Agricultural Education for Development in the Middle East

Proceedings of the Conference on
The Role of Agricultural Education in the
Development of the Middle East
April 24-28, 1979

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FOREWORD

THIS VOLUME records the Proceedings of the Conference on the Role of Agricultural Education in the Development of the Middle East held on the campus of the American University of Beirut, April 24-28, 1979. This conference was the second of a series sponsored by the University under the general theme of human resources and national development, with emphasis on the role of higher education. The objectives were (a) to bring together people involved in agriculture, rural development, and higher education to share their experiences; (b) to review and relate the international experience to the situation in the Middle East today; and (c) to make higher education more effective in the years ahead in terms of its contribution toward meeting the basic food and nutrition needs of all people and creating economically healthy agricultural sectors.

The conference was convened at a critical time in the history of the Near and Middle East. Oil revenues have risen rapidly in recent years, bringing new found wealth and skyrocketing economic activity in some areas. However, most areas have remained economic backwaters with large numbers of people remaining among the world's poorest. Food production in the countries represented at the conference has been rising, yet one-fifth to one-half of the people in most of these countries still have diets which are inadequate in protein and energy. Mr. Edouard Saouma, Director General of the Food and Agriculture Organization of the United Nations, recently reported, "Food production has failed to keep pace with population growth, food imports are increasing, and the situation will get worse unless *positive action** is taken." What should be the various nations' stance on educating and training manpower to bring about the positive action that is so urgently needed? Are the deterrents to progress only minor sectoral flaws,

*Author's underscore.

or are national educational systems inadequate? Is a "new look" needed for education and training? These and many other equally perplexing questions were in the minds of those who attended the conference.

The conference agenda was divided into three plenary sessions, one keynote speech, one main address, three lecture statements, and eight discussion sessions. The initial papers dealt with what has been learned in the international arena in the past and paved the way for a consideration of specific issues in agricultural education in the Middle East later in the conference. The working sessions culminated in the formulation of a specific set of recommendations.

A successful conference is always the product of many people, agencies, and organizations. Appreciation is extended to all who participated; each contributed in his or her own way. Special gratitude is due the United States Agency for International Development for the financial assistance which made the conference possible. Special mention is appropriate for Professor Adib Saad, Chairman of the Conference Organizing Committee, the members of his committee, and all the secretaries, clerks, and others who helped in many different ways. On behalf of the conference sponsor, the Faculty of Agricultural and Food Sciences, American University of Beirut, I thank everyone who contributed, and I join with all people of good intention in the world who hope that the day is near at hand when *all* people shall have reasonable access to adequate daily diets at costs within their means.

April 1979

John L. Fischer, Dean
Faculty of Agricultural and
Food Sciences
American University of Beirut
Beirut, Lebanon

OPENING ADDRESS *

H.E. AMIN AL-BIZRI
Minister of Agriculture
Beirut, Lebanon

IN WELCOMING YOU to this conference, I wish to express my appreciation for your participation and my thanks to the administration of the American University of Beirut, in particular President Harold Hoelscher and Dean John Fischer, for organizing this international conference and giving us the opportunity to discuss the role of educational institutions in the training of human resources for national development. This opportunity for dialogue will allow us to examine the interaction of available resources and skills and their potential for creating a better tomorrow.

This meeting here today is living proof of continued faith in Lebanon and its role in the field of scientific achievement, as well as the confidence which the Lebanese authorities have placed in the American University of Beirut.

We are here to discuss the future of agriculture in the Middle East. We hope these meetings will encourage fruitful discussions and exchanges of information among the specialists, researchers, and representatives of the public and private sectors gathered here to promote agricultural development.

Needless to say, agriculture is the major source of food and is therefore essential to the life of man. For this reason, it was and still is man's major concern throughout the world.

If we consider agriculture from a scientific viewpoint – crop and animal production and management – and if we remind ourselves of the statement made nearly a year ago by the FAO Director General in which he predicts that the reliance of developing nations on developed nations for their food needs will be increasing and the world's agricultural potential will be decreasing, we can see that we are in urgent need of a "Green Revolution," if I may use the expression.

Hunger is a formidable threat to mankind. The hungry man is

* This address was delivered in Arabic.

incapable of working productively or waging war and winning it. Therefore, we must plan and work to guide this region, as much as possible, toward increased agricultural cooperation, avoiding outside influence or domination and at the same time taking into account what suits the nature and climate of the area.

You have the capacity to study, plan, and work for the introduction of this "Green Revolution," or the proper scientfic understanding, to the field of agriculture, so that the ghost of hunger can be banished from this and other regions, and man liberated from this frightening specter.

The "science of agricultural economics" and the application of scientific principles are needed for the task of organizing agricultural resources and for the interaction of the various agricultural sectors, in order to achieve results in production and economy within the total development program. Clarity of vision is needed to enable us to model educational institutions that suit the circumstances of the region.

We need "agricultural management" to tackle the problems of production, marketing, and policy making. We also need to formulate our plans and visions and publicize them by every means possible, so that immediate priority will be given to agricultural concerns.

Finally, we wait impatiently for the day when we can witness the armies of the world made up of farmer soldiers riding tractors instead of tanks, planting the soil with wheat and other grains instead of bombs, with silos as their armories.

I am happy to open this conference and I assure you that the Lebanese authorities fully appreciate the importance of your program and are prepared to support your resolutions in Lebanon and at the international level.

May God grant you success in your search for a better tomorrow.

WHAT WE HAVE LEARNED FROM TWENTY-FIVE YEARS OF AGRICULTURAL DEVELOPMENT: AN INTERNATIONAL PERSPECTIVE

CALVIN H. RAULLERSON
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I WANT to thank you for inviting me to share with you some ideas regarding agricultural development. This is an important conference in that it brings together representatives of various spectra of the process of rural and agricultural development. You will be exchanging concerns about the way in which we should go about promoting a better way of life for all our peoples. It is critical to keep that basic before us -- *all our peoples* -- for we have an interdependence among ourselves and with all the nations of the world. You, and we in the Agency for International Development, are involved with the process of giving hope to the many millions of people throughout the world who are pursued by hunger, debilitated by health hazards and inadequate health standards and medical treatment, and frustrated by the lack of education and the many barriers to a quality of life that has equity as its base and a humane existence as its goal.

Food production, agriculture, and nutrition remain the principal concerns of most of the world's population. Hundreds of millions of people are so malnourished that their health is seriously threatened or impaired or their productivity is reduced. Their incomes are insufficient to buy the food they need. Those who suffer mainly from the inequities in today's world are the poor -- the poorest of the poor in the so-called lesser developed countries (LDCs). The research of a wide diversity of experts engaged in projections of development assistance needs confirms that the food deficits in poor countries are already enormous and will increase in the future.

The international food system is overloaded with inequities in production, distribution, and the need for a food supply that will assure adequate nutrition for peoples throughout the world. The constraints imposed by the inadequacies of the land, the scarcity of water, the need to develop alternative energy sources, enormous population growth in the developing world, the inaccessability of

inexpensive innovative farming techniques, and the unpredictability of the weather are among the variables that combine to provide an even more dismal picture for the developing world of the present and future.

It is not surprising then that the paramount thrust for US development assistance objectives in LDCs is to increase their capacity to expand and distribute food supplies in order (a) to alleviate hunger and malnutrition and (b) to increase participation of poor people in the process and benefits of development assistance.

These initiatives are important to us because of the increasing interdependence within the world's economic, political, and social systems. Our interdependence as nations -- our mutuality of interests -- is a reality. We share an interdependence in problem-solving concerns that affect us all. The enormity of those problems is evident: the world-wide race between population and food production; the depletion of the world reserves of natural resources; the accelerating degradation of national environments and the natural environment of the universe; and the inequitable patterns of international trade and commerce which place tremendous stress on the structure of international banking and commerce. These problems impact more heavily in the LDCs, but are not limited to these countries.

This is the background against which we examine the lessons we have learned together about agricultural development. It's well to remember that we have learned together. It's well to understand the overriding importance of agriculture and its inseparable partners – food and nutrition -- as key elements in our mutual concern for and need to address urgently the enhancement of the quality of life for all peoples of the globe.

In our own technical assistance, there has been a revolutionary shift in the direction of our agricultural concerns. In the 1950s and 1960s we focused largely on building national institutions, especially in agricultural research, education, and extension. Non-agricultural assistance concentrated largely on a broad range of capital and intermediate goods imports and physical infrastructure projects, some of which complemented agricultural and rural development as well.

External development assistance helped many developing nations achieve substantially increased rates of economic growth. By

the end of the sixties donors and recipients were becoming increasingly concerned that even in countries where overall growth was impressive, the distribution of benefits was often extremely uneven. By such measures as income, underemployment, caloric intake, infant mortality, and fertility, the poor constituted the majority of the population and enjoyed very little of the benefits of national economic growth. The neglect of agriculture, and particularly food production for domestic consumption, was identified as a major cause of dualistic growth with urban incomes and productivity far exceeding growth in the rural areas.

There was a "dualism" within agriculture itself. Government and donor support of agricultural research, education, extension, inputs, irrigation, credit, etc. often benefited mainly the minority of larger, higher income farmers, while small farmers eked out a marginal existence at best. Even though activities did not focus deliberately on large farmers, they tended to reap the benefits de facto. Large farmers were in a position to take advantage of new services. They were easier to serve than small farmers. Government pricing policies often served to reinforce the large farmer bias. Neither political pressures nor external assistance effectively supported a different approach.

These and other circumstances contributed to a change of emphasis and an evolution in the thinking of donors and recipients regarding agricultural development. We have come to a point where a major emphasis is now directed to programs more responsive to the poor majority. Increasing emphasis is being placed on improving the access of the poor to resources and related services and institutions so that they might be provided opportunities "to better their lives through their own effort."

It has taken a great deal of learning and trial and error to bring us to this point. We started 25 years ago with an appalling ignorance of the farmers of the countries with which we worked. We had an extremely limited knowledge of the social, economic, and physical environment. We assumed that development of their agriculture was a simple matter of showing and telling about the highly successful modern technology of American agriculture. We generally attributed failure to accept our recommendations to ignorance, illiteracy, superstition, and conservatism of tradition-bound peasants.

Fortunately this period of naiveté did not last long. We soon discovered that most farmers everywhere, although often illiterate, were not ignorant and generally made good economic use of the resources available to them in the circumstances in which they had to operate. We learned, too, that farmers were quite right in rejecting our recommendations on technical grounds. In the early years our recommendations were usually based on research and experience in the temperate climate of the US. Most of the LDCs were in the tropics or sub-tropics. Much of our technology, designed for US conditions of high labor costs relative to capital, was ill-suited to the capital-scarce and inexpensive labor situations in LDCs.

The institution building phase coincided with our recognition of these facts. Institution building provided the in-country facilities to train agricultural scientists, to do research that would adapt technology to real conditions, and to extend technology to the local farmers. Along with the Rockefeller and Ford Foundations, we undertook the development of a network of international agricultural research centers with the main function of developing technologies for the principal cereal crops broadly adapted to major production regions.

The experience of the sixties also taught us that American institutions, like American technology, are generally not transferable without modifications adapting them to local conditions and needs. The principles of coordination and integration of research, teaching, and extension that are characterized in the US land-grant university, for example, are universally valid. We learned, however, that the particular organizational structure appropriate for achieving this integration will differ from country to country.

Another lesson we have learned from 25 years of involvement in agricultural development is that farmers (and herders) are motivated by material incentives, usually in the form of increased income. Increased income is in turn related to a number of factors over which the farmer has little or no control. Price policy, transport, marketing, storage, access to credit, irrigation infrastructure, availability of improved technology, and training are among the factors critical to the viability and success of the small farmer. There is an increasing need for us to recognize the interaction of these and other factors and for both donor and recipient to address these concerns in a realistic way.

The issue here is that agricultural development is a bottoms-up and top-down process wherein linkages must be established between those who control policy decisions and support structures and the producers. We need to demonstrate to those in power that it is in their own interest to commit themselves to rural development.

I believe that we have spent too much time transferring our technology and not enough time on the concerns of people. We have sometimes operated as though we could effectively introduce new varieties of agricultural products or new techniques without the consultation and involvement of the people who have to live with the results for all their lives. Development cannot be a self-sustaining process unless farmers control their own affairs and actively participate in development. When farmers are involved, when they become aware of and take advantage of government-provided services, they will form associations or cooperatives to increase their efficiency and thus create an effective demand for increased services. It is not technical deficiency that frustrates development, but the social problems related to people who are powerless to change their condition. Indigenous cultures are not resistant to change if proper approaches are made in the introduction of new ways of doing things. The lesson we have learned here is that we must concern ourselves with local participation in development. Together, we must design projects that maximize the transmission of information and technology. Popular participation at the national level can take place through political and institutional links between the countryside and the center. It is a fundamental requirement that the needs, desires, and capacities of the people and their indigenous institutions are recognized, understood, and given major weight.

The process of agricultural development is slow. The US had the luxury of a development that was paced by trial and error over a long period of time. That luxury of time is no longer available. Agricultural development is an urgent and sometimes desperate need in these days. The untapped agricultural resources of the developing world present an opportunity for coming to grips with our food problems as projected. We and other donor nations need to give very special attention to stimulating the growth of agriculture in the world beyond our borders. We need to be especially careful that we do not sacrifice assistance to the small farmer for

large-scale enterprises that intrude on the traditions and viability of those bulwarks of the rural sector throughout the world.

Agricultural resource growth has to be no less concerned with intrusion and excessive demands on the earth's natural resources and its ecological systems. We must have common sense in the utilization of land wherever it exists. Improved technology is indispensable if we are to make progress in agricultural productivity. Increases in yield will not come without intensified use of agricultural lands. But this use must be concerned with the integration of all the dynamics and systems of the rural sector.

We must be able to tap all the expertise that exists to enhance the agricultural development of individual countries. This expertise exists in donor countries and recipient countries. We must learn to utilize all the available skills of technical expertise combined with the wisdom of the individual farmer who probably has, wherever he lives, a greater innate feel for the potential of his land and the many constraints that impinge upon increasing productivity. We must listen to this resource. We must transfer the information. We must make the individual farmer a part of the problem solving and not always the problem.

These points are relevant to the concerns that you and I have about development. Within the complexities of development assistance, we are both involved in trying to relate and apply two essential ingredients of development. They are not the only ingredients, but they are terribly important. Energy and agriculture are intertwined. Our ability to provide technical assistance, to achieve salient transfers of knowledge in these two areas, and to plan together for effective resource utilization in these fields represents critical and sometimes desperate challenges. It is important to point out that the challenges are critical to the world at large. We need to find alternate energy resources. This is no less a problem for the developing world than it is for us. If one considers that energy is important to the development of agricultural production and that the supply of food for all of us in the world needs to be increased, the intricate relationship between energy, agricultural production, and viable human survival can be made. This is as important a problem for a family in Ames, Iowa, as it is for a farmer in any other part of the world.

The population of today's world is about four billion. In the

year 2000, it will reach six billion, 87% of which will live in what we consider developing countries. By 1985 there is a projected 100 million-ton food deficit for the developing world. This gap can only be bridged if there is a three- to fivefold increase in production in the developing world. Food deficit, population growth, and energy needs impact on all of us through inadequate attention to health and disease. Migration from rural to urban areas accentuates many of the problems that plague our cities.

A corollary to all the other lessons that we have learned is that we have come to the point where we no longer look upon agricultural development as a giveaway. It is in our interest to promote agricultural development in countries less developed than ours because their economic well-being will further our possibilities of growth. We know that healthy economies will increase the hopes for stability and equity throughout the world.

There is a final but critical lesson we have learned. Basically, it is an ethical issue – a subtlety, but highly important. How do we achieve the benefits of development without destroying man's capacity to act freely? Most of us nod approvingly when we talk about the improvement of the quality of life. But what constitutes the good life and the good society? It is probably not the abundance of "goods." In the transfer of technology from one society to another, *how* is as important as *what* is provided. What significantly affects the "*how*" are the values and attitudes of the donor. What is the most ethical way to go about development at home or abroad -- the way that maximizes the freedom and dignity of the recipient?

The crucial element remains style: it's not what we do, it's the way we do it. It has to be done in a human style. When we meet despair in one of our own urban ghettos or in a barrio or slum abroad, it is in part a consequence of powerlessness and there is no cure for powerlessness but power. As one writer has expressed this, "I believe it to be distinctly a human experience to feel with conviction: I did it and my doing made a difference."

You and I might question whether the word "assistance" smacks of charity, or paternalism, or some attitude demeaning to the recipient. "Technical cooperation" may be a preferable term, implying a twofold exchange and not a unilateral conferral of knowledge upon inert receivers. One could go on to question the attitudinal

baggage conveyed by the word "development" coined by spokesmen from the "developed" areas to characterize efforts by others which they often implicitly presume to be aimed at imitating their own accomplishments and achieving their own status. Sensitivity, understanding, and awareness must mark our endeavors to engage in the highly complex human act of helping others -- an act that becomes more complex, more demanding if it is between people of different cultures or different economic levels.

We must try to avoid building systems of satellite countries in the developing world. We must look to initiatives that recognize that we all have a mutual stake in the well-being of the world. To achieve this, we must give credence to the values and priorities of the millions of people with whom we join in trying to address the world's concerns. We must recognize that out of diverse cultures and values we must come to a condition where inequality in all its aspects is leveled throughout the world.

You and others in the private sector, who join us in this task, have a long-time experience in this sense of sharing in development. Together, we need to build on this experience.

APPROPRIATE CHOICES OF TECHNOLOGY FOR AGRICULTURE AND FOOD SYSTEMS DEVELOPMENT

HAROLD E. HOELSCHER
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Beirut, Lebanon

HUMAN HUNGER and malnutrition are two of the most important problems of the world today, perhaps *the* most important. They are problems of immense proportion and complexity; as such they are rarely well understood.

It is important to recognize that the sequence or chain of activities producing, eventually, food on the plate of a human being is both long and complicated. It begins with the production of chemical fertilizers and seed and includes the peripheral research and development activities associated with these, the agricultural education system, the agricultural extension systems or their equivalent, delivery processes to the farm, farm activities, delivery processes from the farm, collection, storage, and processing of food, a variety of techniques whereby food is delivered to individuals, food processing at the individual level, and many other activities. Operating in parallel but critical to the whole is an appropriate monetary and banking system, a set of income, trade, and land utilization policies, means for the implementation of these and other policies, plus many other such related sub-systems. The agriculture and food system is just that, an enormous, interacting feedback macro-system of many sub-systems in which some of the sub-system loops are positive and some negative. As in all such problems, attention to only one of the operating sub-systems is likely to prove counterproductive to the overall performance of the whole. Note that the on-farm processes represent only one such sub-system of concern.

It is difficult therefore to separate questions of "appropriate choices of technology" for agriculture and food systems from the general question of appropriate choices of technology for the developing world. I will therefore discuss the following general issues relevant to this problem: terminological and underlying policy issues; sources, choices, and adaptation; value problems in choice and adaption; and cost factors. I will then summarize with examples

from food production and delivery problems and return to the question of education for this important area of human concern, focusing on those things which to me seem important in the making of appropriate and educated choices of technology.

Terminological and Underlying Policy Issues

Before discussion of any such issues, we must be sure that we communicate effectively through the proper use of words. Although discussions of terminology are sometimes dismissed as "just a matter of semantics," I must argue that terminology is never neutral. The way we think about a subject is revealed in the way we use words to describe and to present our thoughts. Equally, the way we think about a subject influences our actions. We must be sure that we have common understandings of the words we use, if we are to discuss problem structures effectively and plan actions together.

Whatever we choose to mean by the word "technology," the following must be compatible with that definition.

1. Technology requires time and money to produce. It has a market value at the time of its development and never thereafter becomes value-free; technology which is not in use, which is figuratively on a "shelf" in some sense, reacquires value the moment someone decides that it is a potentially useful tool with which to change a perceived situation in the environment.

2. Technology can only be transferred successfully via the movement and then the effective interaction of individuals, never by the transmission of paper (reprints, patents, books) alone.

3. Technology for a specific problem at a given point in time may not exist; it can only come into existence after a problem situation has been clearly identified and the needs of that situation discovered.

4. Technology in use as a means to a desired end becomes a source of action which then requires commitments of both physical and human resources, i.e. individuals with the basic knowledge and experience to ensure operability of that technology in a given setting. A tool is useless without an understanding of the problem, the specific purpose of that tool, and its function in the problem setting.

5. Technology is valued for its ability to serve goals and ends, not for its intrinsic beauty, form, size, or other characteristics. Changes which improve the effectiveness of technology are seldom questioned in other than objective terms. Improvement of performance is expected of improvements in technology. Contrast the response to suggestions for an improvement in the moon rocket with the probable response to someone suggesting an improvement in a Picasso painting. Change is a normal and expected future for technology.

Thus, a technology is a means to an end. The only "value" associated with a technology is that associated with the anticipated goal and with the effectiveness of its use in a particular setting. It impinges on the value structure of a society through that use as a means to specific goals. Technology in such terms is itself ethically neutral.

The phrase "intermediate technology" is used by some to identify a specific group of technologies which are intermediate in cost per work place between the most modern and the most traditional. Others use "appropriate technology" to describe the concept that each technology should be appropriately designed and/or selected for the conditions at the point of use. Both words have become largely labels or slogans. I suggest that intermediate technologies are physical things which can be photographed, whereas an appropriate technology does not describe a technology at all but rather a concept that cannot be photographed. Even this distinction is circuitous. All becomes clear if the phrase "an appropriate choice of technology" is used. The word "choice" in this context brings us immediately into the real world where individuals, operating within a policy frame and toward an objective, make choices of technology with which to reach their objectives. This is again consistent with the basic issues, namely, that technology is a means to an end, never an end in itself.

The choice of technology for a given problem is not unlimited, but the range of choice varies from problem to problem. To dig a ditch one might choose a highly automated, remote-controlled, tractor-driven plowlike machine or a collection of shovels and day laborers. The question is which is the better choice if the problem is to be solved in consonance with the cultural, social, economic, and technological ambiance at that problem site. For such prob-

lems there is a wide spectrum from which to choose. For more sophisticated manufacturers, e.g. for the manufacture of aircraft engines, the choice becomes limited. Thus, the first focus should be on the goal – the problem to be solved – and this too should be consonant with local conditions and the local state of development.

It has sometimes been argued that underlying policy issues relating to or guiding problem choice, development goals, and development strategies are largely irrelevant to initial states. I cannot accept this. True, the economic environment within which technology is to be brought to bear on a problem is dynamic and constantly in change, but the direction of that change from a given initial state or base must be largely determined by national policy. Such policy must address the relative importance of industrial sectors available for exploitation and development, the extent to which the cost of less efficient technologies is acceptable in terms of increased employment, the pattern or balance of products produced at various scales of operation and organizational structures, and the desired manpower spectrum as a function of time – all matters of government planning and government policies. In developing countries, development policies generally are key factors in the making of technological choices. In summary, policy is largely that instrument from which development strategies are evolved.

Finally, it is important to note the difference between science and technology and therefore the difference between science policy and technology policy, as these provide an underlying basis for national development within the nation. It is a mistake in planning to assume that science policy and technology policy are one and the same for any development sector, but especially so in agriculture. It is or has been often assumed that setting science policy drives development of technology and that both may be covered by the same set of actions, i.e. by the same policy process. Nothing could be further from the truth. Science policy to emphasize development of capabilities in nuclear physics or electrochemistry or biology or other branches of science has no relationship except, perhaps, an inadvertent one to the development of nuclear technology, nuclear weapons, electrochemical generators, or the pharamaceutical industry. The activity known as science and the techniques embodied by the word technology bear only derivative relationships one unto the other.

"Science" is an activity normally done by a single individual and the reward is to a single individual for accomplishment. A publication is a natural result. "Technology," on the other hand, is usually developed by a team; the reward is to the team with credit shared and the result is owned by someone. Technologies are "things" or methods that cost money to develop and never again are value-free. They are used to solve or relieve a problem, that is to accomplish something, and normally involve the use of results from many sciences, not from one, with necessarily a fitting together of many data elements and much related understanding from many sources before a single technology can be made to function for man.

Hence, technology policy, unlike science policy, is always necessarily focused on a set of problems to be solved, a situation to be changed, not on a felt "need-to-know." The decision to place a man on the moon was an act of policy making. It did not directly speak to or of science. The major problem in the field of energy is the recurring confusion between the effort to generate policy relating to energy sciences and the need for policy relating to the development and use of new energy technologies.

Furthermore, these two kinds of policies are not necessarily coupled as the two activities move ahead independently in any society. Progress toward either broad or specific technological goals may be achieved without a complete data base and without a full understanding of the underlying natural laws or principles. Indeed, this has usually been the case. Man used fire long before he had any understanding of the chemistry or physics of combustion. Technological accomplishments are usually prime sources of new understandings developed from studies focused on questions raised by the use of that new technology. Such has surely been the case in the US space program. The principal point is this: science and/or research do not intrinsically promise or offer more than hope for human betterment. It is only when the results from science and/or research are used -- in the form of a new technology embodying new data and new understandings therefrom – that man's condition may be altered and hopefully improved. "Improvement," in turn, is a result when goal structures underlying such human effort are consonant with valid perceptions of directions for change along which will occur the betterment of man's life on

earth. Thus, there is need for both science policy to decide how resources will be allocated among the various fields of science and for technology policy to guide development and problem-solving efforts.

Transition

In the previous section, science is noted as a discovery-oriented activity of man. A technology is identified as a means for making change, a means to ends consonant with man's goals and aspirations in and for his living space. It is noted that the choice of a technology must await decisions about the ends to be served by that choice or that development. Goals must be defined first. Development planning must precede technological choices. Means acceptable to the system can then be found.

A decision to develop a nation's mineral wealth and confine industrial efforts to the primary stage of mining and sale of minerals means certain things in terms of the kind of technology required, the choice of specific types from among those available, and the methods of implementation. A decision to introduce a new rice or wheat variety in the farming of a nation or a region influences every activity in that chain or sequence identified at the beginning of this paper and, what is more, every technological acquisition or development decision at every stage. Having these decisions embodied in an evolving national plan, one may then proceed to be concerned with sources, choices, and adaptation as required.

Sources, Choices, and Adaptation

For any developing country there is a wide range of potential technology sources. These include:

1. Foreign firms with explicit and implicit know-how sale arrangements;
2. Joint ventures and know-how contracts;
3. Turn-key and "product-in-hand" arrangements but without equity;
4. Straight know-how licensing contracts with payment in cash or kind;
5. Engineering consultants;
6. Coproduction or subcontracting;
7. Intergovernmental cooperation and technical assistance from international organizations;

8. Improvement adaptation of available technologies;
9. Local research and development (R&D) efforts for innovation.

The sequence reveals decreasing foreign know-how imports and increasing potential for technological independence. Obviously two or more of these mechanisms may occur concurrently. The choice of strategy depends not only on the technological level and resource constraints of the country concerned, but also on its political and social systems. Table 1 indicates some of the characteristics of alternative routes for technology acquisition.

TABLE 1: CHARACTERISTICS OF ALTERNATIVE ROUTES FOR TECHNOLOGY ACQUISITION

Route	*Development cost*	*Probability of success*	*Time to fruition*	*Likely rewards*	*Capability development*
Local innovation, research & development	High	Moderate	Long	Large	Large
Improvement & adaptation	Moderate	Moderate	Moderate	Small	Large
Licensing of foreign know-how	Low	High	Short	Moderate	Small
Joint ventures & subsidiaries	Low	High	Moderate	Moderate	Small

Although problems of adaptation do arise because techniques suitable to one industrial, social, and economic environment may not be suitable in a different setting, the adaptation of wisely chosen technologies has generally occurred with much less difficulty than supposed. Even chemical process technologies which are generally inflexible with respect to capital and labor utilization have been and are being adapted to the least developed countries around the world in form and style varying only slightly from that in their country of origin. Farm technologies are easily adapted if proper choices are made -- taking into account the size or scale of farming, soil conditions, and other factors of importance to on-farm processes. This is equally true for the technological hardware and the technological software of a system.

Finally, policies influencing the choice and the adaptation of techniques should be designed primarily with a view to increasing efficiency at the level of use and not directly to increasing employment as a first desideratum. Employment is important but the employment objective should be taken care of through national and economic policies influencing, at the macro-level, the capital output ratio and the allocation of resources. Not every national project can aim at the same objectives, e.g. employment. Rather, employment is an objective of national planning and must be emphasized in some projects of that plan.

Value Problems in Choice and Adaptation

One must start with the assumption that all change must be harmonious with societal value systems, that the rate of change should not seriously stress the fabric of that society, and that the directions for change should be consonant with the goals and directions for the society in which that change is to occur. All this is to minimize irreversible rejection mechanisms and human costs.

Importantly, one must ask, "Who are the actors or agents of change? " Standard answers include the planners, experts, or change catalysts as the main agents or actors. As long ago as 1962, Max Millikan[1] wrote, "The process of arriving at a national plan should be one in which the planners present to the community for discussion a variety of critical choices showing for each alternative the consequences for the society of pursuing that value choice consistently and efficiently. It is only by this process that the community can clarify its individual and social goals."

