
Chapter I

Summary

NOTE: This report was largely completed in early 1981 and refers to the food and agricultural research system as of that date. Draft copies of the report were made available at that time for congressional committee staff and executive agencies. Some of the report's potential solutions to food and agricultural research problems have already been enacted. The text has not been revised to reflect all those changes, but the more important ones have been mentioned in footnotes.

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Summary

The food and agricultural industry in the United States is by far the largest of all our industries. In 1980, farm assets totaled over \$900 billion. And one of every five civilian jobs was in the food and agricultural industry. Agricultural products rank first among all U.S. exports. Moreover, food costs to U.S. consumers, while rising, are among the lowest of any country in the world.

Food and agricultural research has contributed markedly in making the United States a giant of industrial enterprise. Research has given us new and better ways to improve production, processing, and marketing. In addition, agricultural research is solving problems in environmental quality and human nutrition. The aim of such research is to assure an ample, safe, and nutritious food supply at reasonable cost, while maintaining a sustainable production system. The United States is generally recognized throughout the world as a leader in agricultural research.

Despite its notable achievements, the U.S. food and agricultural research establishment today is facing new problems. These problems are exerting severe strains on our ability to meet current and projected challenges. Scientists are concerned that new technology may not be keeping pace with domestic and world needs.

The tight world supply-demand balance is also a growing problem. Unless major breakthroughs occur in either expanded resources or new technology, the world food problem is likely to worsen. Changes are also occurring in the structure of agriculture. For example, large farms and businesses have more influence than small farms on the direction public research programs take. New technology tends to be adopted more readily by larger and more mechanized firms than by smaller and less organized agricultural interests.

Recognizing this trend toward industrialization of agriculture, the Office of Management and Budget (OMB) has taken the stand that funds for some forms of public agricultural research are no longer needed. The implication is that the private sector has enough resources to conduct its own research. This argument has been used most specifically for post-harvest technology research. In the future, the argument might be expanded to other forms of technology-related food and agricultural research.

The 1970's brought a host of new public issues and concerns that will likely continue in the 1980's. These include food safety, environmental protection, nutrition, and increasing competition for water resources.

Today, there are additional pressing issues: sustainability of the present agricultural system, water shortages in the West, widespread droughts, excessive soil erosion, increased energy costs, and continued environmental concerns.

Because Federal research funding has not substantially increased in recent years, new research problems must be funded at the expense of traditional research. Moreover, the cost of conducting research has increased. Research today requires more sophisticated and costly equipment and support staff than 10 years ago. Thus, many research areas are receiving relatively much lower real funding today than earlier.

The U.S. Department of Agriculture (USDA) and the State agricultural experiment stations (SAES) have always had a close working relationship in food and agricultural research. As a general rule, USDA has been concerned more with national and regional problems, and the SAES with local and State problems. But over the years, the SAES re-

search programs have grown to include problems of regional and national significance.

With the present structure of USDA, there is some question as to whether USDA has a national research program or merely a series of local and regional activities. Consequently, USDA and SAES appear to be working on seemingly indistinguishable problems. Many people, including Congress, have voiced concern that little, if any, overall planning and coordination of research exist, especially at top levels of administration. They question whether national issues are receiving adequate attention. Further, there seems to be much duplication and vying for funds.

Now, the question arises: How should these new issues and concerns be handled? Over the years, there have been many studies dealing with food and agricultural research. Most studies, such as the World Food and Nutrition Study, have concentrated on agricultural research priorities. These studies have identified the research that requires highest priority and the level of funds needed for the research. Few of these studies have looked into the structure of the research system. There has been little, if any, attempt to identify roles of research agencies or to seek solutions to the problems they face. In addition, there has been little, if any, attempt to classify research from a management perspective.

Congress and others have raised questions about the allocation of research resources and the mechanisms used to develop research priorities. Other issues of concern include the adequacy of research funding, the distribution of research benefits, and the quality of expertise and interest being brought to bear on identifying and conducting research.

These concerns led directly to a request from Congress for the Office of Technology Assessment (OTA) to undertake an assessment of the U.S. food and agricultural research system. Congress stressed that the as-

essment focus on the structure of the research system and that it complement previous studies which identified agricultural research priorities. The requests for an assessment came from the Senate Committee on Appropriations as well as the Senate Committee on Agriculture, Nutrition, and Forestry. The House Agriculture Subcommittee on Department Operations, Research, and Foreign Agriculture also endorsed the requests,

The objectives of this assessment are to:

1. evaluate the funding, benefits, and burdens of food and agricultural research;
2. determine the basis, scientific or otherwise, for the classification of research from a management perspective;
3. identify the roles of Federal, State, and private institutions in developing technologies for solutions to international, national, regional, and State or local problems;
4. examine the management, structure, and policies of USDA in the conduct of food and agricultural research;
5. evaluate methods by which the expertise and interests of Federal, State, and private research organizations can be brought to bear cooperatively in identifying priority research areas; and
- 60 provide public policy options for Congress that will maximize our research potential.

The working groups and advisory committee that prepared and reviewed the resource material for this assessment recognized the urgency for resolving the issues that characterize the present situation in the agricultural research sector. They were motivated by a deep concern for maintaining a strong and growing food and agriculture industry. It is hoped that the analysis of these issues and public policy options offered herein will provide a good starting point for increased effective use of the Nation's scientific capabilities and other research resources.

