities. This is what we should be supporting.

We are here today to listen to testimony about how to move agricultural research forward. I think all of us today would agree that additional investments into this research are needed, but there are some disagreements about how the money should be doled out and who should be on the receiving end. I'm looking forward to hearing from our witnesses today about how USDA's agricultural research should be structured.

Thank you again, Mr. Chairman, for holding this hearing.

Mr. Kagen
CCER hearing
May 10, 2007

Opening Statement

Chairman Holden, thank you for having this hearing today. For many years, America was able to rely on our fertile soil and abundant resources to gain the competitive edge on the rest of the agricultural world. While we are stilled blessed with these advantages, nations around the world are incorporating cheaper land and labor, as well as modeling the approaches American farmers and scientists have proven to work. As bilateral and multilateral trade negotiations continue to arise, so does the pressure place upon the US agricultural sector.

We must continue to utilize our ingenuity and innovation to research new approaches to maximize our agricultural potential. Agricultural research provides some of the greatest return on the government's investment. I look forward to discussing with our panels how we can best direct our research dollars, and maintain our traditional position in the world while embracing new approaches.

The CHAIRMAN. Well, I thank the Chairman. We would like to welcome our first panelist to the table today, Dr. Gale Buchanan, the Under Secretary for Research, Education and Economics for the United States Department of Agriculture. Dr. Buchanan, welcome and you may proceed when you wish.

STATEMENT OF DR. GALE BUCHANAN, UNDER SECRETARY FOR RESEARCH, EDUCATION AND ECONOMICS, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.

Dr. BUCHANAN. Thank you very much, Chairman Holden, Ranking Member Lucas, and other distinguished Members of the Committee. It is really a great pleasure for me to have the opportunity to be here this morning to discuss the Department of Agriculture's Research, Education and Economics Program that is provided for in Title VII of the Administration's 2007 Farm Bill proposals.

In my 40 plus years in agriculture research and administration, I have never seen such exciting times associated with such great opportunities in agriculture. We are experiencing a new paradigm in agriculture, one that we haven't seen before in our history. American agriculture is rapidly moving from a mission of producing food, feed and fiber to food, feed, fiber and fuel for energy for this Nation. To meet this challenge and exceedingly high expectations are parallel needs for research, education, and extension that are the responsibility of the research, education and economics mission area of the U.S. Department of Agriculture.

Science has served as a vitally important foundation for our Nation's agricultural system, where there has been excellent success in the four agencies that I have responsibility for. We must continually improve on this strong foundation to maintain our global leadership in agriculture for the future. This is imperative if this Nation's agricultural system is to continue to be a world leader and respond effectively to the ever-evolving changes in consumer demands, increasing pest threats, changing world markets, and droughts and other natural factors. We must seize the opportunity to provide science-based solutions to these challenges.

The Administration's Title VII of the 2007 Farm Bill proposal focuses on several targeted high-priority national needs. It also provides for an organizational structure to better position our programs to meet the needs of U.S. agriculture in the future. My written testimony describes all of the Administration's research title proposals. I will focus my oral remarks on reorganization, bioenergy and specialty crops.

The organizational structure of our programs has served us well in the past. However, we have a responsibility to strive continuously to improve their efficiency and effectiveness, therefore we must make some changes to ensure our success in the future. We started this process of developing a new structure by first establishing the goals we wish to accomplish. We then did an assessment of our current organization, followed by developing principles to guide us in the development of a new organizational structure. The final step was to identify the desired outcomes of such a reorganization.

Looking to the future, the Administration proposes to create the Research, Education, and Extension Service through the merger of

the U.S. Department of Agriculture's Agricultural Research Service and the Department's Cooperative State Research, Education, and Extension Service. The new agency would be under the leadership of a chief scientist who would have overall responsibility for both intramural and extramural research and related programs. All current formula funding authorities, including those for Hatch, Smith-Lever, McIntire-Stennis, 1890, 1994, Hispanic Serving Institutions, would be retained in their present form.

Probably the greatest advantage of a merger of ARS and CSREES would be in having a single national program staff rather than two distinct, separate staffs as we have now for each agency. A single national program staff would greatly facilitate coordination and planning as well as enhanced stakeholder interaction with the Department. Combining the two national program staffs would also yield an enhanced degree of critical mass required to support program planning. A single national program staff would provide for better coordination and prioritization of research and linkage with extension and educational programs in agriculture. We are also proposing a name change for the mission area, from Research, Education and Economics to Office of Science. Such a name change better describes the foundation of our mission area.

I would also like to touch on two major research initiatives included in the Administration's farm bill proposal, agricultural bioenergy and bio-products, and specialty crops. First, there is $50 million in annual mandatory spending proposed for the creation of the Agricultural Bioenergy and Bio-Based Products Research Initiative. This would enhance the production and conversion of biomass to renewable fuels and bio-products. This new initiative would focus research and development efforts on two objectives. The first is to improve biomass production and sustainability, and second, improving biomass conversion in biorefineries to products that would be useful in various energy needs for agriculture and society. Since the sun is our most reliable source of energy and agriculture's business is converting the sun's energy into things useful to man, it is quite clear to me that agriculture will and must play a vital role in our Nation achieving a greater degree of energy security.

The Administration is also recommending the establishment of a Specialty Crops Research Initiative supported by $100 million in annual mandatory funding. During the farm bill listening sessions, we repeatedly heard the call for an increased investment in research for specialty crops. Specialty crops represent a substantial and ever-increasing part of the total crop portfolio and play a critical role in providing a balanced, nutritional diet for all Americans. Some of the specific areas and issues to be addressed in this initiative would include genetics, genomics, breeding new cultivars and varieties, food safety and quality, production efficiency and mechanization, and the list goes on.

Again, thank you for the opportunity to testify before the Committee regarding the USDA's farm bill proposals to strengthen our Nation's agricultural research, extension and education programs. I look forward to hearing your comments and responding to your questions as we discuss policy that will enhance American agriculture for the future. Thank you very much.

[The prepared statement of Dr. Buchanan follows:]

STATEMENT OF DR. GALE BUCHANAN
UNDER SECRETARY FOR RESEARCH, EDUCATION & ECONOMICS
UNITED STATES DEPARTMENT OF AGRICULTURE

BEFORE THE
U.S. HOUSE COMMITTEE ON AGRICULTURE
SUBCOMMITTEE ON CONSERVATION, CREDIT, ENERGY & RESEARCH
WASHINGTON, DC

MAY 10, 2007

Chairman Holden, Ranking Member Lucas, and distinguished members of the Committee, it is a great pleasure to be here this morning to discuss the United States Department of Agriculture's (USDA) research, extension and education programs and the Administration's 2007 Farm Bill proposals. I appreciate the committee's interest in these programs that are so critical to our nation's future.

The success of American agriculture is attributable, in large part, to advances in science and technology generated by the USDA's research, extension, and education agencies, in partnership with the nation's land-grant universities and other cooperators. Science has served as a vitally important foundation for our agricultural system and its ability to provide this nation and the world with its needs for food, fiber and feed of our livestock.

While there has been excellent success in the past we must look to not only immediate scientific needs, but build an even stronger foundation to maintain our world leadership in agriculture. This is imperative if this nation's agricultural system is to continue as a world leader and not be severely stifled by the ever increasing disease threats, changing world market competition, drought and other natural impacts. For example, there is an immediate and long term need for scientific answers on how our agricultural system can play an important role in meeting our nation's need for greater energy security. The Administration's Title VII 2007 Farm Bill proposals provide organizational changes and specific funding to help meet the immediate and long term scientific needs of American agriculture.

As Under Secretary for Research, Education and Economics, I am responsible for four agencies charged with advancing science in agriculture, the Agricultural Research Service (ARS), the Cooperative State Research, Education and Extension Service (CSREES), the Economic Research Service (ERS) and the National Agricultural Statistics Service (NASS).

ARS is USDA's principal in-house research agency with over 2000 scientists at over 100 locations around the nation and in four foreign countries. The mission of ARS is to conduct research to develop and transfer solutions to agricultural problems of high national priority and provide information access and dissemination to: ensure high-quality, safe food, and other agricultural products; assess the nutritional needs of Americans; sustain a competitive agricultural economy; enhance the natural resource

base and the environment; and provide economic opportunities for rural citizens, communities, and society as a whole.

CSREES' unique mission is to advance knowledge for agriculture, the environment, human health and well-being, and communities by supporting research, education, and extension programs in the land-grant university system and other partner organizations. CSREES does not perform actual research, education, and extension functions but rather helps fund such programs at the state and local level and provides programmatic leadership in these areas.

ERS is a primary source of economic information and research in the U.S. Department of Agriculture. With 450 employees, ERS conducts research and economic analysis programs to inform public and private decision-making on economic and policy issues involving food, farming, natural resources, and rural development.

NASS is the Department's primary statistical agency and provides official USDA crop and livestock production, economic, and environmental data on agriculture and rural America. NASS conducts hundreds of surveys every year and prepares reports covering virtually every aspect of U.S. agriculture including: production and supplies of food and fiber, prices paid and received by farmers, farm labor and wages, farm finances, chemical use, and changes in the demographics of U.S. producers. NASS is also responsible for the Census of Agriculture.

USDA is continually striving to further enhance its science-based programs for the betterment of American agriculture. The Administration's Farm Bill proposals fully recognize this fact and places a high priority on strengthening our system.

As the "People's Department" we seek and consider input from our stakeholders, outside experts, and governing bodies, among others, to ensure that we work effectively to meet the needs of people across the nation and around the world. Input received—that points to the need for reorganization—includes, but is not limited to, input received through Congress and other stakeholders. At the direction of Congress, USDA has requested key studies of REE mission area research by experts of the National Academies that resulted in recommendations for better coordination, integration, and execution of USDA research programs, and a finding that "the current organizational structure limits the combined effectiveness of the REE agencies" (National Research Council, 2003). Land-grant universities have also called for consolidation of USDA's research agencies.

We heard from the American public through the Farm Bill Forums led by Secretary Johanns and research was a major theme in all of the sessions.

From Indiana, we heard during a USDA listening session, "...we get the highest return on investment on those dollars as about any money that's going to be spent in the farm bill. And that allows us to be low-cost producers of a safe and reliable food and fiber source." And, from Delaware we heard, "It's imperative that the next farm bill will provide support for continuing research and education. The future of American agriculture will

depend on it. Technological advances in agriculture will help the next generation of American farmers."

Several speakers mentioned that the Department's dual research structure of ARS/Land Grant Universities has strengths and weaknesses. The intellectual and political challenges these institutions face have never been more numerous or challenging. Others stressed the need for more coordination of USDA's overall research funding strategy.

The Administration's farm bill proposals seek to address these issues and to improve the efficiency of the research, extension, and education programs in the Department. Specifically, the Administration is recommending the following proposals for the 2007 Farm Bill:

1. Consolidate USDA's Agricultural Research Service (ARS) and the Cooperative State Research, Education, and Extension Service into a single agency named the Research, Education, and Extension Service (REES) which will coordinate both intramural and extramural research, extension, and education programs.

2. Rename the Research, Education, and Economics (REE) mission area the Office of Science.

3. Establish an annual $50 million Agricultural Bio-Energy and Bio-Based Products Research Initiative to advance fundamental scientific knowledge for the improved production of renewable fuels and bio-based products.

4. Establish an annual $100 million Specialty Crop Research Initiative to provide science-based tools for the specialty crop industry.

5. Authorize USDA to conduct research and diagnostics for highly infectious foreign animal diseases on mainland locations in the United States.

6. Invest an additional $10 million in mandatory funding to be available until expended for organic research. This new funding would focus on conservation and environmental outcomes and new and improved seed varieties especially suited for organic agriculture.

The following is more detailed information on each of these proposals.

REORGANIZATION:

Historically, an important foundation to the success of American agriculture has been USDA's research, education and extension programs. Federal investments, along with those of our land-grant universities and other partners, have assured that these programs are world leading. For this potential to be fully realized, the agricultural research, education, and extension system must have well-coordinated and critical leadership in place to address the complex roles for agriculture. In addition, there are increasing expectations to use limited federal and state resources optimally. To maintain and

advance as a world leader in agriculture research, education, and extension the REE mission area needs to continually assure that it is effectively and efficiently identifying priorities and managing resources. In view of this commitment and the public input as previously mentioned, the Administration is recommending the reorganization of USDA's research, education, and economics mission area.

We have established five principles that will guide our new organizational structure development:

Principle 1. The reorganization process has a clear purpose with focused objectives to establish a program management scheme, based on agency functions, that assures closely coordinated decision making, accountability, relevancy, and program interoperability.

Principle 2. The foundation that underpins the reorganization is continuity of the Department's mission and goals and continued focus on national priorities.

Principle 3. The reorganization process will encourage open and clear communication with stakeholders and will continue to consider their input.

Principle 4. The reorganization will not address funding levels, balance of funding, or authorities.

Principle 5. The reorganization will incorporate current agency missions, functions, and responsibilities—to enhance integration of national program staff and programs both internally and externally, to assure coordination, relevance and quality.

The desired outcomes of the proposed reorganization include:

- Improved planning and coordination of intramural and extramural research, education, and extension by a unified staff for each program area;
- Increased emphasis on multidisciplinary work that engages all relevant disciplines
- Focused resource allocation to generate substantial and measurable progress toward meeting national needs;
- Robust evaluation of intramural and extramural activities within high-priority, integrated areas of science for relevance, quality, and impact before, during and after implementation;
- Enhanced responsiveness of the agricultural science community to emerging and existing high priority issues;
- Maximized effectiveness of agricultural education and extension systems through focused national leadership and decentralized nationwide implementation
- Highly informed decision making and priority setting with streamlined methods to obtain stakeholder input and promote shared learning.

The proposed reorganization of the USDA's Research, Education, and Economics (REE) mission area is outlined here in terms of the broad conceptual framework for the new

organization and the implementation framework required to establish the new organization.

OFFICE OF SCIENCE:

The reorganized mission area office which is now named Research, Education, and Economics will be renamed the Office of Science (OS), which is consistent with the manner in which several other Federal Departments and agencies designate their science efforts. The Office of Science will have responsibility for the newly created Research, Education and Extension Service (REES), formed from the existing Agricultural Research Service and the Cooperative State Research, Education, and Extension Service, as well as the Economic Research Service (ERS) and the National Agricultural Statistics Service (NASS).

The responsibilities of the Office of Science will be to develop science policy and implement research, education, and extension programs for our nation's agricultural system. The Office of Science also will identify opportunities and act on issues that will have long-term national implications. The research, education and extension programs of USDA will remain under the leadership of a Sub-Cabinet official and will serve as a clearly identifiable single scientific resource for agriculture.

REES will be under the primary leadership of a Chief Scientist with authority for program offices, program implementation and administrative and resource management. The Chief Scientist will report to the Under Secretary for the Office of Science.

Current formula funding authorities will be retained. Appropriated funding will be under the authority of the new agency leader. The Chief Scientist, in consultation with the Under Secretary, will have administrative responsibility to allocate funds as appropriated by Congress. All current formula funding authorities, including Hatch, McIntire-Stennis, Smith-Lever, as well as authorities for 1890, 1994 and Hispanic Serving Institutions would be retained.

The proposal also provides for a merger of the national program staffs of ARS and CSREES. A single national program staff supporting both intramural and extramural research and education programs would be far more effective in communication, coordination, and planning.

Following concurrence on the described conceptual framework, the reorganization will be implemented following a functional and program integration analysis (program function, relationships, and impacts), and in accordance with USDA regulation 1010 (USDA, 2006), which specifies the requirements for detailed analysis of reorganization proposals within USDA. USDA will also complete a detailed Civil Rights Impact Analysis in accordance with USDA Office of Civil Rights regulation 4300-4 (USDA, 2003) including:

- Budget analyses (cost of reorganization and annual operating costs), and

- Human resources analyses (personnel), including Civil Rights impact.

AGRICULTURAL BIOENERGY AND BIOBASED PRODUCTS RESEARCH INTIATIVE

President Bush has provided strong guidance and leadership in our nation's commitment to achieving greater energy security. In his State of the Union speech this year, the President announced a bold initiative to reduce gasoline consumption by 20% over the next 20 years and replace it with renewable alternative fuels such as ethanol and by improving the fuel economy of cars and light trucks.

The Administration's Farm Bill proposal provides $50 million in annual mandatory spending over a ten year period for the creation of the Agricultural Bio-Energy and Bio-Based Products Research Initiative to enhance the production and conversion of biomass to renewable fuels and bioproducts. These funds will support a USDA bio-energy and bio-based product laboratory network utilizing existing USDA research facilities as well as engaging the nation's land-grant and other universities through a competitive process and connecting them to the laboratory network.

The new initiative will focus research and development efforts on two objectives: 1) improving biomass production and sustainability and 2) improving biomass conversion in biorefineries. Through this initiative we will be better able to take full advantage of USDA's internal and external research programs together with the network of extensive knowledge and capabilities that reside within the land-grant universities and other research institutions throughout the United States. These activities will be closely coordinated with the Department of Energy (DOE), and its national laboratories and centers of excellence and other components of the Federal government.

American agriculture has been highly successful in capturing the sun's energy and supplying our nation with an abundant food and fiber supply. Through increased research and technology, we can continue this record of success and move our nation toward greater energy independence.

SPECIALTY CROPS

The Administration is also recommending the establishment of a Specialty Crop Research Initiative supported by $100 million in annual mandatory funding over a ten year period to provide science-based tools for the specialty crop industry.

Fruits, vegetable, horticultural plants, and other specialty crops are essential to healthy diets and the economic viability of American agriculture. However, specialty crop producers face unique challenges including pests and diseases; harvesting and processing issues; domestic cost pressures (including labor issues); and the uncertainty of international markets. Enhanced research, extension, and education programs are needed to help the specialty crop industry address these challenges.

During the Farm Bill listening sessions we repeatedly heard the call for an increased investment in research for specialty crops. For example, Charles from Georgia noted that "federal investment in agricultural research dedicated to the economic vitality and long-term viability of United States specialty crops has been extremely limited...Federal investments in research for specialty crop production, processing, marketing and consumption which influence public access to these vital commodities must be re-emphasized in the next farm bill."

And Tom, at the California forum, stated: "Specialty crops are vital to the health and well-being of all Americans, and increased consumption of specialty crops will provide tremendous health and economic benefits to both consumers and growers...The next Farm Bill must address specialty crop issues much more effectively than in the past Farm Bills...Policy areas that the next Farm Bill must address, with respect to the unique needs of specialty crop growers, include the following: specialty crop block grants, international trade, nutrition, marketing, invasive pest and disease issues, research, competitive grants, and conservation programs."

In addition to input from commodity and trade groups, the National Agricultural Research, Education, Extension and Economics (NAREEE) Advisory Board has identified specialty crops as a high priority and a unique opportunity to strengthen American agriculture.

Funding recommended in the Administration's proposal will provide for the creation of a Specialty Crop Research Initiative to address critical needs throughout the specialty crops industry in all regions of the U.S. Some of the specific issues to be addressed include: plant breeding, genetics, genomics, food safety and quality, production efficiency, and mechanization.

FOREIGN ANIMAL DISEASE RESEARCH

Research and diagnostics for highly infectious foreign animal disease agents, such as Foot and Mouth Disease (FMD) and Rinderpest viruses, are currently confined to an off shore location at the Plum Island Animal Disease Center (PIADC). The Department of Homeland Security (DHS) has initiated a process to move all the functions of PIADC to a new facility to be named the National Bio and Agro Defense Facility (NBAF). In anticipation that this facility will be built on the U.S. mainland, USDA must be authorized to conduct important foreign animal disease research on FMD and other select diseases at the new facility.

Research, diagnostics and training as well as vaccine development and evaluation are critical components to fighting and mitigating the effects of these diseases and securing the U.S. food and agricultural system. Without this research, U.S. farmers and our entire food system would be at greater risk.

The Administration proposes specific authorization for USDA to conduct research and diagnostics for highly infectious disease agents, such as FMD and Rinderpest on the U.S. mainland.

ORGANIC RESEARCH

The Administration's 2007 Farm Bill proposal also includes $10 million in mandatory funding to be available until expended for organic research. This new funding would focus on conservation and environmental outcomes and new and improved seed varieties especially suited for organic agriculture. This initiative will provide new technologies to help solve some of the unique challenges facing this growing segment of the agriculture industry.

Thank you again for the opportunity to testify before the House Agriculture Committee regarding the Administration's 2007 Farm Bill proposals to strengthen the nation's agricultural research, extension and education programs. I look forward to hearing your comments and responding to your questions.

Thank you.

The CHAIRMAN. Well, thank you, Dr. Buchanan, and thank you for your testimony and thank you for talking about your proposals for the farm bill on research reorganization. As you well know, the land-grant institutions also have proposed a reorganization of agricultural research and we are going to address and have some type of reorganization as we begin our process in writing the farm bill. But often, reorganization comes with unintended consequences, what safeguards would you recommend that we put in place so we avoid duplicate research and redundant research but at the same time, we make sure that we are doing all the research necessary, as you have mentioned, with specialty crops and energy feedstocks for the future? Is there anything specific we have to be careful that we don't end up with any unintended consequences?

Dr. BUCHANAN. That is certainly a good question and obviously, having been in agriculture research and administration for over 40 years, this is an issue that concerns me, because the last thing I would like to see happen is changes that I propose not working in the end. So we are trying to exercise as much care as possible in ensuring that what we propose really will work, and we are trying to do that by including as many of our personnel in the agencies as possible. In fact, we have had a number of meetings with personnel, both in ARS as well as the universities. I have spoken to deans and I have spoken to directors. So we are trying to get a broad base of input to ensure that we don't have any unintended consequences. The proposals we have on the table will ensure that that doesn't happen, because you are absolutely right, we want to make sure that the changes we make are not just changes just for the sake of making changes. We want to make sure that the changes we make really accomplish the goals we set out with.

The CHAIRMAN. Well, thank you, Doctor, and we look forward to working with you as we move towards marking up on this Subcommittee. During our energy financing hearing, Under Secretary Dorr mentioned the Executive Council on Energy. Do you participate in that Council?

Dr. BUCHANAN. The Energy Council in the Department?

The CHAIRMAN. Yes.

Dr. BUCHANAN. Yes, sir, I do. In fact, we are now in the process of restructuring our whole energy program in the Department. In the mission area, in order to try to better understand what we are doing in energy, when I first became Under Secretary this past May a year ago, I set out to try to better understand what we were doing in bioenergy and bio-products in the Department, not only in ARS but also supported by CSREES and the universities. And so we put together what we call the ABBREE Council, the Agricultural Bioenergy and Bioproducts Research, Education, and Extension within the mission area. We have entered into a cooperative agreement with an individual with whom we are working in partnership to provide REE leadership for this effort. Together we are working very hard to get a handle on what we are doing because, as one of the Members said earlier, it is important that we not leave any areas out, but it is just as important not to duplicate efforts. In order to do that, we are trying to better understand what we are doing now so we can plan for the most important need in our research agenda.

The CHAIRMAN. Thank you, Doctor. The chair now recognizes the Ranking Member of the Subcommittee, Mr. Lucas.

Mr. LUCAS. Thank you, Chairman. And I would be remiss if I didn't note that this is a very special day for me. Thirteen years ago, I was elected in a special election to join this body and for almost half of that time, you and I have sat next to each other in this Subcommittee, which I appreciate, Mr. Chairman.

Dr. Buchanan, tell me, why did you not include the Economic Research Service and the National Ag Statistics Service in your reorganization plan?

Dr. BUCHANAN. Before we really put our ideas together in the early stages of the farm bill development, we considered a lot of options. The Economic Research Service is a Federal statistical agency. They certainly have a research mission, but they also have a lot of other missions as well. Also, we considered the possibility of splitting that agency up into two or three different parts and portioning out different areas within the Department. But the more we thought about it the more we realized that it probably could work most effectively by being a separate, stand-alone agency as it is now. And so for that reason, we really didn't think that it would be appropriate to include it. Now, the research part of ERS would work very nicely, but the other parts of the agency's responsibility really are not research. They are more analytical and more supportive of other parts of the Department. So we just felt like it would be best not to include them. NASS, of course, has a quite different mission than research and education, so we felt it best to leave it as a separate agency.

Mr. LUCAS. And I guess I would be remiss if I didn't ask the same question about the Forest Service research, too, just for——

Dr. BUCHANAN. Well, that is a little bit different question, in that forest research is part of another Under Secretary's mission area. It receives funding from a different appropriation subcommittee in Congress. It looks like it would be a little bit more difficult to embrace that. Now, we do have some forest research embedded in the CSREES program through the McIntire-Stennis authorization, but it just didn't look like these other two agencies would fit as well as ARS and CSREES, because these two agencies have very similar missions in terms of research.

Mr. LUCAS. If your proposal is adopted, Doctor, how many dollars are we talking about? What kind of budget resources are allocated to those two entities and ultimately, if the proposal is adopted, how big would the budget be for the final entity?

Dr. BUCHANAN. Well, first, we don't anticipate major funding needs to make this happen, because the primary people who would be affected are those here in Washington, the national program staff. There would be some relocations within our organization. But as far as major costs associated, we don't anticipate any major costs associated with the reorganization, because we don't plan to make any changes within the ARS areas. Certainly all of the eight areas in ARS would remain intact. We just don't anticipate any major costs associated, other than very minor costs.

Mr. LUCAS. So along those lines, while we are talking about that kind of thing, you mentioned for a moment—good electronic equipment, yes, sir, Mr. Chairman, trying to get my attention, I thought

there for a moment. Talk to me for a moment about the role of what I would describe as the legacy personnel at those two agencies in a new agency. We have in this Committee, over the course of the last 13 years, gone through lots of reorganization efforts and rearrangements and realignments and it produces some challenges for the good folks who work at the Department when you do that kind of thing. I am sure you have given thought to that, how this would impact people who have worked a career or most of a career in the present structure.

Dr. BUCHANAN. Yes, sir, and let me finish answering a previous question.

Mr. LUCAS. Of course.

Dr. BUCHANAN. The combined agencies would end up being REES, the Research, Education, and Extension Service. The combined agency would have approximately $2 billion of support for research and education programs, and we are not proposing changing the balance of intramural *versus* extramural. That is a very important point that a lot of our internal people have asked. Are we going to move more funding into ARS and less into CSREES? The plan is not to make any change in the balance between those two. Your next question, Congressman——

Mr. LUCAS. And the reason I asked that is that there has been a tendency sometimes in reorganizations, that the bulk of the reorganization happens out in the field where things are happening and it doesn't always seem like there is a lot of reorganization among the various staff components here at the headquarters.

Dr. BUCHANAN. You really asked a question I am delighted to respond to.

Mr. LUCAS. Thank you.

Dr. BUCHANAN. We don't propose to change anything out in the field. I can't imagine any scientist or staff member out in the countryside having any affect whatsoever, other than we will do better planning in Washington. The combining or merging of the two national program staffs will involve trying to create a more effective organization here in Washington to support all of those people out in the countryside that are doing research and education programs. So I think this is just the opposite of affecting the people in the field and not affecting people in town. I am looking at trying to make things in Washington certainly more efficient in terms of how we do business here in town.

The executive group is also looking at this other question you raised. We have had several meetings with various personnel in our organization. One of the first things I did after the farm bill information was released was have a conference call with all ARS employees around the country. We invited every employee to participate in the conference call, if you can believe that. And anyway, we had a number of questions that came up and I invited everybody to write and send me their ideas and suggestions. The most common question that came up was how do we protect the brand name of ARS? It is an important brand name, as you have already alluded to. I don't know exactly how we are going to address that issue, but it is one thing I have given the executive group that is planning the implementation to try to come up with. How do we protect the brand name of ARS, because that is important.

Mr. LUCAS. Thank you, Mr. Secretary. My time has expired. I yield back, Mr. Chairman.

The CHAIRMAN. The chair thanks the Ranking Member and recognizes the Chairman of the full Committee, Mr. Peterson.

Mr. PETERSON. I thank the gentleman. Dr. Buchanan, this Agricultural Bioenergy and Bio-Based Research Initiative, why are you asking for mandatory money, just so you have a certainty of it? Is that what the reason is?

Dr. BUCHANAN. Well, this was a decision to ensure that we have resources that would be in support of what we consider one of the most——

Mr. PETERSON. Can you assure us that the appropriators are not going to use the chimps on us, because when we have done mandatory spending before, they have just eliminated it and spent the money some other place. We are trying to get this resolved in the budget situation, but I am not sure if that is going to happen, and we don't have money to be putting out there in the mandatory baseline if the appropriators are going to take it away. So have you thought about that at all?

Dr. BUCHANAN. Yes, sir, we have and obviously, we are hopeful and encouraged because this is such an important national priority. We are encouraged that this will be new money to help us to enhance the programs we already have, so this is clearly one of the issues that I think is important.

Mr. PETERSON. Well, if it is that big of a priority, they may fund it anyway over there, but we can have that other discussion. I guess the other thing is I read over what you said here in your testimony; it is somewhat general. One of the things; I have been all over the country; everybody in the country wants to be the renewable energy research center. They all have got big plans and there are people out there that I have run into that are researching the same thing but have never talked to each other. Have you got this fleshed out in terms of how this $50 million would be spent? How far are you into the weeds in terms of actually knowing how you are going to spend that?

Dr. BUCHANAN. As I mentioned just a few minutes ago, one of the things that I realized when I first came into the position of Under Secretary was that the whole area of bioenergy was one of the really critical areas we were facing. I started looking around to see what we were doing. I was having great difficulty in finding out what we are doing, not only in-house in ARS, but also in all of the universities, because you are absolutely right, many universities have various types of energy programs. So that is why we have a cooperative agreement with a person to work with us in this area and together gain a better understanding of what we are doing now. That is what we are in the process of doing. In fact, we are planning a workshop that will bring together a number of university scientists from around the country, and our own organization. In September, we will have a conference to outline where we are. That will be the first step in identifying where we need to go next. And while I have heard some say that there are too many other universities getting into the act, I take just the opposite approach. I would like to see every university getting involved in en-

ergy, because I see this as truly one of the major grand challenges of our society of the future, achieving energy security.

Mr. PETERSON. Yes, we don't disagree on that. So you are telling me that you are not going to really know until September?

Dr. BUCHANAN. Sorry?

Mr. PETERSON. You are not going to really know until September how you are going to go ahead with this?

Dr. BUCHANAN. We are still working on that and I don't want to count my chickens until the eggs hatch, but we certainly are working on that and we will have a good idea by the time the new fiscal year rolls around.

Mr. PETERSON. Well, I would just say to you that we are going to start marking up the week after next and we are probably not going to expect you to be able to give us details. I will tell you something; we are not going to be putting mandatory money in unless we understand how it is going to be spent. We are going to have to move up that timeframe if we are going to do this and we will have some more discussions.

Dr. BUCHANAN. I could certainly be ready. Whenever you ask me to, we will be ready, sir.

Mr. PETERSON. All right. Thank you. Thank you.

The CHAIRMAN. The chair thanks the Chairman and recognizes Mr. Fortenberry from Nebraska.

Mr. FORTENBERRY. Thank you, Mr. Chairman. Just following up on Chairman Peterson's comments. We met recently with Secretary Dorr and the Under Secretary of the Department of Energy, asking for a matrix that gets to that very point. Who is doing what and where in regards to alternative energy programs? And I expected the answer to be, "We will get that to you shortly." But apparently this is so complicated and so many agencies and entities are involved, both through the university system as well as in our own direct Federal programs, that it is complicated. Mr. Costa and I wrote a letter recently, which Chairman Holden endorsed, asking for that shortly, so that may be a part the answer to our need here. But I appreciate you appearing today and the question I have is related to this point. There are three emerging trends in agriculture that are going to shape the future of farm policy for years to come. You clearly pointed out it is ag-based energy production, but also agricultural entrepreneurship and a new vision for conservation and good land stewardship. In your proposal, can you point specifically how those outcomes will be achieved by this potential merger of the two organizations? And then I have a follow-up question for you.

Dr. BUCHANAN. Clearly the merger would provide for the consolidation of the national program staffs of the two agencies. The real advantage there is it would provide the basis for a better coordination and planning effort by having a single program staff that is aware of what we are doing internally in our intramural research effort at ARS, as well as what is going on and supported by CSREES through the universities. We have some hundred Agriculture Research Service (ARS) laboratories around the country. There are also some hundred universities of various types around the country. So we have a tremendously large number of institutions engaged in various aspects of research. Trying to find out

what each person at each institution is doing is a real challenge and that is one of the things that a national program staff would have the ability to get a better understanding of. They would know what each institution is doing or what each side of the house is doing. Right now we have two stovepipes. We have the Cooperative State Research, Education, and Extension Service and the universities and we have the Agricultural Research Service. So what we are looking at is trying to have a single group that is looking at all of our programs. That gets back to what was mentioned a moment ago about coordination and this would assist in helping that effort.

Mr. FORTENBERRY. Is there a way to envision merging the program staffs without merging the two agencies?

Dr. BUCHANAN. Well, that is obviously something that we could give thought to. There would be some advantage of merging the agencies that I think would be helpful, but you know, we will do whatever we have to do.

Mr. FORTENBERRY. Sure. Well, again, I urge you to think about, as we are considering reorganization or restructuring, obviously, we keep an eye on the objectives and that is efficiency, saving money, avoiding duplication. But the bigger objective is to really help promote emerging trends that are extraordinarily beneficial for America's energy policy, for American farmers, and that is ag-based energy production. Second, again, the emerging trends toward agricultural entrepreneurship, rethinking traditional commodities production and more specialty types of production that can enhance farm income and deliver local foods locally. And third is conservation practices that would be consistent with good land stewardship. If we keep an eye on those goals as we think about reorganization, I think we can do something very strong and positive for the future of farm policy. Thank you for your appearance, sir.

The CHAIRMAN. The chair thanks the gentleman and recognizes the gentleman from Georgia, Mr. Scott. Maybe turn your mike on.

Mr. SCOTT.—sort of the landscape and then put a few suggestions and get your reactions to it. One of my greatest concerns has been and will continue to be the lack of equity and funding between 1862 land-grant institutions and the 1890 land-grant institutions. These schools continue to be overshadowed by their larger brethren, in terms of funding, while, quite frankly, many of these schools have done more with less since their funding in the late 19th Century. Indeed, the bias against these schools, whether intentional or not, is even more apparent in the witness list for this hearing. There is not one 1890 land-grant school represented here today, and many of these schools serve the African-American underrepresented population.

In addition to major improvements of facilities and equipment, the 1890s need a substantial influx of funding to broaden their research and teaching capabilities. This can best be achieved through expansion of the 1890's Capacity Building Program, such as a GAO study noted in 2003. Research in this program focuses on biotechnology, nutrition, aquaculture, and plant and animal science, included in teaching projects or agribusiness management, marketing, regulatory science. Since the Capacity Building Program

began in Fiscal Year 1990, funding has remained far below the authorized level, thereby dramatically limiting the number of research and teaching grants that could otherwise have been awarded.

And I just have a few suggestions that I would like to make to improve this situation and get your response to: (1) raise the minimum authorization level of Evans-Allen, for 1890s research, from 25 percent of the funds to 30 percent of the funds appropriated in the Hatch Act; (2) raise the minimum authorization levels of the 1890 extension from 15 percent to 20 percent of funds appropriated under the Smith-Lever Act; and (3) extend the authorization of the 1890 facilities capacity building through 2012, change the authorization language in the McIntire-Stennis Cooperative Forestry Act to include 1890s as eligible institutions to receive the funding. And finally, change the authorization language in the Animal Health Research and Disease Program to specify that funds are to be awarded to state agriculture experiment institutions and 1890 institutions.

