

Overview: The USDA and Land-Grant University System Partnership to Support Agricultural Research

The U.S. Department of Agriculture and land-grant universities were established by federal legislation signed by President Lincoln in July 1862, while the Hatch Act of 1887 initiated establishment of state agricultural experiment stations that were entitled to federal support for research. Although Congress considered original research an important focus of the new USDA, it also stated a charge to “acquire and diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense and to procure, propagate, and distribute among the people new and valuable seeds and plants” (U.S. Congress 1863, p. 387). It is important to understand that when Congress authorized establishment of the Department of Agriculture, the agency was intended to “*educate rather than to simply investigate.*” Furthermore, this concern for the practical education of farmers was the impetus for passing the Morrill Act of 1862, which established the “land-grant” universities with an endowment from federal land grants.

The Impetus for Review

Federal formula funding provided under the Hatch Act to state agricultural experiment stations (SAES) is targeted in a proposal by the Bush administration in its 2006 federal budget. The proposal would convert Hatch and other federal formula funded agricultural research programs into a new competitive grant program (CSREES 2005). This was engineered through the administration’s budget formation process without input from the land-grant universities, state agricultural experiment station directors, or the Experiment Station Committee on Policy (ESCOP). This proposal was strategically kept from the state partners before its announcement in February 2005.

CSREES stated that the new initiative “*provides an opportunity to further strengthen the national’s agricultural experiment station system*” and strengthen the partnership between the federal government and the agriculture research units of the land-grant university system. Eleven items are listed in the stated purpose of the new plan, including one to maintain a national network of agricultural experiment stations to support a broad spectrum of research capacity and to respond to stakeholder needs at the local, regional, and national levels through a broad range of approaches (CSREES 2005).

Members of the land-grant university system have a different perspective on the new agricultural science proposal for a competitive pool of funds derived from the existing formula base that supports the SAESs. Experiment station directors clearly see the relationship that has evolved over the past 100 years as a partnership and fail to understand how a proposal hatched in secrecy could be one that will in any way strengthen the federal-state partnership in agricultural research. State experiment station directors note that the current Hatch Act and other federal formula funded programs also meet such purposes as stated above. The new proposal represents an attempt to replace the long-time local control of Hatch Act and other formula funded research with a

competitive grant program directed by the CSREES, the end result being that CSREES will evolve to becoming a granting agency. This initiative certainly introduces a large amount of uncertainty, new transactions costs, and central control to a program founded on the principle of local control and low transactions costs (Huffman and Just 1994; 1999; 2000). Congress, which also was kept in the dark on the development of this new proposal, did not react favorably to the new Bush administration agricultural science proposal either. The House of Representatives restored the original Hatch Act and other formula funded programs and the Senate is expected to follow suit. Clearly should this proposal succeed in the future, the partnership, as we presently know it is over, and CSREES will become nothing more than a granting agency, not a partnering agency. As a result of the secrecy with which this proposal has come forward, the confidence and trust that has long been a hallmark of the traditional federal-state partnership has been significantly damaged. The consequences of the potential transformation of CSREES from a partnering agency to a granting agency cannot be overemphasized. The impacts on our agricultural system and its ability to utilize the latest and cutting edge research to remain competitive on the global scene should not be overlooked.

History of the Research Partnership

Under the Morrill Land-Grant College Act, each state would “*establish and maintain at least one college where the leading object was to teach courses related to agriculture and mechanical arts in order to promote the liberal and practical education of the industrial classes, without excluding other scientific and classical studies, and including military tactics.*” The land-grant universities struggled to obtain scientific material to teach in their new courses on agriculture. This created demand for research at the state rather than federal level, which facilitated establishment of the state experiment stations that preceded and importantly influenced the Hatch Act (Huffman and Evenson 1993, p. 13). Also, westward U.S. expansion gave rise to strong state participation in these activities and recognition that many research benefits were state specific—related to climate, soils, topography, and local economic conditions.¹

The new land-grant colleges faced several other issues in addition to the lack of funds and information. First, few high school graduates existed and those that did tended to be attracted to the more established and traditional colleges. Secondly, few individuals were available to staff teaching and research positions in the new land-grant colleges. Lastly, local farmers and farmers’ organizations were demanding visible evidence that the new land-grant colleges were committed to their well-being. As a result, the faculty saw potential in demonstration or model farms for teaching and research tools. This need for scientific information became the impetus for the agricultural experiment station movement, which began, in the early 1870s.