STRUCTURE OF THE RESEARCH SYSTEM

When it is working properly, the U.S. agricultural research system is tremendously effective. The participants* —USDA, SAES, and private industry—concentrate on mission-oriented research; that is, research directed toward solving identifiable problems, although the programs include some basic research activities. Most land-grant universities and many nonland-grant universities have strong discipline-oriented research programs in the basic sciences, such as physics, chemistry, and botany, that form the foundation of biological and physical sciences on which agricultural research is based.

Federal Research

USDA is the major Federal agency conducting agricultural research. It is also the lead agency for the coordination of all federally funded agricultural research. Through early 1981, the Science and Education Administration (SEA) of USDA was responsible for: 1) broad agricultural research policies and coordination and 2) an operating organization which had day-to-day management supervision over a number of offices including Agricultural Research (AR), Cooperative Research (CR), and Human Nutrition (HN). **

AR is responsible for most of USDA's in-house agricultural research. AR is accountable and responsive to Congress and the executive branch for broad regional, national, and international concerns. It is headed by an administrator located in Washington, D. C.,

*A large number of Federal agencies and public and private institutions are also involved in U.S. agricultural research. This assessment, however, is concerned primarily with the traditional agricultural research system, which includes the USDA research agencies, SAES, and private industry. The 1890 schools, nonland-grant universities, etc., are discussed where most relevant, but no in-depth study was made of them. Forestry research is not included in this assessment.

**In June 1981, USDA announced a reorganization that eliminated the Science and Education Administration and established AR, CR, and Extension Service as separate operating agencies. Most of HN was merged into AR. USDA established an Office of Science and Education, which is to establish broad agricultural research policies, planning, and coordination.

and four regional deputy administrators, one located in each of the four SAES regions. Each region is subdivided into areas under a research area director (fig. 1). A national program staff (NPS) prepares an integrated budget and assists in technical planning and coordination. NPS has no direct line responsibility for program development, staff selection, or resource allocation.

CR is responsible for administering Federal funds that go to States for agricultural research. This includes formula funds, special grants, and competitive grants. Formula funds help to provide a stable and dependable base, ensuring a strong experiment station in each State. Grants provide an opportunity for researchers in nonland-grant universities, SAES, and other institutions to work on problems important to the agricultural industry.

Human nutrition research in USDA is carried out by six research centers. Research at all centers is directed to national concerns.

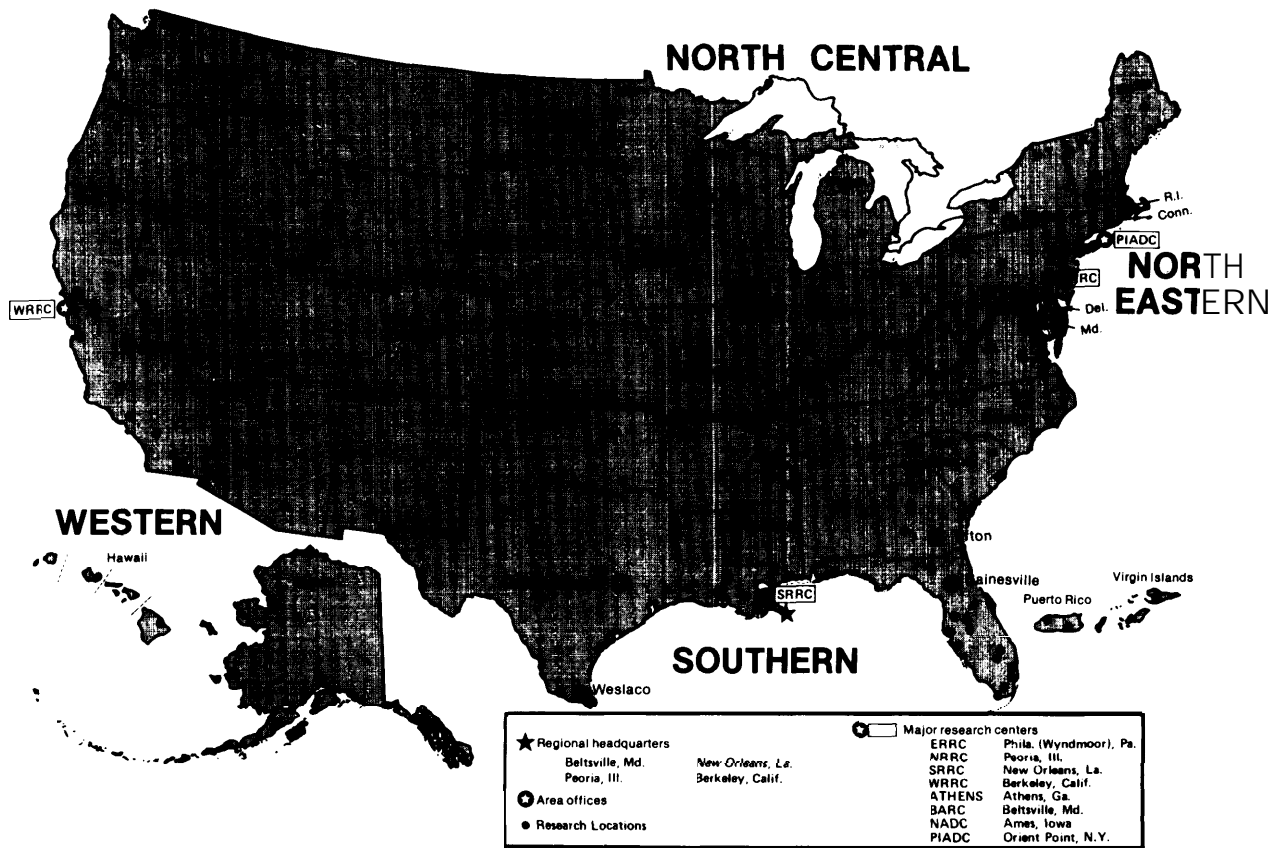
Through early 1981 the economics research program was conducted by the Economics and Statistics Service (ESS). In addition to research, its primary objective is the collection and analysis of economics data. *