There is, of course, a major doubt about the optimistic ability to map out "alternative consequences for the society of pursuing that value choice." Planners are usually as ignorant of the consequences of any decision as the populace itself. There remain deep questions as to the best way to approach a realistic estimate of alternative value costs. The "actors" are inevitably the planners or the experts working together with the interested populace.

However, it is clearly the value system of the planners which is at issue here. It is their image of change, their image of the system's receptivity for change, and that societal "existence rationality" of Goulet[2] which are at play in the decision-making process. The last, the existence rationality, contains core values relating to the

minimum requirements for survival, freedom, personal esteem, and the outer boundaries of secondary values where flexibility is not only possible but normally operative. This existence rationality is highly receptive to change as therefore is the strategy which any society adopts to function successfully in terms of its own goal structures, because these are limited by its access to information and by its ability to process that information. Good strategies operate at the boundaries of the societal existence rationality and offer many options for the future. Success in the planning and selection process requires both increased access to information and increased resources for information processing.

Human values operate to limit technological acceptance and adoption in yet another manner. All societies are, in some measure, influenced by their own mythology. The more traditional societies are dominated by myths, thus producing distrust and fear of change, an option for conformism, the mythicization of innovation, and frustration in any activity which interfaces on a developed segment of the world. There then arises a demand for compensation and ultimately there is escapism. Basically, technology generates an increased range of options (demanding, as above, improved ability to process information about those options) and man must then select, decide, choose, or conclude -- rejecting many for one -- a mind-deafening demand where mythology is dominating reason. US President Abraham Lincoln said, "The dogmas of our quiet past are inadequate for the stormy present" and, I would add, for our future.

Finally, technology is a means, as has been emphasized often in this paper. The ends for which that means is structured house all the value judgments of the architect. If man permits the ends to swallow the means, if man fails to recognize an inevitably and continually increased range of choices, that the possibility of change is known, that Pandora's box is open and there is no retreat to a world in which man meekly accepts his fate, then value systems will surely limit and not guide the application of knowledge and impede progress toward a better world.

But, if successful, then near-term consequences may be unacceptable and a new set of value problems arises. With the first measure of success, wants or desire-mechanisms are enhanced and transformed; natural restraints are lost and contraints are viewed

with less fear. Effective access to resources is increasingly difficult as access increases. Demand increases faster than ability to meet demand. Finally, after resources become increasingly available, they can often be obtained only on terms which discriminate against those whose needs are greatest, i.e. having lower purchasing power and a less certain future. New varieties of a cereal may not be used effectively by the lower economic farm strata since such use requires a commitment which might, if there is failure, wipe out next year's food supply. Subsistence farmers are unable to take chances. They would usually prefer a lower but assured yield to a more uncertain but potentially higher yield. It is only the large-scale farm industries that can both take chances on a higher yielding variety and then backstop those chances with the necessary irrigation, fertilizer, chemicals, etc.

These three tensions operate jointly and account for much of the value conflict in technology transfer in the near-term. They must be taken into account when making choices of new technology, new software, or new hardware for development, while the total system must be viewed in terms of long-range goals and value systems consonant with those goals. The conflict between the short- and long-term goals and consequences of those goals presents an unresolved dilemma to development strategies.

Cost Factors

Technology results from human effort to find ways and means to affect conditions in the living space of people. It requires time and money to develop and, once developed, never thereafter becomes value-free. It can be bought and it can be sold. The question of course is at what price. The market place in which technology is bought and sold is clearly an imperfect one. The price often exceeds the marginal cost and, with oligopolistic characteristics, there is indeterminacy about price which is subject to bargaining strategies and gaming.

There are six types of costs to be considered in choosing a technology for a particular problem situation. These are for:

1. The right to use patents, licenses, trademarks, and/or hardware;
2. Technical knowledge and know-how at the preinvestment and operational levels;
3. Price increases in intracompany sales;

4. Profits capitalized in the acquisition of shares in the receiving company or country;

5. Some part of the profit of fully foreign-owned subsidiaries which have no special provision to pay for technology transfers from the price;

6. Overpricing of capital goods and equipment.

Of these, Points 3 to 6 could be negative in some situations. Most of them, however, represent a substantial drain on the recipient country or company. These costs include research and development -- typically one to 500 million dollars for new technology; market development including initial information, dissemination, and sales training; and the "investment" or preproduction stage.

Experience in developed nations indicates that 10 to 20% of total costs for an innovation, conception to first sales, are research and development costs. An equal (or greater) percentage is engineering, development, and design costs. The remainder is manufacturing, marketing, legal, and related costs. Thus, the total cost of a new innovation is likely to be five times larger than the research and development expenditure. Such data indicate the serious limitations on developing countries which contemplate indigenous technological development. No organization with a gross profit of the order of one-fifth of its output can afford to spend more than 4 to 5% of that output on innovation. This represents a real limitation on innovation. The price of change is high and development is an expensive business.

In actual practice, technology generally operates as a privileged commodity penetrating underdeveloped countries without tariffs. If developing nations accept the commercial ground rules governing technological exchanges as laid down by the source, then they potentially face the larger problem of dependency. Most nations feel that they must develop their own technological capability by gaining open access to scientific and technological information. However, the cost of generating new technology may be excessive.

There is a variety of other operating and societal factors to be considered when evaluating the "cost" of a specific technological choice. Such choices are often influenced by the availability of capital aid in the direction of capital intensification, thus reducing the volume of employment for a given output and thus adversely influencing employment. Commitments to technology requiring

intensive sophisticated maintenance tend to mortgage the future. Technologies which are not in consonance with the problem scale will eventually prove counterproductive.

Examples and a Return to Problems in Education

In summary, there is considerable interaction between the choice of technology and the ease with which it is adapted to local use. The choice of technology influences employment, income distribution, and consumption patterns. The choice must take account of social organizations and political structures. In making appropriate choices of technology for agriculture and food systems, it is necessary to recognize the unique characteristics of lesser developed countries' markets, price variations, price fluctuations, and inelasticities . Factor-price distortions often lead to poor or wrong choices of technology. Dualism, the limited capacity of development administration, inadequate articulation and implementation of policy, and other societal factors are important considerations.

There is not much doubt that there has been too little assessment of the potential impact of a particular technological choice before that choice is made and important decisions taken. The result has often been a mismatch between the social, economic, and technological ambiance of the region and a new entry. There is great need for improved information about agriculture and food system technologies and a wiser use of international aids.

There is the recurring controversy about the optimum scale for agricultural productivity. Hirschman[3] argued in favor of capital intensive techniques that are "large-scale, process-oriented and machine based" to conserve scarce managerial capabilities. Since this statement (early 1965), it has become evident that management is the scarcest talent in the developing world. It has proved equally true that small-scale, labor-intensive activities are always necessarily management-intensive. In China, the failure of small-scale blast furnaces using labor-intensive techniques is one example. In Japan, industrial development was consciously begun at small-scale and labor-intensive levels, but a significant transformation has occurred. In India, the large-scale integrated and well-managed tea, coffee, and rubber plantations show productivities from 25 to 75% above the national averages. At small scales of operation, the socio-cultural influences tend to interfere more significantly than at larger

scales. Individuals who are accustomed to craft-oriented work find these cultural attitudes more difficult to put aside when a continuity of production tasks is expected.

Note that until two years ago my experience was in Asia. Hence, most of the examples to follow are from that world region. Small tractors in the 3-20 HP range and simple in design begin now to fill a basic need in many of the developing countries. Some of the best examples of this are found in the work of the International Rice Research Institute in Baguio in the Philippines. Several Japanese, Korean, American, and European garden-type tractors in the 3-10 HP range are being marketed. Especially advantageous are low-cost, walk-behind models that can be used on small plots for a variety of farm needs. They often serve as auxiliary power sources for irrigation, threshing, milling, and other purposes. Ruggedness, dependability, simplicity of operation, economy, and low maintenance are all important characteristics of such devices.

The Mochudi Tool Bar (*makgonatsolhe* or the "machine that can do anything"), developed in Botswana, is diffusing rapidly throughout Africa and into Asia as a useful agriculture tool. Small-scale pumps (15-20 cubic meters per hectare) drawing from and feeding bamboo piping systems have been developed in several countries and are making an important contribution. While I am familiar with those developed in Assam, now found throughout Asia, I believe that there have been similar developments in Turkey, Pakistan, and countries of the Middle East. They cost a fraction of the imported types, are subject to low maintenance, and are hence affordable for even the smallest of farms.

Such results are very encouraging. Unfortunately, they are still examples from a small number; much more needs to be done at this level of sophistication. The World Bank[4] has published an excellent document summarizing the philosophy and experience which dominates bank activities relating to technological development throughout the Third World. It provides an excellent overview of the needs in such countries and sets forth explicitly dimensions of the notion of "appropriateness" in the choice of technological solutions to the problems.

However, even the most highly sophisticated methods are often appropriate choices for the problems of developing countries. Diaz and Martinez,[5] in their study of Cuban sugarcane transportation

systems, reported on the use of a computer simulation system for analyzing a variety of sugarcane transportation methods. In Cuba, the site of the study, most of the sugar from 152 mills was transported from the field on rubber-tired wagons of four-ton capacity to a railroad siding and then loaded by hand into railroad cars for transportation to the sugar mills. The problem was to investigate other means of transportation, to decrease idle time, and to consider alternative choices of loading equipment. A large-scale simulation model was developed and the results, achieving the objectives of the study, led to a number of significant changes in the scheduling of wagon-rail transport and the decision to decrease loads on each pass of the rail section, but to increase the number of passes.

Planning agriculture and food systems development throughout the Third World should be done in a systematic manner using the best and most sophisticated planning tools available. The National Inter-Regional Agricultural Projections System (NIRAP) of the US has as its purpose the development of computer models using the IBM 370/168 in a Fortran programing language to (a) define scenarios of potential alternative futures for US agriculture, (b) analyze trade-offs between possible conflicting policy goals and suggest possible solutions, (c) provide projections of the major facets of US agriculture in meeting future demands for selective commodities, natural resources, and energy, and (d) analyze the resulting projections and scenarios while anticipating future problems with respect to food and fibers. The last is equivalent to the establishment of an agricultural "early warning" system.

NIRAP is concerned with four model sectors, namely, the aggregate farm output model, the commodity model, the non-farm-produced input models, and the land-use model. There are three major inputs, namely, population growth, economic growth, and international trade. The model has already produced a series of projections relating to the four major agricultural regions of the US and suggested changes in planning for each region. The system is not perfect. Estimating procedures, inflexibility, poor or inadequate resource management, and the level of aggregation are all problems that remain to be solved. But the effort to approach agricultural planning by such a technique seems clearly necessary, particularly so, I suggest, in the developing world, where progress is needed in the shortest possible time-frame if mass hunger, mass malnutrition, and mass starvation are to be avoided.

The transfer of technology involves sets of both short-term and long-range problems which should be part of curricula material in educational programs. The short-term problems are largely tactical in character. Students must understand technology as a means to short-range goals which are so chosen as to be consonant with long-range goals and objectives. The latter must include the development of both human and physical resources as well as careful consideration of the evolving value systems of the region. This is unlikely to fall within the expertise of professional faculty and hence the argument must be strongly made for the involvement of our professional students in humanistic studies in order that they be at least sensitized to such areas of concern. So may an improved future be assured.

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AGRICULTURAL GROWTH AND GOVERNMENTAL INSTITUTIONS IN THE DEVELOPING COUNTRIES: A PLANNER'S VIEWPOINT

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Abstract

Agriculture in the developing countries of Asia and the Middle East is characterized by peasant and tenant farming, traditional techniques, and inadequate infrastructure for modernization. Contrary to popular expectations, the end of colonial rule brought no spectacular improvement in the living standards of the rural population. Agricultural development problems in the region are examined with particular reference to governmental institutions. Stagnation in the agriculture of some of these countries occurs because of uneconomic farm units, inadequate investment, illiteracy, absence of price incentives, and indiscriminate transplanting of institutions from different contexts. Evolution of governmental institutions relevant to agricultural and rural development in developing countries is examined in the context of the Bangladesh experience. The main conclusions are that institutions are not effective because (a) the machinery to work them has deep-rooted inefficiencies; (b) ownership and inheritance patterns of land prevent its best use; and (c) universal literacy is essential for economic modernization. It is possible to design the right kind of institutions to modernize agriculture and to increase rural employment, if we have the political ability to do what is necessary.

Present State of Agriculture in the Developing Countries

IN THE DEVELOPING low-income countries of Asia and Africa, agriculture is the main employer, and often the greater part of the gross domestic product also comes from this sector. Historically, the Middle East, as the cradle of human civilization, is the place where settled or arable agriculture began. Today, there are several common factors affecting the growth of agriculture in the develop-

ing countries that were colonies of one European power or another in the recent past. Some of these are as follows:

1. In all these countries, agriculture is in the hands of small and tenant farmers working on subsistence farms, with some form of lease by absentee landlords, uncertain rights, and sharecropping. If there are peasant landholders, many of them have uneconomic holdings due to fragmentation and land transfer. Thus, many have small landholdings but no incentive or means to improve them or to pay for modern farm inputs.

2. The rural population of many of these countries has a low literacy level, poor health and sanitary conditions, and a dependence on customs and superstitions that make the needed reforms for modernization of the economy difficult or impossible to implement.

3. The colonial heritage has left, in many cases, an inefficient and top-heavy government machinery that is incapable of implementing the plans for rapid development, even if such plans could be prepared or financed.

4. Generally, in spite of some increase in agricultural production, the higher growth rate of the rural population is causing a net increase in the number and proportion of rural families living in absolute poverty. Food deficit is therefore on the increase in many developing countries.

It is an enigma that in the colonial days resources were exploited and taken away from these countries, whereas now that there is an inflow of external resources through foreign assistance for development, the comparative real income of the common man in many of these countries is on a decline since independence. Studies[1] suggest that the barter terms of trade of many developing countries with major agricultural export commodities have recently moved against them and may decrease further in the future, so that the agricultural sector's capacity to pay for the economy's imports is diminishing.

After the Industrial Revolution in Europe, agriculture was modernized in the present-day developed countries through technological research and institutional changes (e.g. the Enclosure Movement in Europe and the consolidation of holdings in Japan). There were other factors, such as the colonies supplying the necessary agricultural raw materials, which contributed to the commercialization of agriculture in the developed world in the last 200 years. After World

War II, many of these colonies achieved independence, but no such agricultural revolution is yet in sight. A World Bank study[2] points out that as a result "in countries where agriculture has expanded more slowly than population (parts of South Asia and Sub-Saharan Africa) the incomes of some of the rural population have probably declined." The problem is difficult to solve because industrialization of these countries with imported technology and capital can increase the national income, but cannot provide food and employment for the rapidly growing rural population that is now living in great poverty.

The object of this paper is to discuss some of the issues involved in increasing agricultural output and employment in the developing countries, with particular reference to institution building through economic planning. The case of Bangladesh with a dense, illiterate population, low-income, traditional agriculture, and a growing landless, rural unemployed class may be used for illustration. (Since 1976, however, the economy of Bangladesh has made steady improvement. In 1977-1978 the real growth rate of gross national product (GNP) was 8%, with a 7% increase in agriculture, partly due to good weather.) Bangladesh has about 50 years of experience in rural institution building and about 20 years of experience in development planning with foreign assistance.

Factors Contributing to a Stagnant Agriculture

The difference between the urban industrial zones of a developed and a developing country is less sharp than the difference between the rural agricultural countryside in the two situations. Pumping oil, running a textile mill, or the operation of an airport is not much different whether it is in a developed or a developing country, because it can be designed and managed in the way known to be most efficient, and the necessary manpower can be trained on the job. This did not happen in agriculture, despite the fact that good textbooks and necessary modern inputs available in the developed countries have been supplied to many low-income developing countries. What are the reasons for this state of affairs? The following factors are relevant to this question.

1. In the developing countries from the Middle East to South Asia, there are variations in soil, climate, and stages of agriculture from nomadic pastoral to the most advanced irrigation farming,

from the rainless desert to the copiously watered hill forests or flood-fed deltaic plains. Despite these variations, systems of agriculture cannot be progressive unless the farm holdings can be worked as a unit. Both small and large farms can be efficient, provided they are a compact economic unit and the person who makes decisions about farming also owns the farm. It does not matter if this owner is an individual or an organization, as long as the size of the farm is manageable.

Unfortunately, a farm holding is often an uneconomic unit, either too fragmented to take advantage of the available scientific knowledge and equipment or large but scattered, separated from the owner's residence, requiring cultivation by tenants with little incentive or freedom to modernize. In this situation, theoretically, there can be a very large output possible for the entire village or zone, but in practice the peasants and tenants achieve only a small part of it. Output does not improve much per unit of land, even if the government provides some of the infrastructures of modernization, extension facilities, and inputs, because only the well-to-do and the owner cultivators have the incentive or capacity to conform to the theoretical maximum.

A plot of land may be good for cotton, but the subsistence tenant may need to raise wheat based on his own priority. A derelict tank may become a profitable source of water and fish if it is re-excavated and enlarged, but all the owners of the land to be benefited by the water or used for the enlargement of the tank may not agree to the project. The same may apply to land leveling, digging plot and field-channels, and sharing the cost of a tube well or a pump.

2. In order to produce more, there has to be more investment in land, infrastructure, and modern inputs. Profitable capital investment in any business requires risk taking and skill in the job itself. If a small or tenant farmer is not able to use the best of inputs or infrastructure because he has no money or incentive, then his decisions also influence the incomes and agro-industrial employment opportunities of the nation.

3. In the advanced countries, universal literacy of the rural population made it easy to introduce the necessary institutional changes from feudalism after the Industrial Revolution. For instance, when the Cooperative Movement began in Europe, the small landholders could understand and run the business, and their mobility and

trainability was high because they could read and write. This has not taken place yet in many of the developing countries, because of the high proportion of rural illiteracy.

4. More investment in agriculture can come either from rural savings or from outside funds, including foreign aid. Savings in the agricultural sector itself are not often reinvested for two reasons: (a) the absentee landowners and surplus farmers spend their rural income in the urban areas, where they or their family members generally live; and (b) the bulk of the peasants, tenants, and the rural landless do not have enough income to save and invest. In some of the newly independent countries, importation of food grains and farm produce as a part of assistance from the developed countries depresses the prices of these commodities or their substitutes produced by the aid receiver. This makes investment in agriculture less profitable and encourages migration to the towns. The development budget for the agricultural and rural sectors is often sizeable in many developing countries, but the projects in these sectors have a tendency to generate income for the rural elite or the urban class. Subsidies on farm inputs, employment in extension services and training and experimental stations, or buying equipment for government farms or offices have little impact on farmers' private savings and investments. Falling terms of external trade for primary exportables also discourage further investment in land and farming. To change the trend, more external finance is needed, particularly for long-term investments in land, and farm prices have to be made more attractive compared to the prices paid for the goods purchased by the farmers.

5. It is a common human tendency to try in one's own situation what has proved successful elsewhere. In the task of upgrading the agricultural economy, the developing countries have adopted technology, such as that of higher yielding varieties, relied upon the expertise of the Cooperative Movement, established agricultural banks and agricultural development corporations, etc. However, the effectiveness of these approaches has been less than in developed countries. When the population is mostly illiterate, social customs (e.g. law of inheritance, discrimination based on caste or sex in employment, etc.) can create inequality of opportunity and competition. Furthermore, technologies or institutions borrowed from a different environment and culture may not by themselves be effective.

In recent years, there has been a tendency to borrow the names or forms of organizations from the socialist countries and apply them in the free economies. This has caused a rapid increase in employment as well as inefficiency and corruption in the public sector, and there has been neglect of the traditional and primary functions of government, such as maintenance of law and order and administration of justice. The 1978 World Development Report states "that the difficulty of making drastic changes in the colonial salary structures in the transitional period has led to excessive growth in bureaucratic employment rather than industrial skill."[3]

Governmental Institutions: Experiments and Lessons

We have observed that growth in agriculture has not been adequate in many of the developing countries of Asia and Africa. According to the World Bank,[4] agricultural growth greater than 4% per annum is difficult to achieve. But the actual performance in many of the low-income developing countries has been far below that level. Some of the reasons why efforts at planned development of agriculture have been relatively ineffective in increasing production and employment in the low-income developing economies have already been discussed.

Economic growth depends on the effectiveness of the institutions through which the economic functions are carried out. Modifying existing institutions and building new ones has been a feature of economic planning in many of the developing countries. Let us now examine the operation of governmental institutions relevant to agricultural and rural development in Bangladesh, a country where traditional agriculture with a colonial background, increasing unemployment, and low per-capita income are in the process of change through 20 years of economic planning. While admitting that agricultural problems are to some extent culture- and country-specific, we shall discuss only the lessons from the Bangladesh experience that may be of interest to countries with a colonial background, traditional techniques, and small farms run by private enterprise. (In Bangladesh, although the efforts at institution building and modernization of agriculture through planning started in the mid-fifties, when it was a part of Pakistan, a rapid population growth (3% per year) and relatively low rate of increase of agricultural output have been the characteristic pattern. In recent years the performance has improved.)

During British rule, the Bengal Government helped the agriculturist in several ways. A Cooperative Movement was started during the period 1904-1912, particularly to supply medium- and short-term credit. In the thirties and forties, rural indebtedness was controlled through the Money-lenders Act. The rights of the tenants were protected by minor tenancy legislation, and a movement toward rural improvement was encouraged through voluntary participation of the masses and the elite (for adult literacy, clearing water hyacinths, etc.). In the fifties, the landlord system was terminated, limiting the maximum size of a family holding (now 30 acres) and abolishing intermediate rent receivers.

At the same time, rural community development (Village Aid) and agricultural extension were introduced with American aid, along with the expansion of education and health services in the rural areas. The local self-governing units, such as the Union Boards (later called the Union Councils), were the institutions used to implement the programs. In the sixties, several specialized institutions were created (e.g. Agricultural Bank, Agricultural Corporation, Water and Power Board, etc.). They were to provide credit; operating supplies such as seeds, fertilizers, and implements; and infrastructures such as embankments, tube wells, and irrigation channels. These organizations were formed on the Japanese model to be run on commercial lines, but in practice they have always needed government subsidies.

In the mid-sixties, a group of rural institutions, initiated in the district of Comilla, became well-known by helping small farmers to modernize their agriculture using higher yielding varieties and capital intensive machinery, through cooperative pooling of the facilities without affecting land ownership. This group included the following institutions and programs. (a) The Thana Training and Development Center was run in coordination with different development agencies to train all village cooperative leaders within a thana in the methods of modernization. (b) A Rural Works Program was implemented through the local governments to build drainage embankments and local roads. Although mainly labor intensive, it was essentially needed for better farming, marketing, and rural communication. (c) A Thana Irrigation Plan was set up to install low-lift pumps and shallow tube wells through teams of local farmers, serviced by the Thana Workshop with engineering services provided by the government. (d) A two-tier cooperative system covering

a thana (about 100 sq. miles) was set up by forming blocks of 50 to 100 acres for improved farming, with the primary village cooperative societies for credit, irrigation, and other facilities. The village society was to be supported by a Central Thana Cooperative Society. Previously handicapped by fragmented holdings and lack of capital and knowledge, the small farmers might now make use of these institutions to secure the advantages of modern technology. This is known as the Integrated Rural Development Program (IRDP).

This institutional framework recognizes that agricultural development is dependent on (a) needed physical infrastructure, (b) organizing the large number of illiterate and small farmers, and (c) an effective administrative machinery through which the inputs of modernization can be made available to these farmers. The services of specialized agencies and other institutions except IRDP were provided in all rural areas; the IRDP was extended between 1973 and 1978 to 250 of the country's 465 thanas, and toward the middle of the First Five Year Plan, when it was obvious that poverty had to be eradicated quickly, another set of institutions was introduced with foreign assistance for specific areas and groups of people. This was called the Intensive Area Development Project. There are also projects for target groups and package programs. For intensive area development, the idea has been that if the modern infrastructure is built to achieve better water control, input supply, and output marketing, then local farmers will do the rest. There are already such projects in seven thanas and more are planned, with financing by the World Bank and the Asian Development Bank. Thus, in the last 50 years, a considerable body of experience has accumulated in the sphere of creating agricultural and rural institutions, some of which were established because international organizations outside the country supported or promoted them.

As a result of these endeavors, salaried employment in public institutions and public investment have increased. A large workforce has been trained in the know-how of modernized agriculture and some infrastructure has been created in the rural areas. It has been shown[5] that investment in agricultural, rural, and water development during the First Five Year Plan was about Tk. 1300 crores. Bangladesh had in 1977-1978 about 37 thousand power pumps and 7.5 thousand tube wells; total fertilizer consumption increased from

about 108,000 tons in 1965-1966 to about 800,000 tons in 1978-1979. These projects as yet have not increased the per-acre yield or cropping intensity very much, nor have they provided enough employment to the rural landless. If water and fertilizer subsidies are withdrawn, it will be difficult to maintain the present growth rate [incremental capital output ratio (ICOR) is about two in agriculture]. Even after considerable investment and extension, agriculture in Bangladesh continues to be dependent on weather and therefore importation of food grains is necessary.

We are still undecided about the right kind of institution to realize the potential of agriculture. When improved technology and external finance are available, it is unfortunate that there is such lack of confidence about the type of institution to be built for the purpose. What can be done about this? The following are some of the lessons learned in this context and stated for whatever they are worth.

1. The operation of any institution is influenced by the ability and motivation of the people who manage it. Honest, efficient, and accountable recruitment of manpower has deteriorated from the colonial days. In the exercise of power, personal or family interests still predominate over the national interest. This is a common occurrence when there is external assistance and the common man is neither literate nor organized. Unfortunately, whatever the source of money, if people are to be employed and money is to be spent, interests other than strict economic considerations are given precedence.

Non-development expenses are frequently put into a development budget. In this situation, whatever is the worth of an institution in theory, it will actually degenerate into a lifeless, inefficient, and corrupt organization difficult to dismantle. Creating a new institution in its place only provides more unproductive jobs, again to be distributed among the friends and relations of the elite, but with no better results. The elite in their own interest welcome foreign aid and discourage direct taxation and taxing of the unearned income. As they are a small group, nobody objects to this short-run profiteering. What is true for the national elites can also be true for the bureaucracy of the international organizations. In that situation, institution building may become unimportant and long-term foreign loans could be used for short-term, quick-yielding gains.

2. Although a village and its farm land may have the potential to produce a large output with the infrastructure provided, in actuality this may not be realized, because the potential is estimated on the basis of the ideal use of every inch of land. A study[6] showed that one irrigation project in Bangladesh which was supposed to increase output by 200% in the feasibility study yielded, after completion of the project, only a small fraction of this figure in actuality. In practice, if land is cultivated by a large number of small farmers with differences in title, tenure, plot shape, crop requirements, family size, and financial capacity, then social and private interests will be different. Land is owned not only as a means of production but also for investment and speculation. With such diverse interests, price mechanisms can hardly lead to the combination of outputs that would maximize income and employment. This happens where land has been in cultivation for a long time and is fertile and heavily fragmented.

3. If holdings are economic and consolidated, the absentee owners object and many small farmers become landless. Such reforms are politically resisted. An alternative is for the population of the entire village to draw a total plan of land use and production, implemented through compulsory participation of all owners of land. Landowners could either conform to the village plan and produce with family labor and capital or lease out their land to the village cooperative. This alternative of using land and delivering the necessary raw materials would solve the problem without change of ownership. This situation exists in industry and does not necessarily reduce efficiency of operation. Such a solution, however, requires drastic legal measures giving power to the village community organizations to make plans, use public infrastructure, and take lease of land that otherwise would not be cultivated by owner-farmers. In this system, ownership remains, but sharecropping goes and rack-renting by landowners does not exist. Cooperative and private enterprise coexist; since the landless are involved in the preparation of the plan, local labor is fully utilized.

4. It is man who makes the institutions, and if the rural population is to make agriculture more efficient by the use of modern techniques, it must be able to read and write. Primary literacy increases the farmers' mobility, level of information, and trainability. Universal literacy was a precondition of all the Western re-

formations brought about in the past. The Cooperative Movement in 19th century Europe or in Japan in the early 20th century, for example, would never have succeeded if the members were illiterate. An increase in literacy needs manpower and a minimal investment in education, which most developing countries can afford. This is one thing which the socialist countries are quick to act upon, and the developing non-socialist countries are lagging behind only at their own peril.

To conclude, there are three basic impediments which prevent existing institutions from achieving the transformation to modern agriculture in the developing countries. These are (a) inefficiency and corruption of the elite; (b) discrepancies between the private and social advantages of land use; and (c) illiteracy of the rural population. They are partly the legacy of colonial and feudal rule over a long period. Changing these three conditions is essential if an institution is to work for modernization. In the past, some agricultural growth in these countries was possible by bringing unused land into production and by using the existing technical knowledge. But such extension possibilities are rather limited. The institutions are not to be blamed, but rather the outdated privileges accorded to some members of society. However, this situation can be changed. The system of private enterprise can work the transformation once again, provided we have the political ability to do what is right.