¹ One provision of the Morrill Act of 1890 was to provide funds to support current expenses of these colleges. Each state and territory was entitled to \$15,000 for the first year and the amount was to increase by \$1,000 per year for a total of 10 years. These funds were to pay for instruction in agriculture, mechanical arts, and other branches of mathematics, physical, natural, and economic sciences related to agriculture and mechanical arts (Huffman and Evenson 2005, p. 42).

In the 1880s, land-grant universities were struggling generally to institutionalize experimental research in agriculture in the states. Leaders in the land-grant university system and in the U.S. Congress became convinced that the research base of the land-grant universities must strengthen. State governments were providing modest support and only in a few locations. The first station bill was introduced in 1882 and debate continued to 1887. Efforts to pass the new federal legislation *were hindered by the concern that federal funding would bring federal control of the research agenda* (Knoblauch, Law and Meyer 1862; Kerr 1987, p. 18). The Hatch Act, however, was passed in 1887, and provided the first initial federal funds to support agricultural research. Each experiment station was “*to conduct original research or verify experiments [on subject] bearing directly upon agricultural industry of the United States,*” and each state was entitled to \$15,000 annually of federal funds to support this research (Knoblauch, Law and Meyer 1962, p. 219). In the first year, 20% at most could be allocated to erection or repair of buildings for research and not more than 5% of each subsequent year’s payment for such purpose (Knoblauch, Law and Meyer 1962, p. 220). The Morrill Land-Grant College Act was cited in the preamble as the authority from whence the station act arose. Thus, the stations were to be “*established under the direction*” of those institutions founded under the provision of the earlier legislation. *Due to the combination of sensitivity to states’ rights issues and recognition of the site-specific nature of production agriculture, the Hatch Act left to the stations the task of determining programs of investigation “having due regard to the varying conditions and needs of the respective States or Territories.”* The Commissioner of Agriculture (forerunner to the Secretary) was limited to indicating subjects of potential interest, and to supplying forms and offering advice to encourage “*uniformity of methods and results in the work of these stations*” (Kerr 1987, p. 20-21). Thus, once enacted the Hatch Act provided the first real opportunity to benefit agriculture through the direct application of discoveries from scientific investigations aimed at meeting local needs.

The Office of Experiment Stations in the USDA was a forerunner of the Cooperative State Research Service. Created in 1887 as a center for information exchange among the stations, it grew into an institution that helped formulate policy for the agricultural experiment station system. During the first 25 years of existence, the Office of Experiment Stations served largely first as a clearinghouse of information. Later, it introduced uniform accounting forms and standards, followed by the introduction of fiscal reviews that arose out of a concern for the management of the Experiment stations and the uniformity with which they were delivering research programs relative to local needs. From 1893 to 1915, A.C. True served as director of the Office of Experiment Stations, and initiated a series of policies and procedures that shaped federal-state relations through the centennial of the Hatch Act (Kerr 1987, p. 41)

Early in the development of the Office of Experiment Stations, the leadership chose to emphasize, as the primary role of experiment stations, scientific discovery rather than information exchange (Kerr 1987, p. 42). Starting in the 1890s, Hatch funds could no longer be used to support college instructional activities, as this was viewed as diluting the research efforts of experiment stations and no longer central to their mission.

Although the USDA was the only organization undertaking public agricultural research from 1862 to 1878, its early research was quite primitive. With Hatch Act funding, the state agricultural experiment stations soon moved ahead of the USDA in research. However, this changed in 1897 when James Wilson became the Secretary of Agriculture and began to build a system of research oriented bureaus within the USDA that soon competed effectively with the state agricultural experiment stations (SAES) for discoveries and for federal funding (Kerr 1987, p. 44-45; Huffman and Evenson 2005). Early in the evolution of the USDA research agenda, work was focused on human nutrition, agricultural engineering associated with irrigation and drainage, and entomology. When conflicts arose between the USDA and SAES system in the early years, Congress encouraged cooperation between the USDA and SAES system that included sharing of research staff and research facilities. Furthermore, it appears that this early cooperation between the state agricultural experiment stations and USDA was the forerunner of numerous cooperative agreements that were to develop over the years (Kerr 1987, p. 46-47).² Hence, by the early 20th Century, the U.S. Congress had enacted legislation completing the federal-state partnership in public agricultural research and cooperative extension outreach. In its wisdom, Congress chose this partnership arrangement where the USDA would control one component centrally from Washington and the states would control the other part focused on local needs and interests. It was believed that this partnership could best service the diverse needs and interests of the country.

