Situation Papers

Presented at the

ANNUAL STAFF CONFERENCE

SCHOOL OF AGRICULTURE
and
AGRICULTURAL EXPERIMENT STATION

AUBURN UNIVERSITY
Auburn, Alabama

CONFERENCE THEME: *"The Role of the College of Agriculture in Human and Natural Resource Development."*

December 17, 1965

AGRICULTURAL EXPERIMENT STATION
AUBURN UNIVERSITY

V. Smith, Director Auburn, Alabama

Situation Papers Presented at the

1965

ANNUAL STAFF CONFERENCE

of the

SCHOOL OF AGRICULTURE

and

AGRICULTURAL EXPERIMENT STATION

of

AUBURN UNIVERSITY

Auburn, Alabama

Conference Theme: "The Role of the College of Agriculture in Human and Natural Resource Development."

December 17, 1965

FOREWORD

"The Role of the College of Agriculture in Human and Natural Resource Development" was selected as the staff conference theme for 1965 for several different reasons. This theme focuses attention on the continuing broad responsibilities of the agricultural division of the Land-Grant University. It also recognizes the basic responsibilities of Land-Grant agricultural workers to both the human and the natural resource components of our economy. In an effort to outline and clarify the role and dimensions of agriculture at Auburn University, as Alabama's Land-Grant University, a series of four situation statements were presented at the 1965 conference. In response to the demand from staff members for copies of one or more of these situation papers, the following papers which bear directly on the theme of the conference have been duplicated and are included in this report in the following order:

1. "The Role of Agriculture in Our Land-Grant Universities," Keynote paper presented by Dr. James H. Hilton, Director of University Development and President Emeritus of Iowa State University.

2. "Dimensions of Agriculture in Auburn's College of Agriculture - General," Situation paper presented by Dr. E. V. Smith, Dean of the School of Agriculture and Director of the Agricultural Experiment Station of Auburn University.

3. "Dimensions of Research in Auburn's College of Agriculture," Situation paper presented by Dr. Ben T. Lanham, Jr., Associate Director of Agricultural Experiment Station and Assistant Dean of School of Agriculture of Auburn University.

4. "Dimensions of Teaching in Auburn's College of Agriculture," Situation paper presented by Dr. Charles F. Simmons, Associate Dean of School of Agriculture and Assistant Director of Agricultural Experiment Station of Auburn University.

E. V. Smith
Dean, School of Agriculture and
Director, Agricultural Experiment Station

January 10, 1966

THE ROLE OF AGRICULTURE IN OUR LAND-GRANT UNIVERSITIES*

James H. Hilton
Director of University Development and President Emeritus
Iowa State University, Ames Iowa

I undertake my assignment here today with mixed emotions.

In the first place, I relish speaking to you as an Ex-president. I am sure that there is no one more bold and more fearless than an ex-president, without administrative responsibility. This is the time he has been waiting for--when he can speak forthrightly on any topic, secure in the knowledge that there is not a single thing he can do by way of implementing any of the pronouncements which he may feel inclined to make.

So I look forward to this assignment -- totally uninhibited.

Many of us have been in the center of the revolution which has swept over rural America during the last two or three decades. We have the feeling that we have stood in the storm's eye. But we are forced to wonder if far greater challenges are not still ahead. I think we can take it for granted that they are.

Certainly it is safe to say that the goals and challenges facing colleges of agriculture can at best be only dimly seen. The question is--like the man seeking direction from the native--can we get there from here? And it is not just a matter of knowing the way. There is the urgent matter of timing. Can we get there in time? Can we get there in time to maintain our leadership and do the things that demand attention? Can we get there in time to avoid being run over by the rush of events--now seemingly at a full speed--which show signs of even faster tempo.

For this audience I need not repeat history--the history of Land-Grant universities, the colleges of agriculture and their contributions. In any case, we have no time to look backward--except to give us an occasional footing for planning the future. Our total concern in colleges of agriculture--"The Dimensions of Agriculture in the University"--must be how to adjust and provide the caliber of leadership which the next decades will demand.

Land-Grant universities--in cooperation with the United States Department of Agriculture and the businesses serving agriculture--have made possible the industrial society which provides our high standard of living. This was done by releasing resources which in other nations are required for the production of food and fiber. The dislocations resulting from our rapid increase in agricultural efficiency--even though called progress--have been painful.

---

*Presented at annual staff conference of the School of Agriculture and Agricultural Experiment Station of Auburn University in Langdon Hall, Auburn University, Auburn, Alabama, on December 17, 1965.

And at the same time our success--has placed heavy international responsibilities on us in this critical moment of history. Our basic Christian ethics dictates that we should share our bounties with the underprivileged. It is in our own enlightened self-interest to do so. The question is how.

* * * * * * * * *

This is a new and uneasy situation--much of it our own making.

How, then, do we go about not only responding to the changes we have brought about domestically but also to the new foreign dimensions now facing us?

What are some of the changes for which we are at least partially responsible and with which we now must cope?

At the turn of the century labor and land represented about 85 per cent of all input in agricultural production. Today in our great farming areas capital represents more than 75 per cent of all inputs and labor represents less than 25 per cent. It is likely that within the next two decades, capital will represent 90 per cent of all inputs used in farming in these areas. I appreciate the fact that these percentages between capital and labor will vary between the different regions of the country, but these changes have had and will continue to have important implications for our colleges of agriculture. If our economic growth continues-- and there is every indication that it will--then we can expect a decrease in the number of farmers and a continued general increase in the size of farms. Such things as managerial ability, more efficient use of capital, number and size of farms, mobility of the labor force and all of the corresponding complexities created by people leaving the farming areas and small towns for the urban areas, the great stresses and strains placed on schools, churches, county government functions and the taxing structure in both the areas where people are leaving and where people are going, are but some of the problems which must be considered by those responsible for the destinies of our colleges of agriculture in decades ahead.

In the ultimate end society as a whole has always been the primary beneficiary of our efforts--although we have worked chiefly with only one small segment. In the future all of society must be our clientele.

Our audience, wherever it is to be found, will be far more sophisticated. We will be working with people whose intellectual background is much advanced over that of even two decades ago.

Futhermore our voice will be only one of many. Public programs, backed by large financial resources, will -- perhaps even more than in the past -- be clamoring for attention. Commercial institutions, with all of the finesse and drive of private enterprise, will be competing for attention and complementing our efforts.

As a result of new scientific knowledge flowing out of our agricultural experiment stations and the industrial research laboratories, great financial and industrial suppliers of capital and materials used in agricultural production and processing, have become important segments of our total agricultural

economy. As farming comes to rest more and more on these inputs, the suppliers of such items as credit, machinery, plant food and other materials, not only have great opportunities to produce and distribute these products and services, they are extending knowledge of how they think these inputs can best be used for the most profitable production. This will provide extensive opportunities for our graduates if they are properly trained for these responsibilities.

In the past much of the responsibilities of importing knowledge of new technology from our research laboratories to farmers has rested with our extension services and communications people. Now much of this is being done by the suppliers of these agricultural production products.

Does this mean that there is no longer such a great need for our agricultural experiment stations, teachers in agriculture, and cooperative extension services? There are some who entertain such thoughts.

I certainly do not.

There is a greater need today for better trained agricultural research workers, teachers, and extension educators than anytime in our history--but, we must move faster in adjusting our programs to meet the needs of the times. Herein has been one of our problems and we just must accept the challenge.

When our experiment stations came into being some seventy-five years ago, labor and land dominated the inputs in agriculture. These were items that industry could not produce and sell. As a result research and education from public sources dominated the development in agriculture at that time. Now the major proportion of agriculture inputs are made up of materials which industry is producing and selling. This is quite often fragmented: that is, fertilizer from one industry, machinery from another, and like farmers, interested in selling at a profit.

I know many of our experiment stations are modernizing their research programs and in many ways are out in front in rolling back the frontiers of knowledge so desperately needed by the total agricultural industry. I also recognize that they serve as an important check to much of the industrial research--which is appreciated and respected by industry and farmers alike. In addition, there is no place in the whole industrial complex with the scope of knowledge, interest, and the resources to deal with the complex interrelationships of management problems which farmers have to face today as do our colleges of agriculture

Certainly the many avenues of communication, whether implemented by a public servant or a business man or both, are such as to give us a whole new format within which to work. How we determine our audience and how we get information to that audience is a much more complicated assignment than ever faced our predecessors.

Furthermore, what sort of knowledge do we generate in an attempt to meet the demands of this new and uneasy world in which we now live?