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A MINISTRY OF AGRICULTURE'S PERSPECTIVE ON AGRICULTURAL EDUCATION AND DEVELOPMENT

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FIRST OF ALL, it is a great pleasure and privilege for me to address this meeting and I would like, on behalf of my Government, to express our thanks, appreciation, and gratitude to our host, the Faculty of Agricultural and Food Sciences of the American University of Beirut, for sponsoring this conference.

The basic objectives of this paper concentrate on the practical approaches that the various departments of the Saudi Arabian Ministry of Agriculture and Water can take to support the development of human resources, which is considered the backbone of agricultural development in Saudi Arabia. To achieve this goal, close cooperation with the various agricultural educational institutions and agricultural training centers in the Middle East and other areas of the world has been maintained. Our reciprocity with the Faculty of Agriculture and Food Sciences of AUB is a living example.

We do realize the shortage at all levels of agriculturally educated people in Saudi Arabia, and it is our policy, in cooperation with the existing agricultural educational institutions in our country, to alleviate this shortage in a balanced manner, that is, to provide for all needed levels of academic personnel as well as technical and skilled labor. This cannot be achieved in a short period of time, especially when competition from other disciplines is at its peak and the challenge agriculturists and farmers are facing in arid-zone farming, where the prevailing natural conditions are rough, is great.

Saudi Arabia is a vast country with a total land area of 2.2 million km^2 and enormous stretches of unproductive land separating the agricultural pockets where water resources are the major limiting factor. Hence, there is the need for new techniques which would make better use of the irrigation water, deal with rough climatic conditions, and reduce dependence on hand labor.

The Ministry of Agriculture and Water tried to increase its manpower fivefold between 1970 and 1978 with a fivefold increase in

the number of degree holders. However, there is still a wide gap amounting to about 51% of its manpower needs, which is partly filled by expatriates. In order to eliminate this shortage, the Ministry has adopted the following measures. (a) It is strengthening its vocational training center in Riyadh, which supervises other rural training centers for technical farmers. (b) It has established, in the Eastern Province, a special training center for veterinary assistants, which is now in its second year. Its services are available to the Gulf States and the Arabian peninsula. (c) It is encouraging on-the-job training in its research centers by hiring high level research personnel who act as project leaders with young Saudi graduates as counterparts. (d) In cooperation with other relevant government departments, graduate Ministry staff are sent abroad for postgraduate training. (e) It cooperates with the Ministry of Education in the orientation of its vocational training program at the Bureida Agricultural Training Institute. (f) The Ministry of Agriculture and Water also cooperates with agricultural colleges through direct contact and exchange of views regarding aspects of agricultural development.

However, I believe the following recommendations are basic to improved agricultural education in Saudi Arabia.

I. Agricultural Education in Schools

Teaching elements of agriculture in elementary and middle schools will bring an early understanding of agriculture and respect for the agricultural profession. The inclusion of agriculture as a subject of study in secondary schools will encourage students to pursue higher agricultural education and thus make a career of it.

II. Higher Education in Agriculture

The Ministry of Agriculture and Water is emphasizing the practical orientation of the students of the Faculties of Agriculture and makes available to them the experiment stations where they undergo summer training with the staff. This is very useful and it will be more useful if more time is spent by the students in contact with the farmers and the field.

III. Making Careers in Agriculture More Attractive

As mentioned earlier, the agricultural profession is facing strong competition, especially in Saudi Arabia. The following recommenda-

tions are aimed at providing incentives for young people to accept such a career and stick to it.

A. For Government Employees

1. The salaries of Ministry employees working in the field (research stations, nurseries, etc.) should be increased 25 to 33%.

2. Free housing should be provided for the experiment station staff.

3. Office staff should be encouraged to go on frequent field trips to get fully acquainted with the practical problems the field is facing.

4. Field and office staff should be rotated periodically to remove the "isolation" complex which the field staff develops.

5. There should be periodic evaluations of achievement and outstanding staff members should be rewarded through extra pay or other means.

6. Extra salary payments should be made to those in remote or hardship areas. They should also be given top priority (after spending at least two years in the field) in fellowships and promotion.

7. Proper and satisfactory posts should be guaranteed to those who complete certain training successfully.

B. For All Agricultural Graduates

Top priority in government assistance programs, such as land distribution, should be given to agriculture.

C. For Farmers and Farmers' Sons

1. Some incentive should be paid to the farmers or their sons who join training courses.

2. Arrangements should be made for young farmers to visit abroad for short periods.

IV. Making More Use of New College Graduates and Trainees

The following factors are thought to play a major role in complicating the problem of manpower shortage in the field of agriculture.

1. Most new graduates, whether from foreign or national colleges, prefer to work at Ministry headquarters in Riyadh or in other urban centers close to their families, and many prefer administrative posts. Very few willingly accept positions in the field and in

rural areas where they are most needed. This situation has resulted in serious manpower shortages in agricultural development projects, field stations, and field offices.

2. Many returnees from training have not been placed where they could fully utilize their training, resulting in vacancies in many essential posts and the waste of the training conducted.

In order to remedy the situation, the following is recommended to the Ministry of Agriculture and Water for adoption.

1. Greater emphasis should be placed on field work; new graduates must accept field posts for at least two to three years before they are allowed city or administrative posts in Riyadh or other urban areas.

2. Training courses must be work-oriented. The courses will be tailored in accordance with the job requirements.

3. Upgrading courses should only be given to those employees who, in the Ministry's judgment, can most effectively use these courses for the improvement of their work performance.

4. The training and research centers should be given adequate autonomy and full authority to design and conduct the training in accordance with the needs of the country as defined by the Ministry. The centers should accept only qualified applicants and be in a position to follow up and evaluate the performance of trainees.

This is a very brief review of the role of the Ministry of Agriculture and Water in Riyadh in the field of promoting and encouraging young Saudis to take up agriculture as a career and a profession. It is hoped that the above recommendations, if adopted, will help in this direction. I do sincerely hope also that society in the Middle East as a whole will upgrade its attitude toward agriculture and the agricultural profession.

THE CONTRIBUTIONS OF THE PRIVATE SECTOR TO THE DEVELOPMENT OF AGRICULTURE

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FARMING HAS BEEN, and will remain, the main occupation of the population of the countries of the Middle East. Even though some countries have reduced the importance of agriculture as a factor in national income and have become dependent upon oil, and others like Lebanon have developed various sources of income and thus reduced agriculture to below 15% of the national income, the main mass of the population remains engaged in farming.

The countries of the Middle East are classified as "underdeveloped." The cause and effect of this underdevelopment is what used to be referred to as "primitive agriculture." The development of any country is a function of its government and its people. Each reacts on the other; each may blame the other for underdevelopment. This is another case of the chicken and the egg. It is more explicitly stated in Arabic as:

كما انتم يولى عليكم او كما يولى عليكم هكذا تكونون

"As you are, so will you be governed. As you are governed, so shall you be."

All people are influenced by special institutions; some of these institutions promote development and some are the cause of underdevelopment. What are the institutions involved in agricultural development in the Middle East? In one direction or another, various factors have affected the development of agriculture in the Middle East. I regret that the time allotted for this subject is not sufficient for a comprehensive presentation, and I apologize for concentrating on Lebanon.

Factors Affecting Agricultural Development

Land Ownership. Ownership of land has been primarily feudalistic or communal. Farmers were mainly tenants working for absentee landlords. Now we have come to realize that both tenancy and

feudalism are the plague of agricultural development and of the nation, reducing the mass of the population to serfdom and its elite to indifference and "happy-go-lucky" living. In Lebanon, the main areas of production, the Beka'a valley and Akkar, were under large ownerships operated by small tenants. The only area operated by small farmer-owners was in Mount Lebanon; land ownership by the farmers in this area is the basic institution that has led to the development of this region of Lebanon. In other countries, steps have been vigorously taken to distribute large ownerships among farmers who live and work on the land. Unfortunately, for various reasons, this distribution of property into small farmer-operated units did not prove an effective measure. It came perhaps 50 years too late. Nowadays, agricultural economy demands large-scale production, use of machinery, and capital intensive farming. The small farmer can hardly compete in this age.

There is no need to discuss the social disadvantages of tenancy. Subservience to the landlord, lack of ambition, ignorance, and illiteracy have always been associated with tenancy and have been a detriment to the utilization of human resources and the development of agriculture. The mentality, behavior, and attitude of the absentee landowning class is not a credit to the social system.

Subsistence Farming. Farming small land units has bred poverty in the population. A farmer's ambition was limited to providing his family with subsistence. The soothing proverb, فلاح مكفي سلطان مخفي (a well-provisioned farmer is a sultan in disguise), explains the attitude of farmers. They could never hope to develop their capital and increase their investments. This state of affairs had a silver lining to it. It promoted the Lebanese small farmer who, because of his land ownership, developed pride and ambition, and he migrated to the Americas in search of a better living. His contacts there and the capital that he poured back into Lebanon brought new economic "blood". to agriculture, even though much of it in those days went into "red-tiled roofs" as it is now going into sky-scrapers.

Illiteracy. The low level of education and the lack of educational institutions have been a great deterrent to agricultural development. Even to this day with the recent expansion of education in Lebanon, we note a much higher level of illiteracy than we are willing

to admit. Educational institutions in Lebanon started early, a 10(years ago. This partly explains the difference in the level of devel opment in Lebanon. Private institutions were at the base of educa tion in Lebanon. Governments are taking over, but they need time

The Present Awakening

Such was the infrastructure of agriculture at the dawn of its de velopment. New forces appeared on the scene and modern agricul ture began to take shape. Government was one factor. This is outsid(the scope of the present discussion. The private sector has mad(valuable contributions. The earliest signs of development appeare(in Egypt where government laid the basic structure for cotton de velopment and trade opened a prosperous market. In Syria, th(great agricultural development of the Jezirah area was primarily a function of private enterprise. In Lebanon, private enterprise wa: definitely the predominant factor in production and development The following will give a brief presentation of private endeavo leading to agricultural development.

Trained Personnel

Early in this century, the first generation of foreign-trained young men began to come back from European and American colleges of agriculture. They brought with them the first ideas of modern agriculture. Some of them went into government service; others went into business and other special enterprises. These trained young men were, in their various activities, the first promoters of agricultural development in this country.

Commercial Enterprises

The private commercial sector should be given full credit for its contributions to the development of agriculture in Lebanon. Its activities are outlined as follows.

Fruit-growing Industry. The development of the modern fruit-growing industry in Lebanon had its inception in the presence in the Beirut market in the late 1920s of so-called "California" apples and pears imported by zealous Lebanese merchants from the states of Washington and Oregon! The proper packing of graded fruits and the high price paid willingly by the consumers stimulated the

interest of farmers in new varieties of fruits. The agents of European and American fruit tree nurseries capitalized on this new interest and toured the country with their colored catalogues promoting new varieties. Farmers began vying with each other for the number of different fruit varieties they could grow in their orchards, until finally the Golden Delicious and the Double-Red Delicious apples dominated the market.

It should be noted that, at the beginning of this development, the Tanayel nurseries and farm in the Beka'a valley, as well as several private nurseries, were responsible for the promotion of fruit growing in Lebanon. For sustaining this development in fruit growing, credit should go to the suppliers of necessary inputs (which will be discussed later), the establishment of cold storage, and modern packing plants.

The increased production of fresh fruits in Lebanon in the early 1930s necessitated the building of cold stores. Merchants met this need by building dozens of cold stores all over the country, together with packing plants. Merchants opened up new markets in Europe and the Arab countries and introduced cooled transport facilities for use across the desert.

The fruit-canning and -processing industry was developed in the face of serious difficulties. The high cost of land and labor, the extensive fresh fruit market available in Lebanon and other Arab countries, and the resulting high price of fresh fruit did not encourage the development of a strong agro-industry. Yet, two important fruit-canning establishments serviced the industry successfully. Moreover, the introduction by merchants and farmers of special varieties of grapes and the use of European production technology have established an important Lebanese wine industry which compares most favorably with the world's best.

Poultry Industry. The tremendous development of the poultry industry in Lebanon over a period of some 20 years has made chicken the food of the poor man all over Lebanon and at the same time supplied the egg and broiler market in several countries of the Middle East. Credit for this development should be shared by the Institute of Agricultural Research, which provided the necessary veterinary protection (vaccines, etc.), the Point IV experts, and the wide-awake poultry producers.

The poultry producers learned and practiced the secrets of the poultry industry in the most modern way. The industry followed early in its history the lines of specialization which led to its success. Poultry farms specialized in different lines of production: day-old chicks, eggs, and broilers. These merchant-poultry keepers imported pedigree stock from the best known firms in the world. Merchants also specialized in the poultry feed industry and assured the supply of balanced feedstuff. The egg-marketing cooperative established in the Beka'a valley has been instrumental in keeping the market open and well organized for the proper distribution of eggs. Without this cooperative action, the egg industry would have faced many difficulties.

Supply of Inputs and Services. The commercial sector has contributed greatly, and in various fields, to the development of agriculture in this country.

1. First, it should be brought out in this institution of higher education that the business sector in Lebanon has opened up an important field of employment for graduates in agriculture. These young men with much knowledge and little practical experience have been offered the opportunity of employment by the several commercial firms dealing in farm supplies, and as employees of these firms they have been instrumental in introducing better farm practices to Lebanese agriculture. Many of them have established their own firms and are now operating on a large scale in the service of agriculture.

2. Chemical fertilizers constitute at present an important item of input in Lebanese agriculture. Production of this input was begun by the commercial sector after World War I. Farmers at first were very negative about the use of chemical fertilizers, saying that they "burned" the soil and produced fruit with no taste. With the continued efforts of businessmen and their agents, chemical fertilizers are now an established item on farms. Even newer generations of fertilizers like microbial fertilizers, slow-release fertilizers, and foliar fertilizers (applied by spraying) are being used in this country as a result of the efforts of businessmen. Our per-hectare global use of fertilizers is above that of any of our neighbors.

3. The tractor, which in the early days was rejected by farmers because it did not "inject the soil with the breath of oxen," is now the common, and in some places, the only implement in use for

tilling the land. Its introduction in the Beka'a valley in the early 1920s by commercial firms has contributed much to the opening up of new land with savings in cost and an increase in returns. The small walking tractor is now being introduced to the narrow terraced land on the mountain slopes. The rocky untilled land is now being opened up by bulldozers. Repair shops for tractors have been established by trained mechanics in areas where there is need for them, and this has been a great support for the introduction of farm machinery.

4. Dealers in insecticides and fungicides introduced the early chemicals that were in use for the control of insects and plant diseases. This has permitted Lebanese farmers to produce the sound fruits and vegetables that are required by the export trade. With the tremendous development of the pesticide industry in post-World War II, pesticide importers representing almost all the major manufacturers in the world became heavily engaged in testing and promoting the various new chemicals. This involved not only selling the pesticide, but also, and mainly, teaching farmers the methods and time of application and the related life history of the pest. The newest generations of pyrethroids and systemics are being sold in our market.

In recent years, herbicides have been introduced and many farmers are being taught to use them to get rid of weeds, rather than weeding by hand or by plowing. Now we are not afraid to propose non-tilled farming. Already several farmers have accepted the idea and many citrus and olive groves and vineyards go untilled. The high cost of labor is permitting merchants to push ahead with the use of herbicides. Spraying machinery from the simplest knapsack type to the present mist blower is being introduced by businessmen in the service of agriculture.

5. Just as the fruit industry was pushed ahead on the road of development by the use of new varieties, so was the vegetable industry advanced by the introduction of pedigree seed, imported through the efforts of the private sector. Importers of new seed had to go through long trial periods before successfully introducing a new variety. The competition in this field has given the farmer a choice of different varieties of vegetables with high production, more resistance to disease, and better adaptation to transport.

It should be stated in this regard that some of our native varieties

excel in taste. These require some local breeding for uniformity and higher production per hectare. Naturally, the businessman cannot enter this field; he can only promote a finished product. Lebanon is specially endowed with a climate of cool summer weather which is essential for breeding purposes. Isolated villages in the valleys among high mountains can be very useful for producing pure stocks of seed. Businessmen welcome the cooperation of government and educational institutions in the development of the plant-breeding industry in Lebanon.

6. A new agricultural development in Lebanon is the establishment of greenhouses for vegetable and flower production. This is a very promising enterprise which will provide off-season production for local consumption and export trade. The system is developing at a steady pace. It is being guided by experts in the business sector. The hydroponic system (soilless agriculture) has also been successfully introduced in Lebanon by the private sector. This system could have a place on the otherwise barren rocky areas of Lebanon. We should not be surprised to see this system invading the roofs of our house in the near future.

7. Water has always been a limiting factor in agricultural development. The small springs throughout the country are being used for irrigation. Villages on the mountain slopes have historically developed around small springs. The fruit- and vegetable-growing industries are also centered around such springs. Rain-fed crops such as cereals, grapes, and olives are grown on unirrigated land. Obviously, the use of water greatly increases production. Shortly before World War I, private enterprise developed an extensive irrigation system with the waters of Nahr Ibrahim (Abraham River). Vast areas of former wasteland produced vegetables, citrus fruits, and bananas. Again, private enterprise introduced drilling equipment, and dozens of deep wells were established in the Beka'a and along the coast, thus contributing to increased production from land under irrigation. It should also be stated in this regard that a lot of our irrigation water is lost, although the farmer has an urgent need for it. Such is the case, for example, with the source of Al-Assi (Orontes River). The development of this irrigation network is beyond the responsibility of the private sector. This and a few other irrigation development projects are still awaiting the efforts of the public sector.

8. The activities of the agricultural commercial sector have not been limited to the sale or provision of agricultural materials. It has been to the mutual advantage of farmers and merchants alike for the private sector to provide advisory services as well. Thus, dealers have been available for consultation on problems facing individual farmers. Farmers sought advice and it was freely given to them. Demonstrations were held on farms in various districts when farmers needed the proof provided by a demonstration to accept a new practice. Also, bulletins on specific and practical subjects were produced to teach farmers about new practices. In general, the advisory services of the commercial sector have contributed greatly to the development of agriculture in this country.

Besides this brief statement, I would like to make the following points. Agriculture in Lebanon is no longer the jobless people's job, as is unfortunately the case in many countries of the world. The Lebanese farmer is aware of his responsibility in contributing to food production and he is now doing his best to fulfill this national and international duty. It is imperative to provide farmers, wherever they are in the world, with the necessary "know-how" and aid to enable them to cultivate to the best of their capabilities the lands they are responsible for, to earn a decent living, and to produce food for those who need it.

PLANNING FOR MEETING BASIC FOOD-NUTRITION NEEDS AND AGRICULTURAL DEVELOPMENT

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BY AND LARGE, agriculture is the basic sector of the economy of the region. The place of food and nutrition in agricultural development planning is fully recognized, and an increase in agricultural production, particularly of food grains, is generally an economic and political necessity.

While agriculture is the basic sector of the economy, it is also a problem sector for several reasons. First, there are a large number of farmers cultivating small and uneconomic holdings of varying sizes. Their decisions are dependent upon their attitude toward economic progress, which is governed in large part by the socio-economic environment surrounding the rural population. The second problem peculiar to the sector arises from its dependence on nature. Natural calamities such as floods, droughts, etc. often upset agricultural production. Third, the seasonal demand for labor makes it difficult to shift workers from other occupations. This imposes the dual problem of finding systems of farming with more steady labor requirements and of usefully engaging the underemployed farm labor during the slack periods.

The extent of food and nutrition problems and their present and future effects on the economic potential of the region demand two basic approaches – global planning and specific programing, the objective of which is improvement of the food and nutrition situation through increasing and restructuring the food supply, regulating food prices, effecting measures for food distribution to low-income households, education and training, and nutritional interventions such as food supplements.

To achieve these objectives, the following measures could be adopted:

1. The food supply model should be elaborated on the basis of consumption targets, which can be derived by taking into consideration demand projecting and the nutrition targets in commodities.

2. The control of food prices should reflect the natural price increase and its limitations.
3. Global food distribution measures for low-income households are necessary. This can be done through rationing.
4. Nutrition education, particularly of women and schoolchildren, is necessary. The training in food technology and nutrition of agriculturists, medical and para-medical staff, and teachers, as well as the education of farmers as food producers, are prerequisites for proper implementation of planned measures.
5. Nutritional intervention in the form of fortification, food supplements, etc. should be implemented.

DISCUSSION SUMMARY

The discussion was mainly concerned with the necessity for making students of agriculture aware of the basic food and nutrition needs of this region. It was emphasized that agricultural development, which is the main occupation of agriculture graduates, cannot be achieved unless these needs are met. It was pointed out that studies and surveys should be carried out continuously to define the nutritional status of the population and recommend remedies for any existing problems. It was concluded that higher agricultural education should be deeply concerned with these issues.

AGRICULTURAL EXTENSION

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AGRICULTURAL EXTENSION was brought to the foreground of agricultural development in post-World War II years throughthe efforts and high-powered promotion of the Point IV Program and the Food and Agriculture Organization of the United Nations (FAO). No branch of rural development has received such intensive promotion as agricultural extension. Throughout the world, foreign assistance programs have found extension a good entree to the masses.

As a new activity in the developing world, agricultural extension appealed both to governments and to the general rural population. Extension services mushroomed wherever the Point IV Program or FAO was in operation. For over 25 years agricultural extension has been an integral part of the agriculture ministries of more than 80% of Third World countries. Hundreds of regional and national meetings on agricultural extension have been held. Training centers have been organized for technicians of various levels. Experts have presented detailed explanations of extension organization and programing, including holding meetings preparing reports, conducting method and result demonstrations, developing and operating audio-visual aids, and other professional duties.

Agricultural extension services are vital to the mechanism for agricultural development. Have these services made a sufficient contribution to agricultural development? In my opinion, there is hardly an extension service in the Arab World worthy of the name. Yet, little criticism has been leveled at these new government departments.

It is hoped that delegates at this conference will forego the usual "country reports" on extension activities and will focus instead on the root causes of the failure of agricultural development. We need to open our eyes to the real problems underlying the organization and operation of extension services. This reappraisal could lead to regional meetings to consider how to deal with these problems.

AGRICULTURAL EXTENSION: ITS ROLE IN THE AGRICULTURAL DEVELOPMENT OF MIDDLE EASTERN COUNTRIES

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AGRICULTURAL DEVELOPMENT is a broad concept which lends itself to many definitions. For the purpose of this paper, it is defined as the process of producing, distributing, processing, and marketing agricultural products more efficiently to raise the farmers' economic and social levels. This definition implies an increase in both the quality and yield of crops per unit area. Such an increase can only be realized if certain agricultural requirements are met and certain agricultural services are available.

A significant increase in the quality and quantity of agricultural production in the world has resulted from the adoption of advanced technology in agriculture. Several studies [1,2] reveal that higher annual income and efficient farm production are associated with the farmer's degree of innovation and his response to change.

Human beings are naturally endowed with the power to change themselves mentally and their environment physically. They have the ability to learn new attitudes and skills, to reason, to judge, to make decisions, and to construct or alter their physical surroundings. Changes in the mind of man always precede changes in his actions. To act, people must first change their level of knowledge, their beliefs, and their practical abilities. These changes must result from the people's own decisions and efforts if the changes are to be enduring educationally, sound socially, viable economically, and permanent physically.

The pace of the desirable change could be catalyzed or enhanced if human endeavors were well organized and carefully planned. In this respect, agriculture extension is important as a discipline or an institution which helps its clientele to achieve their goals in the easiest, most efficient, and most practical way.

The traditional role of agricultural extension was the dissemination of information, i.e. to provide farmers with new scientific findings and technology. In other words, the original task of agricultural

extension was to help rural families apply scientific methods. But agricultural extension must be more comprehensive than just a vehicle for more agricultural products. It has to encompass two main domains: personal growth and boosting of agricultural production.

Personal Growth

Freire[3] wrote that if extension workers limit themselves to a simple form of training, they can, in certain circumstances, obtain a better output. However, they will contribute nothing, or nearly nothing, to the development of peasants as people. Thus, along the same line, agricultural extension must not only deal with "how" but also "why." It has to teach its clientele "how to think" and not "what to think."

If we believe that human beings are naturally endowed with the power to change themselves mentally and their environment physically, how can agricultural extension, as an educational institution, help in developing such power? Every human being possesses individuality and the power to think and to act. It is the function of true education to develop this potential. Therefore. without some kind of education, this power cannot be developed and personal growth in its broadest sense will be hard to achieve.

Unfortunately, most, if not all, farmers in the Middle East are illiterate. This phenomenon is a common one in all developing countries. To achieve personal growth and increase in production, this sector of society has to be provided with some kind of education. They have to compensate for what they have missed; agricultural extension could serve this purpose. In fact, the notion of continuing education and qualifying oneself is well rooted in Islamic and Christian teachings. But what role does education have?There is no doubt that literacy in general has a key role in the development process. It provides both general and specific benefits; it broadens the range of contact and expands the range of stimuli to which an individual is exposed.

Education is used here in its broadest sense as perceived experiences which lead to a change in future behavior patterns, both as overt action and as cognition, reflection, and other mental processes.[4] It is the process through which knowledge is transmitted to or acquired by learners. Learning involves a change in human be-

havior and therefore is crucial to individual and national economic growth. Education transcends cultural limits and prohibitions. It widens the scope for decision making because it broadens the individual's notions of the "possible." It stimulates motivation and enables the individual to think through his problems rationally and not merely accept them as unchangeable situations.

Different writers have different attitudes toward education. Mosher[5] considers it as an accelerator of agricultural development. He defines an accelerator as something important but not indispensable, i.e. agricultural development can happen without one or more of the accelerators. Continuous learning is certainly an essential and not just an accelerator. Essentials are those inputs which directly result in or promote efficient and economic production, processing, distribution, and marketing of agricultural products.

Education stimulates the farmer's curiosity, increasing his chances of discovering new knowledge about the operations of his own farm with its unique combination of resources. It influences the choice of values or goals which the individual makes and, thereby, the activities which he pursues to secure those goals. Most important, education provides a wide variety of different *alternatives*. Being aware of these alternatives will improve the farmer's chances of making rational decisions. Galjart[6] suggests that the individual farmer resists the adoption of new ideas or practices because of ignorance, inability, and unwillingness. According to Galjart, a farmer is ignorant when he does not know what he can do other than what he is currently doing; a farmer is unable when he knows what he can do but he cannot do it for financial or other reasons: and he is unwilling when he fails to adopt a new practice with which he is familiar because of certain values and attitudes. Therefore, education plays a central role in mitigating the ignorance of farmers and encouraging positive attitudes toward new practices. It is thus essential for all people at all ages. With a changing technology, people need continuing education to provide them with the appropriate technical competence to deal with new situations. Farmers' abilities and the decisions they make about their farming operations are crucial to the rate of agricultural development. Therefore, special programs designed to facilitate the education of the farmer are an important phase of development.

Studies[7,8] have shown that there is a direct relationship betweeen

a farmer's education and his exposure to different sources of information, his familiarity with agricultural agencies, his contact with extension services, his ability to make decisions, the rate at which he adopts new technology, his level of annual income, and his participation in community programs. For example, not one of the 25 major wheat-producing countries with a low level of literacy was able to raise yield significantly.[9] Countries making the most progress in raising yields were, in general, those which had near universal literacy. These results confirm the belief that education and training have an important role to play in agricultural development. This is true for both developing and developed nations of the world.

Educated farmers usually get in contact with universities, extension services, and other agencies. They look for new technology, innovations, and sources of information to aid them in decision making. Education is also important for farmers' spouses, since they are usually involved in the farm decision making. It was found that low income farmers' spouses in Wisconsin have less education than high income farmers' spouses. Their lack of education will prevent them from contributing to sound decision making.

Moreover, a farmer is affected by his community in many ways. If his neighbors with farms similar to his own resist technological changes, he will be influenced to reject innovations. On the other hand, if he sees the success of new techniques and methods on his neighbors' farms, he will be encouraged to adopt these innovations. This is the basis for the role of opinion leaders in influencing small farmers to have contacts with agencies outside their community, such as the extension service. Agricultural extension could serve the farmer himself, his family, and his community at the same time. But how can we have an effective educational program?

According to Mosher,[5] any effective farmer's education program should have the following eight characteristics:

1. Such programs must go to farmers where they are working and living. In most places the primary occupation of adult farmers is farming. As a consequence, farmers' education for development must go to them on their farms and in their homes.

2. These programs must be specific to farmers' present interests and needs. They must contain topics in which farmers are already interested, such as how to increase the margin between cost and

returns and how to improve the quality of living for their own families in their own communities. This view is shared by Knowles.[10] In his book, *The Modern Practice of Adult Education: Andragogy versus Pedagogy*, Knowles emphasizes that adults tend to have a perspective of immediacy of application toward most of their learning. They engage in learning largely in response to pressures they feel from their current life situation. To adults, education is the process of improving their ability to deal with problems they face now. They tend, therefore, to enter an educational activity in a problem-centered frame of mind. This applies particularly to small farmers.

