USDA Struggles to Reform Its Research

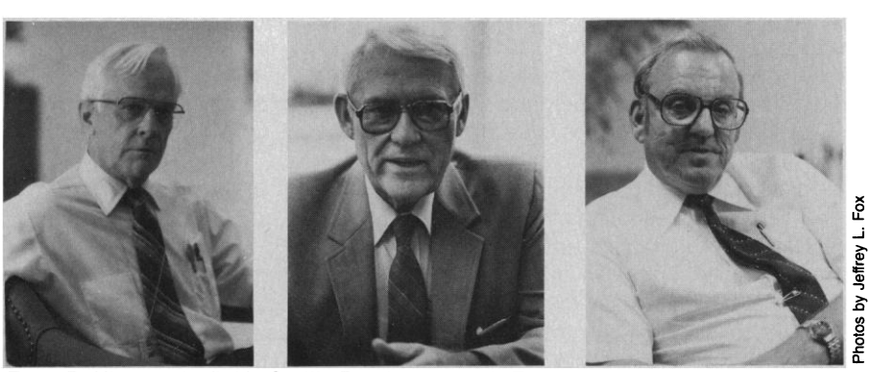
The bureaucracy is being pruned, biotechnology is getting a boost, and programs are being directed more from headquarters

After more than a decade of being on the receiving end of a barrage of criticism, the Department of Agriculture's (USDA's) sprawling research enterprise is in the midst of a shake-up. Many of the changes are aimed at pushing the department more firmly into biotechnology, an area that the critics claim has been relatively neglected. Other reforms include more centralized planning and directing of in-house research and eliminating layers of bureaucracy, resulting in savings that have been plowed into research at a time when overall budgets have seen little growth.

If the past criticisms of the agricultural research system have any merit, these reforms are long overdue. The criticisms began in earnest 12 years ago when the National Academy of Sciences (NAS) delivered the Pound report, a blistering indictment of USDA's research by a panel chaired by University of Wisconsin biologist Glenn Pound. Its critical themes were reintroduced forcefully 2 years ago when the White House Office of Science and Technology Policy issued the Winrock report. Based on a conference involving many leaders of the agricultural research community, it called for major reforms in the agricultural research system, admonishing the department to prune dead wood, bolster basic research, and reduce the deadening effect of its bureaucracy (*Science*, 24 September 1982, p. 1227). Another round of criticisms is likely to come this fall when a high-level NAS committee is due to deliver a report reviewing some of USDA's in-house research programs.

Although there have been complaints that the department's response to these criticisms has not been fast enough, USDA has found itself caught in a difficult political position and has had to proceed somewhat cautiously. Reforms must be steered past a suspicious Congress and through considerable internal opposition. Moreover, the department's research programs are extraordinarily decentralized, with both researchers and administrators accustomed to addressing problems that are defined locally by the state governments, farmers, and agricultural suppliers. Hence, many scientists and administrators within the agency say that the process of reform has been wrenching and suggest that its big payoffs are still to be realized.

USDA supports research through several channels. Its two major programs involving research at the state and local level are the extension service and the cooperative state research service; together their annual budgets for 1984 amounted to nearly $582 million. However, the main part of USDA's in-house research—and often the prime target of the critics—is conducted by the Agricultural Research Service (ARS), which has a $474-million budget in 1984. The nearly 3000 scientists who make up ARS are scattered among 147 facilities. They range in size from the largest center in Beltsville, Maryland, where more than 400 scientists work (see box, p. 1377), to a profusion of much smaller facilities where, for example, two or three scientists may work in virtual isolation.



Photos by Jeffrey L. Fox

Terry B. Kinney, Jr. (left); Orville Bentley (center); Thomas J. Army (right)

ARS administrator Terry B. Kinney, Jr., who is both respected and feared by those who work under him, says he has been trying to reorganize ARS rapidly, arguing that a fast pace is required because it is "like doing surgery on a vital organ." Much of his work is mediated through ARS's national program staff, which in the past 2 years has dwindled somewhat in size but grown considerably in power. The national program staff is run by ARS deputy administrator Thomas J. Army. Under Kinney, Army and his staff now exercise central authority in ARS, deciding what research programs should be followed.

