

USDA Research and Extension Policy in Retrospect: Implications for the Future

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The agricultural economics literature is virtually unanimous in its findings that public investments in agricultural research have yielded high social rates of return, typically in excess of 20 percent per year, over recent decades. And, I suspect few of us would disagree with Wayne Rasmussen's conclusion that the USDA-Land Grant partnership in research and education has been among the most important institutional innovations in US agriculture in the past century. Today, however, there is growing concern regarding the adequacy of public funding and the organization and management of that partnership. Important policy issues have emerged that must be addressed at both the state and federal levels, some as early as in the current budget cycle and certainly in 2007 as a new farm bill is drafted.

My objective in this presentation is to set the stage for remarks by the designated discussants and subsequent discussion from the floor. I begin with an overview of current USDA research and extension policies and their historical foundations. Because USDA programs cannot be viewed realistically in isolation from other public and private components of the national research-extension system, I will examine in some detail their linkages with other institutions, particularly the land grant universities. Finally, I will explore the policy implications of those findings in meeting future national research and extension needs.

USDA Research and Extension Policies: Historical Perspectives

USDA research, development, and extension (RDE) activities are currently conducted in primarily in four Services of the Department: Agricultural Research (ARS); Cooperative State Research, Education, and Extension (CSREES); Economic Research (ERS); National Agricultural Statistic (NASS). ARS, ERS, and NASS are primarily in-house agencies serving the missions of the Department and its various action agencies. CSREES, not itself a provider of research or extension services, is the primary focal point through which USDA funds for RDE are funneled to eligible private and state institutions by means of formula, competitive, and special grants. These grants constitute the major part of RDE funds provided by USDA to the land grant universities although other agencies such as ERS and ARS and action agencies such as FAS and APHIS transfer limited project funds through cooperative agreements with eligible institutions. NASS

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maintains some 45 field offices in state Departments of Agriculture or at land grant universities where much of its statistical data gathering and dissemination functions are performed.

The USDA FY 2006 budget for RDE totaled nearly \$3.0 billion; \$1.3 billion for ARS, \$1.2 billion for CSREES (\$ 700 million research, \$ 451million extension), \$75 million for ERS, and \$380 million for R&D in other agencies primarily the Forest Service and including \$2.0 million for NASS research.

On admittedly arbitrary grounds, I have segmented development of USDA RDE policies into four broad eras and provided selective, highlights of each.

1.Creating the System (1862-1914). By the late 1800's domestic and foreign demand for agricultural products were expanding rapidly. The need for research to enhance production efficiency and capacity of the large number of small farms and improve the income and well being of rural, agriculturally dominated communities was clearly evident. A series of landmark legislation was enacted at the federal and state levels the imprint of which remains to the present. Included were:

1862 Agricultural Organic Act established USDA; Morrill Act established Land Grant Colleges of Agriculture

1887 Hatch Act established agricultural experiment stations at Land Grant Colleges of Agriculture.

1890 Second Morrill Act established 1890 Colleges of Agriculture.

1905 USDA established the Office of Farm Management (and Farm Economics)-an antecedent of today's ERS.

1914 Smith-Lever Act authorizes establishment of the Agricultural (Cooperative) Extension system to disseminate research results.

2. Takeoff (1914-1950). The inter-war period was marked by substantial growth of research and extension programs at both the state and federal levels. Total public funding for research from state and federal sources increased from an annual average of \$ 9 million during 1910-19 to \$ 46 million in 1930-39 and nearly \$ 70 million in nominal terms by the end of World War 11 with USDA in house research accounting for nearly 60 percent of the total.

Mechanization, development of improved plant varieties and an array of manufactured production inputs emanating from R&D investments boosted agricultural output and productivity substantially notwithstanding the debilitating economic effects of the great depression. Milestones during this era included:

1922 Bureau of Agricultural Economics established in USDA to provide economic information and analysis to address price and income problems: the direct forerunner of ERS.

