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New Challenges Facing Agricultural and Resource Economics Departments in the Twenty-first Century

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Land/grant colleges were established to serve the public via a tripartite system of teaching, research, and extension. Agricultural economists have played a key role in this system in meeting agriculture's needs and are expanding this role to better cover the areas of food, natural resources, and the environment. The declining economic importance of agriculture and the growing interest in relegating agriculture to free market forces has resulted in declining formula funding for the land grant system, greater emphasis on competitive funding, demands for greater accountability, and demands for a return to greater focus on public service, problem solving, and stakeholder involvement in the definition of research, teaching, and outreach agenda. Simultaneously, the demand for the traditional "agricultural economics" graduate is declining. This paper reviews the current and long-term issues and trends facing agricultural economics departments, explores the futures of their teaching, research, and outreach programs, and highlights the challenges that will be faced as these departments explore new teaching, research, and service opportunities in the areas of food, natural resources, and the environment. The paper concludes by arguing that for forward thinking agricultural economics departments, these pending changes will represent opportunities for better scholarship, more balance, and more effective service.

Land grant colleges (LGCs) were established to serve people via a tripartite system of teaching, research, and extension, funded via a federal-state (and in the case of extension, local) partnership involving matching funds (Ballenger and Kauadio 1995; Schroeder 1993). Back in the mid to late 1800s and the early 1900s when the system was developed via the Morrill (1862, 1890), Hatch (1887), and Smith-Lever (1914) acts, agriculture was a dominant industry and way of life. It represented almost 60% of the national population (National Research Council 1995; Ballenger 1996). With academic institutions being at the frontier of science and technology, the major constraints to agriculture's growth (National Research Council 1995), it made sense to peg the future growth of agriculture to public universities. LGCs have in-

deed contributed to the growth and success of agriculture (Liska 1988; Young 1985; Cardon 1985). Economists have consistently shown significant returns to the investments in LGCs (Pardey and Craig 1989; National Research Council 1995; Huffman and Evenson 1993; Knutsen and Tweeten 1979; Evenson and Kislev 1975; Rose-Ackerman and Evenson 1985).

Agricultural economics departments (AEDs) have played leading roles in the LGCs in meeting the agricultural needs of the public. In the Northeast, for example, AEDs have successfully educated students for research and management positions in the private and public sectors, particularly in agriculture. AEDs have also been an important source of policy, institutional, and market innovations, and of solutions to various state, regional, and national problems. Examples of areas in which agricultural economists have contributed to public policy include economic development, agricultural production, land use, farmland retention, commodity marketing, international development, international trade, science and technology, resource conservation, commodity regulation, commodity price

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ing, and competitiveness. Extension efforts of AEDs have resulted in improved production practices, marketing, management, and environmental quality.

The relative decline in the number and importance of farmers and agriculture and the growth experienced in other areas of the economy have eroded the political clout of the agricultural industry over time (National Research Council 1995). LGCs have responded by broadening their missions, goals, and mandates to encompass food, forestry, natural resources, and the environment. So have the AEDs, albeit slowly. It is no longer unusual to find environmental, food, and resource economists in AEDs today. AED faculty are actively involved in environmental and food-related research and are turning out students with broader training than in the agricultural area. The expansion of the coverage of AEDs has increased the utility of the profession to the public and its primary clientele.

Despite these changes, the AEDs are currently facing perhaps the most significant challenges in their history. The profession is at a crossroads as universities in general and the LGCs in particular struggle with declining budgets, greater emphasis on competitive funding, challenges from the public about accountability, calls for greater efficiency, demands for greater relevance of university programs, calls for closer relationships with industry, and questions about the utility of tenure (Marchant and Zepeda 1995; Just and Huffman 1992). The effectiveness of the tripartite system of teaching, research, and extension and the usefulness of the "ivory tower" are being questioned as the public is demanding that the universities and the land grant system return to a greater focus on public service, problem solving, and stakeholder involvement in the definition of research, teaching, and outreach agenda.

AEDs and other social science departments have not escaped these challenges. In many cases, undergraduate enrollment and the demand for agricultural economics graduates are declining as AEDs have been slow to embrace the development of curricula in food economics, environmental economics, and other more lucrative areas where student interest is growing. The relevance of some of the research conducted by AEDs, particularly basic disciplinary research, is also being called into question. Local farmers and other clients who look to social scientists to solve some of their social problems are demanding more applied, relevant, and problem-solving research while the newer food and environmental clients, which the profession has been slow to cultivate, raise questions

about the ability of agricultural economists to address their issues and problems. The appropriateness of AED outreach programs is also being questioned.

Following the lead of the Kellogg Foundation, the National Research Council, and others that have been taking a hard look at the land grant system, some of our professional associations, including the AAEA, NAREA, and C-FARE, have recently organized discussions and/or presentations about the challenges facing the AEDs (C-FARE 1997; Kellogg Commission 1997; Marchant and Zepeda 1995; Ballenger 1996). Many AEDs are implementing name changes, curriculum reviews, new focuses on policy, multidisciplinary partnerships, resource redirections to the food and environmental areas, more aggressive techniques in funding pursuit, etc. The profession at large is searching for a new identity, a new balance (with respect to missions and mandates). Some in the profession are resistant to change, and others are questioning the misguided nature and short-sightedness of the new directions in which Congress and society are headed. Some just simply fail to acknowledge the new changes that are about the profession or to accept that some of these are long-term issues that must be addressed.