3. These programs must respect the fact that farmers are adults. Adults usually feel that they are already supposed to know whatever their occupation demands. The mistakes which farmers make are not hidden in the classroom or the laboratory. Instead they take place in full sight of family members and neighbors. Moreover, the rewards of learning may be delayed for weeks or months until the results of applying new knowledge and skills are reflected in greater agricultural production. For these reasons adult education must be quite different from that of the young. This idea is supported by Knowles who emphasizes the use of different techniques, methods, and learning experiences for adults.

4. Extension activities must be scheduled when farmers are not too busy. This involves brief visits to farmers individually while they are on their farms and occasional meetings with groups of farmers at a time of day or night when they are not in their fields or during off-season, when their work load is light.

5. The unit of instruction for teaching and learning must, in most cases, be a particular new or changed practice. In schools and colleges, education is organized around general subjects, but most farmer education for development needs to be organized around specific new or changed practices of agricultural production. What is the new practice? Why is it superior? How can it be carried out? There are some exceptions to this rule. A farmer who has not received formal education may need brief systematic periods of instruction for these specialized skills of farm management, such as planning farm operations, marketing, and administrating cooperative societies. Short courses in machinery operation and maintenance have been used effectively in Nigeria, Greece, Colombia, and other places.[5]

6. Educational programs must be accompanied by immediate opportunities for farmers to try out the newly taught methods. This involves both the timeliness of teaching and the availability of supplies and equipment necessary to put it into practice.

7. Each new or changed practice must be technically sound and economically profitable. To make certain that this need is met, it is always desirable to run local trials to determine what the results would be if nearby farmers adopted the practice. Careful calculations must be made to ensure that returns from the new method will exceed its cost by a substantial amount.

8. Farmers need encouragement to experiment. The farmer who has acquired new knowledge and skills still has to have considerable courage to try a new method for the first time. To reinforce his desire to experiment, he needs the personal support of a friend who will encourage him. Here an extension worker can play an important role. "Trying out" is an important part of farmers' education for development. This step is usually easier if he has a teacher or a skilled friend to support him.

Mosher[5] points out that the role of extension education is to deliver the results of agricultural research to farmers. However, another important dimension of this role is to make farmers aware of the opportunities, alternatives, and methods that are available to them in specific situations. Farmers should be taught to become problem-solving-oriented. This approach supports the notion of clientele involvement in designing and implementing educational programs to provide them with the learning opportunities and skills in problem-solving techniques. Thus, the extension worker has the role of an "encouraging friend" to farmers who would like to try new methods. For education to play its role in agricultural development, it must strive to develop inquiring minds, confidence in problem solving, and scientific habits of thought and action. This education is equally important for farmers on their farms and for technicians and administrators in every activity related to agriculture. Agricultural development requires that people should develop new skills and master new knowledge throughout their careers.

Boosting of Agricultural Development

At current compound rates of growth, world population is projected to double in less than 35 years. World population took 1,500

years to double from the advent of the Christian era to the year 1600. It took three more centuries, from 1600 to 1900, to triple to 1.5 billion people. But at current rates of increase, it will double again in 35 years. In 1973 it reached an estimated 3.8 billion[11]; in 2000 it is projected to be 8 billion.

An increase in population demands an increase in food production. Unfortunately, our resources are limited, particularly cultivable land, and this necessitates efficient use. Food prices are going up steadily, and in some countries certain foods are not available or extremely scarce.

Although the rate of food production has increased, there was a decline in this rate on a global level in 1972 and in developing countries in 1961 and 1969, as well as 1972.[11] World population rose to a total of 69%, based on trend values, over this same period, 65% in developed countries and 75% in developing countries. World food production increased faster than population: the trend rate of increase was 2.8% for production and 2.0% for population, resulting in an increase in world per-capita food production of 0.8%.[11] However, two factors have to be considered: product distribution and the difference in population growth rate.

The rate of population growth in developing countries in general and the Middle East countries in particular is faster than the increase in food production. In Middle East countries, the increased demand for food is generated by an increase in both population and income growth rates. This leads to importation of food from other producing countries. For example, in the four years from 1972 to 1974, grain importation by North Africa and the Middle East was 9.2, 11.9, 8.1, and 14.9 million metric tons, respectively.[11]

These figures show how much we depend on other producing countries to provide us with these food commodities. The crucial point then is what will happen if food commodities are used as political leverage in international relations. It certainly has been an effective weapon whenever it was used. This point urges the launching of a self-sufficiency program for Middle East countries. Such a program would help them keep their sovereignty as well as eradicate world hunger.

Our Potential

Generally, Middle East countries could be categorized as follows: countries with unexploited potential, e.g. Sudan, where only about 20% of its fertile land is used, and countries that are not producing enough food to keep up with the demand, but are able to afford imports, e.g. OPEC countries. The agriculture of food production in many of the OPEC countries is either declining or has failed to keep pace with population growth. Yet, these countries are experiencing relatively rapid growth rates in per-capita gross domestic product (GDP) and have reserves in foreign exchange.

A comparable situation exists for countries experiencing favorable prices for exporting raw materials other than oil.[11] This tremendous potential would help us to achieve our objectives if we consider the human factor as an indispensable element for agricultural development. This is where agricultural extension can play its role as a vehicle of desirable change. It is the process of all pervasive change in the knowledge, skills, attitudes, and motivation of the rural society.

Extension as a Source of Motivation

The fundamental benefits of knowledge lie in its use or application, the development of the individual to serve society, and the development of society itself. How then can we as extensionists motivate people to produce the best of their abilities?

A continuous source of motives and incentives could be found by deriving the philosophy of agricultural extension from our ultimate philosophy of life, from which our behavior stems and receives all its aspiration, vigor, and power. We need to realize that the introduction of technological change in a particular society necessarily calls for support from the ultimate revelation or ideological philosophy of life. Hussain[12] expressed it well by saying, "In agricultural extension, philosophy of life has a central place and is an absolute necessity; it not only determines the working pattern of extension but also keeps that pattern internally integrated and thus sustains its spirit." Thus, by focusing agricultural activities on ultimate ideals, goals, and values, life becomes profoundly purposeful, meaningful, and really enjoyable. "The process of agriculture, i.e. the production of food, fiber and fuel, in sufficient quantity and

of appropriate quality, must not be considered as an end in itself," said Ligutti,[12] "but a means to more important ends, i.e. (i) the full development of man's total personality in the process of production and (ii) the satisfying of personal and family needs for a good life in the fullest sense."

The farmers' activities and their relation to motivation form an integrated pattern. Our task as extensionists is to discover this pattern and to work from within by changing the core elements of this pattern. Unfortunately, so far, the "core elements" of extension philosophy have remained inactivated in our Middle East countries. This results in the lack of enthusiasm and dynamism that characterizes progressive countries.

Dynamic changes in motivation and attitude are only possible within the framework of the particular philosophy by which a people live, in the form of its ideals, beliefs, and values. We as Muslims and Christians could derive our powerful motives and incentives from Islam in its totality as a comprehensive religion (deen) and from Christianity. It has been emphasized that no one is too little to be considered and no one is too big to be indispensable. As such, farmers have to feel that they are important members of society and that they contribute to the development and welfare of their countries as responsible citizens. If agricultural production is an important national goal, farmers deserve public recognition when they have worked hard to realize agricultural development. This public recognition is another driving force in the achievement of increased production and self-satisfaction. It is not by any means a substitute for economic incentive, but it is certainly another source of motivation.

Suggestions

Certain problems are facing agricultural extension in the Middle East, some of which might be solved by adopting the following suggestions.

1. Many programs are taking place in the rural areas. They are either concerned with agricultural development or with community development in general. To avoid duplication and to use our limited resources efficiently, some coordination between these different programs should take place. Therefore, I would suggest an integrated approach to development.

2. A lot of research has been done and good results have been obtained, yet these results are still undisseminated or not used. This might be due to the lack of an official link between the agricultural extension service on the one hand and the research stations, universities, and related institutions on the other. If some kind of link were established, it might help immeasureably.

3. Extension agents have been handicapped for many reasons, such as lack of facilities, equipment, and transportation, shortage of staff, etc. Moreover, in the matter of promotions, training, and status, the extension agent is not as well treated as his colleagues in other jobs. This leads to dissatisfaction, frustration, and low morale which affect performance.

4. Recruitment of extension agents must be carried out according to certain criteria among which is the readiness to live in rural areas. Thus, we need someone who believes strongly in the mission and will devote his or her mental faculties, energy, and time in the service of the rural community. Otherwise, we may recruit an employee whose chances of getting another job are remote and for this reason accepts work as an extension agent.

5. The job description of the extension agent has never been spelled out clearly nor have extension objectives been stated specifically. This leads to confusion and failure to achieve our goals.

6. Some of us may believe that the investment priority at this stage has to be directed to other areas. However, based on various research, human investment has proven to be more rewarding. Therefore, we have to give this service the funds that will allow it to play its role.

These are some of the points I would like to raise. I have the feeling that if they are taken into consideration they may help us to have an effective extension service playing an important role in agricultural development.

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DISCUSSION SUMMARY

Agricultural development is the process of producing and marketing agricultural products. Human beings are vital to this development process. Progress results not only from advanced technology but also from changes in the minds and attitudes of people.

Extension is the medium though which government influences the rural population. While primarily concerned with dissemination of technical information, the extension service contributes to personal growth through continuing adult education. This helps the farmer to make rational choices and to be more receptive to new technologies. The role of extension in raising the farmer's image and achieving public recognition for the agricultural profession is also important. Despite the vast potential of extension as an agent of change and the effort which has been expended in training extension workers, its impact is still quite limited.

The following concerns were identified by the participants: (a) lack of integration and coordination among the various programs in rural areas; (b) poor dissemination of research findings; (c) shortage of staff, inadequate facilities, and unsatisfactory salary and promotion structure; (d) unwillingness of recruits to live in rural areas; (e) unclear job descriptions; and (f) the lack of investment in human resource development.

Besides recommendations inherent in these concerns, other suggestions were made. Extension should focus on community development rather than the traditional agricultural approach. The need for women in extension was stressed. Decisions regarding extension should be made at the level where they are implemented, with greater farmer participation in establishing the goals of extension. Bureaucratic "red tape" was voiced as a major obstacle to the effectiveness of extension work in the Middle East. It was stressed that extension should be an important function of the university.

AGRICULTURAL AND RURAL DEVELOPMENT: ISSUES AND STRATEGIES

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THE ORGANIZING COMMITTEE for this conference decided it should not be a "standard brand" type of conference. First, it should be a "working conference" where many in the audience would be as qualified to present the papers as those asked to do the job. Therefore, the people presenting papers or remarks were not necessarily expected to provide "answers," but rather to set the stage for meaningful discussion among equals. Second, the Planning Committee envisioned that the major benefits from the conference would accrue when each participant returned home and began doing things in a slightly, or perhaps even drastically, different way. In every sense of the term, it was to be a "working conference." The remarks which follow (Endnote 1) are made in the spirit of the conference.

Issue I: What Is the Proper Role of Agriculturists in the Development of the Middle East?

An issue of vital importance for all in the Middle East who are interested in food and agriculture is implicit in the title of the conference, i.e. the role of agriculture, hence agriculturists, in the development of the region. In confronting this issue, several vital questions surface, such as whether agriculturists should concern themselves with *all* of the people of the region meeting their basic food and nutrition needs or should they limit themselves to, say, the production aspects of crops and livestock, i.e. the "social junk." Do agriculturists need to do things *differently* or is what they have been doing over the years satisfactory, only *more* of it needs to be done?

One practical way to cast light on these vital questions is to review the record of the past quarter century. If the record is satisfactory, there is no need for change in either agriculturists' concerns (orientation) or in what they are doing. If the record is not good, then an in-depth review is needed and agriculturists probably must revise their self-perception.

The Record. During the past 25 years, major emphasis in agricultural development in the Third World has been on attempting to increase production, mainly by better management of the natural resource base. Emphasis has been on ways to increase yields per hectare and produce more food and fiber under the assumption that national "food problems" were largely a matter of a general shortage in the supply of food. It was further assumed that increased production would solve both nutritional and rural poverty problems which have long been recognized as serious.

The countries in the Middle East (Endnote 2) region, which I shall hereafter refer to as "our region," generally have pursued policies and strategies very similar to those typical of Third World countries.[2] There are, of course, some country by country differences, but a review I did of the agriculture sector segments of National Plans a few years ago revealed the general thrusts of policies and strategies to be strikingly similar.

If we assume the goals for the agriculture sectors of our region have been simply "to increase production," we have done fairly well. But if the goals were to provide reasonable access for *all* people to the most basic of human needs, namely food, then the policies and strategies pursued by most of the countries in our region during the past quarter century cannot be regarded as successful. We may conclude that while some aspects of the developmental pattern of the past 25 years in our region are favorable, food and proper nutrition remain a particularly troublesome basic need in most countries and the situation is generally deteriorating.

Let us turn to the data which support the above conclusion. According to a recent report from the Food and Agriculture Organization of the United Nations (FAO), the trend in the Near East's self-sufficiency ratio (ability to feed itself from internal sources) declined from approximately 94 in 1961 to 91 in 1975. From among the UN list of 75 developing countries with populations of one million or more, 13 are in the broad definition of the "Middle East" I am using, and in only three of these was the calorie supply during the 1972-1974 period equal to or greater than minimum basic requirements. (The three were Turkey, 112%; Egypt, 105%; and Syria, 102%.) Countries with 90% or less included Jordan, 90%; Sudan, 88%; Yemen Democratic Republic, 85%; Bangladesh, 84%; Somalia, 83%; Afghanistan, 82%; and Yemen Arab Republic, 82% (Endnote 3).

Data prepared by FAO for the World Conference on Agrarian Reform and Rural Development show food production per capita in the Near East increasing by 0.3% annually between the average for 1961-1965 and 1970 and by 1.4% between 1970 and 1976. The Near East had the highest rate of growth for the developing countries in any major region, but the growth still feli far short of what was needed to make much of a dent in the serious under- and malnourishment which existed. Selected FAO reports indicate that about 16% of the people in the Near East have energy intakes below *critical* levels. In the poorer countries of the Near East and Middle East, the percentage below critical levels is at least double the average for the Near East.

The emerging income distribution pattern in our region is a cause for concern. Recent International Labor Organization (ILO) studies which include several Near and Middle East countries note that in the past decade there has been a clear trend toward increased incidence of insufficient income to meet minimum needs in terms of calorie requirements; even more disturbing, the rate of economic growth has not been positively related to reduction in this incidence.[3]

Director General Saouma of the FAO summarized the situation for part of our region in the following way.[4] "In the Near East Region one third of the people have diets which are inadequate in protein and energy. Food production has failed to keep pace with population growth, food imports are increasing, and the situation will get worse unless positive action is taken."

Conclusion. I suggest that in our region the food-nutrition problem is so serious that we agriculturists really have no choice in whether or not we concern ourselves with *all* people meeting their food-nutrition needs. To *not* be concerned, i.e. to say the problem is a "poverty problem" or a "social problem" beyond our domain, is socially irresponsible, and to persist in being mainly production-increasing oriented will eventually get agriculturists branded as people not attuned to reality. We agriculturists must be *need-oriented* and not simply concerned with production.

Issue II: How Are We to Solve the Critical Problems Associated with *All* People Having Reasonable Access to Their Basic Food-Nutrition Needs?

First, we must recognize that "doing the same old thing," only

more of it or doing it faster, is *not* what is needed. With the possible exception of a few oil-rich countries, the government budget and the administrative-managerial resources available are simply not adequate to solve the food-nutrition problem using the approaches which have been in vogue during the past 25 years. Neither can we assume that national policies which attempt to achieve maximum economic growth with equity are the answer. Experience to date indicates that growth with equity policies do not lead to the development of institutions that will deliver the needed goods and services to the bulk of the people. New, or at least revised, policies and strategies are required, and agriculturists and food scientists must take a deeper interest in them. We cannot expect to contribute much to the development of our region if we operate only on the periphery of the total development planning and policy process.

Second, we need to determine whether the Middle East's developmental environment is, as sometimes it is said to be, so different from the rest of the Third World's because of oil wealth. Careful scrutiny of the situation reveals it is not. There are a few Middle Eastern countries where, as a result of the exploitation of naturally endowed minerals, capital is plentiful and labor is scarce. However, the nations in which the vast majority of Middle Easterners live are terribly poor, and they differ little from the balance of the developing world. Also, in large areas of oil-producing countries the impact from oil riches is not felt by many people. Iran is a good illustration. Oil wealth has meant relatively little to the typical Iranian, especially in the rural areas.

Third, we need to evaluate the "basic human needs" (BHN) approach carefully and determine its applicability. What is called the "basic services" (or "basic human needs") approach has been receiving much attention in the past two years, and there are many people in international development circles who feel it is the answer to the Third World's needs. It was in response to the disturbing situation faced in the Third World, including most of the Middle East, that the UN General Assembly in 1976 passed two resolutions explicitly urging developing countries to incorporate the "basic services" concept and approach into their national development plans and strategies and asking the international community to offer increased assistance along those lines. Since then, the World Bank (IBRD), the Organization for Economic Development Cooperation

(OEDC), and the UN "family" of organizations have been encouraging developing countries to make BHN the hard core of their development strategies. The "right to food" resolutions, with which agriculturists are likely to be familiar, are a fitting part of the BHN strategy (Endnote 4).

I find it interesting to note that encouragement from the prestigious UN and other organizations has *not* to date led to developing countries accepting the new approach at a very rapid rate or making major revisions in their plans and strategies. In the Middle East region, only one nation has made a major shift toward the BHN strategy, but a few others are leaning in its direction. Most countries are proceeding with caution, and I am aware that a few developing countries' leaders are even hostile to the new BHN approach. Why?

Perhaps the major reason for developing countries' caution concerning BHN is the considerable confusion about what the approach really means. Its proponents are not in agreement except on generalities, and at this time about all that can be said is that the BHN approach calls for the provision, through income generation, transfers, and public services, of a basic human needs bundle of services to the populace. How the bundle is to be produced and delivered, let alone be paid for, is not specified, hence it is open to controversy. There is no tested prescription for a developing country to follow.

In addition to the confusion concerning the application of the BHN approach, its long-run economic viability is frequently questioned by those responsible for paying the bill, and, I suggest, quite properly so. Many planning agencies and ministries of finance in developing countries fear that the use of the BHN approach will generate demand for governmental services beyond what the country can afford to deliver.

Conclusion. I agree with the many planning agency leaders and ministers of finance that the BHN approach has moved from an abstract concept to a policy issue before it has reached a stage of conceptualization which logically permits its rational adoption. It is not a "ready-made answer" for the Third World or for our region.

From the viewpoint of how best to solve food-nutrition problems in our region, I suggest that at least partial answers to the major unanswered questions associated with the BHN approach are to be found in an examination of *who* is hunger-prone (and probably

not getting adequate health care either). Various studies and careful observation indicate that the people most susceptible to famine, under-, and malnutrition are (a) rural residents with inadequate agricultural resources and (b) recent, poor migrants to the cities from the rural areas. Famine and poor nourishment are thus largely *agri-rural-based.*

Five terms are critical in highlighting the food-nutrition situation in the Middle East. They are majority, low productivity, low income, poor access, and inadequate technical and managerial skills.

1. The *majority* of the people are still dependent upon agriculture for a livelihood, and the majority within that majority are in the quasi-subsistence sub-sectors (Endnote 5).

2. *Low productivity* of the human resource is the core problem. In agriculture in general and the quasi-subsistence sub-sector in particular, a family head and the other members of the family traditionally labor for many days to produce, or earn, a very small quantity of product, most of which is consumed by the family, with little left over for improving life quality. The urbanite on the thin edge of survival is little defferent from the country cousin: both breadwinners are either not very productive or are searching for jobs where few exist, hence are unproductive.

3. *Low income*, i.e. people living in poverty, is a fact of life for the majority of the people. People who are *not productive*, whether in rural or urban areas, simply cannot afford to pay for their basic food needs. Since there are so many people in this category, there is little most nations can do by simple wealth-and income-transferring devices. (The oil-rich Gulf States may be exceptions.) Low productivity of the human resource is thus the crux of the basic food-nutrition problem in the Middle East.

4. *Access* to productivity-increasing goods and services is a serious constraint. Many small farmers would use productivity-increasing inputs and services if they were readily available. Production credit is scarce for those who are unproductive and poor. The extension department doesn't reach them. Inputs are costly and not readily accessible. Markets are risky and not well organized.

5. *Managerial and technical skills* are lacking. Those in the populace who face serious food-nutrition problems are not good managers and technology within their means has escaped them. They

lack access to productivity-increasing goods and services in part, at least, because they cannot properly utilize them.

I suggest that the *major* constraint to the citizenry of Middle East countries meeting their basic food-nutrition needs is *not* a lack of knowledge on the part of the agriculturists of the region concerning how to increase production (however, there is indeed a great need for additional knowledge of certain types), but rather the failure of the socio-economic environment in the various countries to foster high productivity on the part of the human factor in the agri-rural sector. The environment must be changed.

We can further conclude that the key to increasing the number of people who can meet their basic food-nutrition needs in our region is to increase the productivity of those by-passed to date by the process of modernization. Their situation can be bettered on a large scale only by using approaches which rely on resources readily available to them and through projects within the managerial-administrative capabilities of the countries of the region. Governmental policies must be revised and new institutions created.

Issue III: In View of the Problems the Basic Human Needs Approach Faces, Should Our Region Ignore This Approach?

Even though the BHN approach is not *per se* a solution to the socio-economic constraint, it has great potential if some of the concerns about it can be overcome.[9] The best way to overcome these concerns is for each nation to view the human needs problem in its broadest possible terms and attempt to make producing the basic needs the *engine* of growth and development in a new or revised strategy. This can best be accomplished in the more critical areas, where the bulk of the poor and services-disadvantaged live, by a nation concentrating first on meeting food-nutrition needs and by utilizing Integrated Rural Development (IRD) projects as the major implementing tool (Endnote 6).

The IRD project concept stresses the coordination of activities, with emphasis on productivity-increasing components of projects. Top priority in services is given to those which increase productivity, especially in agriculture. To my colleagues in higher education in agriculture in the Middle East, I suggest that IRD is not a passing fancy among our planners and policymakers, and we need to give top priority to adjusting our programs so they will properly backstop it.

Issue IV: Would a Series of Integrated Rural Development Pilot Projects Be Appropriate?

Developing countries are not already developed, in part at least, because they find it so difficult to build upon successful experience at the local level and to institutionalize it. Our region is no different. There is too little tendency for success in isolated projects to be "spun off" and "breed success" on the national level. Alleviating this problem calls for something more than IRD pilot projects. Changes must be made at the top, in fact, in the entire socio-economic *system*. There must be both a national level thrust, as well as a local level thrust. Most countries will face serious challenges within the administrative systems when they attempt to implement IRD projects, as Siffin[11] has so ably reported (see also Ref. 12). The need for the national level thrust has many implications for higher education.

Issue V: Where to Start?

We do not have adequate resources in our region to do everything that needs to be done. Priorities must be established. The most critical issue of all is "where to start." The *first priority* is to revise and develop policies and institutions which will involve all people in the process of economic development (Endnote 7).

This calls for involving those who have been by-passed in the past in the economic development process, as our keynote speaker so properly emphasized. Since in our region most of those by-passed are in the agri-rural sector and already involved in agriculture, food is scarce and expensive, and the resources for increasing production are available in most of our region, *a national "food first" strategy in most countries will make especially good sense*. Therefore, improving policies regarding food production, processing, and marketing is the logical place to start.

Giving priority to revising policies takes note of the fact that national level investments and initiatives are not likely to yield lasting benefits of the type desired without the proper policies and institutions. It corrects a major error made to date, namely emphasis in agricultural programs and projects on those most responsive to change. In agriculture we must be as concerned about *whose* productivity is to be increased as we are about increasing productivity *per se*. The "cafeteria" approach to extension and who obtains productivity-increasing inputs and services is not adequate.

At present, leakage effects from institutional factors in most countries of our region favor the upper and upper-middle classes. They are generally the people who have already broken into the "modern segment" of the dualistic economies which are the norm in most developing countries, and they are the people with whom we agriculturists tend to enjoy working. Unfortunately, it is the small farmer and the landless folk in the traditional economy who are the poorest and have been by-passed to date. They are the people in need of attention and must be given top priority. I cannot in the time available do more than allude to what is required in the way of policy changes and institution building. The conference discussion must do this job.

Issue VI: What Are the Other Priority Activities?

I suggest that the second, third, and fourth priority levels for activities can be identified at this time.

The *second priority* is to expand the national capacity to (a) develop, assess, and disseminate food, nutrition, and health information and (b) to manage and administer self-help programs and projects utilizing appropriate technologies, with emphasis on food production and food marketing. It is illogical to expect people to feed themselves properly or demand and get the health care they need if they are not aware of their bodily requirements. The "wisdom of the ages" cannot be relied upon; nutrition education is vital. But standing alone, education will contribute little. The *means* through which those who are not very productive can become more productive, thus buy their needs, must receive attention. We must not lose sight of the fact that low productivity is the root cause for the poor and services-starved being in their current condition, and it is unrealistic to believe their situation will improve without attacking the root cause. Making people more productive calls for education *and* appropriate technology, improving the availability of goods and services, etc.

The *third priority* is to improve the access of the small farmer and rural villager to purchased inputs, financing, and markets for food products. Limited use of purchased inputs and availability of properly adapted technology and services are serious constraints to increasing productivity in our region, and the situation must be corrected. Many people in our region would gladly use the inputs and services which would make them more productive, but they are

not readily available. A frontal attack must be made on the access problem.

Perhaps it is appropriate to be a bit more specific on the relationship between the second and third priority activities, since many of us attending the conference are educators. While the education and knowledge dissemination aspects of the second priority are necessary conditions for a better food-nutrition situation, they are not *sufficient* conditions. Numerous World Bank and other studies show that education and knowledge transfer are not a panacea for developing countries. For example, education, as financed in most developing countries, does not lead to more equitable income distribution; therefore, its contribution to alleviating the incidence of hunger and undernourishment is open to question (Endnote 8). Education is important and necessary, but it is not a panacea, and we must avoid implying that it is.

The *fourth priority* is to create a supporting physical infrastructure. Little progress can be made without strengthening the infrastructure, but to create it without the elements of the first three priorities in a total strategy is an invitation to waste resources. Infrastructure, like education, is a necessary, but not sufficient, action to foster development. In developing countries, infrastructure construction does not lead automatically to productivity-increasing activities. An integrated approach to development is required (Endnote 9).

Issue VII: Can We Offer a Prescription Which, if Followed, Will Guarantee the Success of Integrated Rural Development Projects?

I suggest that at this time we cannot point to any specific country and find an IRD model which has been tested for a long enough period to be absolutely sure of its working successfully. We are in the "guideline stage," i.e. we can offer guidelines, but we cannot offer prescriptions. In general, experience to date points to the following as useful guidelines.

A. Increasing productivity of the human element in agriculture and the villages must be made an equal partner with delivering basic services on a project by project basis. In the past, most of the nations in our region have attempted to increase production in one set of projects and deliver services in another. In the minds of many people, a cause and effect relationship between increas-

ing productivity and receiving services has not been established. Rural people have not become more productive because in their judgment benefits from attempting to do so were not sufficiently greater than the costs. At the risk of oversimplifying the problem, we can say the incentives have not been proper or adequate. Linking the delivery of life quality-improving services, such as better nutrition, health care, and improved schools, to productivity-increasing activities provides the incentive needed for people to become more productive and break out of the situation in which they are burdens to themselves, their families, their communities, and their nations.

B. Plans must be made on an area basis and the administration of agri-rural activities must be decentratlized. The planning and administrative processes for development projects and programs must ove closer to the people. In the past, there has been a tendency to try to do too much "thinking" for people. The people themselves must become more deeply involved. They know what they want, and they will become more productive to get it.

For many of the poor and basic services-disadvantaged to participate in, and therefore to benefit from, development activities means that most of these activities must occur fairly close to where the people are currently located. Additional massive migrations of people are not acceptable. This calls for utiltizing the resources available locally, i.e. *local area planning.*

Planning on an area basis has many advantages. A strong point in its favor is that it generally forces planners and policymakers to recognize that food and health care *are* serious problems, that local people *can* do something about them, and that given the proper incentive and assistance, they *will* do something about them. Also, local area planning generally shows agriculture to be a basic industry around which developmental activities can be centered, and most of the people are already involved in it. Area planning means working with *all* types of farmers – the large, the small, and the intermediate; it also means working with the landless. In a sense, I have given a new definition to IRD. I have introduced the area, or regional, approach to project planning and implementation. Frankly, I prefer to think in terms of Intergrated Rural *Area* Development projects.

Planning on an area basis and leaving implementation to functionally and vertically oriented general directorates or national level ministries generally has not proven desirable. The problem is that an effective and efficient developmental thrust calls for the coordination of activities, and the vertically oriented agencies, which are the norm in most countries at present, simply will not coordinate their programs. Bureaucracies are by their very nature jealous of their prerogatives. The answer to the dilemma is decentralization of planning and implementation, i.e. area-oriented projects, making full use of local people in the process, with the proper mix of both production-increasing and service-rendering activities.