So Dr. Buchanan, what I am asking is, what is the USDA doing now to rectify this situation with the 1890 institutions, and can you please comment on the proposals that I have recommended?

Dr. BUCHANAN. Well, first let me say I am very familiar with the 1890 institutions having served in 1862 universities in two different states where we had 1890 institutions, and I am aware of some of the exciting and excellent research and the programs that we have at 1890s. We do have programs in CSREES that are directly in support of the 1890 institutions, the capacity building programs, and I can't recall the others, but we certainly have programs that are in direct support of the 1890 institutions. I would say that many of the funding opportunities that are provided through CSREES are open and are available, not only to 1862s, but to 1890s as well as other institutions, and so the 1890s participate in those programs as well. So we do have a range of opportunities for 1890 institutions to participate in our research and education programs through the Department.

Mr. SCOTT. You do agree and recognize the inequity in the situation, do you now?

Dr. BUCHANAN. There is wide variation in funding among all institutions.

Mr. SCOTT. But I need you to say yes or no, because if you don't yourself recognize that there is an unequal funding with these land-grant 1890s, predominantly African-American colleges, as opposed to the others, then we have a discussion here in vain.

Dr. BUCHANAN. Well, Congressman, I would say that, while there is still some difference between funding, the gap is closing in that 1890s support has increased at a faster pace than has 1862s. So I think the outlook is positive and I just think that the other funding mechanisms, including the Competitive Grant Program through the NRI and others, provide options for 1890s just as much as it does 1862s.

Mr. SCOTT. So am I to understand that you do agree, then, that there is a problem of unequal funding?

Dr. BUCHANAN. Yes, sir, there is unequal funding among all institutions.

Mr. SCOTT. No, no, no.

Dr. BUCHANAN. In fact, the Hatch formula provides quite a range of different funding for different institutions.

Mr. SCOTT. We have a problem with these African-American 1890-predominant land-grant schools not receiving their fair share, correct?

Dr. BUCHANAN. You are probably correct, sir.

Mr. SCOTT. Okay, thank you, sir.

The CHAIRMAN. The chair thanks the gentleman and recognizes the gentlewoman from Ohio, Mrs. Schmidt. Okay, the gentlewoman passes. And Mr. Moran? The chair recognizes Mr. Bonner.

Mr. BONNER. I don't have any questions. Thank you.

The CHAIRMAN. Okay, the gentleman passes. The chair would now recognize Mr. Kagen, sticking to time of arrival.

Mr. KAGEN. It looks like I am moving up in the world. Thank you, Mr. Chairman. I want to thank you for your testimony. Gale, thank you for your testimony and your service to the country. It is a complicated job that you have. I am a small businessman and I manage 14 employees and you have got a few more underlings, so congratulations on your hard work. I was looking at your suggestions about putting $50 million into the bioenergy and bio-based ag products. I wonder if there was a typo because you put $100 million into specialty crops. Is there a typo there? Did you favor specialty crops more so than the bioenergy?

Dr. BUCHANAN. I wouldn't say that, sir. In fact, I would say that these are two among my highest priorities. Not only that, the NAREEE board, which is the advisory board to the Secretary and I on this area of research, have identified both of these as very high priorities. When the Secretary had the hearings around the country prior to the development of the farm bill initiatives, one of the issues that came up repeatedly was the importance of energy security, as well as the importance of the specialty crops. So I think both of these are important. One thing that I would say that might clarify this a little bit is that bioenergy is a very specific area. Specialty crops includes many, many, many different crops, as you can imagine. And so the commitment to the specialty crops is already pretty substantial in the Department, but this would be a real boost and a real shot in the arm to enhance support in this area. So there is a little bit of a different way of looking at those two areas: one is very specific and one is much broader.

Mr. KAGEN. Do you know of any farms that now produce more energy than they consume?

Dr. BUCHANAN. Would you say that again?

Mr. KAGEN. Do you know of any farms that are independent, off the grid, that they produce more energy than they consume, that they are donating back energy?

Dr. BUCHANAN. Personally, I don't know of any but I do know that if you go back 100 years, every farm in America was energy independent because they raised the corn and fodder to feed the mules and horses. They used wind to pump water and they used wood to dry and warm by. This lets me get back to amplify a point I made earlier. While we don't have specific research projects identified we would do, if we get this funding in the proposed farm bill, we certainly have identified the general areas that we have already

identified and we are fleshing that out. But clearly, we looked at enhancing biomass production, not only how to produce biomass sustainably, but how to accumulate it and process it and get it ready so you can use it in a bioenergy system. Also, we are looking at the best ways to convert biomass, whether it is hydrolysis or whether it is enzymatic or whatever. So there are a whole range of issues there that we are looking at, but this is a real challenge.

Mr. KAGEN. It is a challenge and I love research. I had a research laboratory for 25 years. But one of the things about research is you have to come up with results and that is how we are going to measure your success, is the results. That is why I wanted to know how many farms are now off the grid and are energy independent, much like they used to be. And I would like to ask you this question. Would you join with me in working with two of my farms in northeast Wisconsin and help them get energy independent and off the grid? Would you be willing to work with me on that?

Dr. BUCHANAN. Certainly.

Mr. KAGEN. Take a large farm, a milk herd of 2,000, a small family farm of 120 and help them to become totally energy independent?

Dr. BUCHANAN. Yes, sir.

Mr. KAGEN. Thank you.

Dr. BUCHANAN. Obviously that would be a challenge.

Mr. KAGEN. It would be a challenge well worth winning and I look forward to those results, because that is how we measure things in Wisconsin. Thank you.

Dr. BUCHANAN. We think agriculture not only has a challenge in producing energy, but how do we become energy independent on the farm? You really touched a very sensitive nerve with me.

Mr. KAGEN. Well, that is my goal, because when I traveled around northeast Wisconsin, the 8th District that I represent, there were only two things on their mind: their high energy costs and their healthcare costs. So if I can help eliminate their energy costs, I can help them become more profitable and at the same time I am working to knock down their healthcare costs. But thank you again, and I yield back my time.

The CHAIRMAN. The chair thanks the gentleman and recognizes the gentlewoman from South Dakota, Ms. Herseth Sandlin.

Ms. HERSETH SANDLIN. Thank you, Mr. Chairman, and thank you, Dr. Buchanan, for your testimony today. I do have a question in response to Chairman Peterson's question earlier, with regard to the requested amounts for bioenergy. You said that the agency had contracted with a person to get a handle on where we are now and that there was going to be a September conference to outline where we are where we should go. Who is that your office has contracted with?

Dr. BUCHANAN. This is an internal review that we would be inviting various directors of laboratories and scientists involved in our bioenergy effort and they would be helping us identify their specific research effort. We have identified the general principles that we want to address, as I mentioned earlier.

Ms. HERSETH SANDLIN. Dr. Buchanan, if I might? I am sorry to interrupt, but who is it? You said you had contracted with a person. Do you mean you contracted——

Dr. BUCHANAN. A person named Dr. Jim Fischer.

Ms. HERSETH SANDLIN. And he is outside the agency?

Dr. BUCHANAN. Yes, he is outside the agency.

Ms. HERSETH SANDLIN. And so can you tell me a little bit about him and then also answer the question of the $50 million that you are requesting? Would you then use some of that money to then set up a national program staff within the agency? You are not going to use that money to contract out to someone to coordinate this information?

Dr. BUCHANAN. No, no, we would simply use the existing authorities that we have to conduct the research internally. We are talking about funding research both in ARS, in Agricultural Research Service, in the universities, through the Cooperative State Research, Education, and Extension Service (CSREES). The person that I have employed to help me is on a cooperative agreement. I employed him because of his broad knowledge. He is a former employee of ARS, a former employee of Clemson University in South Carolina and also is a former employee of DOE. He is a very knowledgeable person who has expertise far beyond what I have. So that is why we are working with Dr. Fischer through a cooperative agreement. But no, the research would be managed in-house. This is what we are talking about.

Ms. HERSETH SANDLIN. No, I anticipated that the research would always be done in-house, but in terms of the ongoing coordination efforts of understanding what is happening out within the universities the intramural, the extramural activities, what is going on with the research so that we aren't looking at duplication? Do you anticipate that after September, after this individual has done the initial stages of identifying what is out there and bringing it together, going forward, that you would have a dedicated staff within your office that would do ongoing information gathering and analysis; sharing that information within the office itself rather than on an ongoing contractual basis with someone outside of the office.

Dr. BUCHANAN. Well, I made the point earlier that we have put together the ABBREE Council within the mission area, which has representatives from ARS, CSREES, NASS and ERS. They provide kind of a coordinating group within the mission area and Dr. Fisher simply provides more help to the ABBREE Council in the coordination effort within the mission area, so we are getting a handle on what we are doing. One of the most important steps in the research process is identifying what needs to be addressed and this is exactly what we are doing. We are identifying what needs to be addressed and the only way you can do that is to systematically assess what you are currently doing.

Ms. HERSETH SANDLIN. I appreciate that and I appreciate the efforts that you have undertaken. I would just perhaps share my preference that the ongoing efforts to gather that information would be done within the office rather than continuing on a contractual basis. I am just stating that. I understand what you are doing now to add to those efforts, but any kind of reorganization that takes place to have a dedicated staff to keep a handle, then,

to add on to this set of information that you are gathering. One other quick question: What are your thoughts as this Office of Science and the reorganization that is being proposed and the responsibilities of the Research, Education, and Economics agency is now becoming an Office of Science. We have done a very good job over the years, through the extension service, sharing research and education with those who are actively farming, and different techniques and different areas of research that have helped productivity growth. What are your thoughts on how your mission might currently address, or could in the future, the issue of entrepreneurs in rural America and technology transfer. I know that is an area that many leaders in the land-grant university system have focused on as they have pursued research, so that it is shared information and knowledge and facilitating efforts, not only to our farmers and ranchers, but also to our rural entrepreneurs.

Dr. BUCHANAN. I am not sure I got the question. Would you give me a capsule of your question again?

Ms. HERSETH SANDLIN. Do you currently, or do you see in the future, a rule for your office in assisting the efforts of rural entrepreneurs through technology transfer of the research conducted through Federal grants at land-grant universities?

Dr. BUCHANAN. Well, clearly the Cooperative Extension Service has a very vital role to play in that process and under the reorganization, I think we will have an even better linkage between the total research capacity in USDA than we have now. At the present time, extension is part of Cooperative State Research, Education, and Extension Service. We have a lot of ad hoc coordination, but the reorganization will institutionalize this process, so I think we will have an even better opportunity for information transfer from the total research system in USDA after the reorganization.

Ms. HERSETH SANDLIN. Thank you and thank you for allowing me to go over time, Mr. Chairman.

The CHAIRMAN. The chair thanks the gentlewoman and recognizes the gentlewoman from New York, Mrs. Gillibrand.

Mrs. GILLIBRAND. Thank you, Mr. Chairman. Thank you, Doctor, for appearing today. I appreciate your testimony very much. I am looking at your recommendations of how to reorganize and the funding mechanisms and the President has proposed $50 million for the bioenergy and bio-based products research. Do you think that amount is going to be sufficient for the level of research that is really going to be required to have the President's 2020 Initiative achieved?

Dr. BUCHANAN. Well, first, I should point out that the total farm bill has a number of other areas that provide funding. In fact, there is a total of $1.6 billion in the total farm bill package for bioenergy and bio-products. The part that is in the Title VII, which is in the research title, is $50 million and this certainly would provide a real boost, a real shot in the arm, if you will, for support of research and education programs in the agencies that I have responsibility for. So we are very pleased at that figure and that would certainly be a great boost to our effort.

Mrs. GILLIBRAND. And what is going to be the focus of your research, figuring out how to use biofuels cost efficiently or figuring

out which materials make the best biofuels? Are you looking at waste products that are on farms, like cow manure?

Dr. BUCHANAN. Well, obviously one of the real opportunities for agriculture is, as I pointed earlier, the sun is our only real ultimate source of energy. Capturing the sun's energy can be done by a couple of ways, such as photovoltaic cells, but the most important and efficient way of capturing the sun's energy is through green plant photosynthesis. Green plant photosynthesis is the heart of agriculture, so agriculture, as I mentioned earlier, is going to be at the heart of addressing the energy picture. So clearly the first challenge we have is what are the best energy crops that we can grow? And of course that takes many, many different approaches, for example, using not only what we have now, but also through screening our germplasm banks. We have 470,000 assession of plants in our germ banks around the country. Many of those have not been screened for energy properties. They have been collected and primarily screened for food and fiber properties. But we need to be looking at all of these assessions for their energy properties. We have been selecting plants for 7,000 years, since we stopped being hunters and gatherers. We really need to be looking at how we can breed and select plants, not only on the basis of food or fiber, but also on the basis of energy.

Mrs. GILLIBRAND. Right. And I have read for cellulosic ethanol, some of the best plants we have discovered are switchgrasses and perhaps woody biomass that is not used in papermaking process and other things like that. In terms of the timeframe for this I have a concern because I have a lot of dairy farms in my district, and right now the cost of grain has doubled because of the corn prices being used for ethanol. So my concern is how long will this take and will you be able to begin to facilitate the transfer away from corn-based ethanol towards perhaps cellulosic-based ethanol that has a greater energy return rate? And I think the difference is it is 2 to 1 for corn and maybe 10 to 1 for these other types of crops.

Dr. BUCHANAN. Well, first, I will give you a researcher's perspective. I can't tell you when because if I could tell you when, then it wouldn't be research. So the one thing I can say is the more research we do, the harder we work, the quicker we will achieve what we want to achieve. I would also say that this is clearly an issue that has come up. We are very much aware of the problem with the other uses, because we not only have a responsibility for energy, I made the comment earlier about, we now have the responsibility for food, feed, fiber and fuel, but just because we have a need for a fuel does not negate the need for food, feed and fiber.

Mrs. GILLIBRAND. Yes.

Dr. BUCHANAN. And I heard a speech at the American Chemical Society meeting a few weeks ago, talking about there not being as much competition between food *versus* fuel as there is between feed *versus* fuel.

Mrs. GILLIBRAND. Right.

Dr. BUCHANAN. And that is a very important point. In fact, we are working and we had a group of our staff working to try to understand what we are doing in research to address this issue. It has taken several different approaches. For example, how do we

make ethanol out of corn and ensure that the resulting DDGS meet the expectations for good quality animal feed? And of course, someone pointed out that we are looking at trying to find an efficient means of converting cellulosic material into ethanol. So we are looking at other ways. What are the other crops that we can grow that will replace feed? For example, in poultry we can use grain millets, which have equal capacity for satisfying poultry needs. So we are looking at a lot of different approaches. This is not a simple issue and I think that anyone that can predict when we are going to achieve this, I would like to meet them, because there is a lot of research that has to be done. We have a lot of effort ahead of us in order to achieve this goal. This is why I refer to this whole business as one of the grand challenges of this century.

Mrs. GILLIBRAND. That is why I started my question with, is $50 million enough?

Dr. BUCHANAN. Well, it is certainly a major start and I am delighted to support this and this will get us going down the road, so I hope that we are successful in getting the funding.

Mrs. GILLIBRAND. Thank you.

The CHAIRMAN. The chair thanks the gentlewoman and recognizes the gentleman from California, Mr. Costa.

Mr. COSTA. Thank you very much, Mr. Chairman. I do appreciate us continuing to follow through on this hearing. I have a couple different questions and part of it is a follow-through of our continuing theme that has been going with my colleagues and that is trying to get a handle on this research that is being done, as both of my last two colleagues indicated. We are not trying to give you a difficult time, Mr. Secretary, but the fact of the matter is that research has been going on for some time and we know that the reason that we are asking about what the Department has done to develop criteria is that they have allowed these research grants to be issued, and because we don't want to waste the taxpayers' dollars. We want to put the research, frankly, into where there already is a great degree of work and research that already has been done, so that we bring added-value and also have timelines in terms of, to use and agricultural term, where the lowest hanging fruit is in terms of asserting agriculture's role, we think a role that will grow in reducing our dependency on foreign sources of energy. To that extent, have you and the Department of Energy better coordinated your biofuels research effort through this bioresearch development initiative, and do you participate on that advisory council initiative?

Dr. BUCHANAN. Well, in the past, I have not been a member of the joint council, but plans are to include me as a member of that council. But clearly one of the Under Secretaries in the Department is a co-chair of that council, which provides coordination with DOE, and obviously there is plenty of work for everybody to do and we are committed to doing that.

Mr. COSTA. Well, it is not the work, it is the collaboration so that we are not reinventing the wheel, so to speak, and that we are not duplicating efforts is the concern I think most of the Committee Members here have, and I share those concerns. We understand that this effort in terms of the joint awards to fund biomass research and development projects. Does this group, in your knowl-

edge, have an oversight capacity? Do you monitor the way the funding is being distributed from your respective agencies under the grant awards, like the CSREES, to make sure that we aren't, as I said, duplicating efforts?

Dr. BUCHANAN. Well, certainly the agencies and CSREES, and the grant process through the NRI, has oversight in terms of ensuring that we don't fund the same projects in two different states by two different investigators. The national program staffs have opportunity for knowing what is going on, so we have a way of ensuring that we don't reinvent the wheel. But I would submit, too, and I have been in research all of my life, that the allegation that we duplicate a lot of work is not—it just doesn't happen too much. A lot of times we do similar research, but often times it is needed to ensure that we answer the right questions and it is location specific. So this is not a major concern of mine, duplicating or reinventing the wheel.

Mr. COSTA. As laypeople, some of us have an understanding that peer research involves validation that involves a lot of that kind of work, but it is my fear, and hopefully it is baseless, but I don't think so. We understand that we have some tremendous universities throughout this country that are doing great research, but we also know that some universities by nature, because of funding challenges, are very adept at chasing those research dollars. I don't think it is the universities' responsibility to police themselves. Some of them do collaborative efforts that I am aware of, but I think we need to, if you are issuing the grants, the Department of Energy is issuing the grants, there needs to be a high level of collaboration to ensure that in fact we are getting the best bang for our dollar.

Dr. BUCHANAN. Well, one of the things that we are doing is we have a joint effort between CSREES and DOE, in which we have jointly funded research efforts, and this is another way of ensuring that we don't fund the same project, by having joint efforts between DOE and CSREES and the Department. I understand what you are saying, Congressman, and clearly, we have too many things to do to not use our money as wisely as we can. That is obviously one of the real important parts of the proposed reorganization, is to have a single national program staff that has purview and is aware of what we are doing both intramurally, as well as extramurally. So that is another way of trying to address exactly what you are saying.

Mr. COSTA. Thank you very much. I have exceeded my time. Thank you, Mr. Chairman, for this effort.

The CHAIRMAN. The chair thanks the gentleman and also, thanks, Dr. Buchanan, for your testimony and for your Q&A session that we had here today. And there is a series of votes going on now, and Dr. Buchanan, it seems like there are no other questions for you at this time, so we thank you again and dismiss you from appearing before the Subcommittee.

Dr. BUCHANAN. Mr. Chairman, thank you very much for the opportunity and we stand ready to provide any information, and if you should have questions about our plans for use of the dollars in specialty crops and energy, we would be pleased to provide any information you ask for.

The CHAIRMAN. Well, we appreciate that, Doctor, and as the Chairman of the full Committee indicated, this Subcommittee intends to begin marking up on May 22, so we will be in touch and we will say to Panel II, that it will be about probably a half hour until we return from the series of votes, so we will back as soon as we can. Thank you.

Dr. BUCHANAN. Thank you very much.

[Recess]

The CHAIRMAN. The Committee will come back to order and Mr. Lucas and I would like to apologize to our witnesses, but we talked about unintended consequences with the last panel and we just ran into one. So we would just like to welcome our second panel, Dr. William Danforth, Chancellor Emeritus of Washington University, Chairman of the Coalition of Plant and Life Sciences, and Chairman of the Donald Danforth Plant Science Center, St. Louis, Missouri; Dr. Bruce McPheron, Associate Dean for Research and Director of Pennsylvania Agricultural Experiment Station, Penn State University, on behalf of the National Association of State Universities and Land-Grant Colleges, from University Park, Pennsylvania; Dr. George W. Norton, Professor of Agricultural and Applied Economics, College of Agriculture and Life Sciences, from Virginia Tech in Blacksburg, Virginia. And Dr. Norton, Mr. Lucas and I would like to express our deepest sympathy for the tragic events that happened at Virginia Tech. And finally, Dr. Joe Bouton, Senior Vice President and Director of Forage Improvement Division, The Samuel Roberts Noble Foundation, and Professor Emeritus, University of Georgia, Ardmore, Oklahoma. Dr. Danforth, you may begin when you are ready.

STATEMENT OF WILLIAM H. DANFORTH, M.D., CHANCELLOR EMERITUS, WASHINGTON UNIVERSITY; CHAIRMAN, DONALD DANFORTH PLANT SCIENCE CENTER; CHAIRMAN, COALITION OF PLANT AND LIFE SCIENCES, ST. LOUIS, MO

Dr. DANFORTH. Chairman Holden, Ranking Member Lucas and Members, I thank you for this opportunity. I have been involved with biomedical research for over 50 years and plant science for a dozen. Thanks to leaders in Congress, I chaired a task force to evaluate the establishment of one or more national institutes for agricultural science. I ask that this report be included in today's record and I have a brought a copy of it.*

The National Institute for Food and Agriculture Act introduced last Wednesday by Chairman Peterson and Members of the Committee, including Representatives Graves, Marshall and Boustany, embodied our recommendations. In March, Chairman Harkin, Senator Bond and others introduced the same Act in the Senate. I would like to just summarize a couple of our conclusions and recommendations.

First, innovations from research have been and are today essential to agriculture. They have given us food and fiber that are plentiful, cheap, safe and contributed to foreign sales. Innovation must continue, for we face serious challenges that have been mentioned

*The report entitled, *National Institute for Food and Agriculture—A Proposal*; dated July 2004; a report of the Research, Education and Economics Task Force of the United States Department of Agriculture; follows Dr. Holden's prepared statement.

and outlined today, including international competition for farm products, the need for bioenergy, growing water shortages, human nutrition, food safety and so on.

Second conclusion, that many of the next generations of breakthrough innovations will come from fundamental research, that is research that develops a better understanding of how animals and plants grow, develop, use nutrients, protect themselves from drought and diseases and so on. Fortunately, we have new and powerful tools, such as cell and molecular biology, genetics, proteomics and so on, that would be useful to agriculture as they have been to understanding human cancers.

Two key recommendations are not new: Scientific panels have advocated them for over 30 years. First, decision making about fundamental research must lean more heavily on scientific judgments. Intelligent laypeople, even people as intelligent as Members of Congress, can't judge the technical quality of modern research. The National Institutes of Health and the National Science Foundation have shown the way to partner scientific and political decision making. They invite researchers to submit competitive—I underlined that—competitive proposals to meet national priorities. Grants are awarded to the best proposals as evaluated by a combination of scientific merit judged by scientists, and national need as judged by Congress and stakeholders. The Act includes recommendations for face-to-face meetings between stakeholders and scientists.

Second, funding has lagged for years and must be increased. The NIH spends about $15 on research for every dollar spent by the USDA; about $150 in competitive peer review grants for every dollar so awarded by the USDA. The national priorities, it seems to me, are out of balance.

A few more points. Our proposals are narrow and focused. They don't touch existing research authorities. We recommend new money to begin to reverse the chronic underfunding of competitive agricultural research and also so as not to compete with the ongoing, well-done, badly needed national needs of the other USDA research programs. We recommend mandatory funding because of the failures of past reports and because we believe that a new way of doing things will need protection for a number a years. We believe such innovation will pay off. There has been, in preparation, a study by the Economic Research Service of the USDA that does suggest that perhaps agricultural research payoff is greater than was mentioned earlier and I think it is worth pressing for those results and seeing what comes of them. The challenges are very pressing today. We shouldn't delay them. We need to keep up our competitive edge and meet the challenges.

So Mr. Chairman, I recommend the adoption of the National Institute for Food and Agriculture Act and the research title of the 2007 Farm Bill. The legislation has the support of key agricultural groups, including the American Soybean Association, the National Pork Producers Council, the National Farmers Union, the National Turkey Federation, the National Corn Growers Association, and the National Chicken Council. I thank you.

[The prepared statement of Dr. Danforth follows:]

Testimony By

Dr. William H. Danforth

Chancellor Emeritus, Washington University

St. Louis, Missouri

Review of agricultural research programs

Before

The House Subcommittee on

Conservation, Credit, Energy and Research

On

May 10, 2007

Chairman Holden, Ranking Member Lucas and Members I thank you for this opportunity. I am William Danforth, former chancellor Washington University and now chair of the board of the Donald Danforth Plant Science Center both in St. Louis. I have been involved in biomedical research for over fifty years and in plant science and agriculture for a dozen.

Despite its enormous potential, agricultural research is neither funded nor managed to make best use of the nation's scientific talent. For over thirty years scientific panels made recommendations similar to the one I am here today to discuss. They have argued for more competitive, merit-based grants, but traditions have made change hard.[1]

Thanks to leaders in the Congress, I chaired a task force to evaluate the merits of establishing one or more National Institutes for agricultural science. I ask that this report be included in today's record. Our recommendations are embodied in the National Institute for Food and Agriculture Act introduced last Wednesday by Chairman Peterson and members of this committee including Representative Graves, Representative Marshall and Representative Boustany. In March, this act was introduced in the Senate by Chairman Harkin, Senator Bond and others.

Our conclusions which served as the foundation for this legislation were:

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[1] The five reports, all produced by the National Academy of Sciences (NAS), are: 1) Report of the Committee on Research Advisory to the U.S. Department of Agriculture (1972); 2) Investing in Research: A Proposal to Strengthen the Agricultural, Food and Environmental System (1989); 3) National Research Initiative (2000); 4) Publicly Funded Agricultural Research and the Changing Structure of U.S. Agriculture (2002); and 5) Frontiers in Agriculture Research: Food, Health, Environment, and Communities (20003). The article, "The Agricultural Grants Program," (1981) was published in the journal Science.

1. **<u>Innovations are essential to agriculture</u>**
    a. **Past innovations growing out of agricultural research and education have given us food and fiber that is plentiful, cheap, safe, and has contributed to foreign sales.**
    b. **Innovations must continue, for we face serious challenges, including**
        i. **Keeping American farmers and ranchers successful in the face of international competition.**
        ii. **Developing cost effective bio-energy,**
        iii. **Conserving water,**
        iv. **Improving human nutrition,**
        v. **Enhancing food safety,**
        vi. **Protecting the environment,**
        vii. **Preventing the spread of diseases among animals and from animals to humans.**

2. **<u>Modern research into the fundamental nature of farm animals and plants is critical to the next generation of innovations.</u> Fortunately, we have new and powerful tools. Cell and molecular biology, genetics and proteomics are as usefully applicable to plants and farm animals as they are to human cancers.**

3. **<u>To make the most of these tools research management must rely more on scientific judgments.</u> Intelligent lay people, even Members of Congress, need scientific help to judge the technical quality of modern research. The National Institutes of Health (NIH) and the National Science Foundation (NSF) are the gold standards. They invite scientists to submit competitive proposals to meet national priorities. Grants are awarded to the best proposals as selected by the combination of scientific merit as judged by scientists and national need as judged by Congress and stakeholders.**
    a. **This system is in keeping with the American tradition of getting the best results through competition.**

4. **<u>Better funding has been needed for years</u>.**
    a. **The NIH spends almost $15 on research for every $1 spent by the USDA and about $150 in competitive, peer reviewed grants for every $1 so awarded by the USDA.**
    b. **This situation is not good. It encourages some of the best scientific talent to work in other areas with better grants.**
    c. **I believe more merit-based competition would make OSTP and OMB more sympathetic to increases in agricultural research. In short, it would restore confidence in the system of agricultural research--- a key first step toward funding increases.**
    d. **Finally, Congress spends $100 billion dollars annually on agriculture. The NIFA seeks slightly more than 2% or $245 million of this total with growth in funding dependent upon meeting research milestones. I contend that virtually every**

other title in the Farm Bill can be improved if we make a greater investment in basic agriculture research and its scientific outcomes.

5. **Our proposals are, as was our charge, narrow and focused, designed to enhance USDA's important fundamental agriculture research.**
   a. **They do *not touch* existing research authorities. Rather they create a new institute so that it might develop its own scientific culture.**
   b. **Recognizing the chronic under-funding of competitive agricultural research, we recommended new money that would not compete with the ongoing programs for which we have respect. We recommended mandatory funding because we believed that a new way of doing things will need protection for a number of years.**

6. **Agricultural research is a great investment. Information prepared by the Economic Research Service of the USDA taken from two decades of studies of different commodities shows that mean estimate for annual market-based returns on public funding for agricultural research was 53 percent with a range from 19 to 95 percent. A 1996 study estimated that a dollar spent on agricultural research returned $10-15 to the economy.**

7. **Finally, the challenges are too great to delay. If nothing is done, America will lose its competitive edge to cheaper land and low cost labor; we will not capitalize optimally on our opportunities for bio-energy, a cure for the most virulent animal diseases will elude us, we will fail to protect our health and environment, our cost of production will continue to rise, our environmental quality will suffer and spending on future farm programs will escalate.**

8. **Mr. Chairman, we recommend the adoption of the National Institute for Food and Agriculture Act in the Research title of the 2007 Farm Bill. This legislation has enjoyed the support of several key agriculture groups including the American Soybean Association, the National Pork Producers Council, the National Farmers Union, the National Turkey Federation, the National Corn Growers Association and the National Chicken Council. This small investment on fundamental agriculture research will reap significant returns for farmers and ranchers and help the nation achieve solutions to pressing long term problems.**

NATIONAL INSTITUTE FOR FOOD AND AGRICULTURE

A PROPOSAL

REPORT OF THE RESEARCH, EDUCATION AND ECONOMICS TASK FORCE OF THE UNITED STATES DEPARTMENT OF AGRICULTRE

July 2004

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Karen Keeler Rogers, M.Ed., of KKR & Company, edited the document to make it more readable.

All of these individuals have been essential to our work. None can be blamed for any shortcomings.

Legislative Charge

THE MANDATE OF THE TASK FORCE; THE AMENDED MANDATE OF THE TASK FORCE

SEC. 7404. REVIEW OF AGRICULTURAL RESEARCH SERVICE.

(a) IN GENERAL.—Not later than 90 days after the date of enactment of this Act, the Secretary shall establish a task force to—

(1) conduct a review of the Agricultural Research Service;

and

(2) evaluate the merits of establishing one or more National Institutes focused on disciplines important to the progress of food and agricultural science.

(b) MEMBERSHIP.—

(1) IN GENERAL.—The Task Force shall consist of 8 members, appointed by the Secretary, that—

(A) have a broad-based background in plant, animal, and agricultural sciences research, food, nutrition, biotechnology, crop production methods, environmental science or related disciplines; and

(B) are familiar with the role and infrastructure used to conduct Federal and private research, including—

(i) the Agricultural Research Service

(ii) The National Institutes of Health

(iii) the National Science Foundation

(iv) the National Aeronautics and Space Administration

(v) the Department of Energy laboratory system; or

(vi) the Cooperative Sate Research, Education, and Extension Service.

(2) PRIVATE SECTOR.—Of the members appointed under paragraph (1), the Secretary shall appoint at least 6 members that are members of the private sector or come from institutions of higher education.

(3) PLANT AND AGRICULTURAL SCIENCES RESEARCH.—Of the members appointed under paragraph (1), the Secretary shall appoint at least 3 members that have an extensive background and preeminence in the field of plant, animal, and agricultural sciences research.

(4) CHAIRPERSON.—Of the members appointed under paragraph (1), the Secretary shall designate a Chairperson that has significant leadership experience in educational and research institutions and in depth knowledge of the research enterprises of the United States.

(5) CONSULTATION.—Before appointing members of the Task Force under this subsection, the Secretary shall consult with the National Academy of Sciences and the Office of Science and Technology Policy.

(c) DUTIES.—The Task Force shall—

(1) conduct a review of the purpose, efficiency effectiveness, and impact on agricultural research of the Agricultural Research Service;

(2) conduct a review and evaluation of the merits of establishing one or more National Institutes (such as National Institution for Plant and Agricultural Sciences) focused on disciplines important to the progress of food and agricultural sciences, and if establishment of one or more National Institutes is recommended, provide further recommendations to the Secretary, including the structure for establishing each Institute, the multistate area location of each Institute, and the amount of funding necessary to establish each Institute; and

(3) submit the reports required by subsection (d).

(d) Reports.—Not later than 12 months after the date of enactment of the Act, the Task Force shall submit to the Committee on Agriculture of the House of Representatives, the Committee on Agriculture, Nutrition, and Forestry of the Senate, and the Secretary—

(1) a report on the review and evaluation required under subsection (c) (1); and

(2) a report on the review and evaluation required under subsection (c) (2).

(e) FUNDING.—The Secretary shall use to carry out this section not more than 0.1 percent of the amount of appropriations available to the Agricultural Research Service for fiscal year 2003.

CONFERENCE REPORT ON H.R. 1559, EMERGENCY WARTIME SUPPLEMENTAL APPROPRIATIONS ACT, 2003

Mr. Young of Florida submitted the following conference report on the bill (H.R. 1559) making emergency wartime supplemental appropriations for the fiscal year ending September 30, 2003, and for the purposes:

[Page H3358]

CONFERENCE REPORT (H. REPT. 108-76)

The committee of conference on the disagreeing votes of the two Houses on the amendment of the Senate to the bill (H.R. 1559), "making emergency wartime supplemental appropriations for the fiscal year 2003, and for the other purposes", having met, after full and free conference, have agreed to recommend and do recommend to their respective Houses as follows:

That the House recede from its disagreement to the amendment of the Senate and agree to the same with an amendment as follows:

In lieu of the matter proposed to be inserted by the Senate amendment, insert the following: *That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, for the fiscal year ending September 30, 2003, and for other purposes, namely:*

TITLE I—WAR-RELATED APPROPRIATIONS

CHAPTER 1

DEPARTMENT OF AGRICULTURE

TITLE II—MISCELLANEOUS AND TECHNICAL APPROPRIATIONS

CHAPTER 1

SUBCOMMITTEE ON AGRICULTURE, RURAL DEVELOPMENT, AND RELATED AGENCIES

GENERAL PROVISIONS

SEC. 2101. (a) Section 756 in Division A of Public Law 108-7 is amended by striking "section 7404" and inserting in lieu thereof "sections 7404 (a)(1) and 7404(c)(1)".

(b) Section 7404 (e) Of Public Law 107-171 is amended by striking "0.1 percent of the amount of appropriations available to the Agriculture Research Service" and inserting in lieu thereof "$499,000 of the amount of appropriations available to the Department of Agriculture".

Executive Summary

RECOMMENDATIONS OF THE TASK FORCE

The United States Department of Agriculture (USDA) Research, Education and Economics Task Force, appointed by the Secretary of the U.S. Department of Agriculture in 2003 at the request of the U.S. Congress, respectfully recommends the following:

- The formation of a **National Institute for Food and Agriculture (NIFA)** within the USDA for the purpose of ensuring the technological superiority of American agriculture. The Institute should report directly to the Secretary of Agriculture. It should be kept separate and managed differently from existing programs so as to develop its own culture and establish its own methods of operation.

