

Chapter VI

Management, Structure, and Policy

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Management, Structure, and Policy

Of all the past assessments of the U.S. food and agricultural research system, few have made a serious attempt to evaluate the problems inherent to management policy. Yet today, as research missions become more varied, as new priorities vie for attention, and as funding becomes more stringent, the need arises for finding ways to strengthen leadership standards and performance at all levels of operation. Accomplishing such goals requires a thorough and honest analysis of management, structure, and policy within the Federal/State agricultural research system.

This study evaluates four research agencies within the U.S. Department of Agriculture (USDA): the Science and Education Administration's (SEA) Agricultural Research (AR), Cooperative Research (CR), Human Nutrition

(HN), and the social science research programs conducted by the Economics and Statistics Service (ESS). Included also is an overview of how the State agricultural experiment stations (SAES) are organized and managed. All of these agencies are experiencing changing roles and may need to consider new policy options that would maximize their research potential.

In striving for effective research management, one important component to consider is a planned systematic classification of the research problems at hand. OTA's study describes the criteria for categorizing the various levels of fund allocation and for assessing the responsibility and accountability of those who must make the ultimate decisions.

RESEARCH CLASSIFICATION FOR MANAGEMENT PURPOSES

Classification of agricultural research problems for management use is a complex process. Three broad areas or levels of activity are in the hands of different decisionmakers. The classification system for each area may vary, and, although there may be some overlapping among areas, the principal responsibilities are clear-cut. These three areas are: a) broad national policy issues including agriculture, b) issues solely within agricultural research, and c) issues within major research activities.

National Policy Issues, Issues at the national level relate primarily to management problems such as responsibility, accountability, and funding. Here, the importance of research and development (R&D) at the Federal level is evaluated in relation to other federally funded activities and the relative level of importance of agricultural R&D v. R&D in other sectors (such as defense or energy). For the most part, these major policy decisions are made outside the realm of the agricultural

sector. They are primarily political decisions made by the President in his annual budget, with help from the Office of Management and Budget (OMB), the Office of Science and Technology Policy (OSTP), and Congress.

As a general rule, decisions affecting this broad area are not conscious decisions directed specifically, for example, at the percentage of the Federal budget for R&D or agricultural R&D. They come about as part of larger decisions concerning perception relating to national issues or the well-being of the country. Furthermore, these changes come about gradually. They are incremental. Criteria used at this level are primarily related to national concerns of the various sectors of the economy and the relative importance of each. Other criteria have been involved at this level in the past. For example, when Sputnik first rose above the horizon in the late 1950's, there was a clamor for more basic research—almost across the board.

Within Agricultural Research. Issues at the second level—within agricultural research—relate to programs, funding levels, management of Federal funds, accountability, and decisions on who does what and the relationships to other research factors.

The Secretary of Agriculture, his senior staff, SAES directors, OSTP, OMB, and Congress have varying degrees of input at this level,

Scientists may have some input at the second level, but by the time it reaches the final decision level in USDA, most of their input cannot be identified. SAES have significant input in the programs and budgets that go to the Secretary for formula and competitive grant funding. The SAES also have input through lobbying at the congressional level.

USDA research administrators, likewise, have significant input within the Department in those programs and budgets relating to their areas of activity. Although OMB usually sets limits on total funding for USDA, the Secretary has some discretion in allocating levels of funding for activities in his Department. In other words, he can give research high or low priority. Congress has the final word for broad priority areas and funding levels. Thus, a wide array of factors is involved, almost exclusively outside the working scientist's level.

Organized groups such as producers, consumers, and environmentalists also have influence at the second level. Budgets and programs approved by Congress are usually specific as to the general intent of their use. The major issues relate to criteria for priority setting—i.e., responsibility, accountability, and further emphasis on who does what.

Within Research Activities, At the third, or lowest, level of decisionmaking, research administrators and their scientific staff make the major decisions on programs and budget allocations. Nearly always, it is the research scientist who decides how to conduct such research. SAES directors working with their department heads have a fairly free hand in allocating formula funds and State funds.

Criteria Used for Classifying Research

Four major criteria are used for classifying agricultural research activity: 1) the geographical area involved in the research problems, 2) the kind of research required to solve the problems—e.g., basic, applied, etc.; 3) research problem area—e.g., appraisal of soil resources; and 4) program structure—i.e., relating research problems to agency goals and missions. There are some additional minor criteria often used in classifying research (see Flatt, et al., 1980).

Geographical Area

A common criterion for classifying research is to consider the geographical area involved. Five such areas are recognized: local, State, regional, National, and international,

Any problem related to agriculture that occurs within a State or a portion of a State is classified as a State or local problem. One example of this might be determination of crop and animal adaptability to various locations and soil types within a State.

Any problem related to agriculture that extends over a major portion of two or more States—or affects the economy, environment, or social conditions of the major portion of two or more States—is classified as a regional research problem. Region does not refer to SAES or SEA/AR regional areas, but to problem areas. One example of a regional research problem would be development of a soybean variety suitable for the Coastal Plains area of the Southeastern United States,

Any agricultural problem that extends over a considerable portion of more than one region or has a major impact on the economy, environment, or social conditions of more than one region is classified as a national research problem. Examples include a migratory pest or disease that affects major portions of two or more regions and human nutrition.

Problems that affect the agriculture of two or more countries and can be solved by the

cooperation of the countries affected are classified as international research problems. An example is the control or eradication of the screwworm, an ectoparasite of livestock, which overwinters in Mexico and, if not controlled, spreads into the United States. It is being attacked in Mexico by a joint effort of government agencies in Mexico and the United States.

The advantage, for management purposes, of differentiating research problems as international, National, regional, State, or local is accountability for funds. It may be used in a general way to arbitrarily distinguish between the major roles to be assumed by State research agencies as compared to Federal agencies such as SEA/AR. State-appropriated funds are often intended to be used to support research that would have a direct bearing on solving local and State problems. Federal formula funds (Hatch) appropriated to States are used primarily to solve problems of the State or region. But collectively, in coordination with SEA/AR and other groups, they contribute to the solution of problems of national and international concern.

Another advantage of the State/National/regional classification is that it tends to increase the desire of Federal and State scientists to cooperate. Professional recognition and promotion in academic rank in some State universities are related to national and international accomplishments; this classification can be of benefit under such conditions.

A disadvantage of using this classification at the State level is that most research is concerned with State problems, even though that same research may have regional, national, or international significance. So, within a State, additional classifications are needed.

From a Federal standpoint, the advantage for management purposes of differentiating research problems as international, National, regional, State, or local is to reach an understanding as to who will accept the primary responsibility for solving a research problem, SEA/AR, for instance, has the primary re-

sponsibility for conducting research that is national or regional in scope. To do this it is necessary to define as precisely as possible what the geographical criteria are.

For example, assume that the boll weevil has spread across the Southeastern Cotton Belt and is seriously damaging cotton in 12 States. Also assume that in all 12 States SEA/AR and ESS have various research programs related to the control of the boll weevil. While the cotton in each State is being affected, and thus to that State it is a State research problem, it is by definition a regional problem. Therefore, if a coordinated regional research thrust is initiated, it would be highly desirable for SEA/AR to furnish a scientist to coordinate the regional research effort, assuming that SEA/AR had, or could employ, a competent scientist who was an effective leader. The SEA/AR scientist would normally have fewer problems traveling anywhere in the region at any time needed to do the coordination.

Two disadvantages for management purposes of using the geographical criterion for classifying research problems are: 1) science knows no boundaries; therefore, it is difficult to limit scientific thought to one classification system; and 2) some State scientists, especially those using contractor grant funds, maybe working on problems that are insignificant to the State. They may or may not be interested in cooperating on the solution to regional or national problems.

Kind of Research

Another common criterion for classifying research is by the kind of approach or type of endeavor needed to solve the problem. The three classifications generally used are basic, applied, and developmental.

Basic research is directed toward increased knowledge in science where the investigator is concerned primarily with gaining a fuller knowledge or understanding of the subject under study.

Applied research is directed toward practical application of knowledge where the in-

investigator is primarily interested in a practical use of the knowledge or understanding for the purpose of meeting a recognized need.

Developmental research is the systematic use of scientific knowledge and understanding gained from research directed toward the production of useful materials, devices, systems, or methods, including design and development of prototypes and processes.

The major advantage of using these criteria to classify research is for funding by Federal agencies such as the National Science Foundation. USDA has become aware in recent years of the need for more basic research, and such a classification system enables it to allocate funds in this manner across disciplines and political boundaries. Most USDA research is mission oriented, which is defined as the aim of achieving a worthwhile goal—e.g., controlling harmful insects or increasing the per-acre yield of soybeans. In the process of achieving such a mission or goal, scientists may conduct research that embodies all three components—basic, applied, and developmental. Today there are so many problems of agricultural production, harvesting, conservation, processing, marketing, and transportation that research classified as “applied” will continue to be stressed by State and Federal leaders.

A disadvantage of using these criteria is one of semantics. What one person perceives as being basic research is viewed by another equally qualified person as being applied. Research is a continuum rather than being clearly defined. Attempts to draw a line of demarcation between basic and applied research are illusory (Pino, 1980). Pasteur once remarked that “there is no pure science or applied science—only science and the application of science.” More important is that the research, whatever its classification, can have an ultimate beneficial effect for mankind.

Research Problem Area

A third criterion used for classifying agricultural research is to group problems in an area in which all of them have one or more

common characteristics. This criterion is used by the Current Research Information System (CRIS), which is a computerized storage and retrieval system developed by USDA and the SAES. An example of a research problem area (RPA) used by CRIS is development of domestic markets for farm products. Because CRIS recognizes 98 RPAs, they are grouped together under nine goals to facilitate easier storage and retrieval, (For further elaboration, see Flatt, et al., 1980.)

Each CRIS project is also classified by activity, commodity, and field of science. Below is an example of the use of the CRIS classification system for the research project “coating cotton for open-end spinning.”

Goal V: Improve Efficiency in the Marketing System,

Research Problem Area (RPA) 501, Improvement of grades and standards—crop and animal products.

Activity 5600, Chemical and physical properties of nonfood products.

Commodity 2100, Cotton,

Field of Science, 1525, Chemistry—inorganic.

In preparing inventories for planning purposes, the CRIS reporting units are usually aggregated into 48 research programs and these in turn are aggregated into nine research program groups.

CRIS is used to report all current research projects of USDA agencies, SAES, and parts of other agricultural research conducted by nonland-grant universities. It is useful for State, National, and regional planning purposes.

Theoretically, CRIS provides information on what research is being done by whom and where. It also provides information on methods and procedures, scope of the research, and progress to date. CRIS can be faulted, however, for the fact that some of the data it provides are usually 2 to 3 years out of date. Nevertheless, CRIS is extremely useful in identifying what is being or has been done and by whom. Since most research is continuous, even though modified, information retrieved from CRIS has current aspects.

Despite its drawbacks, CRIS gives managers a tool to assist them in planning programs and the ability, if the information is updated, to avoid unnecessary duplication.

Program Structure

The Agricultural Research Service (ARS) developed the Management and Planning System (MAPS) which described its component research programs for planning and evaluation. Essentially, MAPS is a program *structure* device for organizing the subject matter of research so that it relates most effectively to the activities and plans of the agency. It provides the framework for the supporting systems and information needed for planning, reporting, evaluating, budgeting, and executing research.

