FORCES RESHAPING AGRICULTURAL RESEARCH AND EDUCATIONAL INSTITUTIONS

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The forces affecting programs of our public agricultural research and educational institutions are complex — probably because the system itself is so complex.

Many observers believe such complexity actually contributes to the strength of scientific and educational programs. It combines independent work with a sense of common purpose and strong program ties that make federal and state institutions capable of providing a broad range of scientific and educational services.

To understand the impact of change on institutional behavior, it will be helpful to think of these groups of institutions as being in two categories, the university community and the research agencies of the federal government.

The University Community

Universities operate under constraints of tradition and external pressures. The university community is a tradition-based entity that revolves around intangibles such as meaning and values. To this community there must be meaning behind quality programs in order to impart the all-important values contained in philosophy, literature, history, sociology, political science, and the basic sciences that form the educational core of a university program. In addition such foundations as faculty tenure and freedom of expression can be considered a part of the "institutional glue" that provides a much-needed framework for operation.

Maintaining an academic environment that fosters scientific inquiry, freedom of expression, and the capacity to set academic standards for its students and faculty are prerogatives that quality universities guard jealously. At the same time, a university has to be responsive to the society it serves, and from whom it receives sustenance and legitimacy. The challenge is to achieve these ends while keeping the body politic at arms length.

Despite these constraints, universities have demonstrated a remarkable capacity to adjust to today's changing research and education needs and shifting social and political environment. Let me recall a few changes in our university system since World War II:

- College of agriculture enrollments have shifted from a high percentage of rural students, typically with farm backgrounds, and predominately male, to greater numbers of urban-oriented and female students.
- Curricular changes have been substantial with greater emphasis on theory and fundamental concepts, and with a reduction in "how-to-do-it" courses that were common for some years. There are new programs in use of computers and international agriculture as well as joint research and development in such areas as biotechnology and natural resource management. This includes environmental pollution, water quality, food safety, and residue avoidance.

Federal Research Agencies

The other major component of the agricultural research system has undergone similar changes.

The USDA's Agricultural Research Service (ARS), like the universities, has traditional and institutional roles that have evolved through successes in fundamental research. ARS scientists developed programs based on scientific and technological leads influenced by national needs. But because ARS funds come directly from the government, ARS feels more direct influence from the political quarter and more pressure from specialized clientele groups than universities.

Other than that, however, the internal and external forces that help shape institutional policy and influence decisions about programs are similar. Both sets of institutions are subject to shifts in public attitudes and policy and must have the internal capacity to reshape programs, whether the pressure comes from inside or outside their communities.

Even as we make progress, we must be prepared to answer the criticisms that frequently come to public institutions — criticisms usually voiced by persons who are not confronted with the complicated processes agricultural research and education institutions must face whenever change is involved. Often, the criticism revolves around the long-range planning process, program coordination, and the level of scientific and scholarly activity.

The louder the criticism, the more likely it is that research and education institutions must bow to those areas of concern that are supported at the state and federal levels by legislative mandate and program funds. The result is that programs can become tilted toward those that are given weight by the simple measure of dollar support. The essential coordination and articulation of an agenda for education/

research is thus clouded by those who seek to exert pressure-by-purse-string combined with political clout.

There is also pressure through competition from non-Land-Grant institutions and private sector laboratories for agriculturally-oriented research funding. The more we have to fight to justify program change, the more slowly we can move ahead in certain areas — and the faster our competition can "move in" on grants monies. How are the state agricultural experiment stations, the extension services, and the federal research agencies going to react and adjust to these developments?

What are the implications for program continuity and for long-term, fundamental, mission-oriented research? What is the future for applied research and technology transfer?

We are continuously evaluating new demands for extension education and for teaching programs at the baccalaureate and graduate levels.

There are many scenarios that can and will be followed to circumvent these problem areas and make our programs timely, functional, and attractive to our nation's best scientists — both present and future.

Emerging Trends

No single prescription can apply to a system as heterogeneous as our universities and federal research agencies, but some common trends are emerging that are likely to affect the future of the agricultural sciences and education in the United States.

A. Greater financial support of basic long-term, mission-oriented research. The Department of Agriculture should take a more aggressive role in leading this effort and providing funding.

B. Development of new and innovative programs by extension specialists and applied researchers to bridge the gap between applied research and more fundamental science in terms of extension education and technology transfer referred to by James Bonnen of Michigan State University.

C. More stress on joint, long-range planning for federal/state programs, followed by more accountability to make sure the needs, priorities, and program directions identified by planners have been fulfilled.

D. Continued emphasis on maintaining what Vernon Ruttan and others have referred to as "institutional capacity for research and education," including the allocation of more federal funding for developing specialty institutes for nutrition, food safety, and environmental impact studies, or other similar areas of concern.

E. Greater public debate about agricultural policy and the relationship of science and education to our water and land resources;

the quality of our environment; international trade; energy; food prices; and the proper role of state and federal research institutions.

F. Recognizing that agricultural mindpower is crucially important to the security and well-being of this country. Our colleges must take aggressive leadership in recruiting qualified undergraduates and expanding graduate education. Opportunities for post-doctorate education must be expanded and encouraged.

