Chapter VII

Determining Research Priorities

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To establish research priorities, goals must be set. It is ironic that the United States has never had a well-articulated set of food and agricultural goals. Without such goals, the process of research priority determination is difficult.

Three kinds of priorities are evident in the U.S. food and agricultural research system. At the highest level is the determination by the Federal Government that it shall spend funds for a research program. This is a broad commitment that has its roots in Federal legislation enacted more than a century ago. The principle continues to be valid and viable.

Priorities at the second level involve broad commitments to specific national needs. They are relevant to problems that affect, directly or indirectly, large segments of the population—such as economic/environmental tradeoffs in river basin studies. The nature of priorities at this level determines what particular agencies shall address them. Their assessment and budgeting become the responsibility of top management.

Priorities at the third level are more specific and may deal with microaspects of broader national programs. Here, individual scientists or middle-management personnel actively participate in recommending action programs and in deciding the degree of funding required. Many of the priority decisions at this level are often influenced by external factors, not the least of which could be the needs of producers and consumers.

Anyone studying priority setting in the U.S. food and agricultural research system will discover a dichotomy of the professed procedures and actual practice. The fact that differences exist between the theory and reality of decisionmaking has no direct implications on the quality of the decisions that are made.

This chapter discusses the need for establishing agricultural policies and goals in order to determine priorities, then follows with: 1) priority setting as the agencies perceive their operations, 2) a review of the factors affecting research decisions and the ways in which they may alter outcome, 3) the roles of the Joint Council on Food and Agricultural Science (JC) and the National Agricultural Research and Extension Users Advisory Board (UAB) as they affect priority setting, and 4) discussion of new procedures that could enable the research system to improve its priority-setting judgments.

NEED FOR FOOD AND AGRICULTURAL GOALS

The food and agricultural research community is often criticized for not providing or developing a national plan for food and agricultural research.[1] Even though the Food and Agriculture Act of 1977 authorizes the establishment of the JC and UAB to assist in planning, criticism continues, Some may be justified; however, for effective long-term agricultural research plans to be developed and maintained, there is need for clear-cut food and agricultural goals.

A goal is defined as the end toward which effort is directed. The end must be definable and, at least in theory, achievable. Some people assume that the goal of U.S. agriculture is to provide an ample supply of nutritious food for the consumer at reasonable cost with a fair return to the farmer within an agricultural system that is sustainable in perpetuity.

[1] Most recently this point was made by the General Accounting Office (GAO) in a report entitled "Long-Range Planning Can Improve the Efficiency of Agriculture Research and Development," 1981.

However, this "goal" is open-ended and, therefore, not achievable. For example, what is meant by an "ample supply?" Does it mean: a) produce to meet U.S. demands? b) produce to meet U.S. demands plus economic demands of the world market? or c) produce to meet U.S. and world market demand plus concessional food to poor countries? How would we know when an "ample supply" is achieved? What is "nutritious" food? How is it defined? Is a "reasonable cost" to consumers 15, 20, or 30 percent of disposable income or some other figure? Is a "fair return to the farmer" 10, 15, or 20 percent on investment? And when would this "fair return" be achieved . . . 1995, 2000, 2500? Is a sustainable system one that tolerates 5, 10, or 15 tons an acre of erosion annually?

These and other questions must be answered for a goal to have meaning and to be useful for the research community in planning a research agenda. With such questions unanswered, setting research priorities is a futile task.

In the past, Congress has set well-defined, achievable goals. Congress set a goal of putting a man on the Moon by a certain date; the goal was met. Congress has set goals for the level of gasoline consumption for different sizes of cars by certain dates. It should be possible for Congress to set well-defined, achievable goals for U.S. agriculture as well.

PRIORITY SETTNG IN USDA[2]

Science and Education Administration (SEA)

Information used in developing priorities is drawn from consumers, producers, in-house scientists, scientific societies, JC and UAB, action and regulatory agencies, cooperators, policy-level people in the executive branch, and Congress. This information is reviewed and summarized by staff and presented to SEA managers who, in close consultation with university cooperators, set the priorities that guide the upcoming planning year.

In Agricultural Research (AR), staff scientists on the national program staff (NPS) are responsible for interacting with administrators and scientists in the regions to maintain up-to-date programs and priorities and to ensure progress toward national priorities and objectives. Regional administrators in each of the four AR regions are responsible for seeing that research conducted within a region meets the national goals and priorities.

In Cooperative Research (CR), the administrator participates in meetings of State agricultural experiment station (SAES) directors' associations for the four regions and concurs in areas of research to be implemented. CR staff are active in regional technical committees that plan and conduct regional research projects.

In Human Nutrition (HN), research is carried out in six research centers.