State Agricultural Experiment Station Research

Over the years, the structure of SAES has changed little. Stations typically include a central station and headquarters, which is generally located on the campus of the State's land-grant university, and a number of branch stations located throughout the State (fig. 2). Stations are organized by departments according to the various scientific disciplines represented on their staffs, such as departments of animal science, entomology, plant pathology, etc. These departments usually are the same as those of the academic unit and, in

*In June 1981, USDA announced a reorganization that eliminated the Economics and Statistics Service and established two separate agencies, Economic Research Service and Statistical Reporting Service.

Figure 1.—USDA Agricultural Research System



SOURCE: U.S. Department of Agriculture.

most cases, also include extension. In many cases, USDA personnel are located in departments and participate fully in departmental activities. The chief administrative officer of each department typically reports three ways—to the dean, to the director of SAES, and to the director of cooperative extension service.

In the early 1900's, the station director reported directly to the president of the university. Today, most station directors report directly to the dean of the college of agriculture. This relationship of the SAES working with the land-grant universities and USDA provides a unique opportunity for graduate training of future scientists for research, teaching, and other State, Federal, and industry needs. In fact, it is by far the principal source of trained scientists.

Beginning in the 1960's, increasing amounts of non-State funding became available from agencies other than USDA. USDA funding remained stable or declined, and grants to some SAES scientists tended to draw them away from the State program toward the interests of individual scientists or the granting institution.

SAES-USDA Interaction

In many areas of agriculture research, there have long been closely knit cooperative relationships between SAES and USDA agricultural research. This relationship has been one of the strong points of the U.S. agricultural research system. Generally, it has resulted in scientists from each group developing respect for those from other groups. The major diffi-

agricultural research. In most cases, such research is complementary to that of USDA. It is conceived and operated to support the basic mission of the respective agency. In order to increase the effectiveness and productivity of Federal R&D agencies, Congress in 1977 mandated the establishment of the Committee on Food and Renewable Resources.

In 1890 Congress passed an act that granted certain Negro colleges and universities the same privileges as those provided by the Morrill Act of 1862. They are called the 1890 land-grant institutions and Tuskegee Institute. Under the 1977 Food and Agriculture Act, these institutions receive substantial amounts of formula-funded agriculture research funds from Federal sources. Their role is to meet the needs of those people whom the system was designed to serve through teaching, research, and extension.

The nonland-grant universities include private institutions and public State universities. The major expertise of the private nonland-grant universities lies in research in the basic sciences. They generally receive no direct continuing State or Federal assistance and support their research through government grants, endowments, and corporate grants

and contracts. Competitive grant funding opens up an opportunity for the universities to be more involved in agricultural research. Large public State universities without agricultural programs have, in many cases, the same problems and interests as the private universities.

The public State universities with agricultural programs perceive their role as providing teaching, research, and public service to their regions and States in accordance with missions and charters set forth by State legislatures. Most of them have evolved from teachers colleges and have a strong emphasis on undergraduate teaching. Their research tends to concentrate on local problems of a more applied nature and on projects for which corporate support is more available.

Most nonland-grant universities have no Federal or State charter for research. Financing, heavily dependent on contracts and grants, has lacked continuity and dependability. Because of the concentration on undergraduate teaching, funding generally has not provided sophisticated facilities and equipment for graduate teaching and research, except for a few outstanding private research institutions.

PROBLEMS AND POTENTIAL SOLUTIONS

Food and Agricultural Goals

The lack of well-defined and agreed-upon national goals for U.S. food and agriculture is a major deterrent in formulating broad food and agricultural policy at the national level.

A goal is the end toward which effort and resources are directed. The end must be definable and achievable at least in theory. Other than general goals of self-sufficiency, the United States has not had well-articulated national food and agricultural goals.

There are implicit goals, but they provide little help in formulating policies and giving direction to the research community. One im-

plied goal is to provide an ample supply of nutritious food for the consumer at reasonable cost with a fair return to farmers within an agricultural system that is sustainable in perpetuity. However, this "goal" is open-ended and, therefore, not achievable. For example, what is meant by "ample supply?" What is nutritious food? What is a reasonable cost to consumers? What is a fair return to farmers? When is this return to be expected? How much soil erosion or dependence on fossil fuel can a sustainable system tolerate?