C. "People orientation" must be utilized in project planning. In the past, too much planning in food and agriculture has been macro-economic and resource management-oriented. It is through a "people orientation" plus the area approach that IRD projects can be different *and better.*

D. Increasing food production and processing to meet local needs must be made the hard core (or central) activity wherever possible. Since food is generally scarce and expensive in the Middle East, producing and processing the food needed to meet local and regional needs is a logical first order activity through which productivity and real incomes can be increased. The numbers of people involved and the relative ease by which benefits can be channeled to those who need help all point to the desirability of a "food-nutrition first" thrust in most IRD projects.

E. Economically viable "delivery systems" must be established. Successful IRD projects deal with the problems of *access.* They provide access to productivity-increasing information, inputs, and services and to life quality-improving services. Specifically, good IRD projects (a) create a delivery system for the inputs and services required for small farmers (sometimes called "villagers" or "traditional farmers") to become more productive; (b) generate jobs in the project area; (c) establish a system for delivering selected basic services; and (d) accomplish the first three aims at a project benefit – cost ratio high enough to make the project yield a bankable internal rate of return (IRR).

It is vital for IRD projects to achieve a bankable IRR, because this is the only way the resources are going to become available to the vast majority of the people with basic needs (Endnote 10).

Little headway is likely to be made in solving the problems of the rural poor in the Middle East or anywhere else if doing so is viewed as a national liability by those who exert the greatest control over national purse strings. The problems of the multitudes of the poor can be solved only by getting adequate resources allocated to their solution, and this will be done only when "it pays."

F. Obtaining *leverage* in project activities must be stressed (Endnote 11). For the agricultural segmemt of the project, increased leverage can be obtained in the following ways.

1. Simple to manage self-help activities should be emphasized, with primary concern for those rural folk who are typical or below in terms of availability of resources, managerial skills, and capital.
2. Production credit should be made more readily available, but its use should be linked absolutely and unfailingly to productivity-increasing activities and *collecting* the debt.
3. The production package approach should be utilized to obtain high yields in relation to input requirements and to get all the mileage possible out of project workers and expenditures (maximum net value of output).
4. In extension, marketing, and supply provision, farmers should be dealt with in groups rather than on a "one on one" basis. Cooperatives will have a vital role to play in most countries. New concepts will be required, especially those of efficiently operated multipurpose local units.
5. The inputs required should be made readily available at a reasonable cost.
6. The market should be protected enough to induce a subsistence, survival-oriented family to produce for it, without overstressing the financial capacity of the government.
7. Field market should be protected enough to induce a sub-insurmountable problem for many developing countries, but it remains the absolutely necessary ingredient. A multipurpose field

organization under a single agency may be the only workable alternative.

8. Local industry and service organization development, especially food marketing, processing, distribution, and the production of inputs, should be tied in with increasing agricultural production. This means using development to beget development. (Marketing farm products and producing inputs are logical local industries).

For the services-delivering segment of the project, increased leverage can be obtained in the following ways.

1. Local people should be used to the maximum extent in implementing the project.

2. Activities that minimize the use of high cost, externally proproduced goods and services should be stressed.

3. Preventive rather than curative medicine should be emphasized.

4. Services rendered should be linked to what the local people can afford.

5. Top priority should be given to those services which contribute directly to increasing productivity, especially in agriculture.

G. Projects should be operated through existing agencies insofar as possible. It is not wise to create new agencies because they are seldom much better than the old ones. However, new agencies are sometimes needed, and under no circumstances should the existing agencies be permitted to block full implementation of an IRD project by their refusal to cooperate or to perform efficiently and on time.

H. Project operations should be handled through multipurpose service centers. The centers should afford easy access to everything that will be needed to implement the production increases planned for the project and to deliver the basic services. This will help provide leverage (see Guideline F), but much more is involved, since the project should include guidance through appropriate agencies for creating village and other group organizations in which collective action of rural people can be channeled toward progressive improvement of the conditions of farm production and community life. This calls for a "bringing together" of the diverse interests and groups in the area.

At minimum, the service centers should be viewed as the potential nucleus of the socio-economic system for a viable community; therefore, the location should be approached carefully. Eventually many stores, service organizations, financial institutions, etc. should find it wise to locate in or near the center. Intensive extension and loan supervision, marketing and input distribution, and health care facilities should be available at the centers from the beginning.

I. Development projects should be institutionalized. Most development projects involve a period of investment and institution development after which a regular ongoing agency or organization is expected to continue the benefit-producing activities. Unfortunately, many development projects are not institutionalized, and after the initial investment thrust the project collapses. Avoiding repetition of past bad experience calls for careful planning for project phase-out. In order to initiate a program in a timely manner, an IRD project may be required to operate certain activities itself which at a later date properly should be transferred. The important thing is for *all* activities, at the end of a specified period, to be in the hands of regularized agencies and organizations which can provide continuity.

J. The private sector should be included in decision making. Throughout our region, as in most of the developing world, the amount of resources under private control greatly exceeds that under the control of governmental agencies. If IRD projects are restricted to activities amenable to force account financing, they will not accomplish much. Planners of projects need to think in terms of providing the incentives which will induce decision makers, whoever they are and wherever they may be located, to make the decisions required to achieve project objectives.

K. The development of cooperatives should be encouraged, but new progressive thinking should be emphasized. Cooperative philosophy is completely compatible with IRD philosophy, and cooperatives are logically institutions of choice for implementing many activities. Yet, cooperatives' unique contribution to date in agri-rural development is hard to identify and evaluate. Cooperative performance in the past indicates they are not pana-

ceas. In most countries, strengthening cooperatives at the local level and reinvigorating the whole cooperative movement will be required. A federated system, based on multipurpose local cooperatives that own specilized, functionally oriented, wholesale, terminal, and input-producing facilities, may be a good solution.

L. Project management should be kept from becoming the Achilles' heel for projects. In IRD projects, achieving enough benefits to cover costs and yield a respectable IRR depends almost 100% on efficient project management. Unfortunately, good managers are extremely hard to find in developing countries. Evaluations by aid agencies of all types of projects have consistently revealed that project management weaknesses account for an extremely high percentage of the failures. On this score, IRD is in no better position than any other project approach. Segregating planning and implementing agencies invites project plans that are difficult to manage, thus the projects produced may be failure-prone. Therefore, it would appear wise to insist that those who are to manage a project must be involved in its planning.

Any agency or organization initiating a series of IRD projects should provide special training for project managers. Project reviews and evaluations should be formalized, and a feedback system which makes management a dynamic process should be developed. What is learned through experience must be utilized in future planning if IRD is to be more than another vogue through which we will pass in time.

Issue VIII: What Are the Implications for Higher Education?

Many of the points made above are controversial, and it will be years before the data needed to reach indisputable conclusions are available. The one thing that is clear is that further dialogue is needed among the four major groups represented in the conference: (a) planners, (b) operating ministries in governments, (c) purveyors of goods and services, and (d) educators. The four groups do not see the world "through the same glasses"; each group should be more cognizant and tolerant of the views of the others.

I personally believe that we in higher education in the Middle East need to become more responsive to the unique developmental

needs of our region than we have been in the past. Being more responsive will call for a considerable number of changes in both *what* we are doing and *how* we are doing it.

We will be entitled to feel satisfied and to rest on our laurels only when we are (a) self-improving, as well as self-reproducing; (b) developing new, appropriate technologies whenever and wherever they are needed, as well as giving proper guidance for the choice of technologies available elsewhere; (c) doing much more to help establish the values needed for the societies of our region to become more productive and equitable (producing an acceptable quality of life for all people), as well as introducing "modern agriculture"; and (d) serving as a major donor to the world knowledge pool, as well as a recipient.

ENDNOTES

1. This paper relies heavily on conclusions from several other papers by the author. Refs. 1 and 2 are especially relevant.

2. In order to conserve space the term "Middle East," as used in this report, is defined as extending from Bangladesh on the east across North Africa on the west and from Turkey on the north to Somalia on the south. The region includes the countries of the FAO Near East Region and of the ECWA Region, plus others.

3. The data are from the Jan.-Feb 1977 issue of *Ceres* (FAO, Rome).

4. For greater detail on BHN program content and issues, see Refs. 5-8.

5. The term subsistence is relative. Admittedly there is almost no pure productivity in our region, but large numbers of families still produce mainly for home or local consumption. Subsistence refers to a state of mind or an orientation.

6. In the past few years there has been an explosion in the number of scholarly publications on IRD programs. For our region, I recommend Ref. 10.

7. Numerous supportive sources for these priorities could be cited (see Refs. 13 and 14).

8. Two excellent articles in the March 1979 issue of *Finance and Development* (World Bank, Washington, DC) cover this point.

9. I am not implying that there is little need for infrastructure or that activities in the public domain are low priority. The first priority deals almost exclusively with the public domain, and there is evidence that "the technology required for basic human needs is mostly in the public domain." See Ref. 15.

10. In the judgment of the author, this is probably the most important point made in the entire paper.

11. The term leverage is used extensively in financial circles. It refers to obtaining the use of additional assets by the commitment of one's own assets.

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IMPLICATIONS FOR EDUCATION OF RECENT EXPERIENCES IN AGRICULTURAL SECTOR ANALYSIS

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SINCE MY POINT OF DEPARTURE is quite different in a number of ways from that of the majority of participants in this conference it may be useful to spend a couple of minutes spelling out where I am coming from before indicating where I am going.

I speak first of all from a Latin American and Caribbean perspective. My experience with agricultural sector analysis and planning is derived almost completely from that part of the world. Just a few moments ago, Dean Fischer somewhat jokingly raised the question of whether all the countries represented here this week can properly be included in the Middle East. By any definition, I don't think we can make the case for Latin America! I am sure, however, that there are certain commonalities between your experiences in agricultural sector analysis and planning and the Latin American experiences I am about to discuss. I hope that this presentation will be of interest and use to you, therefore, and look forward to our subsequent discussions.

The second perspective I speak from is again somewhat different. The experiences I will try to summarize here have been seen largely from the viewpoint of a member of a donor agency. Thus, my perspective does not necessarily coincide with those of planners in the Latin American and Caribbean countries themselves.

The third peculiarity of my experience is that it is based predominantly on contact with planning offices in Ministries of Agriculture. It is only secondarily a function of exposure to central planning offices.

A fourth perspective which may or may not be somewhat different has to do with education. When I refer to education here, I am speaking from the vantage point of one who has been trained in the US. My own personal exposure to formal educational systems in Latin America has been rather limited and many of the planning personnel with whom I have worked are in fact US-trained.

A fifth perspective which may be different from that of most of

you is that I speak from the perspective of a social scientist and, in particular, an economist.

Finally, I speak from a personal perspective. Nothing of what I say today is necessarily officially endorsed by the US Agency for International Development (AID). All points of view are mine alone and are a reflection of my own personal experience. To interpret and generalize from the variety of recent experiences in agricultural sector analysis and planning in Latin America and the Caribbean is a difficult business and I do so at my own peril. Furthermore, Dean Fischer has asked that these presentations be provocative. To encourage reactions and discussion, therefore, there will be times when I will consciously oversimplify and overstate my point as a way of highlighting what is really a question of relative emphasis. I would hope that whatever oversimplifications need to be refined can be honed in subsequent discussion.

I want to make one final point of introduction. My topic this morning is "Implications for Education of Recent Experiences in Agricultural Sector Analysis." I deliberately wish to broaden this focus to include recent experiences in agricultural sector planning, since the kind of analysis at issue here is one which is conducted for the purpose of planning and one which cannot be divorced from the planning process.

Now that it is more or less clear where I am coming from, let me briefly indicate where I am going. If I had to summarize in a few words the major implications of recent agricultural sector analysis and planning experiences in Latin America and the Caribbean, I would say that they are two in number.

First, agricultural sector statistics, analysis, and planning must be responsive to concrete, specific, actionable, decisionable problems. Associated education must likewise be problem-focused. For a Minister of Agriculture, general equilibrium theory and tests of hypotheses are considerably less important than access to specific, well-formulated recommendations for dealing with concrete problems; for instance, whether the support price for corn should be X or Y or whether an investment in rural access roads should receive higher priority in the budgeting process than an expansion of the existing farmer-outreach system. The point is not whether theory and hypothesis testing are useful in answering problems. It is rather that if planning, and education geared to planning, does not have

real world problems as its starting point, there is a risk that much of this work may be simply irrelevant.

The second major implication from the Latin American experience is that sector analysis and planning cannot be divorced from public organizational management and administration. This is not to say that planners must be managers or implementors of agricultural projects. What it does mean, however, is that planners must thoroughly understand how, why, when, where, and whether the planning function "fits in" in bureaucratic, administrative, operational, and implementation terms. If planning is to be meaningful, it must "fit in" in such a way that it makes a difference -- and it will only make a difference if planners themselves understand how the public sector operates, both formally and informally, and are broad-gauged enough to be aware of mechanisms by which public sector management might be improved. The corollary of all this for education is straightforward: if education is to train effective planners, it must, at a minimum, acquaint future planners with solid principles of organizational management and administration.

In brief, these are the two major points I would like to offer for your consideration this morning. In the remaining time available, I will try to support these conclusions and show how they emerge from recent Latin American and Caribbean planning experiences.

Trends in Agricultural Sector Analysis and Planning in Latin America and the Caribbean in the 1970s

During the 1970s, there seem to me to have been three predominant trends of relative emphasis in sector analysis and planning in Latin America and the Caribbean. These emphases, which are not dramatically clearcut but have nevertheless occurred in more or less sequential fashion, can conveniently be characterized as follows: first, a trend of large-scale model building; second, a trend of emphasis on basic statistics; and third, a trend which is now emerging and which parallels the major conclusions of this paper, namely, a focus on problem solving and organizational management. In the next few minutes, I would like to discuss the first two trends and then, finally, turn to the third, i.e. our conclusions, which flow out of the earlier emphases.

Large-Scale Model Building

The first major trend, which was most in vogue at the beginning of the decade, focused on the building of large-scale sector models. Why did this emphasis emerge? It seems to me the basic reasons were twofold. First, there was a growing appreciation at the time of the lack of quantitative rigor in traditional sector work and the failure of conventional tools, such as project analysis, to account for linkages both within the agricultural sector and between the agricultural sector and other sectors. Large-scale sector models were looked to, therefore, as a means of increasing rigor in selecting among alternative investments and of estimating quantitatively the impact of different policy, program, and project options on a variety of policy-relevant variables. The second basic reason for the emerging emphasis on large-scale sector models sprang from a parallel growing dissatisfaction with the individual project approach to agricultural development on the part of the international donor community — and a movement toward sector lending as an alternative investment mechanism. In this context the anticipation was that sector models could help provide an analytical backdrop for such lending and, thus, model building came to be viewed as an activity worthy of international donor support.

We could spend considerably more time elaborating on the whys and wherefores of sector models, but suffice it to say that the trend did not measure up to expectations. This is not to say that there were no positive developments. For example, sector modeling did serve to attract higher professional talent to planning offices in Ministries of Agriculture (the Dominican Republic is a particular case in point), and I think it is fair to say that the generally increasing quality of sector studies which we have witnessed over the decade is attributable, at least in part, to this trend. On the negative side of the ledger, however, there were a number of problems which severely limited the effective use of sector models in planning. In my judgment, the following were the major problems which emerged.

First, making a large-scale model operational takes time. For this reason, personnel engaged in modeling tended to be organized institutionally into separate operating units. While in many ways this kind of setup made sense, separate institutional identity unfortunately had an unforeseen side effect, namely, that modelers tended to be too isolated operationally from the mainstream of

ministry business and thus not enough in contact with concrete problems needing to be addressed. This was the case in Colombia, for instance. In addition, although modeling was generally recognized up front as a long-term effort, the failure of models to produce meaningful policy-relevant results in the relatively near term tended to lower the credibility of the effort in the eyes of ministry decision makers and thus further exacerbated the built-in institutional isolation.

A second problem had to do with the state of the art of sector modeling at the time. Since much of the modeling work performed was indeed intellectually pioneering, in practice a heavy premium was placed on methodological development at the expense of policy-relevant results. The professional literature is replete with sector model methodology but there is little spelling out of implications for policy in relatively concrete terms. Perhaps this is the proper function of the literature and, in this sense, to level this kind of criticism is unfair. As a matter of relative emphasis at the working level, however, I am convinced that the shoe still fits. From the point of view of a Minister of Agriculture, the niceties of variance-covariance matrices are considerably less important than the policy implications of the analysis of which the matrices are a part.

A third problem grew, ironically enough, out of one of modeling's strong selling points. An argument frequently advanced in favor of modeling was that models could be structured in such a way as to capture interrelationships among broad sets of variables and address a multiplicity of policy and program issues. In practice, models tended to encompass considerably less than had been "sold" beforehand. More serious, however, were two other consequences. First, since models had been touted as being able to address virtually anything, there was a tendency to look at "the model" as a self-contained exercise and downplay the significance of previous work not directly feeding into the model itself. Secondly, and perhaps most importantly, the all-embracing character of models tended in practice to serve as a pretext for modelers not to come to grips with specific policy-relevant problems. To make the point by deliberate overstatement: since a model could handle practically everything, there was little incentive to seriously dirty one's hands.

The final problem I would like to highlight is the question of the opportunity cost of the resources devoted to a modeling effort. It is almost axiomatic that the construction of a large-scale model

makes heavy resource demands. The question I would raise, therefore, is whether resources devoted to large models could be more effectively employed in less ambitious, less sophisticated, shorter-term work. The jury may be out forever on this one but if a modeling effort is to be considered in the future, a healthy and honest skepticism on this whole issue strikes me as essential.

From these remarks you may gather that I am "anti-model." If I give this impression, then please let me hasten to clarify the spirit in which the remarks are offered. Personally, I come from the "model school" and am as convinced as ever of the technical power of models and their potential usefulness for planning. The fact is, however, that to make large-scale models operational in a developing country context in such a way that they are genuinely useful for planning is, in practice, quite another matter. In a forum such as this, I believe it is imperative that the other side of the story be plainly told. The bottom line of all this, therefore, is not to "knock" models; it is rather to stress the fact that the proper focal point of planning is not the analytical tools which are used but, again, the concrete, decisionable problems which planning must address and to which the tools must be tailored. If given problems can be attacked with a sledge hammer, use a sledge hammer and not a ballistic missile.

Before passing on to the second major Latin American trend in agricultural sector analysis and planning during the 1970s, it may be useful to consider examples of how some of the problems which we have seen to be associated with large-scale modeling can be countervailed. I should note that the developments to which I shall refer have not necessarily emerged from a conscious disenchantment with models. In any case, they are what I would consider to be positive steps.

The first example is drawn from a recent evaluation exercise in Guyana. Until recently, the Resource Development and Planning Division in the Guyanese Ministry of Agriculture was layered in as a technical line division and, in practice, exerted limited influence in the planning and budgeting process. This has now changed. The newly constituted Planning Department is now directly responsible to the Permanent Secretary in the Ministry and is specifically expected to exercise a central role in the allocation of the agricultural sector budget.

What is now happening in Costa Rica is a second example. Although there is a wealth of data and analyses which are relevant to Costa Rican planning, sources are extremely disparate and there is at present no systematic way of tapping into this information for planning purposes. As a matter of relative emphasis, therefore, the Government of Costa Rica has decided to focus on a thorough inventory of information which currently exists. An accessible information system is being established to enable decision makers to readily retrieve existing policy-relevant information and thus minimize the temptation to "reinvent the wheel" through the generation of new data and studies.

A third example can be drawn from Bolivia. In preparation for its next multi-year Agricultural Sector Plan, the Ministry of Rural and Agricultural Affairs is embarking on a set of data collection activities and individual studies which are consciously focused on significant areas of acknowledged ignorance, rather than on a comprehensive, sophisticated "sector analysis." In the end, it is foreseen that the studies will be linked in more of a qualitative than quantitative fashion. Furthermore, data analysis is expected to stress the identification of readily observable patterns emerging from simple cross-tabulations before contemplating the use of more ambitious analytical tools.

Emphasis on Basic Statistics

The second predominant trend in sector analysis and planning in Latin America and the Caribbean during the 1970s has been an emphasis on basic statistics. By "basic statistics," I mean data obtained generally through a survey mechanism. By highlighting an emphasis on this kind of information as a trend, I in no way intend to minimize the type of information derived from the case study approach typically employed by anthropologists. In my view, survey statistics and case studies are complements, not substitutes. The former are indispensable for informed selection of populations of priority interest; the latter, in turn, are unique in the in-depth, micro-level understanding they can provide concerning these populations.

In one sense, this trend of emphasizing basic statistics grows out of the previous one. It is somewhat paradoxical, in fact, that the emphasis on basic statistics can be looked at as emerging from both the substantial data demands of large-scale models as well as

a disillusionment with and reaction against model building itself. It seems to me, however, that two additional factors have been at least as instrumental in bringing about this gradual shift. The first of these factors is a growing realization that, to tackle the interlocking problems confronting the agricultural sector, conventional qualitative judgments do not suffice; "hard" data are required. Secondly, and in my opinion most importantly, the increasing recognition of the need to spread the benefits of economic growth and to target resources specifically to disadvantaged populations make it imperative that solid data be available for a firmer understanding of the socio-economic characteristics of potential target groups.

First, there has been a tendency not to focus data collection specifically enough on concrete planning problems. Although broad-gauged, multi-purpose surveys are very attractive conceptually, and there are indeed economies of scale associated with data collection, considerable care must be taken that surveys do not become so unwieldy that they stretch the institutional capacity to manage them. (Recent experience in El Salvador may be an example of such overextension.) At least after a certain point, and this point may be reached far more quickly than is commonly recognized, the total costs of a survey effort, from inception through field work to the processing of statistical output, are clearly exponential, not linear. What is required, therefore, is survey management which is,

Regardless of exactly how this trend emerged, it is clear that it has, and the evolution, on the whole, has been a positive one. As in the case of large-scale model building, however, the emphasis on basic statistics has not been without accompanying problems.
to put it frankly, hard-nosed enough to restrict survey content from what is "interesting" to what is essential. None of this is to say that there is no place for broad, baseline information or for data geared to the identification rather than the resolution of priority problems. The point is simply that the appetite for data on the part of potential users is generally insatiable and must be focused within reasonable limits. Speaking personally, I would much prefer to err on the side of a modest survey effort which offers assurance of both data quality and timely results.

A second problem has been the temptation to apply highly sophisticated statistical methods when they are simply not called for or when the benefit of their application is outweighed by difficulties

in conducting subsequent analysis. For example, most mathematical statisticians trained in the US or elsewhere in the developed world are schooled to maximize the statistical reliability of point estimates by minimizing the number of observations required. Frequently what this leads to are heavily stratified sample designs. In the context of agricultural sector planning, however, the precision of any one individual estimate may be beside the point. Of considerably more importance may be the overall pattern of the results which emerge from the survey data, e.g. the relationship between farm size and income per hectare. Furthermore, the more complex the sample design, generally, the more difficult will be the job of the analyst in working with the data later. As a practical rule of thumb, therefore, I would strongly argue the merits of self-weight sample schemes (which are the easiest for the analyst to use) and would suggest that the burden of proof should rest on showing why such a scheme is not appropriate rather than vice versa.

A third problem associated with the emphasis on basic statistics springs from the time and resource intensity inherent in launching a survey effort. The nuts and bolts of pulling off a quality survey cannot be understated. The real danger, in fact, is that the nitty-gritty tasks associated with sample design and field work can so swamp the endeavor that two parties whose participation is crucial get left out in the cold. The first of these parties are data processors. All too often, the attitude of survey designers is, "Let's get the data first. We'll worry about how to process the information later." When such an attitude is present, it is imperative that it be attacked head on, first, because of the efficiencies and cost savings which can be introduced through integration of the data processing design at the inception of the process and, secondly, because failure to do so inevitably leads to underestimation of data processing resources and, consequently, to severe delays in providing useful output in timely fashion. (This latter point cannot be overemphasized. Half the battle in establishing the credibility of a planning unit is the timeliness with which it delivers results.) The second major party whose early participation is essential are the users of the anticipated data. If survey statistics are to be genuinely useful to planning, it must be the planners who determine the content of the data to be collected. Moreover, the input of planners needs to be far more than nominal. For ultimate effectiveness, planners

must foresee how they will use the data in concrete terms and have an early and clear understanding of what they can expect. Collection of data for agricultural sector planning is not an isolated, academic exercise, but one which must be consciously and directly responsive to planners' needs.

Although this brief catalogue of problems is indicative of the sorts of difficulties which have been encountered in the movement toward a greater emphasis on collection of survey statistics, the positive nature of the strides which have been made in this area should not be ignored. As a rule, I think it is fair to say that Latin American planners' knowledge of the socio-economic characteristics of target populations, as well as the factors constraining their development, has never been better. There is still considerably more to be done, of course, but the consciousness and integration of this kind of information in the planning process has, overall, been quite impressive.

Before turning to my concluding summary remarks, I should perhaps pause to illustrate some recent positive developments in the statistical area which tend to counteract some of the problems I have just described. As a first example, the Government of Guatemala is contemplating an area development approach to public sector investments and, as a first step, is launching a cross-sectoral data collection effort at the municipality level. This is an instance of how the form of data collection can be a direct function of the framework in which investment decisions will be made. A second example has been the conscious attempt of Bolivian and Guyanese survey designers to limit the content of broad diagnostic surveys to essentials. A third positive development has been the decision of Haitian agricultural planners to limit data collection to predetermined priority regions in a deliberate attempt not to overextend very limited institutional capacity. Finally, there has been a movement in a number of different countries to simplify potentially complex area-based sample frames to more directly match policy concerns.

Conclusion

Although we have just spent quite a bit of time considering how the trends of model building and basic statistics have evolved over the last decade, practically all the problems we have looked at can be boiled down to two tendencies: first a tendency for analytical

and statistical activities not to be sufficiently problem-focused: and second, a tendency for sector analysis and planning not to be sufficiently integrated organizationally into public sector management and administration. As I suggested earlier, what I see emerging as this decade's third major trend in sector analysis and planning in Latin America and the Caribbean is, fortuitously, precisely a movement to correct these tendencies. From my point of view, needless to say, the emergence of this trend is a most appropriate development and one which is entirely coincident with the two major points I would most like to stress this morning.

Until now, I have focused my comments on how sector analysis and planning have evolved in practice in Latin America and the Caribbean and how they might be improved. Only passing mention has been made of corollaries of all this in terms of specific implications for education. In the few minutes remaining, therefore, I would like to spell out some examples of how education might be structured to train more effective agricultural sector planning personnel.

The first major implication of my remarks is the need for the education of agricultural planning technicians to focus on specific, decisionable, real agricultural sector problems. This is not to say that such training should ignore theory and hypothesis testing, for example, or that a solid grasp of rigorous analytical and statistical methods is unimportant. The fact is, however, that sector planners are expected to deal with problems and it is incumbent on them to have a clear and thorough understanding of the nature of these problems. Such things as models and statistical niceties are not ends in themselves but tools to be tailored to the problems in question.

A second lesson to be drawn from the Latin American and Caribbean experience during this decade is the need for planning-oriented education to provide training in the communications skills required of planning technicians and an appreciation of the day-to-day demands which are placed on their time. To be effective, planning technicians need to write plainly, concisely, and without technical jargon. Ultimate decision makers simply do not have the time to read lengthy, complicated tomes; they want to see the punch line, and the rationale for the punch line, articulated in concise and intelligible form. In a similar vein, the potential planning technician must come to realize that a considerably greater premium is attach-

ed to the timeliness rather than the inherent elegance of what is produced. Whether or not one likes it, the timely delivery of a "half-baked" report is of much greater usefulness than a late, fully polished piece. In this connection, it is also essential to develop a respect for short-term, "brush-fire" work. Indeed, it is often through compliance with unappealing, "short-fuse" demands that a planning technician can establish the credibility for longer-term, more thought-out analysis. In summary, therefore, the education of potential planning technicians needs to stress that they cannot realistically expect to be isolated, pure "paper" technicians. What ultimately counts is responsiveness to and anticipation of decision makers' needs.

In the last couple of moments, I have made extensive use of the term "technician," since this is the conventional label associated with professional staff personnel in a typical agricultural sector planning unit. I use the term with some trepidation, however, because planning technicians simply cannot afford to be technicians in the narrow sense. The potential planning technician really needs to be trained to be what I would call a "technical generalist," that is, a professional who has solid training in one or more technical fields but who is broad-gauged enough to deal with a gamut of agricultural sector planning problems. The concrete problems typically confronting an agricultural sector decision maker do not fall conveniently into one or two academic disciplines. Quite the contrary, they are generally broad-ranging in nature and demand a flexible working knowledge of a variety of disciplines to deal with them adequately. The third major implication for education which I would like to offer this morning, therefore, is that the training of planning technicians needs to be cross-disciplinary. In practice, agricultural planning units cannot afford the luxury of highly specialized compartmentalization, and agricultural planning technicians simply cannot permit themselves to view their role as a narrowly defined box.

