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Federal Agricultural Research Funding: Issues And Concerns

This report describes the source and distribution of Federal funds for agricultural research. It also presents the views of research leaders on funding allocation issues.

Federally funded research is performed at Federal facilities and State land-grant universities. Regional distribution of Federal agricultural research funds varies widely depending on the specific program. Land-grant university officials interviewed by GAO do not favor changes in the formula under which the majority of Federal funds are allocated to States. These officials also generally support increases in formula-derived funding to keep pace with inflation and in funding for the competitive grants program.

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RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

B-213112

The Honorable Richard G. Lugar
Chairman, Subcommittee on Agricultural
Research and Legislation
Committee on Agriculture, Nutrition
and Forestry
United States Senate

Dear Mr. Chairman:

In accordance with your request and subsequent discussions with your office, this report provides information on the source and distribution of Federal agricultural research funds and the views of research leaders on agricultural research funding issues.

As arranged with your office, unless you announce its contents earlier, we plan no further distribution of this report until 2 days after its issue date. At that time, we will send copies to the appropriate House and Senate committees; the Secretary of Agriculture; the Director, Office of Management and Budget; and other interested parties.

Sincerely yours,

J. Dexter Peach
Director

GENERAL ACCOUNTING OFFICE
REPORT TO THE CHAIRMAN,
SUBCOMMITTEE ON AGRICULTURAL
RESEARCH AND LEGISLATION
SENATE COMMITTEE ON AGRICULTURE, NUTRITION AND FORESTRY

FEDERAL AGRICULTURAL RESEARCH FUNDING: ISSUES AND CONCERNS

D I G E S T

The Federal, State, and private sectors support agricultural research. Together, they spend over $2 billion annually for agricultural research and development.

The Chairman, Subcommittee on Agricultural Research and Legislation, Senate Committee on Agriculture, Nutrition and Forestry, asked GAO to provide information on the regional distribution of Federal agricultural research funds administered through the U.S. Department of Agriculture (USDA) and to obtain the views of State and Federal research leaders on agricultural research-funding issues. (See p. 1.)

The U.S. food and agricultural research system is built around (1) USDA's Agricultural Research Service, which operates a network of over 140 domestic research facilities and focuses on agricultural problems of regional, national, and international concerns; (2) the State agricultural experiment stations which are generally a part of a land-grant university and which focus on local and regional problems but also address national and international problems; and (3) the food and fiber industry, which generally performs proprietary-applied research and development. (See p. 2.)

Legislation provides for Federal funds to be allocated to the States for agricultural research on the basis of specific formulas. Such formula-derived funding provides the basic institutional support of the agricultural research system. These funds provide stable long-term research funding and flexibility for land-grant universities to perform research they think should be done. Competitive grants are used to supplement the research programs. Such grants provide additional funding to bolster basic research, bring new scientists into the agricultural research area, and provide a means to target funds toward high-priority research.

SOURCE AND DISTRIBUTION OF FUNDS FOR AGRICULTURAL RESEARCH

Federal agricultural research funds--totaling about $680 million in fiscal year 1983--allocated by USDA are distributed in several ways. Funds allocated to the Agricultural Research Service, about $460 million in fiscal year 1983, are distributed on the basis of research priorities without regard to geographic distribution. Their distribution, however, is influenced by the location of Agricultural Research Service facilities and scientists. (See p. 6.)

In addition, about $220 million in fiscal year 1983 Federal funds was distributed through USDA to the States either through three "formula programs" or through competitive and special grants. The first formula program, the Hatch Act of 1887 funding program, provides the bulk of the Federal support to the States--about $149 million of the $220 million in fiscal year 1983. These funds are allocated to the States by statutory formula primarily on the basis of each State's farm and rural population. A second program provides formula funds, on the basis of the State's farm and rural population, to each of the 16 traditionally black 1890 land-grant colleges, which are primarily located in the South. Tuskegee Institute, a non-land grant school, also gets 1890 funds. A third program provides formula funds for animal health and disease research primarily on the basis of the value of livestock produced and research capacity in a State. Competitive and special grants are normally awarded to research institutions on the basis of research needs specified by the Congress and research proposals submitted to USDA. (See pp. 7 to 12.)

The following table shows the average yearly amount of total Federal agricultural research funding allocated by USDA that each of the four research regions received for fiscal years 1978 thru 1982:

Region	Yearly average amount received, fiscal years, 1978-82	Percent of total
	(000 omitted)	
Southern	$166,071	33
Northeastern	122,662	25
North Central	117,890	24
Western	92,292	18
Total	$498,915	100

GAO found that regional distribution of Federal agricultural research funds varies widely depending on the specific research program. For example, the greatest percentage of Agricultural Research Service in-house funds is spent in the Southern Region, and the greatest amount of Hatch Act formula funds is allocated to the Southern Region. The North Central Region has received the greatest amount of special and competitive grant funds. (See pp. 6 to 12.)

Additionally, funding by the States also varies widely. The Southern States support agricultural research with State funds to a greater degree than the other regions.

VIEWS ON FUNDING ALLOCATION PROCEDURES

GAO visited fourteen 1862 land-grant universities--five in the North Central Region and three each in the Northeastern, Southern, and Western regions--and three 1890 land-grant universities and discussed funding issues with officials at those universities. Within each region, GAO ranked the States according to the amount of Hatch formula funds received and selected States to visit from the upper, middle, and lower third of the ranking. Thus, although GAO's selection was not based on a statistical sample, it was designed to enable GAO to obtain the views of research leaders at land-grant universities receiving varying amounts of Federal agricultural research funds in each of the four research regions. As such, GAO believes it is indicative of perspectives from all parts of the country. (See p. 5.)

Land-grant university officials GAO talked to knew that regions received different levels of Agricultural Research Service research funding; however, this was generally not a matter which they commented on. Rather, officials addressed issues, as indicated below, related to Federal funds allocated directly to the States. (See p. 15.)

Land-grant university officials depend upon both Federal formula and competitive grant funds for their research programs and generally had favorable comments about both. They told GAO that if additional money becomes available, they would like Hatch Act funding increased enough to maintain pace with inflation and the balance used for competitive grants. (See pp. 15 and 19.)

Land-grant university officials indicated general opposition to any change in the Hatch Act formula allocation process. They said the formula was generally fair in its present form because it provides some money for everybody. However, if changes were to be made, officials suggested numerous bases that should be considered such as value of production, number of commodities produced, and amount of State support. They also said that the impact of any proposed change must be carefully analyzed by policymakers. (See p. 16.)

AGENCY COMMENTS

GAO asked USDA to comment on a draft of this report. USDA officials met with GAO and said that the report accurately reflects the agricultural research funding situation, and that the views of land-grant university officials presented therein are consistent with feedback USDA has received.

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ABBREVIATIONS

ARS	Agricultural Research Service
CSRS	Cooperative State Research Service
FY	fiscal year
GAO	General Accounting Office
USDA	U.S. Department of Agriculture

CHAPTER 1

INTRODUCTION

On October 14, 1982, the Chairman, Subcommittee on Agricultural Research and Legislation, Senate Committee on Agriculture, Nutrition, and Forestry, asked us to provide information on the regional distribution of Federal funding for agricultural research. The Chairman was concerned about whether the North Central region was receiving its fair share of Federal funding for agricultural research.

In subsequent discussions with the Chairman's office, we were requested not to concentrate on the North Central Region funding issue but rather to develop information on the source and distribution of Federal funding for cooperative research administered by the Department of Agriculture's (USDA's) Cooperative State Research Service (CSRS).[1] We were also asked to develop the same type of information on in-house research performed by USDA's Agricultural Research Service (ARS). In addition, the Chairman wanted us to obtain views on research funding issues from State and Federal research leaders.

THE AGRICULTURAL RESEARCH SYSTEM SUPPORTS THE FOOD SECTOR

Agriculture plays an important role in U.S. society--in meeting domestic food needs, in making important contributions to world food supplies, and in bolstering the Nation's economy. Agriculture is one of the Nation's largest industries and employers. Its products rank high among all U.S. exports and function as a major contributor to balancing U.S. trade deficits.

Food and agricultural research have made significant contributions to a wide range of agricultural and societal needs. The Federal/State research partnership has given our Nation new and better ways to improve food production, processing, and marketing and has helped solve problems in environmental quality and human nutrition.

Agricultural researh has received the active support of the Federal Government since 1862. In that year, two congressional actions set the stage for the development of a cooperative system of Federal and State agricultural research. First, under the Organic Act of 1862 (12 Stat. 387), the Congress established the U.S. Department of Agriculture. One of the Department's duties was to acquire and preserve information concerning

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[1]CSRS administers the legislation that authorizes Federal payments for agricultural research conducted in State institutions and other eligible organizations.

agriculture through books and correspondence and by practical and scientific experiments. Second, the Congress passed the Morrill Act (12 Stat. 503), which provided for the sale of public lands to support a college[2] in each State that would teach subjects related to agriculture and the mechanic arts.