- The **mission of NIFA** should be to support the highest caliber of fundamental* agricultural research in order to:
  - increase the international competitiveness of American agriculture;
  - develop foods that improve health and combat obesity;
  - create new and more useful products from plants and animals;
  - improve food safety and food security by protecting American plants and animals from insects, diseases, and the threat of bioterrorism;
  - enhance agricultural sustainability and improve the environment;
  - strengthen the economies of the nation's rural communities;
  - decrease American dependence on foreign sources of petroleum by developing bio-based fuels and materials from plants; and
  - strengthen national security by improving the agricultural productivity of subsistence farmers in developing countries to combat hunger and the political instability it produces.

*Fundamental research is research that addresses the frontiers of knowledge, while it leads to practical results and/or to further scientific discovery.

- NIFA should accomplish its mission by awarding **competitive peer-reviewed grants** that support and promote the very highest caliber of fundamental agricultural research. The members of the Task Force define fundamental science as science that advances the frontiers of current knowledge so as to lead to practical results and/or further scientific discovery.

- NIFA's mission should **supplement and enhance, not replace,** the existing research programs of the U.S. Department of Agriculture.

- NIFA should be a **grant-making agency** funding proposals submitted by both individual scientists and single and multi-institutional research centers.

- **Mechanisms should be put into place** to assure that the science funded by NIFA is both of the highest scientific caliber and relevant to national needs and priorities. These mechanisms should include:
    - Committees of Scientists who apply rigorous merit review to all proposals.
    - A Standing Council of Advisers to assure the relevance and importance of the science NIFA funds.

- The **Director of NIFA** should be a distinguished scientist appointed by the President of the United States and confirmed by the United States Senate. The Director should be assisted by a Senior Staff of highly accomplished scientists.

- **Three offices of modest size** should be created to assist the Director and the Standing Council of Advisors. The offices should assure that NIFA-funded research is the most effective for and relevant to national needs and priorities. The offices are:

    - An **Office of Assessment and Scientific Liaison,** which will monitor the effectiveness of NIFA's scientific expenditures and coordinate its research efforts with those of other public research programs in the life sciences.

- An **Office of Scientific Personnel,** which will work with scientific and agricultural experts to assess the adequacy of the numbers and qualifications of scientific personnel in agriculture and related fields and will make recommendations for training programs should any be necessary.

- An **Office of Advanced Science and Application,** which will match national needs to research advances in order to help facilitate solutions to issues of national importance.

- NIFA's annual budget should build to **$1 billion over a five-year period.** When fully operational, management costs should be limited to 5 percent of the total budget.

- NIFA should be **located in Washington, DC** so that it is in close proximity to the headquarters of the nation's other publicly funded scientific agencies.

- **NIFA should be independent of all existing management structures of the USDA**. By doing so, it will develop its own culture of scientific excellence and innovation.

- Congress should **establish funding that is stable enough to support a sufficient number of well-conceived research projects** and give NIFA **clear responsibility for overseeing and managing scientific and technical judgments.**

- **Action** to adopt these recommendations should take place **without delay.**

The full report of the Task Force follows.

Introduction

FIVE CONVICTIONS THAT UNDERLIE THIS REPORT

Five convictions underlie the primary recommendation of this report to form the National Institute for Food and Agriculture. These convictions served as guides to the USDA Research, Education and Economics Task Force as we considered how best to meet the pressing needs of American agriculture.

1. **American agriculture faces critical challenges.**

   The Task Force believes there is an impending crisis in the food, agricultural, and natural resource systems of the United States, which are currently threatened on several fronts. For example, U.S. soybean growers are no longer the world's lowest cost producers; exotic diseases and pests threaten crops and livestock; obesity has reached epidemic proportions; agriculturally related environmental degradation is a serious problem for the United States and other parts of the world; and certain animal diseases threaten human health.

2. **Continual innovation in agriculture is the key to meeting these challenges.**

   The members of this Task Force agree with many Americans that our nation's future depends on our ability to innovate. Innovation – in every field – has been, and continues to be, essential to America's success in war and in peace.

   Agricultural innovation has served Americans well for generations. It has brought hybrid corn, higher yielding wheat, and the "Green Revolution" – all of which enhanced the world's food supply by increasing yields on existing acres. Since 1960, the world's population has tripled with no net increase in the amount of land under cultivation. Currently, because of innovation, only 1.5 percent of the population of the United States provides the food and fiber on which the rest of us depend. With so few people now involved in agricultural production, it is not surprising that many of us overlook the central role agriculture plays in maintaining the health and welfare of all Americans and in husbanding our land and water so as to provide for our children and grandchildren. The question now is: How can we best ensure that the innovation, so important in our past, continues into the future?

3. **Fundamental scientific research is critical to continued innovation in American agriculture.** Where will the next innovations in agriculture be generated? As in the past, many ideas for innovation will evolve from the farmer's experience, from the supplier's knowledge, and from the imagination of those who turn commodity crops into value-added products.

   However, many of the important innovations of the future – those that are totally new, those that solve long-standing problems, and those that represent significant breakthroughs – will come from a deepening understanding of how plants and animals reproduce, grow, and mature, how they produce nutrients, how they protect themselves against pests and diseases, how they utilize water, minerals, and nitrogen from the soil, how they interact with the environment, and how they can be beneficially modified. Fundamental agricultural research unearths these important understandings that can then be linked to the practical needs of all Americans. Continued scientific advances, some of which will be dependant on ideas and technologies from other fields, are necessary to build and replenish the knowledge base necessary for practical innovation. Just as modern irrigation draws on the water in aquifers, agricultural innovations draw on the well of fundamental scientific research.

4. **Opportunities to advance fundamental knowledge of benefit to American agriculture have never been greater.**
   These expanded opportunities are the result of amazing progress in the life sciences over recent decades, thanks in large part to the generous support of the federal government through the National Institutes of Health (NIH) and the National Science Foundation (NSF). New technologies and new concepts have speeded advances in the fields of genetics, cell and molecular biology, and proteomics. The application of the physical sciences and engineering to the life sciences have opened new vistas. Without this reservoir of scientific knowledge and new research technologies, we could not make the recommendations contained in this report.

   Today, much scientific knowledge is ready to be mined for agriculture, and science continues to produce new knowledge at an increasing rate. Many advances in other life sciences will feed quickly into agricultural sciences because all living things share the same genetic code and many of the same biochemical processes.

   [See Appendix 1 for our vision of the future of science-based agriculture.]

5. **Publicly sponsored research will be necessary to take full advantage of the opportunities.** The members of the Task Force believe that publicly sponsored research will be essential to continued agricultural innovation. Other nations recognize this fact, and are making significant investments using peer-review to assure that their science is high quality.[i]

Corporate research is valuable, but the success of American agriculture cannot depend only or primarily on corporate research any more than the health of Americans can depend only or primarily on the research of pharmaceutical companies. For-profit companies must, of necessity, focus their efforts on the development of products that will provide an adequate return on investment to keep the company viable and provide the resources for the development of yet newer products; therefore, American companies are not likely to devote significant research dollars to the study of the long-term effects of agriculture on the environment, the long-term sustainability of agriculture, or other matters of public health and welfare. These areas of investigation must depend on government-funded research for which, fortunately, there is strong public support. (See Figure 1.)

[See Appendix 2 for a lengthier discussion of this topic.]

Chapter 1

MODELS OF FEDERALLY SUPPORTED LIFE SCIENCE RESEARCH

Realizing the need for change in American agricultural research, the Task Force turned to existing, successful models for guidance. We chose the NIH and NSF. Both institutions efficiently manage highly competitive, merit-based, peer-reviewed grant programs that attract and support the nation's leading scientists. Both encourage open competition for grants, and both provide grants of sufficient size so that outstanding scientists from a variety of disciplines are able to carry out first-class research appropriate to the missions of the agencies. Most important, the science supported by these two agencies has greatly benefited the American people.

Modern life science research funded by the NIH and the NSF has provided the United States and the world with a steady flow of practical benefits, which is a major reason why these institutions are valuable as models for NIFA. Their work has led to and continues to lead to spectacular advances in the prevention, diagnosis and treatment of human disease, such as measles, diphtheria, whooping cough, German measles, haemophilous influenza type b meningitis, and polio. Physicians can now control and even cure some cancers, and we have seen dramatic improvements in the treatment of mental illnesses and in the reduction of cardiovascular disease. In addition, these federal agencies have shown the capacity to evolve continuously to meet the new opportunities and challenges that confront our society.

Chapter 2

THE NATIONAL INSTITUTE FOR FOOD AND AGRICULTURE (NIFA)

RECOMMENDATION: We recommend the creation of a National Institute for Food and Agriculture (NIFA) in order to meet the challenges that face our nation and our world. We propose an adequately funded NIFA that is structured and managed so as to bring the most advanced modern life sciences to bear on agriculture.

In the opinion of the Task Force, the creation of a National Institute for Food and Agriculture (NIFA) that brings into the USDA a new culture and new operating methods is essential to ensure the innovation in agriculture needed to ensure our nation's successful future. The name we recommend – NIFA – reflects the primary focus of the Institute: Agriculture is more than food, but it is difficult to think of the two separately.

The shape and functions of NIFA are described in the chapters that follow.

Chapter 3

THE MISSION OF NIFA

RECOMMENDATION: The mission of NIFA should be to support fundamental* agricultural research of the highest caliber in order to:

- Increase the international competitiveness of American agriculture.
- Develop foods that improve health and combat obesity.
- Create new and more useful products from plants and animals.
- Improve food safety and food security by protecting American plants and animals from insects, diseases, and the threat of bioterrorism.
- Enhance agricultural sustainability and improve the environment;
- Strengthen the economies of our nation's rural communities.
- Decrease American dependence on foreign sources of petroleum by developing bio-based fuels and materials from plants.
- Strengthen national security by improving the agricultural productivity of subsistence farmers in developing countries to combat hunger and the international political instability it produces.

Each of these areas of research is discussed in the remainder of this chapter.

1. Increase the international competitiveness of American agriculture.

Agriculture is critical to America's economic strength and balance of trade.

- Farming contributed a total of 0.8 percent to the gross domestic product (GDP) in 2001. It further supported an additional 12 percent of GDP through food service production, provision, and trade.[ii]
- Farming employs 1.2 percent of the civilian labor market, and supports almost an additional 16 percent through food service production, provision, and trade.
- Agriculture commodities accounted for 5.3 percent ($52.7 billion) of the nation's exports in 2001.[iii]

*Fundamental research is research that addresses the frontiers of knowledge, while it leads to practical results and/or to further scientific discovery.

- The overall U.S. balance of trade has been in deficit every year since 1976, yet the nation maintains a positive trade balance in agricultural goods. In 2000, the surplus amounted to $12.6 billion, up from $10.4 billion in 1999. New specialty products and less costly commodities are needed to maintain and further expand this advantage.

American agriculture cannot stand still. As globalization increases, so does foreign competition. Inexpensive land and labor provide great advantages to many nations, some of which are investing in their own research. Low cost soybeans from Brazil, raisins from Chile and Turkey, fresh tomatoes from Mexico, apples and tomatoes from China, and many other crops from other lands threaten America's trade advantages.[iv]

Every nation is working to make its farming more efficient and more productive and its agricultural products less expensive. Now and in the future, American farm products must be competitive both at home and in world markets. America requires highly productive agriculture that is well-suited to the nation's various regional climatic and soil conditions; that minimizes inputs of energy, water, fertilizers and pesticides; that is tolerant, as appropriate, to drought and heavy rain, to heat and cold; and that is easy to harvest. The assurance of food safety is also critical, as is the development of new specialty and value-added crops suitable for various regional growing conditions.

A U.S. competitive advantage, once won, will not last because other nations will be moving forward as well. Science-based innovation in agriculture, therefore, must be constant, with new improvements added every year. To meet this challenge, agricultural research must satisfy three criteria: 1) It must be scientifically first-rate; 2) It must be open to the most innovative ideas; and 3) It must help meet national needs. Success will also require persistence because tomorrow's gains depend on today's investments; therefore, we must place high priority on both important long-term goals and urgent short-term needs.

2. Develop foods that improve health and combat obesity.

In March 2003, Eric M. Bost, Undersecretary of Food, Nutrition and Consumer Services, testified that "Poor diets and sedentary lifestyles cost this nation dearly in medical costs, in lost productivity, and most sadly, in the premature death of over 300,000 citizens annually."[v]

In the last 25 years, obesity has increased markedly in industrialized and non-industrialized nations alike. In the United States, approximately 65 percent of adults and 15 percent of children and adolescents are overweight or obese. Obesity is particularly high in women of African-American, Mexican-American and Native American descent. It has been linked to a dramatic increase in type-2 diabetes as well as asthma, cancer, cardiovascular disease, osteoarthritis, and kidney disease. Obesity-associated health care costs account for approximately 7 percent of national expenditures.[vi] A recent report[vii] noted that in the United States, the number of obesity-related deaths is second only to tobacco-related deaths.

Leading edge science can help improve the diets and eating habits of all Americans. Though research in these areas currently is sponsored by the USDA and NIH, NIFA can play an important role by learning how foods can be modified to suit the nutritional needs of the American public, both those who are healthy and those who are not. For example, by modifying fatty acid profiles the amount of fat contained in both meat and milk may be reduced.[viii]

In the future, modified foods will help treat specific diseases, such as diabetes, and help protect people with genetic predispositions to certain other illnesses. An important goal is to create satisfying, non-allergenic, safe foods with minimal calories and maximum specified nutrients – foods that would promote healthier, longer lives. The addition of macronutrients (e.g. protein) and micronutrients (e.g. vitamins and minerals) can lead to more nutritious foods, and by modifying the composition of meats, scientists may be able to lower fat content and increase the heart-healthy ratio of omega-3 to omega-6 fatty acids. These are only a few ways agricultural science can improve the average American's diet.

3. Create new and more useful products from plants and animals.

Many hopes for agriculture in the future, especially its economic aspects, rest on developing the ability to derive new and more useful bio-based products from plants and animals. In the past, agricultural advances have resulted largely from more efficient production methods using improved seeds coupled with inputs of fertilizers, pesticides, herbicides and water, which together have increased the quantity and lowered the cost of food at home and abroad.

These advances, however, have also increased the financial pressure on most family farmers.[ix] For this reason, the importance of developing specialty and value-added agricultural products is widely recognized. The search is on for new and improved farm products and for more creative uses of both traditional and new products. The potential is great. Rick Tolman, President of the National Corn Growers Association, has said: "Anything that can be developed from petroleum can be developed from corn." The same is true for other cereals, grains, legumes and oilseeds. Products that are biodegradable and recyclable will also add value.

A wide variety of innovative bio-based products from crop plants are currently under development. Ethanol production from corn has been highly publicized, but there is much other potential as well, such as producing low cost pharmaceuticals from plants, egg whites and milk. Scientists are doing early work on many other promising value-added products, including:

- soybean-based biomaterials with desirable, rubber-like properties;
- biodegradable products from corn, such as plastics, solvents and disposable foam for packaging, plates and other uses;
- antibodies and other protein therapeutics produced in corn, tobacco and alfalfa for the treatment of human disease;
- textiles made from corn and other plants that may be used in clothing, bedding, carpeting and automobile interiors;
- new fluids developed from oil-seed crops that have excellent sun-protective qualities and many potential industrial uses; and
- products with unique performance characteristics, such as sturdier cotton or harder or softer wood.

Of the next generation of new drugs, more than half are likely to be biologicals. These medications are derived from human proteins in a process that is lengthy, complex and expensive. The drug industry has no quick or economical way to get these critical drugs from the microscope to the marketplace. The answer to these problems may come from chickens, however. Genetically modified chickens can produce human protein in their eggs. If such a process can be made commercially viable, biological medications could be produced less expensively and in higher volume.[x]

Innovative products such as these can provide important economic benefits to producers and bring new opportunities to small farmers. They also can serve as the basis for new regional industries in rural areas.

4. Protect the health of agricultural workers, the general public, farm animals and crops from natural causes and from terrorist attacks.

There are a number of important human health risks that can be understood and prevented through innovative agricultural research. Some of these risks are:

- *Prostate Cancer in Farmers.* Farmers are at greater than normal risk of prostate cancer, the second leading cause of cancer deaths among American men. The best current information links the incidence of prostate cancer in farmers to their use of methyl bromides as fumigants and to several widely used insecticides.[xi] Safer methods of farming and substitutes for potentially dangerous chemicals should be developed.
- *Food-borne Illness.* The Centers for Disease Control estimate there are 76 million cases of sporadic food-borne illnesses in the United States each year. These illnesses annually result in 325,000 hospitalizations and 5,000 deaths. Innovations flowing from research in fundamental agricultural science should significantly reduce the number of annual cases, and, therefore, lower the death rate from these illnesses.
- *Antibiotic-resistant Pathogens.* The use of antibiotics in animal feed may be causing a significant increase in the number of antibiotic-resistant pathogens, which may pose a serious risk to human health.[xii] More study is needed to assess the level of antibiotic resistance, the risks involved, and what should be done about this issue.

- *Prion Diseases:* Prion diseases, such as bovine spongiform encephalopathy (mad cow disease), are on the rise, yet their biology is little understood. Agricultural research can provide a wide body of scientific information that may help control these diseases and help prevent an emergency.
- *Chemical Food Contaminants.* The effects of chemical contaminants in foods, which are of concern to many, are poorly understood and require significantly more research.
- *Animal to Human Disease Transmission.* We need a better understanding of the ways disease passes from animals to humans and of the risks involved. Influenza, AIDS, SARS, "mad cow disease," and West Nile virus are only a few that require intense study.

There are also significant risks to farm animals and crops:

- *Foot and Mouth Disease:* Outbreaks of Foot and Mouth Disease have a significant economic impact. For instance, the disease cost the European Union $10 billion in 2001 and it cost the Republic of China $8 billion in 1997.
- *Avian Flu:* In 2003, eight Asian countries experienced outbreaks of avian influenza, apparently spread to domestic livestock from wild waterfowl. The consequences were catastrophic. During the first three months of the outbreak, 100 million domestic poultry either died or were culled to contain the spread. In order to guard against epidemics in livestock, it is important to understand more about the disease and its reservoirs, how it is spread, and natural and induced resistances.
- *Fungal Diseases of Plants:* Soybean rust is a pernicious fungal disease that is extraordinarily destructive. In past outbreaks, yield losses have ranged from 10 to 80 percent.[xiii] Currently, soybean rust is not found in the United States, but its arrival here is only a matter of time because the disease, which is airborne, already has infected plants in parts of South America. At this time, there is only one containment facility in the United States authorized to conduct research with this fungus and the plants it infects. Considering the virulence of the fungus and the economic consequences of its arrival in the United States, it seems clear that additional research is needed and needed soon.

- *Bioterrorism:* Many of the plant and animal diseases cited above could be used by bioterrorists against the United States. If we are to combat terrorism and protect our people and our food supply, we must invest in innovative agricultural research to learn more about how diseases spread and how the protective mechanisms of plants and animals can be enhanced.

5. Enhance the environment.

The importance of agriculture to the environment cannot be overstated. American farmers and foresters own 75 percent of the nation's privately held land – land that is both fragile and irreplaceable. Much has been done already. For example, agricultural science has made it possible to use no-till farming to help protect currently farmed land. New techniques have provided significant increases in yield that have enabled America to maintain open space, scenic beauty, wildlife habitats, national parks and recreational areas that otherwise would be needed for food production.

However, challenges continue. Considered as a whole, agriculture, as currently practiced, is not sustainable.[xiv] Agriculture uses 70 percent of the nation's fresh water for irrigation, which drains rivers, lowers the water level in aquifers, and increases the mineral content of the soil. Fertilizers and insecticides pollute streams and rivers. Suburban development and new highways reduce the amount of land available for farming. Invasive exotic plants and animals with no natural enemies are threatening native populations in many parts of the country. And, beyond the farm, stocks of ocean fish are being depleted. Much needs to be done, and done quickly, to protect the environment.

Other parts of the world also face significant challenges that will affect the United States sooner rather than later. To satisfy their need for food and fuel, farmers in underdeveloped countries are destroying tropical rainforests at an alarming rate. Population continues to grow in countries currently unable to feed their people. And, as economic standards rise in countries such as the People's Republic of China, their inhabitants are demanding better diets that include more meat. To satisfy this demand, a greater number of acres will be required to raise grain for animal feed, placing even more strain on the land. We view this trend as irreversible because nearly all

humans will have meat in their diet if they can. Consequently, we must further increase the productivity of plants and animals through agricultural science in order to alleviate this pressure for land. As in the past, our greatest hope for the future will be human ingenuity informed by science.

Several examples of the kinds of environmental issues that might be addressed follow:

- developing a better understanding of the fundamental mechanisms underlying carbon sequestration, which can help reduce agricultural production of greenhouse gases and increase soil nutrient quality;
- finding methods to reduce surface and ground water contamination by pathogens, and by phosphorus and nitrogen run-off from animal waste and fertilizers;
- developing ways to control naturally exotic, invasive or noxious plants, insects and microbes to reduce the use of pesticides and herbicides; and
- enhancing current sustainable agriculture and aquaculture technologies.

6. Strengthen the economies of rural communities.

The United States has become increasingly urbanized and suburbanized. This trend, which is likely to continue, and the changing economics of agriculture threaten the economic health of rural communities whose vitality is essential for those who live in them and for the nation as a whole.

To reinvigorate our rural economies, agricultural science must develop value-added farm products that enable American producers better to compete in both American and world markets. Value-added, specialty crops that are well adapted to local climatic conditions, friendly to the environment and low cost can provide higher yields on existing acres and a higher margin of profitability for rural communities. By growing specialty crops for high value markets, farmers can take best advantage of their specific geographic locations, and by using modern information technology rural communities will be able to develop networks of specialty crop centers. Finally, agricultural science also offers opportunities for developing new forms of processing close to areas of agricultural production.

7. Decrease American dependence on foreign sources of petroleum by developing bio-based fuels and materials from plants.

Currently the United States depends on petroleum imports for nearly 60 percent of its fuel needs. This undesirable situation combined with increasing environmental concerns has created an urgent national need for domestic energy sources that are clean, renewable and economical enough to be used on a large scale.

For example, using ethanol and biodiesel fuels minimizes the release of toxic substances into the air, including sulfur, carbon monoxide and carbon dioxide. Such fuels are produced from renewable resources, such as corn and soybean oil; the crops used to produce them remove more carbon dioxide from the atmosphere than consumption of the fuel adds back. Several studies have concluded that ethanol can provide about 24 percent more energy when it is burned than is used in its production.xv

Modern technology is reducing the cost of ethanol production and making it a more attractive, affordable fuel alternative. Ethanol production is nearly 30 percent more energy-efficient today than it was 20 years ago.[xvi] Nonetheless, it is important to continue to increase the efficiency and lower the cost of ethanol production.

8. Strengthen national security by improving the agricultural productivity of subsistence farmers in developing countries in order to combat hunger, alleviate human misery, and reduce the political instability they produce.

Through its foreign policy, the United States has long encouraged democracy on a world scale. But to be successful as democracies, developing countries must first become self-sufficient in food production so that they have a reliable source of adequate nutrition. Nobel laureate Norman Borlaug often has referred to agriculture as "the engine of change" for developing countries, asserting that the establishment of a reliable, cost-effective agricultural base drives social and economic development. Self-sufficiency in food is almost always the only practical, effective answer to poverty and recurrent hunger; subsistence societies do not have the money to import food, and foreign food aid is always temporary.

In addition to needing more food, people in developing countries need food higher in vitamins, minerals and other nutrients than traditional staples, like rice and cassava. Today, agricultural research is working to produce genetically modified crops that will provide greater quantities of these essential nutrients. Such advances will significantly improve the health of millions, particularly that of pregnant women, lactating mothers and their children.

Research to increase yield per acre remains important to eliminate the need to cultivate marginal land, which will help to relieve some of the pressure on the rainforests. Currently, the tons per acre yield in Africa is only one sixth that of the United States. Research is also needed to alleviate other effects of intensive agriculture, such as soil salinization and the erosion of top soil. Still other research is focused on providing crops with natural resistance to insects and disease, which will reduce the use of chemicals and increase yields. For example, cassava seedlings, genetically engineered to resist cassava mosaic virus, are currently being field-tested in Kenya. The availability of these novel cassava plants may significantly increase yields throughout rural Africa and provide people with a more stable, environmentally sustainable food source.

Unless agricultural research provides the developing world with seeds and technology that can be used locally to produce a steady, abundant supply of nutritious food, we can expect to see a significant increase in world hunger, retarded physical and intellectual growth, diseases, migrations, war and terrorism.

Chapter 4

ELEMENTS NECESSARY FOR THE SUCCESS OF NIFA

RECOMMENDATION: The Task Force recommends that NIFA have the following key elements that will differentiate it from other programs of the USDA and help ensure its success. Each is, in our view, an essential part of the whole.

1. The Institute will focus on fundamental scientific research related to its mission.

We recommend that NIFA focus on fundamental research that will deepen understanding of life processes, thereby, helping to assure that the nation's needs are met. We also recommend that the Institute fund a wide variety of fundamental research projects in the life sciences that will forward its mission. The Institute's scientific findings should be public and freely available to all.

In setting priorities, NIFA should, while keeping current needs in mind, maintain a long-term view. Most important research breakthroughs, such has hybrid corn and the "Green Revolution," were based on knowledge built over years of patient observation and experimentation. Similarly, the advances of future years will grow from the knowledge gained today and tomorrow.

We envision NIFA as a source of fundamental research, which, when joined with the existing programs of the USDA, land grant institutions, farmers, agri-business, environmental organizations, and consumer groups, will greatly enhance the effectiveness and public benefit of agricultural research.

2. NIFA will be a grant-making agency only.

Scientists from any field, including those who work in federal, state or local government agencies, universities and colleges, research institutes, and others whose proposals would benefit agriculture, will be encouraged to apply for support from NIFA. NIFA will not support a research staff of its own.

The recommendation that NIFA be a grant-making agency only is based, once again, on our model institutions, NIH and NSF. In 2002, about 85 percent of the NIH research budget and about 90 percent of the NSF research budget was distributed to areas of highest priority on a competitive basis, while, in the same year, only 8.5 percent of USDA research dollars were allocated to the merit-review competitive process. By concentrating the majority of their research funds in the competitive grant-making area, NIH and NSF help ensure that the science they support is the best and most effective available.[xvii] Fundamental agricultural research should be supported in the same way.

NIFA's program of competitive grants will encourage the nation's most able scientists to submit research proposals designed to produce the fundamental knowledge needed to improve food and agriculture; only the best of those proposals will be funded. Once funded, each grant will be subjected to periodic review to assess an investigator's scientific progress. When the original grant expires, investigators will be required to submit renewal proposals, which will be judged against both new and renewal proposals from other scientists. As a result, NIFA will not be committed to any single project or group of people; instead, it will be able to terminate ineffective programs easily and reallocate its resources as the nation's needs evolve.

By focusing solely on a competitive grant system that encourages fundamental research in the agricultural sciences, NIFA will augment the existing strengths of the USDA's in-house research. For instance, the USDA's experimental research stations, which are located in different parts of the country with different climatic and soil conditions, will be essential for turning NIFA-funded discoveries into practical applications. Also, Agricultural Research Service (ARS) staff will continue to collect and maintain valuable national resources, such as data bases and special genetic reservoirs.

3. NIFA should be administratively separate and report directly to the Secretary of Agriculture.

NIFA should be administratively separate from the USDA's agency of Research, Education and Economics (REE). We consider this recommendation key to NIFA's success. What is needed is a totally new culture and a different approach to setting priorities and making decisions. The traditions of the USDA and its methods of managing are very well-established and have

produced results in the past. Melding a new and different approach into existing programs seems to us an impossible task.

4. The Director of NIFA will be a distinguished scientist appointed by the President and confirmed by the Senate.

NIFA's Director should be a distinguished scientist who is trusted and respected by fellow scientists, by the administration, and by the Congress. NIFA's Director must have a broad and deep understanding of science, scientists, and the challenges facing the nation in food and agriculture. The Director of NIFA will report to the Secretary of Agriculture.

Because we are recommending a new endeavor that must be created and nurtured with both vision and care, we believe the selection of the first director will be especially critical. We believe that a presidential appointment is important for attracting an individual of the highest caliber.

We recommend that the director of NIFA serve for a single six-year term.

5. The Director will be supported by a Senior Staff.

A staff of highly accomplished scientists will assist the Director. Senior staff members will be recruited from the active scientific community. Many of these scientists should have rotating appointments similar to the model used by NSF. Such a system assures a steady influx of program officers familiar with the latest and most advanced science.

6. Standing Scientific Committees will assure high quality science through rigorous merit review.

Standing committees of highly qualified non-federal scientists will be appointed for four-year staggered terms. *Ad hoc* reviewers will supplement the standing committees when grants are submitted that require specialized knowledge not represented on the regular committees. All proposals not passing scientific muster will be declined. All that do pass scientific review will

receive a score based on scientific merit. The approved proposals along with their scores will then be passed on to the Council of Advisors for final review (see below). We recommend using only outstanding non-federal scientists on both the merit review committee and on the Council as part of the effort to create a new culture.

NIFA's ability to fulfill its mission to pursue fundamental science of the highest caliber – science with the potential to provide important benefits for our country – depends on stringent merit review. For more on merit review, see Chapter 5.

7. A Standing Council of Advisors will assure the relevance and importance of the science.

Though merit review by highly qualified scientists is an essential part of a successful research program, merit review alone is not sufficient to guarantee the importance of the work for meeting national needs; therefore, the Task Force recommends that a Standing Council of Advisors, composed both of scientists and stakeholders, be formed to help NIFA set its research priorities and debate and judge the relevance of its programs. The Council will also review all proposals passed by the scientific committees to ensure that the needs of the nation are being met. This recommendation is modeled after the NIH Councils.

The members of the Council should be highly qualified non-federal scientists and distinguished members of the American public, including representatives of farm organizations and industry, and persons knowledgeable about the environment, subsistence agriculture, energy, and human health and disease. We consider face-to-face meetings between scientists and stakeholders to be important to the success of NIFA. The Council will provide an important interface between scientists and stakeholders that will enable NIFA to link national goals and realistic scientific opportunities.

We recommend that members of the Council be appointed to four-year staggered terms by the Secretary of Agriculture, with the advice and consent of NIFA's Director.

8. **By virtue of the informational needs that will be placed on the Director and the Standing Council of Advisors, three offices of modest size should be formed to assist them. These offices will assure that the research NIFA funds is the most effective possible in both the short- and long-term.**

The three offices are:

- **An Office of Advanced Science and Application, which will closely monitor both national needs and advances in research with the goal of identifying pressing problems for which solutions are realistically achievable by research.**

  This office is designed to bring creative talent together from diverse disciplines to bridge potential gaps between fundamental science and high-priority practical needs. Its purpose will be to recommend paths to bring existing fundamental research to bear on the most pressing problems. This office should be organized as follows:

  - It should employ a small, focused staff of rotating experts in science and agriculture.
  - Key staff should be drawn from the ranks of active scientists who should serve no more than three years in order to assure that NIFA benefits from a steady supply of fresh ideas and new scientific insights.
  - Work should focus on a limited number of the most urgent problems. When required, the Office will assemble intensive study groups who will work for a month or more on urgent problems.
  - The Office should make regular reports to the Director of NIFA and to the Standing Council of Advisors and, when appropriate, suggest new research priorities.

- **An Office of Scientific Assessment and Liaison, which will monitor the effectiveness of NIFA's scientific expenditures and oversee the coordination of its research efforts with those of other research programs in the life sciences.**

  The goal of this office will be to assess the effectiveness of NIFA programs from two standpoints: First, the quality of the science will be evaluated using such tools as are readily available; second, the Office will evaluate the contributions of NIFA to the national research effort including how it collaborates and cooperates with other federal agencies. This office will also encourage cooperative approaches among various research agencies.

Since one scientist's work is highly interdependent on the work of other scientists, it makes sense to institutionalize this liaison function within NIFA instead of relying on *ad hoc* arrangements.

- **An Office of Scientific Personnel, which will work with scientific and agricultural experts to assess the numbers of scientists in agriculture and related fields and establish the number that are needed.**

  This office will generate data that will assist the Director and the Standing Council of Advisors in planning appropriate NIFA fellowship and training programs.

  The Director of NIFA should have responsibility for ascertaining the manpower needs of agricultural research in the areas supported by NIFA and, if asked, for other areas of food and agricultural research as well. He or she should work with the Standing Council of Advisors to plan programs that meet the needs of the future. Portable fellowships and training grants to institutions, or a combination of the two, could supplement the manpower needs.

Chapter 5

THE ARGUMENT FOR MERIT REVIEW BY QUALIFIED SCIENTISTS

RECOMMENDATION: NIFA's success depends on a reliable, well-established system of soliciting proposals for grants and then submitting each one to merit review by qualified scientists. All proposals, whether they are submitted by individuals or institutions, should go through this rigorous process.

Merit review of broadly solicited proposals is essential to the success of NIFA. The Task Force considers this process so important that we have devoted this chapter to the concept. The goal is to assure that NIFA receives proposals from any scientist with a promising idea, but funds only those that pass the quality standards of competent scientists.

We recommend this approach because we believe that the U.S. government should get the most for its expenditures. Decisions based on unexamined impressions or personal relationships can lead to unhelpful science and a waste of resources. We believe the government should support only that science that has a good chance of forwarding the federal agenda. By incorporating merit review as a key procedure, NIFA will provide the nation with the best science for the investment.

In order to understand why we now call for a change, it is important to explain why we believe agricultural science is managed so differently from the science of the NIH and the NSF. Agricultural science is the oldest of the federal scientific programs. It has a glorious history and embedded traditions; it accounts for much of the innovation that has supplied the American people with food that is safe, nutritious and inexpensive. Agricultural science came of age when intelligent lay people could understand how it worked and how it led to innovations and improvements in farming. Partly because federal programs evolved in cooperation with state programs, decision-making was concentrated in the political arena. This method of decision-making was logical because politicians and groups representing farmers understood traditional agricultural science – they knew what they needed and wanted.

Traditional agricultural science also differs from science conducted by NIH and NSF because it is place-bound; that is, it differs from one region to another. The needs of those who grow cotton are

not the same as those who grow blueberries or those who raise chickens. Soil and climatic differences have determined the necessary research. So that it might be useful and quickly put into practice, the research has wisely been tied to extension programs. It made sense and still makes sense for politicians to defend the science that they believe is needed by their regions.

But the world changes. Importantly, the underlying science has evolved. The fundamental life sciences on which so much of the future depends are now more esoteric and further removed from the day-to-day experience of lay people. Thus, while traditional agricultural sciences are still necessary and important, the old methods of decision-making do not work well with the new sciences involving genetics, cell and molecular biology, and proteomics. These sciences are difficult to master. The lay person, even if exceptionally intelligent, can no longer judge the value of specific lines of research. Only scientists in similar or related fields can know whether the science is or is not likely to yield any useful answers. Nor are the fundamental sciences place-bound. The practical applications may be, but the underlying science is not. For example, understandings developed from a simple model plant such as Arabidopsis can be quickly applied to major food crops.

It is for these reasons that the traditional methods of managing and making decisions about agricultural sciences are not well-suited for handling the newer life sciences, such as plant and animal molecular biology. They are better handled by the wide solicitation of proposals that are then submitted to scientific review as outlined in earlier chapters.

Chapter 6

NIFA'S ROLE IN THE FEDERAL RESEARCH ENTERPRISE

RECOMMENDATION: NIFA should operate as a key part of the federal research enterprise conceived as a whole. More specifically it should supplement and enhance, not replace, the existing programs of the U. S. Department of Agriculture, the National Science Foundation, and the National Institutes of Health.