1930's Congress enacted extensive price and income, soil conservation, crop insurance, food assistance and rural rehabilitation programs and established regional USDA research labs. The BAE was assigned the role of central planning for department policy and analysis of policy impacts. These actions set the course of USDA programs and agricultural research and extension for many years to come. "Getting two blades of grass to grow where one had grown before" became the slogan of national agricultural research and extension policy. In that respect, the USDA RDE policies were eminently successful by virtually any criterion of evaluation.

3.The Golden Era (1950-90). In retrospect, the years 1950-1990 might properly be described as the "golden era" for agricultural research and extension. Programs multiplied in number and breadth, staffing grew exponentially, and funds flowed freely at both the state and federal levels. In 1950-59, total public sector funding for research averaged nearly \$136 million annually; by 1960-69 it had more than doubled to \$310 million annually; during 1980-89 the annual average had multiplied to \$1.7 billion in nominal terms. Although USDA in house research nearly quintupled during this era to \$500 million, its share of total public investment had declined to about 30 percent reflecting even more rapid expansion in state funding. USDA funding of extension also grew rapidly in this era to nearly \$370 million in 1990—a nearly three-fold growth from 1970 in nominal terms.

Milestones in this period included:

1953 USDA research consolidated into new agency--Agricultural Research Service; BAE abandoned.

1961 Economic Research Service and Statistical Reporting Service created as independent agencies in USDA. ERS expanded research to include economic development, river basin and watershed programs, and natural resource policy.

1965 Special Research Grants Act authorized USDA to make grants to research institutions outside the land grant system.

1970 Plant Variety Protection Act awarded plant breeders intellectual property rights for new crop varieties produced from seeds, particularly field crops; later extended to vegetables and tubers; utility patents authorized for plants and animals in 1985 and 1987 respectively. These policies stimulated both public and private research investments.

1972 Federal Rural Development Act authorized USDA funding for research and extension in rural development at land grant agricultural colleges

1977 Title 14 of Food and Agriculture Act of 1977 authorized competitive research grant program in USDA; provided for sustained federal funding for 1890's; authorized funding for colleges of veterinary medicine.

1977 Merged ERS, SRS and Farmer Cooperative Service; each restored to agency status in 1981; ERS field staff at land grant universities largely eliminated during the 1980s: Science and Education Administration created to enhance coordination of research, teaching, and extension within USDA and with the states.

1980 Bayh-Dole Act stimulated private research investments and public-private research partnerships by granting all institutions "certainty of title" for inventions resulting from federally funded research whether conducted at universities or government labs. Private sector research in chemicals, plant breeding, machinery, pharmaceuticals and food processing expanded rapidly; public-private partnerships expanded.

1981,1985, 1990,1996, 2002 farm bills reauthorized research and extension titles: National Research Initiative (competitive grants) established as independent program in USDA: land grant status conferred on 29 Native American Colleges with authorization of annual appropriations for extension and teaching:

I need not dwell on the impacts of RDE investments on US agriculture during this 40-year period. Suffice it to say that the huge flow of science-based information and technology contributed immensely to transformation of the structure, organization and productivity of the farm sector and the face of rural America.

It was during this period that many of the institutions and characteristics of the current research and extension system came into "full flower". An elaborate system of linkages between the USDA and the states was developed; USDA/state program planning, coordination reporting, and accountability mechanisms were put in place.

Finally, it should be noted that during the 45year era, the subject matter balance of both research and extension programs shifted gradually, but dramatically over time, in response to changing national priorities at both the state and federal levels. From the near singular focus on the farm sector and its productivity in the early years of the period, issues related to marketing, food safety, quality, and nutrition, natural resource use and conservation, environmental quality, and rural development gradually became more prominent features of both the research and extension agenda at both the state and federal levels. As this transition proceeded, federal funding to the states from non-USDA sources such as NIH, NSF, and the Department of Energy and EPA steadily assumed greater significance.

4.Turning Point: 1990s.