USDA's in-house agriculture research program began modestly. In April 1863, it was authorized to use 40 acres of land at the west end of the Mall in Washington, D.C., as an experimental farm. The Hatch Act of 1887 (7 U.S.C. 361 a-361i) was an important legislative step taken in the development of agricultural research in the United States. The act established the system of State agricultural experiment stations and provided Federal formula funds to support agricultural research at these stations. The Hatch Act set the stage for the Federal/State agricultural research system as we know it today. In the years since these fundamental laws were passed, congressional committees and administrators in the Department of Agriculture and land-grant universities have struggled to establish a research system that is efficient, coordinated, far-reaching, and responsive to the needs of farmers and consumers yet flexible and dedicated toward independent investigation and the discovery of new, basic scientific knowledge.

The agricultural research system today

The U.S. food and agriculture research system is built around (1) USDA's ARS, which focuses on agricultural problems of regional, national, and international concerns; (2) State agricultural experiment stations, which are generally parts of land-grant universities and which focus on local and regional problems but also address national and international problems while carrying out educational programs; and (3) the food and fiber industry, which generally performs proprietory-applied research and development.

The Federal Government supports over half of the Nation's public-sector agricultural research. ARS, which operates a network of over 140 domestic research facilities, had a budget of about $460 million for fiscal year 1983. In addition, in fiscal year 1983, the Federal Government provided about $220 million to the States for agricultural research through formulas, primarily the Hatch Act, and other research program funds, including

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[2]In 1890, the Congress passed the so-called second Morrill Act (7 U.S.C. 321 *et seq.*), which established the 1890 land-grant colleges to serve blacks primarily.

special and competitive grants[3] and 1890 school and animal health and disease formula funds[4] administered through USDA's CSRS. Additional Federal funds for research related to agriculture also are provided through other Federal agencies, such as the National Science Foundation.

State appropriations to State Agricultural Experiment Stations amounted to over $500 million in fiscal year 1981, the last year for which complete State data were available. The private sector also conducts agricultural research. Private research expenditures are not known with any degree of accuracy, but estimates are that industry is spending about $750 million to $2.5 billion annually. Funding for agricultural research will be discussed in greater detail in chapter 2.

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[3]The special research grants program began in 1965 with enactment of the so-called Special Research Grants Act (7 U.S.C. 450 i). The National Agricultural Research, Extension, and Teaching Policy Act of 1977 (Pub. L. 95-113, Title XIV) amended the Special Research Grants Act and divided the grants program into two parts: the Special Research Grants Program, open only to those with a demonstrated capacity in agricultural research, and a new Competitive Grants Program, which focuses on high-priority research and is open to all researchers.

[4]The National Agricultural Research, Extension, and Teaching Policy Act of 1977 provides Federal formula funding to support agricultural research at the sixteen 1890 land-grant colleges and Tuskegee Institute and to support livestock and poultry disease research in colleges of veterinary medicine and eligible State agricultural experiment stations.

Agricultural research regions

For administrative purposes, the United States has been broken down into four agricultural research regions:[5] the Northeastern Region, the North Central Region, the Southern Region, and the Western Region. The regions provide a mechanism for interaction between States for relating to common operations and management problems as well as subject areas of mutual concern.

HODGSON STUDY

In early 1982, Harlow J. Hodgson, Assistant to the Director, Wisconsin Agricultural Experiment Station, published a study which showed that, on the basis of agricultural production, the North Central Region received a proportionately small allocation of Federal resources for agricultural research. Hodgson said the North Central Region, with 44 percent of farm cash receipts and 58 percent of the cropland acres, received only 22 percent of ARS research funds. Hodgson concluded that USDA should reexamine methods of establishing research funding priorities to align them more properly with agricultural production statistics and the public interest. Subsequently, the North Central Experiment Station Directors passed a resolution at their July 1982 meeting recommending to the Secretary of Agriculture that the disparity in allocating ARS research dollars and personnel be corrected by concentrating appropriation increases in the North Central Region. The Chairman's request was prompted in part by the resolution.

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[5]States and territories included within the regions are as follows:

Northeastern:	Connecticut, District of Columbia, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and West Virginia.
North Central:	Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.
Southern:	Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, Virginia, and the Virgin Islands.
Western:	Alaska, Arizona, California, Colorado, Guam, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objectives of this assignment were to examine various issues related to agricultural research funding in response to the Chairman's request. The Chairman asked us to provide information on the regional distribution of Federal funding for agricultural research, including developing information on the sources and distribution of Federal agricultural research funds and obtaining the views of State and Federal research leaders on agricultural research funding issues. We agreed to develop and present information on the source and distribution, by State and region, for agricultural research funds allocated through USDA, including ARS in-house research, and the following funds administered through CSRS: the Hatch Act, and 1890 school, and animal health and disease formula funds; and competitive and special grant funds. We analyzed funding for a 5-year period--fiscal years 1978 through 1982.

Our work was performed from November 1982 through June 1983 and was done in accordance with generally accepted Government audit standards. We reviewed previous GAO work; conducted a literature search; reviewed various studies dealing with the agricultural research system; reviewed legislative history; reviewed budget documents; and discussed agricultural research funding issues with cognizant ARS and CSRS officials, deans of agriculture and directors of experiment stations at land-grant institutions in 14 States, the Directors-at-Large of each of the four (North Central, Northeastern, Southern, and Western) research regions, academicians, and others involved with agricultural research.

Our selection of the 14 States we visited included 3 States from each of the four ARS regions. We ranked the States within each ARS region by the amount of Hatch funds received, and selected a State from the upper, middle, and lower third of the ranking in each region. We visited two additional States in the North Central Region, since the resolution which initiated the Chairman's request originated in that region. In three States, we interviewed officials of 1890 land-grant institutions in addition to those of 1862 land-grant institutions. Although our selection was not based on a statistical sample, it was designed to enable us to obtain the views of research leaders at land-grant institutions receiving varying amounts of Federal agricultural research funds in each of the four research regions and, as such, we believe is indicative of perspectives from all parts of the country. Land-grant institutions we visited are listed in appendix I.

CHAPTER 2

SOURCE AND DISTRIBUTION OF FUNDS FOR AGRICULTURAL RESEARCH

Federal agricultural research funds allocated through USDA are distributed in several ways. Funds allocated to ARS for in-house research are distributed on the basis of research programs without regard to geographic dispersion. Their distribution, however, is influenced by the location of ARS facilities and scientists.

Funds distributed to the States are either formula funds (primarily Hatch Act) or competitive and special grants. Hatch Act funds are allocated to the States by statutory formula primarily on the basis of a State's farm and rural population. Competitive and special grants are used to support priority research and are normally awarded on the basis of research needs specified by the Congress and research proposals submitted to USDA. In addition, formula funds are allocated generally on the basis of the State's farm and rural population to each of the 16 traditionally black 1890 land-grant colleges, which are primarily located in the South, and Tuskegee Institute. A small program also provides funds to State institutions on a formula basis for animal health and disease research primarily on the basis of the value of livestock produced and research capacity in a State.

Regional distribution of Federal agricultural research funds varies widely depending upon the specific program analyzed. Also, as discussed in chapter 3, knowledgeable representatives of the agricultural research community have pointed out factors in addition to value of production, as suggested in the Hodgson study, which should be considered in allocating research funds. An analysis of research funds on a strictly regional basis can be misleading because regions do not contain equal numbers of States, and funding may vary widely among the States in a particular region.

Although this chapter concentrates on providing a general overview of the source and distribution of Federal agricultural research funds allocated through USDA, it will also briefly touch on funding for agricultural research provided through other Federal agencies, and State and private support of agricultural research.

HOW THE FEDERAL GOVERNMENT ALLOCATES FUNDS FOR AGRICULTURAL RESEARCH THROUGH USDA

Federal funds are allocated through USDA for in-house research performed by ARS through its network of over 140 research facilities. In addition, the Federal Government provides support for agricultural research to the States through

formula and grant funds administered by CSRS. Appendix II provides an overview by State and region of total funding provided through USDA. Each USDA program is described in additional detail in the following sections.

Agricultural Research Service

Funds are appropriated by the Congress to USDA and are allocated by perceived research priorities as identified by ARS. As previously stated, although funds are allocated without regard to geographic boundaries, allocation is influenced by the location of ARS laboratory facilities and scientists. The location of the facilities is, in turn, influenced by geopolitical considerations. Our report to the Congress entitled "Federal Agricultural Research Facilities are Underused" (GAO/RCED 83-20, Jan. 14, 1983) discusses the use of ARS' research facilities.