MAPS is a logical continuation of the developmental program structure that extends to the individual research project. It consists of missions, goals, programs, work-reporting units, and research projects. It relies heavily on reports from national research program coordinators which are used to provide a summary national report. This report, along with periodic site visits and national program reviews, facilitates tracking all research, assessing progress, keeping abreast of developing technologies, and sensing the importance of developing research problems.

Actually, MAPS is an adjunct to CRIS and in some areas of activity uses the computer facilities of CRIS. There is merit in a possible combination of CRIS and MAPS into one classification system. The CRIS system is

used as the basic input for State, Federal, and some private agricultural research organizations, but the method of aggregation for planning and management purposes differs among the major performers. A modified system of classification could be beneficial.

Principal Findings

- No one system of research classification is sufficient for all management purposes. Some systems work better than others, and certain combinations of systems can be effective. Insofar as USDA is concerned, the local, State, regional, National, and international classification systems along with MAPS, appear to be an effective way to manage research. USDA also uses CRIS as a way of maintaining knowledge of research being done by other institutions and the scientists involved. This classification system is effective in allocating Federal funds to States through CR. There is little management of the formula funds, but contract and grant funds, with the help of MAPS, can also be managed in this manner.

- This system is also of importance to SAES, since most of their funds come from State legislatures and are primarily for local and State problems. Federal formula funds are also primarily for problems of local and State importance but can be used on problems of regional, national, or international significance. But even here, such problems also have facets of local and State concern, and generally it is these aspects that are of major concern to the State scientists.

EVALUATION OF USDA MANAGEMENT AND POLICY PROGRAMS

The diversity, complexity, and broad scope of problems in agricultural research were recognized by Congress in 1977 when it defined the food and agricultural sciences in title XIV of Public Law 95-113. Title XIV states:

Sciences related to food and agriculture in the broadest sense, include the social, economic, and political considerations of:

- Agriculture, including soil and water conservation and use, the use of organic waste materials to improve soil tilth and fertility, plant and animal production and protection, and plant and animal health.
- The processing, distributing, marketing, and utilization of foods and agricultural products.

- Forestry, including range management, production of forest and range products, multiple use of forest and range lands, and urban forestry.
- Aquiculture.
- Home economics, human nutrition, and family life.
- Rural and community development.

The situation is further complicated by the fact that research programs must take into account the attendant problems in exporting food and agricultural products and some of the problems associated with U.S. aid to developing countries. As stated in the National Academy of Sciences (NAS) Committee Report of April 1972:

Agricultural research cannot be restricted to empirical comparisons of methods to increase productivity. The agricultural industry requires research, policy, and programs sufficient to challenge the best efforts and minds of America. On its success depends in large part the welfare of the people of the United States and of the world. It must be given the attention, careful and imaginative planning, and best judgment of the government and of scientists,

Over the years, policy changes within USDA have affected the organizational structure of USDA. Moreover, environmental and social issues have, at various times, had sharp impacts not only on management methods but also on social perception of the Federal agricultural system. Many of these changes and the resultant impacts have involved USDA's main research agency, the Science and Education Administration,

Science and Education Administration

SEA was created in 1977 by USDA in an attempt to improve coordination of research and extension at all levels of Government. Through early 1981 SEA included what was formerly ARS, the Cooperative State Research Service (CSRS), the Extension Service (ES), and the National Agricultural Library. Additional responsibilities in human nutrition, technical information systems, higher

education, and program management, planning, and evaluation were assigned to it by the Secretary. The functional research units of SEA include AR, CR, and HN. *

SEA management includes a program analysis staff whose function is largely one of fostering coordination, and a program planning staff whose major role is to help develop an integrated budget for SEA,

Internal SEA decisions are made by the director and associate director in consultation with the management team. The team consists of the heads of AR, CR, ES, HN, Technical Information, Joint Planning and Evaluation, Higher Education, Special Programs, and Administrative Management. In addition, representatives of subunits usually attend as nonvoting but often participating members. In reality, therefore, more than the above 11 attend. The management team's function is to provide coordination and establish policy that affects the subunits. To date, one of its main activities has been related to budget preparation. Three of the above agencies are of special concern to this study and addressed in some detail. They are: SEA-AR, SEA-CR, and SEA-HN.

Agricultural Research

USDA, in the recent publication "The Mission of the Science and Education Administration—Agricultural Research," outlines the mission and goals, the role and special capability of SEA/AR, the organization and functions, and gives a description of a wide range of research programs. It also includes a compilation of the statutes relating to the agricultural research activities of the SEA/AR.

The foregoing statements and document identify the scope and complexity of the agricultural sector and the research required to serve it. The publication further describes:

*In June 1981, USDA announced a reorganization that eliminated SEA and reestablished ARS, CSRS, and ES. Most of HN was merged into ARS. USDA established an Office of Science and Education to establish broad agricultural research policies, planning, and coordination. These changes are discussed in ch. X and app. A.

a) the SEA/AR responsibilities for the national program, b) the partnership with the SAES, and c) the association with industry. The document provides a good framework for the assessment of the national research system. The critical questions, however, are whether the system is functioning as the paper purports; whether the responsibilities of USDA, SAES, and the private sector are as clearly defined as indicated; whether the relationships are actually as stated; and whether the organization, operations, and leadership are of the nature and caliber to make the system work.

The USDA report furnishes the following guidance with respect to national and regional programs:

1. As the USDA's in-house agricultural research unit, SEA/AR has major responsibilities for conducting and leading the national agricultural research effort.
2. The SAES, with mainly local and regional interests, work in cooperation on national and broad regional research efforts.

The foregoing are the longstanding definitions of the respective USDA and SAES primary responsibilities and areas of concern. However, because of the blurring of these national and regional generalized responsibilities and problems relating to funding at the Federal level, the partnership has become somewhat confused and increasingly uncertain in the last decade.

It is necessary to adapt and adjust the national research capabilities to meet continually changing requirements of those served by agricultural research. This has been particularly critical in the past few decades as the continuing needs of farmers for improved technology were joined by the new and increasingly persistent demands of other sectors of society for answers to environment and consumer interest problems.

Reorganization of 1972

As discussed in chapter III, the reorganization of USDA's ARS in 1972 called for two

major staff units at the headquarters to support the administrator's office. The first staff unit would be composed of the national program staff (NPS), four assistant administrators and their staff specialists. It would be concerned with policy and program development, evaluation, and coordination. The second major staff unit would be concerned with business administration, under a deputy administrator for administrative management. Smaller support staffs were to be responsible for national phases of information, international programs, and similar assignments.

The major thrust of the reorganization was to assign the line operating authority to the field, with four regional deputy administrators, and four associate deputies, to be located within each of the four SAES regions. Each regional deputy administrator would have an administrative services staff, together with a program planning, development, and evaluation staff, and information and biometrical service support.

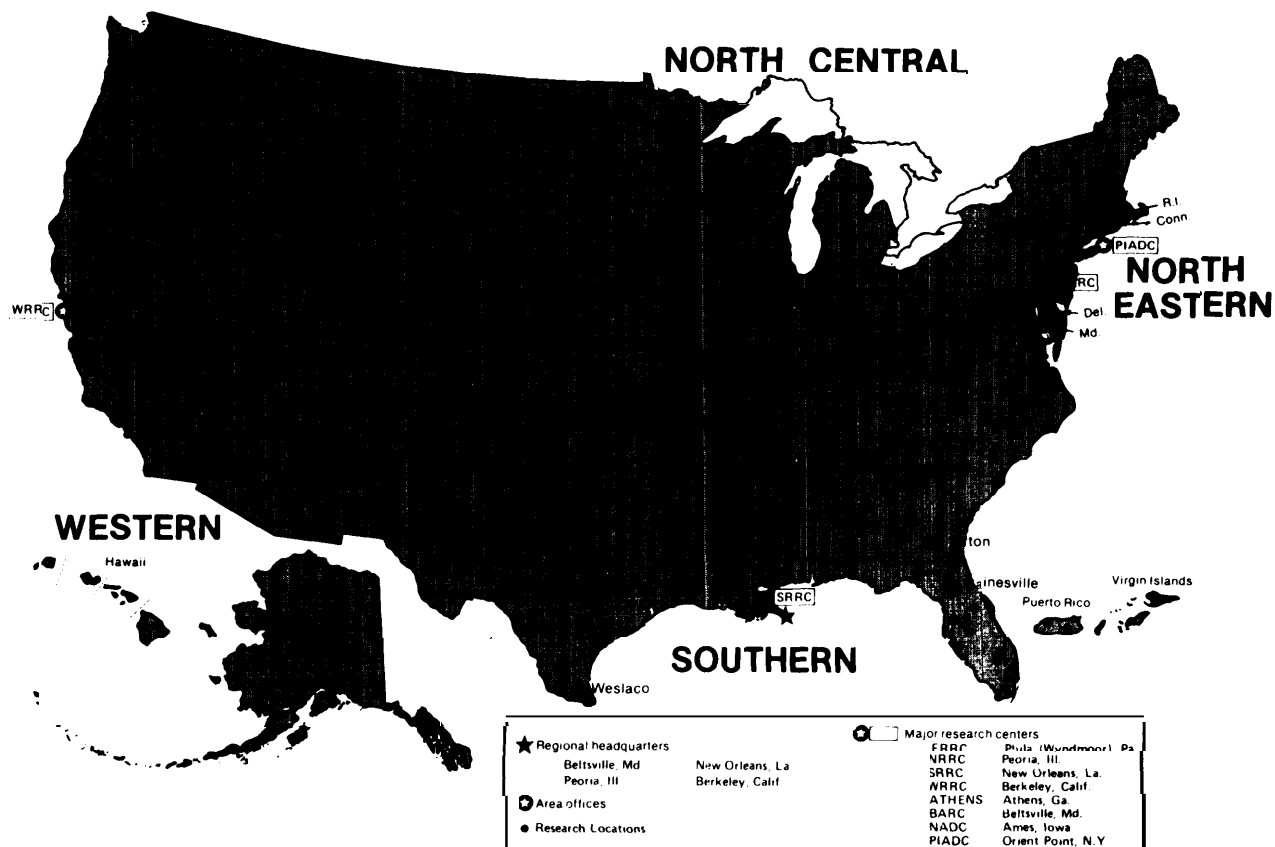
Each of the four regions was further subdivided into a series of research area centers, under a research area director (fig. 22).

The effect of the reorganization was to reassign the former national program investigations leaders to NPS positions, removing their line responsibility and authority with respect to program development, budgeting, selection of staff, etc. The emphasis was placed on the geographical boundaries rather than broad research issues. The national perspective was diminished. By focusing on local and State problems, it became more difficult to emphasize basic research, because of pressure by local groups desiring that research be concentrated on practical problems.

Because the reorganization of ARS has been in effect for nearly 8 years, it appears that sufficient time has elapsed to justify an assessment of the current structure with respect to the overall national research system.

The significant feature of USDA research prior to 1972 was that investigation leaders of the ARS branches guided ARS's regional and national research efforts to solutions of re-

Figure 22.—USDA Agricultural Research System



SOURCE: U.S. Department of Agriculture.

gional and national problems in cooperation with State and regional efforts. The investigation leaders were national leaders from the ARS standpoint. Most enjoyed good cooperation and respect by researchers at SAES and industry (Moseman, et al., 1981). This organizational structure provided an overlay of research support that included scientists, equipment, and operating budgets for research that transcended State boundaries and was of concern in the various farming areas. Research on cotton was conducted and strengthened or modified where that crop was grown. Sugarcane germ plasm and breeding research was concentrated at Canal Point, Fla., and in Hawaii. Potato genetics was centered at Sturgeon Bay, Wis. National or regional investigation leaders were specialists in commodity or problem areas and had in-depth knowledge of their research ac-

tivities, including the expertise of the USDA and SAES. They also knew their subject and geographical territory.