Drawing from national trends and experiences from some northeastern states, especially New Jersey, this paper discusses some of the recent changes in the structural, political, economic, and fiscal environment of teaching, research, and extension in AEDs and highlights the recent trends and challenges facing the profession. Some of the themes that will characterize the future of AEDs are also discussed. Finally, opportunities for growth and greater efficiency, relevance, and contribution are discussed. The paper is intended to be thought-provoking and to stir discussion about the future of the profession.

Recent Changes and Trends in the Teaching, Research, and Extension Environment in AEDs

Ballenger (1996) and Just and Huffman (1992) attribute some of the changes facing the LGCs to changing population and political-economic dynamics. At the creation of the LGCs in 1860, half of the U.S. population lived on farms and more than one-half of the American labor force worked on farms (National Science Foundation 1995). The nation was deeply rooted in its agricultural heritage. Today, farmers represent less than 2% of the national population and farm workers 3% of

the labor force. The “culture and atmosphere” of farming, which shaped the evolution of the LGCs, are things of the past. The growing importance of other issues and industries, such as the environment, food processing, food safety, ethnic minorities, poverty, urban decay, quality of life, and international trade, has helped to crystallize the notion that agriculture may no longer be unique and needs to be left to free market forces (Huffman and Just 1994). Historically, one of the key excuses for government intervention in agriculture was guaranteeing a safe, local food supply. The end of the cold war thwarted this excuse. The 1996 Federal Agricultural Improvement and Reform (FAIR) Act, which prescribes the end of commodity programs, is the ultimate indication of the long-term perspective of federal policymakers about agriculture and about the infrastructure, such as research and extension, that was put in place to support agriculture.

Even before 1996, the warning signs were already in place. The passage of GATT and NAFTA signaled a new age in international trade and relations. Economies are rapidly becoming globalized, and Congress and the public are gearing up for international competitiveness. The nation is trying to stretch each dollar to the maximum. The new buzz words are accountability, efficiency, and impact (at all levels), and Congress and the public are not reluctant to apply these principles to universities and LGCs. For decades, the public has more closely scrutinized the budget, purpose, and modus operandi of the university. The USDA has gone through some reorganization and more is bound to come. Research, teaching, and extension functions at the USDA have recently been combined under one agency, and the relevance of many of the USDA’s programs is being questioned. Recently, the Heritage Foundation proposed new drastic reorganization plans that called for a major scale-down in USDA activities. The USDA’s agenda has also consistently been modified over the years to include greater coverage of food, natural resource and environmental issues.

Specifically, questions are being raised by the public about the fundamental ways by which the land grant system operates. Since 1970, the structure, management, and funding of agricultural science has come under growing public and internal scrutiny (Just and Huffman 1992; Huffman and Just 1994). Many argue that the LGCs have lost their relevance because of their excessive focus on basic research and their abandonment of applied research for more “academically correct” scholarly publications (Schuh 1986). Among the more probative questions being asked are:

- Do we still need the LGCs?
- What is the role of the government in agricultural research and extension?
- Are teaching, research, and extension truly integrated?
- Can we regionalize the LGCs?
- Is stakeholder input into the setting of the research, teaching, and outreach agenda adequate?
- What is the appropriate balance between basic and applied research (Wiggins 1997; Bonnen 1996)?
- Have the LGCs abandoned their teaching mission?

Emerging areas of concern and interest among the public include the environment, natural resources, and food safety. Some have charged that the LGCs have become unresponsive to their clientele, that teaching, research, and outreach need to be better integrated, and that multidisciplinary approaches must be adopted in addressing the teaching, research, and outreach needs of society (Just and Huffman 1992).

The call for accountability and tightening budgets have not been driven only by the federal agenda (Seneca 1997). In many states, the university is under as much pressure from the state government as it is from the federal. In New Jersey, for example, the current governor’s 1993 campaign platform called for a 30 to 40% reduction in state taxes, and she has kept her promise. Governor Christine Whitman took two billion dollars out of the state’s budget, forcing most state-related programs to suffer cuts. The university finds itself in a helpless situation. Raising tuition to balance the budget will likely be viewed negatively by taxpayers. Many past allies of the university and faculty now openly question the tenure process. In the state, the role of the state university is being debated as community colleges are being viewed as more responsive to the needs of stakeholders. The emergence of other pressing issues, besides higher education, extension, and the experiment station, has resulted in a shifting of priorities in state government. In New Jersey, the economy has been slower than the national economy. The interest in growth management and in slowing down development has resulted in the passage of the State Development and Redevelopment Plan. Policy-makers are interested in sustainable development (the dual mandate of balancing the economy and the environment). Unlike thirty years ago, when the university was typically at the top of the agenda, today university issues are just no longer as lapel-grabbing, especially given the growing

concerns about how adequately the university is performing its role.