The research performed by ARS is authorized by the Department of Agriculture Organic Act of 1862 (12 Stat. 387); the Research and Marketing Act of 1946, as amended (7 U.S.C., 427, 1621); the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (Pub. L. 95-113, Title XIV); and the Agriculture and Food Act of 1981 (7 U.S.C. 1281). ARS conducts research to meet six broad objectives including animal production, plant production, soil and water conservation, commodity conversion and delivery, adequate human nutrition, and integration of systems.

Average yearly ARS funds spent within each State and region for fiscal years 1978 through 1982 are shown in appendix III. The largest amount of funding (31 percent) was spent in the Southern Region and the smallest amount (19 percent) in the Western Region. Twenty-nine percent of ARS funds was spent in the Northeastern Region and 21 percent in the North Central Region. Funds spent varied widely among the States; no funds were spent in several Northeastern States. On the other hand, about 19 percent of the funds was spent in Maryland, a Northeastern State, where the Beltsville National Agricultural Research Laboratory is located. If the Beltsville facility were excluded from the analysis, California would be the State with the largest percentage (about 9 percent) of ARS funding.

Cooperative State Research Service

Hatch Act

Funds under the Hatch Act of 1887 as amended (7 U.S.C. 361a-361i) are allocated to the 50 States, the District of Columbia, Puerto Rico, Guam, the Virgin Islands, Micronesia, and

American Samoa[1] by statutory formula primarily on the basis of each State's farm and rural population. The Hatch Act[2] provides that the distribution of Federal payments to States shall be fixed on the basis of the payment to States in fiscal year 1955 and that any sums appropriated in excess of the 1955 level shall be distributed in the following manner.

--Twenty percent shall be allotted equally to each State.

--Not less than 52 percent shall be allotted to the States as follows:

1. One-half shall be allotted in an amount proportionate to the relative rural population of each State compared with the total rural population of all States.

2. One-half shall be allotted in an amount proportionate to the relative farm population of each State compared with the total farm population of all States.

--Not more than 25 percent shall be allotted to States for cooperative regional research where two or more State agricultural experiment stations are cooperating to solve problems that concern the agriculture of more than one State.

--Three percent shall be available to the Secretary of Agriculture for administering the act.

The act also provides that any amount exceeding $90,000 available for allotment to any State, exclusive of the regional research fund, shall be matched by the State out of its own funds for research and for the establishment and maintenance of facilities necessary for the performance of such research.

Average yearly Hatch Act funds allocated to each State and region for fiscal years 1978 through 1982 are shown in appendix IV. The largest amount of funding (35 percent) was allocated to the Southern Region, and the smallest amount (17 percent) was allocated to the Western Region. Thirty percent of the Hatch Act funds was allocated to the North Central Region and 18 percent to the Northeastern Region. Allocations to the States were obviously greatly influenced by farm and rural population and varied widely among the States; each of seven States (two each in the Southern and Northeastern, and three in the North

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[1]American Samoa and Micronesia began receiving Hatch Act funds in 1981. Each has received only limited amounts of Hatch Act funding, and they have not been included in our analysis.

[2]The Hatch Act and supplementary laws relating thereto were consolidated under the Agriculture Experiment Stations Act of August 11, 1955.

Central Region) received more than 3 percent of the funds. At the other end of the scale, the District of Columbia received about one-tenth of 1 percent of the funds.

1890 school formula funds

Modest Federal research funding was first provided to the 1890 schools under Public Law 89-106, passed in 1965. The first funding was for $283,000 in fiscal year 1967. Funding remained relatively modest until fiscal year 1972, when $8.9 million was provided. Permanent formula funding for research at these schools was provided under Section 1445 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (Pub. L. 95-113).

Public Law 95-113, as amended, provides for support of continuing agricultural research at colleges eligible to receive funds under the act of August 30, 1890 (which established black land-grant colleges), including Tuskegee Institute. The act provides that, beginning with fiscal year 1979, appropriated funding for each fiscal year shall not be less than 15 percent of the total for such year under Section 3 of the Hatch Act. Distribution of payments made available under the 1965 act for fiscal year 1978 is at a fixed base, and sums in excess of the 1978 level shall be distributed as follows:

--Three percent shall be available to the Secretary of Agriculture for administration of the act. Of the remaining funds:

  --20 percent shall be allotted equally to each State;

  --40 percent shall be allotted in an amount proportionate to the rural population of the State in which the eligible institution is located, compared with the total rural population of all the States in which eligible institutions are located; and

  --40 percent shall be allotted in an amount proportionate to the farm population of the State in which the eligible institution is located, compared with the total farm population of all the States in which eligible institutions are located.

Sixteen States each have an 1890 land-grant institution. In 1 of the 16 States, Alabama, two institutions--Alabama A&M and Tuskegee Institute--receive 1890 formula funds as if each institution were in a separate State.

Average yearly funds allocated to 1890 schools by State and region for fiscal years 1978 through 1982 is shown in appendix V. Because the 1890 schools are primarily located in the Southern Region, the bulk of the funding for the program is allocated within this region.

In addition, the Agriculture and Food Act of 1981 (Pub. L. 97-98) authorized $50 million in funds for grants over a 5-year period for the 1890 schools and Tuskegee Institute to acquire and improve research facilities and equipment. The first funding for facilities ($10 million) was appropriated in fiscal year 1983, and is not included in our analysis.

Animal health and disease research

Section 1433 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 provides for support of livestock and poultry disease research in colleges of veterinary medicine and in eligible State agricultural experiment stations. Funds are distributed as follows:

--Forty-eight percent shall be distributed in an amount proportionate to the value of and income to producers from domestic livestock and poultry in each State, compared with the total value of and income to producers from domestic livestock and poultry in all the States.

--Forty-eight percent shall be distributed in an amount proportionate to the animal health research capacity of the eligible institutions in each State, compared with the total animal health research capacity in all the States.

--Four percent shall be retained by the Department of Agriculture for administration, program assistance to the eligible institutions, and program coordination.

Eligible institutions must provide non-Federal matching funds in States receiving annual amounts in excess of $100,000 under this authorization.

Funds were first appropriated for this program in fiscal year 1979. Average yearly animal health and disease program funds allocated to each State and region for fiscal years 1978 through 1982 are shown in appendix VI. The largest amount of funding (37 percent) was allocated to the North Central Region, and the smallest amount (12 percent) to the Northeastern Region. Twenty-nine percent of the funds was allocated to the Southern Region, and 22 percent to the Western Region. Funding varied widely by State; of the four States receiving the most funds, one came from each of the four regions.

Special Research Grants Program

The Special Research Grants Program began in 1965 with enactment of the Special Research Grants Act, Public Law 89-106. Section 2 of the Special Research Grants Act, as amended, authorizes Special Research Grants for periods not to exceed 5 years to land-grant colleges and universities, State

agricultural experiment stations, research foundations established by land-grant colleges and universities, and to all colleges and universities having a demonstrable capacity in food and agricultural research to further the programs of the Department of Agriculture.

The Special Research Grants Program was established with two objectives. One was to initiate research in promising areas of food and agricultural science. The second was to expand ongoing State-Federal research programs. Special Research Grants are awarded on a discretionary basis as well as through a competitive peer-panel process in the selection of proposals to be funded. The Congress often recommends specific research areas to be funded in the Appropriation Acts.

Average yearly special Research Grant funds awarded within each State and region for fiscal years 1978 through 1982 are shown in appendix VII. The largest amount of grants (30 percent) went to the North Central Region, and the smallest (16 percent) to the Northeastern Region. Twenty-eight percent of the special grants was awarded within the Southern Region, and 26 percent within the Western Region. Funding varied widely by State; the four States receiving the most funding came from each of the four regions. At the other end of the scale was the District of Columbia, which received no funding.

Competitive Research Grants

The National Agricultural Research, Extension, and Teaching Policy Act of 1977 amended the Special Research Grants Act of 1965 and divided the grants program into two parts: the Special Research Grants Program, open only to those with a demonstrated capacity in agricultural research as described above, and a new Competitive Grants Program to focus on high-priority research and open to all researchers.

Section 2 of the Special Research Grants Act of 1965, as amended, authorizes Competitive Grants for periods not to exceed 5 years to State Agricultural Experiment Stations, all colleges and universities, other research institutions and organizations, Federal agencies, private organizations or corporations, and individuals to further the programs of the Department of Agriculture. By obtaining the participation of outstanding researchers in the entire U.S. scientific community, emphasis is to be placed on basic research critical to food production and human nutrition including biological stress of plants, genetic mechanisms of plants, plant nitrogen fixation, plant photosynthesis, animal science, and human nutrient requirements.

The Competitive Grants Program was begun in fiscal year 1978. About 64 percent of the grants have gone to land-grant institutions, and the remaining 36 percent to universities and others outside the land-grant system.