During the past 2 years, Kinney has wielded a sharp knife at ARS, and the main target has been the service's administration. Previously, it was organized into four regional administrations and 21 centers with little central focus. Kinney has drastically cut that to 11 national centers, whose administrators report directly to ARS headquarters.

"I'm personally involved in selecting people able to manage research," Kinney says. A key change, he adds, is that those administrators "no longer control money nor can they change the research programs. They are executors." Their primary responsibility has become maintaining the quality of the research programs at their centers. But the overall direction of that research, to a much greater extent than ever before, will be managed from headquarters so that it has a "national focus." This fits in with one of the chief recommendations of the Winrock report, which said that ARS should concentrate more on national problems, leaving the extension service and the cooperative state research service to deal with local issues.

In the course of making these and similar changes, Kinney has plowed funds realized from administrative savings back into ARS research programs. Some of this money, which currently amounts to about $16 million, has helped to establish a new plant gene expression center in California (see box, p. 1378), which is one of the ARS's most prominent thrusts into biotechnology. Other funds have been distributed widely in ARS, with a distinct emphasis on projects that fit under the broad rubric of biotechnology. ARS staff at the bench level as well as administrators contacted by *Science* say they are pleased to see this kind of redistribution of funds to benefit research.

However, misgivings about the way in which ARS is making some changes persist. "ARS has fallen badly behind in biotechnology, and it needs to keep up,"

admits one official, who asked not to be named. "But if you're not careful, you can lay a guilt complex onto the traditional people you've already got. . . . You can't tell people to be loyal or quit. If you do, the best people will quit because they have the opportunities for other jobs." His concern, which is shared by others, is that there has been too much "shooting from the hip" in forcing many of the changes in ARS.

In particular, several critics are frankly uneasy with the power vested in ARS's national program staff. "They decide who does what," a critic says, asserting, "There's little objectivity in how things are done." Another critic adds, "National program staff is not 'staff' but has more a top management role, dictating to the entire agency. The greatest effect is a loss of morale among the scientists. It's hard to pinpoint this, but there's no longer a dialogue between the scientists and the national program staff."

Army sees the national program staff's role as being part of a tricky balancing act—caught between answering the needs of Congress and commodity groups, who have resisted changes at ARS, and dealing fairly with ARS's widely dispersed scientists, who are "just beginning to feel the impact of this system on their programs."

ARS scientists are certainly feeling the pressure. "We are trying to force interdisciplinary research by setting up teams," Army says. His associate, Dan Laster, notes, "It's too late for a scientist with 20 years of experience to adapt to new techniques. Just taking a sabbatical may not change someone's approach, although [it] may make a better team player of the scientist. But we can replace them with molecular scientists." Other officials say that ARS, although not trying to fire any scientists, is striving for a somewhat higher attrition rate of about 5 percent instead of its current 3 percent as another way of rejuvenating its science and lowering the average age of its scientific staff. Gentle though such pruning efforts may be, they understandably make some ARS scientists uneasy about their futures.

Kinney says that he may soon ask the National Academy to examine ARS's process for evaluating research projects—another target of ARS critics. "The review process is probably superior to most research reviews," Kinney claims. Yet, "it's got to be different from others, such as NSF [the National Science Foundation], because ultimately we get down to something mundane." The internal review process nonetheless is becoming more rigorous, and it includes a mechanism for outside review.

Although these administrative changes have been difficult to steer past the USDA bureaucracy without further upsetting the ARS scientific staff, whose morale has been shaken, in one sense they have been relatively easy to make because they have not required congressional approval. Attempts to make real structural reforms in USDA's research bureaucracy inevitably run into resistance in Congress. For example, just about every critical report on ARS has recommended closing some smaller research institutions and consolidating operations, but whenever USDA plans to shut down a facility, Congress insists on keeping it open.