Again, who is our audience? How much of our resources--in knowledge generation--must be thrown into the great international effort to meet the crisis of relatively stable food supplies in a world with a rapidly expanding population. How much of this burden do we bear as a nation? How much of it falls within our states? Is there a new balance to be struck between state and national goals and in state and national cooperation?

Unquestionably the vast agribusiness complex will make itself felt increasingly in the area of knowledge generation--of a particular kind. We cannot and should not duplicate. But agribusiness itself and society in general recognize needs in this area over and above those provided by the private sector.

What kind of research should we be doing--given the circumstances of an over-fed domestic population surrounded by a world without enough to eat?

How do we export--those areas of international tension--the knowledge that may make the difference between peace and war--between survival and atomic holocaust? Do we have the imagination to create on a world-wide scale, the concept of our world-famed extension service? How much of our effort do we put into so-called areas of adjustment?

Well, it is indeed quite simple to raise questions of this kind and magnitude. They are very real. Some we have puzzled over--thinking that answers might be provided in some far distant future. The time for answers, rather than questions, is closer than we realize.

So let us examine some of the specifics of our situation.

Perhaps we should begin with our efforts in the area of research. This is logical, for any significant changes of emphasis or redirection in our overall efforts must start in our agricultural research laboratories. The extension education program flows from the areas where knowledge is being generated by research workers. To a large degree the teaching strengths of our colleges of agriculture follow the same pattern--particularly at the graduate level.

Thus any administration concerned with bringing its college of agriculture into alignment with society's needs should look first to its research program.

A committee at Iowa State University charged with reviewing our College of Agriculture program and making recommendations had these suggestions to make with regard to research.

The committee said as part of their recommendations:

1. The College of Agriculture must be dedicated to service and usefulness, the first element of which is scholarship and excellence in research. The second element is to allocate its resources to those kinds of research which are expected to have the most significance over time. A portion of the research work will be of a basic nature and therefore not predictably of use

in problem solving. But as a state-supported institution part of our research effort must be local and empirical to lead and guide the state in its development.

2. Greatly stimulate the concern of the social scientist with those immediate problems facing citizens of the state as a result of our rapid technological advances.

These two recommendations, it seems to me, very well bracket our major concerns for the colleges of agriculture in the years ahead.

Colleges of agriculture cannot, of course, turn their backs on the day-to-day needs of society. Our agricultural producing and processing plant must continue to grow in efficiency, and colleges of agriculture must make continuing contributions in that area. But let's do more in some other areas--areas that are troubling the people we serve.

What will our domestic needs be by the year 2000? Within 15 years we may have 60 per cent fewer farms, containing 50 million fewer acres and 60 million more people. This by no means suggests a shortage of food and fiber. But it does suggest new dimensions for production, changes in processing and marketing systems, and greater opportunities for agribusiness and in the socio-economic areas troubling not only farm people but society in general.

Do we have sufficient experiment station resources focused on these long-range problems which have a tendency, when we turn our backs for a moment, to become short-range problems?

Also, just over the horizon, both literally and figuratively, is this matter of world population out-running the food supply at an alarming rate. On this subject there is much unrealistic thinking. For a variety of reasons, the United States cannot feed the world. But it can, and it must, make major contributions to this overwhelming problem by generating--and exporting--the kind of knowledge that will make it possible for these underdeveloped and over-populated areas of the world to look after themselves.

We know how to generate and diffuse knowledge concerning the production of food and fiber. If there is one thing the world needs today it is that talent.

It is true that assuming this responsibility may cast the Land-Grant universities--and particularly the colleges of agriculture--in new roles. It may mean new state-federal relationships. But if it is in the national interest--and the international interest--it must be done. It will be done. Where are the colleges of agriculture going to be when the job is being done?

Now at the same time, let it be remembered, that the technological and social revolution which has swept over rural America in the last two decades in particular is not coming to a halt. Far from it. The great dislocations in population, job opportunities and economic development resulting from our

past successes are not complete. The challenge is not simply a matter of an orderly and relatively painless movement of people from farming to other occupations. It has to do with the pattern for a whole new social system in both urban and rural America. It concerns food processing. It concerns agribusiness. It concerns all business. It concerns our churches, our schools, our towns and our cities. It concerns roads, zoning and recreation.

It is in these areas where colleges of agriculture have been least effective in the past--and for which they have received the most criticism. No one has questioned our ability to provide new technology for agriculture. Rather the criticism has been levelled at us for not helping to deal with problems which technology and development are bringing.

Thus a new dimension in our colleges of agriculture--that will be broader than agriculture--must be to stimulate concern of the social scientists in applying themselves to these problems of adjustment which are the disturbing but inevitable by-products of progress.

Now as I indicated earlier, it is with our efforts in the areas of research that the die will be cast insofar as our colleges of agriculture are concerned. Programs and curricula flow from the development of new knowledge, and we may have reached that point in our institutions where we need to combine and synthesize new courses and plans of study.

It is in the area of extension--which is the area in which the Land-Grant institutions stand ruly unique--that the changing pattern of rural and urban America will force re-appriasal and new approaches. Our county extension program will need to gear for the dissemination of new and different kinds of knowledge. There will be demands for adult education in the broadest sense of the word--plus a broadening of the programs which have formed the basis for much of our 4-H work in years gone by.

School reorganization, community development, taxation, zoning, recreation--public affairs of all kinds--are increasingly the items which claim the attention of both rural and urban America.

Extension must provide more leadership in these areas. I know that in some universities these areas will require cooperation in several divisions or colleges within the institution.

In all areas of extension, of course, our clientele, whether we find it in strictly rural areas or increasingly in urban areas, will demand skills and training on the part of our staff far greater than has been the case in the past. The median level of schooling of the 25 to 44-year old Iowa farmer is 4 years more than it was for his counterpart 20 years ago. In many areas the average county extension director will find at least 30 farmers in the county with as much education as he has and over 100 who have gone to college. Thus the county extension director has less advantage, intellectually, than he had two or three decades ago.

So regardless of the "mix" in our extension activities between production technology, public affairs, community development or any other categories, we may wish to include, it is an undisputable fact that the field staff of the college of agriculture will require people with more training than was considered sufficient two decades ago. This fact, plus growing interest in the area of community development, automatically focuses attention on another matter which is demanding the attention of colleges of agriculture.

What is a community? We know that communities are different sizes depending upon the service or social factor being considered. There was a time when the community could be identified by the size of the threshing ring. There was a time when a community could be identified by its concern for certain functions of local government which could be carried out on a county basis. Increasingly we are learning that certain areas, which may have no relationship to former social patterns or governmental lines, have common goals and needs for which solutions should be sought on an area basis.

Interesting experiments are now going on, looking toward the possibility of serving the needs of areas--sometimes many counties in size--with area specialists qualified to make contributions to the particular problems of the area or section involved. This is in contrast to the typical 3-per-county pattern of times past.

The points which I have touched in discussing research and extension in colleges of agriculture have their obvious implications for the teaching aspects of our responsibilities.

We need a new type of college of agriculture graduate. Unfortunately, the kind we need, as is true in other disciplines as well, cannot be produced in four years, in many of our present plans of study. And even if we must do the best we can within the customary time period, we find ourselves expected to do a variety of jobs. Our college of agriculture must be in the training ground for the world's very best biological scientists. That is what we will need in the years to come--even more than in the past. At the same time we will also need to train the vast numbers of young people who will serve the ever-expanding agribusiness complex. Fewer people will be on farms--but perhaps even more will be involved in supplying the inputs, producing the food and fiber, processing and marketing the end product than ever before. These people will need to be trained. At the same time colleges of agriculture will have a responsibility--in its most traditional sense--to provide short courses or two-year programs for the young man primarily concerned with the farming operation itself.

Meeting that diversity of needs in the classroom is in itself a challenging assignment.

And of course as we plan our classroom curriculum we must be constantly looking over our shoulder to the growing responsibilities which this nation is taking with the underdeveloped nations of the world. Their first and

foremost needs, in most cases, are the very thing which our colleges of agriculture can provide. But their needs are broader than the traditional production technology tailored to the specific needs of a particular state such as we have so often provided in the past. Our curricula needs to provide a broader base than in the past because our responsibilities and our challenges are of a broader, more far-reaching nature than ever before.