Average yearly competitive grant funds awarded within each State and region for fiscal years 1978 through 1982 are shown in appendix VIII. The largest amount of funds (36 percent) went to the North Central Region, and the smallest amount (17 percent) went to the Southern Region. Twenty-four percent of the competitive grants was awarded within the Northeastern Region, and 23 percent within the Western Region. Funding varied widely among the States, with California receiving more than 12 percent of the funds and 6 of the top 10 States being from the North Central Region. No grants were awarded within three States in the Northeastern Region.

THE FEDERAL GOVERNMENT ALSO FUNDS AGRICULTURAL RESEARCH THROUGH OTHER FEDERAL AGENCIES

In addition to the funding provided through USDA, the Federal Government supports agricultural-related research through other Federal agencies. We did not analyze the source and distribution of Federal funds for agricultural-related research allocations through other agencies. However, according to a February 1983 report by the National Agricultural Research and Extension Users Advisory Board,[3] at least 14 agencies outside the Department of Agriculture are authorized to award grants for research that is in some way related to food and agriculture. For example, the National Science Foundation expects to fund about $43 million in projects on basic plant science research during fiscal year 1983. According to the Users Advisory Board, State agriculture experiment stations received about $78 million in funds from non-USDA sources in 1981. Seven (California, Colorado, New York, Wisconsin, Indiana, Florida, and Oregon) of the State Agricultural Experiment Stations received about 60 percent of those funds.

STATE SUPPORT OF AGRICULTURAL RESEARCH

The States appropriate funds for agricultural research to the State Agricultural Experiment Stations. As appendix IX shows, State appropriations vary significantly among the States. In fiscal year 1981, the last year for which complete State appropriations data were available, of the total State appropriations for agricultural research, the Southern Region appropriated the largest portion (39 percent) of the total, while the Northeastern Region appropriated the smallest portion (10 percent). Twenty-six percent of the State agricultural research funds was appropriated by the Western Region and 25 percent by the North Central Region. Appropriations also varied

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[3]The National Agricultural Research and Extension Users Advisory Board is a committee established by Section 1408 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (7 U.S.C. 3123) to provide independent advisory opinions on the food and agricultural sciences.

widely by State; California led the way by appropriating over 12 percent of the funds.

As appendix X shows, on the average, the ratio of State appropriations to Hatch Act funds received was about 4 to 1. This ratio also varied by region, with the Western Region having the highest ratio (6.2 to 1) and the Northeastern the smallest (2.4 to 1). The Southern region's ratio was 4.5 to 1 and the North Central's 3.4 to 1. Two States stood out in their support of research related to Hatch Act funds received. They are Florida and California, both of which had ratios of State appropriations to Hatch Act funds received of over 16 to 1.

Appendix XI graphically shows State and Federal funds spent on agricultural research for each of the four regions, and appendix XII shows average yearly Federal and State funding by region for fiscal years 1978-82.

PRIVATE SUPPORT OF AGRICULTURAL RESEARCH

Data on expenditures for agricultural research by private industry are very limited. Dr. Joseph Havlicek, Jr., author of the study entitled "Historical Analysis of Investment in Food and Agricultural Research in the United States," which was prepared for the Office of Technology Assessment, told us that, except for the large firms, an accurate picture of what businesses are funding agricultural research is not available. Furthermore, because of the proprietary nature of the data for those firms doing research, an accurate picture of how much they are doing is not available. He also said that even when dollar estimates of a firm's research expenditures exists, one must look closely at the data to determine what portion is really research and what is market development. For example, although accounted for as research and development funds, industry expenditures may include such things as market surveys and initial advertising.

Various studies have estimated different amounts for private industry agricultural research. In its February 1983 report, the Users Advisory Board estimates such expenditures to be about $750 million in fiscal year 1981, while USDA, in its February 1983 "Agricultural Research Service Program Plan," estimated spending for such research to be about $2.5 billion in 1983.

SUMMARY OBSERVATIONS

Funds for agricultural research are distributed in various ways. Data show that regional distribution of agricultural research funds varies widely depending on the program. Although the largest percentage of ARS funds is spent in the Southern Region and the largest amount of Hatch Act funds is allocated to the Southern Region, the North Central Region has received the

largest amount of special and competitive grant funds. Funding by the States also varies widely; Southern States support agricultural research with State funds to a greater degree than the other regions.

Funds might shift among regions if certain programs received more or less emphasis. For example, on the basis of past trends, an additional percentage of the funding would be received by the North Central Region if funding of the Competitive Grants program increased relative to other programs.

AGENCY COMMENTS

USDA officials said that our report accurately reflects the agricultural research funding situation.

CHAPTER 3

VIEWS ON WHETHER FEDERAL FUNDING ALLOCATION PROCEDURES SHOULD BE CHANGED

Land-grant university officials have been aware of the regional differences in location of ARS research facilities and allocation of ARS research funds; however, this was generally not a matter which they commented on. Rather, officials have addressed issues related to Federal funding allocated to the States through CSRS.

Land-grant university officials indicated general opposition to any change in the Hatch Act formula allocation process. However, if a change were considered, several allocation approaches were suggested for consideration, none of which have been studied extensively. They also stated that the impact of any proposed change must be carefully considered.

Land-grant university officials depend on formula funds and grants for their schools' research programs. If additional money becomes available, the majority of the officials we talked to said that they would like Hatch Act money increased enough to maintain pace with inflation and the balance used for competitive grants.

VIEWS ON ALLOCATION OF ARS FUNDS

Although most land-grant officials did not comment on the issue that all regions did not receive equal amounts of ARS research funds, those who did comment generally talked about the good working relationship they had with ARS or the advantages of ARS facilities being located close to a State experiment station. The Director-at-Large of the North Central Association of Agricultural Experiment Station Directors said that he believed his region did not have its "fair share" of ARS facilities but did not know what a "fair share" would be. On the other hand, the Director-at-Large from the Southern Region commented that the concentration of ARS facilities in the South may be appropriate because the Southern States raise a large number of different commodities, and its climate is conducive to many insect and disease problems.

ARS officials told us that funding decisions are made on the basis of research priorities without regard to geographic boundaries. However, they said that since the funds go to areas where the ARS facilities are located, laboratory locations tend to skew allocation statistics. The location of the facilities is, in turn, influenced by geopolitical considerations.

ARS has developed a strategic plan, the "Agriculture Research Service Program Plan," to use as a basis for future research management. ARS officials told us that the

implementation and operational plans that support the strategic plan will be used as the basis to allocate ARS funds to research projects and could affect the regional distribution of ARS funds as well as the use of ARS facilities.

VIEWS ON ALLOCATION BASIS

The land-grant university officials were generally opposed to any changes in the allocation of CSRS agricultural research funds. They said the allocation was generally fair in its present form because it provides some money for everybody. Some officials expressed concern that if the allocation process were considered for change, the resultant political debate could be detrimental to the entire system and could possibly result in less funding for their States. If, however, some change were to be made, the majority of the land-grant officials we talked to indicated that basing the allocation primarily on the value of production (farm cash receipts) as suggested by Hodgson would not be valid in that cash receipts have no direct relation to research needs. Furthermore, they said the use of cash receipts would tend to reward wealthy agriculture States.

The land-grant officials we interviewed mentioned numerous other bases that might also be considered if an allocation change were to be made. These included the number of acres under production, value of commodities produced combined with investment required for production, amount of State funding, number of scientist graduates, number of commodities produced, the extent to which research in a State benefits areas outside the State (spillover effect), and the estimated value added to agriculture commodities as a result of the research. The land-grant officials had not determined how these factors would be used in the allocation process nor the precise impact on amount of funds received by their State. Also, they did not seem very enthused about any of the above.

Regardless of possible allocation factors mentioned, land-grant officials said that if a change were to be made, a combination of allocation factors should be considered in the formula. Some of the present factors might be retained, while others might be added. They also suggested that any change should apply only to new funds, and the allocation basis must be easily measured. Furthermore, any basis which would require annual data generation should be avoided since it would increase the program's administrative burdens. In general, they said that the impact any proposed change would have should be carefully analyzed by policymakers before implementation.

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Various individuals and groups have addressed the agricultural research funding allocation issue in studies.

The use of farm cash receipts as an allocation basis was addressed by Thomas S. Ronningen, Director-at-Large of the Northeast Association of Agricultural Experiment Station Directors. He analyzed the impact of a Hatch Act formula based on cash farm receipts. His analysis looked at the impact on the 10 States gaining the most and 10 losing the most. It showed that the gainers had only a 0.4- to 3.8-percent change in funds received, while the losers had a 2.8- to 13.3-percent change. The gainers were primarily in the North Central Region, while the losers were primarily in the Northeastern Region. The author raised the concern, also expressed by others, that such significant reductions in funding, as would be experienced by the losers, could reduce the incentive of these States to support agricultural research.