Nearly all of the investigation leaders had access to "soft" money, with which they could contract with SAES for special research to round out specific aspects of the national program. Cooperation and participation by State scientists was thus encouraged, but this aspect of the program has largely disappeared.

The present "regional" structure of USDA research is superficial with respect to the agriculture of the United States—if considered from the standpoint of production, processing, marketing, or distribution or from the standpoint of national resource use and management, environmental factors, or consumer concerns. In contrast, the SAES regions fur-

nish a mechanism for interaction between States sharing a general geographic area of the United States to relate to common operation and management problems as well as subject areas of mutual concern. The strength of the former ARS organizational structure was its ability to relate to an individual State and to the group of States within the SAES regions, and then to transcend these boundaries and furnish the cohesive and coordinating services and functions on a nationwide scale.

Under the present organizational structure, responsibility for a given commodity program is highly decentralized. Although NPS provide technical leadership, they function as staff members and do not have line authority. They can advise and exert some influence, but do not have authority to make decisions concerning resource allocation. In the latter case, many others are involved in terms of a national program. Consider, for example, the case of wheat. It would appear necessary to conduct, for example, the hard red winter wheat research program through the concurrence of the AR deputy administrators for the Southern, Western, and North-Central regions. It would be necessary also to work through and with 7 area research directors and the directors of 11 SAES. The interaction with other regions of the United States where wheat is grown would require an extended gauntlet of regional deputy administrators, area directors, and SAES directors. This organizational structure has resulted in a dilution of national leadership for national programs and, in effect, substituted a series of programs oriented to local, State, or several State areas.

The planning and coordination of research in specific research problem areas should be done by knowledgeable scientists. This becomes more important when the number of locations is large and consolidation desirable. AR has more field locations than necessary to conduct effective national and regional research, within the present limitation of funds and personnel ceiling (NAS, 1972; Moseman, et al., 1981). Further, at a number

of these locations, the research programs are primarily concerned with local and State problems. In some cases, efforts have been made to close such locations. These efforts have met strong political opposition from the local community and their congressional representatives (Moseman, et al., 1981). Usually, this has been sufficient to prevent their closing. Area directors and local AR administrators also frequently work against closing any research effort in their "domain." Area directors appear to have no function from a technical or scientific standpoint. They could be more productive in a field station or laboratory where their scientific expertise could relate to their assignment (Moseman, et al., 1981).

Congressional and Professional Reaction

In hearings before a subcommittee of the House Appropriations Committee, Chairman Whitten repeatedly quizzed USDA representatives on the **1972 reorganization** of ARS. He was most critical of the new regional structure. Examples of some comments are:

Mr. Administer: Mr. Chairman, we are charged with the operation of a national program of research to meet the national needs.

Mr. Whitten: That is what you were charged with before. But, as you changed, you gave that responsibility to the men at Beltsville, and the men in Peoria, and the men in Berkeley, and the men in New Orleans, having assigned them your responsibility, why do we need you . . . every time you have a region you have a breakdown point between the people and the Members of Congress who represent them. You have a breakdown between the Secretary of Agriculture and the field where the work is. The more regional people they have to go through the worse it is—when you delegate it, have a straight line to the man who does the work—don't have it broken in Peoria.

Mr. Long: May I add one other comment, Mr. Chairman, that relates to Mr. Edminister's response to your question?

The regionalization of ARS took place before I came on the scene. However, I have had a chance to observe the results in the field and from here for some months now.

Though I don't pose as an expert on the difference that exists between now and then, I do observe one thing that I think is important. Regionalization, I believe, has given us assistance in the area of close coordination with the university system. It is an extremely important element. There are no dollars in this budget indicating what we are gaining here in terms of coordination and cooperation.

We have a lot of work to do but we are making headway and I think the regionalization is broadly helping us in this area to work more closely with the universities and other research facilities in the country, I could go into more detail on this but I think it is an element we ought to weigh.

Mr. Whitten. I have a high regard for the universities in this country but this is not meant to be an aid to the university program. This is meant to be the U.S. Department of Agriculture research program. We have all sorts of regional research; we have had experiment stations; the land-grant college grants, the various programs that make money available for research, I repeat, this is not an aid to the Extension Service nor to the experiment stations, but the Federal research program

I think I have made it quite clear that we are not particularly pleased with the new organization.

Many scientists, not just USDA scientists, were disturbed by the 1972 reorganization. Entomologists were sufficiently disturbed to ask the Entomological Society of America to name a committee to study the impact of USDA-ARS reorganization on the entomology profession.

The committee took the following approaches in this study:

1. Personal interviews of ARS entomologists, administrators, and State personnel.
2. Personal letters to entomologists on NPS and PAC staff and entomologists currently assigned as assistant area directors or area directors.
3. Questionnaires were developed and sent to all ARS entomologists GS-9 and above, selected laboratory directors and research leaders, SAES directors, and all

heads or chairmen of entomology departments.

The response was summarized in four tables. The committee felt the results were self-explanatory and did not discuss them in detail.

The number of USDA entomologists responding was 215 and nearly all were negative to the reorganization (table 7). In general,

Table 7.—USDA Entomologists' Response to 1972 USDA Reorganization (215 reporting)

1. Do you feel that you have as a scientist, more or less restrictions on your research activity?	More—44.2%	Less—29.8%	No change—26.00/0
2. Are you involved more or less in preparing reports and other paperwork since the reorganization?	More—38.0%	Less—13.4%	About the same—48.6%
3. Do you feel that you have been able to communicate your needs better under the new organization than the old?	Yes—28.8%	No—61.0%	No change—10.20/0
4. Has the new organization been more responsive to your research needs than under the old system?	Yes—27.0%	NO—61.0%	No change—12.0%
5. Do you feel that the new organization has been properly and thoroughly explained to you as a research scientist?	Yes—56.70/0	No—41.40/o	No answer—1.9/0
6. Do you feel that communication between entomologists within the USDA under the new system is adequate?	Yes—28.80/0	No—69.30/o	No change—1.9%
7. Do you feel that the reorganization has promoted a closer cooperation and alignment with State entomologists?	Yes—11.20/0	No—26.50/o	About the same—62.30/0
8. Do you personally feel that your opportunities for advancement in your field have been enhanced by the reorganization?	Yes—11.2%	NO—80.0%	No change—9.80/0
9. Do you feel that the prestige and effectiveness of entomology as a discipline within the USDA system has been adversely affected by the reorganization?	Yes—73.0%	No—23.0%	No change—4.00/0
10. Do you feel that the reorganization has affected significantly the recruitment of outstanding young entomologists into USDA?	Yes—30.3%	No—55.6%	No change (too early to assess) 14.1%
11. Do you feel that the reorganization will affect significantly implementation of future large-scale experiments and area suppression/eradication programs?	Yes—52.50/0	No—38.10/0	No change—9.40/0

SOURCE: Entomological Society of America, vol. 20, No. 1, March 1974.

they felt that: a) communication within USDA among entomologists was inadequate under the new system, b) opportunity for advancement in their field had not been enhanced by the reorganization, c) prestige and effectiveness of entomology as a discipline within USDA had been adversely affected by the reorganization, and d) closer cooperation with State entomologists, a major reason for the reorganization, was about the same.

Twenty-two USDA research leaders and laboratory directors answering the questionnaire found few positive attributes to the reorganization (table 8). They were concerned about: a) more paperwork and budgetary work, b) no better line of communication to higher administration, c) less response to entomological needs, d) inadequacy of NPS in overall planning at the national level, and e) cooperation and coordination with State entomologists, a major reason for the reorganization, being no better than before.

Table 8.—USDA Research Leaders' and Laboratory Directors' Response to 1972 USDA Reorganization (22 reporting)

1.	Do you find yourself doing more or less paperwork and budgetary work since the reorganization?	More—77.3%	Less—4.5%	About the same—18.2%
2.	Do you feel that you now have a better line of communication to the higher administration than before the reorganization?	Yes—27.3%	No—45.55	About the same—27.2%
3.	Do you feel that you are adequately able to transmit your unit's research and budgetary needs through current organization as well as through the old organization?	Yes—40.9%	No—36.4%	About the same—22.7%
4.	Is the new organization more or less responsive to entomological needs than before reorganization?	More—9.1 %	Less—59.1%	About the same—31.8%
5.	Do you feel that the NPS and PAC staffs are adequate for overall planning at the national level, program review and evaluation, and coordination?	Yes—22.7%	No—72.7%	No opinion—4.5%
6.	Do you feel that you have a sufficiently close relationship with NPS and PAC staffs to effectively communicate research needs in entomology?	No—72.8%	Yes—27.2%	
7.	Do you feel that more cooperation and coordinated efforts have developed with State entomologists and other personnel since the reorganization?	Yes—22.7%	No—50.0%	About the same—27.3%

SOURCE: Entomological Society of America, vol. 20, No 1, March 1974

Thirty-four SAES directors responded (table 9). Their response indicated that at the administrative level, but not necessarily at the scientist level, communication was improved at least from a cooperative State-Federal team approach, and that USDA was responding more to local and State research needs.

The chairmen and heads of departments of entomology (36) gave responses that were the most negative of those contacted (table 10). They felt that: a) their departments' relations with USDA entomologists had not improved,

Table 9.—Experiment Station Directors' Response to 1972 USDA Reorganization (34 reporting)

1.	Has communication improved between your office and USDA Administrators since the reorganization?	Yes—73.5%	No—20.5%	No change—6.0%
2.	Has USDA been more or less responsive to local and State research needs since the reorganization?	More—44.1%	Less—3.0%	About the same—52.9%
3.	Has the new reorganization catalyzed any significant cooperative State-Federal team approaches to solving local or regional problems in your State?	Yes—44.1%	No—47.0%	About the same—8.9%
4.	Do you feel that the reorganization has affected the ability of any one discipline in carrying out programs, i.e., entomology, agronomy, agricultural engineering, etc.?	Yes 14.7 %/0	No 82.30/o	No change or opinion 3.0 %/0
5.	Have you noted a closer and more cooperative relationship between individual State and Federal disciplinary scientists since the reorganization?	Yes—23.50/0	No—17.5?40	About the same—59.0%
6.	Did you have prior knowledge of the reorganization before it occurred?	No—55.90/o	Yes—44.90/0	
7.	Did you have an opportunity to express your opinions to USDA officials?	Yes—32.4%	No—67.6%	
8.	Do you now feel that the reorganization has strengthened or weakened the USDA in research effectiveness?	Strengthened 41.2%	Weakened 11.8%	About the same 47.0%
9.	Did the reorganization significantly affect your station's mode of research operation?	NO—88.1 %	Yes—8.9%	No opinion—3.0%
10.	Do you feel that the reorganization has affected the training of graduate students significantly at your university?	Significantly 0%	Not significantly 97.0%	No opinion 3.0%

SOURCE: Entomological Society of America, vol. 20, No 1, March 1974

Table 10.—Chairmen and Heads of the Entomology Department's Response to 1972 USDA Reorganization (36 reporting)

1.	In your opinion, has the USDA reorganization improved your department's relations with USDA entomologists?		
	Yes—11.1%	No—72.2%	No change—16.7%
2.	Do you feel that locally USDA entomologists are more or less responsive to entomological problems in your area, State, and region?		
	Yes—50.0%	No—16.7%	No change—33.3%
3.	Has the USDA reorganization had a significant impact on your State research programs?		
	Yes—16.7%	NO—80.6%	No change—2.7%
4.	Do you feel that the reorganization has improved or impaired employment opportunities for your entomology students?		
	Improved 2.7%	Impaired 44.5%	No change 52.8%
5.	in your professional opinion, do you feel that the image of USDA entomologists has been damaged by the reorganization?		
	Yes—72.2%	No—25.0%	No difference—2.7%
6.	Do you feel that it is easier or harder to get entomology research projects funded through ARS, USDA since the reorganization?		
	Easier—5.5%	Harder—55.5%	No difference—39.0%
7.	in your contacts with USDA entomology personnel, what would be your current assessment of their reaction to the reorganization after approximately 1 year?		
	Favorable 5.5%	Unfavorable 80.5%	No opinion 14.0%
8.	Do you feel that the reorganization has with ARS Decreased research productivity—19.4% Research productivity has remained about the same—80.6%		
9.	Do you feel that the reorganization has Improved the security and opportunity for entomologists—5.5% Lessened the security and opportunity for entomologists—83.3% No change—11.2%		

SOURCE: Entomological Society of America, vol. 20, No. 1, March 1974.

b) there had been no significant impact on State research programs, c) the image of USDA entomologists had been damaged, and d) it was more difficult to get entomology research projects funded through USDA since the reorganization.