Such restrictions are but one indication of the mixed, if not outright contradictory, perception of USDA's research agenda that is held on Capitol Hill. Congress' tight hold on USDA budgets has kept many research reforms at a virtual standstill. For example, strong political figures, particularly Representative Jamie L. Whitten (D–Miss.), who chairs key House appropriations committees, still are not sold on the idea that USDA ought to do anything different when it comes to research. This has led to sharp disagreements within Congress over funding of the department's research programs. For example, the House has repeatedly thwarted the efforts of successive administrations to strengthen USDA's competitive grants program with a major new biotechnology component.

Another problem for USDA is that Congress continues to earmark research allocations instead of giving the department a freer hand, indicating what a narrow scientific row Congress usually allows USDA officials to hoe. Such restrictions clearly also frustrate the department's critics who see its reforms as coming too slowly. They suggest that the bulk of USDA's research should come out from under earmarked headings and

Rejuvenating ARS's Showcase

The Agricultural Research Service's (ARS's) Beltsville Agricultural Research Center is the system's showcase. Located in a Maryland suburb of Washington, D.C., it is the largest single facility in the extensive ARS system. It also is the most-visited, especially by international delegations interested in U.S. agricultural research efforts. One consequence of being so visible is that the center has become a focal point for the reforms that are sweeping through the entire system.

Last year, then-acting director Waldemar Klassen asked for recommendations for strengthening the Beltsville research programs. The results are outlined in a report that was recently completed by Klassen's special scientific advisor, H. Graham Purchase. The report identifies a variety of biotechnology-based projects that are "basic, long range, and high risk." The research falls into several categories, including the manipulation of genes of economically important organisms, such as nitrogen-fixing microbes; the study of biological membranes, ranging from those in plant root tips to those surrounding sperm cells and mammary gland cells in farm animals; and the characterization of chemical mediators, such as antibodies, hormones, and pheromones. The report thus lays down a very broad agenda for the Beltsville center, indicating where many of its traditional interests would benefit from the new approaches permitted by molecular biology and similar disciplines.

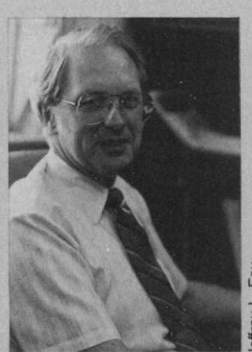
The Beltsville center annual budget is roughly $70 million, supporting about 400 scientists. Biotechnology now accounts for under 10 percent of the budget, and Klassen has said that he would like to see it grow severalfold to amount to as much as one-third of the entire research program at the facility. Some of his wishes already are being partly fulfilled because recent cost savings within ARS have allowed director Terry B. Kinney, Jr., to reallocate $1.25 million towards expanding 15 projects at Beltsville, most of which emphasize biotechnology.

"The management, program, and funding changes are going to make Beltsville a showcase for the new technologies," Purchase says. "The emphasis in hiring will be in biotechnology. The opportunities to put together a team to reach a critical mass for agricultural research are good here—as good as it is for medicine at NIH."—**J.L.F.**

A New Thrust in Plant Genetics

The new Plant Gene Expression Center, to be based at the U.S. Department of Agriculture's (USDA's) Western Regional Center in Albany, California, will be a somewhat unorthodox addition to the Agricultural Research Service (ARS). The center already is winning praise from some of USDA's critics but, perhaps not surprisingly, it also is being criticized by some of the department's erstwhile defenders, including scientists and administrators within the ranks of ARS.

The California center can be called unorthodox for several reasons. Although it is being set up by ARS at a well-established USDA facility, the center will have especially close ties with the University of California's Berkeley campus. For example, the two senior program leaders at the center, who have not yet been named, will also have faculty appointments at the university, according to Gerald Still of ARS who has moved from headquarters to California to become the center's acting director. Another eight scientists of the center's core staff will be adjunct professors. The plan is to "develop a real symbiosis" between the two institutions, Still says.