These and other questions must be answered for a goal to be useful in formulating policy and for the research community in

planning a research agenda. With such questions unanswered, setting research priorities is a difficult task at best.

Policy options

Congress and/or the executive branch could set national goals for U.S. food and agriculture. This could give a clear direction to the research community for developing a research agenda. Public funds would be allocated to research needed to meet goals established by society through its elected officials. Because society provides the funds for research, it can set broad long-term goals and expect the research community to respond accordingly through planning, conducting, and evaluating achievements.

Not setting explicit goals could save time and money at least in the short term. Goal setting is a complex, time-consuming endeavor, and because of the diversity of conditions under which food and fiber are produced, it could be a complicated procedure. However, in the absence of goals established by society, the research community has to set goals. Problems arise when there is lack of agreement on those goals and when there is no practical process for determining the views and priorities of those who are affected.

Research Priority Determination

There is no satisfactory long-term process for evaluating research activities, research opportunities, and development of research priorities. Decisions are made on an ad hoc basis with very little coordination among USDA, SAES, and other agencies conducting food and agricultural research. Long-term research planning, updated every 4 years or more, could be accomplished by an intensive study involving research administrators, scientists, users, and consumers.

Congress established the Joint Council on Food and Agricultural Science (JC) and the National Agricultural Research and Extension Users Advisory Board (UAB), which is made up of citizens, to aid in coordination and priority setting. These groups have struggled with their assignments. Concern exists

as to whether the functions assigned to the JC are attainable. The council has had a limited impact because of: an inability to define its role, a perceived dominance by USDA, and overorganization. UAB's functions are more attainable than the JC's; however, the board's impact on research priorities is unclear. Neither of the units has the capacity to conduct a long-range systematic study of research priorities that involves scientists, research administrators, users, and others; neither was set up to do that.

Involvement of scientists and research administrators is needed for the obvious reason that they have the expertise and are the performers of the research. Research users are needed because they have specific problems that need to be addressed by research. Likewise, consumers have legitimate concerns that the research community needs to address.

Policy Options

Option A. Prepare a national research agenda, updated at specific intervals, using scientists, administrators, users, and consumers under the auspices of USDA. * Such a study could use methods like those pioneered by the National Academy of Sciences *World Food and Nutrition* Study and the OTA studies *Nutrition Research Alternatives* and *Emerging Food Marketing Technologies* for priority determination.

A planning system of this type would include a cross section of scientists, research administrators, users, and consumers. A small staff would manage the study. The bulk of the work would be conducted through a variety of work groups. This ad hoc feature is viewed as being critical to success in long-range infusion of new ideas.

Short-range planning would be done regularly by each research entity in conjunction with budget preparation. This system would not set priorities for SAES, since they are primarily responsible for State and local issues.

*The presently drafted Agriculture and Food Act of 1981 mandates USDA to conduct a long-range research planning study.

The JC and UAB would modify their responsibilities to place emphasis on: 1) supervising the planning process, 2) providing a forum for communication, and 3) providing interim evaluation of planning goals. This modification would permit a more simplified structure than is currently anticipated, especially for the JC. Also, the number of meetings would be reduced.

Coordinating the study under USDA would be in keeping with its responsibilities for food and agricultural research established by Congress.

Option B. Prepare a national research agenda, updated at specific intervals, using scientists, administrators, users, and consumers under the auspices of the National Academy of Sciences (NAS). This would be the same concept as discussed in the previous option except that it would be coordinated under the auspices of NAS rather than USDA.

Some participants in the research system would consider NAS a more objective party than USDA. However, in the past NAS has resisted the use of lesser known scientists, nonscientists, users of research, and the public in conducting such studies. The success of this effort depends to a large extent on the participation of these groups. In addition, NAS expertise is concentrated more in basic rather than mission-oriented research. This would also weaken USDA's leadership role in research, which is contrary to recent legislation.

Funding

USDA research expenditures are proportionately the smallest of any major Federal research agency. In 1978, USDA's share of Federal expenditures for research and development was 1.5 percent of total expenditures compared with the Department of Defense—45 percent, Department of Energy—16 percent, and Department of Health and Human Services—12 percent.

The purchasing power of total SAES and USDA agricultural research expenditures increased 23 percent in constant dollars from 1966 to 1979. The constant-dollar agricultural research expenditures of USDA increased 1 percent, while those of SAES increased 40 percent from 1966 to 1979.

Total expenditures by private enterprise for food and agricultural research are about three-quarters of the expenditures of Federal and State governments combined.

Justification of public funding of food and agricultural research is based on benefits well in excess of costs.¹ Issues of equity, because of the interstate flow of food and related commodities and the spillover effect of research from one geographic region to another, are also cited. Producers benefit from expanding demand and reduced costs. The distribution of consuming population among States, however, is related to the distribution of agricultural production only to a very limited degree. Paradoxically, Federal research funding, relative to State funding, has decreased as the interstate flow of commodities has increased. Therefore, taxpayers in food-surplus States are subsidizing consumers in food-deficit States and the degree of subsidization is increasing steadily.