The fourth, and last, major implication I would like to highlight is a specific case in point of the need for cross-disciplinary training. If I were asked to choose one field to which a potential planning technician requires at least some exposure, it seems to me that it must be public organizational management and administration. As we have seen, sector analysis and planning take place in an overall

public sector context. To operate effectively in that context, it is imperative that the planning technician understand how the public sector operates and what latitude exists for change. To move the planning function from the periodic publication of desiderata to the excution of feasible, operational development programs, the effective planning unit has to know how, when, where, and what "buttons" to press. To buttress the importance I am attaching to training in this area, let me conclude my remarks by citing two recent examples of how a consideration of planning in organizational terms can make a difference and, in the process, also illustrate how the trend toward a focus on organizational management and administration is in fact evolving.

The first example springs from the Dominican Republic. In 1975 the Secretariat of Agriculture launched an effort to construct an agricultural sector linear programing model. One of the objectives of this exercise was to provide the Government with the capability to estimate the impact on the sector of changes in both input and output prices. The Dominican organization charged with price setting is not the Secretariat of Agriculture, however, but the National Price Stabilization Institute, which had not been involved in model design or construction. A recent evaluation of experience to date suggests that the relevance of the model could have been strengthened with more National Price Stabilization Institute collaboration. As a corollary, it also recommended that more formal linkages be set up between the two organizations in the future, a process which is now underway.

The second example concerns the role of the Planning and Evaluation Division in the Jamaican Ministry of Agriculture. Two years ago, the Government of Jamaica set up an innovative system to encourage decentralized generation of project ideas. As the system currently functions, "project profile" documents are put together at the field level (training is provided for this purpose), are screened by the Planning and Evaluation Division, and are then passed on to the National Planning Agency of the Ministry of Finance for a decision on whether to proceed with project development. While the system has worked quite well in the sense that a goodly number of project ideas have indeed emerged, a major difficulty has been that the cost of each individual project is generally too small to encourage serious National Planning Agency attention. A recent

look at this organizational setup has suggested, therefore, that besides screening project ideas, the Planning and Evaluation Division should also perform an amalgamation function, that is, "package" a number of appropriate project ideas together so as to prompt more serious review. This suggestion is presently under consideration and it is likely that some such scheme will be adopted in the future.

Thank you for your kind attention and I look forward to the discussion to follow.

THE LAND-GRANT CONCEPT: THE RELEVANCE AND ADAPTABILITY OF THE US MODEL

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Brief Historical Background

HUMAN RESOURCE development and research have had a key role in the ability of US agriculture to provide a stable nutritious food supply for the American people. The land-grant university is the focal point for a coordinated training, education, and research effort that is uniquely American. The system is a product of the cultural, economic and political milieu in which it was developed. At the outset I wish to acknowledge that the American agri-business sector has had a significant role in research and in the transfer of agricultural technology. Further, one of the strengths of the US system is the joint effort of the land-grant college with the US Department of Agriculture (USDA) to use available resources effectively in a synergistic mode. However, my paper is focused on only *one* aspect of the American agricultural education-research system, the land-grant college or university. These publicly supported, state-controlled as opposed to federally governed, comprehensive universities have evolved over about a century. A few comments about their establishment will contribute to an understanding of the agricultural education and research rationale on which these land-grant colleges were built.

Some 150 years ago agricultural development in the US began to accelerate at a rapid rate. New immigrant settlers were moving into a vast expanse of public lands. World demand for food and fiber was growing. New technology, such as the steel plow and the reaper, and improved livestock often imported from Europe opened new perspectives for agricultural leaders on the relevance of training for farmers and the role of science and education in the future of US agriculture. Ideas from many sources usually promoted by pioneer farmer-educator-legislators coalesced into the famed Land-Grant College Act (Morrill Act) of 1862. The act stated that in the public interest a portion of the public land domain would

be granted by the US Government to each state, upon agreement, to establish a college that would teach the practical arts of agriculture and mechanics. It further stated that these colleges would be funded by the states to provide low-cost educational opportunities for the sons and daughters of farmers and working people. By the end of the century, colleges had been established in each state or territory and many in the eastern half of the nation had already gone from "cow colleges," as many called them, to university status with substantial student enrollment.

In the 1900s these colleges began to take a major place in education systems of the country. They actively sought public financial support through the state legislatures. They created new political clientele-user alliances that spoke out for agricultural research and extension education for farmers. They attracted administrators and professors, usually with agricultural backgrounds, who were avid proponents of the land-grant education concept and strong believers in the value of low-cost public higher education for all qualified students. These faculty and administrators saw that more trained people would be a national asset and they appealed to farmers and rural people to think of the land-grant colleges as "theirs" and help make this system "work" for them. One university used the slogan "the campus extends to the borders of the state." Research was stressed and the scientific approach to solving agricultural problems borrowed largely from Europe became the hallmark of the agricultural experiment station.

Sometimes new educational philosophies clashed with the "educational establishment." The older, more traditional universities were privately supported and more expensive. They were charged with being elitest by the newcomers on the educational scene. Agricultural education was virtually non-existent in the US prior to the 1860s and the new land-grant college faced an uphill fight to gain "academic respectability." However, this factor contributed to the zeal and commitment of the land-grant people. Mosher attributes the rapid growth and success of the land-grant colleges to their unique status "as places where young persons could be helped to gain whatever knowledge and skills they wanted and needed for economically productive adult activities in the fields of agriculture and mechanic arts."

Throughout the initial "establishment phase" and the "maturity

process" the land-grant colleges stressed their service role to agriculture and rural people. The types of programs changed as agriculture and rural America changed in the 20th century. Academic standards changed to reflect the sophistication of agricultural science. The mode of technology transfer shifted to accommodate the needs of the clientele – farmers, rural youth, homeworkers, and rural communities. Its success was assured by such revolutionary development as hybrid corn, agricultural chemicals, all-plant rations for livestock, better nutrition, dramatic increases in farm yields, and the stress on resource management by farmers and livestock raisers. It has been estimated that the growth of modern-day US agriculture is science- and technology-based to the extent that 80% of all agricultural growth and increased production efficiency is traceable to university-based research and education. However great past contributions have been, the land-grant system must retain its viability and concept of service to prosper in the future; more on this topic later.

Tranferability of the US Model

Given this brief outline of the development of the land-grant college in the US, I want now to comment on the transferability of the concept to different cultural and economic conditions found in other countries. Beginning in 1949 with President Truman's celebrated Point IV Programs, the US has helped various developing countries to revamp their agricultural education systems. Many countries have adapted land-grant college concepts of agricultural education with varying degrees of success. Out of these experiences have come a number of urgent observations about the transferability of the US land-grant model.

Every country including the US has learned that building an educational system is usually a slow and difficult process. Colleges and trained people cost money; time is needed to build an educational rationale and to develop quality programs. Countries find that the desire and the plan are not enough; implementation requires a "national will" to make education of farmers a high priority development goal. Trained agriculturists need jobs and the opportunity to use their expertise in a productive way. So the transferability and adaptability of all educational models including the land-grant concept need a friendly and supportive environment to

succeed. Much more than organizing the faculties of agriculture along the lines of a "three-legged" stool is required. The prime requisite for success of the land-grant idea is a commitment by the government and the college or university that education, research, and agricultural technology are essential elements in all agricultural development strategies and that getting knowledge to farmers ultimately determines the success or failure of these programs.

Most analysts of world agricultural development agree on the importance of understanding prevalent social, economic, political, cultural, and religious conditions in realizing viable incountry agricultural programs. As a premise, we must assume that the optimum level of technological transfer will occur in those countries where a coordinated approach, recognizing all of these complex factors, is made.

As Nyle C. Brady, Director General of the International Rice Research Institute, has aptly pointed out, the unique environment, resources, and cultural situation of each nation dictate a specialized technology appropriate to its own peculiar needs. While such specific agricultural problems as saline and arid soils, waterlogging, flooding, and irrigation may be indigenous to the Middle East area, techniques of research and development from the US land-grant system may nevertheless be applicable. Certainly, we recognize that basic technology appropriate to commercial farming in temperate regions is radically different from that of the village cultivator in arid, semi-arid, tropical, and semi-tropical environments. As Brady also affirms, the fallacies of the "know how, show how" concept of technological transfer do not detract from the usefulness of exporting "technique."

> "The technology applicable to our conditions, soil types, climate, varieties, animal breeds, and growing season has generally failed when applied directly to the problems in many tropical and subtropical countries... Stated another way, technology for application in a given environment must nearly always be developed 'on location,' or under circumstances similar enough to permit a transfer of knowledge and physical inputs... May I also emphasize that the *technique* of obtaining new knowledge on which technology must be based is *exportable.* While the exact research institutions of this country cannot be transplanted or duplicated without change in

developing countries, the basic principles of research, extension teaching, and industrial involvement can indeed be exported."

Factors Affecting Adaptability

The World Conference on Agricultural Education and Training, held in Copenhagen in 1970, provided some valuable insights on the applicability of comprehensive and interdisciplinary educational organization — another key factor in the total land-grant picture in the US. With respect to personnel, our land-grant system consists of a comprehensive framework of high-level researchers and educators, intermediate-level extension specialists and technicians, and supportive paraprofessionals and volunteer workers. At the extension education level, major programs have focused on agricultural and natural resources, youth, home economics and family life, and community resource development.

Today, the training of educators and technicians to reach into the rural areas of developing nations is especially important. As the Copenhagen Conference made clear, a priority concern in agriculture in these areas is that "the image and prestige of agriculture be re-established." Along with effective two-way communication and the utilization of a comprehensive interdisciplinary organization, the land-grant system and the US agricultural community have experienced continued respect from and excellent rapport with society as a whole. The matter of prestige and a positive image for agriculture in developing nations is a significant one; as the World Conference proceedings made clear, public policy, the educational system, and the rural communities must all be involved in achieving this desirable status for incountry agriculture.

"Since agriculture is the world's most essential industry and since agricultural development is the key to so many other forms of progress in most developing countries, it is of vital importance that the image and prestige of agriculture be re-established. Various measures can contribute to this end. There must... be a clear and strong government policy for the development of agriculture. Secondly, the educational system can make a most important contribution to changing the attudues of children to agriculture as the most important national industry through introducing them to the basic factors

of their home environment and explaining how, through the application of science and technology, together with human skill and endeavour, agriculture can be transformed into something of which nations will be proud and which can contribute more than anything else to progress in the rural areas. Finally, this image can be changed by the rural communities themselves who, through access to education and training, and the acquisition of leadership and technical skills, will be able to generate profound changes in rural society and occupations."

While recognizing that the technological needs of developing nations may be more immediate and pressing than those of 19th century America, we can assume that certain types of developmental knowledge are as appropriate to the present situation as they have been to rural America. Clifton Wharton has pointed out that these include knowledge about new production inputs, new techniques of production, and land production and marketing economics. Encompassing these rudiments of developmental knowledge is another twofold educational process – that of determining the applicability of new knowledge to the individual farming operation and of seeing how the basic information must be modified or changed to meet local conditions.

As Wharton stresses, extension education programs may indeed have been deficient in the past with respect to this second process, that of *individualization* for particular and unique agricultural needs. Certainly, contemporary extension programs in the US are directed at specializing information and stratifying the "audience" or farmer "clientele" to a greater degree than ever before.

The grass roots or locally oriented philosophy of extension education has been very important in the US, where the continued effort toward a more effective research utilization and extension outreach has led to a combining of direct and mass media contacts, greater in-field contact by upper-level researchers and specialists, the establishment of more regional research and demonstration centers, and greater specialization by extension field personnel in country or local areas. While many countries in the Middle East and elsewhere implement comprehensive agricultural development through central ministries of education and agriculture, the autonomy of the state land-grant institutions in the US has fostered research and extension education on a state and county level.

Today, an expanded definition and orientation of the land-grant system has emerged in the US. The complexity of societal issues involving (and affecting) the agricultural community has increased due to such world-wide problems as population and urbanization, energy utilization and availability, food production and allocation, and troubled international relations. Certainly, these issues will have their affect, either directly or indirectly, on agricultural policy and priorities in every nation.

During much of the period since the initiation of the land-grant concept in 1862, the American definition of agriculture meant farming, and the subject was relevant to a single audience: the American farmer. Under today's expanded definition and orientation, science and education focus on a much wider range of concerns and also serve a much wider range of audience segments. In some agricultural programs, all segments of society are vitally concerned. The most obvious example is, of course, food production, but there are a number of related issues that have become a part of agricultural concern and programing. These include:

Energy Use. An effort to monitor energy used in agriculture, to help the industry increase efficiency, and to develop alternative energy sources.

Food Policy. An effort to encourage more knowledgeable public input into governmental policy decisions affecting food production, processing, and marketing.

Agricultural Policy. An effort to examine issues affecting the structure of modern US agriculture and to gain informed public input to influence future structure. Areas of concern include such fields as production. credit, marketing, taxation, environmental quality, and government regulation.

Environment. An effort to monitor and subsequently lessen agriculture's contribution to the problem and to examine implications of legislation affecting agriculture.

Rural Development. An effort to develop the leadership necessary to revitalize rural communities and provide services and opportunities for residents. Included in this area is an effort to coordinate rural and urban development effectively.

These are, of course, only examples of program areas that contribute to one greatly expanded definition of agriculture. It is obvious that with these program thrusts comes a new audience. In

food policy, for example, the audience includes not only the producers, but also the processors, the marketing and distribution people, and the consumers.

The structure, organization, and educational thrusts of the land-grant institutions in the US are designed to meet the needs of the society they serve. Perhaps there is no more important concept to emphasize than the matter of the relevancy of the educational system to the needs of the people who are working on the farms, producing and processing the food so that it may be available to the consumers.

There are, however, several basic elements that must be present in a viable educational system. First, there should be a commitment to training, an appropriate educational environment, and a positive "image" for the agricultural enterprise as a whole. Such educational conditions are vital in encouraging young men and women to prepare for careers in agriculture and to make significant contributions to the development of a given country or region. Second, there should be a research organization which assists in solving the unique or characteristic problems of incountry and regional agriculture. In so doing, this organization should provide a broad knowledge base, enabling farmers to utilize new technology and scientific development in their particular agricultural production system.

Many countries have successfully adapted the land-grant idea. India is a good example because of the size of the enterprise and the recognized complexity of its agriculture and food system. By 1960 the Indian Government had agreed to proceed with establishing a series of land-grant-type agricultural universities. Today there are 21 such universities and according to a 1978 report from the Council of Agricultural Research (ICAR) the "concept and system has become an essential part of national policy on higher education." Moreover, the report opens its second chapter with these words, "The establishment of the agricultural universities is one of the most significant landmarks in the history of agricultural education in India." This ICAR statement would apply to the US as well.

Given the world-wide urgency of food issues and the need to maximize the use of basic resources, knowledge and education remain key links in strategies to face these challenging issues. Science and technology must be mobilized in innovative and creative

ways to serve mankind. Education is a process; the desire to make progress is an attitude, but the desire to serve people through research and education is a high humanitarian goal worthy of our best efforts on a continuing basis. The land-grant approach is one technique; it will serve people well if applied by dedicated people in the spirit of service for all people, poor or rich, urban or rural. It is this great task that draws us together here and I commend Dean Fischer and AUB for being the catalyst that has made this conference possible.

MODELS OF INSTITUTIONS FOR HUMAN RESOURCES DEVELOPMENT IN AGRICULTURE

Case Studies and Their Relevance to the Middle East: European Model

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Historical Review

DEVELOPMENT OF HUMAN RESOURCES is a term which, as everyone knows, stresses movement forward, but in which direction? To find the answer to this question, we usually turn to someone we call an "expert." We expect to find him in institutions of higher learning, such as universities, academies, and research centers. It is probably this chain reaction of thoughts that makes us want to examine the models of these institutions which obviously have such a high level of significance to the development of a society, since they set the direction of movement which so many of us will then follow without asking too many questions.

We all have our roots in history, probably much more than we are usually aware of, and so have our institutions. They have always been shaped by people who worked for a change of existing patterns and have mostly been maintained by those who believed in preserving what had been achieved. The tension between tradition and progress is the fuel of development and stability.

I don't know if there is a European model for agricultural institutions, but I will report what I know about the German model, hoping it is at least European enough to complement the contributions made by competent speakers from so many Middle Eastern countries and institutions.

Let's go back to history. During the 14th century Europe was swept by what has been called "Humanism," a movement that may well be described as one believing in and striving for the "development of human resources." Universities were the institutions that humanists believed to be vehicles for human development. We see a tendency for continuous growth from 1386, when the first university (Heidelberg) was founded, until 1980, when there was a total of 34 (Table 1).

These universities were "elite" schools at the beginning, with a strong international and European flavor (see student enrollment, Table 1). Eventually they became part of the power structure of feudalistic rulers, each of them favoring his own "university," sponsored to train and produce loyal administrators and knowledgeable development officers who would be responsible for controlled progress and stability.

Interestingly enough, it was during this period that chairs for cameralistics were installed at many universities, with programs for public finance, police affairs, mining, forestry, and agriculture (Table 1). Naturally, there was a strong tendency toward "law and order" after a long destructive period of religiously motivated wars that had left Germany almost in ruins, with more than half its population dead.

But modern analytical thinking crossed the borders of small states and territories and encouraged the application of scientific (especially mathematical) methods to the question of the direction of development. Academies of science were founded as new elite institutions to compete with the old, traditional, inflexible universities. The German philosopher and mathematician Leibniz shaped the first model at Berlin. "They should combine theory and practical skills," he wrote, "to improve not only arts and sciences but also land and people, agriculture, manufactures and commerce, with one word the human nutrition." It was at this first academy that Achard (1799) produced a new crop plant by scientific method, the sugarbeet, with the first sugar factory being built in 1852.

But what favored the beet destroyed the universities. Napoleon's war, hitting both Europe and the Middle East, left a new map behind after the gunsmoke had cleared and 20 out of 34 German universities were closed. Before leaving their chairs of cameralistics, some professors advised the public that there was a difference between modern technology in agriculture and what the rural population really needed. A new government prudently took their advice and started a program for land reform and liberation of farmers from feudal rule, thus resettling the entire social structure in the rural areas.

This opened the door for new production technologies. A. Thaer studied the modern system in England and started a private agricultural school. His success prompted governments to try to advance this early "Green Revolution" by setting up a series of nation-

al centers of agricultural research, called "Agricultural Academies," each with a large experimental farm and a training center. Economics, production techniques, and science were combined in what Thaer called a "system of rational agriculture," a true systems approach.

The academies were soon tied down with their practical problems and the new universities, where brillant scholars drew a "fata morgana" of a happy world based on science and knowledge, immediately challenged the competence of these academies to incorporate the new scientific achievements into the agricultural systems.

Liebig, the discoverer of the mineral nutrition of plants, made fun of Thaer's old-fashioned humus theory and attacked the academies in a very polemic way. He wrote, "The discovery of agriculture by science is similar to the discovery of a new land, which is at first occupied by adventurers and crooks, only later the true colonists arrive to develop it with their hard work..."

The "hard-working colonists" were the university professors, and immediately chairs for agriculture were installed, beginning at Halle with J. Kühn as a chairholder. In England, John Sinclair, the first Director of the Board of Agriculture, had also advocated university training in 1817 with an argument which is still flattering to every agricultural faculty even today. He stated, "The usefulness of such chairs is so clear, that all universities should have them. To do this, no new parliamentary grants are necessary, it only needs an act, that all chairs which don't draw an audience or are of little use should be turned into agricultural chairs." In 1862, Abraham Lincoln signed the so-called "Morrill Act," starting the American land-grant colleges and thus also establishing agricultural university training in the New World.

But enthusiasm and wishful thinking were not enough to develop the new agricultural schools. In 1930 it was an achievement that almost all agricultural faculties in Germany had three full professors in their ranks! Seven of these faculties have survived World War II in West Germany. Now the nutrition needs of a growing world population plus a strong economy and 30 years of peace have brought about a remarkable increase in faculty numbers. Bonn, for example, has 52 full-time faculty members with professorial rank and 1855 students.

A Case Study – The Faculty of Agriculture at the University of Bonn

Each Faculty is indeed different, but any one is also a sample of a larger group. Bonn, with a four-year curriculum, represents Germany quite well. There is a general introduction to the basic sciences during the first year and to agricultural sciences in the second year (Table 2) for all students. Moderate specialization in three different subject areas takes place during the third and fourth years (Table 3). All discussions and plans for more specialization were halted when the student numbers increased dramatically during the last eight to 10 years, and graduates of our school needed more professional flexibility to meet the demands of wider fields of employment.

The modern tendency of diversification is reflected in the so-called electives, which seem to represent the advancement of agricultural sciences in terms of the number of courses and methodology (Table 4). The obligatory farm work seems to be a speciality of our German system. It used to be a two-year apprenticeship with a tough examination at the end, designed as a prerequisite for entering an agricultural faculty. After 1962, it was gradually decreased to six months, which might be performed between semesters. Now the tide has turned. We are back to part-time prestudy farm work, and a one-year requirement is expected soon.

The call for higher specialization to produce "experts" has not, of course, been silenced. At German universities the PhD program takes care of this demand. While no formal graduate program accompanies the student's thesis work, he is fully incorporated into the departmental program and most departments pride themselves in offering a sophisticated training program for their graduates.

Relevance to the Middle East – An Outlook

What is the relevance of all this to the Middle East? Well, knowledge, like water, flows from higher to lower elevations. Wherever a society is cut off from the free exchange of ideas, information will leak through cracks and gaps and may even break dams and sweep away unsound structures. Therefore wise governments have always tried to build "irrigation systems" for the use and spread of knowledge. Much of this has been done by the above-mentioned "humanists," duplicating Arab institutions from Spain and southern Italy to shape the European universities. Likewise models of European

and American agricultural institutions have been used as rubber stamps for Middle Eastern countries. Turkey, for example, has co-operated very closely with Germany, and Egypt and Iraq with England and the US.

But as we have seen, many of these models are really of local significance, grown and aged in national systems and communities which may have little in common with the situation of the receiving partner. No wonder that sometimes efforts and results do not match. What we need now is a period of adaptation. National agricultural education programs must start with the socio-economic status quo of their rural population; perhaps agrarian reforms are necessary steps to pave the way for improved technologies, as we have seen in the German model. This is probably the biggest challenge for agricultural scientists on the national level.

But there is another challenge outside these boundaries. Agricultural sciences are truly international, and the nutritional demands of a growing world population call for a world-wide approach. Will our enlarged, crowded Faculties be able to face the international challenge as well? Already academy-type institutions, the International Centers for Agricultural Research, have appeared on the scene to fill the gap. In conclusion, it is gratifying to realize that knowledge and human intellect have always broken down the self-imposed walls of traditions and conventions from which even the most progressive institutions are never safe.

TABLE 1: MILESTONES IN THE DEVELOPMENT OF AGRICULTURAL INSTITUTIONS IN GERMANY

1386	Heidelberg	
1450	12 Universities - 1800 Students	
1620	- 8000 Students	
1700	26 Universities	Chairs for Cameralistics (Finance, Police, Mining, Forestry Agriculture, etc. at Halle, Göttingen, Geissen, Stuttgart)
1752	First Academy of Science	Research on Forages, New Crops, Animals, Sugarbeet (Achard, 1799)
1802	First Private Agricultural School	(Economics + Production + Science) by A. Thaer
1806-55	11 Agricultural Academies	At Hohenheim, Bonn, Göttingen, Jena, and others
1806-17	Agricultural Reforms	Land Reform, Optimal Farm Size, Liberation of Farmers, Limits to Feudalism
1807	14 Universities - 5300 Students	
1861	University Chairs for Agriculture at Halle (J. Kühn)	Followed by Jena, 1869; Giessen, 1871; Göttingen, 1872; Konigsberg, 1876; Breslau, 1881; Munich, 1927; Bonn, 1934; Berlin, 1938; Stuttgart, 1967
1979	In Federal Republic of Germany:	7 Faculties of Agriculture

TABLE 2: CURRICULUM OF FIRST AND SECOND YEARS IN FACULTY OF AGRICULTURE, BONN

	*Hours per week**		
Year and subject	*Lecture*	*Laboratory*	*Total*
First			
Chemistry	6	4	10
Physics	5		5
Botany	8	2	10
Zoology + Ecology	4		4
Anatomy + Physiology	4	2	6
Mathematics	4	2	6
National Economics	4	2	6
	35	12	47:2=23.5 hrs/sem wk
Second			
Plant Production	9	1	10
Animal Production	11	1	12
Soils	4	1	5
Agricultural Engineering	6		6
Law	2		2
Economics	12	1	13
	44	4	48:2=24 hrs/sem wk

*One academic year = 31 semester weeks, divided into two semesters.

TABLE 3: CURRICULUM OF THIRD AND FOURTH YEARS IN FACULTY OF AGRICULTURE, BONN

	*Hours per week**			
Subject	*Lecture*	*Laboratory*	*Seminar*	*Total*
Plant Production				
Agronomy	17	15	2	34
Plant Nutrition	4	7	1	12
Phytomedicine	4	5	1	10
Horticulture	8	3		11
Plant Breeding or Mechanization Systems	4	4		8
Electives	4	2		6
	41	36	4	81:4=20.25 hrs/sem wk
Animal Production				
Animal Husbandry	10	10	2	22
Animal Nutrition	10	10	2	22
Animal Genetics	9	4		13
Small Animal Husbandry	7	2		9
Hygienics or Mechanization Systems	6	2		8
Electives	4	2		6
	46	30	4	80:4=20 hrs/sem wk
Economics + Social Sciences				
Agricultural Politics + Law	16	2	3	21
Economics	11	3	2	16
Marketing	12		4	16
Sociology	7		2	9
Management or Regional Planning	7	1	2	10
Electives	4		2	6
	57	6	15	78:4=19.5 hrs/sem wk

*Two academic years = 62 semester weeks, divided into four semesters.

TABLE 4: CURRICULUM OF THIRD AND FOURTH YEARS IN FACULTY OF AGRICULTURE, BONN: ELECTIVES

Plant Production
Meteorology
Extension
Biochemistry
Forestry
Microbiology
Drainage + Irrigation
Tropical and Subtropical Crops
Tropical and Subtropical Soils
Economics
Radioisotopes in Agriculture
Virology

Animal Production
Extension
Beekeeping
Biochemistry
Limnology
Economics
Radioisotopes

Economics + Social Sciences
Extension
History of Agriculture
Mechanization Systems
Drainage + Irrigation
Economics + Sociology of Developing Countries
Plant Production
Animal Production

Practical Farm Work

Before 1962:	24 months	Obligatory; before admission; with examination.
1979:	6 months	Obligatory; also between semesters; no examination.
	12 months	Recommeded; partly before admission; with examination.

Thesis Requirements

Literature study or experimental work after the third year in all subjects listed for the third and fourth years. Time allowance is three months.

THE FUTURE OF AGRICULTURE IN LEBANON

ADNAN MIDANI
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Beirut, Lebanon

FOR THE PAST THREE DAYS we have listened to prominent speakers talking about the relationship between agricultural education and national development based on their experiences in many countries of the world, but only one speaker, Mr. Fouad Najjar, presented the pioneering work achieved in Lebanon. Therefore, I am taking this opportunity to make a brief statement addressed to students of the Faculty of Agricultural and Food Sciences of this University.

I have been stationed in Lebanon for almost five years. I have shared your suffering and now I feel it is my duty, in spite of being a neutral, to answer your doubts concerning the future of your country. The achievements in Lebanese agriculture which Mr. Najjar has presented to you can be used to rebuild this country and to tap the great potential still untouched. After much thought, I hereby propose the following list of feasible projects for your careful attention.

Irrigation, Drainage, and Water Supply Projects

1. Litani, Nahr-el-Kabir, and Orontes irrigation projects
2. Akkar and Beka'a drainage projects
3. Construction of small dams to collect rain water
4. Introduction of government regulations to prevent river and sea pollution

Agricultural Production

1. Development of greenhouses
2. Development of tobacco plantations
3. Increasing silk production
4. Improving dairy and animal production
5. Upgrading the processing and control of canned products, especially vegetables and fruits
6. Development of handicraft centers: Jezzine, Ehden, and Baalbeck
7. Reactivating fish ponds

Agricultural Education

1. Development of agricultural research centers in Fanar and Terbol
2. Upgrading rural health
3. Assisting in the creation of the Faculty of Agriculture and Engineering at the Lebanese University

Agricultural Economy

1. Establishing a rural code
2. Improving the Pest Control Office
3. Creation of rural credit
4. Development of rural cooperatives
5. Development of feeder roads
6. Developing the Regional Agricultural Marketing Center of Chtaura
7. Improving the living conditions of the agricultural labor force in Lebanon (reduction of illiteracy, development of social security and dispensaries)

No doubt when you look closer at these projects you will discover scores of sub-projects.

During the implementation of these projects a new relationship should develop between the government authorities and the Lebanese farmer, creating a new breed of citizen, responsible, holding to the best traditions of the past but abandoning the divisiveness of tribal loyalties, with self-respect and pride in his profession.

You will say that it needs a lot of time and money. I have in mind the example of Germany after its complete destruction in World War II. The Germans had the know-how and the will to live and they had the Marshall Plan which, together with their banking system, created the German Miracle. There are some similarities to the Lebanese situation. You have the know-how in agriculture and the will to live. Once the above-mentioned projects are studied and prepared, you are sure to obtain financial support from concerned nations and international organizations. The Lebanese banking system should also lend its support by merging several banks and introducing a new aggressive rural credit policy.

