

Undergraduate Preparation for Agricultural, Food, and Environmental Science Careers

Allan D. Goecker

In his book, *The Kernel & The Bean*, Dan J. Forrestal records the founding and the early development of the A.E. Staley Manufacturing Company. Augustus Eugene Staley grew up on a North Carolina farm. In 1883, at the age of 16, Staley was successful in landing a job as a back room employee in a Greensboro, North Carolina, hardware store. Several months later, the day before Christmas, Staley was fired from his first job at that hardware store. The owner dismissed him with, "You'll never make a businessman, Staley. You better go to the foundry down the street and get a job where you can use your brute strength."

For the next 14 years, Staley was a traveling salesman who wandered the United States for several different companies. He learned the art of salesmanship in those days, and, in 1897, decided to establish his own business--a starch company in Baltimore, Maryland. Staley saw the starch business at the turn of the century as a staple and steady industry, but one in which products were not being merchandised effectively. He established his own brand label, and, for awhile, packaged his food starch at night and contacted grocery stores during the day to sell his product. His early years as a businessman were very rocky, but his starch became widely accepted in the northeastern states. Soon his starch distribution business became a threat to other large starch companies which decided to cut off his supply of raw material. Staley could either go out of business, or find a way to become his own manufacturer.

Staley opted on using his sales abilities to sell stock in hopes of gathering enough capital to obtain and operate a

Goecker is assistant dean and associate director of Academic Programs, School of Agriculture, Purdue University. These remarks were made during the Third General Session of the 1992 NACTA Conference held on the campus of the University of Wisconsin-River Falls.

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world events.

- Within the major, generate a base of knowledge that will serve one through the inevitable evaluation of scientific discovery. The rapidity of change makes continuing education of the applied now a foregone conclusion.

Higher education must step up to a higher level of accountability. Its mission should be to best serve students -- not existing budget allocations and the people who hold those budgets as their personal security blanket.

In Wisconsin, we are making a concerted effort to elevate the quality of undergraduate instruction generally and specifically in agriculture and natural resources.

In the year 2000, we might have a clue as to whether or not we are successful. ☐

starch manufacturing plant. After turning down an available starch business in Lafayette, Indiana in 1907, Staley purchased a bankrupt starch manufacturing firm in Decatur, Illinois in 1908. Initially, Staley was not welcomed in Decatur, and on several occasions the business almost failed due to financial problems. In 1914, for economic reasons, the Decatur plant was shut down. Through refinancing efforts including good fortune--ample midwestern rainfall in 1915 to bolster Staley's short position in corn futures--he was able to reopen his manufacturing operations.

Staley also had an interest in sports. When his business became more profitable in 1918, he sponsored baseball and football teams in midwestern industrial league competition to help create awareness of his business and to provide recreation for his employees. Staley was not one to accept just average performance in merchandising, manufacturing, or in athletic teams. In 1920, Staley hired an engineer from the Chicago, Burlington, and Quincy Railroad in Chicago to organize a first-class sports program to be sponsored by his company. It was George Halas who represented the Decatur Staleys at a meeting in Canton, Ohio in September, 1920 at which the American Professional Football Association was formed. Two years later, Halas was successful in getting the named changed to the National Football League.

In 1922, seventy years ago, it was Staley who initially guaranteed a market for all of the soybeans to be grown on 50,000 acres in the midwestern corn belt. More than any other factor, this one action launched the soybean into its current prominent position in American agriculture.

Our topic today is "Undergraduate Preparation for Careers in the Agricultural, Food, and Environmental Sciences in the 1990's." So, why have I used this time for a historical reference to the formation of agricultural manufacturing firm?

Perhaps it is a way to fill some of the allotted time. But, times are rather difficult today in agricultural higher education programs. Funds to operate our programs are hard to obtain. Popular support of agricultural education has dwindled during the last couple of decades. Other educational programs threaten to cut off or reduce our supply of students. The market for our graduates is changing. General economic conditions are not favorable. We have lots of challenges. Mr. Staley had many problems. He overcame them and succeeded. We must overcome our challenges and succeed!

Factors Shaping Educational Programs

What are the factors which are shaping Agricultural, Food, and Environmental Science higher education programs in the 1990's? I believe that there are five principal

forces which largely shape the dimensions of our educational programs. They are the food and agricultural economic structure, students, faculty, social preferences, and macro-economic conditions.