Policy Options

Option A. Maintain present Federal real funding levels. From a management standpoint, limited funding, up to a point, tends to increase efficiency in the use of funds. It focuses the use of funds on high-priority areas at the expense of less urgent areas. However, a certain level of funds is needed just to maintain the research system. This does not allow research institutions to keep pace with increasing costs, nor does it allow research in new problem areas without abandoning important traditional areas. From an equity

¹Fred White, B. R. Eddleman, and Joseph Purcell, *Nature and Flow of Benefits From Agriculture-Food Research*, OTA background report, 1980.

standpoint, the ratio of Federal research funding relative to State funding would not improve, causing taxpayers in food-surplus States to continue subsidizing consumers in food-deficit States.

Option B. Significantly increase real Federal funding levels for food and agricultural research. Increased Federal funding would: a) allow research institutions to keep pace with the high cost of conducting research, b) allow the research system to open new areas of research while maintaining important traditional research effort, and c) increase Federal research funding relative to State funding, thereby decreasing taxpayer subsidization in food-surplus States to consumers in food-deficit States. From a management standpoint, however, an increase in funding may tend to decrease efficiency in the use of funds. Funds may not be focused on the highest priority problem areas.

Roles of Research Participants

There is a role for a strong national USDA research program. This role has been carried out in the past by AR, HN, ESS, and Federal funding to SAES. The USDA role has been associated with broad regional, national, and international activities. The role of SAES, insofar as Federal funds are concerned, has been primarily for local, State, and regional problems. There has been considerable overlap; some portions of the Federal and State roles are becoming indistinguishable.

USDA's role is to conduct research on: a) agricultural problems important to the Nation, problems that no one State or private group has the resources, facilities, need or incentive to solve, and b) those programs required to fulfill stated objectives of Congress, the President, and the Secretary of Agriculture. USDA could carry out its role by: a) working as a partner with SAES to achieve complementarily and b) cooperating with private universities and industry to coordinate its own contribution to achieve national goals with minimum effort.

Most of the 1890 land-grant institutions and Tuskegee Institute research funds come from Federal resources and if they are to meet their obligations, pressing needs must be addressed. One important need is improved facilities. But an even more important concern is the future role of these institutions and their ability to compete for and maintain faculty and staff. While there is some cooperation with USDA and SAES, coordination with the system is less than adequate.

In 1977, Congress established the Committee on Food and Renewable Resources (CFRR) to improve coordination of the research activity of USDA and the 10 other Federal agencies involved in food and agricultural research. CFRR has not yet satisfactorily fulfilled its role. As of early 1981, CFRR did not have a classification of the food and agricultural research conducted or funded by these agencies nor the amount of funds allocated for such research. Identifying definite objectives for CFRR would be helpful. Further, CFRR lacks authority to carry out the functions assigned by Congress. USDA has an opportunity to take an aggressive leadership role in this area, but to be effective it will require high-level attention and support.

Grant funds provide resources to further the program of USDA. SAES, nonland-grant universities, and other institutions compete for these funds on the basis of their interest and ability to do Federal research. This broadens the base of resources for agricultural research.

The private sector tends to view its role primarily from a profit potential. It conducts research in areas of interest to the companies and in areas that may give them proprietary advantages. There are significant research areas of interest to the public that are not receiving nor are likely to receive adequate research attention if left to the private sector.

Policy Options

Option A. Maintain present roles with clarification. This option would imply continuation of most existing procedures.

USDA would continue in its role as lead agency in the Federal Government in coordinating all agricultural research, extension, and teaching activities conducted or financed by Federal funds.

This provides Congress and the executive branch with one Federal agency, USDA, to hold responsible and accountable for the coordination of all Federal agricultural research funds, and broad regional, national and international research programs. It provides a mechanism whereby Federal funds can go directly (through formula funding) to SAES to have available resources of the institutions for problems of national concern. It also recognizes the public interest in support of a decentralized system of food and agricultural research and provides a mechanism for handling problems of local and State concerns.

This option continues to perpetuate the concern of SAES of too much direction and coordination of research conducted with Federal funds. It also perpetuates the problem of lack of strict accountability to Congress or USDA regarding what research problems formula funds are to be used.

Option B. Eliminate the in-house USDA research role. Provide increased funding to SAES to conduct most publicly supported research. Funds to SAES would be increased on the basis that regional and national agricultural research problems would be solved by the cumulation of local and State solutions. Important national research issues, however, are not solved by a large number of researchers working "on" a problem, but by a few concentrating and coordinating their efforts on the more important aspects of the problem. There would be no research agency having direct responsibility and accountability for regional and national problems to the executive or legislative branches of Government. The research needs of action agencies of USDA would have to be solved by the SAES, or by adding a research function to the action agencies.

Option C. Eliminate the in-house USDA research role. Use present in-house funds, special grants, and competitive grant funds for contract research to carry out important USDA research programs. This would eliminate many Federal positions in USDA and would ease the personnel ceiling problem considerably. Coordination might be improved where the SAES or State universities receive contracts to carry out USDA programs. It might make the closing of some low-priority Federal facilities easier.

However, it would eliminate the largest agricultural research organization in the United States under one management system—AR. Since conduct of research on broad regional and national problems in agriculture is the principal purpose of the Federal programs, this function would be mostly lost. This plan could be an expensive alternative. Overall, it would be very disruptive to present research programs.