As we envision it, NIFA will operate as a key part of the federal research enterprise, conceived as a whole. Though it will be independent, NIFA will be complementary to all current federal research programs, in particular the USDA (for example, the Agriculture Research Service; the Animal and Plant Health Inspection Service; the Cooperative State Research, Education, and Extension Service; the Economic Research Service; the Food Safety and Inspection Service; the National Agricultural Statistics Service; and the Natural Resources Conservation Service), to help provide the fundamental science necessary for their work. In addition, NIFA will complement and augment the important work of the Biological Sciences Directorate of the NSF (that as responsible for understanding the genomes of plants and microorganisms; the NIH that is concerned with overall human health, including food and nutrition; the Department of Energy that is interested in improved methods for producing fuels and other new bio-based products; the Centers for Disease Control that are involved in food safety; the Department of Homeland Security that is charged with defending our food supply against terrorist attacks; the Environmental Protection Agency that looks out for the environment; the United States Agency for International Development that addresses ways to reduce hunger and malnutrition in developing countries; and the Department of Commerce that works to improve foreign trade. It is important to note that none of these agencies can do an effective job without a constant flow of information and new ideas from research in food and agriculture. Similarly, agricultural research cannot proceed apace without benefiting from the work of other fields and agencies.

NIFA will play an important role in protecting the nation's health, economy and environment. It will provide the fundamental science base needed to serve farmers, consumers, environmentalists, and those concerned with the nation's economy and foreign policy. Its closest scientific relationship will likely be with the programs of the USDA, the NIH, and the NSF, but NIFA should also avail itself of the opportunities for collaborative work with other agencies as well.

We recommend this new Institute with full awareness of the USDA's significant past and present contributions to American agriculture. U.S. achievements in agricultural productivity have been called the "Miracle of American Agriculture."[xviii] It has been estimated that every dollar invested in agricultural research returned $3.50 to the American economy within a decade.[xix] For reasons such as these, the USDA should maintain its broad-based responsibility for managing the essential infrastructure of American agriculture.

Nonetheless, new challenges mentioned earlier and new opportunities arising from advances in the life sciences require new approaches. Federal and state governments have historically accepted the responsibility for maintaining the infrastructure necessary to sustain vital agricultural productivity. These investments have for decades included public support for USDA research, as well as for the Land Grant system of Colleges and Universities. Now is the time to add a new, modern element so as to improve upon past successes while addressing the challenges of the present and the future.

More specifically, NIFA will interrelate with the USDA, the life science components of the NSF, and the NIH in the following ways:

- **USDA**

  Agricultural Research Service (ARS) scientists, who are employees of the USDA, conduct both fundamental and applied research. Because NIFA will not perform research in-house and because all its funds will be used for fundamental research via a competitive review process, ARS scientists who perform fundamental research will be able to submit proposals to NIFA for funding, along with scientists from other organizations.

  In this way, NIFA will enhance the work of ARS by providing ARS scientists with an opportunity for additional funding, and by expanding the knowledge base on which they draw.

  Cooperative State Research, Education and Extension Service (CSREES) programs of the USDA fund research conducted by non-USDA scientists. Most of the research funded by CSREES is oriented more toward the achievement of practical results rather than the pursuit of fundamental knowledge; therefore, the objectives of CSREES and NIFA do not conflict.

The program within CSREES that most resembles NIFA is the National Research Initiative (NRI), which receives and distributes only about 8.5 percent of the total USDA research budget. Historically, NRI grants have been small in number and in dollars per grant. In addition, overhead reimbursement to institutions that receive NRI grants is so low that many institutional leaders discourage their scientists from applying for them. As a result, many scientists interested in agriculture prefer projects that receive funding from NIH or NSF. Moreover, NRI does not have a Standing Council of Advisors that includes stakeholders and scientists, nor does it have the specific responsibility of relating fundamental research to practical needs.

It is important to note that NIFA cannot and will not replace the work carried out by ARS scientists across the nation nor will it duplicate the practical research and extension programs of land grant institutions. While NIFA will address issues that are basic to all plants and animals, it will not duplicate nor replace such ARS work as adapting fundamental discoveries to regional conditions, taking into account soil quality, climate, and the availability of water. Therefore, by providing additional support for fundamental research related to agriculture, NIFA will enhance current and future USDA research.

- **NSF**

The NSF funds research in science and engineering. It has a very strong program in plant science that includes work on plant genomes. NIFA would not duplicate this work.

Rather, NIFA will fund other fundamental research that is relevant to the needs of agriculture – a focus that will result in different, but complementary, priorities for the two organizations. While NSF works to learn more about the basic science of plants, NIFA will work to learn more about plants and animals as they relate to agriculture. Research funded by NIFA will complement the science funded by NSF and make that research more relevant to agriculture. The NIH and the Biological Sciences Directorate of the NSF – two agencies whose work has complemented each other very well – divide their research priorities in a similar way.

- **NIH**

  The NIH funds fundamental and applied research related to health. NIFA will fund fundamental research related to agriculture, and ARS and university scientists will apply the results of NIFA research to create practical agricultural advances.

  Despite this division of responsibilities, there are many opportunities for joint or collaborative work between NIFA and NIH scientists on important health issues, including obesity, diabetes, animal to human transmission of diseases, food safety, and special diets for individual health needs. Because both concentrate on the life sciences, there are many opportunities for cross-fertilization, such as the exchange of information concerning the methods various pathogens use to infect plants, farm animals and humans.

Chapter 7
THE BUDGET

RECOMMENDATION: NIFA's budget should build to approximately $1 billion over a five-year period.

NIFA's budget is designed to accomplish the following goals:

- To provide sufficient funds over a long enough period of time to accomplish important work that helps address and solve a variety of challenges discussed elsewhere in this report.
- To encourage outstanding scientific talent, wherever that talent may be, to work on issues important to agriculture.
- To adequately reimburse grant-receiving institutions for their costs so that deans and presidents will encourage scientists to pursue agriculturally related research.

To achieve these goals, we recommend that there be:

- Project Grants (Grants awarded to one or more principal investigators)
    - NIFA should award 1,000 research project grants annually. This number should be sufficient to attract the attention of the scientific community and to add significantly to the number of scientists engaged in agricultural research.
    - The average grant size, including overhead, should be $225,000 per grant year. These grants would be larger than those awarded by NSF, but not so large as those awarded by NIH. We believe the recommended average size of a NIFA grant will be sufficient to attract qualified scientists and to fund important work.
    - NIFA grants should be awarded for a maximum of five years, with an average award duration of 3.5 years. Appropriate annual reports should be required for each award. Training grants will be provided as the need arises.

- Multi-disciplinary Research Center Grants (Grants awarded to a number of collaborating investigators)
    - Beginning in Year Two, NIFA should award 10 research center grants until there are a total of 40 funded research centers. These centers may be single or multi-institutional.

- Research center awards should average $3 million annually for five years.
- Assuming there are adequate proposals, research center grants should represent about 15 percent of NIFA's total research dollars. Merit review by qualified experts will insure that only quality proposals are funded.
- Research center grants from NIFA should fund coordinated cross-disciplinary research programs, an approach NIH and NSF have found very useful in advancing science.

- Indirect Costs (Overhead)
  - The overhead paid to institutions as part of a NIFA grant should be the same as the standard negotiated rates that now apply to NIH and NSF grants rather than the current artificially low rates associated with USDA research grants.

- NIFA Management Costs
  - We assume that NIFA's management costs will represent 5 percent of the total budget when the Institute is fully operational. This is the same percentage as NSF.
  - We assume that the management costs will be a higher percent of the total budget in the early years.

Though actual budgets need to be worked out with great care, and defended, we have provided budget estimates below that would fund a strong NIFA:

Model Budget Year 1	
Project Grants:	$225 million
Management Costs:	20 million
TOTAL:	**$245 million**

Model Budget Year 2	
Project Grants:	$450 million
Center Grants	30 million
Management Costs:	35 million
TOTAL:	**$515 million**

Model Budget Year 3	
Project Grants:	$675 million
Center Grants	60 million
Management Costs:	45 million
TOTAL:	**$780 million**

Model Budget Year 4

Project Grants:	$800 million
Center Grants	90 million
Management Costs:	45 million
TOTAL:	**$935 million**

Model Budget Year 5

Project Grants:	$800 million
Center Grants:	120 million
Management Costs:	46 million
TOTAL:	**$966 million**

Notes: History and Comparative Data

Appendix 3, which compares the size of USDA grants to those of NIH and NSF, demonstrates why agricultural research has not attracted enough leading scientists from outside the USDA. Appendix 3 also shows that growth in research funding available to the USDA has lagged behind the growth of all other federal non-defense research and development over a 20-year period (0.7 percent average annual growth compared to 2.75 percent.) Comparisons with other agencies are also shown.

Chapter 8
LEGISLATIVE RECOMMENDATIONS

RECOMMENDATION: We recommend the creation of NIFA. Its working relationship with Congress should be similar to that of the NIH and NSF. To establish credibility with Congress, NIFA will have a new approach to setting priorities and making decisions with the goal of ensuring scientific and programmatic excellence.

- **NIFA should have independence within the USDA so that it can establish its own culture of scientific excellence and innovation.**
- **If NIFA is to succeed, Congress must provide new funding that is stable enough to support well-conceived research projects; moreover, Congress must give NIFA clear responsibility for overseeing and managing scientific judgments.**

The above recommendation is made with the following points in mind:

1. **Managing and funding modern biological research is a very different job from managing and funding traditional agricultural programs and research.**

   To be effective, management and funding of fundamental research requires a different kind of partnership with the science community than that which has worked for traditional agricultural research. Funding decisions concerning NIFA must take the assessments of knowledgeable scientists into account, not to set governmental policy but to judge the value of science and to weed out applications that are neither scientifically sound nor of high enough scientific quality. In more traditional areas of agricultural research funding, regional needs and priorities are well understood and logically affect legislation. On the other hand, fundamental research, by its very nature, serves the nation as a whole and provides the knowledge base for solving agricultural issues in general, and, therefore, requires a different approach to scientific decision-making.

2. **History warns that the necessary changes will not be easy. Competitive, merit-review grants open to all have not fared well in the agriculture appropriations sub-committees despite past recommendations, yet these types of grants have been shown by both NIH and NSF to be the most effective way of attracting American scientists to important fields of study.**

   Since 1972, numerous reports by the National Research Council have recommended ways to restructure agricultural research for the modern era (See Chapter 9 and Appendix 4), yet these

reports have had little impact. The traditions of funding agricultural research are well established. Innovations, such as the National Research Initiative, have not been funded with sufficient resources to do the necessary job. In addition, NRI grants have been hampered by limitations on the size and length of grants and by artificially low overhead allowances.

3. **There are two important keys to the success of NIFA: A new and stable funding stream and a relationship of trust with Congress so that scientists decide scientific matters.**

To achieve these goals, new funding should come through an appropriations subcommittee, such as the one that funds the VA, HUD and independent agencies, because of that group's experience in handling a major research agency, or through the Agricultural Appropriations Subcommittee if the members wish to embrace a new approach to supporting science.

Chapter 9
WHY A NEW INSTITUTE IS NECESSARY NOW

For decades the United States has led the world in agricultural innovations and in agricultural production, thanks in large part to the leadership of the USDA. Yet, as noted in earlier chapters, American agriculture must now surmount many new challenges, for example, increasingly efficient foreign producers, rising concerns about food safety, the need to preserve the environment, American dependence on foreign sources of petroleum, and other concerns described earlier. Fortunately, today's challenges can be met by applying fundamental life science to agriculture.

This Task Force concludes, along with a number of experts we consulted and with the prior groups that have examined this issue, that America is not optimally exploiting current scientific opportunities to speed agricultural innovation. It is not hard to describe what should be done to develop the necessary scientific base, for in similar life science arenas, the NIH and the NSF have already shown the way. We need to develop a well-financed program, invite the nation's leading scientific talent to propose research that will address important agriculturally related issues, and, finally, select the best proposals for funding by relying on competitive scientific and programmatic review.

Unfortunately, despite the recommendations of very good reports dating back to 1972, there has been little change in the pattern of Congressional funding or the USDA's management of agricultural research. For example, our recommendations track closely an important recommendation from the 1972 report: (See also Appendix 4.)

> "Recommendation
> That the USDA seek a greatly increased level of appropriations for a competitive grants program, which should include support of basic research in the sciences...that underpin the USDA mission...[Grants] should be available to scientists in the USDA, in land-grant and non land-grant public universities or colleges and in private universities or colleges, institutes, and other agencies. The Committee recommends that this program be administered in such a way that research proposals are subjected to evaluation by peer panels of selected scientists...and that the administration should not be the same as that making allocations for USDA in-house research" (1972: p.49). Emphasis in the original.

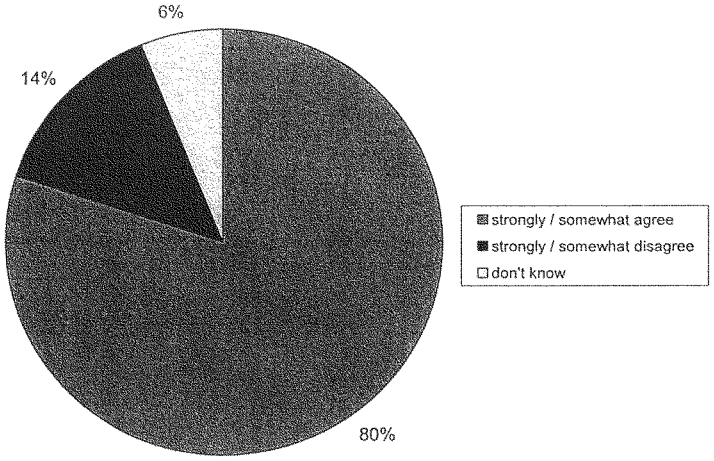
Due in part to subsequent inaction, there has been a loss of confidence in the research sponsored by the USDA. A majority of those with whom we have consulted believe that the monies appropriated for agricultural research have not been spent as well as they should be. Whether one thinks these views are valid or not, the results are evident. Appropriations for agricultural research have grown little in constant dollars in the last 20 years despite the increase in both need and in opportunity. In turn, low levels of funding have delayed scientific progress and further eroded the reputation of agricultural research.

Yet, the need for fundamental research grows every day. Opportunities for progress have been lost. America cannot wait to be surpassed by other countries that use less expensive labor to make effective use of past American innovations, to deplete our supplies of fresh water, or be struck by bioterrorism.

More than 30 years have passed since the 1972 report. We are alarmed that so little progress has been made. We are convinced that – for the good of the nation – action must be taken now. We have faith that America's response will be appropriate.

Figure 1

Public Support for Basic Research
Even if it brings no immediate benefits, basic science research, which advances the frontiers of knowledge, is necessary and should be supported by the federal government.



Source: "Taking our Pulse: The Parade/Research!America Health Poll" conducted by Charlton Research Company, 2004

APPENDIX 1: Vision Statement

If the United States is to meet the current and future challenges of agricultural research, the agriculture of 2024 must be vastly different from today. We envision that higher productivity per acre will have lowered costs and improved American competitiveness, while, at the same time, agricultural incursions into forests, wetlands and outdoor recreational space will have been lessened. A steady flow of innovations will have provided American farmers and consumers with new and specialized products designed to be competitive in the marketplace. Rural areas will have had opportunities to create jobs and capture economic gains from these new products. Americans will be eating more nutritious foods with higher quality proteins and vitamins, and special foods will be available for individualized needs. Collaboration between agricultural and medical scientists will have contributed to reduced obesity through the development of satisfying foods that have fewer calories. The food supply will be much safer than it is today, with effective vigilance against bioterrorism.

There will be new strategies to increase resistance to disease in plants and animals, and a deeper understanding of how to prevent transmission of disease from animals to humans. New bio-based products will have been developed from plants and animals, including new renewable fibers with differing desirable qualities, low-cost pharmaceuticals and vaccines, and fuels from biomass that bring the hope for "green energy" to life. Great advances will have been made toward the production of hydrogen from sunlight. The environment will be enhanced by limiting water, pesticide and fertilizer inputs. Agriculture will be more sustainable, and it will no longer drain aquifers, deplete the topsoil, or pollute rivers and oceans. The nation will be well on the way to using renewable resources in ways that can be sustained generation after generation. Finally, new and improved crops will be available to combat hunger in developing nations.

We believe that our vision is realistically obtainable. It will succeed by attracting the most creative scientific minds to agricultural research that are necessary for creating the knowledge to improve agriculture. Because agriculture is a life science, all of the work already accomplished in understanding the biology of viruses, bacteria, animals and humans is relevant and can be applied to agricultural research.

While we are hopeful and optimistic, we are also very aware of the challenges facing American agriculture and all Americans if nothing is done. We fear that maintaining the *status quo* will result in a loss of competitiveness for American agricultural products in the national and international marketplaces, a continuing erosion of our environment, and a food supply that will be increasingly at risk.

APPENDIX 2: Public and Private Funding of Agricultural Research and Development

An understanding of the responsibilities of the federal government, the states and the private sector in performing and funding agricultural R&D is important. These issues are presented in a thoughtful and helpful way in a paper by Keith Foglie, *et al,* for the Economic Research Service of the USDA. (AER-735)

Briefly, private R&D is commercially oriented. Companies, which must hold down costs, concentrate R&D funds on research that is likely to result in sales and profits, preferably on research that will lead to intellectual property that can be protected by patents. They are little interested in research that will benefit their competitors. For example, more than 40 percent of private agricultural R&D budgets is invested in product development, compared with less than 7 percent in public agricultural research. (AER-735) The directions of agricultural research performed by industry are shown in Figure 1.

Industry, federal and state funding for agricultural research

The traditional role of the federal government has been to support research that would not normally be funded by private industry because:

1. The knowledge produced is available to all and, therefore, is not proprietary, or
2. The new knowledge is in areas that have no profit potential, such as deeper understanding of environmental impact and more nutritious crops for subsistence farmers, or
3. The time and effort needed to develop new knowledge is too long for the time horizon of a commercial venture.

In general, most fundamental research falls into one or more of these categories.

The states, which have long partnered with the federal government in support of agricultural research, have incentives to invest in research that will benefit producers of that state. This type of research tends to be more downstream and applied rather than fundamental. Consequently, there are appropriate roles for all three historic partners.

Figure 2 (from AER-735) shows the flow of funds in the three sectors in 1992.

Trends in funding agriculture R&D

In recent years, public funding has been decreasing in constant dollars as a result of lack of growth in federal funds and tight state budgets. Private funding has grown dramatically, and by 1997 it outpaced public funding by $1.3 billion ($4.5 billion versus $3.2 billion). See "The Seed Industry in US Agriculture" by Jorge Fernandez-Cornejo, USDA/ERS, Jan 2004. As a comparison, the USDA spent only $1.74 billion in 1997.

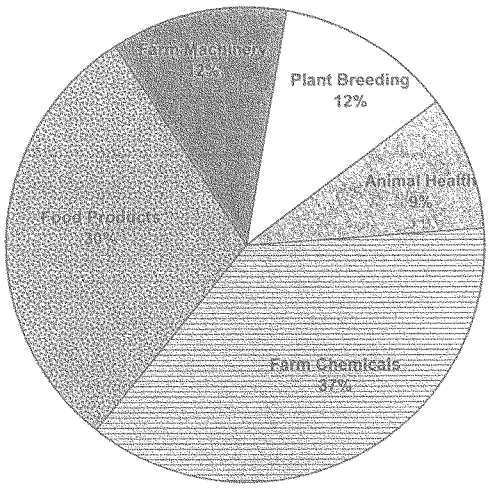
Comparison with health R&D

We believe that there are parallels between agriculture research conducted by the USDA and agri-business, and health research, conducted by NIH and the pharmaceutical companies. In both cases, government and corporate research function best when each plays a different, but synergistic, role.

According to a news release issued by the Pharmaceutical Research and Manufacturer's Association (PhRMA), its member companies invested an estimated $33.2 billion "in discovering and developing new medicines" in 2003. That same year, the NIH spent over $23 billion. Data on state expenditures are not available. One can calculate from the above information, however, that the percentage of federal to private expenditures in health is 0.69, while in agriculture, it is only 0.39. We argue that the science and the use of science is similar in the health and agricultural fields and should be funded similarly.

Figure 2

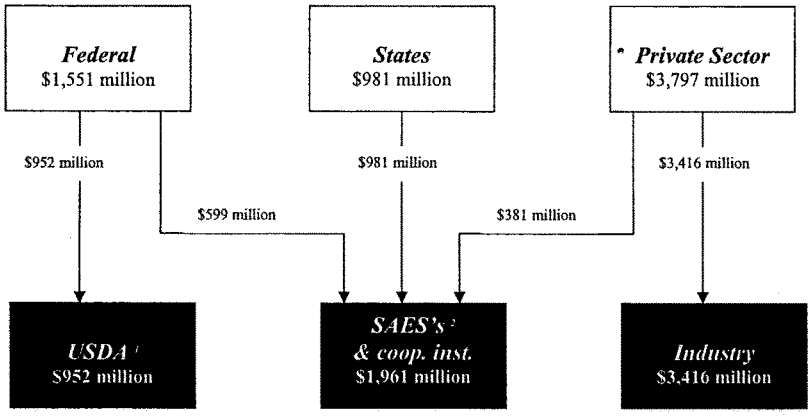
Private agricultural research by industry



Source: Economic Research Service. Data derived from Klotz, Fuglie, and Pray (1995).

Figure 3

Sources and flows of funding for agricultural research in 1992



[1] Includes research by Agricultural Research Service, Forest Service, Economic Research Service and National Agricultural Library.
[2] SAES's are State agricultural experiment stations; coop. instit. include the 1890 schools, forestry schools and veterinary schools.

Sources: Economic Research Service. Data for Federal and State research expenditures derived from the USDA, Inventory of Current Research; data for private sector/industry research expenditures estimated from Klotz, Fuglie and Pray (1995).

APPENDIX 3: Comparative Information

1. For 20 years, the research budget of the USDA has:

   a. Lagged behind the research budgets of NIH, NSF and NASA. Figure 1 shows the cumulative growth of R&D funding for the four agencies.

   b. Lagged behind the growth of all federal non-defense research and development. See Figure 2.

   c. Barely kept ahead of inflation during a time when both opportunities and challenges have grown dramatically. Since 1983, the average annual increase (based on constant 2000 dollars) at each agency has been:
      NIH: 5.73%
      NASA: 3.17%
      NSF: 2.43%
      USDA: 0.70%
      Non-Defense R&D overall: 2.75%

2. Individual grants through USDA are small compared with other federal grants (Table 1), a situation that discourages scientists from applying and prompts them to do research that can be funded by NIH or NSF. As a result, excellent scientists are enticed away from problems of special interest to agriculture.

3. Low overhead reimbursement makes the grants expensive to the scientists' institutions, causing many institutional leaders to discourage their scientists from applying to USDA, thus making it less likely that the research will be performed by our best and brightest scientists.

Figure 4

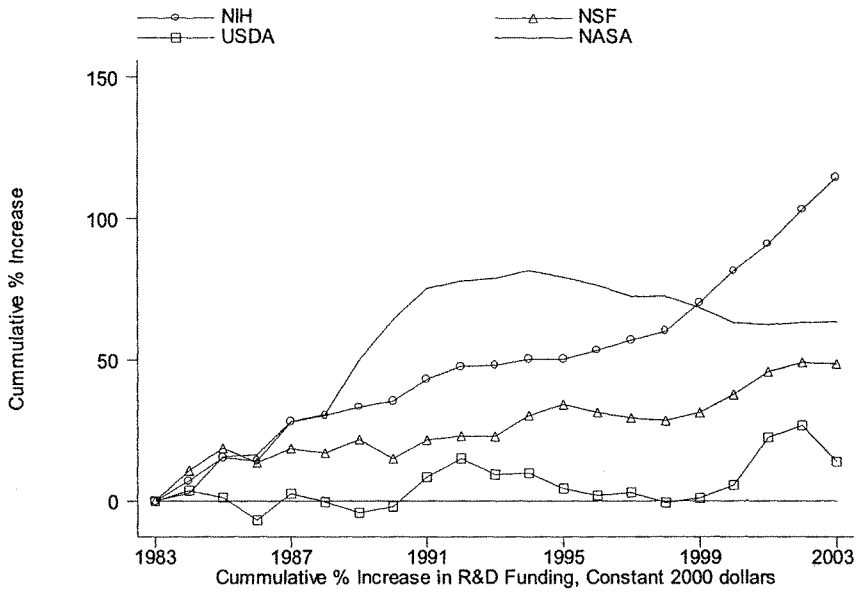

NIH
NSF
USDA
NASA
150
100
50
0
Cummulative % Increase
1983
1987
1991
1995
1999
2003
Cummulative % Increase in R&D Funding, Constant 2000 dollars

Figure 5

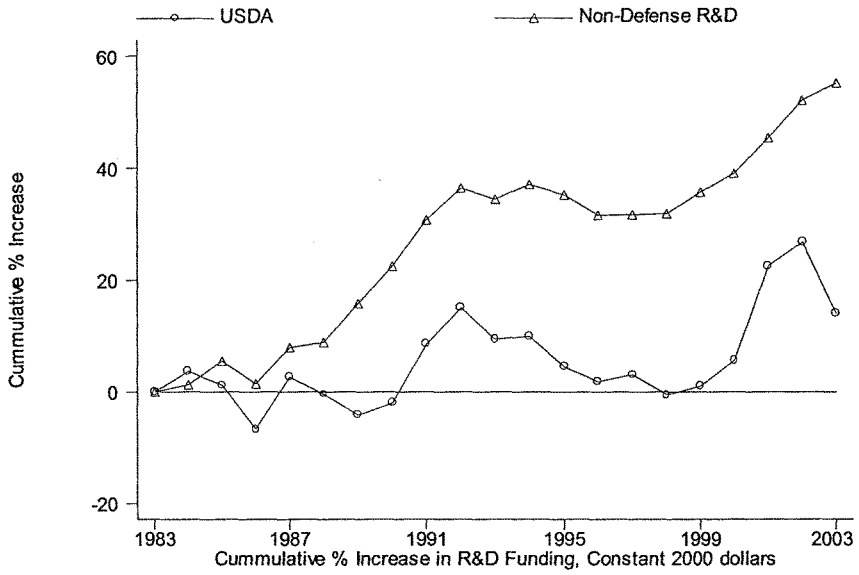

USDA
Non-Defense R&D
60
40
20
0
-20
Cummulative % Increase
1983
1987
1991
1995
1999
2003
Cummulative % Increase in R&D Funding, Constant 2000 dollars

Table 1: FY 2001 Competitive Grant Awards – NIH, NSF & USDA

Agency	Total Award Spending (Millions)	Number of Awards	Average Total Grant Award[1]	Average Duration	Average Annual Award	Median Annual Amount
NIH						
Competitive External Grants (all types)	$16,784.7	46,845	$1,289,890	3.60 yrs	$358,303	na
Research Projects – type R01	$8,092.6	26,173	unk	unk	$309,196	na
NSF						
Competitive Grant Awards	$3,342.6	20,932	$329,443	2.9 yrs	$113,601	$84,612
Division: Biological Sciences	$486.0	3,456	$443,923	3.1 yrs	$143,201	$108,333
USDA – CSREES						
National Research Initiative	$97.4	597	$188,116	2.4 yrs	$78,382	na
Program: Animals	$19.5	90	$216,564	2.5 yrs	$87,994	$86,000
Program: Plants	$10.5	69	$151,987	2.2 yrs	$74,168	$70,461
Higher and Longer Term Awards						
NSF						
Special Competition Awards	$137.2	85	$1,613,686	3.5 yrs	$461,053	$243,877
USDA[2]						
Initiative for Future Agriculture & Food Systems	$115.4	98	$1,177,084	2.9 yrs	$405,891	$314,138

Notes:
[1] This figure is derived from the data listed in the reports cited below. For NIH and NSF, it is the Average Annual Award times the Average Duration. The USDA *NRI Annual Report* provides the NRI's average award; the program averages were calculated based on the abstracts of funded research.
[2] The IFAFS program was created in 1998 to examine critical emerging agricultural issues such as: future food production, food safety, environmental quality, natural resource management, and farm income. The program's funding has been blocked by the House Appropriations Committee since 2001. As a result, USDA is no longer accepting proposals under this program.

Sources:
NIH
Total Award Spending (total cost obligations), Number of Awards: http://grants1.nih.gov/grants/award/trends/fund9202.htm
Average Total Cost: http://grants1.nih.gov/grants/award/trends/avgawdsrgcurrcon9702.htm
Average duration: http://grants1.nih.gov/grants/award/research/avglen01.htm

NSF
Competitive Grant Awards: Summary of FY 2003 Budget Request to Congress (contains revised figures for FY 2001).
http://www.nsf.gov/bfa/bud/fy2003/profile
Division of Biological Sciences: Summary of FY 2003 Budget Request to Congress (contains revised figures for FY 2001)
http://www.nsf.gov/bfa/bud/fy2003/nar_bio.htm
Special Competition Awards: FY 2001 Abstracts of Funded Awards, available at: http://www.nsf.gov/bio/award.htm

USDA
NRI: FY2001 Annual Report, and FY 2001 Abstracts, available at:
http://www.reeusda.gov/nri/pubs/annreport/2001.pdf; http://www.reeusda.gov/nri/pubs/abstracts/programlinks01.htm
IFAFS: FY 2001 Abstracts, available at: http://www.reeusda.gov/ifafs/

Table 2: Total R&D by Agency, 1973-2003
(Constant 2000 Dollars in Billions)

Year	NIH	NSF	USDA	NASA	DOE	DOD
1976	7.35	2.17	1.68	11.46	9.96	32.69
1977	7.64	2.23	1.67	11.68	12.78	35.32
1978	8.14	2.26	1.81	11.57	14.48	34.22
1979	8.48	2.21	1.88	12.00	14.32	34.10
1980	8.11	2.15	1.68	12.34	13.57	32.99
1981	7.64	2.05	1.75	11.83	13.18	37.18
1982	7.44	1.96	1.67	9.23	10.88	41.95
1983	7.87	2.06	1.72	5.31	10.03	45.97
1984	8.44	2.28	1.78	5.46	10.29	50.98
1985	9.13	2.46	1.74	6.17	10.36	55.42
1986	9.02	2.33	1.60	6.21	9.23	58.33
1987	10.26	2.45	1.75	6.94	8.69	59.51
1988	10.50	2.41	1.70	7.11	8.83	57.85
1989	10.82	2.52	1.63	8.48	8.96	55.27
1990	11.05	2.36	1.67	9.69	9.52	51.59
1991	11.89	2.51	1.84	10.76	9.72	49.28
1992	12.43	2.55	1.96	11.04	10.51	48.81
1993	12.49	2.54	1.85	11.13	9.40	49.05
1994	12.76	2.73	1.86	11.46	8.25	43.25
1995	12.74	2.84	1.76	11.19	7.59	41.83
1996	13.16	2.76	1.71	10.87	7.23	41.22
1997	13.62	2.70	1.74	10.43	6.93	41.51
1998	14.05	2.68	1.67	10.45	6.81	40.27
1999	15.48	2.76	1.70	10.03	7.19	40.13
2000	17.23	2.93	1.78	9.49	6.96	39.96
2001	18.86	3.16	2.08	9.42	7.37	40.71
2002	21.15	3.27	2.17	9.49	7.76	46.05
2003	23.58	3.25	1.89	9.52	7.42	48.87

Source: American Association for the Advancement of Science (AAAS) Reports I – XXVI, based on OMB and agency budget data as reported in National Research Council 2003, Table F-2; deflator F-11

APPENDIX 4: A Summary of Past Reports

A large number of prior reports have underscored the importance of research in agriculture and the need to improve how it is carried out. Given the Task Force's current mandate, five prior reports and one academic article seem most relevant.

The five reports, all produced by the National Academy of Sciences (NAS), are: 1) Report of the Committee on Research Advisory to the U.S. Department of Agriculture (1972); 2) Investing in Research: A Proposal to Strengthen the Agricultural, Food, and Environmental System (1989); 3) National Research Initiative: A Vital Grants Program in Food, Fiber, and Natural-Resources Research (2000); 4) Publicly Funded Agricultural Research and the Changing Structure of U.S. Agriculture (2002); and 5) Frontiers in Agriculture Research: Food, Health, Environment, and Communities (2003). The article, "The Agricultural Grants Program," (1981) was published in the journal Science.

The reports summarized below clearly indicate that the need for a well-funded and effective competitive grants program has been evident for at least 30 years.

Reports

1. *Report of the Committee on Research Advisory to the U.S. Department of Agriculture (1972)*
   This report by a distinguished panel of the National Academy of Sciences took note of the challenges to American agriculture and the state of agricultural research. Excerpts follow:

   "The practice of agriculture has long outgrown the individual farmer and his art…It requires research, policy and programs sufficient to challenge the best efforts and minds of America."

   "[The Committee] has found many programs of excellence…Acknowledgement must also be made of findings that indicate that much of agricultural research is outmoded, pedestrian, and inefficient, and that bold moves are called for in reshaping administrative philosophies and organizations, in establishing goals and missions, in training and management of research scientists, and in allocation of resources."

   "…grossly inadequate support was given to the basic sciences that underpin agriculture…"

   "It is not sufficient for the programs of agricultural research to be directed only to the pressing needs of the hour…there must be information generated with which the pressing needs of future generations will be met."

   "Recommendation
   <u>That the USDA seek a greatly increased level of appropriations for a competitive grants program, which should include support of basic research in the sciences…that underpin the USDA mission…[Grants] should be available to scientists in the USDA, in land-grant and non land-grant public universities or colleges and in private universities or colleges, institutes, and other agencies. The Committee recommends that this program be administered in such a way that research proposals are subjected to evaluation by peer panels of selected scientists…and that the administration should not be the same as that making allocations for USDA in-house research.</u>" (Underline present in original report.)

2. *Investing in Research: A Proposal to Strengthen the Agricultural, Food, and Environmental System (1989)*
   This document from the National Research Council (NRC) reports that in the areas of nutrition, international trade, natural resource conservation, and control of pollutants, the problems confronting agriculture are compounding more rapidly than they ever have in the past. The report finds that "Solving the problems . . . will require much more new knowledge than was required to solve previous problems." (p. 2)

   The report states "U.S. farmers cannot compete with the price of labor in many countries, where it is far lower than in the United States. And, for the same reason, they cannot compete with the cost of fertile land in other countries. The single resource U.S. farmers can draw upon to capture the leading edge is science and technology." (p. 9)

   To promote solutions to the above problems, the report makes a number of suggestions. The most important are: 1) The amount of money allocated to agricultural research should be dramatically increased. 2) The best way to improve agricultural research is to fund it through competitive grants, i.e., peer-reviewed science.

3. *National Research Initiative: A Vital Grants Program in Food, Fiber, and Natural-Resources Research (2000)*
   The purpose of this study was to evaluate the national research initiative. The report found that many new opportunities and challenges confront agricultural research.