But these are certainly not all of the problems concerning the dimensions of agriculture in our Land-Grant institutions. The proportionate decrease in the number of agricultural students in relation to the total student enrollment is of special concern to some of you. The rapid increase in enrollments in other colleges of our institutions with the accompanying demands for greater financial resources for both staff and facilities is posing some real problems for administrators as well as our colleges of agriculture. There is no easy solution to some of these difficulties. The simple fact that agriculture is still vitally important to the nation's total economy and the fact that the Land-Grant universities are for all practical purposes the only source of agriculturally trained scientists are certainly factors which should be kept before those who allocate funds in our institutions. Furthermore, it is not just the producer of agricultural products whose interest is at stake in these changing times. It is the supplier of products to the farmer and the processors of agricultural products who have a vital interest in the education of agricultural scientists.

Finally, may I say that it would be wonderful if somehow we could wave a magic wand and have all of these complex, troublesome problems go away. Then we could comfortably repeat the wisdom of knowledge to each succeeding generation.

But we can never be an island unto ourselves. We are a part of these fast moving, highly complex world problems. Progress and change resulting from scientific discoveries and educational processes in our Land-Grant universities is responsible for many of the social and economic problems with which we must now deal. We have no alternative other than to help people find some of the answers to these baffling difficulties. Whether we like it or not, we are in the world stream of rapidly changing human events or through our wisdom and know-how adjust our programs to take the lead in pointing the direction which will permit this great American agriculture to eventually have its fair share of the national economic growth and social progress.

DIMENSIONS OF AGRICULTURE IN AUBURN'S COLLEGE OF AGRICULTURE - GENERAL*

E. V. Smith
Dean, School of Agriculture, and
Director, Agricultural Experiment Station
Auburn University, Auburn, Alabama

Those of us who serve Agriculture in its broad connotation have the responsibility to consider periodically the dimensions of this broad and basic area of our economy. My feeling regarding the grave importance of this responsibility has been reinforced by the trend of thinking that has been woven into the programs of a number of national meetings that I have attended during the last few months. It has been strengthened by press and other reports regarding the National Administration's philosophies and policies on domestic and foreign issues and problems.

One of Agriculture's great problems is the tendency to set narrow limits for its dimensions. This arises in part from our inability to develop an acceptable definition for the term "Agriculture." Those totally outside of Agriculture tend to consider the terms "Agriculture" and "farming" to be synonymous. For example, the December issue of the Auburn University High School Memo carries an article entitled, "Alabama's Changing Job Picture." Several statements in this article illustrate the point. I quote: "In 1940, about 40 per cent of Alabama's employed workers were in agriculture; in 1960, a little less than 10 per cent were working on the farms." "With the decline in agriculture, population began to shift from the country to the towns." "Forestry and fisheries -- a small proportion of Alabama's employment -- has remained relatively the same." (Underscoring by E. V. S.). I do not need to point out the inaccuracies in such statements to you nor to dwell on the misimpressions that they create.

I was pleased, therefore, to find the Division of Agriculture focusing its program on Dimensions of Agriculture and on Natural Resource Development at the recent annual meeting of the Association of State Universities and Land-Grant Colleges. Having tentatively selected a theme in this general area for our own staff conference, some of the discussions heard there caused us to make a definite decision.

I left the Land-Grant College meetings early in order to attend a meeting of the National Environmental Health Advisory Committee. Here I heard a great deal of concern expressed for the growing complementary deleterious effects of a rapidly increasing human population and the environment. I couldn't help being impressed by the mutuality of the common aims of the two groups -- Agriculture and Environmental Health.

---

*Presented at annual staff conference of the School of Agriculture and Agricultural Experiment Station of Auburn University in Langdon Hall, Auburn University, Auburn, Alabama, on December 17, 1965.

Now let us return directly to the subject. I am sure that most of you have already raised the question as to whether Auburn University has a College of Agriculture. The answer, of course, is that it doesn't. This is neither the time nor the place for a discussion of whether it should have one. Even if it did, the name College of Agriculture would be too restrictive to properly encompass the broad missions of the School of Agriculture and the Agricultural Experiment Station as they have developed over time at this institution.

Contrary to the beliefs of many newspaper writers who often write "Auburn has now become a University and is no longer primarily an agricultural college," Auburn never was primarily an agricultural college. Converted from a small, bankrupt, liberal arts denominational college to a Land-Grant College in 1872, it was about five years before the college's first class in Agriculture graduated. Only Arts degrees were awarded in 1872 and 1873. Two AB, one BS, and one engineering degree were awarded in 1874 and three BS degrees in 1875. Auburn apparently was primarily an Ag. School only in 1876 when the graduating class consisted of seven in Agriculture and one in engineering. Thereafter during the early years, the numbers of agricultural and engineering graduates were about the same and were equalled or exceeded by the straight bachelor of arts or bachelor of science graduates. Thus, the objectives of Auburn University today are not far different from those of the Alabama Agricultural and Mechanical College although the means of arriving at them may be poles apart.

Agriculture and Biology at Auburn have always been intimately related. As we might suspect, the very first faculty in 1872 included a Professor of Agriculture. Early recognition of the importance of biological science to Agriculture is shown by the appointment of a Professor of Botany and Geology six years later. One of the first biological science laboratories in the South was established and a Professor of Biology was appointed in 1889.

By the early 1890's the concept of general Agriculture was being superseded by one of specialization and a Professor of Horticulture was noted in 1891 and of Agronomy in 1895. Interrelation of basic and applied areas is illustrated by the joint Professor of Biology and Horticulture in 1896. Zoology was also recognized by the appointment of a Professor of Zoology the same year.

The intimate relationship of research and teaching in the life sciences was early recognized. The first Director of the Experiment Station, Prof. J. S. Newman, also had the title of Professor of Agriculture from 1883 to 1891. The first Professor of Biology conducted pioneering and distinguished research in plant pathology and nematology.

As science grew and proliferated during the first half of the current century, additional disciplines related to a broadly based concept of Agriculture were recognized at Auburn; these disciplines were interwoven into the teaching programs of the School of Agriculture or the research program of the Agricultural Experiment Station or into both.

My purposes in indulging in this background review are several-fold. The first is to point to the broad mission that our area of Auburn University has accepted through long years of development and to assert once again that we

must find a more descriptive name for it. The second is to reemphasize the interdependence of the basic biological sciences and the applied areas in Agriculture and Forestry. The third is to establish a framework for our consideration of "dimensions of Agriculture" and of "resource development," as they apply to our own programs.

To a very large extent, my focus will be on sharing with you the impressions that I have gained. I shall not deal in depth in anything relevant to our research or teaching programs since I anticipate Dr. Lanham and Dr. Simmons will respectively treat these areas.

In an address entitled, "Dimensions of Agriculture in Our Society," Under Secretary of Agriculture John A. Schnittker said, "I believe that the mood of pessimism in American Agriculture has been broken." This is a belief that many of us who have lived through a long period of pessimism share. We see it reflected in the increase in number and quality of students now entering curricula in Schools of Agriculture. We see it in the interest of agribusiness firms and farm and commodity organizations in the establishment of undergraduate scholarships. We see it in the competition for our graduates. We see it in the mood of farm people. Surely, we can plan ahead with a better heart when a mood of optimism prevails.

I shall quote only one other statement from Dr. Schnittker's talk. He said, "Farm policy -- and policy related to rural America generally -- must increasingly be an integral link in general economic policy. Its goals must be compatible with those of general economic policy. Its means and methods and procedures must not only be acceptable to farm people but they must also be understandable to nonfarm people." Dr. Schnittker was stating a fact of modern political life. The lesson for us is that we cannot restrict our programs of research and teaching narrowly to production problems but must keep them broad based to serve an ever increasing and more complex clientele.

For the first time in several years, I did not hear the term "basic research" emphasized at the Land-Grant College meeting, nor did I hear it later mentioned in Washington. Like the little city boy who couldn't sleep in the country because the quiet was so loud, this lack of emphasis has some significance for us in our planning.

Dr. George Mehren is Assistant Secretary of Agriculture and now Acting Director of Science and Education for the Department. Because of his position, his talk had much relevance for us as we plan ahead.

He emphasized the cost-benefit relationship of research programs, a relationship that most of us have valued but have frequently found it discrete to ignore in our approaches to many granting agencies. I decided that his emphasis was more than a "straw in the wind" when I found it repeated by a representative of another Federal agency a few days later.

Dr. Mehren discussed the missions that the Land-Grant Colleges and the USDA jointly share. Briefly, they are:

1. the mission of helping to enhance the efficiency of farming, food, fiber, and forest economy;

2. the mission of benefiting our people as consumers;

3. the mission for the wise use and maintenance and development of natural resources;

4. the mission of programs designed to contribute to economic growth;

5. the mission to help in the development of the developing nations of the World;

6. finally, the mission to build a store of human knowledge and to assure its effective use by people.