Option D. Reduce the role of the SAES in regional, national, and international research by eliminating all formula funds, leaving grants as their source of Federal funds. This would help to answer the criticism that formula funds are given to SAES without sufficient accountability and Federal management. It might help remove some of the competition between SAES and USDA over budgets. It would increase the probability that Federal funds going to SAES and other institutions would go to those judged to be most capable of performing good research, if done on a truly competitive basis. It would make it more certain that the funds were spent on high national priority problems.

However, unlike research in other fields, much of agricultural research is site-specific, simply because it is so closely related to problems of a specific area. And biological research must be long-term and continuous to be effective. Hence there must be facilities and professional staff available for such research, none of which can be created or dispersed on short notice. SAES are best

equipped to manage this research, and formula funding provides continuous and secure source of funds for this activity.

Option E. Increase the role of the private sector through incentives to conduct more research of concern to the public. Private industry has the capacity to conduct more research and probably would if it were profitable. The private sector could probably be induced to increase its efforts in agricultural research through direct grants, reduced taxes, or other incentives. Since the nature of the private sector requires that it be concerned with self interest, no amount of incentives would assure adequate research on all issues of public concern. But the private sector could become more active through this process.

Management of U.S. Agricultural Research

The level of agricultural research funding has been constantly decreasing as a percentage of total Federal research and development. Within USDA, the number of positions assigned to agricultural research has been decreasing, and the relationship of the size of the agricultural research budget to other functions of USDA has likewise been decreasing. This indicates a lack of appreciation at the USDA policy level of the importance of agricultural research. Yet, a prime function of the director of SEA and the SAES directors is to assure that the importance of agricultural research is maintained in policy decisions.

Much of SEA's efforts are dissipated in operational activities at the expense of policy-level activities. This has resulted in inadequate funding requests by the executive branch, less-than-adequate funding by Congress, continuing vying for funds between USDA and SAES, and inefficient management at the agency administrators' level.

As of early 1981, SEA was headed by a director who had responsibility for: 1) broad agricultural research policies, planning, and coordination and 2) an operating organization which had day-to-day management sup-

ervision over AR, CR, HN, and its other offices.

The operating aspects of this dual responsibility: 1) reduce the time and attention that can be given to determining policy, planning, and coordination; 2) reduce the authority of the administrators of AR, CR, HN, and other offices; 3) reduce their operational efficiency; and 4) increase bureaucratic delays in decisionmaking.

AR is not organized to manage, conduct, and be responsive to broad regional, national, and international agricultural research needs and interests of the United States. When the 1972 reorganization of USDA's Agricultural Research Service transferred line responsibility to four regional administrators, the NPS was left without direct line responsibility for program development, staff selection, resource allocation, etc. This caused AR to lose much, if not all, of its ability to plan, manage, and conduct research on broad regional and national problems. AR's research has become more oriented to local and State issues. Not only does this provide opportunities for duplication, but it increases the likelihood that: 1) broad regional and national interest will not receive adequate attention and 2) Federal funds appropriated for these purposes will be diverted or used inefficiently.

CR is responsible for administering formula funds, special grants, and competitive grants. It conducts project reviews of activities that are supported by formula funds (Hatch Act), but these reviews are more a formality than an in-depth examination. As a part of the process, onsite reviews are held every 3 to 5 years at the request of the client institution. Their value rests mainly on actions taken by the institution being reviewed, since CR has no followup responsibilities. Further, CR has little authority in dealing with SAES. CR has at times tended to operate as though it were under the supervision of SAES, rather than the director of SEA.

It is questionable whether CR is the appropriate office to administer the competitive research grants. All U.S. research institutions

and research scientists that have expertise and capabilities are supposed to be considered equally as potential grantees. Having one agency whose main function is so closely tied to one segment of the research community (and which receives a large share of the grants) administer the grants gives reason for concern.

SEA has not accomplished the intent of the Food and Agriculture Act of 1977 with respect to human nutrition research. SEA established human nutrition research as a mission, but it did not establish human nutrition as a separate budget item. HN consists of six research centers at which human nutrition research is conducted. Functioning of the centers, however, has been hampered by insufficient funding. The three newest centers are particularly hard hit because they had to be developed anew, and as of early 1981, the total professional staff at the three centers numbered only six.

As of early 1981, economics research remained combined with statistical reporting activities. Concern exists that this combination has caused confusion for the public. A small part of the economics research budget is allocated to research, and there is little cooperative effort with AR.

Policy Options

SCIENCE AND EDUCATION ADMINISTRATION

Option A. Operate SEA as a policy and coordination office. * SEA would no longer have an operating function and could spend full time on policy and coordination which does not now receive adequate attention. The administrators of the respective agencies would be responsible for the operating functions of their agencies. For example, budgets and other management functions would be prepared within each of the agencies and coordinated at the SEA level. This would improve management efficiency and reduce bureaucratic delays.

* USDA has begun putting this option into effect (see footnote ** on p. 5).

Option B. Establish an assistant secretary for research, extension, and higher education with a deputy assistant secretary who would coordinate agencies comprising SEA. * **The position of director of SEA would not be retained.** This would give research increased visibility in USDA and in the eyes of OMB and Congress. The office would have a larger role in forming overall USDA research policy. Administrators of the agencies within SEA would be responsible for the operating functions of their agencies. This has the potential for improving the efficiency and management of these agencies and reducing bureaucratic delays.