Food and Agricultural Economic Structure

During the 1980's, a very large number of agribusiness firms in the United States discontinued operations or were consolidated into larger organizations. Also, U.S. farm numbers declined by 300,000 from 2,440,000 in 1980 to 2,140,000 in 1990. Likewise, it was a period when there was significant business consolidation in food processing and manufacturing. Estimated average annual openings for new college graduates in the food and agricultural sciences fell by 12 percent from the early 1980's compared to today. It's clear that significant reorganization of the food and agriculture economic structure occurred in the 1980's with additional changes expected in the 1990's.

While significant food and agricultural economic consolidation is anticipated in the 1990's, it is expected that employment reductions which result from mergers will be offset by an increasing proportion of college graduates being required for the available positions in food, agricultural, and environmental professions to solve increasingly complex problems. Therefore, the aggregate number of positions for college graduates in these professional areas should remain relatively constant through the decade.

Students

During the past ten years, U.S. college of agriculture and natural resources undergraduate enrollments fell by nine percent and graduate student enrollments declined by ten percent. Enrollment during the next decade will depend on the success in attracting traditional college students from high school, and other adult learners.

Since 1979, the annual number of U.S. high school graduates has declined by more than 20 percent. In contrast, during the next decade, the U.S. Department of Education projects the number of U.S. high school graduates to increase by 20 percent from a low of 2,446,000 in 1992 to a high of 2,943,000 in 2001. During the same period, the total number of full-time college students is expected to escalate by 14 percent from 7,781,000 to 8,906,000. Part-time college student enrollments are expected to increase by nine percent from 6,364,000 to 6,959,000.

Faculty

Without question, faculty are single most important factor which shapes educational programs offered by colleges of agriculture and natural resources. While the number of faculty in colleges of agriculture and natural resources having Agricultural Experiment Stations has increased from 10,503 in 1950 to 24,139 in 1987, Professor Willis Peterson of the University of Minnesota projects that faculty numbers will remain relatively constant in the 1990's. Furthermore, he suggests that doctoral degree programs probably should be refocused to better prepare graduates for professions outside of academe.

Peterson and other investigators suggest that agricultural and natural resources college faculty will not increase in size. Some indicate reductions in faculty numbers. Conse-

quently, it is likely that faculty development programs will become increasingly important to maintain the expertise base to meet the emerging undergraduate educational needs in the coming decade. Also, it is likely that significantly more courses will be shared by several universities to utilize more effectively the available faculty resources.

Social Priorities

Enrollments in undergraduate agricultural science programs have increased by 8,653 from 56,086 to 64,739 in U.S. land-grant colleges of agriculture during the the past five years. This 15 percent total enrollment growth is contrasted to a 72 percent increase of students in natural resources curricula in the same period. Stated in another manner, more than 55 percent of the total student enrollment growth in colleges of agriculture during 1987-1991 was in natural resources curricula which account for only 17 percent of the undergraduate enrollment.

Our citizen's recent renewed interest in environment is very clearly reflected in college of agriculture student enrollments and in courses dealing with environmental science and management. I strongly suspect that social priorities--environment, safe food and water, land use planning, and others--have been the predominant factors which have spurred recent enrollment growth while university administrators and colleges of agriculture may claim the response was largely due to effective marketing and recruitment efforts.

Macroeconomic Conditions

Most of what we do is ultimately impacted by macroeconomic conditions which surround us. Therefore, it probably requires little discussion to conclude that agricultural and natural resources educational programs are shaped by macroeconomic conditions. As public institutions, our financial resources, and ultimately our programs, are largely dependent upon the economic health of the state which we represent, and the nation as a whole.

Employment markets for our graduates are impacted. During the past couple of years, agribusiness graduates have seen much stiffer competition from business school graduates who have been less successful in launching careers in traditional occupations. Higher rates of unemployment impact the numbers of families who feel that they can send children to college. Support of scholarship programs is dependent upon the economic health of individuals and businesses.

Now, I wish to focus upon ten things which I feel that colleges and teachers of agriculture must do in the 1990's to help students prepare for future careers, and gain an understanding of food, agricultural, and environmental issues.

Ten Things We Must Do

Provide Agricultural, Food, and Environmental Literacy

Perhaps the greatest current opportunity for agricultural and natural resources college faculty is to exploit the need for agricultural, food, and environmental literacy in our society. Who is more capable of providing a fundamental understanding of our food, agricultural, and natural resource system to future college graduates?