Research

Specific changes have had direct implications for research, particularly in the AEDs. For the last two decades, the share of agricultural research expenditures coming from public sources has been declining (Huffman and Just 1994). Furthermore, federal funds appropriated for agricultural experiment stations have been declining (Norton et al. 1995). Formula funding for agricultural research has been decreasing and allocations via competitive grants programs have been increasing (Just and Huffman 1992; Ballenger 1996; Ballenger and Kouadio 1995; Christenson and Robinson 1985). Industry funding for agricultural research is also growing (Ballenger and Kouadio 1995). These changes really have affected how agricultural economists do business, at least in terms of how their activities are funded. On the other hand, some agricultural economists have responded well and have been able to tap into new resources and opportunities. On the other hand, many have questioned and challenged the wisdom of these changes (Norton et al. 1995; Huffman and Just 1994; Just and Huffman 1992), and some have gone as far as to argue that the effectiveness of the agricultural research system will be compromised if funding for agricultural research continues to become more competitive. Of course, as economists, we know that research effectiveness will be lower only if it is true that agriculture is a unique industry which involves significant externalities and requires public intervention to ensure adequate resource allocation to it and to agricultural research. For other industries, where the externality argument cannot be made, existing funds to support research are available largely as competitive grants.

The colleges of agriculture have responded in a number of remarkably interesting ways. According to Ballenger and Kouadio (1995) "an evolution, if not a revolution, is at work." Administrators are demanding greater accountability and demonstration of impact. College names are changing. Hard and soft-wall multidisciplinary centers are being developed. Department walls are breaking down as greater collaboration and multi-disciplinary partnerships are being developed. Departments are merging, and some are closing down outright. There is a renewed emphasis on policy research, research focused on state and local issues, and problem-oriented, as opposed to disciplinary research. Multi-institutional collaboration not only is being fostered but is indeed happening. There is

talk about regionalizing certain research efforts. More than ever before, the utility of tenure is being questioned, and many institutions, including Rutgers, have advocated or implemented a "post tenure review" process.

At the departmental level, budgets are simply tight. At the Department of Agricultural Economics and Marketing at Rutgers, experiment station and teaching allocations, which accounted for 95% of a total operating budget of about \$200,000 just fifteen years ago, now account for less than 6% of total 1996 operating funds of almost \$1 million. Grant funds, which were dismal fifteen years ago, now amount to over 90% of operational dollars. We are doing "more with less" in terms of college resources. Faculty lines, which were automatically replaced upon the retirement of older faculty, are almost guaranteed to be lost today, and departments have to be exceptionally convincing to administration to get the lines back. Faculty are finding innovative new ways to fund research and support graduate students. The payment of page charges for scholarly publications, travel monies to national meetings, funding for books and new equipment, and other things that were normal aspects of the research operation are no longer so. Some faculty have had to pay page charges out of their pockets, and many are thinking twice before going out to publish.

In the profession, serious thought is being given to the direction of the profession. Applied journals are becoming more acceptable and the value of the "high discipline" journals is being questioned. As positions have tightened, fewer departments have been able to bring in new faculty. Many Ph.D. recipients remain underemployed for years after graduation as a result of perhaps the worst "buyer's market" in the profession in the last half decade. Twenty years ago, it was almost unheard of for a Ph.D. agricultural economist to take on a post doctoral position. It is the norm today. Many AEDs are increasing their reliance on state sources of grant funds. Many departments are changing names. In fact, no northeastern department bears the name "Department of Agricultural Economics" today. The AEDs at the Universities of Connecticut and Maryland are now called "Agricultural and Resource Economics," while Cornell University's AED recently adopted "Agricultural, Resource and Managerial Economics." Rutgers University's AED, which changed its name two decades ago to "Agricultural Economics and Marketing," is now contemplating another name change. The AED at the University of Delaware is now "Food and Resource Economics." The University of Massachusetts's AED is simply called

"Resource Economics." The University of New Hampshire's AED is called "Resource Economics and Development," Virginia Polytechnic's AED is called "Agricultural and Applied Economics," and Pennsylvania State University's AED is called "Agricultural Economics and Rural Sociology." In fact, nationally and worldwide, there are more departments that have gone beyond "Agricultural Economics" than those that have not.

Teaching

In the area of teaching, LGCs also face some interesting challenges. One significant challenge to the teaching program is public perception that the emphasis on disciplinary scholarship and the lack of a clear-cut reward structure for good and imaginative teaching hamper the ability of the university to effectively educate the next generation of Americans. In some institutions, being a good teacher is tantamount to failing as a scholar. According to Bonnen (1996), "state universities have drifted out of the direct control of university leadership and into increasingly disciplinary-oriented, national funding sources, national professional associations, and their journals." This has made it difficult for many institutions to focus on students, public service and state problems (Bonnen 1996). The public has charged that the university has simply lost sight of its mission in the area of teaching. A common question facing department chairs and curriculum coordinators today is "What can my child do with this degree?" Yet, given the tendency of agricultural economics faculty to focus on what they do as professors and their nature as faculty, rarely do they make attempts to go outside the walls of the university to see what employers really want. Sometimes, faculty act as if they are the customer, defending tenure and what they do as if they are the reason for the existence of the university.

Many state legislatures have attempted to force the university back into a teaching mode where good teaching is valued and rewarded. Many university administrators are demanding a movement of the faculty in the direction of teaching. At Rutgers, the college and faculty have recently implemented a "moral contract" that requires at least a certain level of teaching by even the most successful research faculty. The reward system is changing, and so are tenure rules (Bonnen 1996).