By 1990, the confluence of changes of the type outlined above had substantially altered the funding, organization, and management of RDE in the USDA-Land Grant partnership. Growth in total public funding of the system began to slow. USDA R&D

funding increased at an annual rate of less than 1.0 percent in real terms in the '90s compared to a 2.75 percent growth rate for non-defense R&D overall. By the mid-1990s formula funding began a decade of decline in real terms. CSREES formula funding for the state experiment stations declined 24 percent and that for extension dropped nearly 46 percent in real terms between 1997 and 2005. At the same time, the recession of the early 1990s coupled with the rising costs of research associated with growing emphasis on biotechnology resulted in severe pressure on both research and extension programs at the state levels. That pressure led to substantial downsizing of staff and programs, particularly extension, in the early 90s and again at the turn of the century.

USDA RDE policies shifted dramatically toward competitive grants at the expense of formula funding. In the 10 years 1996-2006, funding for NRI competitive grants nearly doubled to \$181 million, still well below the authorized level of \$550 million. Special funds earmarked by the Congress grew 130 percent in the same period. Private sector research funding continued to expand rapidly (now in excess of \$4.0 billion annually) throughout the period particularly in the biological sciences and became an increasingly important source of RDE funds at the land grant universities (about 20 percent currently).

Another of the driving forces shaping RDE policies in the late 80s and through the 90s was growing public concern regarding some of the unintended consequences of high tech agriculture and continuing emphasis of USDA and land grant research and extension on technology and productivity in the farm sector. Issues regarding the environmental and human health consequences of farm production, sustainability of high-tech production systems, alternative production systems including organic, natural resource use, nutrition and food quality, quality of life in rural America and globalization of world agricultural markets became increasingly important components of the RDE agenda. Many of the colleges of agriculture changed names to incorporate natural resources and/or environmental sciences to better reflect the changing agenda.

One of the important driving forces in altering the research agenda in this era was the basic scientific advancement in the biological sciences. Coupled with advances in information technology that greatly expanded the data management and analytical capabilities of researchers, new vistas of genetic engineering and biotechnology research and development related to plant and animal genetics came into prominence. Research investments in both the public and private sectors grew rapidly. Colleges of agriculture revised their curricula, reorganized departments, recruited a "new breed" of scientist trained in cellular and molecular biology, and aggressively sought financial support beyond USDA. Similar types of realignment of research priorities occurred in USDA to exploit the potential of the new technologies in the plant and animal sciences, in biomedical fields, human nutrition, and environmental sciences.

These changing priorities lead some to question whether RDE institutions including USDA were abandoning their traditional missions of serving production agriculture. Others contended that continued use of public funds directed to support of well capitalized, increasingly concentrated commercial agriculture could no longer be justified as a public good. Reflecting the changing agenda, RDE state institutions responded by

shifting program emphasis marginally and seeking additional financial support from non-USDA federal agencies as NSF, NIH, DOE, and EPA and the private sector.

The USDA reorganized its RDE activities in the late 1990s to achieve closer coordination between research and extension by merging the Cooperative State Research Service and the Extension Service to create CSREES. A set of competitive grant programs described as Integrated Activities (Section 406) were created to further encourage joint research/extension programming. Greater emphasis was placed on regional and multi-state research/extension in response to allegations of duplication of effort among states and USDA and to enhance coordination across state lines. Finally, in an effort to enhance coordination among all major RDE agencies, USDA reorganized reporting lines among the RDE agencies creating an office of Undersecretary for Research, Education, and Economics to which ERS, ARS, NASS, as well as CSREES, report administratively.

The net effects of that reorganization are debatable. Some observers assert that one effect was to dilute and diminish the roles and importance of extension and weaken its linkages with state extension organizations by placing it in agency dominated by research interests. Others contend that the closer linkage with research makes for more efficient and responsive programming to the long-term advantage of both research and extension and agriculture. The results of the Integrated Activities initiative seem thus far inconclusive in that respect.