SEA budgets are designed to reflect priorities. Budget requests are modified at various points, the changes being based on priorities as viewed by the decisionmakers involved and the fiscal constraints. Resources are then allocated to the SEA units in accordance with these documented plans, and usually on a program-by-program basis.

AR uses several mechanisms to assure that resources go to the priority problems: continuing review of annual program evaluation, and annual project reviews.

Regional priorities result from recommendations by JC, research planning committees, and their indications of need from research users and input from SAES directors, AR re-

[2]This information was provided by USDA in response to letters of inquiry from OTA.

gional administrators, and private industry representatives.

Many traditional agricultural groups have developed a way to interact with the U.S. Department of Agriculture (USDA) in discussing their priority research needs (i. e., Cotton Council, NASCD, etc.), but most nontraditional agricultural groups have not. There is a need for better and more positive methods of assuring that all interested groups have an opportunity to be involved in discussions concerning food and agricultural research priorities. With AR research being responsible primarily for broad regional and national issues, it is important that the interaction be with national and regional leaders of the interested organizations. AR could designate some staff to be responsible for developing procedures to assure that all interested organizations have an opportunity to express their views and concerns with respect to agricultural research priorities.

Economic Research Service (ERS)

ERS evaluates its programs in accordance with feedback from user groups and other information on current and future priorities, such as topics highlighted in the public media and personal communication with persons in Government and the private sector.

Each year, ERS conducts three or four workshops in different regions of the country with representatives of farm and commodity organizations to discuss their need for data as well as situation and outlook information on commodities.

ERS has met with UAB to review its work programs in relation to agriculture and farm markets. In addition, the agency meets with JC to obtain their reactions about research and data needs. ERS interacts regularly with the Federal agencies, State universities, professional associations, and State and local governments.

ERS provides flexibility for scientists to work on problems and issues which they see as important to decisionmakers. All work is subject to review to assure consistency with agency plans.

PRIORITY SETTING IN SAES[3]

In virtually all activities, including priority setting, SAES operate in a different manner than their USDA counterparts. Planning, priority setting, budgeting, and program development are functions of line administrators and scientists active in research. They are not functions assigned to special staff scientists, as some are in USDA agencies.

The goal of priority setting in the States is to aid in allocating scarce resources to develop and maintain an effective and responsive SAES program. Steps in priority setting are to: a) identify the research investigations and programs of greatest need and value to the State, b) examine the scientific and practical feasibility of those investigations relative to the resources available or required, and c) set priorities according to the needs and feasibility of the research investigations and programs.

There are various levels of priority setting at the SAES beginning with that of the scientist and continuing through the department (such as the animal science department), the department head or chairman, the experiment station as a whole, and the university itself,

Role of Scientists

At the scientist level, the process begins with an examination of user needs that relate

[3]The information presented in this section draws heavily on the report entitled "Priority Setting Processes in the State Agricultural Experiment Stations" prepared by Keith Huston for OTA.

to the scientist's discipline. Needs that can be met by existing knowledge or can be handled elsewhere are eliminated. The remainder are translated into approaches that might be used in meeting those needs, An examination of current pertinent knowledge and scientific feasibility of the approach is made, and the time and kind and amount of resources required is estimated. In addition, the importance of user needs is compared with those being addressed. And finally, colleagues and the department head may be consulted about the issues and approaches.

In arriving at priorities, a scientist makes many complex judgments. Scientific feasibility of a given priority setting is based on perceptions of the present state of knowledge relative to the issues and number, kind, and sequence of discoveries that need to be made, and the probability of making them, Scientific feasibility requires judgments about hypothetical discoveries; it makes heavy demands on intuition. And even the most gifted scientist has no assurance that his intuition will prove accurate,

Role of Department

Priority setting by a station department introduces additional considerations not found in the processes of individual scientists. Insofar as resource allocation is concerned, the central theme of priority setting within a department takes on a broader, more complex dimension. The predictable outcome is that one scientist will be allocated more resources than another.

In setting departmental research priorities, the involvement of individual scientists takes on a variety of patterns. In some departments, all scientists are involved; they reach a consensus about priorities and that consensus is subject to only moderate alteration by the department chairman. Matters discussed by the group include station or legislative mandates, restrictions based on resources or by grantors, research needed for instructional curriculum, differences in kinds and amounts of resources needed and available for each project, and the possibilities of change in current investigations.

Another pattern is one in which final setting of priorities is done by the department chairman after a consensus emerges among the staff. This is one of the most common patterns, Another approach is one in which the department head discusses issues with individual scientists and then establishes the priorities. These priorities may be submitted to the faculty for comments or ratification. This approach is also one of the more common patterns.