However, a new problem of overlap in the research agendas of the two agricultural research systems has periodically arisen. For example, during the early 20th century, the experiment stations claimed that they had been established to conduct original research or verify experiments on an unlimited range of topics associated with agriculture, while USDA argued that it had a Congressional mandate to investigate questions of general concern to the nation's farm sector and on specific projects at particular locations.

Through 1955, increases in federal funding of the SAES system came primarily from periodic passage of new legislative acts that targeted funding for a particular area of new research. In 1906, the Adams Act enabled each state to receive additional federal funding to pay the necessary expenses of conducting original research and experimentation. The states were treated equally with funding phased-in over a 6-year period (Huffman and Evenson 2005, p. 23). The Adams Act, through the USDA Office of Experiment Stations, required for the first time that each state submit a written plan of work, with all activities grouped into distinct "projects." Each project proposal was to state a general area of concern, the central problem to be addressed, and the specific methodology or experimental approach that would yield information toward a solution.

² Two systems of agricultural extension evolved in the late 1800s in the U.S., one focused on short-courses and farmers institutes run by Land Grant Universities and a second run by the USDA focused in the South on field demonstrations for controlling widespread pests and in the North on farm management. In the Smith Lever Act of 1914, the two systems of extension were combined together into Cooperative Extension (Huffman and Evenson 1993, p. 23-24).

An itemized budget was to also accompany each project proposal. Hence, for the first time the Office of Experiment Stations had a system to monitor research undertaken under the Adams Act. This project system continued in existence until quite recently.

In 1925, the passage of the Purnell Act provided additional research funds, which were shared equally over a 5-year period, specifically for economics and sociological investigations, with the intent to establish and maintain a permanent and efficient agricultural industry and to develop and improve the rural home and rural life. This research effort was largely the result of a post-World War I decline in the profitability of agriculture.

In 1935, the Bankhead-Jones Act, stimulated by the Great Depression was passed to provide additional research funding for research into laws and principles underlying basic problems of agriculture; research relating to improvement of the quality of, and the development of new and improved methods of production of, distribution of, and new and extended uses and markets for agricultural commodities; and research relating to conservation, development, and use of land and water resources for agricultural purposes. Part of the funds under this act was to be allocated equally among the states and part was to be allocated unequally for the first time and by a new formula; each state was to receive an amount in proportion to its share of the U.S. population (Knoblauch, Law and Meyer 1962, p. 224-225).³ In addition and perhaps overlooked in the legislation, States were required for the first time **“to match”** the new federal funds for agricultural experiment station research. Also, 40% of the Bankhead-Jones Act funds were allocated to USDA for its own research and this added funding was instrumental in the establishment of the first of USDA regional research laboratories.

Immediately following World War II, as farm prices reverted to a normal level, the Research and Marketing Act of 1946 was passed. It provided funds to cover various aspects of marketing research to the USDA that could in turn be allocated to state agencies through cooperative agreements. However, the state agencies were expected to match these federal funds with other funds (Knoblauch, Law and Meyer 1962, p. 231).

Between 1948 and 1951, the federal government reduced its funding for USDA research, while federal support of the SAES system rose by 17 percent and the total SAES system funding rose by 18 percent (Huffman and Evenson 2005, p. 102, 115). This short period of time represented a major shift in federal priorities for agricultural research—dramatic reduction in absolute and relative size of USDA’s research portfolio and significant increases for the SAES system. Furthermore, in 1953 a major effort was undertaken to reorganize the USDA’s research operation-- dissolving the many research bureaus and bringing them together under a new organization called the Agricultural Research Service (ARS). *For a few years, the Office of Experiment Stations was actually*