I do not have national data on the proportion of

college graduates who have completed one or more college of agriculture and natural resources courses during their undergraduate years. However, I suspect that the proportion is similar on our respective campuses where colleges of agriculture and natural resources are located. Our best estimate at Purdue is that we are reaching about 15 percent of the students outside of the School of Agriculture with one or more of our undergraduate courses. Through some excellent faculty efforts during recent years, we are observing growing non-agriculture and natural resource student enrollments in forestry and natural resources, entomology, food science, and agribusiness management courses. Yet, it is obvious that we are not even close to being where we should be in reaching future leaders who are currently enrolled in other curricula on our campuses. Increasingly, we must view our teaching mission as an integral component of an undergraduate college education rather than an exclusive product for professional preparation.

Offer a More Flexible Undergraduate Curriculum

Many colleges of agriculture and natural resources have made recent curricular changes. Some are in the process today. Others will occur soon. With more rapidly changing technology and business operations, a plausible way of dealing with a greater number of unknowns is to broaden the curriculum. But, the central question remains. What undergraduate curriculum should be offered to the student who is preparing for a food, agricultural, or environmental career?

I fully realize that the number of optimal curricular models approximates the total number of faculty members. Yet, there are some common components which characterize most curricula. My personal view is that the optimal agricultural and natural resources undergraduate curriculum for the 1990's has equal parts of mathematics and basic sciences, communications and social sciences, technical and professional subjects, and electives to select from the very best courses which are offered anywhere on campus. This model is probably more flexible than most current college of agriculture and natural resources curricula, but with an effective mentoring program, I believe that it is the curriculum which we should be putting before our students. That leads us to the next "must."

Be A Mentor

One of the factors which distinguishes colleges of agriculture and natural resources from most or all other programs on our campuses is the continued commitment of faculty to counseling and mentoring undergraduate students. It is a strength which we must continue to exploit in the coming years. Clearly, students want to relate to the faculty in their principal interest area. With a flexible curriculum, it is truly an exhilarating experience to help a student create an undergraduate education.

Increasing pressures on faculty to obtain outside grants and growing university administrative bureaucracies have caused many other colleges to assign the counseling and mentoring to non-faculty members. Yet, more than one-half of the students on my campus who change their enrollment from another college to agriculture cite a desire for faculty mentoring as a principal factor in their decision. Be a mentor.

Focus on Problem Solving

In his treatise, *On Science*, Albert Einstein indicated that imagination is more important than knowledge. This is not to diminish the importance of acquiring knowledge, but being able to use one's imagination to apply knowledge to solve important human problems is the paramount goal. Educational programs of colleges of agriculture and natural resources have a long and highly respected legacy of focusing on solving important human problems. This focus must be maintained.

With the establishment of the land-grant colleges 130 years ago, the U.S. Congress invested in educational institutions "where the leading object shall be, without excluding other scientific and classical studies including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes on the several pursuits and professions in life."

It seems a bit strange that some of these universities in recent years have invested significant amounts of advertising and promotional resources in an attempt to shed their roots and to proclaim that they have become world-class bastions of knowledge. My view is that we must continue to use our imagination to offer educational programs which challenge our graduates to become solvers of important human problems.

Design New Packages

Our nation's food manufacturers have been very adept during the last decade in redesigning their products for changing consumer lifestyles and expectations. The once standard 16 ounce can has been replaced largely by other sized containers and processing methods to meet the needs of senior citizens, singles, and other contemporary sub-populations who's kitchens may include only a refrigerator/freezer, a microwave oven, and a disposal. No longer are foods exclusively marketed to the once standard family of four.

How are we changing in our colleges of agriculture and natural resources? Should the vast majority of our teaching be delivered in semester courses of three credits, or quarter courses of four credits. In the college of agriculture from which I come, 78 percent of the courses are three credits and 16 weeks long. Only two percent of the course offerings are less than a semester in length. I believe that the lifestyles of our learners are changing rapidly and many of our current courses must be molded into new and different packages if we are to teach optimally in the coming years. Not only must the package change, but also more courses must be offered via telecommunications and other delivery systems.