Role of Department Head

An SAES department head bears a singular role in setting departmental priorities, A prime responsibility is ensuring that the departmental research program responds to user needs. The intellectual efforts of the scientists are the department's principal resources. To meet program needs, resources must often be manipulated by forming teams of scientists or transferring funds, equipment, animals, or lands.

The department head must also consider the research activities supported by other agencies, such as field stations of USDA, because these resources may contribute to meeting user needs in the State and thus permit alternate use of department resources. It is necessary to keep abreast of the research of private firms because quite often this research is closely related to the research program of the SAES. A department head must also consider research needs as well as perceived needs of other groups such as organic farmers and environmentalists.

Department heads do not specifically state the rationale they use in ultimately resolving issues. They likely base their decisions on the general characteristics of user needs. Whether or not these needs will be met depends on a number of factors, not the least of which is the extent of human and financial resources available to carry on a program.

Other Priority-Setting Factors

Within a department, several scientists may be tackling a scientific problem that requires the efforts of several different disciplines. Again, the two major priority forces—user needs and matching scientific resources—provide a basis for priority setting. Other State agencies often provide input, as do annual planning conferences where staffs of branch stations and the central staff discuss factors that may bear heavily on priority setting.

Role of SAES in Priority Setting

Most general concerns of department heads are mirrored by the SAES and its director on a much broader scale. Although the priority-setting processes follow the same general steps as outlined earlier, both the process and the issues are much more complex at the SAES level.

SAES's priorities must address not only direct user needs but also State needs. Generally, a State's needs deviate from direct user needs only in requiring a somewhat greater attention to certain issues such as environmental quality. Special needs emerge gradually in the State. They reflect the general temper of the people of the State and of the times. Consequently, State scientists can generally perceive these needs quite readily.

Prior to the 1960's, SAES generally allocated most of their research resources to increasing food supplies. In the past 20 years, however, food supplies have been abundant and cheap. Consequently, society's priorities have shifted, and SAES have moved their resources to other issues. But the pendulum once again is swinging back to the uncertainty about the abundance of relatively low cost food continuing in the next 20 years. Rate and growth of agricultural productivity have slowed. International food supplies are once again in question. Costs of energy are likely to increase. Sales of food reserves to foreign countries will possibly increase. Perceptions of such factors most certainly affect decisions of a SAES director in setting State priorities.

Although SAES follow the same general steps of others at the State level, the patterns may differ, The factors affecting such changes include attitudes of State legislatures and Congress; priorities of the university; shifts of resources because of changing programs and resource availability; university, State, and Federal budgeting patterns and restrictions; and the interrelationship of these factors.

Role of University in Priority Setting

In most States, the SAES is funded as a part of the general university budget. Priorities that depend solely on allocation of funds under complete control of the SAES usually can be accommodated without undue difficulty. But sometimes priorities established within the SAES compete with priorities at a higher level of the university heirarchy. Thus, funds for new programs, new buildings, and support are occasionally at stake. Generally, agricultural colleges, because they have faculty employed as research scientists in the SAES, enjoy greater opportunity and resources than other colleges.

PRIORITY SETTING IN THE PRIVATE SECTOR[4]

In the private sector, market need and characteristics of existing products determine to a large degree the kinds of research priorities selected.

There appears to be no direct role which the public sector or consumers play in determining research priorities in the private sector. The public sector, however, has a responsibility to be familiar with the private sector's research efforts in order to avoid duplication of effort and costly oversights.

[4]This section is based on responses from the private sector to inquiries by OTA.

The public sector has a role, frequently a negative one, in establishing research priorities for the private sector through regulatory agencies. The activities of such agencies tend to reduce the amount of basic research that the private sector might do that relates to its own interests. The net effect is to add to the costs of doing research without enhancing research productivity.

Private companies engaged in manufacturing the same kinds of products, or related products, often form associations to gain more impact in their dealings with both consumers and governmental bodies. One example is the Institute of Food Technologists, which deals with priority matters through a research committee made up of representatives from member companies. Both the public sector and consumers provide important input to the work of this committee.

In addition, the private sector helps determine priorities by lending equipment to SAES providing grants, and serving on advisory committees.