To assure a positive response to the need for new approaches and improved coordination of research activities, Dr. Mehren presented the following steps:

"First, together with you, we are reviewing our entire research effort with the idea of clearly defining our goals and setting forth the questions that need to be asked today.

"We are also taking a hard look at our present priorities in the assignment of resources and personnel in research, and evaluating present use in terms of present goals. We are considering reallocations that may be necessary to get our work done more efficiently. And we are seeking to define the areas that need additional resources if our missions are fully to be served.

"I think there's no question that such evaluations will be a regular part of the program planning and budgeting process in the future. And, as always, the job will call for the joint efforts of the Department and the States. We must be able to assure the program and budget makers that we have planned our research together and divided the tasks among us in such a way as to carry out the work effectively and with the most productive allocation of our resources.

"Second, and again together, we are building an improved system for storing and retrieving scientific information. We hope ultimately to coordinate this system with those of other scientific and educational agencies.

"Third, we are devising mechanisms that will bring disciplines and agencies together to develop the research packages that are now so clearly needed in many areas of our work.

"Every aspect of a problem must be covered -- the engineers and economists often need to be brought in along with the biological scientists. And institutions with outstanding capabilities for dealing with the problem should have an opportunity to contribute.

"Fourth, we are making every effort to tie research more explicitly to the Department's missions.

"In this connection, I'm sure you are aware that we in the USDA -- along with other Federal departments -- have been requested to continue our critical study of all of our missions, and to develop consistent and coordinated plans for accomplishing them.

"The President intends to see that all program planning, in every part the Executive Branch, is directly oriented to mission as soon as possible. This means that we must define . . . as explicitly as we can . . . the goals we are seeking. Then we need to allocate our resources -- again, as best we can -- to achieve these goals.

"Thus, the research supported by the Department must be directly related to its missions, including that of advancing and disseminating knowledge itself. Since the missions of the States and the universities are consistent with those of the Department, we should make every effort, as we have done over the years, to design and carry out our work together.

"Keeping missions always in view should help sharpen our thinking and improve our research planning."

Dr. Mehren's views have great significance for us in the State Experiment Stations. We should remember that the Federal-Grant fund that we know as the Hatch Act has been a major source of financial support for our continuing research programs and usually supports the salaries of senior scientists. The newer McIntire-Stennis Act provides similar support for research on forest-related problems. Since we derive support from a number of Federal agencies, his statement that the President intends to see that all program planning, in every part of the Executive Branch, is directly oriented to mission is very significant for us.

We should not be misled by my statement about lack of emphasis on basic research and emphasis on cost-benefit ratio research into a belief that we are approaching a time of emphasis on superficial problems covered by generalized outlines. Every indication that I see is in the opposite direction. There seems to be plenty of money to support good proposals that are well prepared and originated by good scientists. Poorly prepared proposals tend to be discounted.

The Experiment Station and Extension Sections had a joint session devoted to the subject "Meeting the Challenge in Resource Development." Speaking from the Extension viewpoint, Director John Hutchinson posed a series of searching questions regarding research findings needed by Extension to more adequately assist with resource development. Dean Sherwood Berg queried a number of Experiment Station Directors in preparation for his topic "How Some Experiment Stations are Providing a Broader Range of Research Findings Needed for Resource Development."

Frankly I was surprised at the apparent narrow concept of the mission of the Experiment Stations attributed to some Directors by Dean Berg. Some seemed to think the mission to be narrowly production oriented and others farm oriented. To some, problems of natural and human resource development seemed to be new concepts.

In pondering this anomaly, I concluded that climate, geology, and geography may have combined to make the staff of this institution more responsive to resource development needs than those of Land-Grant Colleges in more favored agricultural regions. Dugger and Funchess knew that means of improving and maintaining soil fertility would have to be discovered through research before Alabama could hope to have a prosperous agriculture. Nichols was experimenting with terrace design for soil conservation long before the Soil Conservation Service was created. Swingle and co-workers initiated research in freshwater fisheries at a time when both State and Federal agencies expressed doubt as to whether research funds could be expended for the purpose. Ware was interested in forest management research long before a Forestry Department was established. One of the first Cooperative Wildlife Research Units was located at Auburn. The Southern Experiment Station Directors approved a regional project in rural sociology entitled, "Factors in the Adjustment of Families and Individuals to Changing Conditions in Low-Income Rural Areas," long before President Johnson adapted the term "Great Society."

Thus, it is obvious that we at Auburn have a great and valuable background of experience in resource development. We should be able to use that background to further expand our research and teaching programs in these fields of growing national concern. At the meeting of the Environmental Health Advisory Committee in November, advanced copies of the Report of the Environmental Pollution Panel, President's Science Advisory Committee, entitled, "Restoring the Quality of Our Environment" were distributed. The report has since been commented on in Science, U S News and World Report, and elsewhere. The printed report is now available. The panel again emphasized the variety of ways in which man is polluting his environment to his own harm. Its recommendations are wide-ranging and may result in vastly increased funds for research and training. In Environmental Health, as well as in other areas served by the Life Sciences, the supply of trained scientists is in woefully short supply. As an aside at the Advisory Committee meeting, a science administrator from another agency said to me, "The big thrust in the next ten years will be in environmental biology, even though molecular biology will continue important."

People in AID, USDA, and other agencies with international responsibilities have no doubt long been aware of the growing food shortages and the threat of famine over a wide area of the world. To many of us stay-at-homes, the seriousness of the world food situation comes as something of a surprise. I quote from an eloquent speech by Senator George McGovern:

"Mr. President, the most challenging crisis for the rest of this century will be the accelerating race between food and people. We are faced with the specter of widespread hunger and starvation on a scale the world has never before known unless we begin today to plan for tomorrow's food needs. The nations of the earth must do more than they are now doing to meet future food demands or major starvation will be the most painful fact of life on this planet within 10 years.

"The population of the world is now accelerating at a faster rate than is food production. It has taken the entire history of the human race from the Garden of Eden to the year 1960 to reach global population of 3 billion people.

But the most careful projection indicates that by the end of this century -- 35 years hence -- the population of the globe will be double its present size, or 6 billion. What required thousands of years to achieve will be duplicated in 35 years."

Several Administrations have struggled to reduce surpluses of wheat, feed grains, and other commodities to so-called manageable proportions. To accomplish the goal, millions of acres have been diverted from agricultural production. Research and other agencies have been concerned with developing alternative uses for diverted acres such as forestry, wildlife management, and outdoor recreation.

It is an anomalous situation that, now just as the Administration is bragging that surpluses of wheat and feed grains have been eliminated, the very real question is being asked as to whether America morally can keep millions of acres out of production while hunger and starvation threaten four-fifths of the World's population. It is a good bet that the next session of Congress will witness a strong effort to substitute a policy of all-out production for the present one of controlled production. The outcome will influence all the programs we have discussed.

In conclusion, I am sure that I have not developed my part on the program as you may have anticipated. I hope that I have succeeded in drawing each of you out of your discipline for a little while and further set the stage for the remainder of our conference program. The old saying that "no man is an island unto himself" has never been more true. Individuals and institutions increasingly must fit themselves into broader patterns.

DIMENSIONS OF RESEARCH IN AUBURN'S COLLEGE OF AGRICULTURE*

Ben T. Lanham, Jr.
Associate Director, Agricultural Experiment Station, and
Assistant Dean, School of Agriculture
Auburn University, Auburn, Alabama

A century ago, the Morrill Act of 1862 provided for the establishment of this country's unique system of Land-Grant Colleges and State Universities.[1/] The primary function of these institutions at that time was resident teaching. This continues as a major function and division of Land-Grant institutions today.

The Hatch Act of 1887 provided for the establishment of Agricultural Experiment Stations as a second major division of Land-Grant institutions.[2/] A major function of these experiment stations always has been and continues to be that of conducting both basic and applied research in agriculture and in related areas.

To assist in carrying out the Land-Grant institution's educational responsibilities to all of the people, the Smith-Lever Act in 1914 provided for the establishment of the Cooperative Extension Service in Agriculture and Home

---

*Presented at Annual Staff Conference of School of Agriculture and Agricultural Experiment Station of Auburn University in Langdon Hall, Auburn University, Auburn, Alabama, on December 17, 1965.