   At the time the report was written (2000), USDA spent about $1.7 billion a year on research. Of this, only $120 million was spent on competitive grants. The remainder of the $1.6 billion that USDA spent on research was "distributed non-competitively through intramural research grants to USDA staff, formula funds to state agricultural experiment stations, and special grants for targeted initiatives and direct grants to states." (p. 2) The report states that such practices are at odds with the way most publicly supported research is funded, and it asserts that "merit-based peer-reviewed research . . . could have profoundly beneficial effects in the United States and the rest of the world." (p. 2)

   The National Research Initiative (NRI) is seen as a pilot program that has garnered some success given its very limited resources. In fact, the committee found that the NRI is in decline because of the size of the program, the short duration of individual grants, and the low overhead allowance. The conclusion is that "the location of the NRI within the USDA organizational structure suggests that the USDA and Congress place a higher priority on formula funds, special grants, and intramural research than on extramural, merit-based peer-reviewed research." (p. 4)

   The committee makes a number of recommendations, including: 1) That high-risk research with potential long-term payoffs be undertaken. 2) That the distribution of all research funds be done through merit-based peer review. 3) That stakeholders be more engaged. 4) That priority-setting be improved. 5) That a new institutional structure is needed if merit-based peer-reviewed research is to flourish.

The executive summary of the report concludes with a dire warning for Congress and the American public. It states: "The food, fiber, and natural-resource system is too important and too fundamental to future national security and stability not to have its own research program that focuses explicitly on high-risk problems with potential long-term payoffs...Without a dramatically enhanced commitment to merit-based peer-reviewed food, fiber, and natural-resources research, the nation places itself at risk." (p.14)

4. *Publicly Funded Agricultural Research and the Changing Structure of U.S. Agriculture (2002)*
   The mission of the committee that conducted this study was to "...examine whether publicly funded agricultural research has influenced the structure of U.S. agriculture..." (p. 2)

   Among the committee's findings are that: 1) "public-sector agricultural research is an important, but not an exclusive factor in structural change" (p. 5), and 2) "publicly funded research is important to the public good." (p. 7)

   The committee goes on to make a number of suggestions as to how agricultural research can be improved. They suggest that public-sector research be broadened beyond productivity and efficiency; that stakeholder needs and knowledge be incorporated into the research agenda; and finally that underserved populations also benefit from agricultural research.

5. *Frontiers in Agriculture Research: Food, Health, Environment, and Communities (2003)*
   At the request of Congress, the NRC undertook "a study of the United States Department of Agriculture's (USDA) Research, Education and Economics (REE) mission area." (p. 1) They were also tasked with providing "recommendations for future opportunities and directions." (p. 1) In the report, the NRC finds that agricultural research is being transformed and that a new focus is needed.

   The committee felt many new challenges confront agricultural research, including the globalization of food production and its implications, the identification of emerging pathogens and other hazards in the food supply, nutrition and human health, protection of the environment, and the strengthening of rural communities.

   Because much of the benefits from this research, in particular that related to public health and the environment, are widely distributed, it is difficult for any private firm to capture the revenue that such benefits generate. Thus, the report concludes that research in such fields as public health and the environment will not be conducted unless it is undertaken by the public sector.

   The National Academy of Sciences calls for a new vision in agricultural research. To this end, they make a number of recommendations. Some of these are that Congress should increase funding for agricultural research; that competitive grants, i.e. peer-reviewed science, should be broadly embraced in agricultural research; that there should be balanced stakeholder input; that more links should exist between the NSF, NIH, Department of Energy and USDA; and that new leadership is needed.

   In essence, the NRC argues that a new agricultural research model is needed.

Article

"The Agricultural Grants Program" (1981)
In this article from *Science*, the publication of the American Association for the Advancement of Science (AAAS), David Krogmann and Joe Key discuss the increasing need for peer-reviewed science to take hold in agricultural research. They point out that peer-reviewed science has not been fully embraced at the USDA for political, institutional and administrative reasons, but that because there have been a few USDA pilot programs that included peer-reviewed science, we have a wonderful natural experiment between formula funds and special grants in comparison with competitive peer-reviewed science. What we learn from that experiment is that "basic research seems to prosper by minimizing administrative direction and maximizing the opportunity of the investigator to exploit new opportunities" (p. 182); thus, if research is to flourish, it needs to be done in a competitive environment.

Conclusion
Much can be learned from the above article and reports. The themes that resonate most clearly are 1) that the U.S. is seriously under-funding agricultural research; 2) that competitive, merit-reviewed grants are important to advancing agriculture research; and 3) that a new model for agricultural research is needed.

Clearly, money is essential, but it is not enough. To successfully address the challenges and problems identified in the above reports, it is necessary – in addition to funding – to create a new institutional model that embraces competitive, peer-reviewed science as one of its fundamental planks.

APPENDIX 5: Consultants to the Task Force

The USDA Research, Education and Economics Task Force was appointed by Secretary Ann Veneman on January 21, 2003, at the request of Congress. A list of members and their affiliations appears below. The Task Force met four times: July 31, 2003; October 27, 2003; January 28, 2004, and April 20, 2004. The members studied past reports and information from the USDA, NSF, NIH and other sources. Members of the Task Force, singly or in groups, consulted with 68 knowledgeable people. We are grateful to Joe Jen, Under Secretary for Research, Education and Economics, and Katie Boots, Special Assistant to the Under Secretary, for their guidance and help.

Bruce Alberts, President, National Academy of Sciences
Martin Apple, President, Council of Scientific Society Presidents
Terry Barr, Chief Economist and Vice President, National Council of Farmer Cooperatives
Roger Beachy, President, Donald Danforth Plant Science Center
John Becherer, Chief Executive Officer, United Soybean Board
Robert Bertram, International Research and Biotechnology Specialist, U.S. Agency for International Development
Dennis Bier, Director, Children's Nutrition Research Center at Baylor College of Medicine
Kerry Bolognese, Director, Federal Relations, National Association of State Universities and Land-Grant Colleges
Kathryn Boots, Special Assistant to the Under Secretary for Research Education and Economics, U.S. Department of Agriculture
R. Ronald Bosecker, Administrator, Research Education and Economics, U.S. Department of Agriculture
Rodney Brown, Deputy Under Secretary for Research Education and Economics, U.S. Department of Agriculture
Steve Censky, Chief Executive Officer, American Soybean Association
Mary Clutter, Assistant Director, Biological Sciences Directorate of the National Science Foundation
Thomas Cooley, Director, Office of Budget, Finance and Award Management, National Science Foundation
Janice Dahl, Executive Director, United Soybean Board
Bryan Dierlam, Director of Legislative Affairs, National Cattlemen's Beef Association
Mark Drabenstott, Vice President and Director, Center for the Study of Rural America
Mitchell Dubensky, Director, Forest Resources Environment, American Forest and Paper Association
Ken Duberstein, Chairman and Chief Executive Officer, The Duberstein Group
Anthony Fauci, Director, National Institute of Allergy and Infectious Diseases, National Institutes of Health
Kirk Ferrell, Vice President of Public Policy, National Pork Producers Council
Carol Tucker Foreman, Director, Consumer Federation of America's Food Policy Institute
Howard Garrison, Director, Public Affairs, Federation of American Societies for Experimental Biology
Richard Glass, Vice President, Research and Development, National Corn Growers Association
Barbara Glenn, Director, Animal Biotechnology, Biotechnology Industry Organization
Carrie Golash, Senior Science Policy Analyst, Federation for American Societies for Experimental Biology
Michael Goldblatt, Former Director, Defense Advanced Research Projects Agency
Randy Green, United Egg Producers
Teresa Gruber, Executive Vice President, Council for Agriculture, Science and Technology
Colien Hefferan, Administrator, Cooperative State Research, Education and Extension Service
Lawrence Heider, Executive Director, Association of American Veterinary Medical Colleges
David Hess, Director, Office of Natural Resource Management, U.S. Agency for International Development
Charles Hess, Former Dean of the College of Agriculture and Environmental Sciences, University of California-Davis
Randall Huffman, Vice President of Scientific Affairs, American Meat Institute Foundation
Joseph Jen, Under Secretary for Research, Education and Economics, U.S. Department of Agriculture
Chandler Keys, Vice President of Government Affairs, National Cattlemen's Beef Association

Rick Kirckoff, Executive Vice President and CEO, National Association of State Departments of Agriculture
Ganesh Kishore, Vice President, Agriculture and Nutrition, DuPont/Solae
Samuel Klein, Director, Washington University Center for Human Nutrition
John Marburger, Director, Office of Science and Technology Policy
Dale Maronek, President, Council for Agriculture, Science and Technology
Ian Maw, Director, Academic Program for Agriculture and Natural Resources, National Association of State Universities and Land-Grant Colleges
C. Peter McGrath, President, National Association of State Universities and Land-Grant Colleges
David Meeker, Interim Scientific Liaison, Federation of Animal Science Societies
Katy Moffett, Director, PAC and Grassroots, American Forest and Paper Association
Harley Moon, Board of Agriculture and Natural Resources, National Academy of Sciences
Andrew Natsios, Administrator, U.S. Agency for International Development
Mortimer Neufville, Vice President, National Association of State Universities and Land-Grant Colleges
Susan Offutt, Administrator, Economic Research Service
Mike Phillips, Executive Director, Food and Agriculture, BIO
Steve Pretanik, Director of Science and Technology, National Chicken Council
Lowell Randel, Meyers and Associates
Peter Raven, Director, Missouri Botanical Garden
Caird Rexroad, Jr., Acting Associate Administrator, Agricultural Research Service
Frederick Rickles, Executive Director, Federation of American Societies for Experimental Biology
Paul Rodgers, Deputy Director of Policy, American Sheep Industry
Gerald Rushin, American Veterinary Medical Association
Philip Schwab, Science Policy and Legislative Affairs, U.S. Department of Agriculture
DeAnn Stish, Director, Congressional Affairs, American Forest and Paper Association
S. Richard Tolman, Chief Executive Officer, National Corn Growers Association
Jim Travis, Federal Government Affairs, Monsanto
Tom Van Arsdall, Staff, National Coalition for Food and Agriculture Research
Virginia Weldon, Former Member, President's Committee of Advisors on Science and Technology
Leah Wilkinson, Associate Director of Food Policy, National Cattlemen's Beef Association
Terry Wolfe, Member, Board of Directors, Illinois Corn Marketing Board
Mary Woolley, President, Research!America
Richard Wootton, Director, Extension and Outreach, National Association of State Universities and Land-Grant Colleges
Catherine Woteki, Dean of the College of Agriculture, Iowa State University

ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ARS	Agricultural Research Service
CSREES	Cooperative State Research, Education, and Extension Service
DOD	Department of Defense
DOE	Department of Energy
ERS	Economic Research Service
NAS	National Academy of Sciences
NASA	National Aeronautic and Space Administration
NIFA	National Institute of Food and Agriculture
NIH	National Institutes of Health
NRC	National Research Council
NRI	National Research Initiative
NSF	National Science Foundation
REE	Research, Education and Economics
SAES	State Agriculture Experiment Stations
SARS	Severe Acute Respiratory Syndrome
USDA	United States Department of Agriculture

ENDNOTES

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[i] See, for instance, Jeffrey Mervis and Dennis Normile. "Agencies Embrace Peer Review to Strengthen Research Base." *Science*. 279 (1998): 1471 – 1473., and Richard Stone. "Germany Puts Money on Peer Review." *Science*. 278 (1997): 792 – 794.

[ii] Economic Research Service, USDA. "Food and Fiber System Important Part of Economy" Rural America. 17:1, Spring 2002. Table 1. Available on-line @: http://www.ers.usda.gov/publications.rural america/ra171/ra171g.pdf.

[iii] Economic Research Service, USDA. "Food and Agricultural Exports Increased in 2000 at a Greater Rate than Imports, Reversing a 5-year Trend." Rural America, 17:1, Spring 2002. Table 1. Available on-line @: http://www.ers.usda.gov/publications/ruralamerica/ra171/ra171h.pdf.

[iv] *New York Times,* Mar. 22, 2004.

[v] Under Secretary Eric M. Bost, Food, Nutrition, and Consumer Services, testimony before Subcommittee on Agriculture, Rural Development, March 20, 2003. Prepared statement available on-line @: http://www.fns.usda.gov/cga/Speeches/CT03203.html. See also Allison, D.B., Fontaine, K.R., Steverns, J., and Van Itallie, T.G. "Annual deaths attributable to obesity in the United States" JAMA 1999; 282:1530-1538.

[vi] See "Obesity and the Environment – Initiatives of the National Institute of Environmental Health Services." 2003.

[vii] Mokdad, Ali H., Marks, James S., Stroup, Donna F., Gerberding, Julie L. "Actual Causes of Death in the United States, 2000" *JAMA* 2004; 291:1238-1245.

[viii] For more on this, see www.fass.org/government/csreesfs.htm.

[ix] See Hightower, Jim. *Hard Tomatoes, Hard Times*. Cambridge: Schenkman Publishing Company, 1973.

[x] For more on this, see the following article at www.animalbiotechnology.org/ani_bio.asp?news_id=818&mode=showarticle&show=false

[xi] For more on this, see http://pmep.cce.cornell.edu/profiles/extoxnet/haloxyfop-methylparathion/methyl-bromide-ext.html; also see the National Cancer web site.

[xii] New England Journal of Medicine 345:1147-1154, 2001; Stuart B. Levy, *The Antibiotic Paradox: How the Misuse of Antibiotics Destroys Their Curative Powers,* 2nd Edition, Perseus Publishing, 2002.

[xiii] See http://www.planthealth.info/rust/rust.htm.

[xiv] Tilman, David, et al. "Forecasting Agriculturally Driven Global Environmental Change." *Science*. 292 (2001): 281 – 284.

[xv] Shapouri, Duffield, Graboski. "USDA Estimating the Net Energy Balance of Corn Ethanol." July 1995.

[xvi] Shapouri, Gallager, Graboski. "USDA Ethanol Cost of Production Study." January 2002.

[xvii] See page 30 in Frontiers *in Agricultural Research*. National Research Council: 2003.

[xviii] Report of the Committee on Research Advisory to the U.S. Department of Agriculture, 1972.

[xviii] See Fuglie, Keith., Ballenger, Nicole., Day, Kelly., Klotz, Cassandra., Ollinger, Michael., Reilly, John., Vasavada, Utpal., and Yee, Jet. "Agricultural Research and Development: Public and Private Investments Under Alternative Markets and Institutions" Agricultural Economics Report No. 735. May 1996.

[xviii] For instance, see Jeffrey Mervis and Dennis Normile. "Agencies Embrace Peer Review to Strengthen Research Base." *Science*. 279 (1998): 1471 – 1473., and Richard Stone. "Germany Puts Money on Peer Review." *Science*. 278 (1997): 792 – 794.

[xix] See Fuglie, Keith., Ballenger, Nicole., Day, Kelly., Klotz, Cassandra., Ollinger, Michael., Reilly, John., Vasavada, Utpal., and Yee, Jet. "Agricultural Research and Development: Public and Private Investments Under Alternative Markets and Institutions" Agricultural Economics Report No. 735. May 1996.

The CHAIRMAN. Thank you, Dr. Danforth. The chair was negligent and Dr. Danforth, you were right on target. If you can keep your remarks to 5 minutes and submit your entire testimony for the record. We would like keep things moving along. There is another hearing that is behind us in this room. So Dr. McPheron?

STATEMENT OF DR. BRUCE A. MCPHERON, ASSOCIATE DEAN FOR RESEARCH AND DIRECTOR, PENNSYLVANIA AGRICULTURAL EXPERIMENT STATION, PENNSYLVANIA STATE UNIVERSITY, UNIVERSITY PARK, PA; ON BEHALF OF NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

Dr. MCPHERON. Thank you, Mr. Chairman, for the opportunity to discuss the land-grant system's CREATE–21 proposal. I am told that you, Ranking Member Lucas and your staff have been thoroughly briefed, so I will summarize the proposal and refer you to our written statement and legislative language for additional detail.

As you know, CREATE–21 has two fundamental purposes. It will bring together in a single organization the research agency's programs, personnel and facilities spread across USDA, and more tightly integrate this intramural research capacity with the extramural research, teaching and extension capacity within land-grant universities and related institutions. It will also double USDA funding authorizations for food, agricultural and natural resources, teaching, research and extension programs, to address the dozens of critical and urgent national problems that will remain unsolved unless USDA science program levels are substantially and immediately increased.

With respect to funding, we propose to dedicate 70¢ of each new dollar for competitively awarded grants, with the remaining 30¢ used to stabilize the capacity programs that support the basic USDA and land-grant infrastructure. In addition, we have specific provisions to address the tremendous unmet capacity and competitive program needs at America's historically black land-grant universities, tribal colleges and other minority-serving institutions.

The land-grant community has coalesced behind CREATE–21 because we believe that neither the *status quo* nor halfway measures are acceptable. To illustrate why a comprehensive approach dealing with both organizational and funding issues is absolutely necessary, let me present an example of an urgent national problem that would be better addressed under CREATE–21. The example I have chosen relates to the sudden and wholesale disappearance of honeybee colonies and these are the essential facts. Beginning in late 2006, beekeepers reported sudden catastrophic losses of honeybee colonies on a scale that they had not previously experienced. The problem is widespread and unexplained. Honeybees are incredibly important, pollinating some $15 billion worth of fruit, vegetables and forage crops each year. There are a variety of potential explanations for the problem, including mites, pathogens such as viruses, bacteria, fungi and protozoans, pesticides, colony transportation issues, imported bees and royal jelly. It is likely that a combination of these elements will be implicated. Penn State and other

land-grant universities have been collaborating with Federal and state agencies to investigate the problem and develop responses.

So what does this problem have to do with CREATE–21? Well, let me make five quick points. First, it underscores the vital link between research and extension. This problem was first reported by a beekeeper, one of our stakeholders, through the cooperative extension system at Penn State, and the close link between our extension and research programs permitted us to immediately design research experiments and get into the field.

Second, it points out the enduring value of capacity funding. Hatch and Smith-Lever funds provide Penn State and other land-grant universities with support for the world-class laboratories, scientists and staff necessary to attack urgent national problems.

Third, it demonstrates the significance of a national network of state agricultural experiment stations and cooperative extension units. While Penn State is at the forefront of this effort, we are collaborating with land-grants in dozens of states, from North Carolina to Washington.

Fourth, it illustrates the need for greater integration among USDA agencies and the Department's external partners. Both ARS and CSREES have national program leaders in this area and both agencies are sponsoring the search. While there is ad hoc coordination, there is no clear and simple integration as would be the case under CREATE–21.

Fifth and finally, it shows the importance of fundamental research. Recently the honeybee genome was sequenced and as a result, researchers are able to narrow the focus of their current investigations and should be able to produce results more rapidly.

In summary, Mr. Chairman, this is a good example of what we are promoting under CREATE–21 and what we hope will emerge from this Subcommittee: enhanced capacity funding, increased funding for fundamental research, and greater integration among USDA agencies and better coordination with the Department's external partners.

In conclusion, let me offer an analogy for your consideration. The current USDA science apparatus is like an old pickup with 300,000 miles that served its owner extremely well over the years. A prudent farmer wouldn't simply put on a new pair of tires. He would give it a thorough tune-up, too. So Mr. Chairman, we stand ready to help you with both the tune-up and the new tires. Thank you for the opportunity to present our views and I stand ready for your questions.

[The prepared statement of Dr. McPheron follows:]

NASULGC National Association of State Universities and Land-Grant Colleges

Testimony of

Dr. Bruce A. McPheron
Associate Dean for Research and
Director of the Pennsylvania Agricultural Experiment Station
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Representing the
Board on Agriculture Assembly
National Association of State Universities and Land-Grant Colleges

Before the

Committee on Agriculture
Subcommittee on Conservation, Credit, Energy, and Research
United States House of Representatives

"Agriculture Research Programs"

May 10, 2007

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Mr. Chairman and members of the subcommittee, I am pleased to appear before you this morning representing the National Association of State Universities and Land-Grant Colleges (NASULGC) to discuss our proposals for the Research Title of the Farm Bill.

As you know, NASULGC has been working diligently over the past two years to reach consensus within the land-grant community and among our stakeholders about how the Federal-State Partnership[1] in food, agriculture, and natural resources research, education, and extension should be updated and improved to meet the opportunities and challenges of the 21st Century.

The land-grant system traces its roots to the First Morrill Act of 1862, with major statutory authorities enacted in 1887, 1890, 1914, 1962, 1977, 1994, 1997, and 1998. Although we have a long history and many proud traditions, we have looked hard at how we have been doing business, listened to our critics, and embraced change.

Specifically, we have decided that future funding increases for both fundamental research and integrated activities (projects that integrate research with extension and/or education) should be distributed primarily through competitively-awarded, peer-reviewed grants. However, for reasons explained below, this must not be done by reducing the funding streams that sustain the basic capacity of U.S. Department of Agriculture's intramural research units, land-grant universities, state agricultural experiment stations, or cooperative extension offices. In fact, just the opposite is true; these capacity programs need greater funding too!

CREATE-21: A Bold and Comprehensive Plan

CREATE-21 is, as I said, the result of a deliberative process to rethink the basic structure of the Federal-State Partnership that guides, manages, and funds America's food, agriculture, and natural resources research, education, and public outreach. The acronym we've chosen stands for "Creating Research, Extension, and Teaching Excellence for the 21st Century," and we believe that ours is the best plan to accomplish that objective.

CREATE-21 originated, in part, as a response to Office of Management and Budget (OMB) efforts over the last three years to eliminate entirely or redirect to competitive mechanisms a portion of appropriated research funds flowing through the USDA to state agricultural experiment stations, forestry schools, and veterinary medicine schools.[2]

However, CREATE-21 is much more than just a response to OMB criticism. It is a bold and comprehensive plan to bring together in a single organization the many research agencies, offices, programs, projects, personnel, and facilities currently spread across USDA and more tightly integrate this "intramural" research capacity with the "extramural" research, teaching, and extension capacity within land-grant universities and related institutions. (See Fig. 1, pg. 7.)

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[1] The unique partnership arrangement between the Federal Government and the governments of the several States is described in Section 1409A (a) of the National Agricultural Research, Extension, and Teaching Act of 1977 (as amended).

[2] OMB's objections stem not from the quality of the research work performed — after all, these programs routinely garner high OMB program evaluation scores — but rather from the fact that the funds are distributed by statutory formulas and not competitive processes.

The other fundamental purpose of CREATE-21 is to double USDA funding for intramural and extramural food, agricultural, and natural resource research, teaching, and extension programs. This element is included within CREATE-21 because there are dozens of critical and urgent national problems that will not be solved in an acceptable timeframe unless USDA science program levels are substantially and immediately increased. (See Fig. 2, pg. 7.)

CREATE-21: Details and Benefits

Food, agricultural, and natural resources research, extension, and education programs are spread over four USDA agencies: (1) Agriculture Research Service (ARS); (2) Cooperative State Research, Education, and Extension Service (CSREES); (3) Economic Research Service (ERS); and (4) Forest Service R&D (USFS R&D). As a result, there is frequent programmatic duplication, no "lead-agency" to address critical national issues, and a lack of clear and simple integration across agencies.

CREATE-21 addresses the shortcomings of this situation by integrating ARS, CSREES, ERS, and Forest Service R&D (including their functions, personnel, programs, and activities) into a new organization to be called the National Institutes for Food and Agriculture (NIFA).[3]

- NIFA will be an independent agency reporting directly to the Secretary of Agriculture and headed by a Director who is an acknowledged expert. The Director will be nominated by the President, confirmed by the Senate for a single six-year term, and guided by a Council of Advisors.
- The Director and his team will manage a broad and integrated portfolio of programs organized by problem/solution areas and will include six national institutes:
  (1) Economic Opportunities in Agriculture and Natural Resources;
  (2) Nutrition and Health;
  (3) Rural and Urban Community Development;
  (4) Natural Resources and Environment;
  (5) Food Safety and Agricultural Security; and
  (6) Families, Youth, and Communities.
- NIFA's "competitive" programs will be open to all qualified universities/investigators and will be aimed at solving problems of pressing multistate, national, or international significance.
- NIFA's "capacity" programs will maintain and expand the intramural research capabilities within USDA (e.g. ARS, ERS, and USFS R&D) and the research, extension, education, and international capabilities within land-grant universities and related institutions.
- Finally, NIFA will have special funding provisions to enhance the capacity and competitiveness of the 1890, 1994, small 1862 land-grant institutions, and related agricultural colleges.

[3] "NIFA" as included in the CREATE-21 proposal refers to the new organization to be formed from ARS, CSREES, ERS, and USFS R&D. Under the "Danforth" proposal, "NIFA" is a new stand-alone agency reporting to the Secretary of Agriculture and providing fundamental research grants.

Consolidating ARS, CSREES, ERS, and Forest Service R&D into one cohesive organization will, we believe, have many advantages:

- Program integration will be strengthened by integrating the research capacity of ARS, ERS, and Forest Service R&D and aligning these intramural resources more closely with the research, education, and extension capacity of America's land-grant universities and related institutions.
- Budgetary efficiency will be improved through elimination of duplicative programs and activities and a streamlined bureaucracy.
- Organizational flexibility will be increased through a variable structure organized around six major problem-solution areas (the six institutes listed above).
- Stakeholder participation will be enhanced through a Council of Advisors and other mechanisms for improved and increased input at all levels.

In addition to the organizational elements described above, CREATE-21 envisions increased funding (compared to current agency baselines) for NIFA's competitive and capacity programs. If CREATE-21 is enacted and fully funded, after seven years:

- Competitive funding will reach $2.1 billion per year, with fundamental research constituting 55 percent of the total and integrated programs the remaining 45 percent.
- Capacity funding will reach $2.9 billion per year, enabling intramural USDA research and extramural programs at land-grant universities and related institutions to maintain and extend their base operations.
- The competitive/capacity ratio — considering existing funds ($2.7 billion) and new funds ($2.7 billion) — would be 42 percent competitive and 58 percent capacity funding. Currently, the ratio is approximately 10 percent competitive and 90 percent capacity.

However, to "jump start" the funding enhancement program, $200 million per year in mandatory funding would flow immediately to NIFA from the statutory authority for the Initiative for Future Agricultural and Food Systems (IFAFS) program.

Urgent National Example: Honey Bee Colony Collapse Disorder

Mr. Chairman, the land-grant community realizes that CREATE-21 is ambitious in its objectives and scope. We have coalesced behind this proposal because we believe that neither the status quo nor halfway measures are acceptable. To illustrate why a comprehensive approach — dealing with both organizational structure and funding issues — is absolutely necessary, let me present a single, detailed example[4] of an urgent national problem that would be better addressed if CREATE-21 were enacted.

The Associated Press ran a story recently that appeared in hundreds of newspapers across the country relating to the sudden and wholesale disappearance of honey bee colonies. This problem, which has been called "Colony Collapse Disorder" (CCD) is well known to us at Penn State and

[4] Although this example focuses on the honey bee colony collapse disorder, there are many other problem areas that could illustrate our case (such as avian influenza, human health and obesity, biofuels/bioproducts, international competitiveness, animal health and disease, climate change, sustainable agriculture, etc.).

to me, personally, as I am an entomologist whose research has focused on insect genetics, including honey bee genetics. It is a problem with enormous implications:

- Honey bees pollinate $15 billion in U.S. crops each year.
- Major crops that depend on honey bee pollination for 90 to 100 percent of their fruit set include apples, blueberries, cherries, almonds, cucumbers, and squash.
- Crops that depend upon honey bee pollination for significant fruit/vegetable production include asparagus, avocados, broccoli, cantaloupe, celery, citrus, cranberries, melons, peaches, pears, and strawberries.
- Feed crops that depend upon honey bee pollination include alfalfa and soybeans.

Beekeepers have experienced honey bee losses for many years.[5] However, in late 2006, beekeepers reported sudden, catastrophic losses of colonies on a scale that they had not previously experienced. Moreover, the causal agent of these losses was not readily apparent to beekeepers or university and ARS researchers.

The problem is widespread. According to our best information, CCD symptoms have been reported in 24 states, Canada, and Europe. In addition, CCD affects both migratory colonies (those that are moved from region to region to service the pollination needs of commercial agriculture) and colonies that remain in one location throughout the year.

A variety of potential explanations exist for CCD. Researchers are examining mite load, disease presence (both known diseases and new pathogens), pesticide effects on bees, the impact of transportation on bee colony health, the health of imported honey bees, the contents of imported royal jelly, and the impact of reusing old beekeeping equipment on CCD incidence.

The explanation for CCD is likely to be a complex mixture of factors:

- Mites have been a major factor in honey bee health for the past 15 years. Work at Penn State, the Pennsylvania Department of Agriculture, and ARS is examining collapsed and healthy colonies to assess the impact of mite presence in the syndrome.
- A variety of pathogens — viruses, bacteria, fungi, and protozoans — have been identified in bees from collapsed hives. Work at Penn State is now focusing on comparing healthy and collapsed hives to look for patterns in which pathogens might be associated specifically with collapsed colonies.
- Methods for analyzing pesticide levels in hive compounds (wax, honey, and pollen) are under development so that healthy and collapsed colonies can be compared. This work, begun at Penn State, has expanded dramatically, with cooperation from USDA, the Environmental Protection Agency, and pesticide producers.

What does this problem have to do with CREATE-21?

[5] A variety of diseases and, more recently, two species of parasitic mites have resulted in death of colonies and reduction of surviving honey bees within surviving hives.

1. It underscores the vital link between research and extension. CCD was first reported by a stakeholder (beekeeper) through the Cooperative Extension System at Penn State. The close link between extension and research permitted us to immediately design research experiments to address this emerging problem. Without such a relationship, our response would have been greatly delayed as the data slowly made their way from the field to the laboratory. Thus, it is important for Congress to increase funding for both research and extension and thereby stop the slow, steady erosion (by inflation) of capacity funding programs such as Hatch (research) and Smith-Lever (extension).

2. It points out the enduring value of capacity funding. The Hatch and Smith-Lever programs provide Penn State and other land-grant universities with support for the world-class laboratories, scientists, and staff necessary to tackle urgent national problems. Our immediate response to CCD was to initiate research and successfully leverage federal capacity funds with monies from external funding sources. Without Hatch and Smith-Lever funds, we would still be raising money and recruiting scientists instead of moving ahead with this time-critical research!

3. It demonstrates the significance of a national network of state agricultural experiment stations and cooperative extension units. While Penn State is at the forefront of the CCD effort, we are collaborating with colleagues in dozens of states. Yes, some of the answers to the CCD riddle may come from Pennsylvania, but they may just as likely come — in whole or part — from research in Florida, Maine, or Montana!

4. It illustrates the need for greater integration among USDA agencies and the Department's external partners. Both ARS and CSREES have national program leaders for "bees and pollination" and both agencies sponsor research in this area (with the ARS work performed internally and the CSREES research at land-grant and other universities). While there is ad hoc coordination among the various entities, there is no clear and simple integration as would be the case under CREATE-21.

5. It shows the importance of fundamental research. Recently, the honey bee genome was sequenced (mapped) and we now know that honey bees do not have the normal complement of genes to eliminate toxins from their systems or genes to fight immune disease. Armed with this information, researchers are able to narrow the focus of their current investigations and thereby produce results (hopefully) in a more expeditious manner.

In summary; CCD is a good example of what we are promoting under CREATE-21: (1) enhanced capacity funding; (2) increased funding for fundamental research; and (3) greater integration among USDA agencies and better coordination with the Department's external partners.

Concluding Remarks

CREATE-21 Compared to the Other Leading Plans. As described above, CREATE-21 addresses both the organizational and funding issues that this subcommittee must tackle as you craft the Research Title of the 2007 Farm Bill. The two other major proposals before you have much to recommend them, but as the attached document illustrates, neither represent a truly comprehensive approach. Now, this is not to say the other proposals are bad; they are both sound and would serve to improve upon the system now in existence. They are just not as all-encompassing as CREATE-21.

The leaders of America's land-grant universities believe that this may be the only near-term opportunity to reinvigorate all of the components of the Federal-State Partnership. Therefore, we urge you to create an organizational structure and funding framework that will serve our stakeholders over the next 50 years. Collectively, if we fail to adjust to new economic and environmental conditions, then we will surely fail in our mutual responsibility to provide America's farmers, ranchers, foresters, families, and children with the service, science, and education they so rightly deserve.

Other Farm Bill Recommendations. Mr. Chairman, NASULGC's Farm Bill Committee has developed a number of other proposals to improve the operation and effectiveness of Farm Bill programs and authorities beyond CREATE-21. These include suggestions to further enhance the contributions that our research, education, and extension programs make through the Farm Bill's research, energy, conservation, nutrition, rural development, trade, and other titles. These were developed by consensus over the past year, and include provisions to improve research, extension, and teaching at 1890 universities, Tribal colleges, Insular Area institutions, as well as traditional land-grant colleges. We will be pleased to submit draft legislative language to achieve these goals to you or to the committee staff. We urge your favorable consideration of these proposals as well as CREATE-21.

Conclusion. On behalf of the Board on Agriculture Assembly of the National Association of State Universities and Land-Grant Colleges let me thank you for the opportunity to present this testimony. We look forward to working closely with you in the weeks ahead to craft a Research Title to the 2007 Farm Bill that seizes the opportunity to update and improve both the structure of the USDA science apparatus and the mechanisms by which the Federal-State Partnership funds food, agricultural, and natural resources research, teaching, and extension.