The National Food Processors Association, in commenting on the issue of priority determination, issued the following statement (OTA letter of inquiry, 1980):

> The agricultural scientific community was once described as a "vast isolated island. " The recognition of new environmental and consumer issues should have enlarged the support base of this isolated island as new problems arose. Unfortunatel, support has been reduced,
>
> It now appears that not only has the public sector of agricultural research not been able to respond to these new issues, but that EPA [Environmental Protection Agency] grants are used to supplement the decreased public sector research funds, This means that EPA sets the priorities and can even withdraw support if meaningful research does not meet their intended goals. Scientists in support of food and agriculture should not be faced with this [condition],

FORCES AFFECTING RESEARCH DECISIONS[5]

A variety of external forces can exert influence on both the manner in which research priorities are made and the outcome of the research activity itself. Thus, research priorities may be established much differently from that described in the previous section. Some of these forces can be national in scope; others may concern only individual scientists in their decisionmaking process. A prime example of the former is the 1970 Southern corn leaf blight which reduced U.S. corn production 16 percent. Another example was the combination of unfavorable weather and purchasing strategies of certain foreign countries that led to low grain stocks and high prices from 1973 through 1975. These two events resulted in several assessments of the world food situation and the ability to feed an ever-increasing population. To cope with the new situation and its attendant problems, research priorities had to be adapted—some of them quickly and drastically.

Industrialization of Agriculture

Industrialization of agriculture affects the distribution of benefits from public research that supports or facilitates technological change. The first beneficiaries are the suppliers who sell new technology to producers. The second beneficiaries are the first adopters. These are frequently farmers who are more aggressive and have ready access to capital and information. Farmers who do not or cannot adopt new technology find themselves squeezed by the effect of lower prices. The ultimate beneficiaries are consumers. But even their benefits can be delayed by intervening processing and marketing factors.

[5]The material in this section draws heavily on the OTA resource paper, "Forces Affecting Food and Agricultural Research Decisions," prepared by Ron Knutson, Don Paarlberg, and Alex McCalla.

Trends toward industrialization of agriculture lend credibility to arguments expressing concern about close ties between large farms, large agribusiness firms, and the research establishment (Paarlberg, 1981). Reality suggests that:

1. Large farms have more influence than small farms on research and education programs in the land-grant system and USDA.
2. Development of technology has more frequently followed the demands and needs of the larger and more mechanized farms than those of small and less organized farming interests.
3. The private sector—i. e., farm input suppliers, etc.—benefit from public research.
4. Food processors, marketing firms, and retailers benefit from post-harvest research, and some have sufficient market influence to delay the benefits of research in reaching the public.

One of the important implications of the above situation is that research administrators and scientists should be aware of the need for public-interest objectivity in making research decisions.

New Issues

In addition to food shortages and the continuing process of industrialization, the 1970's were confronted with a host of new issues that will surely continue into the 1980's. Demands developed for more generous food programs, organization rights for farm labor, lower food prices, increased food safety, increased environmental protection, sharing water rights, equal rights for agricultural minorities, and improved nutrition.

These new issues are being funded at the expense of traditional agricultural interests. Concern exists within the agricultural research establishment that all areas will be increasingly underfunded as the research base continues to expand, unless new funds are made available.

Concern exists also that, without major scientific breakthroughs in agriculture's capacity to produce, the world may be unable to satisfy future food needs. It was only natural, therefore, that these concerns created a call for more research.

The Food and Agriculture Act of 1977 was responsive to the perceived need for more research. The act explicitly provided for creation of competitive research grants, using a system of peer review that was foreign to the traditional USDA research system where funds were allocated on a formula basis. The competitive grants program was opened up to proposals from scientists outside the agricultural research establishment.

The 1977 act also created the JC to oversee, advise, coordinate, and set research priorities. This structure was designed to replace the previous research policy committee referred to as ARPAC (Agricultural Research Policy Advisory Committee).

This combination of events has created considerable tension within the agricultural research establishment. Charges are made of attempts by special Federal interests to control agricultural research at both Federal and State levels. To an important extent, the problem is as much one of strategy to get the needed level and mix of support as it is of directing research to priority areas. One cannot disregard the fact that the two are interrelated.

Realities of Research Planning

The need for planning and coordinating the food and agricultural research system is obvious, Planning must be done to determine the size of the budget to carry out the research mission. Planning must be done to clarify where specific areas of research responsibility lie, to communicate what is being done, and to determine what needs exist. The question, therefore, is not whether planning is needed but: a) who should do what type of planning, b) how the results of plan-

ning should be translated into budget, and c) how planning and budget should be translated into research.

Planning within the food and agricultural research system has not come naturally. This fact has meant that research planning initiatives have tended to be mandated by Congress itself. The first such mandate was the Research and Marketing Act of 1946 which set up joint planning for regional research. The latest mandates were the creation of the JC and UAB. (These two groups are discussed fully in a later section of this chapter.)