³ In the Amendment of Bankhead-Jones Act in 1946, the allocation was changed: 20% allocated equally among the states, 26 percent allocated to a state based upon its share of the U.S. rural population and 26 percent based upon its share of the farm population of the U.S., and 25 percent for regional research. The remaining 3 percent was to be allocated to administration of the program (Knoblauch, Law and Meyer 1962, p. 226-227).

part of ARS, however, the experiment station system stood in opposition and in 1958 the Administrator of ARS along with the Experiment Station Committee on Policy (ESCOP) undertook a full-scale review of federal-state relations in agricultural research. Their 1960 report, however, concluded that neither sphere was mutually exclusive and that both federal and state station scientists had a responsibility to conduct basic research. Thus, an agreement was reached that encouraged state and USDA researchers to work together more closely in locating research facilities and in undertaking cooperative activities (Kerr 1987, p. 96-97).

Following discussions between ESCOP and the Bureau of the Budget starting in the late 1940s, a major effort to simplify and consolidate the now numerous different federal authorizations for funding agricultural experiment station research occurred. This lengthy legislative process was accomplished in the 1955 Amended Hatch Act and provided funding *“to conduct original and other research investigations, and experiments bearing directly on and contribution to the establishment and maintenance of a permanent and effective agricultural industry in the U.S., including research basic to the problems of agriculture, and investigations to develop and improve the rural home and rural life and, hence, the welfare of consumers”* (Knoblauch, Law and Meyer 1962, p. 233). It consolidated federal funding for state agricultural experiment stations. Twenty percent of the funds were to be allocated to marketing research, 25 percent for regional research, and 3 percent for administration. The balance of the funds was to be allocated to the states as follows: 20 percent allocated equally, 26 percent allocated according to each state’s share of the U.S. rural population, and 26 percent allocated according to each state’s share of the U.S. farm population (Knoblauch, Law and Meyer 1962, p. 232-233). The Amended Hatch Act departed in a major way from earlier legislation that had been quite specific about the amount per year that was to be spent on each program. It indicated *“such sums as Congress may from time to time determine to be necessary”* (Kerr 1987, p. 100). *“All of the Hatch formula funds must be 100 percent matched by the SAES.”*

In 1961, Secretary of Agriculture Orville Freeman under the Kennedy administration re-instated the agency charged with oversight of the Hatch Act to a position of equality with ARS, the federal arm of the research partnership, and named it the Cooperative State Experiment Station Service. In 1963, the agency was renamed the Cooperative State Research Service (CSRS), however, the administrator of CSRS tended to favor the USDA over the sentiments of the state agricultural experiment station directors (Kerr 1987, pp. 105). Even with this bias, the federal-state partnership in research was strengthened. At this same time there was a growing concern within CSRS about the quality of SAES research facilities, many which were in poor condition, and Hatch Act funds (i.e., Research Facilities grants starting in 1965) were for the first time approved for upgrading research facilities in the states.

In 1965, Congress saw the need again to direct some of the research funds going to the SAES system and forestry schools. This resulted in a Special Research Grants program for special research topics chosen by Congress to run for a maximum of 5 years. A review committee was established to rank the proposals received in each area (Kerr

1987, pp. 114). About the same time there was a concern for a national inventory of ongoing agricultural research in the USDA and state system. As part of this program, the Current Research Information System (CRIS) was established in 1967, and all approved research projects were to be included in this system. CRIS included a description of each project according to its objectives, approach, and relation to research problem areas and commodities. Thus, the federal-state research partnership was provided for the first time with a system for indexing, reporting, accounting, and managing research. This data system became a useful resource in later attempts to engage in research planning by ESCOP or CSRS.

Starting in 1972, the USDA-Land Grant Research System came under criticism from a variety of sources, including populists like James Hightower, author of *Hard Times, Hard Tomatoes*, and also the National Academy of Science in the *Pound Report*. The latter group organized a series of discipline-oriented panels to sample the research activities of the federal-state partnership as represented in CRIS, but putting greater emphasis on ARS than the land-grant system. The report characterized much of the research as mundane and was seen as damning by many, while at the same time other studies of the federal-state partnership in this era praised the system for its flexibility in marshaling scientific expertise that returned high dividends on its public investment in the past (Kerr 1987, pp. 131). What was surfacing however was the idea of more emphasis on “priority setting.” One outcome of the Pound Report was that ARS was reorganized and restructured on a regional basis (four regions) in 1972. In addition, there appears to have been a conscientious strengthening of the federal-state partnership in agricultural research as more ARS staff and facilities were being located on land-grant university campuses. According to Kerr, this reduced much of the existing rivalry in the federal-state research partnership.