According to the National Research Council (1996), the land grant system seems to have gone out of sync with its student clientele. Comparing the expertise of faculty with the interests of students, Ballenger and Kouadio (1995) found that

while undergraduates in the LGCs choose programs in natural resources first, agribusiness and agricultural economics second, animal sciences third, nonagricultural programs fourth, and plant sciences fifth, researchers within the LGCs prefer to research, in order of importance, plant systems, animal systems, and natural resources. Bonnen (1988) argued that the leaders of the LGCs are largely trained in biological and physical sciences, their imaginations do not tell them that problems can be solved by social science capability, and some are actively biased against social sciences (viewing them as nonsciences and unobjective). Resource allocations made under such a system overallocates resources toward biophysical sciences, despite the need for greater research and teaching in the social sciences.

The system is also out of sync in terms of subject matter and industry clientele. Agriculture's ability to generate jobs has dwindled, while jobs in the food industry, in the area of the environment, and in natural resources have grown. There are real needs in the food industry to which the land grant system has not adequately responded. The system has tended to assume that food science and technology research and teaching will meet the needs of the food industry while largely ignoring the social science, business, and economic needs of the industry. In a recent study by Adelaja et al. (1997) in New Jersey, when food companies (processors, wholesalers, retailers, and food service people) were asked to rank their problems, the issues that topped their list were regulations, education and training, transportation, economic development issues, fiscal issues, and other social science issues; no mention was made of technology. Despite the needs of the industry, somehow, the land grant system has been able to get away with delivering what it wants to deliver. In New Jersey, for example, the 9,000 farms in the state employ about 20,000 workers, while the food industry employs about 320,000 workers. In the Agricultural Economics and Marketing Department at Rutgers, only one faculty member has expertise in food, while all others but one (an environmental economist) have agriculture expertise.

As job opportunities have thinned in agriculture, so have they grown in other areas. AEDs have to be concerned about building faculty expertise in areas where students are interested. At Rutgers, the department's program has three options: business economics, natural resource/environmental economics, and agricultural economics. Of the 125 or so students in the program today, none so far has chosen agricultural economics as an option. The vast majority of the students are in business eco-

nomics. Nonetheless, the department's name remains "Agricultural Economics and Marketing." Some might look at this as false advertising. The faculty expertise was largely in agricultural economics until 1993, when an environmental economist and a food economist joined the faculty. In July 1997, two new food economists will be joining the faculty. Most graduates move on to jobs in nontraditional areas for agricultural economics graduates. Technically, what we do as a faculty may be disjoint from the needs of our students and industry.

Many AEDs have implemented product differentiation by adding new majors. For example, the Department of Agricultural and Applied Economics at the University of Georgia recently added two new majors: environmental economics and management, and agribusiness (Broder and Bergstrom 1996). At Purdue, Sigurdson (1996) reports new growth in enrollment fueled by interest in the food industry. Such curriculum changes must be accompanied by long-term changes in the expertise of our faculty.

Student enrollment is also falling in some departments, while student demand for multidisciplinary programs is growing. Moreover, while American students still dominate the undergraduate programs of AEDs, most Ph.D. candidates are foreign students (Marchant and Zepeda 1995). This situation has implication for the next generation of scholars and offers opportunities for cross-cultural and global learning. The job market is also tight. It is taking Ph.D. recipients as long as five years to achieve a faculty position. Most Ph.D.s now have to do a postdoc, and many new faculty hires have significant pre-employment experience (Marchant and Zepeda).

Innovations are emerging in the areas of experiential learning. Many employers want students with experience, which means that most students are now involved in one form or the other of cooperative education. At Rutgers, experiential learning is now a requirement at the Department of Agricultural Economics and Marketing. There are also technological innovations. Most jobs that students go on to now require not only computer knowledge, but a mastery of computer applications. AEDs are beginning to offer computer courses, and some have integrated computers into regular courses. Many universities are capitalizing on interactive television (ITV), and distance learning is beginning to pick up. The professor of the future may indeed have to compete for students as distance learning allows faculty to teach students far away, in other states or even nations. In addition, employers are increasingly interested in stu-

dents with the ability to work in teams or groups. Team teaching is also emerging as faculty are learning that, in some cases, students are better served by a team of faculty.

In addition to the above issues, the following are questions that AEDs and the rest of the land grant system will have to deal with in the future (see NASULGC 1997):

- Will the university remain the best venue for teaching students and the future citizens of the nation?
- In what area is the university not able to compete with other sources of learning?
- With growing interest in on-the-job training, what role can the university play?
- To what extent should AEDs train economics and business personnel for the food industry?
- What is the role of business schools in training food industry personnel?
- Are there partnership opportunities between AEDs and schools of business?
- In what areas can AEDs partner with industry and government in educating students?
- Are AEDs ready to compete with each other as new technologies facilitate new forms of distance education?
- How many B.S., M.S. and Ph.D. programs will still exist in twenty years? Which ones will survive? Will your institution survive?