It is important to ask why Congress in 1977 felt a need to enact these mandates. A number of reasons can be suggested:

1. Congress had no confidence in the recommendations it was getting on appropriations. The President's budget recommendations were suspected of being manipulated by the agencies, the Secretary, and the Office of Management and Budget. The recommendations of ARPAC were suspected of being the vested interests of the performers.
2. Because of an increasingly tight world food situation, it appeared that increased funding was going to be required. Congress desired to make sure that new money was spent in areas that had the potential for greatest payoff—the so-called high-priority research areas.
3. Concern existed that the food and agricultural research system was not adjusting its research program to evolving clientele needs.
4. The complexity of the research situation led to the conclusion that it was out of control, duplicating research, and unaccountable. Hearings tended to fortify rather than refute this conclusion.
5. Experience with earmarking funds for specific research had not always worked. The impression existed that projects were simply being renamed and the research program did not change.

Each of these reasons was at least partially true (Knutson, et al., 1980). Restoring confidence in the system will require a recognition of this fact. It will also require that the food and agricultural research establishment become organized in a manner whereby it can have a more decisive impact on and control over legislation enacted in its behalf,

Research Decisions of Scientists

Despite the existence of elaborate administrative structures in both USDA and the universities, the major decisions on what research is to be undertaken are made by research scientists. They develop project proposals, give reasons for the required level of support, and then, within the limits of the available budget, decide what specific research is to be undertaken.

Because of the increased complexity of research projects, research administrators are in a poor position to evaluate the relative merits of particular projects. Yet, they play a very important role in coordination, organization, and policy for research. However, the further removed the administrator is from the project—i.e., the higher the level of administrative bureaucracy—the greater the potential for being wrong on the relative merits of particular projects. Thus, the greatest potential for administrators influencing research decisions is through hiring staff and resource allocation to broad areas of research.

Motives influencing the research decisions of scientists may be grouped under four general headings: intellectual curiosity, availability of funds, responsiveness to clientele, and personal gain (Knutson, et al., 1980).

Intellectual curiosity is research motivation in its pure form. It is the motive that led Gregor Mendel to discover the principles of heredity and caused Darwin to persist in his studies until he formulated the theory of evolution. It is part of the motivation of every researcher worthy of the name. Administrative interruption of this process of discovering new knowledge can be costly. Likewise, a scientist is likely to be more productive working on a problem in which he or she has a direct interest.

Availability of funds can make the difference between meager research results and findings worthy of being converted to useful technology. Both new people and new money are needed to give research priorities a reasonable opportunity for success. If additional funds are allocated to a new high-priority project but additional people are not appointed, these new funds probably will be spread over ongoing projects.

A substitution of grant funds for formula funds does not necessarily solve this problem because in the face of reduced formula funding, grant money will likewise tend to be used to support ongoing research projects, while formula funds are shifted to areas where grants are unavailable. The lesson here is that the most effective means of initiating change is through increased incremental funding. Competitive grants, in addition to providing scientists an added base of financial support, often give them freedom to pursue their chosen field of research.

Responsiveness to clientele is not readily quantifiable. It cannot be denied, however, that there is far less responsiveness to sectors of agriculture that are poorly organized—part-time farmers, small farms, hired labor, and minority groups. Recent concern about social structure reflects the belief that a tax-supported research system owes the public more than to respond primarily to those clientele groups that are most affluent, most persuasive, and best organized.

A growing force in setting priorities—both in research and action programs—is the influence wielded by certain organizations and societies made up of users and consumers who have a vested interest in Government plans and programs that they believe oppose their own plans, ideals, or philosophy about the environment or the welfare of society. One of the prime concerns of such groups is wise husbandry of natural resources for use in perpetuity. A typical example is the possible environmental damage incurred by the continued damming of rivers to provide more water for agricultural irrigation, recreational use, or urban water supplies. They are also interested in the exploration of ways to help the food and agricultural system become less concentrated, less reliant on fossil fuel energy, less capital intensive, and less dependent on chemicals. These organizations—such as the Audubon Society and the Sierra Club—will undoubtedly continue to exert pressure on legislators to achieve their goals. Hence, they must be regarded as viable forces in the priority-setting process.

Personal gain—such as promotions, salary, and peer recognition—is an important motivator for scientists. Actually, this can be an excellent means to an end—that is, the discovery of new knowledge. For some researchers, however, personal gain is an end in itself.

Differences exist among universities and USDA agencies as to their ability to reward top-quality scientists. Also, substantial resource differences exist among universities for attracting scientific talent. These differences result from a combination of factors such as a State's population, income, resource base, and tax structure. They also result from the Federal system of allocating research dollars. For example, increased emphasis on competitive grants allocated strictly on the basis of proposal and scientific qualities will further concentrate research in those universities that have had the research dollars needed to attract top-quality basic scientists.

Despite its complexity, the U.S. food and agricultural research system operating in a relatively free-market agricultural setting has an enviable record of success. This success has been accomplished in a decentralized research setting where scientists in proximity to their agricultural clientele make the critical decisions on what research is to be done.