The wisdom of administrative placement of ERS and NASS in the sphere of the Undersecretary for Research and Education rather than the Chief Economist (Assistant Secretary for Economics) also is debatable. Some assert that the integrity, objectivity and independence of ERS and NASS are enhanced by placing them “offline” relative to the immediate Office of the Secretary (aka Chief Economist) and its policy/political functions. Others contend that the reorganization will in the long run weaken the position of ERS in the USDA and in the eyes of the Congress by the policy disconnect and by its appearance as an independent research agency rather than as a Departmental economics service agency. Thus far there is no evidence of negative outcomes resulting from this reorganization. ERS continues to provide policy analysis, outlook information and other analysis to the Office of the Secretary and other agencies as requested. ERS and NASS budgets have remained relatively constant in real terms for the past 10 years although in ERS employment has fallen 28 percent. Salaries now absorb nearly two-thirds and extramural support about 9 percent of the annual ERS budget.

Policy Issues and Proposals

The national RDE system is at a policy crossroads. The character of agriculture and rural America has changed irrevocably. So has that of science itself. The “biological revolution” has opened vast new scientific vistas, many with application to agriculture, food, natural resources and environmental quality at home and abroad. Research and extension policy paradigms of previous decades are in many respects inadequate for the future. Choices must be made regarding the balance across the continuum of fundamental, applied and developmental research. Linkages among federal, state and private research institutions and the roles and comparative advantage of each need revisiting. The balance of research and extension programs between traditional on-farm production issues and those occurring upstream or downstream, requires continuing attention and rebalancing. In fact, the very question of the roles of the public RDE system in the contemporary and prospective environments of agriculture in a “flattening world” begs for rigorous reexamination.

Many of the current RDE institutions have their origins in the late 18th and early 19th centuries in times when the nature of agriculture and society were vastly different from the early 21st century. Institutional obsolescence and associated rigidities play a role in constraining adjustments to change. Extension, for example, continues to be organized on a county basis although fewer and fewer of today’s issues can be addressed adequately on that basis. The social and economic interdependence of agriculture with other sectors and communities, coupled with IT developments and the collective capacities of the private sector, raise basic questions regarding the organization, methodologies and program focus of extension. And it may be that there is excess capacity in and excessive duplication among the experiment stations that serve each of the states. Regional or multi-state collaboration taking fuller advantages of IT might enhance efficiency of some types of research and extension programming.

The changing nature of science and the interests and capabilities of scientists who ultimately make decisions on the nature of research to be pursued have altered both methods of research and the composition of the research agenda, generally favoring a movement to more fundamental and/or disciplinary research at universities, frequently at higher costs per scientist. There is an emerging consensus that public fundamental research in the US is seriously under-funded and, to some extent, impeded by current RDE policies and institutions.

The increasing research capabilities of the private sector have important policy implications in the RDE system. The enhancement of those capabilities means that some types of research, particularly developmental and applied research once conducted in the public sector, might now be left to private organizations. In some cases, the private firm will have related extension-type programs of a quality at least equal to that of the local or state extension system. Second, those capabilities suggest that more attention should be directed to formal public-private partnerships as a means of sharing costs. However, state

and federal research institutions must review their policies to ensure that their integrity and public responsibilities are not compromised by such partnerships.

These policy issues cannot be resolved by simple palliatives or simply “throwing more money” at them although who would deny the marginal value of new funds for many purposes! Some of the issues will precipitate lengthy and contentious discussion and debate. Some can be addressed only through structural reform of the system. However difficult or protracted the process of adjustment may be, continuation of current policies is not a viable alternative if the system is to retain its legacy of scientific progressiveness and adaptability of the past century.

FY 2007 Budget Proposals.

“The Administration proposes: the Congress disposes” in the words of one observer of the federal budget process. A brief review of that process with reference to the FY 2007 USDA RDE budget reveals substantial differences in policy preferences between the two bodies and the land grant community as reflected in NASULGC proposals (Table A).