Outreach

Cooperative extension's role within the agricultural economics profession is to link the departments to the grassroots needs of the public. The theory behind extension is that education and research development achieved through public funding should be made readily available to the public served by the AEDs (National Research Council 1996). Citing Alfred North Whitehead, Bonnen (1988) asserts that unapplied knowledge is knowledge shorn of its meaning. Extension serves to transfer and apply innovations generated within the university to the public and to close the gap between the professor and the public. Doing this in a world where many academics do not understand the need for their research to be relevant could be a difficult task. Researchers should ask themselves the following questions: Do the extension people in their departments (or fields) really serve to take the innovations that they develop into the field? When was the last time the researcher sat down with extension personnel to review the latest in solutions to the problems of the clientele? Are the extension faculty extending their own research, or

the research of all faculty in the discipline? The answers to these questions may help us to understand how integrated extension is.

Extension is funded by a three-way partnership among the federal, state, and local governments. In recent years, the federal role has dwindled, while state and local governments are providing a greater proportion of extension funding. The declining federal funding has posed interesting challenges for AED extension programs. On the one hand, federal mandates are helping to set the agenda for outreach. On the other hand, local entities, whose contributions to extension's budget are rising, are increasingly being vocal about their needs and wants. The federal agenda has encouraged the broadening of extension's role in recent years to include programs in such areas as urban issues, youth, community issues, family and consumer sciences, nutrition, diet, health, leadership development, food, environment, resource management, sustainable agriculture, conservation, and policy. Yet the traditional local farm clientele complains of ever diminishing services.

According to Ballenger and Kouadio (1995), a very large share of extension resources and personnel is devoted to youth, family, community, and leadership development programs. Nonetheless, research resources are concentrated in the areas of plant systems, animal systems, and natural resources. These discrepancies suggest the existence of yet another divergence in focus between research and outreach and a lack of integration in teaching, research, and extension. AEDs like to think that their teaching, research, and extension programs are integrated, but are they really? How many researchers work regularly with extension faculty to plan information and knowledge distribution? If the answer is "few," it probably has something to do with the reward system.

A major challenge facing extension is how to integrate it with teaching and research. Another is whether federal funding for extension will continue long-term. Already, some are calling for the abolition of extension, and others propose to dispense of components such as 4H. Others are suggesting that extension programs can be regionalized across states. Some are questioning whether extension's role should be further broadened. Other important questions include how to continue to communicate the importance of extension to federal and state policymakers and the public, and how to sustain local funding for outreach in the face of declining federal budgets. As extension has broadened its scope, its traditional clientele has been critical. Extension's new clientele also needs to be brought into a tighter network. Balancing the

needs of the farm and nonfarm clientele will be a challenge for AEDs.

One of the changes that is occurring in the extension landscape is the transformation, in some universities, of extension into university-wide outreach programs. It will be interesting to see what type of funding mechanism can be put in place to support university-wide outreach and whether or not federal dollars can be involved with such a broad agenda. Some are calling for true extension-research-teaching integration, whereby each professor in the university has responsibility for outreach. This proposal promises to expand the walls of the university and bring the professor closer to the public. Such moves will bring about new opportunities for AEDs because of the potential relevance of research and outreach programs. Another emerging trend is the rapid development and application of electronic technology. The Email and other capabilities of the Internet have offered extension faculty new methods of communicating and reaching out to the clientele. As the clientele base becomes broader, extension faculty must find the most effective ways to communicate with each category of clientele. Another challenge facing extension is the extent to which users can be made to pay a fee for services. U.S. Senator Richard Lugar raised this issue in Congress.

One of the challenges AEDs are facing is how to come up with meaningful performance standards for extension personnel. The evaluation process in many institutions is dominated by the researcher mind set. In New Jersey for example, the denial of tenure to a group of extension faculty recently drew criticisms from members of the extension faculty and the farm community, who felt that the activities of these faculty members were meaningful and relevant, and had impact. During the crisis, some long-term allies of the university went as far as to question the appropriateness of tenure and the criteria used in evaluating faculty. In fact, some of them threatened to argue against the college's budget at the legislature. The university will have to define new performance standards for outreach, where extension practice is evaluated on the basis of balance among scholarship, significance, and impact. The definition of such new standards will test the current university reward system.

Themes of the Twenty First Century

The future is obviously going to be very different for AEDs. Together with its related disciplines, agricultural economics is going through a paradigm shift, similar in magnitude to the one that

created the land grant system in the first place. Even more fundamental is that this shift is happening simultaneously with the reengineering of higher education, the wholesale questioning of how the higher educational system works, and a rapid technological advancement that could provide some of the tools needed to reengineer the land grant system. Though changes may occur slowly, they surely will. We in the university system must realize that the world is different and that the university, which has become one of the most rigid institutions in society today, must change. Institutions that impede such change will find themselves on the wrong side of history.

The ideal agricultural economist of the future will be cross-functional in the sense that he/she will perform all three mandates (teaching, research and extension), simultaneously and equally well. He/she will also be trained to do just that. The future economist will be well grounded in economic theory but also will be able to straddle the worlds of applied and theoretical economics. What will really set the future economist apart from today's economist will be the ability to partner with others from other disciplines, and indeed from outside the university, in teams to solve real, not academically perceived, problems facing society. If the land grant system survives, future departmental leadership will put significant energy into team building, team management, project management, interdepartmental dialogue, and faculty mentoring. The future AED academic will be a problem solver.