# # #

Figure 1:

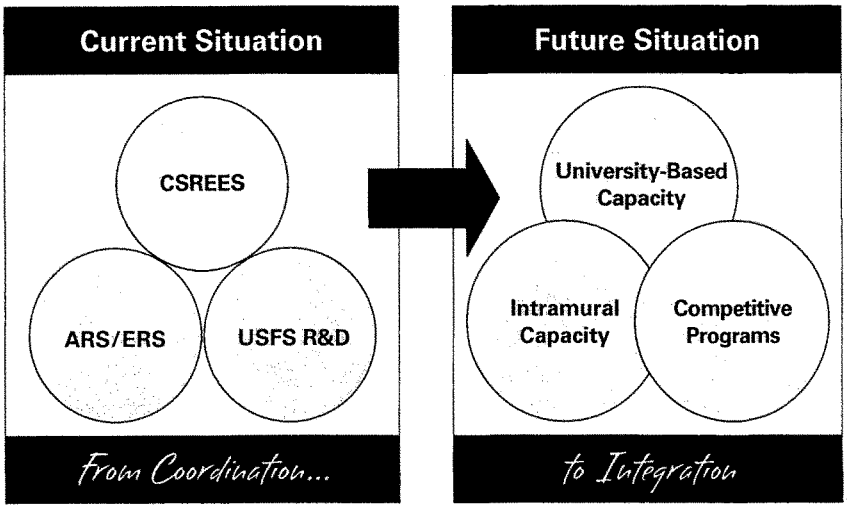
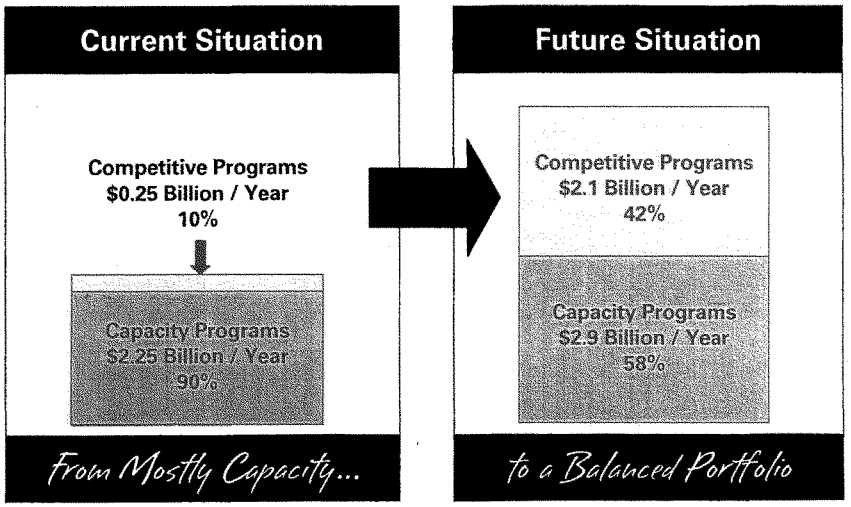


Figure 2:



Side-by-Side Comparison

CREATE-21	REE (Danforth) Task Force	Administration's Farm Bill Proposal
National Institutes for Food and Agriculture ▪ Independent agency reporting directly to USDA Secretary ▪ Director "distinguished expert" appointed by President and confirmed by Senate for single six-year term ▪ Director assisted by 13-Member "Standing Council of Advisors" – Director, 12 non-federal stakeholders ▪ Council "shall assist the Director in establishing NIFA's priorities, and in reviewing, judging, and maintaining relevance of NIFA programs" ▪ Six Institutes: (1) Economic Opportunities in Agriculture and Natural Resources; (2) Nutrition and Health; (3) Rural and Urban Community Development; (4) Natural Resources and Environment; (5) Food Safety and Agricultural Security; and (6) Families, Youth, and Communities	**National Institute of Food and Agriculture** ▪ Agency within USDA reporting directly to USDA Secretary ▪ Director "distinguished scientist" appointed by President and confirmed by Senate for six-year term ▪ Director assisted by 25-Member "Council" – Director, 12 scientists, 12 stakeholders ▪ Council has authority to review proposals as recommended by Institute's standing committees ▪ Three offices: (1) Advanced Science and Application; (2) Scientific Assessment and Liaison; and (3) Scientific Personnel	
Reorganization within USDA ▪ Consolidates CSREES, ARS, ERS, and Forest Service R&D into National Institutes for Food and Agriculture ▪ New Institute reports directly to Secretary		**Reorganization within USDA** ▪ Combines CSREES and ARS into: Research, Education, and Extension Service (ERS, USFS R&D left as is) ▪ New agency led by "Chief Scientist" reporting to new "Undersecretary for Science"
Spending Authorization/Funding ▪ Consolidate authorization for all intramural and extramural activities (one budgetary line) ▪ FY 2007 funding for CSREES, ARS, ERS, and USFS-R&D become "current baseline" ▪ New funds above baseline split 70/30 between competitive grants and capacity programs ▪ Total authorized funding starts at baseline of $2.68 billion per year, grows to $5.35 billion per year in seventh year ▪ New competitive grant funds split 55/45 between fundamental and integrative (IFAFS-like) programs ▪ $200 million in new monies (above baseline) is "mandatory" funding coming from prior IFAFS authority (is split 70/30 competitive/capacity)	**Spending Authorization/Funding** ▪ New competitive grants program for fundamental research only ▪ Starts at $245 million per year, grows to $966 million per year in fifth year ▪ In addition to existing authorizations for ARS, CSREES, ERS, USFS-R&D ($2.68 billion) ▪ Total authorized funding at end of fifth year: $3.646 billion	**Spending Authorization/Funding** ▪ $50 million per year "in mandatory funding... for a Bioenergy and Bioproducts Research Initiative" ▪ $100 million per year for Specialty Crop Research Initiative "to provide science-based tools for specialty crop industry"

CREATE-21	REE (Danforth) Task Force	Administration's Farm Bill Proposal
Analysis: Strengths of Proposal (Structure) ▪ Combines all major sciences agencies/units at USDA ▪ Increases organizational flexibility through a variable structure organized around six major institutes with focus on problem/solution areas ▪ Improves budgetary efficiency by eliminating duplicative programs/activities and streamlined bureaucracy ▪ Enhances program integration by bringing intramural research capacity of ARS, ERS, and USFS R&D more closely together with research, education, and extension capacity of land-grant and related institutions ▪ Boosts stakeholder involvement through new mechanisms for improved/increased input at all levels	**Analysis: Strengths of Proposal (Structure)** ▪ Creates a new fundamental science agency at USDA ▪ (NOTE: The REE Task Force was not charged with considering a reorganization of the science agencies at USDA and therefore, did not deal with that issue as both CREATE-21 and the Administration's Farm Bill proposals do.)	**Analysis: Strengths of Proposal (Structure)** ▪ Combines two of the major science agencies/units at USDA into a new agency (CSREES + ARS = REES), which will help improve budgetary efficiency and program integration
Analysis: Strengths of Proposal (Funding) ▪ Focuses on increased funding for research and teaching and extension ▪ Recognizes that fundamental research in agriculture, food, natural resources, etc. must be increased dramatically; authorizes new funding of ≈$1.2 billion per year (in seventh year) ▪ Also recognizes that applied/integrated activities (where research and extension combined) must be increased significantly; authorizes new funding of ≈$960 million per year (in seventh year) ▪ Also recognizes that the intramural capacity (ARS, ERS, USFS R&D, land-grant universities) must not continue to be eroded by inflation; authorizes new funding of ≈$670 million per year (in seventh year) for research, teaching, and extension ▪ Establishes fail-safe procedures to protect existing intramural research, education, and extension capacity should funding fall in future years ▪ Captures mandatory funding from the Initiative for Future Agriculture and Food Systems (IFAFS) program for immediate infusion of $200 million per year (Split: $140 M competitive/$60 M capacity) ▪ Provides a single funding "line" thereby creating a single focal point for political efforts to increase funding for food, agriculture, and natural resources research, education, and extension ▪ Recognizes that 1890, 1994, Insular Area, Small 1862, and AASSCARR Institutions have special needs and reserves a portion of both competitive and capacity funding for these institutions exclusively	**Analysis: Strengths of Proposal (Funding)** ▪ Recognizes that fundamental research in agriculture, food, etc. must be increased dramatically; authorizes new funding of ≈$1 billion per year (in fifth year)	**Analysis: Strengths of Proposal (Funding)** ▪ Provides ≈$150 million per year in new fundamental research in bioenergy and bioproducts (including cellulosic ethanol) and specialty crops

The CHAIRMAN. Well, thank you, Dr. McPheron. And as I mentioned to the previous panel, we are going to be marking up in 2 weeks and we are certainly going to need your help. Dr. Norton?

STATEMENT OF DR. GEORGE W. NORTON, PROFESSOR OF AGRICULTURAL AND APPLIED ECONOMICS, COLLEGE OF AGRICULTURE AND LIFE SCIENCES, VIRGINIA TECH, BLACKSBURG, VA

Dr. NORTON. Thank you, Mr. Chairman. I am pleased to be here today representing my own views as a specialist in agricultural research evaluation, but also representing the views of Dr. Sharron Quisenberry, Dean of the College of Agriculture Life Sciences at Virginia Tech, and also Dr. Elsa Murano, Dean of the College of Agriculture Life Sciences at Texas A&M University and Director of the Texas Agriculture Experiment Station.

Our joint Federal-state partnership in agricultural research has helped to make U.S. agriculture among the most productive in the world. Unfortunately, agricultural productivity has slowed since about 1990. This slowdown is due in part to a slowdown in funding in agricultural research that began about 1980. At the same time, the need for environmental, nutrition and health, bio-based energy, rural development and other issues have grown. Numerous studies have documented extraordinarily high rates of return to public investments in agricultural research, so it is imperative that we adequately support this research and manage it efficiently. Proposals have been presented that would restructure how public agricultural-related research is conducted and supported and my remarks are going to address both organizational and funding issues.

The core research capacity of USDA is essential for maintaining long-term research on national issues, while research at state agricultural experiment stations ensures responsiveness to local as well as regional and national needs. Federal support for state agricultural experiment stations leverages significant state and private resources. It encourages individual states to address multi-state needs by partially compensating them for benefits of their research that spill over to other states. The recent CREATE–21 proposal calls for formation of a set of six national institutes for agriculture, run by a director who reports to the Secretary of Agriculture.

The Administration proposes a somewhat simpler plan, merging, as you know, ARS with CSREES without ERS and the Forest Service. However, they would keep the new unit under the purview of the Under Secretary of Research, Education and Economics within USDA. It is our view that moving agencies around in a major way to form new ones is seldom an efficient way to solve a problem. The inefficiencies created in the transition can well out weigh the eventual benefits. The current system is relatively responsive to local stakeholders, flexible to address emerging problems that has generated high returns. A more consolidated top-down system runs the risk of losing stakeholder support at the local level for perhaps a marginal gain. We just don't quite see the benefits to farmers, ranchers and other stakeholders.

Second, an Under Secretary might be better able to stand than a director to stand toe to toe with other sub-cabinet members of USDA to advocate for his or her unit.

Third, CREATE–21 calls for merger of intramural and extramural funding into one budgetary line. While the Administration proposes merging CSREES and ARS, it would keep the intramural *versus* extramural funding roughly in balance, as we heard this morning from Dr. Buchanan. We feel this balance is essential to the complimentary roles that are played by ARS and state agricultural experiment stations.

Let me turn to funding. CREATE–21 calls for doubling of expenditures on agricultural and related research. This goal, while it may be difficult to achieve, there is little question that lack of research funds in recent years has hurt productivity in agriculture. This has hindered our ability to achieve our other goals. Improving productivity is essential for trade, it is essential as our need for agriculture to supply fuel expands, and specialty crops assume increased importance.

The need is great, but making a case for ag research requires expressions of need by local and regional, in addition to national, constituencies. Reorganization will not buy much if local interests groups have little voice in establishing priorities. Because crops, livestock and forests are sensitive to geoclimatic and economic conditions, many important agricultural and natural resource problems are local or regional. In recent years, competitively funded programs have grown at the expense of core capacity programs. An appropriate balance in the growth of both types of funding is needed. Formula funds facilitate long-term, high-payoff research, they support salaries of scientists, fund research infrastructure to help state agricultural experiment stations respond quickly to crises such as the recent soybean rust problem that we had a couple of years ago, and they leverage state funds. They minimize transaction costs of scientists so they spend more time on their research and less on writing grant proposals for shorter-term projects.

Competitive grants are excellent for funding cutting-edge science needed to solve national problems, for which research can be done of shorter duration. They are less well suited for funding long-term research capacity, as required to meet local and regional in addition to national needs; also for responding to immediate crises. When these needs are neglected, support from broad-based constituencies tends to erode. We caution against drastic reorganization of agriculture and related research in USDA and call for an appropriate balance in formula and competitive funds. Programs currently in place to assure accountability and flexibility to changing stakeholder needs should be enhanced. Our public agricultural research system is effectively responding to the scientific revolution that is underway in biological sciences, but it is underfunded given the high rates of return that we see for agriculture research; and the need for a broad agenda. The basic problem is funding. It is not really the organization of USDA, but it is basically a funding problem. Thank you.

[The prepared statement of Dr. Norton follows:]

Statement by

Dr. George W. Norton
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Representing
Dr. Sharron Quisenberry, Dean
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and

Dr. Elsa Murano, Vice Chancellor of Agriculture and Dean
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presented to the

House Agriculture Sub-Committee on Conservation, Credit, and Research

"Strengthening Our Agricultural Research Base to Benefit the Nation"

May 10, 2007

Mr. Chairman and members of the sub-committee, I am pleased to appear before you today to discuss organizational and funding issues with respect to agricultural research. I am Professor George Norton of the Department of Agricultural and Applied Economics at Virginia Tech and a specialist in evaluating and prioritizing agricultural research and extension programs. I represent my own views as well as those of Dr. Sharron Quisenberry, Dean of the College of Agriculture and Life Sciences at Virginia Tech, and Dr. Elsa Murano, Vice Chancellor of Agriculture and Dean, College of Agriculture and Life Sciences, Texas A&M University.

Well-supported and efficiently managed agricultural and related research in natural resources and veterinary medicine is vital to healthy farm and rural economies; a safe, healthy, and nutritious food supply; environmental quality; and enhanced production of bio-based energy. Our joint federal-state partnership in agricultural and related research has helped to meet these needs and to make U.S. agriculture among the most productive in the world.

Unfortunately, productivity growth in U.S. agriculture has slowed in recent years, in part due to a slowdown in the rate of growth in research funding (Alston and Pardey, 2007; Huffman and Evenson, 2006a). At the same time, the demands on agricultural scientists have grown as the needs for research on environmental, nutrition and health, renewable energy, rural development, zoonotic diseases, and other issues have expanded. Numerous studies have documented the extraordinarily high rates of return on public investments in agricultural and related research (Huffman and Evenson, 2006b, pp. 292-296; National Academy of Sciences, 2007). Therefore, it is imperative to adequately support this research and to manage it in a way that is most efficient.

In recent years, several proposals have surfaced that would restructure how public agricultural research is conducted and supported. Some of those proposals have related specifically to how funds are allocated, others to how programs are structured, and others have addressed both. Most recently, the CREATE – 21 proposal and the Administration's own proposal have called for reorganization of the U.S. Department of Agriculture (USDA) and for increased funding, especially for competitive grants. This morning I will address my remarks to both organizational structure and funding issues that affect agricultural and related research.

Organizational Structure

An effective organizational structure for agricultural and related research must (1) be cost efficient, (2) address local as well as national needs, (3) provide flexibility to meet changing priorities over time, (4) be sustainable in times of severe funding constraints, and (5) minimize partisan pressures on the research agenda.

The current public agricultural research structure includes USDA intramural research units (ARS, ERS, and Forest Service R&D) linked, through the USDA Cooperative

Research, Education, and Extension Service (CSREES), to the state agricultural experiment stations of the land-grant universities and other institutions. The core research capacity of USDA is essential for maintaining long term research on national issues, and research at the state agricultural experiment stations ensures responsiveness to local as well as regional and national needs. Federal support for state experiment stations leverages significant state and private resources, while encouraging individual states to address multi-state needs by partially compensating them for benefits that spill over from their research to other states.

The recent CREATE 21 proposal calls for the formation of a National Institutes for Food and Agriculture (NIsFA) run by a Director appointed by the President and reporting to the Secretary of Agriculture. The NIsFA would be comprised of six separate institutes with oversight provided by the Director on the advice of a 13 member Council of Advisors. The Council would consist of the Director, four members appointed by the Secretary of Agriculture with the concurrence of the Director, and four each by the House and Senate committees responsible for agriculture. The ARS, ERS, CSREES, and Forest Service R&D would be merged into these institutes An earlier task force chaired by Dr. William Danforth called for establishing a new institute within USDA to focus on fundamental research, with a Director reporting to the Secretary of Agriculture. The Administration proposes to merge ARS with CSREES (without ERS and USFS R&D) and keep them all under the purview of the Undersecretary for Research, Education, and Economics within USDA.

First, it is our view that wholesale reorganization of existing entities to form new ones is seldom an efficient way to solve a problem. The inefficiencies in the transition might well outweigh the eventual benefits. The current system is relatively responsive to local stakeholders, flexible to address emerging problems, and has generated high returns. A more consolidated top-down system runs the risk of losing stakeholder support at the local level for a perhaps marginal gain. It has been argued that a consolidated Institute would reduce administrative costs, but it is not clear that science or stakeholders would gain. We need to be careful not to restructure in a way that causes more harm than good. We fail to see the need to create a virtually independent entity outside of USDA.

Second, an Undersecretary tends to have more clout than a Director, being better able to stand toe-to-toe with other sub-cabinet members of USDA and related agencies in support of his or her mission. This ability to be a champion and an advocate is important, especially when priorities and budget allocation decisions are made by the Secretary. The argument has been made that since the new set of institutes would have more independence and a single focal point, it would attract more funding, but independence and focus does not guarantee funding, especially if local stakeholders feel more alienated. The Administration's proposal to merge CSREES and ARS would also provide focus, but without the disruptions and unintended consequences that would result from forming a new entity.

Third, CREATE 21 calls for the merger of intramural and extramural funding into one budgetary line. The Administration proposes merging CSREES and ARS, but they

would keep the intramural vs. extramural funding balance roughly the same as it is now. This issue is important because under a single line most of the funding might eventually go intramural, leaving little money for universities. Or, as some may argue, most of the funding might eventually go extramural, potentially crippling ARS. That would be ill-advised because ARS assures that certain types of research are conducted on a continual basis by scientists with no obligations besides research. Universities conduct research while educating the next generation of scientists. Both ARS and university research is needed to advance and sustain agricultural and related science.

Fourth, CREATE 21 calls for specific percentages to be used in allocating resources (such as basic vs. applied, competitive versus formula). This approach reduces valuable flexibility. The Administration proposes to maintain the flexibility to allocate funds in the way that makes the most sense at the time. Sometimes that may mean more for certain areas of study than others, or more for basic versus applied research (or vice versa), depending on the situation. From Dr. Murano's experience in Washington, the more flexibility you give the agencies, the better the money is spent. So, forcing the spending to be done a certain way is potentially inefficient and wasteful.

Funding

Critical funding issues for agricultural and related research are: (1) how to enhance and sustain research funding over time, (2) who sets the research agenda, and (3) relative costs of alternative funding mechanisms.

CREATE 21 calls for doubling of expenditures on agricultural and related research over seven years. While this is certainly a laudable objective, it may be a difficult goal to achieve. However, there is little question that failure to achieve sufficient growth in such research funding in recent years has constrained productivity growth and hindered our ability to achieve other research goals. Simply put, agricultural and related research is starved for resources.

The evidence is clear that agricultural and related research pays high returns. Improving agricultural productivity is essential as international trade and trade reforms continue to grow in importance; as the need for agriculture to supply fuel as well as food and feed expands; as specialty crops grow in importance, as the sustainability of our natural resource base remains under constant pressure; and as the complex linkages among human and animal health, nutrition, and food safety continue to demand attention.

The need is great, but making a case that agricultural and related research is a high priority for funding requires expressions of need by local and regional in addition to national constituencies. Reorganization will not buy much if local interest groups do not have a voice in establishing priorities. USDA uses various advisory groups to help set the national agricultural research agenda. National priorities, however, can imperfectly mirror local and regional needs.

The agenda for agricultural and related research must strike a balance among issues of importance to local, regional, and national stakeholders. Because crops, livestock, and forests are sensitive to geo-climatic and economic conditions, many important agricultural and natural resource research problems are local or regional in nature. Currently about 60 percent of U.S. public agricultural research is conducted at State Agricultural Experiment Stations (SAESs) and most of the rest by USDA intramural units. A little over 10 percent of SAES funding comes from the combination of Hatch formula funds and competitive National Research Initiative Grants (Huffman et al., 2006). The formula funds provide a stable base of top scientists that successfully leverage significant state support for agricultural and related research. Together these federal and state resources pay for the core human and physical capacity that allows states to respond to local and regional priorities.

In recent years, competitively funded programs have grown at the expense of core capacity programs, both intramural in USDA and at SAES. An appropriate balance in the growth of both types of funding is needed, because formula funds facilitate long-term high-payoff research. They support salaries of scientists and fund research infrastructure. They help SAESs respond quickly to local crises and they leverage state funds. They minimize transactions costs of scientists so they spend more time on research and less on writing grant proposals.

The time scientists spend writing grant proposals has become significant, and coupled with the short run nature of grants reduces opportunities for conducting long-term high-payoff research. Competitive grants are excellent for funding cutting-edge science needed to solve national problems for which the research can be of shorter duration. They are less well suited for funding long-term research capacity that is required to meet local and regional in addition to national needs. When these needs are neglected, support from broad-based constituencies tends to erode.

Conclusion

We caution against drastic reorganization of agricultural and related research in USDA, and for an appropriate balance in formula (block-grant) and competitive funds. Programs currently in place to ensure accountability and flexibility to changing stakeholder needs should be enhanced. The U.S. agricultural sector has outperformed the non-farm sectors in the U.S. economy for decades in terms of multi-factor productivity growth (Huffman and Evenson, 2006b, page 299). The current public agricultural research system is effectively responding to the scientific revolution in biological sciences that is underway, but it is under-funded given the high rates of return to research and the need to continue to pursue a broad research agenda.

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The CHAIRMAN. Thank you, Dr. Norton. Dr. Bouton?

STATEMENT OF JOESEPH H. BOUTON, PH.D., SENIOR VICE PRESIDENT AND DIRECTOR, FORAGE IMPROVEMENT DIVISION, THE SAMUEL ROBERTS NOBLE FOUNDATION, INC.; PROFESSOR EMERITUS, UNIVERSITY OF GEORGIA, ATHENS, ARDMORE, OK

Dr. BOUTON. Thank you, Chairman Holden, Congressman Lucas and Members of the Subcommittee, for inviting me to testify. USDA research efforts and strategies are important to the future of domestic agriculture, the prosperity of rural America, and potentially the energy security of this Nation.

As a brief background, the Noble Foundation, founded in 1945, is a private, nonprofit institute located in rural Oklahoma. The Noble Foundation has more than 320 employees from 27 countries, more than 80 with Ph.D.s. In addition to a state-of-the-art research campus, we own and manage more than 15,000 acres for research and demonstration purposes. Our operations extend from the laboratory to the field and our research outcomes have international applications. Our scientists use molecular biology, genetics and genomics to explore basic plant mechanisms. Using both modern plant breeding and genetic technologies, we move discoveries into crops, primarily forage and pasture crops, like clovers, alfalfa and grasses.

Finally, our agricultural specialists work on both our farms and farms of more than 1,400 producers within a 100 mile radius of Noble to help them achieve their operational goals. These services are offered at no cost and are estimated to contribute $15 million annually to the program participants' bottom line. We regularly participate in public stakeholder discussions to set USDA research priorities, serve on review teams to assess their national programs, compete for USDA grants and collaborate with USDA–ARS scientists, for example, the talented scientists at the U.S. Dairy and Forage Research Center in Madison, Wisconsin.

We have considered the USDA's proposed Agricultural Bioenergy and Bio-Based Products Research Initiative with much interest: $500 million over 10 years, targeting renewable fuels and bio-based products. The stated objectives of this initiative are to improve biomass production and sustainability and improve biorefinery conversion techniques. These two objectives historically have received millions of dollars from the Federal Government. Due to these investments, private entities are now entering these spaces. For example, due to our forage grass research, the Noble Foundation has taken a leadership position in the improvement of switchgrass as a dedicated energy crop. Our program leverages plant varieties developed in the 1990s during my tenure at the University of Georgia, for the DOE's Herbaceous Bioenergy Feedstock Program.

To move our research into the marketplace, we have entered a long-term collaboration with Ceres, Inc. of Thousand Oaks, California. Through this collaboration, we are creating new, more productive switchgrass varieties through breeding and hybrid techniques. Switchgrass is in its infancy as a production crop. We are confident that, with modern breeding tools, significant improvements can be attained in a relatively short period of time, much

shorter than the 70 years it took for corn to reach its current production levels. We have moved our first-generation switchgrass varieties into broad geographic evaluations across the U.S. This year we will have more than 25 evaluation sites assessing variety performance. Through these trials, we have seen on average a 20 percent increase in tonnage of the new varieties over current commercial switchgrass varieties. Ceres, further, is increasing seed of these new varieties, with the intent of a 2009 commercial release.

Importantly, Noble's serious collaboration goes much further than simply creating improved switchgrass varieties. We are developing a handbook to assist producers in establishing and sustaining cultivated switchgrass. In the near future, domestic agriculture will see the emergence of switchgrass farmers. Unlike farmers in traditional crops, they will not have the benefit of generational knowledge passed from their fathers, grandfathers or farming leaders in their communities. There is no production scale acreage of switchgrass in the United States. Educational resources will be important for these true pioneers. We are also establishing the economics of the dedicated energy crops. Little is known about this topic for these crops on a commercial scale. An understanding of the actual cost is necessary to allow producers to evaluate market alternatives.

As the Subcommittee writes the 2007 Farm Bill, it is important to remember that the private sector now possesses an ability to grow and manage—to begin growing and managing bioenergy crops and conversion technologies—and as such is well beyond basic science for the advancement of these fields. Consequently, there are other areas that could benefit from focused research: Biomass handling, harvest, storage and transport is one of them; grower management plans for various geographies; long-term understanding of soil nutrition to support high-yielding perennial bioenergy crops; carbon and nutrient sequestration; integration of the dedicated energy crops into existing farming and agricultural operations.

In conclusion, the Noble Foundation welcomes the opportunity to be a resource for this Subcommittee. Thank you for considering these issues and thank you for the invitation to discuss these matters. I will be glad to answer any questions.

[The prepared statement of Dr. Bouton follows:]

Testimony of Dr. Joe Bouton, Ph.D.
Senior Vice President and Director of the Forage Improvement Division
The Samuel Roberts Noble Foundation, Inc.
***Professor Emeritus*, University of Georgia, Athens**
Agriculture Subcommittee on Conservation, Credit, Energy & Research
May 10, 2007

Thank you, Chairman Holden, Congressman Lucas, and members of the Subcommittee for the opportunity to testify today. The issue of USDA research efforts and strategies are important to the future of domestic agriculture, the prosperity of rural America, and potentially the energy security of this nation.

This Subcommittee's effort to understand the issues is to be commended. The product of your work – particularly the research and energy titles of the 2007 Farm Bill – will have a dramatic and lasting impact on this nation's agriculture and energy industries.

I am a senior vice president at The Samuel Roberts Noble Foundation and director of its Forage Improvement Division. Prior to this position, I was a professor at the University of Georgia in Athens for almost 30 years. This experience has given me a perspective on agriculture research in both this country and abroad, the benefit of developing a strategic research focus, the delivery of research outcomes to agricultural producers, as well as the potential efficiencies and benefits that can be achieved through public-private investments in research.

As background, the Noble Foundation is a private, non-profit institution located in rural Oklahoma. It was founded in 1945 by Lloyd Noble, an Oklahoma oil man. In addition to the Noble Foundation, Mr. Noble is better known for the founding of two publicly-traded energy companies, Noble Corporation and Noble Energy, Inc.

Mr. Noble's success resulted in a personal need to give back to the society he felt had afforded him opportunities for individual and financial success. Mr. Noble said on several occasions he was grateful to have had the privilege to live in a country where the spirit of entrepreneurship and freedom of enterprise were encouraged.

Growing up in Oklahoma, Mr. Noble witnessed both the value of agricultural production to the state and its people, as well as the catastrophic effects poor farming practices had on the land's fertility and the consequential impact on the state's economy.

It was from these firsthand observations that he developed his value for the land and his understanding of the influence viable, productive land has on the well-being of people and the regional economy. He understood that land is essential to the success of Oklahoma as well as the nation, and it will continue to be needed long after oil and gas are gone.

Mr. Noble initially established the Noble Foundation to help educate regional agricultural producers in the use of best management and conservation practices. Today, we continue that important educational mission, but we have expanded our science and research capacity to allow us to make material contributions to plant science and agriculture on a regional, national and international scale.

The Noble Foundation employs more than 320 employees from 27 countries – more than 80 having Ph.D.s. Our 500,000 square-foot research campus includes world-class laboratories and a greenhouse complex that has more than an acre under glass. Further, we own and manage more than 15,000 acres in southern Oklahoma for use as a "living" laboratory and as a resource to demonstrate critical agricultural management practices to regional agricultural producers.

Our scientific and agricultural operations extend from the laboratory to the field.

Some of our scientists use molecular biology, genetics, and genomics to understand the basic mechanisms of plants. While others seek to move innovations and discoveries into crops – primarily forage and pasture crops like clovers, alfalfa and grasses – using both modern plant breeding and genetic technologies. Finally, our agricultural specialists are working on our own farms, but more importantly, the farms of more than 1,400 agricultural producers within a 100-mile radius around Noble, to help them achieve their goals, whether production, financial or quality-of-life. These services, which are offered at no cost to the benefiting agricultural producers, have yielded an estimated $15 million annually to the participating producers' bottom line.

While the individual operations of the Noble Foundation are similar in purpose and function to the programs of the nation's land grant universities, the Noble Foundation differs in that it can coordinate the movement of relevant discoveries from the laboratory,

through proof of concept and performance evaluations and into the fields of the ultimate user.

Despite this "corporate" development pipeline, Noble scientists traditionally publish more than 80 articles in peer-reviewed journals each year, including such journals as *Nature*, *Science*, and the *Proceedings of the National Academy of Sciences*. Further, Noble regularly commits its research findings to the public domain through submissions to public databases or through publication.

Today's Noble Foundation is a testament to Mr. Noble and his vision. Further, it is a credit to his descendents – who remain actively involved in directing the Noble Foundation's programs and efforts and pursuing the organization's original mission.

Noble-USDA Interactions

Given the breadth of our operations and interests, we regularly participate in stakeholder discussions establishing USDA research priorities, serve on review teams to assess their national programs, successfully compete for USDA grants, and collaborate with USDA-ARS scientists.

Through CSREES awards, we currently are conducting important pollen-flow research for the USDA's risk management program, and are working to improve the conversion efficiency of switchgrass as a bioenergy feedstock through manipulation of natural lignin levels as well as developing breeding tools to assist in the development of future generations of switchgrass.

We collaborate with a number of USDA-ARS sites. One of our most productive collaborations is with the U.S. Dairy and Forage Research Center in Madison, Wis. Noble and USDA-ARS scientists are working together with Forage Genetics International to identify the critical needs of agricultural producers and develop the "perfect" alfalfa that can be tailored to benefit not only the nation's beef industry but also the nation's dairy industry. This is only a single example of how regional expertise and private-public collaborations can benefit national and international agriculture.

Noble Biofuels Research

As a consequence of our research in forage grasses and their improvement, the Noble Foundation was well-positioned to become a natural leader in the improvement of switchgrass as a dedicated energy crop. Our current program further benefits from plant varieties developed in the 1990s during my tenure at the University of Georgia for the Department of Energy's herbaceous bioenergy feedstock program.

Because our practice is to join strong commercial entities to move our research into the marketplace to benefit the broadest possible base, the Noble Foundation switchgrass improvement program is part of a long-term collaboration with Ceres, Inc. of Thousand Oaks, Calif.

Through this collaboration, we are creating new, more productive switchgrass varieties using breeding and hybrids techniques. It is important to remember that switchgrass is in its infancy as a production crop.

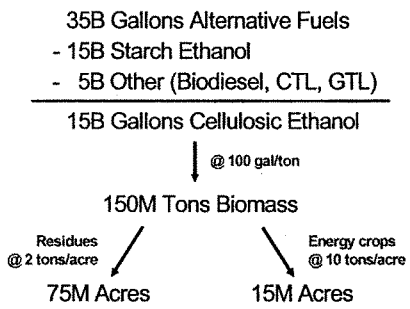
Although it took 70 years of crop improvement to reach the current corn yields, corn and other production crops have provided today's scientists with new tools for use in switchgrass and other potential bioenergy crops. Further, we have seen that this important cellulosic biofuels crop is responsive to improvement. We believe that using available tools will allow us to make significant strides in variety improvement in a relatively short period of time.

We have moved our first generation switchgrass varieties into broad geographic evaluations that extend from the East Coast to the West Coast and from the Dakotas to south Texas. This year, we will have more than 25 evaluation sites assessing the performance of these varieties. These evaluations are important in variety development and understanding a given plant's geographic range. Importantly, we have seen on average 20+% increase in tonnage of the new varieties over current commercial switchgrass varieties.

While we are making these assessments, Ceres is moving to increase the seed of these varieties to enable a commercial release in 2009. This will be necessary to meet the need for "proven" dedicated energy crops in the near-term.

Important to us, the Noble Foundation collaboration with Ceres goes much further than simply creating improved switchgrass varieties. It goes to creating those resources necessary to create a new industry – within the next decade – and help sustain such industry well into the future.

To put this timeframe in context, the President has called for 35 billion gallons of alternative fuels by 2017. As part of meeting this objective, it is reasonable to believe that we can derive 15 billion gallons from starch-based ethanol and 5 billion from a combination of sources including biodiesel, coal-to-liquids, gas-to-liquids, etc. This leaves another 15 billion that must come from cellulosic biofuels. At a conversion ratio of 100 gallons per ton of biomass (higher than today's technology can deliver, but potentially achievable by 2017), this 15 billion gallons of cellulosic biofuels will require 150 million tons of biomass.



If we could harvest an average of two tons of agricultural residues per acre, it would require 75 million acres to meet this demand. This represents a large fraction of the total potential acreage from which agricultural residues could be collected in the United States. And while there are some areas of the country, such as the Corn Belt, where these resources are sufficiently concentrated to enable the creation of biorefineries based entirely on agricultural residues, these areas are relatively few and would not serve to greatly expand the geographic scope of biofuel production.

In contrast, with a high-yielding dedicated energy crop (producing an average of 10 tons per acre), we will only require 15 million acres to provide the necessary biomass. Of course, this is not an "either/or" choice – residues v. dedicated energy crops – there will be a need for both. Rather, it is anticipated that in some cases energy crops will be used as sole feedstocks to cellulosic biorefineries and in other cases as complements to

agricultural and forestry residues to enable biorefineries to collect a sufficient volume of feedstock within a reasonable radius.

Crop Management. At Noble, we are also developing protocols and procedures, which will ultimately take the form of a grower's handbook, to assist agricultural producers in establishing and sustaining this new crop.

In the near future, domestic agriculture will soon see the emergence of "switchgrass" farmers. These farmers will be true pioneers. Unlike farmers in traditional crops, they will not have the benefit of the knowledge of their fathers or grandfathers or be able to rely on the generational knowledge of farming leaders in their communities. There is no production-scale acreage of switchgrass in the United States. This is truly a new endeavor.

We are working on "emergence" protocols that will guide new producers through the appropriate pre- and post-emergence plant and soil treatments to maximize first-year emergence – a critical step in producing a successful crop.

We are working on management protocols to teach farmers the proper levels of nitrogen and other macro-nutrients needed to maximize crop performance but prevent "over-applications" that cost America's farmers unnecessary expense. Again, we know that switchgrass does not behave like other crops – its efficient use of inputs like nitrogen, phosphate and other nutrients will be a new experience for existing farmers and ranchers.

We are investigating and developing protocols to educate new producers in the use of "nurse crops" and "co-crops." Nurse crops will be planted with dedicated energy crops to effectively care for, or nurse, young perennial energy crops during their first year of growth and provide some yield during this establishment period. Co-crops, or inter-crops, could be planted with dedicated energy crops to (a) benefit the energy crops, for example, alfalfa to contribute nitrogen to the soil and reduce the amount of applied nitrogen required; (b) provide another crop for the benefit of an existing agricultural operation, for example, tall fescue or alfalfa for livestock grazing; or (c) provide an additional crop(s) to supply a biorefinery multiple feedstocks to enable staggered harvest times and manage risks associated with crop disease and pests.

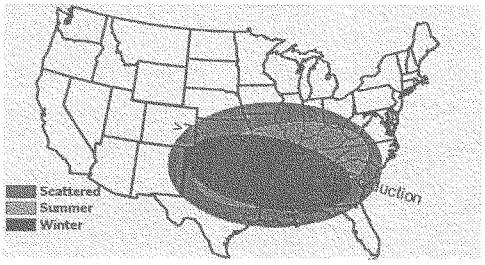
Efforts to create basic knowledge and understanding of dedicated energy crops and their management – across all geographies and likely energy crop candidates – are critical. Developing mechanisms to disseminate this information will be imperative to grower adoption and, ultimately, the success of this industry.

Establish Economic Basis. Noble agronomists and economists further are assessing the economics of producing dedicated energy crops. The cellulosic ethanol industry will begin by using crop residues, such as wheat straw and corn stover, as feedstocks. To be successful, however, the industry will require the dramatic growth of dedicated energy crop acreage by claiming existing crop and pasture lands.