Table A: Proposed Changes in FY 2007 RDE Budget Relative to FY 2006 (%)

	USDA	NASULGC	House
CSREES			
Formula Research	-1.8	10.3	3.3
Special Research Grants	-87.2	NA	-5.5
NRI (Comp. Grants)	36.6	36.6	4.3
Integrated Activities	-65.4	NA	6.7
Formula Extension	0.2	9.9	3.1
3 (d) Extension	-0.5	NA	3.6
Other Extension	-39.6	NA	-12.5.
CSREES Total	-13.4	NA	-0.9
ARS Res.& Info	-11.0	NA	-11.5
ERS Total	8.0	NA	6.6
NASS Total	9.0	NA	7.2

The major policy issue reflected in these budget proposals turns on formula funds. The USDA proposes to retain Hatch (research) and Smith –Lever (extension) formula funds at approximately FY 2006 levels of \$177 million and \$273 million, respectively (Table A). NASULGC, however, seeks an increase of nearly 10 percent in research and extension formula grants and House action approves an increase of about 3 percent for each (Table A). If enacted by the Congress, the House action would result in the first increase in nominal terms in Hatch funds in eight years although only about equal to inflation.

USDA, however, further proposes to dramatically alter the distribution of Hatch funds by redirecting 55.6 percent of the funds (\$98million) to nationally, competitively awarded,

multi-state, multi-institutional projects in the first year with the remaining multi-state funds being phased into competitive grant from formula funds over a four year period as multi-state projects are completed. Part of this redirection has already been implemented by redirection of about 25 percent of the formula funds being spent out of a multi-state fund established in FY 2006.

Another issue of disputation pertains to the NRI. USDA proposes a 37 percent increase from the FY 2006 total of \$182 million (Table A). However, nearly two-thirds of the increase would be derived from transfer of funds from the so-called Section 406 account supporting integrated research-extension programs on topics such as water quality, food safety, and pest management. On the other hand, House action proposes an increase of nearly seven percent in integrated activities and a modest increase of four percent in NRI funding (Table A) Finally, as would be expected, there is disagreement with respect to Congressional earmarks in the budget. The House retains more than 80 percent of the \$124 million it earmarked for special grants in FY 2006 whereas USDA proposes elimination of such funds. The land grant proposal is silent with respect to special grants perhaps reflecting ambivalent or conflicting positions among land grant leaders regarding these earmarks.

Clearly, we are at pivotal moment in the history of formula funds. The USDA has conveyed its clear preference for competitive funding over formula methods of distribution contending that competitive funding is more likely to yield higher quality results that better meets national needs. It also might be asserted that the current formula by which grants are distributed is seriously outdated and not reflective of conditions in contemporary agriculture and rural communities.

Land grant universities argue that further reductions in formula grants (about 30 percent of total expenditures by those universities) could undermine their ability to maintain critical research-extension infrastructure in an era of declining state support. They further argue that reductions in formula funding could result in losing funding in research areas that address state-specific needs that, while critical to an individual state, might not rise to the level of a national priority. Finally there is the contention that competitive grant mechanisms discriminate against smaller institutions with lesser capacity to bear the high transaction costs associated with competitive grant procedures.

Although the budget cycle for FY2007 is not yet complete, it seems likely that the outcome will more closely resemble the House action than the USDA proposal given that a similar USDA proposal was rejected in large part by the Congress in FY 2006. The land grant community proposes major changes of the type advanced by USDA be delayed pending an in-depth review of current policies in the 2007 farm bill process.

Land Grant and Senate Proposals:

The Board on Agriculture Assembly of NASULGC is preparing a proposal to create within USDA a new, independent agency—the National Institute for Food, Agriculture, and Natural Resources. In addition, a bill has been introduced into the US Senate by

Senator Talent of Missouri (the so-called Danforth proposal) to create a somewhat similar but more narrowly focused National Institute of Food and Agriculture within the USDA. If enacted into law, either of these proposals or a combination thereof would result in a major increase in USDA RDE funding and changes in mechanisms for linkage of institutions within and outside the USDA.

The NASULGC proposal, **CREATE-21** (Creating Research, Extension, and Teaching Excellence for the 21st Century), would consolidate in the Institute the agencies, programs, and activities currently within the USDA's Research, Education, and Extension mission area (ARS, CSREES, and presumably ERS and NASS), and the Forest Service R&D under leadership of a Director appointed by the President and confirmed by the Senate for a six-year term and reporting administratively to the Secretary of Agriculture. One of the primary purposes of the reorganization would be to reduce duplication, enhance integration and program focus among USDA RDE agencies.