AGRICULTURE RESEARCH

Option A. Within AR, transfer line authority, including the responsibility and accountability for planning and coordination of research, and resource allocation for regional and national research, from regional administrators to NPS. This would restore to AR the capability to plan, execute, and be responsible for research programs with regional, national, and international concerns. It would reduce manpower requirements and strengthen the scientific aspects of AR's program. It would give greater assurance to Congress that funds appropriated for regional and national concerns were being spent on those issues. Less attention would be given to local and State issues. This change can best be handled by the executive branch.

Option B. Same as above, but consider a change in the number and location of regions to provide more efficient management and eliminate the offices of area directors. The geographical area covered by each regional deputy administrator was chosen to coincide with the SAES regional areas and has no significant correlation with regional research problems. Such problems do not follow State lines, nor does any group of re-

*The presently drafted Agriculture and Food Act of 1981 authorizes a USDA Assistant Secretary for Research, Extension, and Higher Education.

gional problems fall within the same cluster of States. Consideration should be given to whether there is a need for four such regional administrators and, if so, determining their best geographic locations, including the possibility of locating them in the D.C. area.

Both options would eliminate the need for area director positions. All technical planning would be conducted by NPS and technical staff. With the reduced workload, it appears that regional administrators could carry out the administrative functions without area directors. Locating regional administrators in the D.C. area would facilitate focusing on broad regional and national issues. However, two advantages of locating them in the field and having their duties correspond to SAES regions are: a) to facilitate communication between regional administrators and SAES directors of the region and b) probably to aid in coordination at the management level. This change can best be handled by the executive branch.

COOPERATIVE RESEARCH

Option A. Strengthen CR's authority in managing Federal funds allocated to the States. CR would exercise more authority in approval and disapproval of proposed projects under formula funding and for review of such projects for continued, reduced, or discontinued funding. CR could represent the SAES in a more meaningful way on such items as budgets, research priorities, formula or grant funds, etc. Since the original Hatch Act makes the directors of the SAES responsible and accountable for the Hatch funds they receive, legislation would probably be required if a major change were to be made.

Option B. Establish formula funds as block grants and eliminate the CR office; establish a secretariat for handling block grants. Since SAES already have responsibility and accountability for Hatch funds, this would save time, funds, and personnel positions in administering these funds. It should have little or no adverse effect on the research programs. This option, however,

would increase the criticism that formula funds receive little or no meaningful review by USDA (CR). Other services provided to SAES by CR would either be lost or picked up by another office.

Option C. For Options A and B above, eliminate administration of all competitive grants from CR or secretariat staff and establish an office for this function that would report directly to the director or assistant secretary. This would provide for administration of these grants by an office that had no vested interest in who receives the grants. This would improve the climate for more objective administration of the competitive grants program.

HUMAN NUTRITION

Option A. Maintain present management structure within USDA with clarification in budget and staffing. This would clarify HN's status within USDA. At present, administrative and budgetary authority are split. It would obviate possible conflicts of interest between AR research interests and HN interests. It can be argued that HN is not large enough to warrant a separate system, but it would carry out the mandate of Congress. This change can best be handled by the executive branch.

Option B. Remove HN from SEA and place it under the Assistant Secretary for Food and Consumer Services. This option would place all nutrition activity of USDA within the purview of a single assistant secretary concerned with human nutrition and would give the administrator of HN direct access to the assistant secretary. However, it would separate human nutrition from all other research in USDA. Placement of HN within an action arm of USDA would cause research results to be less respected than if they were produced by an independent research arm. It would tend to cause research to be directed toward the needs of that arm and thus hamper long-term research projects. It could politicize nutrition research so that research directions would change with each

new administration. This change can best be handled by the executive branch.

Option C. Dispense with HN as an administrative and planning entity and disperse HN research within AR. Place each of the centers under the authority of the director for the region in which it is situated. Any positive aspects of such a move would be political rather than managerial. It would reassert that USDA places producers' interests at a higher priority than consumers' interests. Segmentation of HN research would make it extremely difficult for USDA to develop a coordinated research effort in human nutrition. It would also place the centers in a position of competing for funds with other research in a particular region, and research at the centers would lose its national character and could become focused on agricultural products of a region rather than on basic human conditions and their nutritional needs.

Option D. Dispense with HN as an administrative and planning entity, disperse the clinical and laboratory components within AR under the authority of the regional directors, and place the survey and statistical research and information services under the Assistant Secretary for Food and Consumer Services. * Food and Nutrition Service, the major agency under the Assistant Secretary would have closer coordination with the developers of nutrition-informative and educational material and with the researchers who survey and analyze food-consumption patterns in the United States. All the disadvantages of options B and C apply, as well as a problem of separating the development of educational and informational materials from the research on which they are based. Not only would the possibility of misinterpretation arise, but it would be necessary to hire additional staff to do the interpretive work, since the scientists who developed it would be in a different division of USDA.

*USDA has put this option into effect.