As both fear of and evidence of an increasingly tight world food supply-demand balance increase, as pressures to cut Federal spending mount, and as the size and complexity of the food and agricultural research establishment grow, Congress and State legis-

latures have become increasingly concerned about the performance of the food and agricultural research system. Incentives exist for increased planning, increased accountability, and greater control over what research is to be done.

ROLE OF THE JOINT COUNCIL ON FOOD AND AGRICULTURAL SCIENCE

The Food and Agriculture Act of 1977, gave the Secretary of Agriculture authority to appoint a Joint Council on Food and Agricultural Science. The JC was to include the traditional teaching, research, and extension partners as well as representatives from other public and private institutions. Primary responsibility of JC is to foster coordination of research, extension, and teaching activities of the Federal Government, the States, colleges and universities, and other public and private institutions involved in the food and agricultural sciences. The JC took over the functions of ARPAC.

The responsibilities of the JC as specified in the legislation suggest the formation of a central planning agency for research, extension, and teaching. The responsibilities include evaluation of program impacts, identification of high-priority research, developing memoranda of understanding among the participants, establishing priorities, recommending responsibility for research, and summarizing achievements. The Secretary is to use JC recommendations, as well as other input, in submitting to Congress a 5-year projection of national research priorities.

In a sense, all JC activities lead to priority setting. Recommended priorities form the basis for JC's annual report. The JC has released two reports on research planning and a planning report by the National Planning Committee. These reports basically summarize trends that affect food needs in the future and identify a long list of research priority areas. The reports do not establish objectives, rank priorities or develop implementing programs. Without these, JC reports will have only minimal impact on agricultural research planning (GAO, 1981).

JC's planning and coordination structure has evolved over a 3-year period. Considerable debate attended these efforts to broaden participation in planning and coordination and create a representative new structure. In the structure finally adopted by the JC, each of the four regions has three committees, one for teaching, one for research, one for extension. The three fall under a regional council. That is, all four regional research committees operate under a national research committee.

The JC's struggle to develop a workable planning structure sometimes evoked images of overorganization or tenuous communication links. In contrast, ARPAC, a product of many years of development, sometimes seemed a better planning structure (Mahlstede, 1980).

The JC faced a problem ARPAC had not encountered. In attempting to make teaching, extension, and research equal partners in research planning, it sought a program structure common to the three functions. However, it found that each function had a unique structure, developed to suit its needs. When the JC identified an area for which coordination across the three functions should have high priority, these structures did not lend themselves to examination of existing interrelationships or establishment of new ones (Mahlstede, 1980).

There seems to be a perception—even among some who make up its membership—that the JC is not fulfilling its intended role. One of its problems, according to USDA, is lack of sufficient resources, particularly staff support. USDA's Economics and Statistics Service stated that the JC suffers from the dual role of supporter of the food and agricultural science system and evaluator of the

system, The private sector is particularly critical of the JC, believing that too much effort is devoted to "lubricating the machinery" rather than identifying desired results and existing impediments to their achievement.

Within the administrative segments of the JC itself, some dissension has developed. For example, on July 31, 1980, the North Central Regional Experiment Station Directors Association voted unanimously to suspend participation in the JC planning process. Their concern was that USDA did not use State input in budgeting and the Association did not understand the role of the regional councils. They also disapproved of the membership and size of the JC national research planning committee, The Association recently resumed participation in the JC's activities.

JC's success has also been limited by a lack of clear direction by the whole Council to its role. Individual members define JC's coordination role in widely differing terms from "facilitating exchange of information" to acting "as an oversight council" and "setting research priorities. " Adding to this confusion, USDA takes the position that the JC's role is to supply input to USDA's long-range planning process and to accomplish much of the legislative planning responsibilities of the Secretary. JC members, however, believe their key role lies in fostering coordination and that their role in planning is that of an advisor to other actual planners (GAO, 1981).

There is also debate over the composition of JC. Through early 1981, the JC was composed of 24 members, which represented the following: 9 from USDA, 5 from land-grant colleges and SAES, 2 from UAB, 2 from private industry, 1 from Office of Science and Technology policy, and 5 from extension, nonland-grant universities and other interested parties. In the view of SAES, they are not adequately represented on the JC considering that they fund and conduct a significant amount of agricultural research (OTA letter of inquiry, 1981). There is a perception that because the JC is composed of a large number of USDA employees, it is dominated by USDA.

In relation to this concern is the fact that the JC must use USDA for staff support. The JC believes it would enhance its ability to be an independent advisory committee if it had its own staff (OTA letter of inquiry, 1980).

In evaluating its own performance, the JC believes it has made some progress in its area of responsibility. But it recognizes that certain responsibilities charged to it by Congress have not been fulfilled (OTA letter of inquiry, 1980).