Jeffrey L. Fox

Gerald Still

Besides building close ties with the university, the center also will be open to forming short-term cooperative research partnerships with private firms. Indeed, the Albany site was chosen in part because there is a high concentration of biotechnology companies within easy reach in northern California, Still notes.

Observers point to several potential problems arising from these arrangements. It is "a shotgun marriage" that "has to create jealousies," says one long-time observer of agricultural research in California. Although plans call for including some of the Albany center's established scientific staff in a wider "consortium," some jealousy is bound to arise between them and their new colleagues who will be joining the plant gene center, he adds. (The consortium scientists who will be drawn from ARS and elsewhere, will engage in cooperative research efforts with the incoming center staff, and who will be selected for their skills in plant molecular biology. The established ARS scientists at Albany have expertise in more traditional disciplines, such as biochemistry, plant physiology, and genetics.)

The plans also call for the plant gene center to have its own director who will have separate authority from the current ARS center director at Albany. This arrangement already is stimulating some rather diffuse anxiety over whether the presence of two directors under one roof will itself be a problem. In addition, "there may be some university–USDA friction because there will be two masters for these [new] people to serve," says one ARS scientist on the Albany staff. A colleague adds, "Our arrangement with the university reinforces the idea that the university knows how to do [research] and we need to bring them in to direct us. That's bad for ARS."

Nevertheless, some ARS scientists are inclined to welcome the new center because it will bolster the overall scientific program at Albany. Director-designate Still also plays down the worries, saying that the center is designed to be a place for multidisciplinary research, and that traditional disciplines will be augmented by molecular biology, not replaced. "The Albany center people are worried about being squeezed out," he says. "Not so. We'll just squeeze the real estate some. . . . It will help the science there."

Plans now call for the center to grow to a staff of about 70, which would bring the Albany facility, whose current staff is about 300, close to its historical capacity of 400. Although there is now some confusion over what resources will be allocated to the new center, it is expected to become a magnet for funds. USDA plans to provide the center $4 million annually, with the expectation that matching funds will be found from a variety of public and private sources.—**J.L.F.**

be moved into competitive programs and that increased emphasis be put on training bright young scientists. Political realities make such drastic changes seem unlikely for the immediate future.

The department is always dealing with "highly motivated people," says Orville Bentley, who has been USDA's assistant secretary for science and education during the past two years. The trick is to "find compromises and common denominators" that will be accepted not only within the department but also by its many watchdogs who often yelp for very different reasons.

Such circumstances force the department to take a measured approach toward solving its problems. Thus, Bentley takes pride in a series of planning documents the department has put together over the past year—in part, a response to the criticism that the department lacked a coherent plan for its research programs. These documents formulate needs, goals, and plans to redirect the agency's research during the current period of virtually no budgetary growth—without abandoning programs that address the pragmatic needs of the department's many powerful, traditional-minded users, he points out.

Battles over changes at USDA could come to a climax next year when the farm bill comes up for consideration in Congress. It is the major piece of legislation that authorizes USDA programs, and it could offer an opportunity for some creative compromising to sort out many disagreements over the proper future of agricultural research. Bentley says that a subcabinet committee currently is developing position papers, including one on science and research, as an effort to reshape congressional thinking. The series of planning documents developed at the department during the past year will be heavily relied on during this subcabinet exercise, he says. "We're trying to factor science in. But our outreach to Congress partly awaits the outcome of the election."

"ARS has taken a hard, painful look at its programs and management," Kinney says. The result has been many changes, with a distinct new emphasis on biotechnology in ARS research. However, this has not meant abandoning more traditional approaches or ignoring the many interest groups who insist on maintaining an influence on USDA programs. "We can do all the genetic engineering we want, but ultimately we come back to the applied—the plant breeder with a holistic approach," Kinney says. "I am excited with the opportunities out there."

—**JEFFREY L. FOX**