Dr. A.D. Seale, Jr., of Mississippi State University, also stressed the need to carefully analyze the impacts of any change in the allocation formula. In commenting on alternate proposals, he said that including the value of agricultural production in an allocation formula would generally shift research funds from States in the Northeast, West and, to some extent, from the South to States in the North Central Region, California, and Texas. He suggested, however, that before considering any new formula, it would be appropriate to look at the extent to which States support their research programs. He analyzed the relationship of non-Federal research funds to three common factors: (1) support per acre in farms, (2) support per unit value of agricultural production, and (3) Federal support to the State experiment stations. The table below demonstrates the impact of these different factors:

Relationship of Non-Federal Research Funds Received by Land-Grant Institutions to Acres, Value of Farm Production, and Federal Support by Regions, 1979

Region	Non-Federal funds per acre in farms	Non-Federal funds per $1,000 value of farm products	Non-Federal funds per dollar of Federal funds
Northeastern	$1.77	$6.50	$1.55
North Central	.41	2.44	2.35
Southern	.59	4.76	2.25
Western	.36	4.09	2.24
U.S.	.49	3.69	2.16

His analysis shows that although the Northeastern Region is lowest in non-Federal funds per dollar of Federal funds received, it spent the highest amount of non-Federal research funds per unit value of farm production. In contrast, in the North Central Region, although support per dollar of Federal funds is slightly above the U.S. average, non-Federal support per unit value of farm production is considerably below that of other regions.

In a 1982 study, Dr. J.C. Purcell of the University of Georgia, Dr. B.R. Eddleman of Mississippi State University, and J.J. Kunz of CSRS provided information on production-related agricultural research in the land-grant universities and ARS relative to value added in the farm sector as a result of the research. Although no prescribed formula exists as to the proportion of wealth created that could or should be invested in research, development, and education, the study revealed that land-grant university research expenditures are not closely correlated with values created by agricultural activities. Nationally, slightly less than 1 percent of value added by agricultural production activities is invested in agricultural research. On a regional basis, this varies from a low of about 0.6 percent in the North Central Region to a high of 3.1 percent in the Northeastern Region.

This same study examined the relationship of value added to U.S. agriculture as a result of research expenditures related to improving production. The study used 1979 data, and considered State agricultural experiment station and ARS expenditures. The table below shows the value added by source:

SAES and ARS Expenditures per $1,000 of Value Added by Source

Region	Federal	Non-Federal	Total research
North Central	$ 2.65	$3.23	$ 5.88
Western	6.44	6.97	13.41
Southern	6.41	7.49	13.90
Northeastern	21.56	9.10	30.66
National total	5.49	5.38	10.87

This table shows that for each $1,000 value added in the North Central Region, only $2.65 in Federal funds was expended. In contrast, in the Northeastern Region, for each $1,000 value added, $21.56 in Federal funds was expended.

The study does not infer that value added or created in the farm sector is attributed wholly or partially to land-grant or ARS research. However, it indicates that these factors might be considered when looking at ways to place research money.

In a 1982 paper, Dr. B.R. Eddleman said that the matching grant formula could be based on the relative importance of external (spillover) to internal benefits. Spillover is where research financed by one geographic entity benefits residents of other entities without any compensation to the research organization. The ratio of spillovers to internal benefits could be used to determine the basis for allocating the Federal Government's agriculture research funds. Under this scheme, the Federal Government would match State appropriations for agricultural research that had spillover effects to other States. To

do so would require identification and quantification of benefits and spillovers.

VIEWS ON HATCH FORMULA AND COMPETITIVE GRANTS AS FUNDING MECHANISMS

Land-grant university officials generally had favorable comments about Hatch Act formula funds and competitive grants. Both approaches to funding have advantages and disadvantages.

Hatch Act formula funds

Land-grant officials told us that Hatch Act formula funds provide the basic institutional support for agricultural research activities. Such funds provide long-term and stable research funding and flexibility for institutions to perform research they think should be done. They also said formula funds provide an important link for the State/Federal research partnership in agricultural research. A disadvantage of formula funding, from a Federal perspective, is that the Federal Government has less say over the research work.

Competitive grants

Land-grant officials told us the competitive grant funds are used to supplement the research programs funded by the Federal formula and State and private funds. These grants are especially important for bolstering basic research. Officials said that such grants help bring scientists into the agriculture research area from schools outside the land-grant system. They also saw competitive grants as providing a means to target funds toward high-priority agricultural research areas.

Although land-grant officials generally had favorable comments on competitive grants, several individuals suggested the need to expand the program to include other disciplines, especially animal research. One official was critical of the competitive grants program, stating that the time spent by scientists preparing applications was wasted if the application was not approved. Two others saw the application process as beneficial, even to someone who was not awarded a grant, because it required the scientist to plan his project carefully. Some officials in smaller universities said they could not compete successfully with the larger institutions. They said larger universities had a better chance of receiving grants since they had well-established research capabilities.

VIEWS ON 1890 LAND-GRANT FUNDING

As mentioned earlier, we met with officials of three 1890 institutions during the course of our work. Generally, we observed that the 1890 institutions were much behind the 1862 institutions in research capability and facilities.

The 1890 school issue is socio-economic in nature. These schools have historically received only limited public funds for agricultural research programs. In each State where an 1890 school is located, there is an 1862 school which is much larger and which also has a system of experiment stations. A concern of several 1862 school officials was that if each of the 1890 schools' experiment stations were to be fully developed, some States would, in effect, have complete dual land-grant university research programs.

The 1890 school officials we interviewed did not favor changing either the Hatch Act formula or 1890 school allocation formulas. They liked the present formulas because they are weighted in favor of schools whose clients are rural citizens and small farmers.

Several 1890 school officials, however, were concerned that they cannot compete for competitive grants as successfully as the larger schools. One 1890 official said the competitive grant program allows the rich to get richer. One official suggested a need for collaborative grants under which an 1890 school and an 1862 school could work together on a grant.

SUMMARY OBSERVATIONS

Land-grant university officials generally did not comment on allocation of research funds within ARS. Rather, they addressed issues related to Federal funding allocated to the States through CSRS.

Land-grant university officials do not favor change in the Hatch Act formula. However, if an allocation change is considered, land-grant university officials suggested numerous bases that might be studied. They cautioned, however, that the impact of any proposed allocation change must be carefully analyzed, and any revised allocation formula should apply to new funds only and should be based on factors that are easily measured.

Land-grant university officials had favorable comments about both formula funds and competitive grants. If additional funds become available, land-grant university officials generally would like part of the increase to be placed in Hatch Act formula funds to allow these funds to keep up with inflation and the balance to go to competitive grants.

AGENCY COMMENTS

USDA officials said the views of land-grant university officials presented in our report are consistent with feedback USDA has received.

LAND-GRANT INSTITUTIONS WE VISITED

NORTH CENTRAL REGION

Iowa State University, Ames, Ia.
North Dakota State University, Fargo, N.Dak.
Purdue University, West Lafayette, Ind.
University of Minnesota, St. Paul, Minn.
University of Wisconsin, Madison, Wis.

NORTHEASTERN REGION

Delaware State College,[a] Dover, Del.
Pennsylvania State University, University Park, Pa.
University of Delaware, Newark, Del.
University of Massachusetts, Amherst, Mass.

SOUTHERN REGION

Florida A&M University,[a] Tallahassee, Fla.
Mississippi State University, Starkville, Miss.
North Carolina A&T State University,[a] Greensboro, N.C.
North Carolina State University, Raleigh, N.C.
University of Florida, Gainesville, Fla.

WESTERN REGION

Montana State University, Bozeman, Mont.
University of California, Davis, Calif.
University of Wyoming, Laramie, Wyo.

[a]An 1890 institution.

RANKING OF TOTAL FEDERAL AGRICULTURAL RESEARCH FUNDS RECEIVED BY STATE AND REGION (YEARLY AVERAGE DURING THE PERIOD FY 1978 THROUGH FY 1982)[a]

Rank	State	Yearly average amount received (000 omitted)	Percent of total
1	Maryland	$64,731	12.97
2	California	34,837	6.98
3	Texas	28,630	5.74
4	Louisiana	24,858	4.98
5	Illinois	24,458	4.90
6	Georgia	22,544	4.52
7	New York	19,529	3.91
8	Pennsylvania	18,143	3.64
9	Iowa	16,979	3.40
10	Mississippi	16,401	3.29
11	Florida	14,663	2.94
12	North Dakota	11,908	2.39
13	North Carolina	11,171	2.24
14	Nebraska	10,495	2.10
15	Washington	10,147	2.03
16	Colorado	8,625	1.73
17	Missouri	8,542	1.71
18	Arizona	8,444	1.69
19	Ohio	7,888	1.58
20	Minnesota	7,679	1.54
21	South Carolina	7,399	1.48
22	Oklahoma	7,397	1.48
23	Michigan	7,392	1.48
24	Alabama	7,329	1.47
25	Wisconsin	6,995	1.40
26	Indiana	6,631	1.33
27	Tennessee	5,845	1.17
28	Oregon	5,793	1.16
29	Kentucky	5,741	1.15
30	Kansas	5,673	1.14
31	Idaho	5,579	1.12
32	Virginia	4,978	1.00
33	Massachusetts	4,969	1.00
34	Arkansas	4,346	.87
35	Puerto Rico	4,226	.85
36	Montana	4,173	.84
37	West Virginia	3,759	.75

[a]Includes Hatch Act funds, Competitive grants, special grants, 1890 school funds, animal health and disease research funds, and ARS funds. All funds are averaged over the 5-year period; that includes the animal health and disease research program which was funded only 4 of the 5 years.