1/ The Morrill Act of 1862 donated public lands to the several states and territories for providing colleges for the benefit of agriculture and the mechanic arts. According to this Act, the leading object of the Land-Grant colleges was to teach such branches of learning as are related to agriculture and mechanic arts without excluding other sciences and classical studies and including military tactics.

In 1868, Alabama accepted this Act and appointed a commission to sell the land script. In 1872, the Alabama Agricultural and Mechanical College was established by the State Legislature at Auburn in buildings and on land which had been donated by the Alabama Conference of the Methodist Episcopal Church, South. The name was changed to the Alabama Polytechnic Institute in 1899. On January 1, 1960, the name was changed to Auburn University.

2/ In 1883, the State Legislature appropriated the funds from a fertilizer tax for the establishment and maintenance of an Agricultural Experiment Station and State Chemistry Laboratory at Auburn. Four years later, in 1887, the Federal Government recognized that agricultural problems were regional or national in scope rather than being localized within states. Therefore, the Hatch Act was passed which provided for the establishment of a "department to be known and designated as an agricultural experiment station" at each Land-Grant College. This Act appropriated $15,000 per year to each experiment station.

Economics.[3] The principal function of the Cooperative Extension Service is to disseminate among the people of the State practical and useful information on farming, homemaking, and related subjects.

Thus, public responsibility for agricultural research and education has been recognized, accepted, and supported for many decades in this country. As a result of the Land-Grant system, we have seen during recent years a transformation of American agriculture from a relatively inefficient, self-sufficing type of family existence to a relatively efficient, highly commercialized type of business operation.

The forces behind this revolution in American agriculture have been science and technology. And the force behind science and technology has been research -- agricultural research in the Land-Grant agricultural experiment stations, in the U. S. Department of Agriculture, and in related private agricuatural research organizations.

Despite the progress that has been made, however, research has not solved all of the problems of American agriculture. Nor should we expect research to solve all of these problems. Research in agriculture, as in any other area, has a way of raising more questions than it answers. The faster we progress, the more difficult are the solutions to our still unanswered questions and problems.

This calls for major emphasis in our research efforts on basic studies that probe deeply into the unexplored and unknown. At the same time, a continuing agricultural research responsibility relates to discovery of new knowledge, new techniques, and new developments for better agricultural products, more efficiently produced.

In the final analysis, this is research not just for farmers and for the several groups that service farmer needs and handle farm products, but it is research for every man, woman, and child in the country. Agricultural research that helps to solve these kinds of problems helps to protect the health and welfare of all the people. Agricultural research, therefore, is vital to Alabama, to the region, to the nation, and to the free world.

Most agricultural research deals with living things -- plants, animals, people -- and the factors affecting these living things. And because these living things and the factors that affect them are constantly changing, agricultural research also must constantly change. For example, the agricultural research program at Auburn is a highly dynamic program. Compared to any

---

[3] The educational and organizational work of Extension is carried out through a system of county agricultural chairmen and their associates and assistants located in each county in the State. Extension subject-matter specialists at the Land-Grant University work with county Extension personnel in planning, projecting, and executing Extension educational programs.

previous time period, Auburn's agricultural research today is more sophisticated, requires greater scientific competence, requires more technical scientific equipment, and is far more basic and more expensive than that of earlier years.

Agricultural research, as carried out through the Alabama Agricultural Experiment Station System of Auburn University, has a responsibility to meet the needs of farmers as producers of the food and fiber demanded by consumers, but of equal importance is the research obligation to the general public as the consumer of the farm products produced. If research and education fail to service producer needs, then the producer will fail to service consumer needs in terms of a low-cost, high quality, and adequate volume of food and fiber.

Agricultural research has a continuing responsibility both in basic research as a back stop to applied research, and in applied research as a program to stay close to the people served by agriculture. A major problem in any agricultural research program is to continually focus research efforts in those areas that will likely produce the greatest return for the effort expended.

Agricultural research becomes valuable and produces dividends only when research information is properly interpreted and understood and when wisely used. It is not what is known that improves the economy and its people. Rather, it is the use that is made of the information that is available.

With this type of background, philosophy, and responsibility, what are some of the major dimensions of research in Auburn's College of Agriculture in the future?

For most of the past century, agriculture has been relatively unchallenged in the research field. State Agricultural Experiment Stations and the U. S. Department of Agriculture received a sizable proportion of the federal research dollar. On the campus of the Land-Grant institution, the agricultural experiment station was frequently the envy of other divisions of the university. Usually, the station had funds to employ research scientists and to support their projects on a continuing basis. Within the university, the experiment station, the extension service, and the school of agriculture were often the most prestigious and influential of all divisions both on campus and throughout the State.

Those days of affluence and prestige have been seriously challenged during recent years.

The impetus for this changed position started in the national scene during World War II. Just as the war-stimulated support for research was being cut back, the Russians launched Sputnik and the entire western world suddenly realized that each nation's stature, security, and economy depended upon a flourishing research activity in nearly all fields.

Funds were lavished on the National Institutes of Health beyond their most optomistic dreams. The National Science Foundation was conceived and created, and while not quite so favored as NIH, it enjoyed a remarkable growth. The defense agencies became the real "houses of wealth" who lavished funds on their favored friends. Often the symbols of science -- the buildings and

associated hardware -- seemed to be more esteemed than basic research investigations!

This enthusiasm for research spread so that not only the military and the agencies organized to sponsor research, but nearly all federal units got into the act. The House of Representatives' Select Committee on Government Research last year listed 34 different federal agencies that had statutory authority to make research grants.

In this rapidly shifting panorama, the State Agricultural Experiment Stations and the U. S. Department of Agriculture were largely neglected under the pretense that the major problems of agriculture had been solved, as evidenced by large surpluses of certain agricultural products. As a consequence, the agricultural experiment station's position in relation to total federal research funds has declined more than 50 per cent since World War II.

This national surge in research activity and the acceptance of research as a major public responsibility has been underway for about 15 years. Although there are still many evidences of stress and strain among agencies and within universities, basic relationships appear to have been well established. This, therefore, seems to be an appropriate time for the agricultural experiment station to examine its programs, including its traditional goals and affiliations, and to consider what appear to be some of the major dimensions of agricultural research for the future.

A university research scientist in the Midwest recently advanced the following position hypothesis relative to Land-Grant Agricultural Experiment Stations: "The experiment stations have developed highly structured systems that, although they are often very efficient in an organizational or administrative way, have become relatively traditional in approaches to research. The methods for developing and organizing research projects have become highly institutionalized. The patterns of use of manpower, funds, and equipment have assumed very predictable forms. The kinds of problems which the experiment station is expected to study have also assumed relatively definite patterns."

If we accept this statement as true, the experiment station obviously is neither making nor in a position to make the kinds of needed changes and adjustments that both Dr. Hilton and Dean Smith have discussed at this conference. Here at Auburn, we would contend that the Alabama Station does not fit the above description, but rather that we have a dynamic program and that changes and adjustments are continuously being made as needed.

The Land-Grant university, at one time almost exclusively devoted to the affairs of rural life and farming, is today under intense pressure to become a full-scale high-quality institution of higher education and to extend its research and public service functions not only to the whole of our society but into international situations and problems as well. The Land-Grant university is no longer linked exclusively to rural institutions and interests at either the state or the national level. Research, teaching, and extension funds, for example, today come from many sources. The Land-Grant university is broadening its old established functions of research, education, and service to rural America to functions of research, education, and service for

the whole of society. At the same time, the U. S. Department of Agriculture has been forced to narrow its function to that of servicing commercial agriculture alone. Since we are so closely allied with USDA, this means that the Land-Grant division of agriculture, whether we like it or not, is being forced to move in both directions at the same time.

The implications of this type of dual movement is that we may be losing ground in our established dedication to the growth and development of the entire rural community. We, for example, long have talked about doing something for the non-commercial and the non-farm sectors of our society, doing something about the acute problems of rural communities, and doing something for the poor, but we have far too little evidence of productive results of work in some of these areas.

Numerous urgent issues in market organization and bargaining power are being posed today. There is also an urgent need today for action program support on the multiplex aspects of poverty. In neither case have enough resources been put into research to provide adequate answers to current questions. In the case of market organization, research results almost invariably upset some politically potent part of the market structure. In the case of poverty, research results usually reflect poorly on the power structure and on the resources diverted from the research interests of commercial agriculture. For these kinds of reasons, we have tended to avoid involvement in research on these kinds of problems. Two results are obvious. In the development of today's Great Society, decisions are being made and programs are being initiated without an adequate research base. More importantly, these programs are being largely developed, organized, funded, and administered by non-agricultural agencies.

