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.

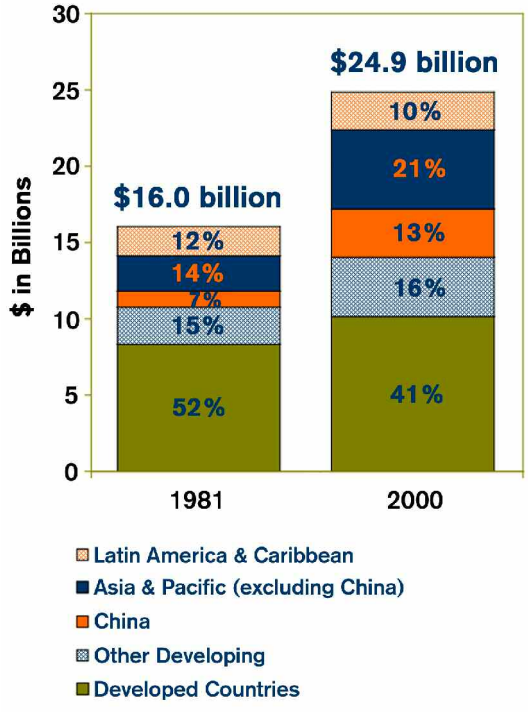
"This compound productivity growth reflected growth in the quantity of U.S. agricultural output while the quantity of total productive inputs remained fairly constant," Alston explains. Land use and labor use were reduced, offset somewhat by increased use of capital and especially other inputs.

"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.

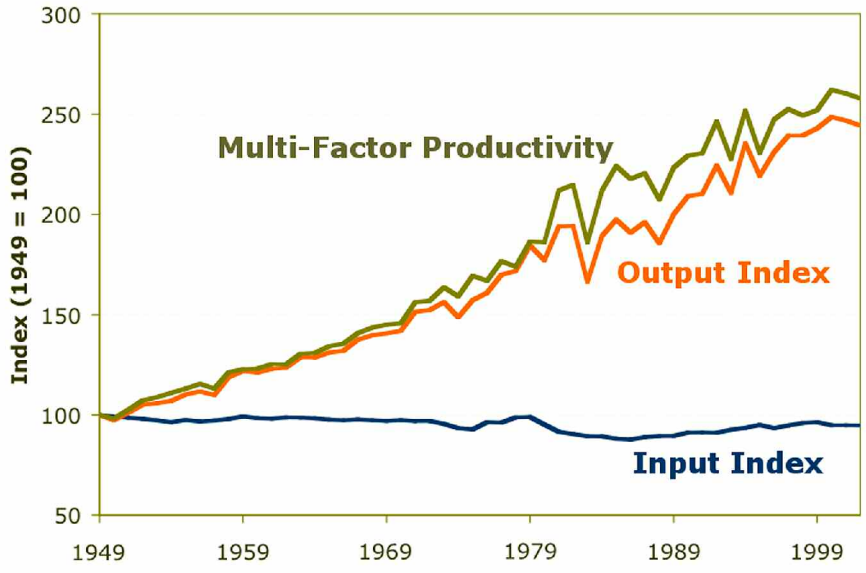
Global Agriculture R&D Investments, 2000

	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).

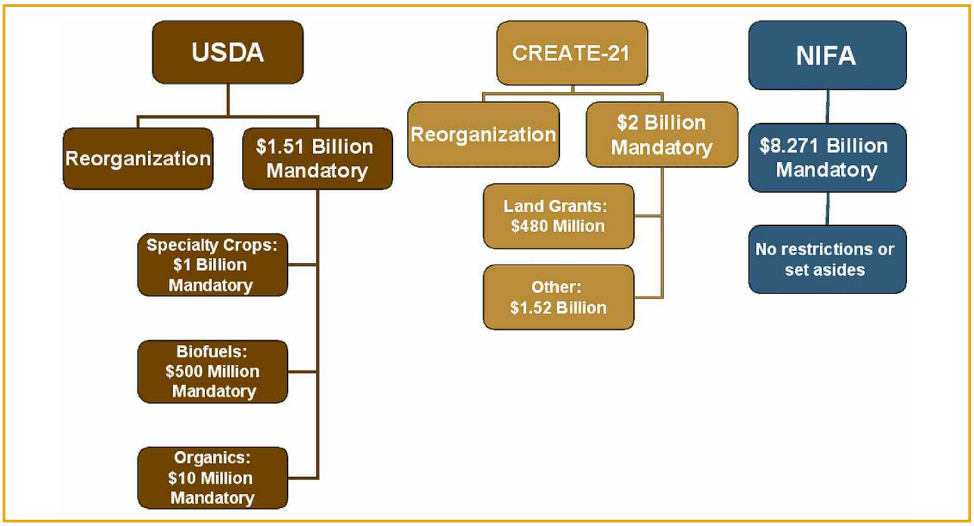
Another proposal, the National Institute for Food and Agriculture (NIFA), would create an independent institute within USDA to provide peer-reviewed, competitively-awarded grants for fundamental agricultural research. The institute would report directly to the Secretary of Agriculture. Legislation to 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
1301 West 22nd Street • Oak Brook, IL 60523
Tel (630) 571-9393 • Fax (630) 571-9580
www.farmfoundation.org