In the 1970s, ESCOP and the SAES system were concerned about the lack of growth in federal funding for agricultural research through Hatch Act funding. This led to a coordinated effort to obtain targeted funding for new lines of research, e.g., rural development, energy, environment, small farms, animal health, international development. In the Food and Agriculture Act of 1977, Congress recognized the strength of the federal-state research and extension partnership in contributing to the development of American agriculture, while also seeing a need for further strengthening through greater coordination to meeting a broad set of needs for agricultural research. As a result a new competitive grants program was established to fund research in high-priority areas. This was changed in 1985 to focus on biotechnology research and in 1990 these programs became known as the National Research Initiative (NRI) Competitive Grant Program.

The Carter Administration seems to be the only Democratic administration to cause increased stress in the federal-state agricultural research and extension partnership, through its effort to consolidate the existing partnership into a new agency, the Science and Education Administration. As a result, CSRS was renamed Cooperative Research, ARS renamed Agricultural Research, Extension Division renamed Extension, and National Agricultural Library renamed Technical Information Systems. The land-grant system was seemingly frustrated by this organization (Kerr 1987, p. 157-58) and saw this

as simply the Administration wanting the whole research and extension system articulated in one single budget. In addition, efforts for greater control by the federal government raised long-simmering states rights issues. Furthermore, the administration sought to have all increases in SAES funding channeled through a competitive grant funding process.

In response to the centralization of power in Washington, ESCOP initiated a series of “white papers” in 1979 to address national concerns about agricultural research. Accompanying this effort, the SAES system initiated a new inter-regional project, IR-6, to evaluate the historical value of their efforts and to estimate social rates of return of past investments in public agricultural research and to enhance that value in the future. The land-grant system remained steadfast to the principle that a network of locally directed state agricultural experiment stations should remain key to the U.S. public agricultural research system. While the Administration’s leadership disagreed, this difference in perspective on agricultural science policy greatly strained federal-state relations during the Carter Administration.

Starting in the early 1980s, efforts were underway to repair the federal-state partnership in agricultural research. First, the amendment to Title XIV of the National Agricultural Research, Extension, and Teaching Policy Act in 1981 reaffirmed the importance of the state-federal agricultural science partnership, hailed by Congress as having been “*eminently successful*” in providing “*the most productive and efficient food and agricultural system in the world*” which served as “*the basis of our national affluence*” (Kerr 1987, pp 169). This act referenced “*the varied, dispersed, and in many cases, site-specific needs of American agriculture*” as the feature that made the “*unique federal-state partnership arrangement*” so necessary for success. At the same time, land-grant universities and state agricultural experiment stations were given greater weight on the Joint Council on Food and Agricultural Sciences, which represented the interest of those who were on the front line in efforts to expand agricultural research, extension, and teaching. The Users Advisory Board, which had been established in 1977 to represent the “users” of agricultural research, extension, and teaching, was expanded in membership and greater weight was given to commodity and regional interests (Kerr 1987, pp. 171). Since these two boards were advisory to the Secretary of Agriculture, their composition made a major difference in the types of policy recommendations that were forthcoming. However, the mission statement of CSRS was still one-sided, emphasizing the agency’s role as the representative of the Secretary of Agriculture rather than the broader community involved in performing public agricultural research, extension and education.

Second, the old names and administrative structure were reinstated, and CSRS had a new administrator who set out to rebuild ties and support with the state agricultural experiment station directors. The agency developed a new mission statement: “*to advance science and technology in support of agriculture, forestry, people and communities: in partnership with the state agricultural experiment station system, colleges, and universities and other research organizations, and in concert with the Secretary of Agriculture and the intent of Congress.*” To fulfill its mission, CSRS identified three goals in the mid-1980s: Obtaining federal resources for the acquisition of

new knowledge, promoting excellence in the research system, *and improving cooperation between the various research partners* (Kerr 1987, pp. 176-77). Furthermore, CSRS began to see its role as re-building the federal-state partnership in agricultural research and not principally as a voice for the Secretary of Agriculture.