When faced with this kind of situation, it seems appropriate that we devote a part of this annual staff conference to the question of the role of agriculture in human and natural resource development. This is an area receiving major attention by the present administration in Washington and by all federal agencies with which we are associated and from whom we seek federal support for our research. In terms of our agricultural research, we need to recognize the importance of current thinking and trends in agricultural and related research in places other than on our own campus.

It has been said that the primary job of research is to ask questions -- and to provide answers.[4/] This means that it takes a lot of questions and answers to achieve missions as complex as are those of the modern Land-Grant university. It also means that we must look beyond the practical questions that have to be answered. We will continue to find practical answers only by constantly extending and building up a storehouse of knowledge through basic

---

4/ George L. Mehren, "In the House of Science, There Are Many Mansions," Address before National Association of State Universities and Land-Grant Colleges, Minneapolis, Minnesota, on November 16, 1965.

research. Fundamental studies (or basic research) enable us to deal with the problems of the next decade, and the decade after that. Despite the apparent shift in current-day thinking about basic research, this type of fundamental work must be continued as a major part of our total research mission.

At the Land-Grant meetings in Minneapolis last month, George L. Mehren, Assistant Secretary of Agriculture, speaking before the division of agriculture of the Land-Grant Association, made a pointed reference to a joint USDA-Land-Grant project carried out this year. This is the project in which we all participated, and which was called "a national inventory and classification of agricultural research projects." One of the objectives of this project was to review this country's total agricultural research effort as a basis for clearly defining agricultural research goals for the future and the more practical questions that need to be asked today. Out of this study will come a priority of assignment of resources and personnel in research, both in the Department of Agriculture and in Land-Grant agricultural experiment stations. In terms of present needs and future goals, some reallocations may be necessary for efficient achievement of this dual mission. As Secretary Mehren pointed out, "There's no question that such evaluations will be a regular part of the program planning and budgeting process in the future." Keeping our missions always in view should help us to sharpen our thinking and should improve our research planning.

The apparent recent shift in emphasis at the national level from basic to mission-oriented (or applied) research will have its effects on our Hatch, RRF, and McIntire-Stennis projects that are processed through CSRS. It will have an effect on the types of contract and grant research proposals that go to USDA, NSF, HEW, and other federal agencies.

The increasing emphasis on interdisciplinary (or team) research will need to be given more attention in future project proposals developed by the Alabama Station. This emphasis will need to be reflected not only between departments at the Main Station but also between Main Station departments and Outlying Units of the Alabama Agricultural Experiment Station System. As project leaders from different disciplines and different departments join together for a team attack on major research projects, substations and other outlying units must become more involved than in the past if our research mission is to be completed.

As we focus more attention on mission-oriented (or problem solving) research, most substations and other outlying units will become major field stations within the Alabama Agricultural Experiment Station System. For some units, this will be a major adjustment; for others, the change will be less pronounced. At some substations at present, for example, cooperative research is underway with from 8 to 10 Main Station departments and involving from 60 to 75 different experiments or work plans. At some other substations, cooperative research is limited to work with only one or two departments and involving fewer than 10 different experiments or work plans. The same situation exists for departments at the Main Station. Some departments are engaged in cooperative research with nearly all appropriate substations. Some other departments are involved in no cooperative research with substations or other outlying units.

We need to be aware of the recent and current pattern of agricultural research appropriations by the national Congress. Although it is somewhat comforting to know that many people feel that the attitude of pessimism about agriculture has changed, there is little reason to expect that an urban-oriented Congress is likely to reverse its present pattern of agricultural appropriations. This means that any increase in agricultural research appropriations coming from the Congress in the immediate future will likely be of two types -- that for a cost-of-living adjustment in salaries, and that which is ear-marked for special use or special programs. This would be a continuation of the pattern of recent years during which we have seen ear-marked funds for weed research, for pesticide research, for forestry research, and for research on reducing the costs of producing cotton. In most of these cases, this Experiment Station's participation in these programs has been dependent upon the Station's ability to effectively compete with other Stations for the limited funds available. In some cases, our record in facing this competition has been good; in others, it has been disappointing.

We are all aware that a large part of the federal research dollar for domestic research today is devoted to servicing the new programs of the Great Society. All of these programs have worthy objectives -- whether they be the elimination of poverty, increasing educational levels, upgrading skills of labor, increasing cultural values, or more recreational and beautification work. We should also be aware that federal research dollars for such programs are being channeled largely through new federal agencies or through established non-agricultural federal agencies. This does not mean that we in the Agricultural Experiment Stations do not have access to these funds. It does mean, however, that if we expect to obtain some of these funds, we must compete for the funds on the basis of our reputation and the quality of the research proposals which we submit.

The increases in State Research funds that have come to the Agricultural Experiment Station in recent years have all gone into salary improvements. These funds, plus small amounts of Federal-Grant funds earmarked for cost-of-living salary adjustments, have permitted this Station to make needed salary improvements, but State Research funds have not been available for expanding the Station's research program. Since major research expansion has not been possible from Federal-Grant nor from State Research funds, we have witnessed expansion only in those areas and by those departments and project leaders that have taken advantage of available contract and grant research opportunities. Here again, there is no reason to think that this situation will change in the immediate future.

In research, there is no such thing as stability. We either move forward or backward. As individual scientists, as members of this academic community, our goal is always to move forward. The work of the scientist -- any scientist -- is to discover the truth, to formulate it, and to make it a matter of public as well as professional knowledge.

The function of the scientist is to add to knowledge. He can accomplish this only if he communicates to others what he has learned. This communication

is an essential, integral part of scholarship, whether devoted to the discovery of truth or to its application. No scientist should consider his research complete unless the results of his work have been published. To fail to publish research results, or to permit important research data to lie idle in data books or project files is a wasteful use of scarce scientific resources and manpower. At this Station, there are those who publish and there are those who do not. The results of this situation are reflected in many different ways. One of the most important is that in which the scientist seeks support for his program of research.

Publication in the scientific literature can be and usually is the most important product of the individual scientist. This forms the basis for the widest possible extension of scientific knowledge. For the scientist, it permits development of his most creative and productive abilities. Since scientists live in a world where prestige is capital, scientific publications add tremendously to the scientist's personal prestige as well as to his professional and scientific reputation.

A high intensity of effort and a high quality of published writings are required to gain the prestige needed and to secure the support that can and which must follow if an individual is to build a strong career in research. In today's world, if our research program is to continue to expand and move forward, we must be able to meet modern competition. Any major expansion will come largely through contract and grant research. To successfully compete for these kinds of funds, we must become experts in the art of communication. Our project proposals and applications must be imaginative. They must be well conceived. They must be properly written, adequately justified, convincingly supported by trained and experienced project leaders, and correctly oriented toward the goals and policies of granting agencies. They must be expertly presented if we expect to gain the necessary attention to warrant approval in an atmosphere where support is often limited and where funds frequently already have been largely distributed or committed.

In view of this situation, we need to critically re-examine our attitudes, policies, procedures, and relationships to correspond with our support. We in the Agricultural Experiment Station are rapidly becoming more like other divisions of the Land-Grant university in that much of our research depends upon funds from many public agencies. We are already undergoing definite changes in our contacts and in our operating procedures. This developing situation is more likely to strengthen than to weaken our total accomplishments.

The need to compete for funds and to develop a more potent public image means that our research will have to be directed toward establishing principles with broader application than has been the case in the past. Staff strength is one of the most effective factors that can be used in negotiating with granting agencies. The abilities and performance records of individual staff members, therefore, will be more critically reviewed. The weaker or less productive staff members eventually will be forced to assume supporting roles for those staff members who make the more distinctive contributions to research efforts.

There are some hazards involved in seeking an increasing proportion of our research support by going the "grant" route. Agricultural Experiment Stations, generally, are mission-oriented research agencies. They are the research arms of the Land-Grant university and of the federal government in agriculture and in natural resource areas. There is always a temptation for staff members to reach out for all available research funds even though these funds may require that the researcher depart from or minimize his efforts on previously approved Station research problems and projects. In such instances, certain administrative restrictions or restraints may become necessary. Most research granting agencies are primarily concerned with the importance of the problem, the quality of the research proposal, and the demonstrated research ability of the project leader. There should be ample flexibility in most granting agencies, therefore, to permit us to use grant funds in support of Agricultural Experiment Station research rather than in competition with our research.