We believe the single greatest variable in the "decision equation" for any agricultural producer when deciding whether to participate in this industry will be his or her economic returns.

Little is known about the economics of large-scale, production acreage devoted to dedicated energy crops. Knowledge of actual establishment and on-going costs are necessary to give agricultural producers the knowledge they need to evaluate market alternatives.

Energy Crop Integration into Cattle Operations. The Noble Foundation is investigating the integration of switchgrass into traditional forage and livestock operations. In a region extending from Kansas, Oklahoma, and Texas to the East Coast – an important region due to its productive soils, long growing seasons and abundant rainfall – landowners, who serve as America's beef producers, should have the knowledge base necessary to allow them to also contribute to this bioenergy industry.



Stocker Cattle Production in United States

With more than 2.8 million head of cattle in a 100-mile radius around the Noble Foundation, we recognize that for

our area agricultural producers to financially benefit from this new industry, they need to understand how they can participate without displacing cattle operations altogether.

First, if complete displacement of current operations is required, it is unlikely that such a transition could occur within a single generation (of the landowners) – even if economically justifiable. Second, it is a circumstance that is not likely desired, as it would probably have a negative impact on domestic beef production.

Research in this area will investigate using bioenergy crops, such as switchgrass, in early season grazing rotations to facilitate productive grazing transitions in the spring and/or in early season hay production to provide hay alternatives for fall and winter feedings.

USDA Opportunities

The USDA has an opportunity to establish a research agenda capable of fostering a new cellulosic biofuels industry and participating in a true agricultural revolution.

The proposed Agricultural Bioenergy and Biobased Products Research Initiative within the 2007 Farm Bill Proposals is generally encouraging -- $500 million targeting renewable fuels and biobased products.

This being said, the defined objectives of this initiative are to improve biomass production and sustainability and to improve biomass conversion in biorefineries. While on the surface these objectives appear appropriate, it is important to note that these objectives have historically received millions of research dollars from the federal government.

As evidence of the government's success and the wisdom of past investments, we now see the private-sector entering and succeeding in these fields. Given the recent flurry of corporate activity and investment from private sources, it is reasonable to believe that the private-sector possesses an ability to begin to manage and grow these important areas of research, and as such, is well beyond basic science for their advancement. Caution is then required to prevent the impact of further government support undermining market forces that are already driving innovation.

If such is the case, it is necessary to look at other key factors that may aid in setting the research priorities for these important titles in the 2007 Farm Bill.

One of the primary factors to be considered must be time. Participants (and future participants) of this industry, whether found in the private- or public-sectors, have been charged with creating a productive industry – approximately 15+ billion gallons of cellulosic ethanol annually – in 10 years. Today, there are no commercial cellulosic ethanol biorefineries.

There exists an opportunity to shape the research and energy titles of this Farm Bill to address the immediate challenges of the cellulosic biofuels industry. Examples of such areas include:

(A) Biomass harvest, handling, storage, and transport. This has been an area historically neglected by federal programs. Considering that each 100 million gallon per year biorefinery will require the delivery of more than 4,000 tons of biomass a day (likely requiring more than 150 semi-trucks daily), we will be faced with logistical challenges we have never encountered. In addition, agricultural producers are appropriately concerned about issues of harvest and biomass storage that have yet to be considered beyond academic, theoretical models.

(B) Grower management plans for various geographies and bioenergy crops. Consistent with the Noble-Ceres research described above, there is a need to create educational resources, based on actual research outcomes, for near-term bioenergy crops across productive, contributing geographies.

(C) Long-term understanding of soil nutrition to support high-yielding, perennial bioenergy crops. While we have a functional understanding of the nutritional demands of crops such as corn, soybean and cotton, the lack of similar information for high-yielding, perennial bioenergy crops creates questions in the minds of agricultural producers as to how the soil can maintain its productivity when significant tonnages are removed with relatively little inputs (e.g., nitrogen). Such questions are appropriate but can be readily answered from a multi-crop and broad geographical perspective.

(D) Carbon and nutrient sequestration of perennial bioenergy crops.

(E) Integration of dedicated bioenergy crops into existing farming and agricultural operations. Consistent with the Noble-Ceres research described above, it is anticipated that other opportunities to integrate dedicated energy crops into existing farming or agricultural operations will occur which will be unique to a geography or environment – similar to the beef cattle industry near the Noble Foundation. It is not believed that overnight dedicated energy crops will replace existing production, whether cropland or pasture land. Consequently, American's agricultural producers must understand how these new crops can be integrated in an efficient and economically productive manner.

Whether through the 2007 Farm Bill or through other vehicles, this Subcommittee should be aware of other noteworthy policy priorities that have been proposed by **Ceres, Inc.** Ceres' intention is aimed at providing the necessary opportunities and incentives to initiate this industry. Some of these are feedstock-specific policies – an area that has been somewhat overlooked by commercialization-related policies to date – and others are more general.

Feedstock pilot or demonstration programs: As established above, few people have experience growing dedicated energy crops. As a result, it will be a challenge for agricultural producers to adopt these crops for the first commercial biorefineries that choose to use such feedstocks for part or all of their supply. For this reason, pilot or demonstration scale programs would help provide agricultural producers with the opportunity to become familiar with growing these crops.

Such programs could take any variety of forms, but they should target and assist agricultural producers proximate to sites designated by companies as being future biorefinery sites.

The impact of these programs also could be optimized by having enough feedstock grown in a sufficiently concentrated area to allow the study of harvest, handling, storage, and transport logistics for that area as these logistics will vary substantially by region and choice of dedicated energy crops.

Transitional assistance: For perennial crops such as switchgrass and miscanthus, producers will not achieve a full yield in their first year of cultivation. Depending on

what region of the country the producer is located in, the first-year yield achieved may or may not be sufficient to warrant harvesting. Because it will require eighteen months or more to construct a biorefinery, this lag in achieving full yields is acceptable from the perspective of the biorefinery because full or near-full yields will be available when the biorefinery becomes fully operational. The issue is that of the producer's, who will lose a year of production from the underlying acreage.

In order to facilitate adoption of dedicated energy crops, it is necessary to contemplate a program that would provide transitional assistance to these growers in the form of compensating them for their opportunity cost for the year of lost revenue. This is a program that would likely exist during the infancy of the industry but would be less necessary as the industry matures, crop yields increase and the potential (long-term) economic benefits to the producers become better understood.

Crop insurance pilot program: As the cellulosic biofuels industry develops, it becomes important that dedicated energy crops not be disadvantaged relative to other crops in terms of the government's "safety net." The goal must be to allow producers to make decisions about which crops to grow based on market forces, not based on which crops are or aren't supported by government programs of whatever form.

Toward this goal, it is necessary to begin to collect data that can be used to enable a program like crop insurance. The objective should be to collect sufficient data to enable the roll-out of a crop insurance program for dedicated energy crops in the 2012 Farm Bill.

Cellulosic Bioenergy Program: The USDA has proposed a program for cellulosic ethanol similar to the Commodity Credit Corporation program that existed in the early days of the starch ethanol industry. As with the starch version, this program would help make biorefinery start-up and expansion more affordable and easier to finance by covering the cost of the feedstock in the first year of the biorefinery's operation and incremental feedstock used to increase capacity in subsequent years.

The USDA suggested that this program could be simplified to provide a per gallon payment rate, include a payment limit per eligible entity, and be terminated as cellulosic ethanol becomes commercially feasible.

Renewable reserves: As was demonstrated by Shell's restatement of reserves in 2004 and the resulting decline in their share price, the market capitalization of the oil majors is determined at least in part by their proved reserves. This provides an incentive for energy companies to continue to invest in exploration because their share price should increase with any new proven finds.

As of today, there is no equivalent incentive for these companies to invest in development of renewable fuels, nor is there a good metric for them to be able to measure themselves against one another in terms of how aggressively they are pursuing biofuels. It has been proposed that the SEC be asked to convene the necessary experts and promulgate a definition of "renewable reserves," which would exist alongside the definition of "proved reserves." Long-term contracts with producers that give the biorefinery the right to purchase biomass feedstock from those producers would be regarded in a manner consistent with mineral rights or long-term leases that entitle energy companies to extract oil or gas from underlying property.

Never in my career have I seen the potential that domestic agriculture holds at this time. It has the opportunity to revitalize rural America, improve our energy security and retain those monies otherwise sent outside the country to purchase foreign oil.

In conclusion, the Noble Foundation welcomes the opportunity to be a resource for this Subcommittee. Thank you for considering these issues. And, thank you for the invitation to discuss these matters. I will be glad to answer your questions.

The CHAIRMAN. Thank you, Dr. Bouton. And Dr. Bouton, I think I will start with you. You mentioned that you believe the cellulosic ethanol market could be viable in 2009?

Dr. BOUTON. No, sir.

The CHAIRMAN. Much less than the 7 years for corn ethanol?

Dr. BOUTON. No, sir. The industry itself will take some time. When I was talking 2009, with the newer switchgrass varieties with higher yield will be available by 2009.

The CHAIRMAN. 2009.

Dr. BOUTON. Yes.

The CHAIRMAN. We will ask you and then maybe other members of the panel: When do you believe the earliest could be conceived that we would have a viable cellulosic ethanol market in the U.S.? The plants will be up and running and it will be a true alternative using renewable feedstocks.

Dr. BOUTON. Well, we are starting to see some of the first plants that have cellulosic ethanol production capability starting to go in, and I think the DOE just put out five plants or funding for five plants. We are also hearing from private companies like Abengoa and Iogen, that they will have plants on board fairly soon, but they will be in pilot and demonstration scales in the early days.

The CHAIRMAN. Well, again, when do you—and other members of the panel, please feel free to jump in here—when do we think it is realistic that we are going to have a serious effort and a serious production; that we are going to be able to make some giant steps forward here to get the plants up and running and be able to get the product to market and really have alternative uses? Dr. McPheron, we asked that when I was at Penn State as well. We talked.

Dr. MCPHERON. Yes, Mr. Chairman, we did talk about that a little bit up there and I am afraid that my answer is the same as we hear from the Noble Foundation. We see these plants coming on as pilot-scale demonstration sorts of production and there is a very compelling question about when they are going to be actually a competitive source of alternative fuels.

The CHAIRMAN. Dr. McPheron, just following up, you mentioned capacity funding; could you elaborate a little bit on that. What exactly were you talking about with capacity funding?

Dr. MCPHERON. Yes, sir, I am happy to do that. Within the CREATE–21 proposal, we are looking at funding from multiple streams. The capacity funding we are referring to would be funding sources that currently exist, like the Hatch funding, Smith-Lever, Evans-Allen, McIntire-Stennis, programs that we have heard mentioned earlier this morning by Dr. Buchanan. We feel that it is a compelling and necessary part of looking to the future to maintain that underlying capacity that supports our personnel and our facilities. There are similar sorts of funding levels or funding programs that support ARS, ERS and the USDA Forest Service Research and Development that are covered in our proposals. So when we refer to that capacity, we are committed to preserving that level of capacity which gives us the solid base of people and facilities from which to respond to emerging problems and needs.

The CHAIRMAN. Thank you. Dr. Danforth, you mentioned competitiveness at USDA. I assume you believe that it should be more

competitive in nature. Is there anything that this Subcommittee could do, anything specific to try to have more competitiveness with the USDA's efforts?

Dr. DANFORTH. Yes, Mr. Chairman, we did lay out in our proposal a plan for establishing the National Institute for Food and Agriculture, which would be devoted only to competitive grants. It has been very hard for the USDA to mount a very large competitive grant program, for some of the reasons I think that Chairman Peterson mentioned earlier today, that appropriation subcommittees have not been as sympathetic to bringing more scientific decision making into the process. If you are going to have competitive grants, you have to put out RFPs and then you have to have them, the scientists from any walk of life, apply to help deal with that particular problem, and then you have to judge the best science that is coming forward. And we recommend that there be panels of scientists who judge the science, recommend and give it grades for the quality of the science, and then a second review that reviews not just the quality of the science but also the importance of the science to meeting national needs. I think it would require that sort of setup within the USDA to do that sort of thing.

The CHAIRMAN. Thank you. Mr. Lucas?

Mr. LUCAS. Thank you, Mr. Chairman, and I can't help but think about Chairman Peterson's observations and yours and of course, the great challenge as authorizers we always face is being caught in a squeeze between the appropriators and the United States Senate, since we are the rational part of the equation, but that is a personal observation.

Dr. Bouton, it seemed to me in your testimony that you were suggesting, perhaps, that Federal funding for bioenergy should be focused on infrastructure improvement, grower education, and other areas that some might define as unrelated to basic research. You further seem to be suggesting that this area could be handled most efficiently by the private sector. Could you expand on that or did I understand you correctly? Provide us with some insights.

Dr. BOUTON. Well, for us, I think we feel that this industry, even though you are looking at it as national, it is going to be local in scope. And so for us there at the Noble Foundation and our 100 mile radius there that we really can see, these are questions that are coming from our producers already, and it becomes a chicken and egg argument. You know, will the plant be there first or will the feedstock be there first? So we have a lot of farmers who are willing to step up to the plate now and say, "Okay, we will demonstrate these plants, even though they might only be pilot or demonstration scale, that we can grow a thousand acres of switchgrass each and maybe have several thousand acres there. So when they want to kick off, and then the thing will grow from there." So we see that there is already a need to look at things scale-up; going from just small acreages to large acreages, just so they could prove that they can have the feedstock available if a plant wants to come in there; and they are willing to take the risk if they can integrate it, too, into their normal livestock operations. So it becomes kind of the ability to do that too. It would be very helpful.

Mr. LUCAS. Do you have any comments on the proposals that you have been listening to today and the general sense of ag research? Any insights from your years of experience?

Dr. BOUTON. As far as the merger, we really don't have a position on that. We just know we have worked a lot with ARS over the years and some of their—even their biofuels program in the northern plains, there in Lincoln, Nebraska—has been very, oriented toward that and very good, so we are using a lot of their information to bring it down to the southern plains and look at it there. So I do agree that we are not concerned as much as we are very attentive to what the USDA–ARS is going to do.

Mr. LUCAS. Dr. Norton, in my, now, 13 years in this body, we have gone through lots of reorganization efforts and lots of reallocation and refocus and there is always unforeseen consequences there. Could you offer an opinion or two? We have heard about the potential benefits of reorganization. Could you expand for a little bit on what the potential risk could be, too?

Dr. NORTON. Well, I think the greatest risk——

Mr. LUCAS. If you see any risks.

Dr. NORTON. I do see risks. I think the greatest risk is loss of support from local constituencies, because it is not united, reorganization is not united to funding and in the long run you have so many of the needs in agriculture that are regional-based and are locally-based. I have a concern that you are going to have a council of 12 advisors—if we go with say, the CREATE–21 proposal and they will take into account national priorities. But I am very concerned about whether we maintain the local support. That is one thing.

There are always inefficiencies that crop up when you reorganize, because there are also some reasons for why it is organized the way it is, and I see new inefficiencies that can creep in as you put up all the additional resources into competitive funds—what happens is you end up with another level of bureaucracy and time lag for projects which generally turn out to be a maximum of 3 years. The scientists are then writing proposals continually, spending less time on research, and that is a loss in the system that is sometimes hard to measure, but it reduces the efficiency of the system. And I mentioned that rust example, because I think back to that case a couple years ago. When that came out. The system was able to respond very quickly, because you had ARS immediately being able to use its core capacity to get together with the states and put together a task force that still operates and is very effective and I worry about a competitive grant. If you tried to do that through a competitive grant, what would have happened?

Mr. LUCAS. And if the Chairman will indulge me with another minute or so? To Dr. Danforth and Dr. McPheron, what are the risks of the *status quo* if we don't?

Dr. MCPHERON. Congressman, our feeling with generating CREATE–21 and putting it before you is that we have the opportunity to basically build on something that started 150 years ago. This is the final farm bill before the sesquicentennial anniversary of the land-grant system. In 1862, Congress made a visionary decision to move forward and what we have now is the opportunity to really embrace change and position ourselves for the next 150 years, with

respect to all of the challenges in food, fiber, feed and fuel, as we heard earlier this morning.

What we propose in CREATE–21 is not to strip out that local responsiveness, but rather to concomitantly grow the capacity needs that keep us strong and flexible, and also the fundamental and integrated applied research competitive programs that are proposed by Dr. Danforth's group. So in a way we, in CREATE–21, have embraced both the strong points of the Danforth proposal and also the merits of having better coordination at the leadership level within the USDA research enterprise.

Dr. DANFORTH. Mr. Chairman, thanks for the question. To solve some of these problems that we have been talking about today, one cannot overestimate the difficulty in doing so. There are some very tough problems that are going to require very good science addressed to them. Now, none of these problems will be solved without first having the basic knowledge, the basic scientific knowledge that underlies what you want to do. Second, having the ability to transfer that knowledge; to use it; to educate farmers and others about the use of the technology; to fit it in with entrepreneurial activity, and to fit it in with the old economic system of the United States and our foreign competition. We do not have the fundamental science yet, to address these problems optimally.

You are always adding scientific knowledge and building on that and it is that fundamental science that especially needs scientific input and judgment in what you fund and how you do it. And that is what we tried to recommend, to get that fundamental knowledge for the long-term problems that we are addressing. I suspect that Congress and the American people are going to be addressing these problems, not just for the next decade, but for the next 50 years. These are very long-term problems we are addressing and we need to do it in the best way to do the fundamental science that is going to underlie the long-term developments in the U.S.

The CHAIRMAN. Mr. Lucas and I would like to thank the panel for your testimony today. As I mentioned to Dr. Buchanan, we will begin marking up, in this Subcommittee, May 22nd or 23rd and I just want to assure you that your oral statements and written testimony will be given full consideration as we try to move forward with this farm bill.

So with that, under the rules of the Committee, the record of today's hearing will remain open for 10 days to receive additional material and supplementary written responses from witnesses to any question posed by a Member of the panel. This hearing of the Subcommittee on Conservation, Credit, Energy, and Research is adjourned. Thank you.

[Whereupon, at 12:52 p.m., the Subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

Comments of the American Society of Plant Biologists

Submitted to the

Subcommittee on Conservation, Credit, Energy and Research

House Committee on Agriculture

For the May 10, 2007 Hearing Record

"Hearing to Review Agriculture Research Programs"

Submitted by Dr. Rick Amasino

Professor, University of Wisconsin

President, American Society of Plant Biologists

My name is Rick Amasino, Professor in the Biochemistry Department, University of Wisconsin, Madison, and President of the American Society of Plant Biologists (ASPB). These comments are submitted on behalf of ASPB. The American Society of Plant Biologists is a non-profit science society representing 5,000 plant scientists conducting research primarily at universities and including researchers with the Agricultural Research Service and private industry laboratories. ASPB's membership includes the world's leading scientists who conduct fundamental research on plants. Founded in 1924, ASPB publishes two of the most frequently cited plant science journals: *The Plant Cell* and *Plant Physiology*.

We appreciate this opportunity to submit written comments to the Subcommittee for the May 10, 2007 hearing record on agricultural research. Following are ASPB's recommendations for the Research Title of the Farm Bill.

Support Reauthorization of the National Research Initiative Competitive Grants Program

Reauthorization of the National Research Initiative Competitive Grants Program (NRI) within the Department of Agriculture Cooperative State Research, Education and Extension Service (CSREES) is essential to continued support for leading fundamental research in agriculture. The need for increased support of the NRI is explained by the National Research Council (NRC) in its report, "National Research Initiative: A Vital Competitive Grants Program in Food, Fiber and Natural-Resources Research." The NRC found that "Without a dramatically enhanced commitment to merit-based peer-reviewed food, fiber and natural resources research, the nation places itself at risk."

We urge the Subcommittee to reauthorize funding authority for the NRI in the Farm Bill to enhance and build upon current leading research programs.

Support Authorization of NIFA

ASPB supports the authorization of the National Institute of Food and Agriculture Act of 2007 (H.R. 2118) as introduced by Chairman Peterson. The NIFA legislation contains recommendations from a report of a task force appointed by the Department of Agriculture and chaired by Dr. William Danforth. NIFA would advance fundamental knowledge of benefit to agricultural producers and consumers.

Americans look to agricultural research to help meet a number of the nation's most fundamental needs -- our food, feed and fiber supply, huge increases in supply of renewable transportation fuels, and a more sustainable environment. Research supported by USDA in past years has helped bring plant science and related sciences to a point where they can project advances that will better meet increased demands for food, fiber, fuel and a sustainable environment. The increased commitment of support for fundamental research contained in NIFA would make possible greater advances in these areas. NIFA would bring the needed commitment of research to help address enormous demands for food, feed, fiber, and fuels produced in a sustainable manner.

Support Authorization of the Specialty Crop Research Initiative

The Specialty Crop Research Initiative proposed by the Department of Agriculture for inclusion in the Farm Bill would invest $1 billion over ten years to provide science-based tools to the specialty crop industry. Specialty crops grown in the U.S. represent $49 billion in sales. Increasing the level of federal research support devoted to study specialty crops can be expected to lead to new varieties that will: reduce susceptibility of specialty crops to freezes and other severe weather conditions; and enhance crop growth, development and yield. Scientists can project advances in research that will lead to increased phytonutrient content of specialty crops, which would contribute to the improved health and nutrition of Americans. ASPB supports authorization of the Specialty Crop Research Initiative.

Reorganization Proposals

There are significant differences between managing an intramural research program and extramural research program. A number of the keys to the success of the research programs of CSREES and the Agricultural Research Service are the knowledge, experience and dedication of current CSREES and ARS national program leaders and of administrators of the agencies. We applaud Research, Education and Economics Under Secretary Gale Buchanan for assuring the Subcommittee at its hearing May 10 that existing staff would continue to be needed and relied upon to administer and manage the Department's world-leading research programs.

Support Authorization of the Agricultural Bioenergy and Biobased Products Research Initiative

In this statement, we would like to comment to you further concerning research opportunities that would address the nation's bioenergy needs. ASPB fully supports the Department in proposing the Agricultural Bioenergy and Biobased Products

Research Initiative to transition to home-grown and processed plant-based fuels and biobased products while reducing dependence on foreign petroleum.

We have sought further input of scientists, including scientists among those who contributed to the development of the Department of Energy "Research Roadmap Resulting from the Biomass to Biofuels Workshop" held December 7-9, 2005 contained in the DOE report: "Breaking the Biological Barriers to Cellulosic Ethanol" http://genomicsgtl.energy.gov/biofuels/b2bworkshop.shtml

These scientists have informed us of a need for increased research efforts within the Department of Agriculture that would complement DOE bioenergy research efforts and contribute to future production of biofuels

Increased support by the Department of Agriculture is needed for basic research related to plant growth and development and biotic and abiotic stress tolerance. These and related areas of research are all of central importance to the long-term goal of maximizing plant productivity.

USDA-NRI plant research programs on gene expression and genetic diversity; environmental stress; plant biochemistry; plant growth and development; plant genomics; biobased products and bioenergy production research and other key areas provide valuable knowledge that plant breeders and growers will need to sustain increased bioenergy crop production.

Increased support for research supported by USDA-CSREES and USDA-ARS is also needed in the following areas.

1. **Carry out long-term sustainability studies on plants that are being considered for energy crops. What is needed are studies at many geographical locations for many years in which the productivity of stands of perennials (eg., switch grass, Miscanthus) and annuals (corn, sorghum) are harvested at various levels (eg., 0% of biomass, 100% of biomass) and subsequent biomass productivity is measured. This would be a very big experiment because there are many combinations of location, species, cropping level, inputs etc.**

2. **Expand collections of species that can be used for biofuels. There are relatively few accessions of potentially important bioenergy species such as switch grass and Miscanthus in the GRIN system.**

3. **Improve the breeding systems for perennial C4 grasses. Most of the species such as switch grass that are likely to be used as dedicated energy crops are self incompatible and, therefore, not amenable to development of true breeding lines for hybrid seed production. Basic studies on the mechanisms of self incompatibility in the grasses would be very useful for future breeding programs.**

4. **Identification of useful species. Are there additional plant species that could be useful as bioenergy crops?**

5. **Identification of herbicides that can be used during establishment of various energy crops.**

6. **Identification of pests and pathogens that are likely to be problems for potential energy crops. Survey for genetic diversity in natural resistance to such pests and pathogens. Develop pesticide management practices.**

7. **Determine optimal methods for long-term storage of harvested energy crops.**

8. **Evaluate fire management practices (i.e., how should energy crops be planted to minimize the danger of large fires). Are there risks associated with certain crops or with certain cropping practices?**

There are a number of specific research targets that would contribute to enhanced net photosynthetic production of feedstock crops.

*** *Responsiveness to elevated C02.* CO2 is increasing in the atmosphere and will continue to do so attaining levels 1.5 times current levels by the middle of this century. In principle CO2, should "fertilize" photosynthesis in C3 plants both by stimulating the rate of primary carboxylation and by suppressing photorespiration. But the stimulation is often substantially less than expected from theory. Moreover, what is already understood about photosynthesis suggests a variety of refinements that would increase the expected CO2 enhancement. Research aimed at understanding the determinants and improving the responsiveness of feedstock crops should be strongly supported.**

*** *Staying green (delayed senescence).* Net photosynthetic production is dictated by efficiency of photosynthesis, the amount of light that is intercepted per day, and number days that the crop intercepts light. Research aimed at delaying leaf senescence and the dismantling of the photosynthetic apparatus in the Fall has significant potential for improving seasonal biomass production of biofuel crops.**

*** *Refining photoprotection.* Plants, nearly on a daily basis, experience for a portion of the day more light than they are able to utilize in photosynthesis. For this reason, sophisticated photoprotective mechanisms have evolved that prevent damage to photosynthetic apparatus. However, these photoprotective mechanisms compete with photosynthetic efficiency. Although the trade-off between efficiency and photoprotection is clear, from an agricultural perspective, it is less apparent how well the dynamic range of the trade-off is suited for agricultural environments and productivity goals. In fact it seems clear that forfeiture of photosynthetic efficiency may under some circumstances exceed that required to prevent photodamage thus reducing net photosynthetic productivity more than necessary. It is likely that net photosynthetic production could be improved by more than 15% by research aimed at refining the control of photoprotection processes.**

*** *Reducing photorespiratory losses.* In C3 plants, photorespiration competes with photosynthesis and lowers net photosynthetic production by about 20%. Explaining why the suppression of photorespiration occurs continues to be an important goal of photosynthesis research. Newly emergent research tools and approaches clearly justify revisiting this high priority goal of photosynthesis research.**

*** *Improving water use efficiency.* Plants are forced to give up a great deal of water to take in a small amount of C02; the ratio of water molecules lost to CO2**

taken up into the leaf can be as much as a 1000 to 1 under agricultural conditions. This makes net photosynthetic production very dependent on water and very susceptible to drought. However, water use efficiency, generally defined as the amount of biomass produced per unit of water used, varies among agricultural plants and even among cultivars of the same species (e.g. soybean). Research focused on discovering the genetic and physiological determinants of water use efficiency should be a high priority goal for biofuel feedstock research.

* *Photosynthetic Electron Transfer.* Further understanding is needed of the basic photochemical processes involved in photosynthetic electron transfer. The objective would be to elucidate the primary photochemical processes involved in water oxidation. A more fundamental understanding of these processes could provide useful insights into developing synthetic mimics that could produce hydrogen from water with oxygen as a by-product.

* *Characterization of carbon-partitioning mechanisms in plants.* The objective would be to design metabolic engineering strategies to enhance carbohydrate storage for biofuel production. For example, researchers are discussing ways to reduce non-fermentable fiber and a promising way to do this is modify carbon partitioning mechanisms.

Metabolic Engineering

To transition to a plant-based energy economy, more investment is needed in plant research on metabolic engineering. In order to attempt to modify existing crop plants (or other plants that would then serve as new energy crops) in a way that will enhance their properties for use as either fuels or as specialty chemical feedstocks, we must understand the metabolism of those plants and we must be able to predictably and accurately modify the metabolism in those plants. There is a rapidly growing and significant body of literature that demonstrates that production of specific individual compounds in plants is not predictable with current knowledge. Further knowledge will be needed in metabolic engineering to change large subsets of metabolism as may be required for alterations in biomass production.

Competing with all Imported Petroleum Market Sectors

We recommend collaborations between the Department of Agriculture and the Department of Energy in identifying ways to derive energy from a broad variety of plants for ethanol, cellulosic ethanol, and biodiesel. Both Departments have relationships with plant scientists who could share their knowledge on ways to exploit energy sources in plant cellulose in switch grass, miscanthus, trees, wood chips, crop residues and other sources of biomass.

Along with corn and sorghum, there are future ethanol production opportunities research could offer with sweet potato, sugarcane and other crops. For sugarcane, research would be needed to increase drought and cold stress tolerance. Gains in production in biodiesel from soybean and other regionally grown oil seed crops could result from accelerated bioenergy research. In addition to production of biofuels, increased support for plant bioenergy research could lead to advances in

production of high-value biochemical products, such as superior quality nylon and polyurethane that have historically been derived from petroleum.

We recognize that a substantial investment of new funds is needed for the Department of Agriculture to pursue bioenergy-related plant research recommendations presented in these comments. It is essential to continue strong support for existing research programs. New funds are needed to undertake these research initiatives and the Department would provide much of the needed funds through its proposal for the Agricultural Bioenergy and Biobased Products Research Initiative

Investment of new funds in these recommended areas would result in huge benefits for the nation and its citizens. With advances in plant bioenergy research leading to production gains in home-grown ethanol, cellulosic ethanol, biodiesel and biochemical products, American farmers won't need to concede a single segment of the nation's energy supply market to foreign oil. This transition to home-grown biofuels will boost rural and regional economies; help lower and stabilize fuel prices just as food-related plant research has helped stabilize the cost of food; reduce the national trade deficit; enhance national security and dramatically reduce emissions of stored carbon dioxide.

This is an exciting time in the nation's history of energy research, development and production. Please let us know if we can provide further information on plant research opportunities.

Testimony of John Thaemert
President of the
National Association of Wheat Growers
On behalf of National Wheat Improvement Committee
Submitted for the Record
to
the House Committee on Agriculture's
Subcommittee on Conservation, Credit, Energy and Research
May 10, 2007

On behalf of the members of the National Association of Wheat Growers and the National Wheat Improvement Committee, I submit for the record the following comments on the three major agricultural research restructuring proposals and agricultural research funding.

We request that in the new farm legislation, funding for core research be continued and increased and that the funding not be jeopardized by diversion of funds into competitive grants or reorganization of research agencies.

Wheat is an example of one crop that is particularly reliant on funding of core research. Since wheat is a self-pollinated crop, private enterprise has limited opportunity to profit from research that would improve wheat yield, quality, insect and pathogen resistance or weed control. Unlike corn and soybeans, the protection and improvement of the wheat crop is largely dependent upon the core funding of public research and the continuation of the institutional memory embodied in our research scientists. Agricultural research is also unique compared to other forms of research (such as cancer) because it must be replicated at a number of locations to take into account varying climatic conditions; it cannot be done at only one site. Replicated research will have difficulty obtaining support if the funding emphasis shifts from core to competitive.

In the recent decade, wheat research has been under funded and advances in all phases of wheat production have not kept pace with the advances made in corn and soybeans. Just maintaining wheat production at its present levels requires a strong commitment to core research. For example, plant pathogens, because of sheer numbers, mutate into new strains that are not controlled by the existing resistance genes. In 1999 a highly virulent new race of stem rust, designated 'Ug99' ('Pgt-TTKS'), was identified in Uganda. It has spread to Ethiopia and is now a very serious and imminent threat to wheat production in the Middle East and West Asia, including Pakistan and India. The International Maize and Wheat Improvement Center (CIMMYT) estimates that as much as 80 percent of wheat acreage in those countries is susceptible to Ug99. More than 75 percent of U.S. hard winter wheat acreage and more than 50 percent of soft red acreage is also considered highly vulnerable. This race of wheat stem rust is spread quickly over long distances via wind and adherence to clothing. The potential wheat production loss in the U.S. could reach $6 billion at the farm gate.

In addition major shifts have occurred in stripe rust and leaf rust continues to cause serious losses. U.S. losses to stripe rust in 2004 were estimated at $360 million. From 2000 to 2004, U.S. losses to leaf rust were estimated at $350 million. Rust pathogens evolve rapidly. For all three rusts, breeders are running out of genes that can provide effective and stable resistance. More diverse and durable sources of resistance are needed, such as genes from related species or combinations of genes that provide partial resistance, but these are inherently more difficult to identify and manipulate and movement of these genes would be enhanced by completing the genome mapping of wheat and pursuing plant breeding programs to incorporate the resistance into our quality wheat varieties.

The defense against the continual onslaught of pathogens is a strong core funded research system so that the scientific expertise and specialized laboratories are in operation and able to respond to new threats. For this reason and to improve the quality and competitiveness of our crops, we have reservations about the three proposals to reorganize the working relationship established between the Agricultural Research Service (ARS) and the Cooperative State Research, Education and Extension Service (CSREES). Our primary need is a commitment to funding the long-term, multidisciplinary and applied research that has been critical to the success of U.S. agriculture.

We oppose the Administration's proposal to consolidate the ARS and CSREES into a new entity named the Office of Science (OS). These agencies are highly productive and are complementary in mission, activities and scope. They have evolved side-by-side and have developed on-going working relationships. Responsiveness to stakeholders and evolving research needs will be sacrificed for minor savings in efficiencies that might accrue from management consolidation. The proposal fails to provide new funding strategies to support core, long-term research and fundamental, basic research. The proposal fails to show how a single federal agency will more effectively maintain and balance critical research needs and funding at national, regional, state and local levels. Please note that this experiment was attempted in the late 1970s by combining the agencies into the Science and Education Administration (SEA) and was quickly undone three years later when it was judged a failure.

The CREATE-21 proposal for a new integrated structure and funding mechanism for federal agricultural research places an increased emphasis on national competitive grants. CREATE-21 uses FY07 funding for ARS and CSREES to establish a 'base' for core funding. Additional funds are then arbitrarily split on a 70 percent competitive/30 percent capacity basis. This split fails to recognize or remedy the current situation under which many of our core programs are critically under funded. The current ratio of 90 percent capacity/10 percent competitive funding of agricultural research would arbitrarily change to 58 percent capacity/42 percent competitive after seven years, assuming full funding. Please note that the CREATE-21 proposal authorizes significantly higher overhead rates for universities than currently allowed, which one can argue comes at the expenses of research. We fear that research funding would be skewed toward projects based upon

presentation skills and not necessarily based upon the significance of the research to agriculture production or in the nation's best interest.

CREATE-21 and the National Institute of Food and Agriculture (NIFA) both propose the creation of a powerful position of director of the National Institute for Food and Agriculture and a single Advisory Committee. The proposals fail to define the structure of the Advisory Committee or its authority vis-à-vis the director and stakeholders. While assurances are made in the proposals for stakeholder participation and increased funding for core research, we do not see that either proposal will result in an improvement in agricultural research. Consolidation and centralization of power will inevitably result in a "creep" away from stakeholder participation and an increase in decision making from the administrative top down. None of the proposed institutes under NIFA or CREATE-21 have a production emphasis as a primary function, yet this is the most important component from an economic and return on investment perspective. It is our position that the farmers producing crops working in conjunction with expert researchers are those most aware of the problems of efficient production of nutritious food and must have a strong input into the allocation of research funds.