In the future, we will see department walls break down. Departments will continue to do disciplinary research that is important for the development of disciplinary knowledge. However, as in other areas of research such as comparative politics, physics, and biology, such research will and should be grant-funded and will likely not be funded by experiment station funds, which should fund more problem-oriented research. We are already seeing experiment station directors create pools of special initiative money to encourage problem oriented research. USDA's National Research Initiative (NRI) grant programs have also tended to emphasize such research, at least in the social sciences. NRI programs in the social sciences have particularly stressed multi-institutional, multidisciplinary research. Multidisciplinary research centers (particularly policy research centers) will play a major role in bringing the agricultural economist together with other social scientists and biophysical scientists.

According to Bonnen (1988), the responsibility of any single discipline like agricultural economics

is twofold: (1) it is responsible to itself for improving its explanatory and predictive power through the advancement of theory and empirical inquiry (disciplinary knowledge), and (2) it is responsible to society for helping with and sustaining the capacity for multidisciplinary subject matter and problem-solving work. Disciplinary research does not solve problems directly but increases the capacity of a discipline and is useful in subject matter and problem-solving knowledge. Subject matter knowledge is multidisciplinary and multidepartmental and is useful to a variety of decision makers in problem solving. Problem-solving knowledge is also multidisciplinary in nature but is useful to a single decisionmaker. AEDs must strike a balance among all three.

Obviously, many AEDs will not survive, particularly those ones that fail to discover new relevance, recognize their land grant roots and mission, and chart new courses that connect directly with the needs of society today. For a department to survive, its mission will have to be broadened beyond agriculture, in recognition of the contemporary view of agriculture and food systems (Schuh 1986; National Research Council 1996). Areas of promising growth include the food industry, natural resources, and the environment. Already, the LGCs have experienced declines in the number of departments in many key disciplinary areas (National Research Council 1996). In some cases, departments will be merged: family and consumer sciences, human ecology, natural resources, and rural sociology are among the most likely merger partners. Vermont is an example of a department where such a merger has already taken place. Currently at Rutgers, a few departments have recently gone through mergers. The AEDs that survive without being combined will be those that have embraced a broader mandate and that have fully balanced the mandates to serve the agriculture, food, and environmental communities. These departments will probably be good at collaborating in and out of the university. Already at Rutgers we are seeing cross-university partnerships such as the Ecomplex, a joint venture among New Jersey Institute of Technology, Rutgers, Stevens Institute of Technology, and some community colleges.

The system of accountability in the future will be different. Scholarship, at least in the land grant system, will probably be redefined so that it recognizes outreach, relevance, and impact. Faculty will engage in less scattershot approaches to research, the research process will involve stakeholders in research agenda setting, efficiency and quality will be emphasized, and faculty salaries will

reflect these changes. Administrators will probably have more power, as recommended by Schuh, and their guidance would be needed to help instill a new sense of mission (Schuh 1986). The profession of agricultural economics will probably see a proliferation of publication outlets and a change in the name of the profession itself. The powers afforded by tenure will probably be more limited. Renewed emphasis will probably be placed on cost control, avoidance of duplication, and cost-sharing.

From a funding standpoint, both federal and state sources of funding for research (matching funds) will thin out and may eventually disappear, while new opportunities will emerge from the public sectors to fund research at the AEDs. Public sector dollars to fund policy research projects at the university will probably grow. Under this new arrangement, agricultural economists will be essential both in terms of the tools they can bring to the table and the leadership they can provide as the premier policy analysts. State and local issues represent an area of growing need for research and analysis. In developing government-university partnerships, it is important to recall that the cultures of the university and the government are different. Universities tend to be autonomous, are not always interested in the real world, tend to think long-term, prefer substantial lead time, and are accountable via peer review. Governments, however, want immediate solutions to problems, are accountable to the public, solve problems by consensus, want information to support their views, would use the university as hired guns (if allowed), and do not always understand the workings of research. Forging a true collaboration will require the investment of a "relationship-building effort" on the part of the AEDs. Already, university-government collaboration is taking place successfully at the federal level. Some state universities are also having successes. For example, the Department of Agricultural Economics and Marketing at Rutgers received over \$1.3 million in research grants from state government agencies between 1994 and 1997.

New opportunities will also emerge from the private sectors to fund research at the AEDs (Carpenter 1985). The food industry is particularly promising, as are commodity groups. Some in the profession have expressed fears about reliance on industry support, citing the tendency for industry support to "lead us further from long-term research and bring about inappropriate private sector influence on academic research" (Norton et al. 1995). However, such fears may not be entirely justifiable and may reflect our limited exposure to industry. The academic has the flexibility to reject

research funds that have strings attached or that do not suit the faculty's interest, just as he/she is able to reject those NRI competitive funds that are designed to get faculty away from what the federal government considers to be "not so relevant" research. The trick in collaborating with industry is to pursue those projects that have mutual benefit and that relate to the entire industry, not one company. An appropriate role for AEDs to play is to bring all segments of the food industry together with government to discuss common issues facing industry and government. Agricultural economists may be pleasantly surprised by what evolves out of such discussions and the opportunities for research.