Rank	State	Yearly average amount received (000 omitted)	Percent of total
38	Utah	$ 3,720	0.75
39	South Dakota	3,250	.65
40	New Mexico	2,773	.56
41	Hawaii	2,723	.55
42	New Jersey	2,692	.54
43	Wyoming	2,127	.43
44	Delaware	2,101	.42
45	Maine	1,788	.36
46	Nevada	1,510	.30
47	Alaska	1,396	.28
48	Connecticut	1,383	.28
49	Vermont	1,114	.22
50	New Hampshire	1,009	.20
51	Rhode Island	1,003	.20
52	Virgin Islands	543	.11
53	Guam	475	.09
54	Washington, D.C.	441	.09
	Total	$498,915	100.00

Summary by Region

Region	Yearly average amount received (000 omitted)	Percent of total
Southern	$166,071	33
Northeastern	122,662	25
North Central	117,890	24
Western	92,292	18
Total	$498,915	100

RANKING OF ARS FUNDS RECEIVED BY STATE AND REGION

(YEARLY AVERAGE DURING THE PERIOD FY 1978 THROUGH FY 1982)[a]

Rank	State	Yearly average amount received (000 omitted)	Percent of total
1	Maryland[b]	$61,819	18.70
2	California	28,199	8.53
3	Louisiana	21,420	6.48
4	Texas	20,571	6.22
5	Illinois	19,392	5.86
6	Georgia	17,556	5.31
7	New York	13,527	4.09
8	Pennsylvania	13,077	3.95
9	Iowa	12,110	3.66
10	Mississippi	12,063	3.65
11	Florida	11,208	3.39
12	North Dakota	10,077	3.05
13	Nebraska	7,674	2.32
14	Washington	6,721	2.03
15	Arizona	6,505	1.97
16	Colorado	6,111	1.85
17	North Carolina	4,450	1.35
18	Oklahoma	4,155	1.26
19	South Carolina	4,151	1.26
20	Idaho	3,722	1.13
21	Minnesota	3,429	1.04
22	Missouri	3,281	.99
23	Kansas	2,865	.87
24	Oregon	2,834	.86
25	Montana	2,596	.79
26	Ohio	2,593	.78
27	Michigan	2,553	.77
28	Massachusetts	2,468	.75
29	Wisconsin	2,463	.74
30	Indiana	2,319	.70
31	Utah	2,226	.67
32	Alabama	2,037	.62
33	West Virginia	1,886	.57
34	Hawaii	1,756	.53
35	South Dakota	1,431	.43
36	New Mexico	1,219	.37

[a]Does not include ARS Headquarters Program Staff, which is located in the District of Columbia.

[b]Includes Beltsville National Research Laboratory, which was funded at a yearly average of $56,898,344. If Beltsville were excluded, the Maryland total would be $4,921,091, and Maryland would be 16th on the list.

Rank	State	Yearly average amount received (000 omitted)	Percent of total
37	Puerto Rico	$ 1,178	0.36
38	Tennessee	999	.30
39	Wyoming	968	.29
40	Kentucky	796	.24
41	Delaware	743	.22
42	Arkansas	636	.19
43	Virginia	626	.19
44	Nevada	609	.18
45	Alaska	559	.17
46	Maine	461	.14
47	New Jersey	316	.10
48	Virgin Islands	276	.08
49	Connecticut	0	-
50	New Hampshire	0	-
51	Rhode Island	0	-
52	Vermont	0	-
53	Guam	0	-
54	Washington, D.C.	0	-
	Total	$330,631	100.00

Summary by Region

Region	Yearly average amount received (000 omitted)	Percent of total
Southern	$102,122	31
Northeastern[c]	94,297	29
North Central	70,187	21
Western	64,025	19
Total	$330,631	100

[c]Includes Beltsville. If Beltsville were excluded, the regional total would be $37,398,831.

RANKING OF HATCH ACT FUNDS RECEIVED BY STATE AND REGION

(YEARLY AVERAGE DURING THE PERIOD FY 1978 THROUGH FY 1982)[a]

Rank	State	Yearly average amount received (000 omitted)	Percent of total
1	North Carolina	$4,427	3.81
2	Texas	4,222	3.63
3	Pennsylvania	4,030	3.47
4	Ohio	3,818	3.28
5	Iowa	3,690	3.17
6	New York	3,636	3.13
7	Illinois	3,571	3.07
8	California	3,436	2.95
9	Wisconsin	3,311	2.85
10	Kentucky	3,289	2.83
11	Michigan	3,283	2.82
12	Tennessee	3,254	2.80
13	Indiana	3,239	2.79
14	Minnesota	3,202	2.75
15	Georgia	3,135	2.70
16	Missouri	3,056	2.63
17	Puerto Rico	3,021	2.60
18	Mississippi	2,935	2.52
19	Virginia	2,832	2.44
20	Alabama	2,753	2.37
21	South Carolina	2,372	2.04
22	Arkansas	2,352	2.02
23	Washington	2,295	1.97
24	Kansas	2,277	1.96
25	Louisiana	2,189	1.88
26	Nebraska	2,177	1.87
27	Oklahoma	2,066	1.78
28	Florida	1,925	1.66
29	Oregon	1,872	1.61
30	West Virginia	1,842	1.58
31	New Jersey	1,739	1.50
32	Colorado	1,725	1.48
33	Maryland	1,674	1.44
34	South Dakota	1,618	1.39
35	North Dakota	1,591	1.37
36	Massachusetts	1,505	1.29
37	Idaho	1,398	1.20
38	Montana	1,394	1.20
39	Arizona	1,315	1.13
40	Connecticut	1,249	1.07
41	Maine	1,242	1.07
42	Utah	1,201	1.03

[a]Does not include American Samoa and Micronesia, which began receiving Hatch Act funds in 1981.

Rank	State	Yearly average amount received (000 omitted)	Percent of total
43	New Mexico	$ 1,107	0.95
44	Wyoming	1,053	.91
45	Vermont	984	.85
46	New Hampshire	967	.83
47	Hawaii	903	.78
48	Delaware	888	.76
49	Rhode Island	848	.73
50	Nevada	831	.71
51	Alaska	690	.59
52	Guam	471	.40
53	Virgin Islands	262	.23
54	Washington, D.C.	132	.11
	Total	$116,294	100.00

Regional Summary

Region	Yearly average amount received (000 omitted)	Percent of total
Southern	41,034	35
North Central	$ 34,833	30
Northeastern	20,736	18
Western	19,691	17
Total	$116,294	100

RANKING OF 1890 FUNDING RECEIVED BY STATE AND REGION

(YEARLY AVERAGE DURING THE PERIOD FY 1978 THROUGH FY 1982)[a]

Rank	State	Yearly average amount received	Percent of total
		(000 omitted)	
1	Alabama[b]	$ 2,120	12.55
2	North Carolina	1,555	9.21
3	Texas	1,543	9.13
4	Kentucky	1,224	7.25
5	Tennessee	1,182	7.00
6	Georgia	1,137	6.73
7	Missouri	1,128	6.68
8	Virginia	1,038	6.14
9	Mississippi	997	5.90
10	Arkansas	916	5.42
11	Louisiana	824	4.88
12	Oklahoma	812	4.81
13	South Carolina	725	4.29
14	Florida	705	4.17
15	Maryland	610	3.61
16	Delaware	377	2.23
	Total	$16,893	100.00

Summary by Region

Region	Yearly average amount received	Percent of total
	(000 omitted)	
Southern	$14,778	87
North Central	1,128	7
Northeastern	987	6
Western	0	0
Total	$16,893	100

[a]Does not include grants to upgrade 1890 research facilities which would first be allocated in FY 1983.

[b]Alabama is the only State that includes two schools--Alabama A&M and Tuskegee Institute.