CREATE-21 proposes a philosophical shift to short-term competitive grant funding to maintain agricultural long-term productivity and food security in the U.S. Our research scientists, a national treasury and our institutional memory, are involved in complex research that often requires a whole career to complete. They cannot function effectively when the research they have undertaken may be terminated in the next budget. They need the security of resources, well-equipped laboratories and the assurance that they can continue their research. If these basic needs are not provided, the most gifted of our scientists will migrate into industry and be lost to agricultural research.

In all three of these proposals, we laud the call for increased funding of research and concur that funds spent in agricultural research are not only crucial for nutrition, bio-security and maintenance of our competitive position in world agriculture, but also for the national security that results from sufficient, affordable food to feed the world's expanding population. We strongly support the desire of the CREATE-21 and NIFA sponsors to increase the nation's investment in agricultural research. The refrain at the hearing May 10 was for more funds, more coordination and more communication. It is our position that the proposals go too far. The problem is not the organization of our research and extension services, but that funding of research has been insufficient and not balanced.

To reiterate our position:

1) Core funding is extremely important to maintain the quality and security of our food supply.
2) Additional funding for core and basic research is needed to advance the quality and yields of wheat and other commodity crops and protect them from threats.
3) ARS and CSREES are sister agencies that have developed complementary working relationships. The gains from reorganization may be offset by collateral damage.

4) The increased emphasis on national competitive grants will skew research in favor of university programs and prolific grant writers at the expense of core/capacity funding and basic research.
5) Our research scientists need adequate funding and the security of time to complete research that requires years of investing their talent and energy. Competitive grant writing is a distraction from their research and creates an element of instability. Our most talented researchers will migrate into industry and away from basic agricultural investigations.
6) Increased overhead rates for universities come at the expense of research.
7) Consolidation of ARS and CSREES will ultimately diminish stakeholder participation, the people most conversant with agricultural production challenges.
8) The establishment of a large oversight agency will require time and divert limited funds into bureaucratic organization.
9) Centralized authority increases the possibility of scarce funds being appropriated for research favored for political value by the Administration, especially the diversion of funds into programs with the Department of Energy (DOE) that promote the reduction of greenhouse gases. While such programs are very important to minimize climate change, we can not sacrifice our food security. A balance must be maintained.

In summary, we do not need a new structure to organize agricultural research; we simply need to provide adequate funding for the existing agencies. Compare the growth rates of National Institute of Health (NIH) and National Science Foundation (NSF) funding with agricultural research funding and consider what is at stake for the US as we fail to invest sufficiently in agricultural research.

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The American Dietetic Association (ADA) commends the House Agriculture Subcommittee on Conservation, Credit, Energy and Research for holding this hearing to on Agricultural Research Programs. ADA has a long history of involvement in food, food assistance, food safety and nutrition programs and our members provided written testimony at the regional farm bill hearings held last summer.

ADA is the largest organization of its kind and it is guided by a philosophy based on sound science and evidence-based practice. ADA members are sought-out participants in domestic and international discussions as they work on nearly every aspect of food, nutrition and health. As such, we are familiar with the importance of the Farm Bill on USDA food and nutrition research.

Investing in Food and Agriculture Research
ADA supports increased investment in all areas of food and agriculture research. We are a member of National C-FAR, a *customer-led* coalition that brings food, agriculture, nutrition, conservation and natural resource stakeholders together with the food and agriculture research and extension community, serving as a forum and a unified voice in support of sustaining and increasing public investment at the national level in food and agricultural research, extension and education.

ADA believes the creation of a National Institute for Food and Agriculture (NIFA) with $1 billion of new Federal funding for food, nutrition, agriculture and environment research and extension is vitally needed. Federal research provides the bedrock for our knowledge about food, nutrition, agricultural productivity, the environment and climate. The discovery and application of new knowledge will help us take care of this and future generations, protect the environment and the plants and animals that live among us, and it will sow the seeds for our people to live healthier and more prosperous lives.

A federal investment in research is needed to guide sound environmental, agriculture, economic and social decisions. A shift of about 1 percent in total federal expenditures for food and agriculture -- $1 billion of new funding – can help catch up from years of flat and declining budgets and adequately invest in the knowledge that can sustain and improve life on this planet.

Part of this federal investment must be directed to food and nutrition research. The Food and Agricultural Act of 1977 established food and human nutrition as a separate and distinct mission of USDA, and designates USDA as the lead federal agency for human nutrition research.

Increasing the Investment in Nutrition Research and Nutrition Education
ADA, as leaders in food and nutrition, strongly supports the existing USDA research programs as well as the creation of NIFA. In particular, ADA commends the extraordinary value of federal nutrition research performed in the Agricultural Research Service and the Human Nutrition

Research Centers across the nation. These facilities focus uniquely on human nutrition research, consistent with the directives of the 1977 farm bill which designated USDA as the lead agency for human nutrition research.

If we expect consumers to take personal responsibility for making healthy choices, then we have a responsibility to make sure that they are adequately prepared. The government must invest in the nutrition research and nutrition education necessary to give Americans the knowledge and ability to make their own nutrition decisions.

Nutrition recommendations and programs for the public must be based on sound science. Only the federal government has the public mandate and resources to carry out research on human nutrition needs and to develop dietary guidance that forms the basis for all federal nutrition programs. In particular, the work done at the Human Nutrition Research Centers has been the cornerstone of federal dietary guidance.

It has been more than a decade since Congress has made a comprehensive review of the nation's nutrition policies and programs. Many of the Senate and House Agriculture Committees' newer members have never been briefed on USDA's role as the lead agency for federal human nutrition research. Discussions regarding USDA and nutrition typically focus on food assistance programs, but do not address the key underlying work being conducted by USDA researchers throughout the United States that forms the basis for the Federal nutrition information and education efforts affecting every American.

Clearly, there is significant potential benefit in addressing food, nutrition and health issues now, before circumstances deteriorate, and to ameliorate human as well as economic costs. A government investment in nutrition research and nutrition education is needed now more than ever.

We encourage the House Agriculture Subcommittee on Conservation, Credit, Energy and Research to support a strong research title in the 2007 Farm Bill by authorizing a National Institute for Food and Agriculture with $1 billion of new Federal funding and supporting the existing ARS Human Nutrition Research Centers.

For more information, or if you have questions, please contact:
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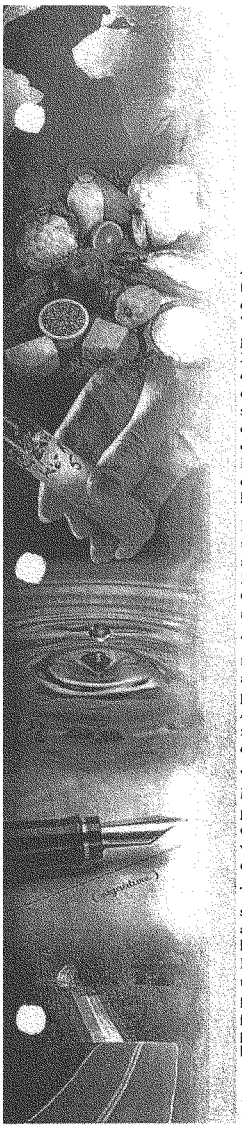


Farm Foundation

Issue Report

Funding Research and Extension

As concern continues over tightening federal support for agricultural research and extension, new research findings indicate a "disturbing" slowdown in U.S. agricultural productivity growth in the last decade of the 20th century. Cited as among the likely contributors to this slowdown are the declining rate of growth in U.S. public-sector spending on agricultural research and development, and a progressive redirection of agricultural research funds away from improving farm productivity to such other concerns as environmental issues, human health and food safety.

For the 52 years between 1950 and 2002, the aggregate U.S. farm productivity growth rate was 1.8% per annum, report researchers Dr. Julian Alston of the University of California-Davis, and Dr. Philip Pardey of the University of Minnesota.

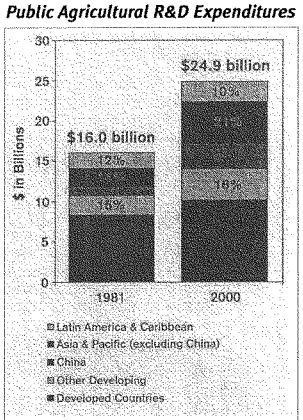
"This compound productivity growth reflected growth in the quantity of U.S. agricultural output while the quantity of total productive inputs remained fairly constant," Alston explains. Land use and labor use were reduced, offset somewhat by increased use of capital and especially other inputs.

"Without this productivity growth, the inputs used in recent years would have produced less than half of what they actually did," says Alston. "U.S. costs of production would be much higher, and the U.S. competitive position would be much weaker."

This productivity growth has major significance for the economy. In recent years agriculture has contributed about $300 billion per year to the national economy. If agriculture today had to use 1950s technology, the resources used would have produced only 40% of the quantity actually produced. At current prices the value of production would have been lower by $180 billion—the value of the additional output now as a result of productivity gains since 1950. Alternatively, to produce the same amount of output with 1950s technology would cost an additional $180 billion, so this value represents the resources saved as a result of productivity gains.

The national aggregate summary "masks important details, including variances in productivity patterns year-to-year and state-to-state," the researchers explain. From 1950 through 1989, the national rate of productivity growth averaged 2.01%, ranging from 1.67% to 2.51%. But from 1990 to 2002, the agricultural productivity growth rate averaged 1.11% per annum, a slowdown the researchers describe as "appreciable and statistically significant."

Public Agricultural R&D Expenditures



Worldwide, investment in agricultural research and development grew by more than 50% between 1981 and 2000, mainly the result of increased investments by developing nations.

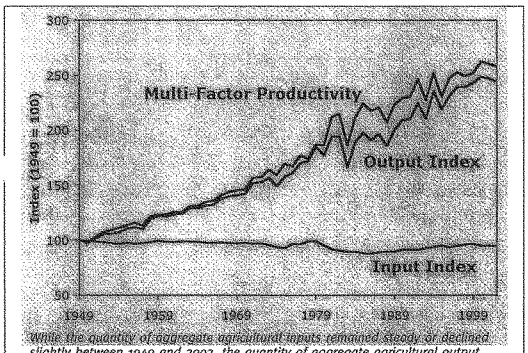
Global Agriculture R&D Investments, 2000

	Public	Private	Total	Public Share of Total
	(millions 2000 international dollars*)			(percentage)
Latin American and Caribbean	2,454	124	2,578	95.2
Asia & Pacific	7,523	663	8,186	91.9
China	3,150	131	3,281	96.0
Developing, Subtotal	12,819	862	13,682	93.7
Developed Countries	10,191	12,086	22,277	45.7
United States	3,828	4,601	8,429	45.4
Total	23,010	12,948	35,958	64.0

* Conversions from local currencies to U.S dollar equivalent international dollars using purchasing power parity rates instead of market exchange rates.

Public funds represent the majority of research dollars invested by developing countries. In developed countries, less than half of research funding is from taxpayers.

U.S. Agricultural Productivity, 1949 - 2002



While the quantity of aggregate agricultural inputs remained steady or declined slightly between 1949 and 2002, the quantity of aggregate agricultural output produced with those inputs more than doubled, such that multi-factor productivity (aggregate output per unit of aggregate input) more than doubled.

The difference in percentages may appear small, but the effects are cumulative and compounding. A 1% compounding growth in productivity would result in productivity being 22% higher after 20 years. A 2% compounding growth in productivity would result in productivity being 49% higher after 20 years. Applied to an industry with an economic value of $300 billion per year, the difference between a 1% and 2% growth in productivity compounding over time represents billions of dollars.

In addition to the effects of a run of unfavorable weather, Alston and Pardey cite two key factors in the slowdown—the declining rate of growth in U.S. public-sector spending on agricultural research and development, and a progressive redirection of agricultural research funds away from improving farm productivity to address such other concerns as environmental issues, human health and food safety. "The growth in total funds available for public agricultural research and development has slowed considerably in recent decades—yet important issues have increased demand for those funds," the researchers note.

"The time lags between investing public funds in R&D and reaping the returns from those investments are long—typically decades," Pardey says. "Consequently it takes time for the effects of past funding decisions to become apparent, but those effects can be expected to last for a long time. The recent farm productivity slowdown may be initial evidence that the past shifts in agricultural research spending are beginning to take effect."

The challenges

University administrators are well aware of the challenges to adequately fund basic and applied agricultural research, says Vic Lechtenberg, vice provost for engagement at Purdue University. Encouragement must continue for multi-state collaborations and interdisciplinary work. Institutions need to adopt modern intellectual property policies, and design into projects a high level of accountability and quality control. Public-private partnerships need to be encouraged. Mechanisms must be in place for stakeholder input in the priority setting processes.

The dynamic nature of agriculture and the food system is reflected in the changing demands on research and extension, notes New Mexico State University President Mike Martin. The larger role of variable costs in the economics of production agriculture has shifted the research focus to maximizing yields and, hopefully, net income.

Further increasing demands on agricultural research are growing consumer interests in how food is produced, food safety issues, and environmental issues, including those related to sustainability. While needs and demands increase, a declining farm population reduces the political strength needed to sustain adequate funding for research and extension, Martin adds.

The increasing diversity and complexity of food system issues requires research institutions to re-examine their structure. Issues include organizing research around problem areas rather than specific disciplines, and expanding linkages with other disciplines, such as medical sciences. A key element is reducing bureaucratic barricades and simplifying funding hurdles that limit cross disciplinary work, or even drive researchers away.

Responsibility also lies with taxpayers to recognize that the most important research may not yield returns for many years. Demanding immediate results may be short-sighted in the long run.

Moving knowledge gained in the laboratory into the field is crucial. In one case cited, a producer-funded research project was stymied by lack of outreach personnel to communicate project findings to the field. Public and private collaborations may be needed to complete this important link in the research chain.

"Without exploring new means and improving existing practices, there is no doubt that U.S. agriculture will be less efficient, less advanced in terms of technology, and most critically, less competitive in the global market," says American Farm Bureau Federation (AFBF) President Bob Stallman.

As part of the National Coalition for Food and Agricultural Research, AFBF is asking the Senate Agriculture Committee to double funding for food and agriculture research, extension and education over the next five years. "This is critical," Stallman said. "Our Land Grant universities not only help in enhancing productivity, but also the competitiveness of agriculture and the food system. Over the past two decades, public funding has fallen in real dollars and that trend needs to stop."

New expectations are being placed on agriculture in such areas as biosecurity, food-linked health issues, environment, increased world food needs, biotechnology and energy. Each area has specific and unique research challenges.

Consistent concerns and needs were cited by stakeholders from various segments of the industry:

- As agriculture, the food system and the customer base served become more complex, diversified and global, so do the issues requiring more research. Issues include disease and pest controls, food safety, biotechnology and breeding plants for specific end-uses.
- Coordination and collaboration are needed among stakeholders, public institutions and private businesses. Such efforts leverage human and financial resources, as well as on-going research initiatives. This requires strong communication and resolution of intellectual property issues.
- It takes years to complete and to realize the full returns from agricultural research, mandating that the work and the financial investment begin now. Consistent financial support is needed to ensure the continuity of the research.
- Research investments require education and outreach to move knowledge from the lab to the field.
- A declining number of researchers and educators with expertise in agricultural production is one consequence of lower public investment in agricultural research. These human resources, whether in the public or private sector, are crucial to the future competitiveness of U.S. agriculture. In some areas, only a handful of experts exist and many are nearing retirement age. Stakeholders question who will do the research work in the future and who will train the next generation of researchers and agricultural managers.
- The long-term impacts and importance of agricultural research must be effectively communicated to taxpayers, including consumers, special interest groups and policy makers. This includes communicating the return on investment of research past and present.

Future funding and organizational alternatives

A more effective organizational structure that is better able to address the problems of agriculture and the food system today is the goal of reorganization being studied within USDA. The proposal involves the Agricultural Research Service (ARS), and the Cooperative State Research, Education and Extension Service (CSREES). This proposal also calls for $1.51 billion of new mandatory funding—$1 billion for specialty crops, $500 million for biofuels and $10 million for organics.

Increasing linkages between USDA and the Land Grant universities is also needed to meet research and extension needs, according to USDA Under Secretary Gale Buchanan.

University and private industry leaders are also proposing new ways to increase funding and reorganize national research efforts. Create Research, Extension and Teaching Excellence for the 21st Century (CREATE-21) would strengthen the partnership between USDA and the nation's Land Grant colleges and universities.

Spearheaded by the Board on Agriculture Assembly of the National Association of State Universities and Land-Grant Colleges (NASULGC), this proposal has two key elements. The first is to combine USDA's research, extension and teaching functions to be more responsive to national and emerging problems. The second is to double research funding over a seven-year period to $5.3 billion per year from the current $2.7 billion. The proposal outlines $2 billion in mandatory funding, including $480 million reserved for work at Land Grant institutions.

CREATE-21 would combine ARS, CSREES and the Economic Research Service (ERS), as well as the research and development work of the U.S. Forest Service (USFS). A single national program staff would integrate university-based research, competitive grants for integrated and fundamental research, and the intramural work of ARS, ERS and USFS.

To increase organizational flexibility, enhance program integration, and increase responsiveness to stakeholder needs, CREATE 21 would create six National Institutes for Food and Agriculture–Nutrition and Health; Natural Resources and Environment; Families, Youth and Communities; Food Safety and Agricultural Security; Rural and Urban Community Development; and Economic Opportunities in Agriculture and Natural Resources. Each institute would capitalize on intramural work of USDA agencies, competitive programs and the capacity of the Land Grant universities and related institutions.

According to its proponents, CREATE-21 would yield an integrated organization that is more flexible, relevant and responsive to the needs of stakeholders, enhance funding to permit expanded research in critical areas, improve dissemination of knowledge through extension, and better educate future farmers and agricultural producers. Legislation to establish CREATE-21 has been introduced in the U.S. Senate (S.1094).

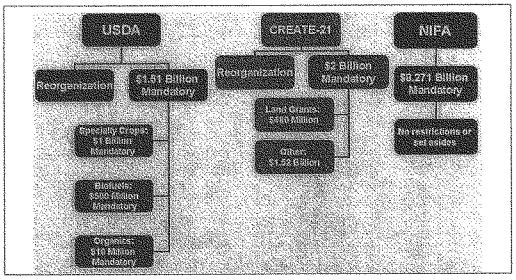
Another proposal, the National Institute for Food and Agriculture (NIFA), would create an independent institute within USDA to provide peer-reviewed, competitively-awarded grants for fundamental agricultural research. The institute would report directly to the Secretary of Agriculture. Legislation to create and fund NIFA has been introduced in the U.S. Senate (S.971) and the House of Representatives (H.R.2118). The objective is to include this legislation in the research title of the 2007 Farm Bill. Existing agencies and programs are left intact by the NIFA proposal.

NIFA is modeled after the organizational structure of the National Institutes of Health. NIFA would increase funds for competitive research grants. Comprised of stakeholders and scientists, NIFA's Standing Council of Advisors would set research priorities, maintain the relevance of NIFA programs, and review all proposals. NIFA supporters call for $8.27 billion in increased mandatory funding over a seven-year period. This level of funding represents about 1% of USDA's 10-year mandatory spending budget of $608 billion.

Moving forward

Obtaining increased public funding for agricultural research and extension is critical to the future competitiveness of U.S. agriculture in a global economy. The potential returns are high for investments in research and extension, as past efforts have demonstrated. A concerted effort by stakeholders, working with universities and USDA is needed to achieve this goal.

Comparison of Funding & Organization Proposals

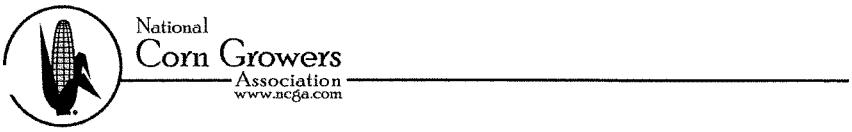


The Source

This *Farm Foundation Issue Report* summarizes discussions at the March 2007 Farm Foundation conference, "Funding Research and Extension to Assure the Future of U.S. Agricultural Competitiveness." Participants examined trends and rates of growth in agricultural productivity and how research and extension affects productivity. Options were discussed to fund and organize research and extension at the federal level. Strategies for improving research and outreach in the future were also discussed. Participants represented agricultural organizations, Land Grant universities, federal agencies, professional societies, NGOs and the private-sector. All presentations from the conference are posted on the Foundation Web site, *www.farmfoundation.org*.

Farm Foundation's mission is to improve the economic and social well-being of U.S. agriculture, the food system and rural communities by serving as a catalyst to assist private and public sector decision makers in identifying and understanding forces that will shape the future.

Farm Foundation



National Corn Growers Association
Statement Submitted for the Hearing Record to the
House Committee on Agriculture
Subcommittee on Conservation, Credit, Energy, and Research
Review of Agricultural Research Programs
May 10, 2007

The National Corn Growers Association (NCGA) represents more than 32,000 corn farmers from 48 states. NCGA also represents more than 300,000 farmers who contribute to corn check off programs and 26 affiliated state corn organizations across the nation.

NCGA's mission is to create and increase opportunities for corn growers in a changing world and to enhance corn's profitability and usage across this country. This year National Corn Growers Association celebrates its' 50th anniversary. Visionaries through these past five decades have advocated on many issues such as federal research to bring back value to corn growers. We continue that work today, knowing that scientific research is critical to answering real world problems and creating opportunities for our growers.

Investment in research helps to produce plants that more successfully survive stress from disease, pests, and water variability. It also allows important work to be conducted on various efficiencies in corn production, including yield, crop rotation, and inputs. Research will also someday improve the efficiencies of corn lignocellulose to ethanol.

Funding for food, agriculture and natural resources research at the U.S. Department of Agriculture (USDA) has grown at an average annual rate of just 1.85% over the last 35 years. As this Committee reviews Title VII of the 2002 Farm Bill, commonly referred to as the Research Title, we strongly encourage the recognition of the important role agricultural research plays in the assurance of a safe, healthy and efficient food, feed, and fuel supply.

In 2003, at the request of Congress, a Research, Education and Economics (REE) Task Force of the USDA was created to review and make recommendations for agricultural research policy to the Secretary of Agriculture. The task force eventually made recommendations that a national institute of food and agriculture (NIFA), modeled after the National Science Foundation and the National Institutes of Health, be formed, which followed similar recommendations made over the last thirty years. The task force based its recommendations on the following key premises: American agriculture faces critical challenges; continual innovation in agriculture is the key to meeting these challenges; fundamental scientific research is critical to continued innovation in American agriculture; opportunities to advance fundamental knowledge of benefit to American

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agriculture have never been greater; and publicly sponsored research will be necessary to take full advantage of the opportunities.

The mission would be to "support the highest caliber of fundamental agricultural research to advance the frontiers of current knowledge so as to lead to practical results and or further scientific discovery". Support for the mission would:

- increase the international competitiveness of American agriculture;
- develop foods that improve health and combat obesity;
- create new and more useful products from plants and animals;
- improve food safety and food security by protecting American plants and animals from insects, diseases, and the threat of bioterrorism;
- enhance agricultural sustainability and improve the environment;
- strengthen the economies of the nation's rural communities;
- decrease American dependence on foreign sources of petroleum by developing bio-based fuels and materials from plants; and
- strengthen national security by improving the agricultural productivity of subsistence farmers in developing countries to combat hunger and the political instability it produces.

NCGA supports strengthening the Research Title of the farm bill through the creation of a new program of competitive, merit-based grants for agricultural research supported by mandatory funding within the USDA. The NIFA should be a grant-making agency that funds food and agricultural research through a competitive, peer-reviewed process.

The current level of Federal spending in competitive food and agriculture research is inadequate and needs to be significantly enhanced. Legislation implementing the task force's recommendations directs the USDA to create a NIFA that provides mandatory funds for competitive fundamental agriculture research grants. The legislation would provide $3.44 billion in federal funds over the next five years. This spending would boost federal investment in agricultural research to help keep America's farmers competitive in the world market and continue providing consumers with a safe, affordable, and nutritious food supply.

NCGA realizes that dollars are scarce and that the competition for mandatory money is intense. However, research is the backbone to a profitable corn industry, a thriving rural economy and the continued supply of abundant and safe food, feed and fuel. We urge this Committee to give priority to change that would help realize the concept of advancing and improving agriculture research.

NCGA is also aware of that the land-grant university system (including the 1890's Institutions, 1994 Institutions, and Insular Area land-grants) and related institutions (American Association of State Colleges of Agriculture and Renewable Resources) have coalesced behind a proposal named the Creating Research Extension and Teaching Excellence for the 21st Century Act of 2007 (CREATE-21) developed by the National Association of State Universities and Land Grant Colleges (NASULGC) Board on Agriculture Assembly to update the Federal-State Partnership in food and agricultural sciences. The proposal calls for a new institute under the USDA that would continue existing "capacity" funding for intramural research at USDA and formula funded REE programs at land-grant and related universities and institutions. It would also authorize expanded competitive funding to support fundamental and applied research projects. The proposal seeks to enhance program integration by bringing together the research capacities of the Agricultural Research Service (ARS), Cooperative State Research, Education, and Extension Service (CSREES), Economic Research Service (ERS) and the U.S. Forest Service (USFS).

The proposal incorporates some key elements of the NIFA proposal referenced above, including authorization of a National Institute that would provide for fundamental agricultural research through competitively-awarded, peer-reviewed grants. The proposal does provide $200 million per year in mandatory funding from the Commodity Credit Corporation (CCC), with 70% of monies spent on competitive research and 30% to be spent on capacity funding. Generally, of the 70%, 55% would be spent on fundamental research, and 45% would be allocated towards integrated programs.

Discretionary funding in the CREATE-21 proposal preserves the Critical Base Funding for capacity programs at their Fiscal Year 2007 levels before any appropriated funds could go to competitive programs. Enhanced funding beyond the aggregate combined total funding level of the Capacity Program Critical Base Funding and the Competitive Program Critical Base Funding would be allocated in the manner referenced generally above, with 70% spent on competitive research, and 30% on capacity funding. The proposal seeks to double the amount of funding currently available for agriculture research through the farm bill.

While NCGA is certainly supportive of the portion of the $200 million in mandatory funding that would be disbursed in a truly competitive system towards research in the CREATE-21 proposal, we are concerned that this amount does fall short of the goals espoused by the REE task force. As discretionary funding for competitive granting would be subject to the appropriations process as well as baseline capacity funding requirements, NCGA is unsure as to whether our policy goal of significant mandatory funding towards truly competitive, peer-reviewed granting would be realized.

Maintaining and improving upon the resources available for crop systems is now more important than ever, as agriculture strives to meet the demands of consumers worldwide by providing a safe and secure supply of resources for human and animal nutrition, fiber, bioenergy, and industrial feeds. We believe that Federal research is crucial to the future of corn and its inherent possibilities for opportunity.

American Society for Nutrition

Testimony to the House Agriculture Subcommittee on Conservation, Credit, Energy and Research

"Review of Agricultural Research Programs"

May 10, 2007

Mr. Chairman and Members of the Subcommittee:

The American Society for Nutrition (ASN) appreciates this opportunity to submit testimony to the House Agriculture Subcommittee on Conservation, Credit, Energy and Research for the record in response to the May 10, 2007 hearing, "Review of Agricultural Research Programs." With a membership of more than 3000 scientists and physicians, ASN is the premier research society dedicated to improving the health and quality of life through the science of nutrition. Our members conduct food and nutrition research at the cellular and *in vitro* levels, in animal models, in food product development, and they conduct clinical research that explores the connection between food, nutrition and the modification of risk for acute and chronic diseases. Our members direct the Human Nutrition Research Centers (HNRCs) funded directly or through agreements by USDA, they conduct intramural research at the agency, and many are recipients of USDA grants through the National Research Initiative.

We thank the Committee for the opportunity to discuss the future of food, agricultural and nutrition research in America. Basic and applied agricultural and nutrition research is critical to American health and the U.S. economy. Awareness of the growing epidemic of obesity and the contribution of obesity-related illness to burgeoning health care costs has highlighted the need for improved information on people's dietary intake and improved strategies for dietary change. Demand for a safer and more nutritious food supply continues to increase. Preventable dietary and physical activity related diseases cost the economy over $117 billion annually, and this cost is predicted to rise to $1.7 trillion in the next ten years. Nevertheless, funding for food and nutrition research at USDA has not increased in real dollars since 1983.

Through its agricultural subsidy and price support programs, USDA touches the lives of all Americans and its policies and programs influence both the availability and affordability of food for all Americans. The USDA is thus the single most important federal agency influencing U.S. dietary patterns. Furthermore, through the nutrition and food assistance programs, which form roughly 60% of its budget, USDA has a direct influence on the dietary intake (and ultimately the health) of millions of Americans. It is important to better understand the impact of these programs on the food choices and dietary intake and nutritional status of the vulnerable populations served by these programs.

Acknowledging its profound influence on the availability and affordability of food for all Americans, the USDA has historically been identified as the lead nutrition agency. With the epidemic of obesity spreading to children, USDA programs, research priorities and policies to shape food choices and dietary patterns are under increasing scrutiny.

USDA is responsible for three major functions with respect to human nutrition: (1) the development and translation of federal dietary guidance; (2) implementation of nutrition and food assistance programs, and complementary nutrition education; and, (3) national nutrition monitoring. The human nutrition research programs of the USDA support these three major functions to ensure evidence-based policy, accurate and valid research methods and databases, and new understanding of diet and nutritional needs for optimal health. Human nutrition research at USDA is funded primarily through two programs: its intramural arm, the Agriculture Research Service (ARS), and its competitive grants

program, the National Research Initiative (NRI) administered by the Cooperative State Research, Education and Extension Service (CSREES).

The ARS maintains essential research facilities across the country that conduct both agricultural and nutrition research. The six HNRCs[1] are at the forefront of nutrition research, and the center structure adds unique value by fully integrating a multitude of nutritional science disciplines that cross both traditional university department boundaries and the functional compartmentalization of conventional funding mechanisms. These facilities make extraordinary contributions by conducting unparalleled human nutrition research on the role of food and dietary components in human health from conception to advanced old age, and by providing authoritative, peer-reviewed, science-based evidence that forms the basis of our federal nutrition policy and programs.

Although the NRI was authorized at $500 million in FY2006, only $181 million was appropriated, and of this amount, only $20 million was allocated to the priority areas of human nutrition and obesity. Yet, these symbiotic programs provide the infrastructure and continuous generation of new knowledge that allow for rapid progress towards meeting national dietary needs. Through its programs in Human Nutrition, as well as the related emphasis areas in Food Quality, Value and Safety, and through the research conducted at six Human Nutrition Research Centers and Land Grant Universities around the country, the USDA makes the connection between what we grow and what we eat. And additionally, through strategic nutrition monitoring conducted by USDA, we can learn more about how dietary intake affects our health.

The 2007 reauthorization of the Farm Security and Rural Investment Act (Farm Bill) presents an important opportunity to consider and enhance the nutrition research done at USDA, and we strongly support the Research Title within this legislation. To strengthen and improve the current research programs within the USDA, ASN sets forth the following principles and recommendations for your consideration.

Consider nutrition in a new paradigm for research at the USDA
In order to provide a clearer organizational mechanism to support nutrition research, ASN supports the establishment of a National Institute for Food and Agriculture (NIFA), with the inclusion of human nutrition research as a component on par with traditional food and agriculture research. According to a 2004 report submitted by a commission led by Dr. William Danforth, "the creation of a National Institute for Food and Agriculture (NIFA) that brings into the USDA a new culture and new operating methods is essential to ensure the innovation in agriculture needed to ensure our nation's successful future." [2] We support the establishment of this new institute under USDA, but seek to broaden the mission (and hence the name) to more clearly identify its mandate to address the many nutritional challenges we face as a nation. The specific addition of nutrition research to NIFA acknowledges the strategic importance of nutrition to the mission of this new institute.

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[1] Of the six HNRCs, three are fully administered by ARS and are located in David, CA, Beltsville, MD, and Grand Forks, ND. The other three are administered through cooperative agreements with Baylor University Medical Center in Houston, TX; Tufts University in Boston, MA; and, the University of Arkansas in Little Rock.

[2] Report of the Research, Education and Economics Task Force of the U.S. Department of Agriculture. "National Institute for Food and Agriculture: A Proposal." July 2004.

With a new paradigm should come new funding for research at USDA. ASN supports the goal of funding the Institute to a level of $1 billion over the next five years to be sustained at or above that level annually thereafter. This commitment is essential if we are to remain competitive in a global agricultural economy, meet the growing need for affordable and sustainable sources of energy, and stem the growing prevalence of overweight, obesity and preventable illness in our children, as well as food insecurity among many of our citizens.

Reauthorize Nutrition Monitoring
It is critical that USDA enhances the intramural research activities conducted by ARS that are an essential element of our national nutrition monitoring (NM) system. Such activities include the "What We Eat in America" survey, and the updating and maintenance of the food composition databases. Nutrition monitoring is a unique and vitally important surveillance function in which dietary intake, nutritional status and health status are evaluated in a rigorous and standardized manner, and the findings critically inform nutrition policy and all nutrition programs. ASN supports the expansion of the mission of the NM system to include the ability to conduct regional or even community assessments. The dietary assessment component of such an expansion would fall under USDA. Thus nutrition monitoring should be reauthorized and the needed budget and staffing to implement this expansion should be supported.

National nutrition monitoring and the maintenance of accurate and current food composition database activities are part of ARS' Human Nutrition Research Program, which is evaluated every five to six years. A recent review of the program by an external scientific panel provided a strong endorsement of this program, rating it "high" in terms of the quality of the research and valuable use of federal funds.

The NRI should be funded at the full authorization level of $500 million annually
In recent years, our nation's investment in agricultural research has been declining, threatening our ability to sustain the vitality of our research portfolio. Funding for the NRI has yet to reach $200 million, despite its initial authorization of $500 million. Continuation of this neglect will inevitably undermine the success of the USDA's research programs. Thus, it is imperative that the breadth and competitive nature of the NRI portfolio be maintained and expanded to ensure our nation's excellence in agricultural research and the well-being of all Americans.

One of the NRI's strategic goals is to improve the nation's nutrition and health through two objectives: (1) to focus on improving human health by better understanding an individual's nutrient requirements and nutritional value of foods; and (2) to promote research on healthier food choices and lifestyles. The potential for nutrition research conducted as a result of NRI grants is unlimited. For example, NRI grants are helping scientists learn more about the role of food and nutrients in the prevention of chronic disease, how dietary bioactive components have widespread health benefits in humans, and how nutrition education interventions can reduce the incidence of childhood obesity, especially in low-income families.

Conclusion
The time has come to commit resources to ensure food, agricultural and nutrition research keeps apace in the 21st century, and assures the U.S. remains competitive in a

global economy. ASN recommends the following for the reauthorization of the Farm Bill and for agricultural research:

- **A National Institute for Food, Agriculture, which includes nutrition, should be established at the USDA.**
- **National nutrition monitoring activities at ARS should be reauthorized and enhanced, and the food composition database updated to keep apace with the growing variation of the American food supply.**
- **The NRI should be funded at the full authorization level of $500 million annually.**

From the critical basic research supported at universities throughout the nation to the important work carried out by the HNRCs, USDA research programs deserve to be supported at the highest level possible. We must maintain and magnify the breadth and competitive nature of the agricultural research portfolio, to ensure the United States' economic vitality and the well-being of all Americans.

We hope these comments are useful as Congress moves forward with the reauthorization of the Farm Bill. Please do not hesitate to contact Mary Lee Watts, ASN's Director of Public Policy and Communications, by phone at (301) 634-7112 or by email at mwatts@nutrition.org should you have any questions.

Sincerely,

Stephanie Atkinson, PhD

President

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