As indicated earlier, the committee did not analyze the data in detail. It did make a few general comments which clearly indicated its belief that the new organization was less effective than the former. The following is one such comment:

The reorganization has fragmented the largest body of entomologists in the world working effectively together as a single unit. The role that this unit once served as an organization structure and communication trunkline for nationwide entomological research is no more. The advantages or disadvantages of the reorganization and its impact on the profession can at this point only be debated, and only time will enable us to fully evaluate the full significance of the reorganization (pp. 51-52).

Time has shown that the new organization, as now functioning, is probably less effective than the committee anticipated.

Regional Boundaries and National Needs

The geographical area covered by each regional deputy administrator was chosen to coincide with the SAES regional areas and, consequently, to aid in communicating and working with the SAES. However, these areas have no significance to truly regional research problems. Such problems do not follow State lines, nor do most groups of regional problems fall within the same cluster of States. AR regional administrators most likely do not possess the technical expertise needed to make sound judgments on the technical components of their varied research portfolio because of the wide-ranging subjects, which may include poultry, beef cattle, corn, soil erosion, and plant disease.

The present organizational structure does provide the environment for interdisciplinary research. This is a positive aspect of the organization if a national research focus as opposed to a local one exists. However, maintaining a national focus is difficult with the present organization and there is nothing to preclude NPS from being organized along interdisciplinary lines.

The development of strong, efficient research programs directed toward the solution of regional and national problems requires strong technical leadership at the national level. Such leaders must have full knowledge of the technical and scientific aspects of the

problems they face. Such leaders must have the ability to work with other scientists in a cooperative and technical capacity. They must also have an in-depth knowledge of all physical, personnel, and financial resources of AR for their areas of expertise and should be responsible for making final recommendations on allocation of these resources after being given a budget allocation from a higher authority. In other words, they should have line authority.

AR scientists located in the various laboratories and field locations of all regions must have the opportunity to work directly with the national program leaders in finding the best way for their efforts to become effective and useful parts of the national and regional efforts. These scientists' responsibilities are primarily to carry out the national and regional programs jointly developed and to coordinate these activities with directors of SAES and other interested parties.

A recent letter from the administrator of AR directed to regional administrators, deputy administrators, NPS, and NPS chiefs attempts to correct the problems addressed above (Kinney, 1981). However, more formal changes will have to be articulated into the organization charts and job descriptions to carry out effectively what appears to be the intent of the letter.

There are other issues that need study and evaluation. There is a real question as to the need for area administrators. They frequently work against closing any research effort in their domain. As noted earlier, area directors appear to have no function from a technical or scientific standpoint. Study is needed on how to use them in a more effective way.

Cooperative Research

CR is responsible for administering Federal funds that go to States for agricultural re-

search. Traditionally CR has developed a close working relationship with the SAES, the schools of forestry, and the 1890 colleges and Tuskegee Institute. Many of the staff were former scientists at these universities.

The administrator is a member of the Experiment Station Committee on Organization and Policy and meets regularly with it on research matters of interest to the States and USDA.

As a part of the CR staff's responsibilities toward coordination of research among the States and between the States and USDA, they represent the States. This representation involves budgets, research priorities, formula v. grant funds, coordination, and in fact most problems the SAES have.

The CR staff is also charged with the responsibility of developing a budget that reflects the State's input. At that point CR, like AR, has only minimal control over, and input to, the USDA research budget that is submitted to OMB and ultimately Congress. This is a Government-wide practice. However, AR and CR complain of too much staff time being spent in preparing the SEA budget and little or no input after it is combined into the SEA budget (Lovvorn, 1980).

The Hatch Act gives the Secretary of Agriculture broad power and responsibility in administering funds to the States. CR performs these functions on behalf of the Secretary. The SAES directors, however, have never been willing to fully use CR in terms of the agency being their Washington representative. In the name of States' rights, they have prevented CR from performing many functions that would assist their own programs. CR should have the necessary authority to represent the States (Lovvorn, 1980).

Review Function

CR conducts onsite systematic subject matter reviews in all of the States. These reviews include not only research funded by Hatch or grant funds but, by mutual consent, all of the research, regardless of the source of funding.

Review teams include experts from universities as well as from the USDA and the private sector. At the close of the review, they report to the scientists, department head, and SAES director. The reviews generally cover broad subject areas such as crop science and soil science. They are usually conducted every 3 to 5 years, and their purpose is to serve the needs of the research group that requested it (Special Review Process, USDA, 1980). They deal only briefly with the past and emphasize approaches to program improvement and plans for future endeavors. After giving an oral and a subsequent written statement of the review, there is no further followup. Acceptance of recommendations is an option of the client institution. If a request is not made for a review of an area of work within 3 to 4 years, CR may suggest that a review be undertaken. There are no legal requirements for reviews; they are conducted as part of CR's responsibility for coordination of research sponsored by Hatch funds. However, most SAES personnel believe they are beneficial (Lovvorn, 1980).

All Hatch-supported projects are sent to CR for review and approval or disapproval. By mutual consent between CR and the SAES directors, all State-supported projects are also sent to CR. Thus, the CR staff is knowledgeable of all activities at the State level. This desk project review process is not always productive. Most SAES directors submit good outlines; some do not. Some CR staff members make excellent contributions to the outline; others do not (Lovvorn, 1980).

The House Science and Technology Committee—in 1976 hearings on agricultural R&D—found that the special and onsite reviews of SAES performed by CR should be strengthened and more widely used. They

also suggested that, where appropriate, increased use of qualified scientists from outside the USDA-SAES system should be encouraged. These recommendations appear to be still valid.

Administration of Grants

CR also administers a research-grants program that uses the competitive process in the selection of grantees. These programs are:

1. competitive research grants program to support basic research in the food and agricultural sciences,
2. special research grants program to support research deemed by Congress and USDA to be of particular importance to the Nation,
3. alcohols and industrial hydrocarbons program, and
4. native latex research program.

A comparable grant program for the Solar Energy Systems for Agriculture Program is administered by SEA's Southern Energy Center in Tifton, Ga. Guidelines for grants to be awarded competitively are published annually in the Federal Register.

A CR program manager is selected who chairs the peer panel and reviews and scores proposals for special grants. Each panel consists of eight members, including the chairperson. The panel is selected from: a) USDA and other Federal agencies (minimum of one); b) SAES, forestry schools, schools of veterinary medicine, and colleges of 1890 and Tuskegee Institute (minimum of three); c) scientists of nonland-grant institutions with food and agricultural research capabilities (minimum of one); and d) scientists with needed expertise not covered by a member listed above or by the chairperson. The program manager summarizes the panel's findings, and on the recommendations of the CR administrator, the SEA director signs off on the proposal (Policies and Procedures for Special Grants, USDA, 1980). The CR administrator could make this decision without this extra layer of administration.

Regional Research

Section 3(c)3 of the Hatch Act provides that up to 25 percent of the funds may be used for regional research to “stimulate and facilitate interstate cooperation on research of a regional and national character both among SAES and with the United States Department of Agriculture” (USDA Food and Agricultural Research Grants, 1980).

CR has the responsibility for administering these funds. Advisory to CR is the Committee of Nine, a committee specified by law to include eight SAES directors and one home economics research administrator. The concept is good and it has encouraged cooperation among States, but the SAES directors have not allowed the committee enough authority to plan and carry out strong regional programs (Lovvorn, 1980).

The regional projects carried out under the SAES basically constitute a group of scientists working on a problem of importance to more than one State. The funds for the regional projects give these scientists an opportunity to get together and exchange information. Some change in direction or emphasis of their research may take place as a result of such meetings, but there is no one with authority to allocate resources (personnel and funds) to any given area of activity. There is no one source of accountability, and there is no assurance that all aspects of the needed research will be covered. Notwithstanding, these regional funds have been extremely useful. Not only do they benefit the work that is important to each of the cooperating States, but usually the net result is a greater and more coordinated effort than it would have been without such funds.

SAES-sponsored regional research should be cooperative with AR where the problem is of sufficient regional or national importance to require AR input. With interest and capable technical leadership, AR should be able to adjust its resource input to give assurance that all necessary aspects of the problem are covered. Thus, the SAES would be contributing to those aspects that are most useful and

of most interest to them, but the total effort should lead to a fully rounded research attack on the regional or national problem. Prior to the 1972 reorganization of ARS, most ARS cooperative research with the SAES took this form of cooperation (Moseman, et al., 1981).

evaluation

Attempting to evaluate the administrative and management aspect of CR is difficult considering the long history of legislation and the independent nature of each of the SAES. The original Hatch Act makes the directors of the SAES responsible and accountable for the Hatch funds they receive. From the legislation and the manner in which CR (and its predecessors) operates, it appears that CR is an agency only for transmitting funds and for coordination. CR operates as though it were under the supervision of the SAES directors, rather than the administrator of SEA.

There is no doubt that strengthening the research base and basic research of all the SAES is desirable and in the public interest, and it should be done through the Hatch process. It is difficult for SAES to agree on budgets or programs that do not provide something for everyone. However, in times of stringent budgets it is difficult, if not impossible, to convince everyone, especially Congress, that this is the most efficient way to solve agricultural research problems. A quick glance at the Food and Agricultural Research Grants, fiscal year 1980, shows most of them to be small and spread over a large number of institutions (USDA Food and Agricultural Research Grants, 1980). Since competitive and special grants were not meant to take the place of formula funding, they should be built more around major new priority problems that would enable new thrusts to be initiated until ongoing programs can be shifted.

Questions have been raised as to whether CR is the appropriate agency to administer the competitive research grants program. All U.S. research institutions and scientists that have expertise and capabilities are supposed to be [and should be] considered equally as

possible grantees. Having one agency, whose main function and purpose is so closely tied to one segment of the research community (and which receives a large share of the grants), administer these grants gives reason for concern. In 1980, out of a total of 207 grants, 114 went to land-grant institutions, 13 to Federal agencies, and 80 to nonland-grant institutions (USDA, Food and Agricultural Research Grants, 1980). This is consistent with the ratio of applications to grants received.