Achieve a More Diverse Student Body

In 1991, slightly more than seven percent of the undergraduates enrolled in U.S. food, agricultural, and environmental programs were people of color. In contrast, minorities accounted for 22 percent of all U.S. college students last year. Clearly, colleges of agriculture are still facing some very significant challenges in attracting more students of color.

Enrolling more people of color is one challenge. Provid-

ing an appropriate educational climate and support structure to foster success by minority students in colleges of agriculture is perhaps a bigger challenge. Yet, colleges of agriculture and natural resources must develop new working relationships with other educational institutions, especially with community colleges which are increasingly the point of entry into higher education for more students including minorities.

Tithe Annually

For effective teaching in food, agricultural, and environmental programs, faculty members must plan to change at least 10 percent of each course each year. I realize that some of us teach subjects having content which we feel is comparable to a course on the "Basic Laws of Human Nature," (not subject to change) but we must challenge ourselves to constantly modify course content, applications, or operations.

How do your courses differ from three years ago? Five years ago? Have you been making your annual ten percent charitable contribution to the educational archives? More importantly, what changes are you planning for 1992-93? Remember, we must tithe annually.

Build New Educational Teams

In his article, "Death of A Sacred Cow," Gene Logsdon suggests that colleges of agriculture and natural resources should be more responsive to the same economic forces which have contributed to restructuring farming and related businesses. Among his recommendations is the request that colleges of agriculture and natural resources should work together more often to utilize available resources more efficiently.

There is little doubt that we will see additional interstate cooperation in the coming years through a variety of educational mechanisms. A number of programs are already in place including courses offered and subscribed via telecommunication links, student exchange programs with reciprocal fee agreements, and specialized programs offered on only one campus among a group of cooperating colleges in a geographic region.

We will likely see universities providing more specialized and contracted academic courses to specific business and agency users. Also, there will be increased use of adjunct faculty from industry and government to teach specialized courses as universities deal with educational cost constraints. For better or for worse, the line which has separated the role of public college or university from the private user will become dimmer.

Change the Faculty Incentive Structure

Except for the individual who is being most highly rewarded, perhaps it is only human nature to suggest that the reward structure be reformed to recognize more appropriately one's professional contributions or priorities such as teaching. Yet, I believe that most of our larger research-oriented universities are still placing far more emphasis on talking about the importance of good undergraduate teaching than rewarding it. We all know that the incentive structure will change only when the predominant number of senior faculty deem that it should.

Undergraduate teaching is generally not viewed as a "profit center" by the business managers of the contemporary "corporate-versity." Therefore, the larger salary rewards tend to flow to those who generate the larger revenues--successful grantspersons and winning football and basketball coaches. Empirical evidence can be obtained by comparing average annual salaries of winning football and soccer coaches at large U.S. universities.

I believe that it is imperative for a faculty member to achieve a symbiotic scholarly program of teaching and research. Yet, my perception is that an appropriate balance is not being achieved in far too many cases. And, I am still waiting for the chief academic officer to advise new faculty members that they may want to limit their grants pursuits during the first five to ten years so that they can focus on their teaching programs to achieve tenure and promotion. Then, we will have reached another point of academic disequilibrium. Again, the incentive structure will change when senior faculty decide it is appropriate.

Take Time to Savor the Moment

Many of my most valuable lessons were learned while I was growing up on a small farm in south central Indiana. Some that I especially remember are that it is advantageous to focus on the positive, work hard, and don't take one's self too seriously. Contrary to widely held contemporary thinking, not everything can be reduced to a bottom line on a profit and loss statement, simulated by computer analysis, or solved by a government program.

Teachers of agriculture and natural resources must take time to share and learn as we are doing today. Not only must we focus on the positive and work hard, but also we must reflect upon seeing our students go on to be successful in their professions. We must appreciate the enthusiasm expressed by our students when they reach goals and are stimulated to use their imaginations to solve problems. Simply stated, we must take time to savor the moments.

Finally, let me close with another reference to A.E. Staley. The A.E. Staley Manufacturing Company, now a division of Tate & Lyle, an international sugar, cereal sweetener, and starch group, earned profits of \$172 million in 1990 from its corn wet milling operations. Staley no longer is a soybean processor, and two of its corn milling plants are located in Lafayette, Indiana, a location initially rejected 85 years ago. Mr. Staley saw opportunities, focused upon them, and took action. We have opportunities. Let's focus upon them and take action.

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