The Institute would be charged with responsibilities for fundamental and applied research in the agricultural sciences; preservation and enhancement of the environment; provision for education and extension programs to enhance the vitality of youth, families, and communities; sustenance and expansion of the capability of both the Department to carry out intramural research (ARS, ERS, Forest Service) and the land grant and related university partners capabilities to perform extramural research, extension, education, and international programs

Programs of the Institute would be collaboratively determined by the Director and land grant and related partners with recommendations from a National Stakeholder Advisory Committee. The proposal envisions a broad and integrated portfolio of programs to be organized by problem/solution areas and funding mechanisms including capacity building grants (including formula grants) and competitive grants to focus on problems of pressing multi-state, national, and international significance.

The current budget of the agencies to be consolidated in the Institute approximates \$2.75 billion per year. The proposal would double that level to \$5.5 billion per year within seven years. Seventy five percent (\$2.06 billion) of the **increase** would be for competitive grants; 25 percent (\$ 688 million) for capacity programs.

Of the \$2.06 billion increase for competitive grants, 70 percent would be directed to fundamental research with 20 percent of that set-aside for the 1890s, 1994s, and smaller 1862 land grant institutions. Integrated (research/extension/education) competitive grants would constitute the remaining 30 percent with the same 20 percent set-asides. Of the **increase** in the capacity grants, 50 percent of the new Hatch, Smith Lever, and McIntire-Stennis money would go to land grants as competitively distributed multi-institutional funds.

The **Talent bill** is more narrowly focused on fundamental research and revitalization of agricultural research facilities at institutions of higher education, independent, nonprofit research institutions and consortia of those institutions. As with CREATE-21, the

proposed National Institute of Food and Agriculture would be an independent agency within the Department and would report directly to the Secretary. The design and functioning of the Institute would resemble those of the NSF and NIH with funds distributed on the basis of peer reviewed competitive grants. The Institute, with the approval of the Secretary, would be authorized to consolidate funds of existing agencies having functions similar to the Institute with the proposed new funds. Authorization of new funds would begin at \$245 million in FY 2007 rising annually to \$966 million in FY 2011 and years thereafter.

Both proposals are designed to sharply increase USDA funding for fundamental research to meet future domestic and international demand for food and fiber and to keep agriculture competitive in global markets. Both point to opportunities to extend and apply in agriculture recent scientific advances in fields such as genetics, cell and molecular biology, proteomics, and information technology. Both point to the need for an expanded research effort to mitigate or harmonize the long-term effects of agriculture on the environment, enhance the long-term sustainability of agriculture, and improve public health and welfare. Both stress the importance of peer-reviewed, competitive grants as the preferred means of achieving high quality, scientific results. The NASULGC proposal is the more inclusive in its explicit recognition of the need to strengthen extension as well as research and to maintain or enhance the infrastructure at smaller research institutions. Both would require a large bureaucracy and substantial transaction costs to administer.

In both these proposals and in the USDA FY 2007 budget proposal, the position of extension seems tenuous and underemphasized relative to research. Coupled with past state budget reductions, some of them steep and disproportional relative to research, some observers question the long-term viability of extension as currently organized and programmatically focused. Some states are privatizing selected extension functions and many have moved toward in-state consolidation of extension staff. Some advocate a major retrofit of extension to further develop and serve broader public interests in fields such as natural resource use, environmental quality, human nutrition, and rural development and their interrelationships with agriculture.

Both **CREATE-21** and the **Talent bill** set ambitious funding goals at a time when there is likely to be intense budget pressure on all types of federal discretionary spending including those for non-defense R&D. The difficulty of developing effective support for fundamental research in the Congress and among agricultural stakeholders is illustrated by the modest progress in funding of the NRI during the immediate past decade. Some believe that budget savings accruing from WTO-induced reform of US price and income programs might be sequestered for research and education purposes in the USDA. Such reform is at this time highly problematical and even if such budgetary savings were realized they would be contested rigorously by other interests within and outside the federal government and in agriculture itself. Nevertheless, with agricultural RDE at its current turning point in history, bold action is called for.