There would be less criticism and at least the appearance of more objectivity if these grants were administered by a separate office within SEA that had no allegiance to any special facet of the agricultural research community. This office would include the administration of the competitive grants for the Solar Energy System for Agriculture Program (now administered directly by SEA's Southern Energy Center).

Human Nutrition

Authorization for Federal human nutrition research of importance to U.S. citizens is principally the province of USDA and the Department of Health and Human Services (DHHS). Within DHHS, it is funded or conducted mainly by National Institutes of Health (NIH) and to a lesser extent by the Food and Drug Administration (FDA) and Center for Disease Control (CDC). Other agencies (IDCA/AID, DOC/NOAA, DOD, NASA, NSF, and VA) are involved to lesser degrees in certain aspects of human nutrition research.

Although human nutrition research had been done by USDA under an 1862 congressional mandate until the passage of the 1977 farm bill, direct Federal effort was confined to very few issues which related to national problems concerned with nutrition. The 1977 farm bill specifically singled out certain mission-oriented research which was needed to conduct large national intervention programs involving nutrition and to solve national issues concerned with diet in health promo-

tion. In addition, it specified that coordination and communication within and among Federal agencies on the subject of human nutrition take place.

Human Nutrition Research in USDA

During the 95th Congress, the displeasure of Congress with the state of Federal human nutrition research became apparent. At one point in the drafting of the 1977 farm bill, all nutrition research was placed within the purview of USDA. This language did not survive the conference committee, but the National Agriculture Research, Extension, and Teaching Policy Act of 1977, Public Law 95-113, established "firmly the Department of Agriculture as the lead agency in the Federal Government for the food and agricultural sciences, " and furthermore that "the Department of Agriculture is designated as the lead agency of the Federal Government for agricultural research (except with respect to the biomedical aspects of human nutrition concerned with diagnosis or treatment of disease)" Specifically, the law states: "The Secretary shall establish research into food and human nutrition as a separate and distinct mission of the Department of Agriculture, and the Secretary shall increase support for such research to a level that provides resources adequate to meet the policy of this subtitle. " In addition, the Secretary of Agriculture was directed to "establish jointly with the Secretary of HEW procedures for coordination with respect to nutrition research in areas of mutual interest, " and to "coordinate all agricultural research, extension, and teaching activity conducted or financed by the Department of Agriculture and, to the maximum extent practicable, by other agencies of the executive branch of the United States Government. "

The USDA was specifically delegated the following research goals:

1. research on human nutritional requirements;
2. research on the nutrient composition of foods and the effects of agricultural practices, handling, food processing, and cooking on the nutrients they contain;

3. surveillance of the nutritional benefits provided to participants in the food programs administered by USDA;
4. research on the factors affecting food preference and habits; and
5. the development of techniques and equipment to assist consumers in the home or in institutions in selecting food that supplies a nutritionally adequate diet.

In response to the 1977 farm bill, HN was established as an administratively independent unit of SEA. However, its budget authority was based in AR. Through early 1981, it was headed by an administrator and consisted of six research centers. * The HN administrative and technical staff are professionally trained in nutrition or a related discipline. The administrator of HN and the directors of the centers are scientists with international reputations in nutrition research. The regional human nutrition research centers programs are national in scope and mission oriented. The concept of the centers was established in the 1977 farm bill, and three existing institutions—the USDA Nutrition Institute at Beltsville, the Human Nutrition Laboratory at Grand Forks, and the Consumer Nutrition Center at Hyattsville, which had been mandated by FUS SC427 and public Law 89-316 respectively—became the first centers. In 1978, Congress mandated two additional centers—the Children’s Nutrition Research Center at Baylor and the Human Nutrition Research Center on Aging at Tufts—in Public Law 95-448 of 1978. Additionally, Public Law 96-154 of 1979 mandated “that the Department of the Army transfer to USDA 19 positions at the Institute (LAIR) currently dedicated to nutrition research. USDA is to develop a program for a Western Nutrition Center . . . ,” thus establishing the sixth center.

The functioning of the centers has been hampered by low levels of funding overall (fig. 23). The three newest centers are par-

ticularly hard-hit, since they have had to be developed de novo and have had a severely restricted number of slots for professional staff. Through early 1981, USDA professional staff at all three of the new centers totaled 6; an additional 12 civil service positions remained to be filled. The bulk of the work at two of the centers is being carried out by non-USDA contract personnel. At the Center on Aging at Tufts, of the 10 professional staff only 1, the director, is a USDA civil service employee, while at the Children’s Nutrition Research Center, none of the 16 professional staff are USDA civil service employees.

Restricted funding has led to some anomalous situations. For example, a large research building is being constructed for the HN Center on Aging; however, only five slots have been allotted for professional USDA staff. While at the Western Nutrition Center, only half a floor has been allocated for all administrative, management and research activities. Neither the floor space nor the eight professional slots appear to be adequate for the proposed mission of the Western Nutrition Center. Part of that mission is to act as the technical resource and research group for the National Nutrition Status Monitoring System which will be jointly administered by USDA and DHHS. For the three newest centers, neither proposed funding nor staffing allotments appear to be adequate to allow these centers to conduct meaningful research.

Implementation of a research center’s mission is the primary responsibility of the center’s director and his or her research leader. They make use of recommendations from an executive committee established for each research center and a Board of Scientific Counselors, who continuously monitor the program. The executive committee (which includes representatives of the center’s cooperating institutions) reviews the broad scientific program within the center and deals with issues that affect the coordination of the research between participating agencies and institutions and with other aspects of research management. The Board of Scientific Counselors to HN (operating on an ad hoc basis

*As noted earlier, in June 1981 USDA eliminated HN as an administrative unit and merged most of it with ARS. This change is discussed in ch. X and app. A.

Figure 23.—USDA Human Nutrition Research Centers

Research center	Established*	Enabling legislation*	Collaborator	USDA scientists professional staff (FY1981)	Non-USDA scientists professional staff**	Scientists professional staff positions	FY 1980 budget (dollars in thousands)	FY 1981 budget (dollars in thousands)	FY 1982 budget (dollars in thousands)	Physical plant
Beltsville HN Research center	1941	7USC427	None	46	0	46	\$6,435	\$6,943	\$7,506	HN
Consumer Nutrition Center	1954	7USC427	None	31	0	31	8,532	8,146	8,458	Commercial leased
Grand Forks HN Center	1966	PL89-316	Univ. of ND	10	1	10	2,408	2,788	3,292	HN
HN Res. Center on Aging at Tufts.	1978	CR95-1579 on PL95-448	Tufts Univ.	1	9	5	2,000	3,704	3,845	Cooperator
Children's Nutrition Res. Center	1978	CR95-1579 on PL95-448	Baylor Col. of Medicine	0	16	5	2,500	2,800	2,905	Cooperator
Western HN Res. Center	1979	SR95-553 on PL96-154	UC Berkeley	5	0	8	1,000	2,010	2,087	Fed. Dept. Army

*Original human nutrition research dates back to 1893 based on a Congressional Directive in 1862.

**USDA contact personnel.

SOURCE: U.S. Department of Agriculture, 1981.

and made up of scientific experts from outside USDA) reviews the scientific and technical aspects of the program.

Administratively, the coordination, direction, and monitoring of the centers are carried out by the HN Administrator's staff through onsite visits and analysis of annual reports and plans from the centers and their advisory and oversight bodies. These analyses are the basis for the Administrator's selection of priority problems to meet national needs. It is unclear, however, how a director of a research center who is not a USDA employee, but rather an employee of the cooperating institution, would interact with the Administrator and his or her staff. The relationship would seem to be that of a contractor-contractee rather than that of the usual chain

of command. It is also not clear what lines of authority and responsibility exist between a director or research leader of a center if they are not USDA employees and their USDA staff.

In addition to the research work of the centers, HN has the responsibility to: 1) support extramural research in human nutrition; 2) develop and disseminate to the public and user groups nutrition information through appropriate educational programs; 3) develop effective coordination mechanisms with other agencies concerned with human nutrition; 4) conduct technical clearance of all human nutrition education and information materials; and 5) ensure that human nutrition programs and policy decisions at USDA re-

fleet and are consistent with scientific consensus.

The human nutrition component of the competitive grants program, while coordinated with HN, is funded and administered through CR. The fiscal year 1981 budget allowed \$2.9 million for the program. This reflects an absolute drop of \$0.1 million since the program's inception in 1978. At this level and with the allowable research topics limited to a few narrow areas, it does not seem that this grants program will be capable of stimulating significant creative research efforts in nutrition.

Finally, SAES, 1890 land-grant colleges and Tuskegee Institute, carry out nutrition research with Hatch Act or other Federal funds. Determination of research direction is largely determined at a local level.

Each of the above USDA activities in human nutrition research is earmarked and budgeted for human nutrition research in a prospective manner. Related work in animals or plants would not be counted toward human nutrition research. The definition used for human nutrition at USDA is defined, clear-cut, and narrow.

Coordination With **Other** Federal Agencies

A Human Nutrition Policy Committee, established by USDA, oversees all nutrition efforts within USDA; coordinates and integrates the human nutrition research, education, and information activities within USDA; and cooperates with other Government agencies in coordinating their activities with those of USDA.

The basic attempt at coordination of human nutrition research within the Federal Government has been the Joint Subcommittee on Human Nutrition Research of the Committee on Health and Medicine (JSHNR) and the Committee on Food and Renewable Resources, Federal Coordinating Council on Science, Engineering, and Technology, OSTP. The committee meets at fairly regular

intervals and has high-ranking representatives from all Federal agencies involved with human nutrition research.

The USDA HN Administrator and the chair of the DHHS NIH's Nutrition Coordinating Committee are the cochairs of this joint subcommittee; however, all the staff work is provided by DHHS NIH. During the 2½ years of its existence, the subcommittee has enunciated a Federal definition of human nutrition research; it is an extremely broad definition which encompasses much of the basic research in cell biology, molecular biochemistry, membrane transport, etc., which the DHHS NIH classifies as human nutrition research. In fact, the JSHNR definition virtually duplicates the definition for human nutrition research that NIH first expounded in 1977. JSHNR has also produced the first of a three-part report entitled *Federally Supported Human Nutrition Research and Training and Education Update for the 1980's, Part 1: Human Nutrition Research and Training*. Parts II and III will focus on international nutrition research and nutrition education research, education for professionals and for the public. JSHNR has been ineffective in furthering the development of the congressionally mandated National Status Monitoring System. Also, effective advance coordination of Federal research projects has yet to be demonstrated.

Human Nutrition Research in DHHS

The overall role of DHHS in human nutrition research was broadly mandated, although never specifically mentioned in the Public Health Service Act of 1944 (Public Law 410). However, after passage of the 1977 farm bill, DHHS's role in human nutrition research and education was precisely defined by Public Law 95-622, the Biomedical Research and Training Amendments of 1978. Of DHHS's many divisions, only FDA has separate statutory authority to conduct human nutrition research to regulate the safety and labeling of foods.

DHHS has a very different management setup from USDA. At the department level, DHHS employs an executive secretary for its department-wide Nutrition Coordinating Committee; this position has no line management or budgetary authority but is a staff advisory post which reports to the Deputy Assistant Secretary for Health. Since 1977, this post has been held by professors of medicine on leave from their respective medical schools for a year.