RANKING OF ANIMAL HEALTH AND DISEASE RESEARCH FUNDS RECEIVED BY STATE AND REGION

(YEARLY AVERAGE DURING THE PERIOD FY 78 THROUGH FY 82)[a]

Rank	State	Yearly average amount received (000 omitted)	Percent of total
1	Texas	$313	7.01
2	California	270	6.05
3	Iowa	266	5.96
4	New York	186	4.16
5	Colorado	179	4.01
6	Wisconsin	171	3.83
7	Minnesota	161	3.61
8	Illinois	150	3.36
9	Kansas	149	3.34
10	Nebraska	143	3.20
11	Georgia	137	3.07
12	Missouri	130	2.91
13	Pennsylvania	119	2.66
14	Oklahoma	116	2.60
15	Ohio	116	2.60
16	Alabama	115	2.57
17	Michigan	109	2.44
18	Washington	106	2.37
19	Indiana	101	2.26
20	North Carolina	94	2.10
21	South Dakota	91	2.04
22	Oregon	89	1.99
23	Louisiana	89	1.99
24	Florida	82	1.84
25	Kentucky	80	1.79
26	Montana	80	1.79
27	Idaho	75	1.68
28	Virginia	68	1.52
29	Arkansas	65	1.46
30	Maryland	60	1.34
31	Tennessee	59	1.32
32	Mississippi	58	1.30
33	Arizona	51	1.14
34	North Dakota	51	1.14
35	Utah	42	.94
36	Wyoming	38	.85
37	New Mexico	37	.83
38	Massachusetts	29	.65
39	New Jersey	23	.51
40	Nevada	23	.51
41	South Carolina	21	.47

[a]Program has only been in effect for 4 years (1979-82).

Rank	State	Yearly average amount received (000 omitted)	Percent of total
42	Maine	$ 18	0.40
43	West Virginia	16	.36
44	Vermont	15	.34
45	Connecticut	13	.29
46	New Hampshire	12	.27
47	Delaware	12	.27
48	Puerto Rico	12	.27
49	Rhode Island	11	.25
50	Alaska	8	.18
51	Hawaii	7	.16
52	Washington, D.C.	0	-
53	Virgin Islands	0	-
54	Guam	0	-
	Total	$4,466	100.00

Regional Summary

Region	Yearly average amount received (000 omitted)	Percent of total
North Central	$1,638	37
Southern	1,309	29
Western	1,005	22
Northeastern	514	12
Total	$4,466	100

RANKING OF SPECIAL RESEARCH GRANT FUNDS

RECEIVED BY STATE AND REGION

(YEARLY AVERAGE DURING THE PERIOD FY 1978 THROUGH FY 1982)

Rank	State	Yearly average amount received (000 omitted)	Percent of total
1	Texas	$ 1,584	10.18
2	California	1,121	7.20
3	New York	881	5.66
4	Ohio	736	4.73
5	Michigan	707	4.54
6	Pennsylvania	664	4.27
7	Iowa	595	3.82
8	Oregon	578	3.71
9	Washington	539	3.46
10	Indiana	470	3.02
11	Wisconsin	437	2.81
12	New Jersey	433	2.78
13	Arizona	413	2.65
14	Minnesota	401	2.58
15	Missouri	396	2.54
16	New Mexico	390	2.51
17	Colorado	383	2.46
18	Florida	360	2.31
19	Georgia	349	2.24
20	Idaho	337	2.17
21	Arkansas	329	2.11
22	Illinois	305	1.96
23	Mississippi	273	1.75
24	Alabama	268	1.72
25	Nebraska	246	1.58
26	North Carolina	246	1.58
27	Louisiana	221	1.42
28	Kansas	186	1.20
29	Tennessee	167	1.07
30	Virginia	164	1.05
31	Kentucky	152	.98
32	Alaska	139	.89
33	Oklahoma	128	.82
34	Massachusetts	82	.53
35	South Carolina	77	.50
36	Rhode Island	75	.48
37	South Dakota	74	.48
38	Maryland	69	.44
39	Montana	69	.44
40	North Dakota	68	.44
41	Maine	67	.43
42	Utah	62	.40
43	Delaware	61	.39

Rank	State	Yearly average amount received (000 omitted)	Percent of total
44	Wyoming	$ 53	0.34
45	Hawaii	45	.29
46	Connecticut	42	.27
47	Vermont	32	.21
48	New Hampshire	30	.19
49	Nevada	21	.14
50	West Virginia	15	.10
51	Puerto Rico	15	.10
52	Virgin Islands	5	.03
53	Guam	4	.03
54	Washington, D.C.	0	-
Total		$15,564	100.00

Regional Summary

Region	Yearly average amount received (000 omitted)	Percent of total
North Central	$ 4,621	30
Southern	4,338	28
Western	4,154	26
Northeastern	2,451	16
Total	$15,564	100

RANKING OF COMPETITIVE GRANT FUNDS RECEIVED BY STATE AND REGION

(YEARLY AVERAGE DURING THE PERIOD FY 1978 THROUGH FY 1982)

Rank	State	Yearly average amount received (000 omitted)	Percent of total
1	California	$1,811	12.02
2	New York	1,299	8.62
3	Illinois	1,040	6.90
4	Massachusetts	885	5.87
5	Michigan	740	4.91
6	Ohio	625	4.15
7	Wisconsin	613	4.07
8	Missouri	551	3.66
9	Indiana	502	3.33
10	Maryland	499	3.31
11	Washington	486	3.23
12	Minnesota	486	3.23
13	Oregon	420	2.79
14	North Carolina	399	2.65
15	Texas	397	2.64
16	Florida	383	2.54
17	Iowa	318	2.11
18	Washington, D.C.	309	2.05
19	Nebraska	255	1.69
20	Pennsylvania	253	1.68
21	Virginia	250	1.66
22	Georgia	230	1.53
23	Colorado	227	1.51
24	Kentucky	200	1.33
25	Kansas	196	1.30
26	Utah	189	1.25
27	Tennessee	184	1.22
28	New Jersey	181	1.20
29	Arizona	130	.86
30	North Dakota	121	.80
31	Oklahoma	120	.80
32	Louisiana	115	.76
33	Vermont	83	.55
34	Connecticut	79	.52
35	Mississippi	75	.50
36	Rhode Island	69	.46
37	South Carolina	53	.35
38	Arkansas	48	.32
39	Idaho	47	.31
40	Alabama	36	.24
41	South Dakota	36	.24
42	Montana	34	.23
43	Nevada	26	.17
44	New Mexico	20	.13
45	Delaware	20	.13

Rank	State	Yearly average amount received (000 omitted)	Percent of total
46	Wyoming	$ 15	0.10
47	Hawaii	12	.08
48	Puerto Rico	0	-
49	Virgin Islands	0	-
50	Alaska	0	-
51	Maine	0	-
52	New Hampshire	0	-
53	West Virginia	0	-
54	Guam	0	-
	Total	$15,067	100.00

Regional Summary

Region	Yearly average amount received (000 omitted)	Percent of total
North Central	$ 5,483	36
Northeastern	3,677	24
Western	3,417	23
Southern	2,490	17
Total	$15,067	100

RANKING OF STATE APPROPRIATIONS TO STATE AGRICULTURAL EXPERIMENT STATIONS BY STATE AND REGION, 1981[a]

Rank	State	1981 State appropriation (000 omitted)	Percent of total
1	California	$61,600	12.29
2	Florida	34,570	6.90
3	North Carolina	22,149	4.42
4	Georgia	21,378	4.27
5	Texas	20,933	4.18
6	New York	19,396	3.87
7	Minnesota	18,386	3.67
8	Louisiana	17,552	3.50
9	Ohio	13,757	2.75
10	Wisconsin	13,662	2.73
11	Mississippi	12,285	2.45
12	Virginia	12,106	2.42
13	Indiana	11,364	2.27
14	Oregon	11,070	2.21
15	Kansas	10,851	2.17
16	North Dakota	10,499	2.09
17	Arkansas	10,449	2.09
18	South Carólina	9,896	1.97
19	Washington	9,838	1.96
20	Arizona	9,812	1.96
21	Nebraska	9,712	1.94
22	Michigan	9,591	1.91
23	Iowa	8,432	1.68
24	Kentucky	8,382	1.67
25	New Jersey	8,263	1.65
26	Illinois	8,140	1.62
27	Missouri	8,001	1.60
28	Alabama	7,320	1.46
29	Pennsylvania	6,756	1.35
30	Colorado	6,753	1.35
31	Hawaii	6,312	1.26
32	Idaho	6,244	1.25
33	Oklahoma	6,030	1.20
34	Tennessee	5,982	1.19
35	Puerto Rico	5,231	1.04
36	Maryland	4,469	.89
37	Utah	4,225	.84
38	Montana	3,956	.79
39	South Dakota	3,480	.69
40	Connecticut	3,049	.61
41	Nevada	2,381	.48
42	Wyoming	2,191	.44
43	Massachusetts	2,027	.40

[a]Last year for which complete data were available.