In our agricultural research, we should not try to do everything for everybody, but we can and should expand our horizons. This Station's staff and facilities uniquely qualify the Station to undertake additional needed research in the areas of human and natural resource development. To accomplish this, we need to re-examine the relationships of the Station with other divisions of the University and with the major federal and other agencies in the resource field. Current trends may cost the Station something in autonomy and in the uniqueness of our present position. This may be good or bad, depending upon our individual point of view. But our growing dependence on multiple sources for funds and our increasing acceptance and use of the "grant" route for research support indicate that the Experiment Station, in time, will become more like other university-related research units and organizations.

In this statement, we have attempted to sketch some of the history and philosophy of agricultural experiment station research. We have attempted to identify some of the changes and trends currently underway in agricultural experiment station research. We have attempted to emphasize some of the problems that appear to have significant implications for the future of agricultural experiment station research. Without repeating these points, it should be obvious that we anticipate continuing changes and adjustments in our agricultural research programs in the future just as we have experienced in the past.

The responsibility for agricultural research will fall much heavier on agricultural experiment stations in the future than in the past. Originally, both the Land-Grant institutions and USDA were heavily involved in agricultural research. But today, the USDA's research functions account for less than 4 per cent of the department's budget. More than 85 per cent of USDA's current budget is devoted to servicing federal action programs of farm income support, resource conservation, and rural credit. This simply means that the job of conducting publicly supported agricultural research has fallen largely into the hands of State Agricultural Experiment Stations.

In carrying out this responsibility, we should anticipate that agricultural experiment stations will have to make certain changes and adjustments as compared to our current situation. We should anticipate changes in public policies affecting agriculture and agricultural research. We should anticipate some change in philosophy relating to publicly-supported research in agriculture. We should anticipate certain changes in the structure of research organizations at the federal level, at the Land-Grant university level, and within the agricultural experiment station. We should anticipate changes in the scope and direction of our agricultural research. We should anticipate certain changes in emphasis on different parts of our research program. We should anticipate that the audience for the products of our efforts will be far different from our audience today. We should anticipate that much of our fundamental or basic research in the future will need to be carried at least one step further toward application. We should anticipate that the competition for limited research resources in the future will be much keener than in the past. Finally, we should anticipate that adequate support for maintenance and expansion of research will continue to be available for those departments and project leaders who are the most imaginative, the most efficient, the most aggressive, and that can most effectively communicate to others a record of their past accomplishments, their current status, and their plans and objectives for the future.

The combined effects of these kinds of changes will provide us with new dimensions for our agricultural research. They will provide us with major challenges for the years ahead. Our acceptance of these challenges, and the manner and success with which we handle them, should reflect credit and benefits to the Agricultural Experiment Station, its departments, and individual staff members; to Auburn University of which we are a part; and to the general public which we serve.

DIMENSIONS OF TEACHING IN AUBURN'S COLLEGE OF AGRICULTURE*

Charles F. Simmons
Associate Dean, School of Agriculture, and
Assistant Director, Agricultural Experiment Station
Auburn University, Auburn, Alabama

The dimensions of Agriculture will be measured according to the people who comprise it--little people, small dimensions; large people--great dimensions. And, of all the segments of agriculture, the teaching division of the Land-Grant College will continue to have the greatest influence on the dimensions of agriculture because it is the Gamaliel to those who make up agriculture. Most of the weaknesses or strengths of those who are in agriculture the farmer, the researcher, the extension worker, the agricultural business man, the manufacturer and distributor of agricultural equipment and supplies, and even the agricultural teacher can often be traced directly to the stimulation contributed by the College of Agriculture and the quality of its instruction.

It is impossible to judge the effect of the teaching division on the agricultural revolution that began with the passage of the Morrill Act more than a hundred years ago but which did not really achieve momentum until the post-war period. Yet we know without any extensive review here what proportions this revolution has achieved, and I think those of us in teaching can be assured that we have played a substantial part in this revolution. However, this has not been accomplished without changes even though the speed of these changes may have seemed incredibly slow to some who have had a part in them. These changes have occurred in quality of student and faculty as well as in courses, course content, and facilities. The agriculture curricula at Auburn, like those of most Land-Grant Colleges, have had a historical foundation in the sciences since most of the early teachers in schools of agriculture were natural scientists. Michigan State University when it was established as the state agricultural college in 1855 was charged with offering a course of instruction consisting of "an English and scientific course, natural philosophy, chemistry, botany, animal and vegetable anatomy and philosophy, geology, mineralogy, meterology, entomology, veterinary art, mensuration, leveling and political economy, with bookkeeping and the mechanic arts which are directly connected with agriculture." Within limits this is not greatly different from what a good agriculture curriculum might include today. After the colleges of agriculture were established, curricula were under constant fire from those who on the one hand wanted to make the agriculture curriculum "practical" versus the classicists who held that the curriculum should be scholarly. For this reason, agricultural curricula have undergone many changes in their hundred years of existence. In the early days lack of scientific knowledge resulted in curricula heavy in the skills. This is not to say that these early schools of agriculture with their emphasis on skills, even to the requirement that each student must work on the college farm, did not produce some real giants. Today's agricultural revolution is proof of the effectiveness of much of the curricula in those

---

*Presented at annual staff conference of the School of Agriculture and Agricultural Experiment Station of Auburn University in Langdon Hall, Auburn University, Auburn, Alabama, on December 17, 1965

early schools of agriculture. One of the evident changes in agricultural curricula has been the gradual reduction of skills courses and their replacement by more basic courses. However, I am afraid that we in agriculture have not educated our colleagues in other areas to this fact. This is probably because some of our curricula still include more of this type of instruction than we are willing to admit. In many cases, however, this is a by-product to the teaching of basic principles--the students acquire the skills in the laboratory, it is true, but this is incidental to their learning a more basic concept that the practice of skills emphasizes.

The disagreements about the relative requirements for the basic sciences, social science, and humanities and applied sciences is one that is as alive today as it was a hundred years ago, but it is generally accepted that the curricula should be composed of each group in about equal parts. However, one has only to see the recommendations for course substitutions to include more courses in the advisor's field to understand how loosely this principle of distribution is held.

Another change that has taken place in the agricultural curricula is the increase in specialization of agricultural college students. This is in spite of the fact that employers seldom indicate any appreciation for the students' particular major. We are prone to criticize them for this lack of discernment, but a study of the undergraduate backgrounds of graduate students indicate that our own faculty may have a similar blindspot.

Just as society changes or perhaps because society changes, the teaching program in schools of agriculture change: sometimes fast but more often slowly. There are, however, many changes that face us. Some of these are peculiar to the conditions of our own State and must be made regardless of our opinions. Others are evolutionary and are common to all schools of agriculture. I think we should welcome these changes, even the ones that are forced on us because they can all result in an improved teaching program.

One of the changes that we will likely see--in fact, I think we saw the first evidence of it this past fall--is the effect on our programs of the establishment of the junior college system in Alabama. For those who have not kept informed on this development, I would like to review the situation. There are 14 state-supported junior colleges in operation this year. One of these, Southern Union College, was in operation for a number of years before becoming a state supported college, but none of the other 13 were in operation before 1964 and most of them enrolled their first classes in the fall of 1965. This year's total enrollment of the 14 was almost double what was anticipated. These colleges have no academic admission requirements other than a high school diploma and the fees are $45 a quarter. After talking with representatives of some of these schools, I am convinced that they will have tremendous effect on our freshman enrollment at Auburn by attracting many students who otherwise would have enrolled as freshmen in the School of Agriculture. Many of these students had they enrolled at Auburn would have failed academically and many will fail at the junior colleges or will transfer to the terminal program. Others, however, will complete the Associate in arts program and will transfer

to Auburn at the end of that time. Some, of course, will transfer before that time. One point to recognize is that many students will enter these colleges who would never have attended college. This can and probably will mean larger enrollments in the School of Agriculture at Auburn at the upper levels than we have ever had if we meet the challenge by making the transfer of these students feasible and the scheduling of required courses at Auburn possible. This means that there must be some degree of coordination of the programs of the junior colleges with ours, and, since there is at present no requirement for coordination, the coordination that we effect must be on a voluntary basis.

As a step in establishing relations, the School of Agriculture has joined with other Schools on the campus in several meetings with junior college representatives. At the last meeting held at Auburn, our department heads met with Dean Smith and me and at least one representative from all of the state junior colleges except one and from most of the private junior colleges. A study of our curricula indicated that a student could spend 2 years at a junior college where he would take the nontechnical subjects required in our curricula and about 30 hours of general subjects. On transferring to Auburn he could expect to graduate in about 6 quarters if he is able to schedule a normal load of required subjects and successfully passes them. Agricultural Engineering would be one exception. Like the other engineering curricula, it has more than 6 quarters of required work that most of the junior colleges cannot provide.