In developing industry-university partnerships, it is also important to recall that the culture of industry is different from that of the university. Industry produces goods (not knowledge), in a highly competitive environment (Cyert and Goodman 1995). Companies think in terms of quarterly goals and other short-term constraints, whereas faculty often do not work by such tight deadlines. Success in industry is measured in money terms, and a change in the market can result in an instant elimination of a project. Universities do not work that way. Cyert and Goodman suggest collaboration on motivating problems and propose a number of approaches to creating effective relationships. A major theme in the future will be that each program and each partnership will have some revenue stream associated with it.

The university has a real role to play in policy and industry research, especially in complex areas of policy that require rigorous analysis and a private-public partnership. In many areas, the university can serve as the neutral third party that brings objectivity and a long-term perspective into solutions to problems. Economists are the premier policy analysts in the system, bringing in quantitative and qualitative tools such as cost benefit analysis, econometrics, modeling, surveys, statistical analysis, database management skills, etc.

In the future, extension will be very different from what it is today. In the future, teaching, research, and extension will be integrated (Ballenger and Kouadio 1995). We will see the advent of university-wide outreach and the development of cross-functional individuals and programs. There will also be cross-university partnerships. The current level of duplication across states is staggering. Collaborative agreements between extension programs across states will reduce duplication.

In the future, extension will be even more customer-oriented and problem-oriented. Extension will have to connect in new ways to existing and new clients. Such connections will be based on

new delivery systems and frontier information technology. Problem-solving teams will emerge and will further improve the effectiveness of extension. Each program will have a revenue stream and will be financially sustainable.

Based on a public survey, Christenson et al. (1995) showed that for every \$100 in public funds allocated to the land grant universities, the public would prefer that \$45 go to teaching students on campus, \$30 go to outreach activities, and \$25 go to research. To the public, extension is obviously a higher priority than research. Extension programs of the future will have to be based on strong customer orientation, stakeholder involvement and expanding the walls of the university (Meyer 1997). For this to happen, the land grant system will have to improve the evaluative criteria for outreach and provide for better recognition of outreach. The current criteria for promotion does not adequately recognize applied work and place too much emphasis on publication in scholarly journals (Farney 1986; Schuh 1986). If the responses of the AEDs to the changes in society are too slow, the public will search for new alternatives, particularly in the areas of teaching and resident instruction. For example, St. Joseph's University in Philadelphia recently received a USDA grant that is in the millions of dollars to support its food marketing programs. In New Jersey, the Food Council recently teamed up with a group of community colleges and provided funding to develop educational food programs to meet their needs. Of course, when the clientele has to go around the AEDs to get their needs addressed and is forced to raise funds for activities the AEDs should already be performing, we can not expect stellar efforts on their part to lobby in favor of funding for our programs.

Integrative teaching, research, and extension offer AEDs the opportunity to differentiate their product. So would multidepartmental and multidisciplinary courses and strong, mentored internships which would allow AEDs to partner with industry. Unless the graduate curricula broaden to better meet the needs of students interested in natural resource/environmental economics and food economics, the number of graduate programs offered by the AEDs will have to be reduced, and joint, multi-institutional Ph.D. programs will have to be implemented. Furthermore, a major challenge ahead is the new competition in teaching, as distance education technologies are perfected. AEDs must be able to respond by being at the forefront of LGC attempts to explore this emerging technology.

The curricula at the graduate and undergraduate levels will have to be broadened even further into

environmental economics and food economics. Partnerships with new clientele and stakeholder input into curricula design will be crucial as AEDs broaden their scope. One of the interesting challenges will be whether AEDs can establish partnerships to meet the needs of the food industry in the area of business education. Many, if not all, degree programs will require experiential learning and cooperative education. Better balance will be achieved in the recognition of teaching if scholarship is redefined to reward good university citizenship. Rapid changes will occur in undergraduate and graduate curricula.

The wave of AED title changes will continue, especially for those departments in the Midwest and South, where demographics have hitherto been relatively static. Teaching programs in agricultural, food, and natural resource economics will be versatile and responsive to the needs of students. Computer tools and applications will be better integrated into the classroom. Industry representatives will visit the classroom more to help students learn via demonstration. The profession should continue to experience a buyer's market for Ph.D.s, until the enrolled student population in AEDs falls significantly.

Opportunities and Challenges for AEDs

According to Bonnen (1988), hitherto, most leaders within the land grant system have been biological and physical scientists. Their imaginations do not tell them when some of their problems can be addressed by social science capabilities, and they lack an understanding of social science methods. Compared with biological and physical scientists, agricultural economists do not provide many good success stories for agricultural administrators. Bonnen (1988) argues that our research even allows biological and physical sciences to take credit for the tremendous productivity growth in agriculture. These have been the primary reason why the social sciences have been historically underfunded (Bonnen 1988).

The recent and pending changes in the structural, political, economic, and fiscal environment of LGCs offer a great opportunity for AEDs to demonstrate their value and be at the forefront of serving the clientele of LGCs. Partnering, multidisciplinary research, institutional analysis, policy analysis, knowledge of the real world, ability to do applied work, ability to solve real problems, ability to assist producers and others in the marketplace, ability to work with government and industry, and ability to influence policy are among many things

that agricultural economists can do well. Rather than capitalizing on its strengths, in the past five decades the agricultural economics profession has been trying to be like the biological and physical sciences. The social sciences have lacked social science success stories because they have shied away from the areas where they can produce tangible products: major institutional change, major policy reform, innovative market arrangements, etc.