Rank	State	1981 State appropriation (000 omitted)	Percent of total
44	New Mexico	$ 1,995	0.40
45	Alaska	1,895	.38
46	Delaware	1,720	.34
47	Maine	1,663	.33
48	West Virginia	1,597	.32
49	Vermont	1,270	.25
50	New Hampshire	1,114	.22
51	Rhode Island	950	.19
52	Guam	309	.06
53	Virgin Islands	160	.03
	Total	$501,153	100.00

Summary by Region

Region	State appropriations (000 omitted)	Percent
Southern	$194,423	39
Western	128,581	26
North Central	125,875	25
Northeastern	52,274	10
Total	$501,153	100

RANKING OF RELATIONSHIP OF STATE-APPROPRIATED FUNDS AND HATCH ACT FUNDS BY STATE AND REGION, 1981

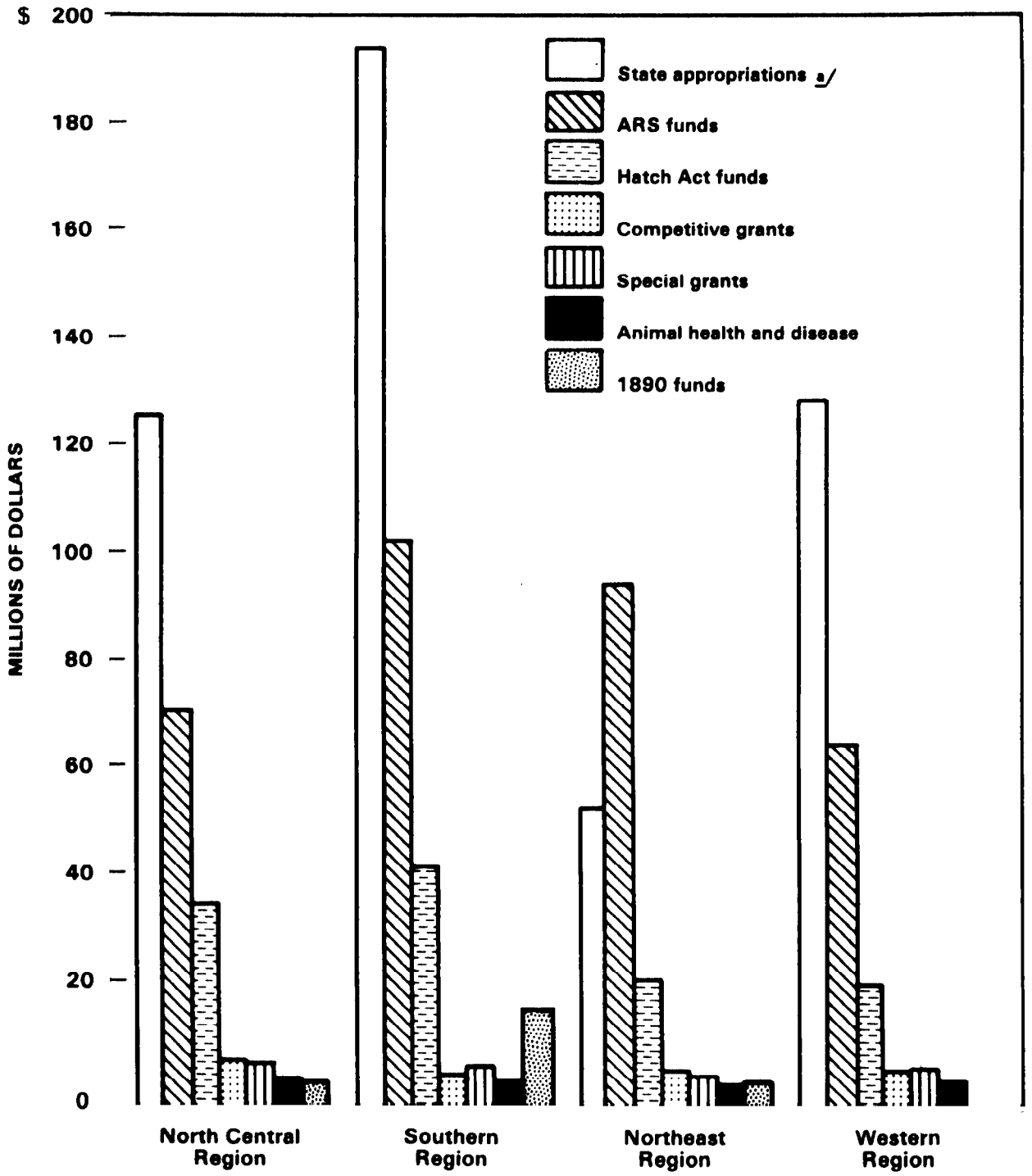
Rank	State	Hatch Act funds received	State appropriation	Ratio of State appropriation to Hatch Act funds
		(000 omitted)		
1	Florida	$2,047	$34,570	16.89
2	California	3,654	61,600	16.86
3	Louisiana	2,321	17,552	7.56
4	Arizona	1,397	9,812	7.02
5	Hawaii	958	6,312	6.59
6	Georgia	3,365	21,378	6.35
7	North Dakota	1,699	10,499	6.18
8	Oregon	1,990	11,070	5.56
9	Minnesota	3,407	18,386	5.40
10	New York	3,867	19,396	5.02
11	North Carolina	4,699	22,149	4.71
12	Texas	4,469	20,933	4.68
13	New Jersey	1,841	8,263	4.49
14	Kansas	2,431	10,851	4.46
15	Idaho	1,481	6,244	4.22
16	Arkansas	2,487	10,449	4.20
17	Nebraska	2,327	9,712	4.17
18	Virginia	2,995	12,106	4.04
19	Washington	2,442	9,838	4.03
20	South Carolina	2,507	9,896	3.95
21	Mississippi	3,123	12,285	3.93
22	Wisconsin	3,539	13,662	3.86
23	Colorado	1,834	6,753	3.68
24	Ohio	4,074	13,757	3.38
25	Utah	1,275	4,225	3.31
26	Indiana	3,464	11,364	3.28
27	Oklahoma	2,190	6,030	2.75
28	Michigan	3,502	9,591	2.74
29	Nevada	882	2,381	2.70
30	Montana	1,484	3,956	2.67
31	Alaska	734	1,895	2.58
32	Alabama	2,907	7,320	2.52
33	Maryland	1,775	4,469	2.52
34	Missouri	3,257	8,001	2.46
35	Kentucky	3,494	8,382	2.40
36	Connecticut	1,331	3,049	2.29
37	Iowa	3,871	8,432	2.18
38	Illinois	3,818	8,140	2.13
39	South Dakota	1,729	3,480	2.01
40	Wyoming	1,112	2,191	1.97
41	Delaware	946	1,720	1.82
42	Tennessee	3,450	5,982	1.73
43	New Mexico	1,174	1,995	1.70
44	Puerto Rico	3,197	5,231	1.64

Rank	State	Hatch Act funds received	State appropriation	Ratio of State appropriation to Hatch Act funds
		(000 omitted)		
45	Pennsylvania	$ 4,286	$ 6,756	1.58
46	Massachusetts	1,600	2,027	1.27
47	Maine	1,318	1,663	1.26
48	Vermont	1,049	1,270	1.21
49	New Hampshire	1,024	1,114	1.09
50	Rhode Island	905	950	1.05
51	West Virginia	1,946	1,597	.82
52	Guam	504	309	.61
53	Virgin Islands	285	160	.56
54	Washington, D.C.	84	0	-
	Total	$123,547	$501,153	4.06

Summary by Region

Region	Hatch Act funds received	State appropriation	Ratio
	(000 omitted)		
Western	$ 20,921	$128,581	6.15
Southern	43,536	194,423	4.47
North Central	37,118	125,875	3.39
Northeastern	21,972	52,274	2.38
Total	$123,547	$501,153	4.06

AVERAGE YEARLY AGRICULTURAL RESEARCH FUNDS BY SOURCE/BY REGION



a/ State appropriations are for 1981. The other figures are for average research expenditures for fiscal years 1978 through 1982.

Source: Chart developed by GAO on the basis of USDA data.

YEARLY AVERAGE AGRICULTURAL RESEARCH FUNDS RECEIVED

BY REGION BY FUNDING CATEGORY

(FY 1978 THROUGH FY 1982, EXCEPT AS NOTED)[a]

Funding type	North Central Region	Northeastern Region	Southern Region	Western Region	Total
	(000 omitted)				
Hatch Act formula funds	$ 34,833	$ 20,736	$ 41,034	$ 19,691	$ 116,294
Competitive grants	5,483	3,677	2,490	3,417	15,067
Special research grants	4,621	2,451	4,338	4,154	15,564
Animal health and disease	1,638	514	1,309	1,005	4,466
1890 school funding	1,128	987	14,778	0	16,893
Subtotal	47,703	28,365	63,949	28,267	168,284
ARS funding	70,187	94,297	102,122	64,025	330,631
Subtotal	117,890	122,662	166,071	92,292	498,915
State appropriations	125,875	52,274	194,423	128,581	501,153
Total	$243,765	$174,936	$360,494	$220,873	$1,000,068

[a]Complete data were only available for 1981; therefore, we have used 1981 State expenditures in this table.

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