Option E. For all options above, determine if all regional human nutrition research centers are needed, and if not, which ones best serve the public interest. Available funds for human nutrition would be allocated to the needed centers. This would assure that funds allocated to human nutrition are used for high-priority needs and would assist in funding centers at a level commensurate with national interest. However, even though the centers are not adequately funded, there is continuing interest in these centers and a felt need for this research.

ECONOMICS RESEARCH

Option A. Reinstate the Economics Research Service (ERS) and the Statistical Reporting Service (SRS) to separate agency status reporting to the Assistant Secretary for Economics. * This option would aid in eliminating the confusion between the statistical unit's information and the projections and forecasts of the economics research unit. It would, however, create two entities where only one existed previously. This change can best be handled by the executive branch.

Option B. Reinstate ERS and SRS to separate agency status with SRS reporting to the Assistant Secretary for Economics and ERS reporting to the Director of SEA. This would mean that ERS would join the other research agencies in SEA. For the economic policy analysis that needs to be conducted, an analytic and policy staff would be assigned directly to the Assistant Secretary for Economics.

With all the major research agencies reporting to SEA, it would mean that coordination among research agencies is much easier. It would facilitate the integration of economics research with biological and physical science research, and by working more closely with these disciplines, it may be easier for economics research to obtain increased funding.

* USDA has put this option into effect.

It would, however, have some drawbacks. Only certain economics-research activities in ERS lend themselves to integration with biological and physical science research, and the economics unit might tend to be regarded as a service unit to biological and physical research. This change can best be handled by the executive branch.

International Agricultural Research

It is in the U.S. interest to help developing countries solve their technical problems related to food production and availability. Strengthening agriculture in developing nations: 1) enables them to increase their own supplies and reduces the need for expensive food aid from the United States, 2) stimulates their general economic growth so that they become better customers for trade with the United States, and 3) helps them attain the stability needed to provide a wide range of commodities that are important to the United States. Finally, it is the humanitarian thing to do, even where the United States receives no immediate benefit.

The U.S. Agency for International Development (AID) and USDA are involved in international agricultural research and technical assistance, but from the developing-country standpoint, AID is the prime Federal agency.

For AID to provide effective research and technical assistance to developing countries, it must have an in-house capability in the technical disciplines. Moreover, organizational structure, responsibilities, accountabilities, and procedures must reflect this fact. These conditions have not existed in AID. Technical staff is now scattered throughout the agency and no regional bureau has enough scientists to cover the required disciplines for developing-country programs. Advanced training of technical staff is usually lacking. With 50 percent of the total budget in food and agricultural activities, technical personnel trained in these areas account for 5 percent of the total personnel. Few, if any, are in decisionmaking positions.

The United States has much to gain, as well as give, in the international research network. There are 10 international agricultural research centers and 3 related programs sponsored by the Consultative Group on International Agricultural Research (CGIAR). Most of these centers have modern facilities, excellent staffs, and are highly productive. In recent years, many developing countries and most developed countries have been expanding their agricultural research base much faster than the United States (where Federal funds for agricultural research have remained fairly constant).

The United States has an opportunity to benefit from these new and expanding research efforts. At present, no Federal agency has the specific responsibility for taking the lead in coordination and cooperation on methods, procedures, and actions necessary to facilitate acquisition of technology which might benefit the United States.

Policy Options

Option A. Centralize technical staff in one bureau in AID. * USDA would maintain its present level of activity. The technical staff from the regional bureaus and missions would be combined with the central staff of the Development Support Bureau to form an overall operating technical bureau. The technical bureau would have responsibility for country and central programs of technical assistance, research, training, and institution building, and would be headed by outstanding professionals in their relevant fields. The functions of the regional bureaus would be reduced to those necessary for liaison with State and collation of normal desk functions. Presidential appointees would not be required for these positions. This would permit, but not assure, improved use of U.S. technical expertise in assisting developing countries in research and technical efforts. This change can best be handled by the executive branch.

*AID has moved in the direction of this option, but still retains the regional bureau structure.

Option B. Establish technical bureaus around the major thrusts of AID programs as defined by legislation—i.e., food and nutrition, population and health, and natural resources and energy. USDA would maintain its present level of activity.

Technical bureaus would have responsibility for country and central programs of technical assistance, research, training, and institution building, and would be headed by outstanding professionals in their relevant fields. Regional bureaus would be eliminated and regional office positions set up either in the Program, Planning, and Coordination Office or under an assistant administrator with limited role and powers necessary for liaison with the Department of State and operation of normal desk functions. This would improve organizational changes and enlarge the role of technical to nontechnical personnel. It would permit a much greater use and concentration of U.S. technical expertise in identifying and solving problems of interest to both the developing country and the United States.

AID's difficult problem of recruiting and maintaining technical personnel would be greatly relieved. This option would require some major changes in AID, and additional study on details would be desirable. This change can best be handled by the executive branch.

Option C. Increase USDA involvement in the international agricultural research network with major emphasis on maximizing U.S. benefits. This applies to both options A and B above. One Federal agency, USDA, would take the lead in programs to facilitate acquisition and use of agricultural research conducted in other countries and the international centers. Our ability would be increased to quickly obtain knowledge of research breakthroughs in the international area. There could be criticism from other countries that the United States has mixed aims in assisting developing countries, but this is true of the overall assistance programs. This change can best be handled by the executive branch.