It is not surprising that the JC has not, in its 3 years of existence, fully satisfied all of its objectives. In fact, the JC only recently was able to develop its 21-member committee on regional and national organizational structure. Serious questions exist as to whether the JC could ever effectively carry out the functions assigned to it. Even more serious questions exist as to whether, if it could carry out those assignments, the results would be desirable.

Castle, in a recent evaluation of the food and agricultural research planning system including ARPAC, put it this way:

> This (the present) system is a vast exercise in hypocrisy. All experienced administrators know that planning and coordination exercises are not worth much if control of budget and personnel resides elsewhere. If you believe as I and many others do, that decentralization has been and is a necessary characteristic of a productive system, the only thing worse than the present planning and coordination would be to give it control over budget and/or personnel. There are worse things than irrelevance; if the present planning and coordination really became relevant to budget and personnel the situation would be worse—much much worse (p. 16).

ROLE OF THE NATIONAL AGRICULTURAL RESEARCH AND EXTENSION USERS ADVISORY BOARD

The Food and Agriculture Act of 1977 also directed the Secretary of Agriculture to appoint a National Agricultural Research and Extension Users Advisory Board (UAB). Its primary purpose is to represent the divergent opinions of users and determine their needs and priorities. UAB's members come from the food and agricultural sectors of the economy; others are consumers. They are chosen for their potential to offer opinions independent of political considerations that might inhibit Federal employees or representatives of organizations. Among UAB's mandates are the following:

- review USDA's policies, plans, and goals for research and extension;
- examine relationships between private and public programs and assess the extent of research conducted by the private sector;
- recommend policies, priorities, and strategies for research and extension; and
- assess distribution of resources and allocation of funds for research and extension.

UAB is required to submit two reports annually. One is to the Secretary recommending allocation of responsibilities and funding levels among federally supported agricultural research and extension programs, including a review and assessment of the allocation of funds for research and extension by the organizations represented on the JC. The second is a report to the President and to the Senate and House agriculture and appropriations committees which reviews the President's proposed budget for food and agricultural sciences.

UAB has focused its efforts on primarily reviewing and advising the Secretary on national long-term research priorities, policies, and strategies. In preparing the above reports it develops research priorities in a multistep procedure. First, members identify their own concerns and after discussion develop a list of priority areas. Next, UAB obtains an inventory of research and extension activity in each area. After holding field meetings and soliciting more opinions from users, the original list is modified to develop a statement of UAB opinion.

Priorities recommended by UAB are examined by the JC, and UAB in turn reviews the JC's recommendations. In the end, the two groups may agree on one set of priorities, but they are not obligated to do so.

UAB's responsibilities are more realistic and attainable than those of the JC (Knutson, Paarlberg, and McCalla, 1980). However, its impact on research priorities is unclear. UAB itself questions whether it has had any impact. USDA officials feel that UAB has been effective. However, when questioned, these officials were unable to point to specifics (GAO, 1981). Some USDA administrators indicate that they refer to UAB reports when establishing their priorities, but, because UAB priorities often parallel USDA positions, the UAB's impact is uncertain. USDA's responses to UAB reports indicate the similarity of the two groups' positions. In response to UAB's October 1979 report, USDA concurred fully or in part in 41 of UAB's 46 recommendations. In concurring, USDA often cited ongoing work as covering the recommendations (GAO, 1981).

Critics have not been as harsh with UAB as they have been with the JC. USDA believes UAB is fulfilling its intended role but has yet to deal effectively with negative or low priorities. Moreover, says USDA, UAB needs to: a) learn more about the science and education system, and b) improve its group decision processes and skills. Some critics in the private sector believe that both the JC and UAB have done a miserable job, have had little impact, and do not adequately represent the private sector (Responses to OTA letters of inquiry, 1980). These critics are for the

most part organizations that are not represented on UAB.

Lack of user representation on UAB is a problem. UAB has limited membership and cannot include individuals from all interested groups. Representatives of interested groups and organizations can appear before UAB, but this procedure is less than satisfactory to most organizations. Even if UAB were to arrange for formal and periodic meetings, it is only an advisory board, and most organizations desire direct contact with those responsible for public-supported research. However, UAB members do not see themselves as representatives of organized groups. They believe their task is to interact among themselves and with researchers, not to serve as mere conduits for the opinions of others. They believe they represent the multiple interests of all users, rather than the interests of groups (Response to OTA letter of inquiry, 1980),

UAB, like the JC, must rely on USDA for its resources. It does not have operating funds or authority to appoint staff. Thus, the scope of work performed by UAB relies on the benevolence of USDA.

UAB was established as a citizens group to represent users of research. However, some represented on the present UAB are more providers or performers of research than strictly users. Examples include the Rockefeller Foundation and retired researchers. These entities should more appropriately be represented on the JC.