In spite of the last five years, I am very optimistic about the future of Lebanese agriculture. The following are promising signs:

1. A Lebanese agricultural engineer has been elected to the highest agricultural post in the UN system: Mr. Edouard Saouma, Direc-

tor General of the Food and Agriculture Organization (FAO-Rome). He was elected by 121 countries' representatives out of 130. It was the highest score ever registered.

2. The largest and most unique regional agriculture marketing center in the Middle East (Chtaura-Masna'a-Zahle traingle) has been established with the help of private enterprise only. (Seven banks in Chtaura and the same number in Zahle have been opened with an estimated daily turnover of 10 to 12 million LL and a daily supply of 70 to 100 cooling trucks for export of fruits and vegetables to Saudi Arabia and the Gulf States during harvest season.)
3. Hundreds of dunums of greenhouses and citrus plantations have been developed in the Kiserwan and Akkar regions.
4. Vegetables of improved quality have been introduced in the Beka'a region.

Thank you for your kind attention. May God's blessings go with you.

DISCUSSION SUMMARY

Human resources are the key to improving quality of life. The suggested approach to development encompasses concepts of teaching, research, and extension. Educational and curriculum needs in the Middle East include practical applied training. Development strategy adopted must be location-specific within a given socio-cultural environment. Development must incorporate multidisciplinary teams comprised of specialists and generalists and must include the commitment and participation of the local target population. Development activities need to focus on the improved use of local resources and applied technology that is well adapted to local areas and needs.

The major drawbacks to agricultural development in the Middle East include illiteracy, traditional farming practices, certain socio-cultural factors and land ownership patterns, administrative constraints, and lack of sufficient water supplies.

The recommendation has been made for a conference follow-up that would focus on the identification of specific development needs in the Middle East and practical solutions. Regional integration in production and financing would be key issues to examine.

THE ROLE OF HIGHER EDUCATION IN THE TRAINING OF HUMAN RESOURCES FOR MEETING BASIC FOOD-NUTRITION NEEDS AND AGRICULTURAL DEVELOPMENT: AN INPUT-OUTPUT APPROACH?

JOHN S. ROBINS
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Pullman, Washington, USA

IT IS A REAL PLEASURE for me to be here this week to participate in this most interesting and potentially useful conference. The conference addresses a general subject of great relevance and importance, not only to those of us in higher education, but also to our colleagues in government and business. Resources are so scarce and the task before us is so large that we must continually seek ways to increase the effectiveness of our efforts.

It is likewise a challenge to appear on your program this afternoon to tackle the assigned subject. I hope I can do it reasonable justice. I have taken the liberty of converting the title from a statement to a question since it seems to me that this part of the program should be framed in an inquisitive rather than a pragmatic context. I hope Dr. Saad and his committee will permit that liberty.

I shall begin with a story which has a moral that I believe applies here.

> As Moses and his followers moved across the desert with the enemy in pursuit, he searched for a plan of escape. At last he conceived one – he would part the sea, the party would walk through the opening, then the sea would rejoin, trapping the pursuers. As with any leader, he felt it wise to consult his advisors, so he called for the chief engineer. Upon hearing the plan, the engineer was aghast. "It's physically impossible," he said. "Walls of water just won't stand alone. We'll need to design and install walls of concrete with massive bracing and reinforcement. The design work alone will take months and then it's questionable whether it would succeed. And we have no time. It won't work, Moses."
>
> So Moses called his legal counsel whose response was equally

negative. "It's very doubtful that it's legal to begin with. The rising water will flood farms and villages along the shore. We could be in court on any of a variety of counts. And to protect ourselves, we would need a detailed environmental impact statement which would take months of work to prepare, let alone the review process. Moses, it's out of the question." Moses then called the head medical advisor who also had objections to the plan. "We'll have a terrible medical problem. The sharp shells and stones will cut through our sandals. All kinds of bacteria and fungi will infect us. Diseases will be rampant. No, the plan is not good."

Finally, Moses called his public relations expert who, upon hearing the plan, said: "Moses I don't know whether it is physically possible or not. Neither can I even guess at the legal ramifications or the medical consequences. But I can tell you this. If you do pull it off, I'll virtually guarantee you five verses in the Old Testament!" And you know the rest of the story.

Now several morals might be drawn from this story. The one I would focus on here is that specialization is never the full answer to any problem. What is important is the ability of the human mind to weigh alternatives, interpret potential consequences, and arrive at rational conclusions with or without heavenly guidance. And to me that is the central goal of higher education – to equip the student with the knowledge base and the intellectual frame of reference to exploit more fully that most precious gift, the mind.

Returning now from platitudes to the realities of this conference, we have for nearly a day and a half been considering the conference subject from a number of current and historic perspectives. We are now at a turning point in the conference – a turning of our attention from what is or has been the effect of higher education on agricultural development and food-nutrition needs and strategies to the question of what can higher education do differently in the future to make its inputs more effective and meaningful.

For the non-economists among you, I did not attempt an input-output study, so we don't have to agonize over that technology. Rather I asked the question, "Can and, if so, to what extent should higher education tailor-make educational programs that differentiate among student groups based on unique needs?" The differentiation might be in educational form or in content or level

of subject matter but the aim would be delivery of a product or "output" of the system that is tailor-made for specific endeavors. My answer to that question as you will see is a somewhat qualified "yes."

My thesis is that agricultural development and the meeting of basic food-nutrition needs optimally rest everywhere on a firm foundation which has as cornerstones: (a) somewhere, the necessary base of natural resources; (b) a literate citizenry, i.e. an effective base of human resources; (c) an effectively organized institutional infrastructure; and (d) an adequate base of trained personnel to sustain and make effective that infrastructure.

Lacking any of the above, the meeting of basic needs, including specifically food-nutrition and agricultural development, would be difficult indeed. From that thesis one can see several challenges for higher education. We cannot do much to change the inherited base of natural resources, but we are challenged in terms of maximizing the effectiveness of those we have. This involves direct inputs to enhance the knowledge base and impart training for improved utilization, both in a management and policy context. Moreover, higher education must assume focal responsibility in each of the other areas because we mold those who contribute directly or indirectly to the strength and stability of the other cornerstones.

Taking a different approach to the challenges emerging from my thesis, I would focus on three to which we might devote attention. The first of these is the challenge of influencing public policy. Now I do not suggest that higher education should or can become anything more than one of the participants in the making of public policy. However, I do believe that we have a critical responsibility in this arena and that we can and should make our unique contribution. This contribution is, of course, the generation of and participation in more orderly and effective public policy processes. It encompasses process conceptualization, issue analysis, the organization and guidance of public policy forms, and the enunciation of alternatives and assistance in understanding them as a basis for better decision making. And there is a major educational dimension involved, both for students who will be the future policymakers and for the current participants in policymaking. I believe we should take up this challenge more aggressively than in the past, both inside and outside the classroom. And I again emphasize that the focus should be on process development and facilitation and

education and training for more effective participation in the process, not on policy making per se.

A second challenge emerging from my thesis, and one which we must always keep before us, is retention of quality and objectivity in our educational services. Quality is essential in any of the following educational activities: preparing teachers for primary and secondary schools, vocational-technical institutes, and higher educational institutions; training professionals and technicians for services in government, business, and industry; and delivering or preparing people to deliver informal education to improve the knowledge base, skills, and organizational ability of people engaged in agricultural pursuits. And, surely, objectivity must remain the hallmark of all our endeavors.

I include in the term "quality" a dimension of appropriateness both in terms of educational form and in terms of level, content, and technical depth. A policy level administrator in the Ministry of Agriculture or a Dean of Agriculture for that matter has little use for a PhD in soil physics or plant pathology. In fact, such might be a handicap – but a nice one to have. What they do need is a broadly based understanding of natural and biological phenomena and of the workings of the agricultural production and marketing systems *and* professional training in administrative management and policy processes.

The knowledge base and the educational needs of the producer, whether a small farmer or a large one, are vastly different. He or she needs a general understanding of production and marketing technology, i.e. a balanced base of knowledge on plant materials, fertilizers, pest control methods, input services, marketing options, etc. The producer does not need to know that nitrogen is taken up by most plants largely as nitrate or the mechanisms of phosphorus fixation in soils – only that they happen. What the producer does need to know is that certain chemical elements are essential to successful production: what those elements are, the amounts needed, where to obtain and how to apply them, and some notion of the economics of fertilizer use.

The advisory technician, on the other hand, does need to know that ammonia converts quickly to nitrate when applied to most soils, that nitrates are soluble and readily leached if irrigation is excessive, and the management options to minimize that production hazard. Further, the technician needs to know what is important

and what is trivial in the production and marketing systems, the difference in a given set of circumstances, and how to describe or demonstrate those that are important to those who need to know.

Furthermore, the professional in the science and technology of agriculture – the researcher or teacher – needs yet another set of tools. Whether in production, post-harvest, or marketing technology, this level needs a base of knowledge that permits specification of not only *what* happens but *why* – in essence, to interpret cause and effect relationships in physical, biological, economic, and/or socio-behavioral terms.

From these observations, one may now begin to perceive how I arrive at the "yes" part of my answer to my earlier question, "Can or should we tailor-make educational programs?" In fact, we practice differences in level and content regularly and this clearly should continue. We should, I believe, experiment and innovate more with the form of the educational experience based on needs of students – for example, with practitioners, internships, and the like, based again on particular needs. I inferred earlier but did not say in so many words that we should give more attention to management principles, organizational concepts, and policy processes in our offerings. We lay such heavy emphasis on technical matters that I fear most of our trained personnel have difficulty in placing their observations in a management or organizational context. I am sure we give too little attention to grounding of students in policy processes – an arena in which they will or at least should be caught up from time to time. And as for administrative management into which many of us have moved or been shoved, God help the average Aggie!

Now let's turn finally to the third challenge of my thesis, and one which my prior comments suggest we have not dealt with adequately, the assessment of educational needs or perhaps more fully described as educational "opportunity" assessment. This challenge focuses directly on the objectives of this conference. I like the term opportunity because it better describes, at least for me, what the higher education community is capable of achieving. Further, it better relates the educational dimension to the rest of human resource development. And it stresses the "art of the possible" and lessens the risk of our being self-serving.

That is what this conference is all about. Can we and, if so, should we tailor our offerings to the unique needs of groups of

students? And my answer is a qualified "yes." We have perhaps been too traditional in many respects, even though we specialize heavily in the technical dimension. I believe that a fuller assessment of needs of students will open opportunities to alter the output. We may well find that this process sends us in a direction quite the opposite of past decades – namely, to more breadth and generalization rather than narrowness and specification. But it's well worth the hunt and I commend you at AUB for so challenging us.

And now I'll close by returning again to my earlier question and the basis for my qualified "yes" answer. As we explore innovation in agricultural education – as we attempt to better relate the education of students to a studied need on his or her behalf, i.e. a search for educational opportunity, let us not forget the basic role of education. And that is centered on the development of the human mind – development to question, to analyze, to interpret, and to do these within a rational framework. That development must be made to occur within and outside the classroom. Put simply, our teaching (training) must have the central objective of developing the ability to reason, to analyze, and to interpret objectively – in essence, to think.

So I wish you well in your efforts to improve higher education within the context of Middle East circumstances, and I enthusiastically endorse the concept of input-output within the limits just stated.

HOW SHOULD THE FUTURE GRADUATE OF A MIDDLE EASTERN COLLEGE OF AGRICULTURE BE DESCRIBED?

ABDEL GADIR H. KHATTAB
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THE STRUCTURE of undergraduate courses in the Faculty of Agriculture, University of Khartoum, is based on a five-year program. One year is spent in the Faculty of Science and four in the Faculty of Agriculture. Most of the basic and general topics in agriculture are covered during the first three years, leaving the final year for some degree of specialization. The final year is not specialization in the sense of concentrating on a single discipline, since subject matter specialization is left for the postgraduate level.

The design that best fits our requirements as a developing country is to offer in the final year a combination of selected courses from which the student is able to choose one discipline as his main option. However, he should take additional supporting (ancillary) courses from other departments. The amount in formal timetable hours is the same as that spent in the main option. In adopting this system, the Faculty was able to achieve a higher level of intellectual and academic activities than that of the General Degree program. This group specialization design not only brings the teaching staff in each department closer together for purposes of coordination, but also strengthens the links between departments.

The main objective of our system is to graduate young men and women who are adequately aware of the underlying scientific and social principles governing agriculture, who possess a good measure of competence in the principles and practices of crop and animal production, and who develop an interest in one agricultural science but by no means exclusively specialize in it. Thus, unlike many Faculties of Agriculture, we have avoided exclusive specialization even in the final year. As far as can be assessed, the Sudan and other developing countries will continue to need graduates in agriculture with fairly broad backgrounds. The underlying major fault in our old General Degree in Agriculture was that it tried to cover a continuously expanding array of disciplines.

Two flaws develop in this structure sooner or later. The increase in the number of staff members, each with his speciality, means that each claims a de facto recognition by demanding his share of the teaching timetable. This may well lead to interdepartmental stresses and jealousies. Thus, the teaching timetable at one time was 32 hours per week of formal classes. The second flaw is that as a result the student is bored, bogged down, and often loses any interest that originally sparked his imagination toward agriculture. On the other hand, the group specialization approach was found to give wide coverage in the first three years. The final year provides students with more time to think, read, and enjoy their respective subjects. As the philosopher Whitehead said, "Do not teach too many subjects" and "What you teach, teach thoroughly."

The Sudan and perhaps many other countries in the region will remain agrarian for some time to come and graduates in agriculture will continue to hold leadership posts in the economy. Therefore, the following questions need to be asked. Are the Faculties of Agriculture in the region serving the needs of their countries and region efficiently and purposefully? Are we going at the right pace in the right direction, usefully employing all the available manpower resources?

"Tradition and change" have been the themes of many formal and informal gatherings, but the role of the Faculties of Agriculture in this discussion has never been brought into focus. It must, however, be mentioned that most of the Faculties of Agriculture in the area have had little contact with their own people and much more with the West, which has offered the graft of its own pattern of university system onto the Arab stock. Although this situation can be tolerated in the sphere of chemistry or even medicine, it has to be criticially scrutinized every now and then in the domain of agriculture, where science comes closest to serving the needs of man.

In most countries of our region, the needs of man are elemental and so the utility of scientific findings for enchancing rural development must logically receive effective awareness. Thus, it is necessary that the system of education and training should result in closer coordination between researcher, teacher, planner, and farmer. Courses in extension and management should therefore receive due attention. The minds of the graduates, and hence those of the

policy and decision makers, should be led toward adopting extension rather than inspection attitudes.

Schultz states that "to produce an abundance of farm products requires that the farmer has access to and has the skill and knowledge to use what science knows about soils, plants, animals and machines. To command farmers to increase production is doomed to failure."

Most people in the Middle East are living as agriculturalists or as nomads depending on a dryland pattern of subsistence. Most areas are hot, and evapotranspiration losses are high. Therefore, irrigation is essential if the subsistence level is to be elevated to production for the market. Modern concepts and technologies in agriculture must be extended to the farmer in order to obviate the elemental hazards and aim at progressively higher targets in production and marketing. Sociology and economics should be harmoniously utilized together with physical and biological sciences to transform agriculture in the Middle East. The role of the graduate of agriculture is paramount in all this: to provide leadership in both planning and execution.

The training programs should be geared toward the community so that the graduates are all conscious of what the community expects. The community expects from us more and better trained graduates and more and better planned research, the results of which are quickly available for application.

So far, quantity-wise, we are still unable to satisfy the community because development is necessarily limited by socio-economic, historic, and geographic factors. In quality, we aspire to give the best we can afford. We hope to graduate men and women with enthusiasm for their profession, each in his or her own field. But our countries, not to mention the world, still look at the agricultural "profession" with guarded interest in years of economic distress and with an indifferent yawn when the rains are good.

In view of the fluctuations in crop and pasture yields in the region, the peasant and the nomad have yet to be convinced of the need for our services. There is a vicious cycle which will be broken in time by education at all levels. The Faculties of Agriculture have a role to play by developing a sense of pride in the profession. If staff members inspire students by their example, graduates may emerge enthusiastic and dedicated.

DISCUSSION SUMMARY

Academic people are not responsive to the needs of the community. Community-oriented graduates are needed, but graduates are not service-oriented. They want to stay in urban areas rather than going to rural areas where they are needed. Graduates cannot apply their theoretical academic knowledge. Agricultural colleges must begin to train students to identify problems and teach them where to find answers. Only 25 to 75% of available trained manpower is utilized because (a) the training is not the kind needed and (b) developing countries do not know how to use technically trained manpower. In Egypt students are taught applied skills and keep their links to rural areas. Training centers prepare individuals for specific jobs before giving them the jobs. Incentives might be offered to encourage graduates to return to rural areas. Locating facilities and schools in rural areas would help make training more appropriate to needs. It could be on a sub-collegiate level.

THE ROLE OF WOMEN IN MEETING BASIC FOOD-NUTRITION NEEDS AND AGRICULTURAL DEVELOPMENT IN THE MIDDLE EAST

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IT IS OF MONUMENTAL SIGNIFICANCE that the organizers of this conference saw the importance of including a discussion of the role of women within the scope of the topic: Agricultural Education in the Devlopment of the Middle East. You will recognize my nutrition-oriented biases as the discussion proceeds, but from the outset I must also comment that it is enormously helpful that Dean Fischer and others have directed our attention to the fact that perhaps the most fundamental goal of development is "adequate food for all." In fact, of course, proper nutrition is both a goal of development and one important measure of the state or degree of development. If we can't agree that it is a basic human right for all people everywhere to have enough food to eat in order to prevent the physical and mental stunting that malnutrition causes, then I don't know what goal of development on God's good earth we could possibly agree on.

There are essentially two categories of women that are involved in the development of the rural, agricultural areas of the Middle East: (a) the trained, professional women with the BS or beyond in agriculture or food science who serve as extension agents or consultants in the villages of the Arab World and may live (but more probably do not at the present time) in the rural countryside; and (b) the untrained women who live out their lives in the agricultural sector.

In the case of the former (the professional), her role is to get into the "field" and to share her expertise in practical, meaningful ways with the women who need her assistance. She will be a partner with the rural woman in the events of development. Although such a description sounds simple enough, it is often exceedingly difficult to implement.

However, for the purposes of this discussion, and in order to focus our attention on what I consider to be the most important aspect of our topic, let's concentrate on the roles of the untrained

woman, especially the rural woman, in the development of agriculture in the Middle East. I have three major points to make on this subject.

The first point would be that the rural woman not only has a role or roles, but she is already actively engaged in fulfilling many roles in agriculture. She assists in planting the crop, does much of the weeding and cultivating, helps harvest the crops, threshes the grain, pounds the grain into flour, gathers wild plants and fruits, raises vegetables in a garden near the house, tends the dooryard chickens and animals, sometimes herds the sheep and goats, carries the water, gathers the fuel and makes the fire, cooks the meals, processes much of the food (for example, makes yogurt and cheese; bakes bread; and dries fruits, vegetables, and herbs), sells eggs and produce in the marketplace, and barters for food she needs in order to supplement what is produced at home. The list seems almost endless. The rural woman is indeed contributing significantly to the development of the rural sector. These activities consume major portions of her time and energy; although she is sometimes taken for granted, the agricultural system could not possibly work without her.

A second point is that the rural woman needs to have a greater role in agricultural development (if we consider proper nutrition as the goal of development) because she and her offspring are the most vulnerable groups in any culture. It is they who suffer most if food is limited.

Because pregnant and lactating women have the largest caloric and nutrient needs of all humans, they are therefore at greatest risk when the culture or society assumes that men should eat first and devour the choicest morsels (sometimes including the *only* meat) while the women and children get by on whatever is left over. This custom is not a problem where there is plenty of food, but for the rural poor on the knife-edge of starvation, it has a grim outcome.

In Jordan, according to governmental statistics,[1] there were 1193 infants who died in 1977 before their first birthday. Of these deaths, 29 were attributed to malnutrition while 293 were listed as the result of measles, pneumonia, diarrheal disease, and other infections. All of us know that a healthy, well-nourished child does not easily succumb to such infectious diseases. The *real* reason for

most of these deaths probably should have been given as "malnutrition," owing to the disastrous synergism of infection and poor diet. For example, low protein intake causes decreased antibody production which, in turn, means lowered ability to ward off infection. Once an infection takes hold, the fever, diarrhea, vomiting, and other symptoms that commonly accompany such disease call for increased nutrient consumption when, in fact, the actual intake of food is less than normal, and "normal" is not enough. The child who gets sick because his diet is not adequate, then requires even more food and of better quality than before, if he is to improve. But how can this be provided in the socio-economic circumstance in which sufficient food is not available in the first place? A vicious cycle has been set in motion. Indeed, the rural women and children of the developing countries of the Middle East, as elsewhere, have much to gain from the goal of adequate food and nutrition.

My third and final point is that women in the developing countries will welcome new roles and will be eager to try to do things in new and better ways *if* they themselves have an input into the decision-making stages of agricultural project development.

In every country, food goes to waste everyday in the marketplace because it cannot be sold before it deteriorates. Ask the women of the village, for example, what *they* would do about this situation if they were helped to set up a community-based canning center and taught how to can food before it spoils.

In order to further illustrate my third point, let me tell you briefly about a remarkable conference held in Tucson, Arizona, in January of 1978. Women from many parts of the world met for an International Conference on Women and Food. The conference was supported by the US Agency for International Development (AID) and coordinated by the same Dean Fischer of AUB who is responsible for this present conference. The testimony of these women bears witness to their interest in and desire for a greater role in development. I urge you to read the proceedings[2] of this conference, if you can, to discover all the truly fundamental things the 250 delegates proposed as they considered the needs and roles of women in the developing countries.

However, for our brief discussion today, may I share with you three of the ideas of this conference. The delegates reached a working consensus on the following statements.

1. "The basic food/nutrition needs of all people can be met in the foreseeable future if the knowledge available today concerning how to grow, market, and equitably distribute food, and manage consumption within the home is properly utilized."

2. "If basic food/nutrition needs are to be met, developing countries must take into account the historic role of women in their food production and marketing systems, and involve them as equal partners in the development process."

3. The women from the developing countries themselves, although relatively few in number, were not timid in stating the issues of special concern to them, and I suspect they reflect, in part at least, what the women of the Middle East might place before us if they were here in my stead.

"We recognize," they said, "that programs for women in development are valid and necessary, *but* the biggest problem is one of poverty and lack of economic power. We want to make clear to the Conference that while we can, and do, support programs specifically for women, we want to emphasize that (a) the real problem of development is poverty for some created by uneven distribution of resources, nationally and internationally, and (b) the woman in the Third World is an integral part of the family, and cannot be separated from men, women and children. *The family must be held as a unit.*"

"We also recognize that in some countries women are awarded second-class status. We do not condone this second-class, oppressive status, and support programs to raise women to an equal status with other sex and groups in the home, in the marketplace, and in the society at large."

In summary, rural, agricultural women have roles and are already doing, by tradition, many of the tnings that are vital to agriculture. These women need to be involved in development because the stakes for them in terms of their own health and that of their children are very high. Women will be more likely to do things differently (things that will enhance development) if they are given new roles as co-planners and decision makers when the development projects are being set up. They need to help identify the problems, to make suggestions about what classes, demonstrations, field days, programs, or other solutions will fit their needs and their busy schedules, and finally to participate in the projects and evaluate their worth.

I have great faith in women. I hope you do too. Now, we are ready to open the floor to a discussion of the role(s) of women in the agricultural development of the Middle East.

LITERATURE CITED

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DISCUSSION SUMMARY

The discussion opened with a comparison of the enrollment of women in agricultural colleges in the Middle East. Women students constitute 25% of the total enrollment in Sudan and Jordan and 40% of first year students and 25% of graduating students in Lebanon. In Sudan and Lebanon women who complete college have difficulty getting jobs. In Turkey and Iraq this situation is changing and women are accepted in technical jobs.

An important area for women is extension work. Although women still are not accepted in extension jobs, they are needed to reach the rural women. Because mothers are less mobile, areas of specialization in which they can work close to their homes are most appropriate. In some cases, women's attitudes prevent them from gaining equality. Women do not have equal opportunities in Arab countries, but progress is being made.

EXTENSION AND ADULT EDUCATION IN TURKEY

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General View of the Agricultural Sector in Turkey

IN SPITE OF ALL DEVELOPMENT EFFORTS, Turkey continues to be a country with an economy dependent upon agriculture. Agriculture is a main sector of the economy. Table 1 presents various economic indicators including the agricultural population, the contribution of agriculture to the overall national economy, and its share in foreign trade as well as its effects on the activities of other sectors of the economy.

Presently, the bulk of the population lives in rural areas. The rural population constituted 67% of the total population in 1962, although now it is around 57%. However, the total rural population has not shown a decrease during this period, but on the contrary has increased by 25%. The growth of the rural population is much slower than the urban population.

The share of agriculture in the national income is used as a measure to determine the significance of agriculture in the country. Agriculture contributed 38% in 1962, but this figure decreased to 23% in 1977. The main reason for the decrease is the fact that the rate of development of the industrial and other sectors has been much greater than that of agriculture.

There are vast differences between the agricultural sector and non-agricultural sectors in terms of per-capita income. This is true for the developing countries as well as the lesser developed countries of the world. In Turkey, per-capita income in the agricultural sector is far below that in other sectors. This is one of the factors causing migration from rural to urban areas, which creates certain socio-economic problems associated with urbanization.

The role and place of agriculture in foreign trade cannot be overlooked. Agricultural products comprise 75% of total exports. Thus, the role and importance of the agricultural sector in providing the foreign exchange required for development efforts is heavily em-

phasized in Turkey. It was thought that economic developme would alter this situation and reduce the importance of agric ture. However, it is now estimated that since this type of chan has not yet reached a significant level, agriculture continues hold its dominant position in foreign trade. This situation is like to persist for the immediate years to come.

In order to show the direct and indirect effects of agriculture other sectors, one should review the structure of these sectors. Tl manufacturing industry in Turkey is largely composed of industri activities processing agricultural products, as in lesser develop countries which are in the initial stages of industrialization. Tl main industrial activities dealing with agriculture are those whi involve food, beverages, tobacco, and textiles. Industries utilizi agricultural products as raw materials could actually be said comprise more than half of the employment and production val of the overall manufacturing industry.

In summary, the agricultural sector continues to maintain i importance in the Turkish economy as that sector which provid the nutritional requirements of the population and comprises 9 of the total exports whether directly or indirectly through indu tries relying on agriculture.

Agricultural Extension: Favorable and Unfavorable Aspects

This subject will be approached on the basis of our experience observations, and studies, rather than from a theoretical stan point. The importance of adult education and theoretical metho are well known to everyone. We are also aware that undesirab circumstances can often be experienced in the practice of adu education, even though the theory was well founded.

In developing countries, adult education is generally unsucces ful because it is not properly evaluated or integrated with existin social and economic conditions. Where success occurs, contact is usually on a one-to-one basis.

During the last 20 years, there has been significant progress in Turkey in adult education and extension services and consequently in agricultural production. Considerable investment has been made in both adult education and extension. However, investment in agricultural inputs has not keep pace with that in extension,

with the result that overall output from agriculture has been less than anticipated.

In recent years, many technicians needed and required by agricultural and private sectors have been educated in the professional schools of agriculture, home economics, and animal husbandry. However, as due consideration was not given to the number of schools and relevant employment conditions in rural areas, technicians accumulated in large settlement centers. In addition to political pressures, inadequate living conditions in rural areas discouraged technicians from settling in villages. As another factor, the news media in the 67 provinces and more than 600 districts have provided an effective educational service and have stressed the advantages of modern agricultural techniques and inputs. Some inputs have even been supplied to farmers free of charge in order to promote innovations more effectively.

During implementation of the training and visiting program, it was not anticipated, in the beginning, that the farmers would readily adopt such innovations, and recognizing later that the situation was indeed serious, an increase in inputs was planned along with the training programs. However, as in developing countries, the expected inputs could not be realized in Turkey due to inadequate capital. Efforts were made to fill the gap in the important inputs through imports, but these measures failed because of stringent foreign exchange regulations. As for available inputs, many of them did not reach the farmers in time owing to distribution problems.

This experience taught us that a training program could not be successful alone and led us to realize the necessity for regulating the input distribution channel in integration with the training program and requiring this package to carry the other supporting services.

Whenever sufficient inputs could not be found in the market, the extension organization was placed in an awkward position. Some farmers typically responded to this situation by saying, "Give us the means of carrying out what you have taught us." Such justified and reasonable requests made the extension organization uncomfortable and even led to agents avoiding the villages.