During the Reagan, Bush, and Clinton Administrations, federal funding of agricultural research via the Hatch Appropriations and other formula funding declined by 25 percent from 1980 to 1990, and another 17 percent during the period of 1990 to 2000. Nominal dollar funding actually increased over this period, but by less than the price index for agricultural research. However, USDA's competitive grant program was re-named and the National Research Initiative Competitive Grant Program received an additional \$50 million. At this time, however, a new form of nontraditional federal agricultural research funding began to appear as the federal earmarking of funds for research. An academic earmark is a project, facility, instrument or other academic or research-related expense that is directly funded by Congress. Its administration, however, is generally through CSRS or now CSREES. One rationale for the growth in federal earmarked funds for agricultural research is that it was a reaction of the states to attempts by the Administration to increase extramural agricultural research funding largely through competitive grant funding and at the same time reduce real Hatch Act and other formula funded research (Huffman and Evenson 2005). It is clear that while Hatch and other formula funding remained static or declined in real purchasing power, states saw real needs and used a political approach to secure needed appropriations.

The name of CSRS was changed in 1995 to the Cooperative State, Research, Education and Extension Service (CSREES). In reviewing the history of the Office of Experiment Stations and CSRS, one is impressed by the large share of these individuals who were former directors of a state agricultural experiment station. During the Bush Administration this has not been the case; the Administrator is a long-term servant of USDA, which goes against tradition and has implications for the federal-state partnership in agricultural research and extension. It is interesting to note that the new Strategic Plan of CSREES (CSREES 2004) is a 37-page document that reads primarily as a research agency running extramural competitive grant programs in research, extension, and education. Listed 11th among 15 key external factors that might constrain progress toward the agency's performance goals is "*coordination and cooperation of state partners.*" Curiously, this document makes little mention of maintaining or strengthening the federal-state partnership in research, extension, and education, as it sets the course for the agency. While the state experiment stations were surprised with the President's FY 06 budget and plans to implement a new SAES Competitive Grants program, through redirection of the formula funds, one only has to look carefully at the 2004 CSREES Strategic Plan to understand the agency's long-term view of the partnership

Similarities of Block Grants for ARS and the SAES System

Hatch Act and other formula funded programs, which are a type of block grant, have long been an integral part of the SAES research funding stream. When the Eisenhower Administration dissolved the USDA agricultural research bureaus, they were reorganized into new agencies—ARS that focuses on biological and chemical research

and ERS that focuses on social science research. ARS and ERS receive federal block grants for agricultural research. The long-term partnership on agricultural research has been one where the USDA's research agencies, which are centrally controlled, were complemented by a set of locally controlled state agricultural experiment stations, forestry schools, and veterinary medicine colleges and schools. The prevailing view has been that both federal and state agricultural research institutions are needed in the U.S. to have a strong agricultural research system, including one that addresses issues that are geo-climatic or economic region specific. Each time that the federal partner has attempted to take charge of agricultural research and run it from Washington, the federal-state partnership has been put under stress and suffered. Periods of stress occurred during the 1950s, 1970s, and the current Bush administration.

It is difficult to argue that the organization of Hatch Act and other formula funded research in the land-grant system is inferior to the organization of research in ARS and ERS. In fact, the SAESs, forestry schools, and veterinary colleges benefit from the wide-ranging nature of research undertaken in land-grant universities and from being an integral part of graduate level teaching and research. Although some of the ARS research units are located on university campuses, many are located in rather geographically or intellectually isolated areas and only those who are located on or close to land-grant universities or other major university campuses have ready access to a wide range of science and opportunities to participate in graduate training. It is safe to say that ARS has benefited greatly by its close relationship with the land-grant universities in any number of ways, but principally through the hiring of many scientists and post-doctorates who are critical to the agency's ability to meet research goals. Although USDA may attempt to draw a large distinction between these two different organizational structures of research, it is the complementary relationship that exists between scientists and units that makes this a system that meets the nation's food and fiber needs efficiently and effectively. The U.S. public agricultural research and extension systems continue to need a partnership between the centrally controlled USDA system and the locally controlled SAES and cooperative extension systems. If one were to design a better system, we are not sure what it is or how it could evolve to better meet the nation's needs.

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