Agricultural economists have tended to choose research topics more on the basis of personal interest, excitement, and publishability than on appropriateness, importance to policymakers, and impact (Cassidy 1996). It is simply not going to work that way in the future. No entity, except in the case where significant externalities exist and government intervention is involved, can lose sight of its customer base and survive. As the fundamental problem-solving social scientists, economists must provide leadership to other social scientists in the building of multidisciplinary teams to solve some of society's most pressing problems in the areas of agriculture, natural resources, food, and the environment. Economists can address integrative, more relevant questions. If the interest is in social impact, technology assessment, institutional innovation, purpose, relevance, the big picture or how things fit together, the economist is the ideal person to approach if he/she has not been bitten by the bug of irrelevance. These are the issues that are pressing for society today. Other issues of concern, such as international trade and competitiveness, land use, sustainable agriculture, food safety, poverty, and food stamps (Hasserbroom 1993; Merriam 1993), could benefit from the expertise of the economist. We can play a major role in the current debate about the land grant system by analyzing how land grant resources should be allocated among teaching, research, and outreach, and also among the social and other sciences. The relevance of these areas necessitates that the outreach programs emanating from them be relevant and have impact. The relevance will be maintained through sincere attempts to implement true partnerships with stakeholders, which would ensure free-flowing input. The physical and biological sciences are limited in their people appeal and on immediate problem-solving ability. The social sciences are not.

Our new role will require us to step beyond our current role as agricultural economists. Depending on the state, the AEDs must become food, natural resource, environmental, institutional, and social economists. That means new clientele in the food industry and the environmental community. The

profession needs to be actively involved in "environmental scans" and "stakeholder assessments" to evaluate where opportunities exist for research and service. Each department should probably re-examine the composition of its external advisory board. Many departments do not even have such a board and some have only former graduates or individuals representative of the traditional clientele. AEDs must also be able to integrate with other college initiatives in policy, food technology, biotechnology, remote sensing, and natural resources. AEDs have to be at the forefront of integrating into their courses the most advanced teaching and learning technologies, including distance learning. AEDs must also be able to enhance student competitiveness in the job market by developing curricula that blend technical subjects with business and liberal arts and that provide students with information about the entire world and international markets. All of these changes must be done in the context of an institutional focus.

As a profession in a particularly advantageous position, agricultural economists must be at the forefront of the changes occurring in the land grant system. AEDs have to be adaptable, flexible, and innovative. The agricultural economics profession must lead the process of defining its future. Otherwise, administrators and others, most of whom are not necessarily well informed about the importance of the AEDs and the social sciences, will define or attempt to define our future for us. In that case, many departments, and possibly even the profession, will face the danger of extinction. AED faculty at every institution should be actively involved in discussing the future of their departments, the profession, undergraduate and graduate curricula, and clientele.

The above issues suggest that this is a time of paradigm shifts for the AEDs. We are talking not about slow change but about rapid change for a relatively conservative profession. AEDs have to get away from their typical supply-push perspective and rediscover the demand-pull perspective that was responsible for the early development of the profession as a powerhouse in the land grant system. There is a danger in taking the approach that "this is who we are, this is what we do, this is how we do it best, and therefore, here are our customers." Some recent articles in the professional journals have taken that view. For example Just and Huffman (1992), Huffman and Just (1994), and Norton et al. (1995) argue that competitive funding (or reliance on industry funds) will compromise long-term research or reduce the productivity of our system. I embrace the alternative

view, one that has been expressed by Warren Johnston (1985, p. 1260):

The extent that state appropriations and contract research may come to dominate our budgets may influence research agendas in the direction of more applied research that is common to current tastes and may raise further questions of our relevance to important policy issues. The shift to more localized support in research funding may well provide incentives to cover a wider spectrum in the research milieu, include the prospect of more cooperative work with agricultural, biological, and natural scientists, and (hopefully) reverse our progressive isolation from the rest of the agricultural research community (Phillips and Dalrymple). . . . Economics is an integrating science in its applications to real problems, yet we seem unable to engender increased professional interest in the pursuit of societal problems. Our professional goals, set largely by the reward system, and the purity of our contemporary training contribute to the existence of tremendous barriers to problem-solving research. Stanton and Farrell suggest that our isolation from agriculture may inhibit interdisciplinary mission-oriented research of the type needed to resolve many of the problems of the 1980s. An equally valid concern is that agricultural economics needs to be recognized as an applied economics discipline, well grounded in contemporary economic thought and practice and no longer a genetically separate strain arising from agronomy and farm management. The hopeful blending of contemporary skills with a dedication to mission oriented research would do much to enhance the self-image and external reputation of the profession. . . . More diverse sources of funding and the associated instability therein may give cause for reflection about society's changing needs for our research expertise and on the organizational forms that may be required for our profession to meet more fully the substantial challenges before us. Might the changes be good or bad? . . . The December issue of the mid-1990s will chronicle our ability to respond."

We are nowhere near adequately responding.

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