DHHS's portion of the Federal human nutrition research budget is figured at \$137.3 million by JSHNR or greater than 76 percent of the Federal Government's effort in this area. However, this figure is compiled by using the broad definition of human nutrition research discussed in the previous section. Relatively limited amounts, less than 2.5 percent of the DHHS's total effort, of money are allocated to the mission-oriented human nutrition research programs in FDA, CDC, and the National Center for Health Statistics. These are mainly intramural programs, although FDA has recently expanded its contracted research, and are staffed by professionals expert in human nutrition research who have clear-cut programs with defined management structure.

The bulk of human nutrition research funded by DHHS (over 93 percent) is administered by NIH. At the institute-wide level there is a special assistant to the director who acts as the chair of the NIH Nutrition Coordinating Committee (NCC). This committee is composed of one representative from each of the institutes conducting research, administering research, or having an interest in nutrition. With the exception of the newly funded Clinical Nutrition Research Unit (CNRU), NCC has no line management or budgetary authority over any nutrition research. Even in the case of CNRU the funds are provided by three of the institutes (National Cancer Institute (NCI), National Heart, Lung, and Blood Institute, and National Institute of Arthritis, Metabolism, and Digestive Diseases).

Grants make up the largest share of human nutrition research dollars at NIH and are

administered by the Division of Research Grants. This group is totally independent of any of the institutes. The staff does not review grant applications but sets up outside study sections and coordinates their activities through a staff executive secretary. Study sections composed of outside expert reviewers are set up to review each area of biomedical research including nutrition. After grants are funded for the year, the abstracts of these grants are reviewed by the relevant institutes and NCC, and the nutrition-related moneys in these grants assigned. Thus, an NIH grant can be anywhere from 1 to 100 percent nutrition. More than 75 percent of the grants designated nutrition related are reviewed by study sections other than nutrition. Therefore, the major emphasis of these grants is not nutrition. In contrast to USDA, grant moneys from NIH are determined to be nutrition related after the fact, rather than before the grant is made.

Institutes (or groups of institutes under coordination of NCC) may put out a request for application (RFA) for grants in the specific neglected areas of nutrition; proposals that are funded under this mechanism are considered to be 100 percent nutrition related. Six such RFAs have been released from June 1977 to June 1980. Program announcements (PAs) are similarly released, but they are much less specific in the research requested; eight such announcements were released from June 1977 to June 1980. All funded proposals to such an announcement would be considered 100 percent nutrition related. (No dollar figures are set aside for the grants funded through RFAs and PAs.) A given RFA might result in no funding whatsoever.

In contrast, request for proposals (RFPs) have budgeted amounts within individual Institutes. With the exception of NCI's Diet, Nutrition, and Cancer Program (DNCP), there is no entity within any of the institutes whose main emphasis is nutrition and which has funding for that purpose. Even DNCP no longer has management or budget authority. Thus, any contracted research in nutrition

must originate from nonnutrition administrative entities. Of the nine research RFPs issued by the institutes from June 1977 to June 1980, three were issued by DNCP when they still had independent funding authority. Thus, there is no NIH-wide budgetary or managerial control of nutrition research. Indeed, in many of the institutes there is no institute-wide control; these decisions are left to the division level or lower. NCC acts only in a staff advisory capacity to most of the nutrition research activity at NIH.

Since the province of NIH is biomedical research, the major emphasis of nutrition-related research is the role of nutrition in the causes, prevention, or treatment of disease. Thus, most of NIH's administrators and many of its intramural researchers in nutrition are M.D.'s with an interest in nutrition, rather than professional nutritionists.

In 1978, OTA issued the report *Nutrition Research Alternatives* which dealt with the interagency issues in nutrition research. The findings of the report are still valid, since many of the same problems between DHHS and USDA continue.

Need for Change in SEA Management

Title XIV of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 designates USDA as the lead agency of the Federal Government for agricultural research (except for biomedical aspects of human nutrition), extension, and teaching in the food and agricultural sciences. As noted earlier, USDA created SEA to focus attention on the coordination of these three functions, partially in response to the legislation and to increase the credibility of management as viewed by OMB. The architects of the agency feel the credibility of research has increased in OMB and the White House (Lovvorn, 1980).

Lovvorn, in interviewing individuals within USDA as well as in the university community, gained the impression that the director of SEA is held in high esteem; he goes on to state:

A good job is being done in budget preparation but at enormous manpower expense, and that progress is being made in the two advisory committees. Little progress seems to have been accomplished in long-range planning, in expediting decision making, and furthermore morale is low in the sub-agencies because of heavy drain on their limited personnel, thus preventing them from performing their necessary functions. The University half of the partnership concept is in disarray. They no longer see themselves as a viable and functional partner.

Until the early 1950's, research leaders of USDA, including the chiefs of bureaus and the head of the Office of Experiment Stations had direct contact with the Secretary of Agriculture through fortnightly staff meetings called by the Secretary. Secretary Benson terminated these meetings but had some continuing contact with the agricultural research administrator. However, the lines of communication with the research administrator (and occasionally some bureau chiefs) were primarily through the Assistant Secretary for Research and Extension. Following the reorganization of 1953, the directors of research and others at this level had less frequent and primarily informal contacts with the assistant secretary. By 1963, the position had been reduced to director of research and education.

In the PSAC Agriculture Panel report of January 1962, it was recommended that there should be appointed an Assistant Secretary for Science and Technology in USDA to devote full attention to USDA activities in domestic and foreign science and technology. The same recommendation was made 15 years later by the NAS study on world food and nutrition.

During the Nixon administration, the Director of Science and Education (S&E) position was abolished and responsibilities for S&E came under an assistant secretary who had responsibility for conservation, research, and education. This continued into the Carter administration. After a few months, the research and education responsibilities were split off and placed under a Director for SEA. Thus, the heads of the AR and the CR re-

mained downgraded, serving under a Director of Research and Education.

The SEA Director wears two hats; he is chief executive officer of SEA, an operating agency. He is also science and education advisor to the Secretary and, as such, is equivalent to an Assistant Secretary. Within SEA, each of the programs is headed by an administrator (AR, CR, HN, ES, and Technical Information Systems) and each could operate more efficiently by having only policy guidance above them. The additional layer of administration has caused delays; many decisions formerly made by the administrators must now be forwarded to the SEA Director for final approval. The Director and Associate Director seem to be concerned with too many details on day-to-day operations. Their talents could best be directed toward policy matters (Lovvorn, 1980).

In view of the importance of a strong and responsive agricultural research program, both nationally and internationally, it seems essential to provide for a more direct relationship to the Office of Secretary.

Economics Research

Of the total research budget of USDA (excluding funds passed on to the States), economics research has a relatively small role. From 1972 to 1980, it accounted for only about 5.5 percent of USDA research expenditures. No trend was apparent in this proportion.

As USDA is organized, economics research is in a sense a synonym for social-science research. The economics research structure includes limited research in the other social sciences (particularly rural sociology) and in history. The economics research staff, however, is almost entirely composed of agricultural economists.

Historically, economics research has not typically been strongly favored by the agricultural committees in Congress. Other forms of social science research have been even less favored.

Institutional Development¹

Agricultural economics research has existed in USDA since 1901, when a farm management branch was initiated under the leadership of an agronomist. In the next two decades, other lines of agricultural economics work were added, and in 1919, the Office of Farm Management was reestablished as the Office of Farm Management and Farm Economics.

In 1922, USDA economics and statistical activities were consolidated into a new organization, the Bureau of Agricultural Economics (BAE). During the first years of the Bureau, research emphasized the collection and analysis of data on production, prices, and markets for farm products. From 1922 to 1938, various activities were added to and removed from BAE's portfolio. Through the period, however, research funding was overshadowed by crop and livestock reporting and marketing services (such as the market news service) and regulatory functions.

In 1938, BAE was substantially reorganized in an effort to transform it into the general planning agency for USDA. Responsibility for marketing and regulatory work was transferred to other agencies. The research program and the statistical work were retained. The planning work proved to be highly controversial and was gradually cut back. Some research involving social matters also proved to be quite unpopular with certain Members of Congress.

In 1946-47, the work of the bureau was somewhat reorganized to reflect congressional preferences. Research staffing and studies were reduced, while the statistics staff was increased.

In 1953, with the arrival of a new administration, BAE was abolished and its functions were divided between two new agencies—ARS and the Agricultural Marketing Service (AMS). A Farm and Land Management Division was established in ARS and three others in AMS: Market Research, Agricultural

¹This section is based on Baker and Rasmussen, pp. 53-72.

Economics, and Agricultural Estimates. Administrator Wells said he thought the reorganization offered agricultural economists more opportunity for research than any other form of organization proposed. Research appropriations did in fact increase substantially, though not without some congressional concerns.

In 1961, another new administration arrived, and agricultural economics work was again substantially reorganized. Work previously grouped in ARS and AMS, as well as some work carried out in the Foreign Agricultural Service, was regrouped into two new agencies: The Economics Research Service (ERS) and the Statistical Reporting Service (SRS), which were placed under a new Director of Agricultural Economics. A staff economists group was also established under the Director's supervision.

While the new arrangement was quite attractive to many agricultural economists, it evidently did not find great favor in Congress. Congressman Whitten said in 1967, quoting an earlier statement of his own:

You insist on having a Bureau of Agricultural Economics. It is my judgement it costs you about a million or a million and a half dollars a year to carry that title, because it is hard to sell (Baker and Rasmussen, p. 67).

Only rarely did an appropriation increasing funds for a particular line of economic research get through Congress. As for the regular ERS budget, Congress continued to be critical. The Administrator sometimes seemed to be on a treadmill where great effort was required merely to remain in place (Baker and Rasmussen, p. 68).

In 1977, with the arrival of another new administration, further organizational changes were made. ERS and SRS, along with the Farmer Cooperative Service, were combined into a new agency, the Economics, Statistics, and Cooperatives Service (ESCS). It reported to a Director of Economics, Policy Analysis, and Budget. The actual operations of the three component agencies, however, did not change greatly; the main shift was in the top

administrative structure. In 1980, the technical assistance functions relative to cooperatives were transferred out and ESCS was reestablished as ESS. Yet another administration arrived in early 1981. The first move was to replace the former Director by an Assistant Secretary for Economics. A second move was to separate ERS and SRS back out of ESS.

Current Status'

Structure and Budget. As of early 1981, ESS was divided into three main components: economics, statistics, and administration. Each was headed by a deputy administrator. In terms of total budget and total staffing as of November 1980, the statistics unit was somewhat larger than the economics unit: a budget of \$50.6 million v. \$35 million in fiscal year 1980, and a staff of 1,076 v. 784. Both units had staff divided between Washington and the field, though in quite different proportions. Statistics had 70 percent of its staff in the field v. 19 percent for economics.

The economics unit (now ERS) is divided into four main divisions: national economics, international economics, natural resources economics, and economic development. National economics is the largest in terms of budget and staff, and economic development is the smallest. On balance, about 78 percent of the funding is devoted to domestic economics and 22 percent to international economics.

As of November 1980, 149 economics staff members were located at 41 field locations in 31 States, generally in a department of agricultural economics at a State university.