Concluding Remarks

I conclude with the following summary for reflection and discussion:

- The decentralized federal/ state partnership in agricultural research and extension has been a remarkably adaptive, scientifically progressive, and, on the whole, successful institution for more than a century.
- Today, however, the partnership is at a policy crossroads. After several decades of rapid expansion following World War II, the partnership reached a turning point in the 1990s as a result of stagnant or declining real budgets at both the state and federal levels, changes in science itself that have opened new vistas and opportunities for research, institutional obsolescence and rigidities, overlap and duplication of functions and programs in the system, and rapid increases in costs of RDE.
- USDA funding for RDE has been stagnant for nearly two decades. Funding of formula grants has fallen 24 percent and 46 percent in real terms for research and extension, respectively, during the past decade. At the same time, funds for NRI competitive grants have nearly doubled and those for Congressionally earmarked special programs have increased 130 percent.
- USDA proposes to phase out formula grants over a four-year period beginning in FY 2007 by shifting those funds to multi-state, multi-institutional competitive grants. Those policy changes raise questions regarding the viability of research and extension programs in smaller land grant universities. The proclivity of the Congress to earmark funds for special projects raises questions regarding the politicization and balance of the research/extension agenda.
- The CREATE-21 proposes to more fully integrate USDA RDE activities in an independent institute within USDA and nearly double USDA RDE funding over a seven-year period. The proposals would strengthen the role of peer-reviewed competitive grants and further shift the agenda toward fundamental, multi-institutional, multi-disciplinary research. The Talent Bill proposes to nearly treble new funds in the USDA budget for fundamental research in the same time period.
- Further attention should be given to formal public/private partnerships as a means of sharing costs of research. However, state and federal research institutions must ensure that their integrity, objectivity, and public responsibilities are not compromised by such partnerships.
- The current financial squeeze in the RDE partnership emanates from several underlying driving forces that have been emerging in recent decades. For example:

- The changing structure of agriculture and its interdependence with other sectors of the domestic and international economies: who are the appropriate stakeholders?
- Unintended consequences of high tech agriculture: more emphasis on issues upstream and downstream from the farm: what is the appropriate balance of research and extension programs among those issues?
- Developments in basic science and their potential application in agriculture: public under-investment in fundamental research? Balance across the continuum?
- Institutional obsolescence and rigidities in the RDE system: current economic and geographic boundaries less realistic: institutions loathe to change from traditional organization and methods. Incentives? Better use of IT?
- Changing interests and capabilities of scientists favor more fundamental and/or disciplinary research at higher costs per scientist: shift more applied research and extension to private sector?
- Extension seems particularly vulnerable in the current era: further refocus programs, regionalize, more extensive use of IT, privatize, integrate more closely with research?

In summary, the USDA/ state RDE partnership is at critical policy crossroads: it can continue on the course of marginal adjustments in its organization, management, and funding and run the risk of stagnation and loss of public confidence **OR** it can undertake institutional reform and seek major increases in public funding, perhaps augmented by public/private partnerships. In either case, it must contend with conditions of intense competition at both the state and federal levels for discretionary public funds.

A great strength of the partnership has been its abilities to adapt successfully to its changing environments. That legacy will surely be challenged in the years ahead.

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Appendix Table 1
 USDA Research and Extension Appropriations, 1996-2006
 (Million \$)

	1996	2000	2006
CSREES			
Formula			
Hatch	168.7	180.5	177.0
Total	221.7	238.3	241.2
Special Grants	61.5	73.8	141.6
NRI (Comp. Grants)	94.2	119.3	181.2
Other Research	23.9	28.1	72.5
Total Research	401.3	459.5	636.5
Extension			
Formula	293.6	303.4	306.5
3-D	107.0	87.8	92.0
Other	27.2	33.0	52.9
Total	427.8	424.2	451.4
Integrated Activities	NA	39.5	55.2
CSREES Total	912.1	951.2	1199.3
ARS (Research and Info. only)	710.0	835.0	1131.0
ERS	53.0	65.0	75.0
NASS	81.0	99.0	139.0

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