METHODOLOGICAL APPROACHES IN DETERMINING RESEARCH PRIORITIES[6]

The process for determining priorities for food and agricultural research in the United States invariably raises problems for those who administer the system. Moreover, these problems are exploding into complex policy issues. Unfortunately, the processes that were formerly used to determine priorities no longer seem to be functioning as smoothly as they did. New processes for improving the priority-setting system are necessary for three reasons.

First, decisions will always have to be made, but they should not be made by default. Decisions deserve to be arrived at by a responsible process.

Second, most of the expertise for making appropriate decisions is within the system itself. Some persons would prefer to shift the decision process—or at least some segments of it—outside the system. However, the record of the system is too commanding to allow its leadership to abandon its role.

Third, the evolving planning system somewhat legitimized by the Food and Agriculture Act of 1977 threatens the system. Castle characterizes the research system as a troubled and uncertain system, and the proposed system of national planning and coordination as a vast exercise in hypocrisy (Castle, 1980). This disturbing evaluation has been endorsed by others.

Those managing the system must work within it to adapt it as needed; otherwise the inevitable result is to lose the freedom which the system now enjoys. What is needed is a strategy that can discipline the system, protect its integrity, retain reasonable control of it, provide a framework for more accountability, and give more positive direction to the system.

A number of new processes for priority setting are available for research management to consider. One is the project ranking system, in which an attempt is made to place judg-

[6]The information presented in this section draws heavily from the OTA resource paper, "The Process of Setting Priorities for Food and Agricultural Research, " prepared by Charles E. French.

ment on research priorities into some kind of rigorous evaluation system. Another is an approach to optimize resource allocation, such as benefit-cost analysis.

Another new process that deserves careful consideration is the one used in the World Food and Nutrition Study conducted by the National Academy of Sciences in 1977. This process included: a) a thorough analysis of the need for the study and the time required to complete it, b) an evaluation of the various constraints involved, c) a thoughtful study of the criteria for choice, and d) an accurate delineation of the parameters of the study (French, 1981).

Within the current planning system, consensus development does indeed occur, but it occurs more on a give-and-take negotiation among managers than on approaching the problem on a more systematic basis of project-ranking, benefit-cost analysis, or the methodology used in the World Food and Nutrition Study.

The most important guidance gleaned from the new processes is that they are mechanisms for developing a consensus. This avoids certain drawbacks such as indecision, internal bickering and resultant weak bargaining power, outsiders, failure to communicate clearly, and underrating society's expectations about putting parts of the research house in order. Consensus by those within the system would help on all these problems.

In setting up a priority-setting process, consensus making protects the integrity of the individual and demands rigor—i.e., being realistic about the situations in which the participants can be expected to make reasonable judgments. Another useful principle about consensus making is that it must provide for interaction. Feedback is a powerful modern concept, and it can prove itself in the priority-setting process.

A good, workable priority-setting process keeps the research system from being bogged down with other problems and gives the system a chance to stand on its own in making priority judgments. Moreover, a rigorous planning-process approach goes a long way in arguing for a fairly open, freely operating research system. There is no room for internal strife. And finally, the need for continuity in planning and evaluation within the system seems obvious. In the present planning systems, continuity is often lacking.

It should be kept in mind that these new processes are still evolving and have not yet proved themselves in some situations. They cannot surround problems that the mind cannot comprehend; they cannot create judgment. They cannot substitute for peer accountability or scientific objectivity. Priority planners should also realize that consensus making is only one part of these processes. But it is an important one. Scientists may not always want a consensus. Scientists make convincing arguments that the lifeblood of their creativity and objectivity lies in their diversity and controversy. These processes, therefore, have limits and any use made of them in priority setting should take their latent limitations into consideration.

PRINCIPAL FINDINGS

- To adequately determine research priorities there need to be explicitly stated goals for food and agriculture. There are no explicitly stated food and agricultural goals for the research community to use in determining research priorities.
- There is concern whether the functions assigned to the JC are attainable. It has had major problems in attempting to satisfy these functions and as a result has had limited impact. Its effectiveness is limited by a lack of consensus by its members on its role, percep-

tion of USDA dominance, and overorganization.

• Functions of UAB are more attainable than those of the JC. Impact of UAB on research priorities is unclear. It cannot represent all users of research, and those not represented are critical of UAB's performance. UAB, like the JC, lacks its own operating funds and is dependent on USDA for its resources. Its membership includes performers as well as users.

. There is lack of satisfactory long-term process for evaluating existing research activities, potential research opportunities, and development of a new set of research priorities. Long-term research planning which is updated every 4 years or more can be accomplished by an intensive, comprehensive study involving research administrators, scientists, and users.

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