Role of Research.—As noted earlier, about 5.5 percent of USDA research budget for 1972 to 1980 was spent on economics research. This figure was based on the total appropriated budget of the economics unit and its predecessor, ERS. Although the figure of 5.5

¹This section is largely based on "An Assessment . . . Response to OIA Questions;" "Economics and Statistics: Programs Results and Plans"; and "Economic, and Statistic Service: Programs, Functions and Organization." It was prepared prior to the recent division of ESS into ERS and SRS.

percent is not high, it overstates the actual status of economics research. In fact, much of the unit's efforts is devoted to economic analysis and data acquisition. *

It is interesting to note how ESS sorted out the activities of its economics unit. For fiscal year 1980, it estimated that only 35 percent went for research, 47 percent for analysis, and 18 percent for data acquisition. If these proportions are applied to the total fiscal year 1980 budget of \$35 million, it meant that \$12,25 million was spent on research, \$16,45 million on analysis, and \$6,3 million on data acquisition. Following this through suggests that only about 2 percent of the USDA research budget was spent on economics research, and that the other 3,5 percent was being spent on economics related activities. There are no widely accepted norms in these matters, but this seems a very small proportion for economics research,

The leadership of ESS was acutely aware of the situation. It acknowledged that "from a functional standpoint, the major emphasis of the agency is on economic analysis" (ESCS response to OTA inquiry, 1980). It stated that:

... there has been a real cost in terms of research. Research resources have been preempted by the exigency of short-term economic analysis. We desperately need to restore the balance between research and analysis in order to build an improved research program upon which to base our analyses (p. 14).

We are taking steps to increase the share of resources devoted to research. We believe that a greater share devoted to research is a necessary investment in our in-house capacity, expertise, and knowledge base, without which our ability to do economic analysis would eventually be eroded (p. 4).

*While difficult to draw sharp lines between research and analysis, ESS defines: a) research as all work that is intended to measure or uncover new socioeconomic relationships or that is directed to testing and improving the use of the relationships previously measured, and b) analysis as the application of currently available results of research and statistical measurement to current and prospective problems, issues, and decisions,

There are, however, limitations on how much can be done in the way of adjusting within the available resources. ESS notes several constraints in these terms (ESS, p. 9):

- Legislative commitments. By law, we must do an undefined minimum of work in several areas (cost of production, and crop and livestock statistics, for example).
- Budget commitments. (There is an) . . . increasing amount of work earmarked in the budget process. We honor such commitments for at least three years.
- Public expectations. The public and private sectors have become accustomed to having us provide some of the basic data and indicators on a regular basis.
- Researchers' adaptability. Extensive and rapid redirection is often limited by the ability of highly specialized researchers or statisticians to adjust quickly to the other lines of work.

In short, ESS appears to be in a very tight and difficult situation with respect to the research function. It can make some adjustments itself, but to do more research would likely require help from Congress.

Current Issues

According to data in the preceding section and in chapter IV, it seems that relatively limited funding is available for economics research as such. Research is part of a larger economic package involving data collection and analysis. A balance is needed among these activities. But assessments of what constitutes an appropriate balance vary. Thus, securing more funds for research by shifting resources from analysis would be a debatable strategy. In any case, it would be difficult to do because of the strong demand for analysis. Another approach would be for Congress to do less earmarking of funds or provide more funds for research as such. The probability of either happening, however, is not great at this point (for further discussion, see Ruttan, 1981).

The key issues raised more generally in the OTA study, such as: 1) delineating local/regional/national problems, 2) establishing re-

search priorities, and 3) linking with other agencies—Federal, State, and local—are as relevant to ESS (and now ERS) as they are to AR.

In August 1979, ESCS convened a national committee of department chairmen and researchers to develop recommendations focusing on the agency's problems. The meeting resulted in two major findings (ESCS, 1979). The first was that there is no systematic process to coordinate efforts to identify important problems in agricultural economics on which future research should focus. It was recognized that there are many research planning efforts that have been and are being conducted. However, the classification used does not break out economics problems per se and, consequently, it is impossible to compare planned research with research needs for economics as a whole.

The second finding by this group was that there is considerable misunderstanding about similarities and differences in the role of ESS and the departments of agricultural economics in the land-grant universities. More important, perhaps, it was the view of some that this lack of understanding was a barrier to improving the linkages between ESS and universities. At the conference, several stereotypical descriptions indicated the perceptions of the group:

- ESS works on national problems, and universities work on local and regional problems;
- universities work on microproblems and ESS on macroproblems;
- universities should conduct basic and methodological research, and ESS should conduct applied research; and
- ESS serves national policy maker clientele, and universities serve farmers and State policy makers.

Apparently, there is a need to clarify roles and dispel misconceptions, so that it will be less difficult to identify areas of mutual interest where cooperative research stands a better chance of success. The findings in chapter

V regarding USDA and SAES are appropriate here.

Three additional areas are worth noting in this discussion. In 1980 when the Farmer Cooperative Service was transferred out of ESCS, the economics unit of ESS was tentatively assigned the function of review and analysis of the Capper-Volsted Act for undue price enhancement by farmer cooperatives. Enforcement or investigation is incompatible with ESS economics research activities which rely on voluntary cooperation of clientele. ESS is not equipped to handle this function. It would seem more reasonable to locate this activity in a regulatory agency, such as AMS, not in an economics research agency.

ESS has as its primary objective the collection and analysis of economic data as an input into decisions by policy makers, producers, agribusiness, and consumers. Before 1976, ERS and SRS were separate agencies reporting to the Director of Agricultural Economics. Concern existed in early 1981—particularly in the statistical unit—that its combination with the economics unit had: a) caused confusion for the public between information reported by the statistical unit and the projections or forecasts of the economics unit, b) drained away vital financial and personnel resources to the Office of Administrator, and c) created in the Office of Administrator unproductive bureaucratic procedures and paperwork.

During the long existence of BAE and since 1961, agricultural economics research has been a separate component in USDA. One result of this type of organization has been some isolation from the rest of the agricultural research community. The discovery of new knowledge does not come as easily or in such small disciplinary packages as it once did. Modern agricultural research tends to be mission oriented and multidisciplinary—involving the commitment of large expenditures over time.

In ESS, there is some communication between economists and a few other social sci-

entists, but very little cooperative work between ESS and AR. In fact, with the exception of some ad hoc groups that meet sporadically, there is no coordinating mechanism for planning and conducting multidisciplinary research between ESS and AR. Closer coordination and collaboration of research in the National Economics and the Natural Resource Economics Divisions with AR research is warranted.

principal Findings

. Through early 1981, the Director of SEA, with two responsibilities, did not give adequate attention to policy and coordinating functions. Operational details of SEA interfered with effective management at the individual agency administrator's level.

- NPS staff have insufficient authority and responsibility for providing effective leadership to regional and national research programs. A change in responsibility would be conducive to improved staff capability.

- Rationale for establishing AR regions along the same boundaries as SAES regions is managerial and has been beneficial for this purpose; however, they do not conform to types of farming or to regional or national research problems, and as AR is organized, are detrimental to the development of broad regional and national programs.

- There is little evidence of the need for the area director positions in AR.

- CR conducts Hatch-supported project reviews that are less than in-depth examinations. As a part of the process, onsite reviews are held every 3 to 5 years but with no required followup, except as would be done locally,

- CR lacks authority in dealing with the States, CR operates as though it were under the supervision of SAES directors rather than the Administrator of SEA.

- CR administers the competitive grants program. Its major clientele, SAES, compete for these grants; there is criticism of this arrangement.

- HN has not accomplished the intent of the Food and Agriculture Act of 1977 with respect to human nutrition research. SEA has established human nutrition research as a mission, but it has not established human nutrition as a separate budget item, nor has it properly funded and staffed the six research institutes to conduct meaningful research,

- Through early 1981, in ESS, concern existed that the combination of the statistical unit with the economics unit had caused confusion for the public between the statistical unit's information and the projections and forecasts of the economics research unit. A small proportion of the economics research budget is allocated to research, and there is very little cooperative effort with AR.

SAES MANAGEMENT AND POLICY PROGRAMS

It is not the purpose or the intent of this section to evaluate the management of the various SAES. Rather, it is to provide general information on how the SAES are organized and managed and on some of the changes that relate to their operation.

Structure of SAES

Over the years, neither the structure nor the names of the SAES have changed much. As

reported earlier in this assessment, the movement to establish experiment stations in the United States drew its first inspiration from European experience. Samuel W. Johnson, one of America's foremost pioneers in the movement, went to the village of Moeckern on the outskirts of Leipzig, Germany, in February 1854, where he visited a new institution which its founders called an "agricultural experiment station." This station, Johnson learned, was the Saxon answer to the search

for methods of applying science to agriculture. When the movement later gained momentum in the United States, the name experiment station stuck, and with only three exceptions—Ohio, North Carolina, and Washington—they are still called experiment stations.

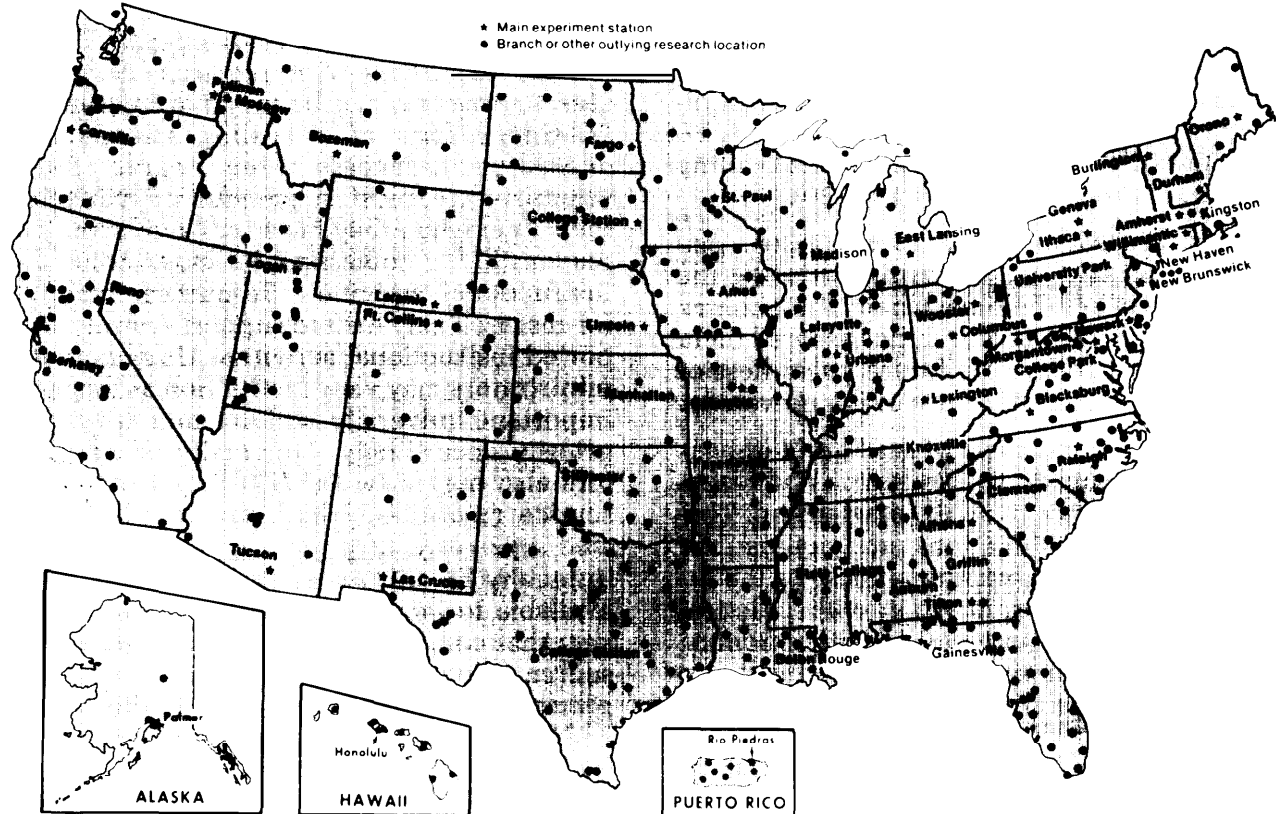
The name “station” evokes for many persons a bucolic vision of scientists surrounded by experimental fields, orchards, barns, flocks, and herds. In most States, however, the scientists work in buildings on the land-grant university campus, and the experimental fields are some distance away.