Planning for Change

Given our system, the dialogue — and sometimes conflicting views — between Congress and research and educational institutions will continue. But it is our greatest hope that the dialogue will encourage long-range planning resource allocation and assessment of the roles of publicly supported institutions. There are many examples of this kind of activity.

Early this year, ARS issued a strategic long-range plan for the future along with a six-year implementation plan. The reaction in Congress and among user groups and scientists was mixed. Too often, those who saw resources shifting away from their areas of interest were alarmed, while those who saw their concerns appearing as higher priorities were supportive.

The ARS experience typifies the dilemma many institutions face in their planning efforts: resistance to changes in institutional structure and programs. This is true for a college faculty as well as for the federally-funded agencies and the clientele we serve.

Recall, if you will, the great brouhaha over cross-breeding in hogs; the tightening of environmental regulations on chemicals; enforcing pure food and drug laws; and introducing hybrid seed corn. Some courses deemed important years ago look ridiculous by today's standards. But today's courses may become outmoded, horse-and-carriage curricula tomorrow.

The message, then: institutions and their leaders must do a better job of anticipating change, and then managing change in a framework that preserves basic educational values such as freedom of inquiry, institutional autonomy, accountability for funds, intellectual objectivity, and developing the social and intellectual conscience of the students and the public they serve.

Interdisciplinary research, teaching, and extension programs will be increasingly important to future developments in science and education in agriculture.

Every university, federal agency, non-Land-Grant institution, and private sector laboratory has successful cooperative programs. Unfortunately, there are too many well-conceived efforts that have never

fulfilled their potential. Intellectual and physical resources need to be mobilized to initiate new broad-based research.

Funding Trends

There will be continued basic support for federal funding of state agricultural experiment stations and extension services but experience suggests that federal funds for major expansion of these science and education areas will come slowly.

Competitive grants for encouraging new research are more likely to be preferred to new formula funds because support for these grants by science policy makers is stronger. But this support should be aimed at priorities and long-term research needs by achieving a broad-based consensus.

State funding should continue to grow modestly, depending, of course, on tax revenues and state of the economy. Industry funding is likely to increase, but these efforts are likely to be designated for areas of potential economic return on investment. Industry-supported checkoffs are likely to increase, but the core funding will continue to come from federal and state sources.

Overall, justification of educational funds at all levels will become more demanding and subject to increasing caveats on their use from legislative bodies and state educational coordinating boards. Hence, the greater need for the institutions to develop internal assessment-allocation processes — either through the peer review system or an analog that can serve as a surrogate for the public, building confidence in the intellectual and scientific quality of our programs.

Coping with Change

The outlook may be uncertain, but not necessarily pessimistic. We can do a lot to help ourselves. At the federal level, we can streamline programs; phase out underfunded, outdated, low-priority programs; or, where appropriate, shift from federal involvement at field locations to state-based operations closer to the needs and problems of the producers. Transferring the responsibility for programs will produce better management at state levels.

If this were done, funds saved could be used to support programs that extend across all agricultural sciences such as germplasm storage; cataloging and evaluating expensive large-scale, long-term projects in breeding and genetics systems; molecular biology; watershed management; environmental problems requiring great amounts of time and evaluation of their impacts on food safety; and potential long-term environmental pollution. But to do this requires user group cooperation, Congressional understanding, and a willingness of all members of the team to support and accept advice from peers and the opinions of scientists and program administrators.

Congressional understanding of the need for the ongoing research funding is important because of the Congressional committees in the budgeting process.

Closely related to the oversight role of Congressional committees are questions about the impact this function has on making decisions on scientific matters and program evaluation. Does such oversight unduly discourage long-term commitments to basic research? Does it distort short-term resource allocation for more applied research?

Creating a Unified Voice

We need a more unified "voice" for agricultural science and education. The long history of institutional cooperation and voluntary planning proves that Experiment Station Extension and Resident Instruction Committees on Policy, National Association of State Universities and Land-Grant Colleges, USDA, industry-university-USDA groups, the Congress, and state and federal regulatory groups have served well.

The Joint Council for Food and Agricultural Sciences is mandated by Congress to provide leadership in the federal/state sector. And they do have their work cut out for them! The role of the Board of Agriculture for the National Academy of Sciences in developing policy and identifying research needs is likely to grow, especially in new and emerging areas of agricultural sciences. But more is needed. We should develop a broad consensus on major, high-priority goals and needs.

There has been a recommendation for a high-level board or commission for agricultural science. There has also been suggested an institute for agriculture similar to the National Institutes of Health (NIH). But that doesn't seem to be the answer. NIH and Congressional committees are now debating programs and internal organizations and such issues as new institutes and program priorities similar to those familiar to us in the agricultural arena.

Personally, I'm proud of our system — but policymakers don't always agree. This is why we need to explain the system and tell about the successes at many levels. At the same time, it is important to remember that we must constantly review ourselves and determine how we can be even more effective in meeting our ultimate objective — the well-being of the American people. One of the ways we can do that is by involving our clients — the people — at every level. You make the difference.