My understanding from the last meeting was that the junior colleges do not propose to offer any technical subjects in agriculture, forestry, or engineering. We at Auburn must work closely with these junior colleges to effect the necessary coordination and some adjustment in our curricula and even in some of our courses.

This brings me to another change that we face. This, too, is not one of our making but it possibly should be. This involves the integration of our beginning biology courses. Like the areas of mathematics and chemistry, biology curricula are being critically studied by biologists in colleges throughout the country. Most of you who have children in high school know something of the recent change in high school biology courses; schools that use the BSCS series and teach effectively offer their students a program that in many cases is more challenging than the college courses. As an outgrowth of interest by colleges in reorganizing both their biology courses and their biology curricula, a Commission on Undergraduate Education in the Biological Sciences has been established. This commission, known by the initials CUEBS and financed by grants from government and foundations, has held a number of national and regional meetings on what should be included in a curriculum for biological science majors. This necessarily involves a consideration of how the individual biology courses should be organized. You need not be reminded that any change in biology offerings at Auburn would have tremendous effect not only on the biological science curriculum but on all other curricula in the School of Agriculture as well. In

this connection a committee composed of representatives of the departments of Zoology and Botany has been studying the programs and possibilities of integrating not only the beginning biology courses but some of the other courses as well. A similar study and implementation should be made in other teaching areas of the School of Agriculture.

Other changes that are taking place in the School of Agriculture at Auburn are reflected in the pattern of enrollment in numbers and in choice of curriculum both at the undergraduate as well as the graduate level. For the first time in 10 years, the enrollment has reached a figure as high as that in 1956. However, there has taken place a change in distribution of enrollment by curriculum. Hence, total enrollment figures do not give a true picture of enrollment. We are now going through a period of intense interest in the biological science curriculum. It will be interesting to watch this trend. Whether this interest will be maintained will depend largely on external factors over which we have no control, however, much will depend on the content of our curriculum and whether the majors in this curriculum will find satisfactory employment. I am sure that enrollment in these areas will be as sensitive and perhaps more sensitive to employment opportunities as had been our forestry enrollment. This should be of particular concern to those of us who are responsible for the wildlife and fisheries management majors, which account for approximately 40 per cent of the enrollment in the biological sciences.

A second significant change in enrollment patterns is in the graduate enrollment. The graduate program at Auburn has assumed significant proportions, with approximately 10 per cent of the University's students enrolled at the graduate level. Graduate enrollment in the School of Agriculture represents 25 per cent of the school's total enrollment and has increased more than 300 per cent in the past 10 years.

Undergraduate enrollment in the School of Agriculture represents about $5\frac{1}{2}$ per cent of the University's total undergraduate enrollment, whereas its graduate enrollment represents about 18 per cent of the University's total graduate enrollment and about 30 per cent of the enrollment of students working toward the M.S., M.A., and Ph.D. degrees.

Another change that has been evident during the past several years is the academic competence of our entering freshmen. Though still below the level of all entering freshmen, the average ACT scores for freshmen entering the School of Agriculture has shown a significant increase of more than 3 points, or 15 per cent, each in the 5 years for which we have scores. Though our enrollment still includes students with scores of 17 and 18 we have many students with scores of 27 or above. These students present as much of a problem as the students with the low scores, but the problem is somewhat different; it is one of challenging the outstanding abilities of these students and to keep them interested in their programs of study. The fact that Auburn has not solved this problem is shown by the numbers of these students who are dropped for academic reasons.

This points up an opportunity we have for advising students. Part of the functions of advising students is simply that of helping them arrange their schedules so that they keep up with what is required and thus will be able to graduate on time. This is going to be a very important function of advising students transferring from the junior colleges because they will have so little time for schedule adjustment. But with all students, a good advisor can help a student make the best choices of electives or to make substitutions that will be more in line with his objectives or his capabilities than those listed in his curriculum. To understand how important a responsibility this is, we should remember that the School of Agriculture student is by nature conservative. He is not inclined to venture into new fields without encouragement.

We see evidences of this in the employment choices of our graduates. Most of them want a job as close to home as they can find. In their choice of courses, they want something with which they already have some feeling of familiarity. Most of these students feel that if they are pushed into the sea of the humanities they would drown. The facts are that once they are shoved overboard into new areas and they learn they can swim they get a thrill out of it and begin to enjoy it. One of the biggest problems facing an advisor is to understand how a course in political science or literature or logic or even music appreciation might be more important in the student's future than another course in a production field. Without such understanding the advisor will not be able to explain to the student how this can be. One of the things we need to do is to begin again our teaching seminars and to include in some programs the employers of our graduates who do not hesitate to tell us how deficient our graduates are in the area of communications.

I would like to use the area of production agriculture as another one of change that we must consider in curriculum reorganization. This is an area that I believe the Colleges of Agriculture have tended to overlook in our movement into other segments of agriculture. Although I would not say that a farmer must hold a college degree in agriculture any more than I would say that a banker or a manufacturer must have a college degree, it does seem to me that the rapidly expanding capital structure and the increasingly complex technical problems of commercial farming today make it imperative that the farmer have the best available training he can get. There are, for example, about 10 thousand commercial farms in Alabama that have gross sales of over 10 thousand dollars and an average capitalization of more than 100,000 dollars. We would not hesitate to recommend a college education for a man who owns and operates any other business of such magnitude. Neither do I think we should be hesitant to say that a degree in agriculture would not be out of place for a commercial farmer.

Next consider how technical sophistication on the part of farmers will affect the training of students who go into other areas of the agricultural complex. Commercial farmers will not be satisfied to deal with personnel of second rate quality whether it be personnel in research, extension, college teaching, or in the agricultural business.

And furthermore the farmer will probably have the greatest need of any one in agriculture for a liberal education because he is losing his place as a political power and must be trained to handle many problems beyond that of production.

I mention the responsibilities we have in training people in the area of production for two reasons. First there is some evidence that Colleges of Agriculture are tending to move away from this responsibility. To quote one dean, "Our history in this college as well as in many other colleges however, has over and over shown that the boys who do go back to be farmers and ranchers after contact with the College of Agriculture are for the most part short-course graduates, or boys who received a two-year certificate, or stopped short of their four-year program. I believe there is some basic incompatibility between the personalities of those boys who glean their greatest pleasure from the actual production phases of farm work and those who obtain their greatest pleasures from academic pursuits." All I can say here is that I would hate to be connected with an agricultural college having that philosophy.

Yet in recent months my attention has been called to publications from colleges of agriculture in two of our leading agricultural states in which statements seem to be made with pride that only 15 per cent of their graduates return to the farm. In one of these states the 42 Ag graduates who returned to the farm last year represented less than $2\frac{1}{2}$ per cent of the annual replacements needed on the commercial farms of the first three economic categories of agricultural census. The second reason for bringing this subject to your attention is to point up the effect that increasing interest of students who plan to farm could have on our enrollment. Over 200 replacements will be needed annually to take the place of retiring commercial farmers who gross 10 thousand dollars a year. If only half of their replacements come from Auburn's School of Agriculture, it would require an enrollment of approximately 600 students just to take care of these needs--or about 250 if they all first went to junior colleges.

Regardless of a curriculum, however, one real need we should recognize is that of providing the School of Agriculture student a real academic challenge. This does not mean that the curriculum should be developed only for the intellectually elite, but our students should take as much pride in their accomplishments as any students on the campus and they should be as well educated as graduates from any other college of agriculture in the United States--better educated, if possible. And their education should make it possible for them to move into society on an equal basis with graduates from colleges of liberal arts or business administration, medicine or engineering.

As I come to the end of these remarks, let me urge that we measure the dimensions of Agriculture not with finite terms as Moses used in describing the dimensions of the Ark of Testimony as

> Two cubits and a half shall be its length,
> a cubit and a half shall be its breadth and
> a cubit and a half its height.

Rather let us measure its dimensions with the same magnificent terms Job used in measuring his God:

> He who removes mountains and they know it not
> When he overturns them in his anger
> Who shakes the earth out of its place
> and its pillars tremble
> Who commands the sun and it does not rise
> Who seals up the stores
> Who alone stretched out the heavens
> and trampled the waves of the sea
> Who made the Bear and Orion
> The Pleiades and the chambers of the South
> Who does great things beyond understanding
> and marvelous things without number.