SAES typically include a central station and headquarters at one location and a number of branch stations or other outlying units located strategically around the State (fig. 24). Stations are organized by departments ac-

cording to the various scientific disciplines represented on the station staff—e.g., departments of animal science, entomology, agricultural economics, plant pathology, etc. The chief administrative officer of each department is usually referred to as “chairman” or “department head.” This officer reports either to the director of the station or to the associate director, as in most States.

In the early days, the SAES director reported directly to the president of the university. Likewise, he defended his budget before the State legislature. The SAES was a substantial part of the college or university, and the director was a “big man on campus.” Today, except in a few States, the station director reports to the dean of the college of agriculture. These deans are actually administrative officers with overall responsibility for

Figure 24.—State Agriculture Experiment Station System



SOURCE: U.S. Department of Agriculture.

research, teaching, and extension. Thus, the SAES director moved a notch lower in the administrative structure. These changes were made for the purpose of enhancing coordination and cooperation.

Although research programs of the SAES are managed in a collegial fashion to optimize individual initiative, the director has legal responsibility for funds and programs. The director, associate director, assistant directors, and the department heads often form an administrative council that oversees SAES operations.

As a statewide function, the SAES in most States is funded as a part of the general university budget, but separate from the general instructional fund. In a few States, the SAES budget is separate from the university budget. SAES receive supplemental funds from Federal sources.

Beginning in the 1950's, as sources of non-State funding became available from agencies other than USDA, grants were not necessarily oriented toward the State program but toward the particular interest of the individual scientists. In spite of what station directors claimed, they were becoming less influential in terms of developing and leading their own programs (Lovvorn, 1980).

Thus, the status of SAES has risen, plateaued, and to a degree subsided during the first 100 years of their existence. Their contributions to society, however, has assured them an important role in the future, regardless of the organizational structure of the university.

Most faculty members of land-grant university departments do both research and teaching; some are also involved in extension. Theoretically, these functions are compatible. Teaching requires keeping abreast of the literature and keeping in touch with practical problems through interaction with students. Research requires keeping up with the literature in one's specific field and keeps one intellectually stimulated. Extension keeps one close to the problems. Some faculty members are incapable of performing all three func-

tions, so administrators usually assign individuals to functions they do best—be it full-time teaching, full-time research, full-time extension, or, as in most instances, joint teaching and research.

The central station of all but a few SAES is on the campus of the State's land-grant university. The scientists of the SAES are members of the faculty of the university. The SAES gains from that association because it provides access to many Ph.D. scientists, specializing in different disciplines, whose services and counsel are easily available. It also provides access to university facilities such as libraries, computers, machine and electronic shops, analytical laboratories, and other specialized units.

SAES research programs also benefit greatly by the expansion of their options for employing scientific talents made possible through the graduate education programs at the M. S., Ph. D., and post-Ph.D. levels.

There are also some disadvantages. Teaching may interfere with research. Some research programs may be so important that the full-time efforts of a leading scientist are critical to the success of the program. Some scientists are most successful in managing their time when they have only one principal responsibility; some may be most suited for instructional activities. Resources intended for research may drift to support scantily supported instructional activities. University administrators may view instruction as the most important university activity and may give priority accordingly. University administrators also may view the SAES and extension service resources, which are usually budgeted separately, as providing more resources to faculty in colleges of agriculture than are available to faculty elsewhere in the university; that could have an adverse effect on resource allocation to the agricultural programs. SAES land that is close to the offices and laboratories of the station may be needed for instructional or recreational facilities for students (Huston, 1981).

The departments are the principal operational units of SAES and provide day-to-day research management. They usually have responsibility for undergraduate and graduate instruction and related scholarly research funded through the university instructional budget, for research of the SAES, for extension activities of the Cooperative Extension Service, and for modest international agricultural activities. Thus, the departments have much broader responsibilities and greater resources than are characteristic of other university departments. In those departments where education is a sizable activity, temporary contractions and expansions may occur in certain SAES research activities. Extension activities may also be affected during part of the year.

While the above describes the general organization and management characteristics of SAES, there obviously are differences among them. The relationship of the director to the dean or vice president for agriculture is an important one. The larger universities have more departments than the smaller ones. Some give more responsibilities to the departments than others. Some seek and use grant funding to a greater degree than others. All of these and other factors are important in determining the degree of authority the director of SAES has in carrying out State agricultural research programs and in cooperating with other research agencies.

Changing Role of SAES

Although the SAES retain their traditional focus in serving farmers and the agricultural sector of their States, their roles are changing. Some of the factors causing these changes include the following:

- Society's needs for the skills normally found in the SAES—and USDA—increasingly exceed the needs of farmers and the agricultural sector. Examples include chemistry and metabolism of pesticides and the use of soil descriptions in planning land use and in construction.

- Many new staff members have no background in agriculture. They see more opportunity for recognition and rewards in research that is not closely allied to needs of farmers.
- Limitations in funds available to the SAES from Hatch and State sources lead faculty to seek grants that may be available for nonagricultural topics. Because of this outside funding, SAES directors have lost some of their control over such programs.

Some of the States with limited resources or with a small agricultural industry—i.e., certain Northeastern, Western, and Northern plains States—are finding it very difficult to adequately fund State agricultural universities and SAES that try to be all things to all people. There has been some discussion on the desirability of certain States that have similar agricultural problems in dividing the workload or concentrating on specific problems—i.e., centers of emphasis—so that each State concentrates on certain problems and leaves the rest to other States. While from a scientific, technical, and resource standpoint this would seem feasible and desirable, sometimes it is not appreciated by specific vested interests in the States. Such an arrangement could allow each such State to develop centers of emphasis on specific problems, rather than to be spread so thin as to have programs of questionable value.

SAES-USDA Interactions

In many areas of research in crops, soils, etc., there have long been very closely knit cooperative relationships between the SAES and AR. About 500 USDA scientists are stationed in SAES buildings. A reverse exchange exists in that 100 or so SAES scientists are housed in USDA facilities (Huston, 1981). There also are a number of special purpose AR research units on university campuses, some housed in university buildings and others in AR buildings built on land donated through the SAES by the State. AR sci-

entists hold courtesy ranks in the university departments and are free to participate in departmental and SAES activities.

SAES programs are built around full use of the resources of these scientists, and vice versa as far as AR regional and national research is concerned. If efforts by AR scientists or units can effectively serve user needs in that field of specialization, no State-supported scientists will be employed. If, however, the manpower commitment by AR is inadequate for State needs, additional State scientists will be employed. Even when AR units are remote from the central station, State programs are developed around those efforts. This joint endeavor permits SAES to meet user needs more fully by adding to the diversity of scientists available and by broadening the range of problems SAES can address. The same logic and planning by AR technical leaders assist AR in focusing their resources on regional and national problems.

Only a few ERS scientists are housed at SAES. Most ERS work in SAES is done by SAES economists on a cooperative agreement, contract, or grant. While the relationship between ERS and many agricultural economics departments has been close, that with the SAES administration has been distant.

This close working relationship among scientists of SAES and AR, as mentioned elsewhere in this report, has been one of the major strong points of the U.S. agricultural research system. It has resulted, generally, in high respect for each other at the scientist level. The major difficulty in the U.S. agricultural research system between USDA and the SAES is at the administrative level. This includes directors of SAES and sometimes heads of departments and administrators in USDA.

The root cause of nearly all the difficulties, centers around budgets. SAES fights for increased Federal funds for their research activities and USDA fights for additional funds for their in-house research. The budget problem distorts and tends to create problems in the stated roles of the two groups and in co-

operation at the administrative level to such a point that, unfortunately, it sometimes permeates the whole system. The problem has always existed, but appears to be much more intense now, in times of stringent budgets for research, than in the past.

What appears to be at stake is whether the United States will be able to maintain a national research effort. As Castle stated in 1980: "The question should be faced squarely as to whether the historic partnership between the USDA and the land-grant universities remains viable." Castle goes on to say that "the planning framework advanced by the joint council has not only brought Federal-State conflicts to the surface but has also intensified internal land-grant tensions, and these tensions are now being reflected at regional and national levels."

In his Cosmos Club lecture of April 1980, Dr. John W. Gardner addressed the subject of "The War of the Parts Against the Whole." Dr. Gardner notes the continued development of various "groups" that have expanded in number and diversity following World War II—and in their capacity to organize for combat. The following comments from his paper are of special interest.

In most of these groups the element of cohesion is supplied by a common economic activity or interest. But others seek redress of grievances that they have suffered at the hands of society. And then there are the "issue" groups, members of which may come from diverse social, economic, or occupational backgrounds, but have in common a shared concern for advancement of a particular public policy.

I want to emphasize that most of the groups have legitimate concerns: some of them have concerns that are, by any standards, urgent. But as more and more of them learn how to organize for effective action, and how to slug it out on the adversary mode, what started as healthy competition has developed destructive aspects. If we can't face that fact, we're lost.

The war of the parts against the whole is a central problem of pluralism today. We're

moving toward a society so intricately organized that the working of the whole system may be halted if one part stops functioning. Thus our capacity to frustrate one another through non-cooperation has increased dramatically. A part can hold the whole system up for ransom as the air traffic controllers, among others, have so vividly demonstrated.

All of this is ironic when one recognizes that never have so many of these groups been so highly organized and effective in action. They know how to lobby. They know how to “use” the media. They establish “beach heads” in government agencies, sometimes even force reorganization of an agency to suit their purposes. And they effect public policy.

It is entirely legitimate for such groups to organize themselves. It is their constitutional right to seek to influence government, and often what they want is not unreasonable. But what can we do when the factional strife becomes more than the system can bear?

All too rarely have any of the organized groups shown the slightest concern for the health of the political process. All too often they have been satisfied with incompetent, disorganized, or even corrupt government, provided that they could influence it.

Our pluralistic philosophy invites each organization, institution, or special group to develop and enhance its own potentialities. But the price of that treasured autonomy and self-preoccupation is that each institution concern itself also with the common good. That is not idealism: it is self-preservation. The argument is not moralistic. If the larger system

fails, the subsystems fail. That should not be such a difficult concept for the contending groups to understand (Gardner, 1980).

It would be unfair and unrealistic to suggest that the competition between USDA and SAES is the only factor that has been deleterious to the operation of the national agricultural research system in recent years. But there is need for a serious self-assessment of the current organizations, operations, and policies of USDA and the SAES with respect to their basic charters and to relationships in programs of mutual concern (Moseman, et al., 1981).

Principal Findings

The SAES research budget from other than grant resources has tightened and an overall dean or vice president of research coordinates research at most land-grant universities. This, in part, has diminished the stature and authority of the directors of SAES in directing State agricultural programs.

- At the scientist level, the SAES and USDA scientists enjoy good working relations and generally excellent cooperation, all to the benefit of the system, the States, and the Nation.

- At the administrative level of SAES and USDA, there is competition over funds and position.

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