These farmers were already educated and knew how to generate more income. They also realized that use of chemical fertilizers,

TABLE 1: AGRICULTURAL ECONOMY AND POPULATION IN TURKEY

Economic indicators	*1962*	*1967*	*1972*	*1977(1)*	*Average growth rate per year (%)*
Population(2) (million)					
Total	29.2	32.7	37.1	42.1	2.5
Agriculture	19.5	21.0	22.4	24.0	1.4
%	66.8	64.2	60.4	57.0	
Active population (million)					1.4
Total	12.0	12.7	13.5	14.8	-0.1
Agriculture	9.2	9.1	8.8	9.1	
%	77.1	71.3	65.0	61.5	
					6.8
Gross national product(3) (billion 1968) (factor prices-TL)					3.3
Total	68.7	94.1	134.1	185.0	
Agriculture	26.3	30.5	36.1	42.7	
%	38.3	32.4	26.9	23.1	4.1
					1.9
Income per capita (factor prices 1968-TL)					
Total	2374	2874	3611	4396	
Agriculture	1349	1452	1612	1779	23.6
%	56.8	50.5	44.6	40.5	14.3
Export (million$)					
Total	381.2	522.7	885.0	1753	
Agriculture	295.1	420.7	607.4	1041	
%	77.4	80.5	68.6	59.4	

(1) State Planning Organization, 1978 Program.
(2) State Institute of Statistics, 1977.
(3) State Institute of Statistics, National Income, 1967-1977.

higher yielding varieties, improved animal breeds, better irrigation, fumigation, mechanization, good quality feedstuffs, and new technological practices were all to their advantage. Having such a level of awareness, the farmers began to influence the politicians and government officials, requesting sufficient and timely provision of inputs as needed by the new technical agriculture, and often brought considerable pressure to bear on the government. That is to say, they requested that technical knowledge be accompanied by economic support services.

At this point, I would like to recount an experience of mine. It was in 1964 when the Supervised Credit System was instituted in

TABLE 2: AGRICULTURAL PRODUCTION IN PLAN PERIODS(1)

Indicators	*First five-year plan (1976)*	*Second five-year plan (1972)*	*Third five-year plan (1977)*	*Average Growth rate per year (%)*
Cultivated land(2) (million ha)				
Total	23.9	25.0	24.2	
Fallow	8.4	8.9	7.9	
%	35.0	35.6	32.6	
Inputs(3)				
Fertilizer (000 tons)	1500	3284	6600	29.6
Irrigatable land (000 ha)	8500	8500	8500	
Irrigated land (000 ha)	1115	1939	2600	11.9
%	13	23	30	
Tractors (000)	75	136	335	27.5
Chemicals (000 tons)	40	51	70	7.5
Government investments (billion TL 1971 current prices)				
Total	26.4	81.9	138.5	42.5
Agricultural	4.0	9.7	13.6	24.0
% Realization	15.3	11.8	9.8	
% Plan target	(17.7)	(15.2)	(11.7)	
Growth rate(4)				
Total	6.7	6.8	6.5	
Agriculture	3.2	3.1	3.3	
%	47.8	45.6	50.8	

(1) It represents the last year of the plan.
(2) State Institute of Statistics.
(3) Agricultural inputs and their prices (Ministry of Agriculture 1960-1975).
(4) State Planning Organization, 1978 Program.

two provinces. I worked in the application of this credit system in Erzincan, which was one of these two provinces. The farmers remained somewhat uninterested in the extension people who visited them in their villages because they only made recommendations, whereas we received much interest and attention because we were making five-year operational plans and annual application plans for the farmers. We were putting into operation a complete package deal including all inputs, know-how, and credit. The farmers were obviously attracted to such an approach.

Despite obvious difficulties, the extension service has been very effective and consequently the use of inputs has increased on a large scale. Various indicators can be shown by the five-year plan periods in Table 2.

New Aproaches Derived from Experience

The extension work which I have tried to describe was both wasteful and only advisory in nature, and therefore not fully effective. This is why we introduced the first package practice in 1964 using supervised credit. We started with two provinces, and today we are operating in 40 provinces. The objective was to make a five-year plan of operation and annual plans based thereon and to provide the required know-how and inputs together. In this way, efficient use of the resources and the inputs would be ensured and production controlled to some extent as well. Frankly speaking, I can say that we have had a significant advantage with this system, whereby it is also easy for the credit granted to be paid back.

Later on, we expanded our activities by developing special projects and integrated rural development projects with a view to increasing production, in addition to the above system. The objective of such projects was to carry to the rural areas an effective adult education and extension service together with economic supporting services. At the same time, these programs were of vital importance as they ensured that the technicians lived in and had direct contact with the central villages where producers lived. One technician would be assigned to the central village in the middle of three or four villages where integrated economic and social services would be provided (i.e. one technician for 500 to 600 farm families would carry services to farmers within this area). Also, a foreman would live in each village and would, after certain training, act as a leader in his village and establish contact with the technician located in the central village. In addition, subject specialists (SMS) were made available at the district and provincial levels, thus ensuring contact of the provincial center with the village. This practice has yielded successful results in rural development projects and therefore conventional extension is being leveloped in this direction.

During the present year, we have intensified our activities and started arrangements for agricultural production planning in order

to ensure the most efficient utilization of the agricultural resources available in Turkey. With the implementation of agricultural production planning, production, consumption, exports, provision of inputs, and more effective utilization of the technicians would be ensured and the economy would not be unduly burdened by unwise purchasing and inventory policies.

Planning Efforts in Agricultural Production

In addition to the social, technical, and structural problems of the agricultural sector in Turkey, there is the problem of production planning. As you may know, the main tools of production planning are investment, price, credit, and tax policies. Among them, price policy is the most important and effective in production planning. Over the last decade, the support prices have been determined mainly with reference to the production cost of each commodity. Little attention has been paid to market prospects or the relative price levels between commodities. Prices have not been used as an instrument of planning to encourage the selective expansion of production. In addition, prices have usually been declared too late in the production year to influence the area sown or the use of fertilizers and other inputs. At that time, heavy subsidies were paid on most farm inputs, but these were not directed toward the production of crops which might be considered to have greater priority.

In order to improve the government's capacity for developing its support price policy and production planning, the Ministry of Food, Agriculture and Livestock has established a production planning unit and has been given the authority to prepare a comprehensive program toward this goal. The concepts and work plan have been completed and implementation is underway.

THE ROLE OF SUB-COLLEGIATE AGRICULTURAL EDUCATION IN THE DEVELOPMENT OF THE MIDDLE EAST

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A GREAT DEAL has been written on the sub-collegiate system of agricultural education. Sometimes it is called sub-university (or below university) level, but most of the time it is referred to as intermediate level agricultural education. This title covers a wide range of agricultural education, from higher college level to secondary and sometimes to farmers' level. In developing countries, this range is confined mostly to secondary and vocational education; in a few of these countries, it is post-secondary varying from one to three years. In some European countries, notably Denmark and Switzerland, sub-collegiate or higher intermediate level agricultural education is wholly directed toward the education and training of farmers.

The rapid changes and technological advances in agricultural production, mainly after World War II, and the immense growth of agricultural industries, marketing, and business management have led to greater specialization and a higher level of technological skill. As a result of this revolutionary growth in agricultural production. agricultural education, both at university and intermediate levels, has undergone remarkable changes in its structure, content, methods, and organization. In highly developed countries, particularly the US, there has emerged a type of university level, technological agricultural education which is directed mainly toward the development of agricultural industries, business management, and mechanization. The California Polytechnic College is famous for this type of agricultural education and offers advanced courses for MS and PhD degrees.

In most Middle Eastern countries, the same dramatic changes in agricultural and livestock productivity and output have taken place. In addition, recent years have witnessed immense rural transformation with comprehensive and interrelated economic activities, such as food processing, storage, and marketing; provision of agricultural credit; organization of cooperatives; and village and

community development programs to improve water supply, roads, sanitation, etc. In addition, services for supplying fertilizers, seed, and insecticides, distribution and repair services for implements and farm equipment, and many other technological innovations have been introduced recently, causing a shift from traditional subsistence agriculture to a market economy with rural-urban interaction. Agricultural education must therefore play a more effective role in promoting rural transformation in the Middle East than it has in the past. Agricultural education, particularly the higher intermediate or sub-university level, needs to be re-examined and reorganized so that it can effect a more substantial contribution to rural development in the Middle East.

It is also essential that agricultural education planning in Middle Eastern countries aim at designing major modifications in the content and structure of curricula which reflect the emerging new rural potential and meet the rapidly changing technological features of present-day agricultural production and industry.

The other major factor which has led to changes in the structure of agricultural education is the necessity for educating and training the masses of farmers and cultivators who need to develop new farming skills and expertise of a high order to cope with the demands of modern agricultural production. Most countries have established departments within ministries of agriculture to deal with extension work in agricultural production and homemaking in rural areas. Of course, to supply the needed skilled manpower for extension services requires particular educational standards and technical proficiencies. Furthermore, the numerous employment opportunities in the various activities related and ancillary to modern agricultural production and industry need to be filled by agricultural graduates with a good general education supplemented by adequate practical field experience

In a paper delivered at the Conference of the Association of Faculties of Agriculture in Africa (AFAA) held in Cairo in October 1975, I outlined the wide variety of occupations that are open to graduates of higher and lower intermediate level agricultural education, starting with those performing the functions of checking, supervising, and organizing at a level below that of general policy formulation; those engaged in highly skilled technical activity at a level below that of major decision making; those engaged in

promoting community development activities and extension work; and lastly, those working as artisans, small entrepreneurs, farmers, or independent tradesmen. The first three types of middle level personnel, supervisors, technicians, and extension workers, are considered of major importance in defining the role of sub-collegiate agricultural education in rural development, particularly in Middle Eastern countries.

As a result of the delineation and clarification of the jobs and responsibilities of middle level agriculture personnel, the following conclusions were drawn in the AFAA Conference.

1. There is growing need for middle level agricultural technicians in developing countries as agents for promoting agricultural development and social change in rural communities.

2. The complexity and diversity of jobs for middle level agricultural technicians require a high degree of technical competence and practical skill in evaluating research results and planning, implementing, managing, and supervising agricultural development projects.

3. Middle level agricultural technicians, by virtue of their technical training and intermediate position between the level of management and that of field operations, are most suited for jobs in extension and community organization. Thus, they need intensive training in methods of communication and leadership development.

4. Furthermore, middle level agricultural technicians need adequate and comprehensive training in management and supervision. In particular, they need to be acquainted with managerial problems of agricultural development schemes at the farmer's level, so they can transmit the required technical and leadership skills.

It is important to our forthcoming discussion to assess with greater accuracy the types or levels of agricultural personnel who will be needed for modern agricultural development and industry. In 1966, an attempt (Harvey Report) was made to categorize agricultural personnel as follows:

1. Operatives are workers who carry out routine tasks of a non-specialist nature, having typically acquired their skills on an empirical basis. This is a class of decreasing importance, but the industry for some years to come will still need to absorb a certain number of personnel in this category.

2. Craftsmen are skilled workers who carry out specialized but routine work, with an understanding of the underlying principles.

3. Technicians are workers responsible for a specific production unit, having adequate technical and practical knowledge to comprehend and operate the unit for which they are responsible.

4. Management-technologists are those responsible for the conduct of the business as a whole, having a thorough grounding in the applied natural and social sciences.

5. Technologists are those with advanced qualifications who have studied a technology in depth and can harness it to production.

6. Applied scientists are those primarily concerned with basic principles, and more with their potential application to a technology than with their executive application.

TABLE 1: SYSTEMS AND SUB-SYSTEMS OF AGRICULTURAL EDUCATION

Degree in Agricultural Sciences	Degree in Agricultural Engineering and Technology	
Agricultural Scientists	Applied Scientists	University Level
Research Specialists	Technologists	
	Management - Technologists	
Research Assistants	Technicians	Higher Intermediate (Post-Secondary)
	Craftsmen	Lower Intermediate
	Operatives	Secondary and Intermediate
Research finding in natural and social sciences	Application of research findings for agricultural production and rural development	Production Level
Advance of the science of agricultural production and study of human behavior	Advance of the techniques and art of production and social development	Farmers Groups Communities

The six categories have been found to overlap in most training scheme situations. The curriculum content and course work of most agricultural educational institutions are designed to fulfill the requirements of the six categories. Training in Categories 1 to 3 is offered at higher and lower intermediate agricultural education levels. In advanced polytechnic agricultural colleges of university level, the training of Categories 5 and 6 takes place. The training of management-technologists (Category 4) is an area covering a broad spectrum of businesses and needs a wider range of courses and training experiences. It is therefore dealt with at both university and below university levels. These systems of agricultural education are illustrated in Table 1.

At this stage, I wish to pose the following questions. Are our universities or colleges producing the right type of applied scientists or agricultural technologists? Are our intermediate agricultural education institutions producing a qualified and skillful technician, craftsman, and operator? Of course, the first question is not within my range of inquiry, but the second question could be answered by describing the efforts of some countries in the Middle East and North Africa which have made worthwhile contributions to the advancement of the training of middle level agricultural technicians. These remarkable examples come from Tunisia and Iraq.

I. System of Agricultural Education in Tunisia

Agriculture occupies a dominant place in the economy of Tunisia. For this reason Tunisia has made considerable progress in the mobilization, recruitment, and training of the required agricultural personnel at all levels for balanced and comprehensive agricultural development. To train the required agricultural manpower, Tunisia has developed a system of agricultural education consisting of three main divisions (see Table 2).

A. Agricultural Technical Training Center

There are 24 centers distributed all over the country. Admission to these centers is limited to students who have completed their intermediate education or their first year of secondary education. The duration of training is two years for all the various agricultural specializations, except farm mechanics, which takes four years including workshops, supervision, and practice. The curriculum of

instruction in the centers is made up of 80% practice and 20% theory. There are two centers for the training of girls in homemaking and agricultural practices.

B. Agricultural Secondary Schools

There are seven agricultural secondary schools in Tunisia; an eighth school is concerned with the training of girls. Admission is limited to those who have completed the first phase of secondary education, science or math divisions. The duration of training is four years and graduates are employed as technical assistants. The curriculum content is confined to the study of agricultural technology. Usually the fourth year is either practical agricultural training for those completing their studies in Diploma in Agricultural Technology or a preparatory year for distinguished students who plan to pursue their studies in higher agricultural institutions.

C. Higher Agricultural Education

This system of higher education consists of two main divisions.

1. Higher Institute of Agricultural Technology (Two Years). These higher specialized institutes are post-secondary and below university level and offer a two-year course of 50% practical agriculture. The graduates qualify themselves for the post of Assistant Agricultural Engineer. Each of these eight higher intermediate agricultural institutes is concerned with the education and training for a particular agricultural specialization: drainage and rural development (Magran); rural engineering and farm mechanics (Majaz El Bab); horticulture (Shat Mariam); forestry (Tabralca); animal production (Matir); cereals production (El Kaf); dry farming, pastures, and arid areas (Medineen); and food technology (Tunis). The total number of students in 1976-1977 was 483, 260 in the first year and 223 in the second.

2. University Agricultural Education (Four to Five Years). There are four Colleges of Agriculture in Tunisia with a total of 650 students. Admission requirements are the successful completion of the Certificate in Agricultural Technology from the agricultural secondary school or successful completion of secondary education in science and mathematics. The four colleges are University College of Agricultural Sciences (College of Agriculture) in Tunis (four to five years with advanced studies leading to the MS degree); Uni-

versity College for Rural Development and Mechanization in Majaz El Bab (four years); University College for Horticultural Sciences in Shat Mariam (four years); and National University College of Veterinary Science in Sidi Sabit (51/2 years).

II. Sub-Collegiate Agricultural Education in Iraq

The system of sub-collegiate agricultural education in Iraq consists of the agricultural secondary schools (lower intermediate) and the Institute of Agricultural Technology (higher intermediate).

A. Agricultural Secondary Schools

There are about 13 agricultural secondary schools in Iraq distributed throughout the provinces. The duration of training is three years after the intermediate level. Graduates are offered certificates in agricultural practices together with secondary school completion certificates; they can then be employed as assistant extension workers in the Ministry of Agriculture.

Until recently, the secondary agricultural education in Iraq was a closed system, and usually the graduates had no access to higher agricultural institutes or university education of any type. The idea behind this policy was that graduates were supposed to go back to farming in their rural communities, but unfortunately they were discouraged from pursuing farming careers, and finally ended up in government jobs. Since 1975, graduates of agricultural secondary schools have been admitted to the post-secondary level institutes of agricultural technology.

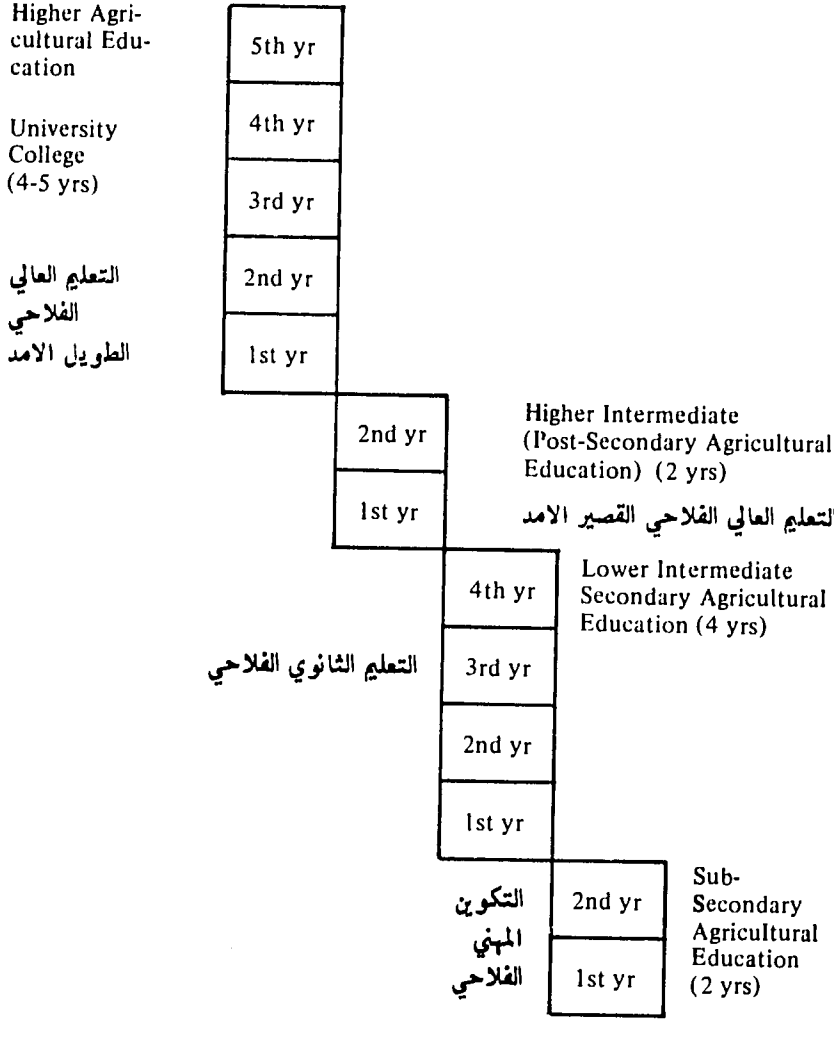
B. Institutes of Agricultural Technology

The Institute of Agricultural Technology at Abu Gharaib was established in 1965 under the auspices of the University of Baghdad, but in 1971 this institute together with other institutes established at Eski Kalek in the north and Missan in the south were also affliated to the Ministry of Higher Education and Scientific Research. Training is limited to two years and students are admitted from the scientific sections of general secondary schools and not from agricultural secondary schools.

During the early years of the Institute at Abu Gharaib, the curriculum consisted of general agricultural sciences in the first year and specialization in agronomy, horticulture, soils, plant protec-

TABLE 2: LEVELS OF THE AGRICULTURAL EDUCATION SYSTEM IN TUNISIA

اقسام التعليم الفلاحي في تونس



tion, and animal husbandry in the second. Students obtained their practical agricultural experience in organized sessions of on-the-job training in the Ministry of Agriculture; sometimes they were sent to Holland during the three-month summer vacation to practice as farm workers under the supervision of Dutch farmers.

C. Curriculum Planning for Intermediate Level Agricultural Education

The UNDP/FAO Project (1969-1975) in the Institute of Agricultural Technology at Abu Gharaib developed a two-year specialization curriculum of teaching and training which was adopted in the 1971-1972 school year. After graduating three classes in this advanced curriculum, the project organized a research survey to assess the content of various curricula adopted by the Institute since its establishment in 1965. The objectives of the research survey were to:

1. Obtain the required information and data for the proper evaluation of the various teaching and training curricula and define suitable criteria for curriculum planning and revision, in order to increase the relevance of teaching and training to agricultural development projects.

2. Improve instructional content and methods and strengthen pedagogical techniques for higher educational achievement, particularly in the teaching and training of specialized courses.

3. Update the contents of specialized courses in the light of new trends of adaptive research and development.

4. Design and adopt new specialized courses to train graduates in modern aspects of business administration and developmental organization and increase their efficiency in the formulation and implementation of extension education programs and farmer training courses.

5. Introduce a system of in-service training for follow-up of graduates in their employment locations at government ministries, in order to strengthen their proficiency in areas of specialization and to improve working conditions and relationships.

6. Train the Institute teaching staff in research procedures and field surveys for collection of data and information for curriculum planning purposes.

An attempt was made to use the Delphi study method to assess the ideas and recommendations of three types of population on the effectiveness and validity of the three teaching and training curricula that were in operation in the Institute during the periods 1965-1969 and 1969-1970 and the new curriculum in operation during the period 1971-1975, in which three classes completed their graduation requirements.

The population of this study consisted of the graduates of the Institute of Agricultural Technology at Abu Gharaib (Phase A); employers of Institute graduates, chosen from directors, administrators, agricultural engineers, and specialists, working in the various ministries and departments concerned with agricultural production programs and policy formulation at the national level (Phase B); and Institute teachers and heads of departments, together with any part-time teachers from outside the Institute who have taken part in all the activities of curriculum planning, organization, and management in the Institute (Phase C).

The study as a whole utilized three types of mailed questionnaires. The Delphi technique was used to obtain group opinion about necessary revisions and changes in the Institute's teaching and training curriculum. The study aimed at obtaining a wide consensus, with room for legitimate differences of opinion. Mailed questionnaires were sent to each group of respondents with feedback from each round of questions being used in succeeding rounds to get the best and soundest judgments, proposals, alternatives, and solutions for a more efficient and effective system of high intermediate level agricultural education in Iraq.

The UNDP/FAO project ended in December 1975; only Phase A of the study was completed and the Final Report was prepared in March 1976. A detailed questionnaire was applied to three samples of 184 graduates who were trained at different intervals in the Institute under different curricula as follows: 24-month course (1965-1969), 18-month course (1969-1971), and two nine-month courses (with two summer vacations) adopted by UNDP/FAO between 1971 and 1975.

Most of these graduates were employed by the Ministry of Agriculture in its various departments, some worked as teachers, and only two were self-employed as farmers in their localities. In brief, the study has revealed the following. Most of the graduates indi-

cated that they joined the Institute because they had no other options. The students with GCE (from general secondary schools) performed better as students and as agriculturists than those students from agricultural secondary schools. The majority of students based choice of specialization on prospects of future employment. The major problems faced by graduates were: not working in their field of specialization, being involved in administrative work, and having to work as assistants in research institutions, a type of work for which they were not adequately trained. The majority felt the need for refresher courses to be organized by the Institute. Those who were appointed as managers of agricultural cooperatives felt the need for training in cooperatives and rural community organization projects, as they had been given very little information about these areas during their Institute studies.

The following were graduates' views and recommendations about curriculum revision and improvement.

1. Full-time, qualified teachers specially trained in teaching agricultural technology must be recruited. The Institute should not depend on part-time teachers from colleges of agriculture, ministries, and departments.

2. The assistants, laboratory specialists, and farm managers should be further trained to perform their duties effectively and should not be allowed to undertake the teaching of theory courses or replace full-time teachers.

3. For effective adoption of the curriculum in specialized courses, the graduates felt that the laboratories should be updated and supplied with modern equipment, and teaching aids, such as audio-visuals, should be available in lecture rooms.

4. The extent of specialization at the theoretical and practical levels should be intensified.

5. Training should be extended to four years and graduates should be granted BS degrees in applied agricultural technology.

6. The students indicated the apparent lack of suitable textbooks, publications, and printed lectures and urged the expansion and improvement of the library facilities and the availability of science books, periodicals, bibliographies, etc. both in Arabic and English.

7. Concerted effort should be made to integrate teaching and training in the Institute with the present agricultural revolution (or "Green Revolution") in Iraq so that the Institute and its graduates will make a real impact and effective contribution.

8. Some courses should be taught in English, particularly specialization courses.

9. The following courses should be introduced into the curriculum: development organization, economics of agricultural production, farm management, farm accountancy and bookkeeping, cooperative organization of collective farms and state farms, etc.

10. A "research project" course should be introduced for final year students in some problematic aspects of their areas of specialization. This type of individual research project should continue during the second year of specialization and have relevance to their prospective jobs after graduation.

11. A department of higher studies should be established in the Institute in connection with similar institutes of agricultural technology or institutions of applied research in Iraq or abroad.

12. An adequate placement program must be adopted to ensure that Institute graduates occupy jobs within their areas of specialization and are given appropriate titles and salaries.

13. Periodic evaluation of curriculum content and organization must be carried out in consultation with authorities in the Ministry of Agriculture and other concerned departments. Students' as well as graduates' points of view on the curriculum should always be considered when evaluating curricula.

14. The following course plan should be adopted: first year course includes all fields of agricultural specialization; second year is divided into six months of practical agriculture in the Institute and six months of training abroad.

III. Importance of Sub-Collegiate Agricultural Education in the Middle East

It must be emphasized that agricultural education planners, particularly in Asia and Africa, adopted from the beginning a narrow view of the concept of sub-collegiate or intermediate level agricultural education, which caused a considerable lag in its develop-

ment. In most countries, it is regarded as a separate system of agricultural education and is run on an ad hoc or temporary basis. In fact, the 1970 World Conference on Agricultural Education in Denmark emphasized "the importance of recognizing that connections between all levels of agricultural education, including university level, are more important than the differences between them," and stated that "the total system of agricultural education and training in any country gains enormously from having a well integrated and planned structure which makes maximum use of all available resources."

Tunisia offers a model of a system of agricultural education with all levels connected and interrelated and a curriculum well geared to conditions and problems of agricultural production and rural development in Tunisia. The specialized higher institutes of agricultural technology have contributed greatly to the production, processing, and marketing of the most important agricultural commodities and cash crops. The lower intermediate type of training institute has played a remarkable role in training agricultural operators, craftsmen, and farmers of all ages and levels and has helped to build the broad base of agricultural development in Tunisia.

The role of intermediate level agricultural education in the development of the Middle East as a whole, or in national development, has been illustrated in numerous papers and in many conferences and seminars. It would be worthwhile in this context to outline the main areas of potential development which can be tackled by graduates from institutions of intermediate level agricultural education.

1. Graduates of intermediate level education are effective forces of change, especially valuable as extension workers for modernizing agricultural production on a commercial basis and introducing mechanization and improved farm implements and tools.

2. The problems of rural transformation are partly human as well as technological. Therefore, intermediate level personnel are best suited to work in agricultural settlement areas with rehabilitation schemes for nomads and bedouins, as community organizers and managers of cooperatives, and in other rural development activities.

3. In the Ad Hoc Consultation on the Planning and Methodology of Intermediate Level Education held in Khartoum in December

1971, the participants stressed the training of middle level agricultural technicians, the creation of positive attitudes toward agriculture and rural development, dedication toward national goals, and orientation toward specific jobs, especially at the higher intermediate level.

4. In addition, the Consultation added that "intermediate institutions should serve the rural communities by offering training for farmers, act as a link between applied research and extension, and, in more general terms, help to enlighten the rural mind and promote scientific and reflective thinking."

5. The nature and diversity of the work of middle level technicians raise many questions about the methodology and approach to problems of training, especially in the area of specialization. However, experience has shown that inflexible, tailor-made training has too often caused graduates to lose their jobs due to sudden technological changes in production operations for which they were not prepared. The system of training in the Institutes has not built in an awareness and expectation of rapid technological development in agricultural production. To avoid such situations, flexibility in outlook and acquired skills should be instilled in Institute graduates to enable them to make the required adaptations whenever sudden changes occur.

6. For the purpose of enabling middle level technicians to acquire the required technology, there must be a fully equipped institutional farm and a Productive Training Unit, run on a commercial basis, so that students can learn, in addition to the technology of production, the business of farming with its profits and losses.

7. The policy of establishing individual specialized institutes, such as potato production, processing and marketing of olives, animal production, etc., will call for more concentration and broader specialization in the training of graduates and will make an effective contribution to the development and progress of the agricultural industry in the country or region.

8. As indicated earlier, university agricultural education could produce a healthy and useful dichotomy by providing undergraduate and postgraduate studies in agricultural sciences and in agricultural technology and applied research. The agricultural science graduates would serve the advancement of research and science of pro-

duction and the other graduates would be concerned with applied research and technology for the development of production techniques and skills. Both types of university agricultural graduates need a comprehensive and thorough grounding in the applied aspects of the social sciences, particularly business management, development organization, and adult education.

9. The future development of sub-university, higher or lower intermediate level agricultural education, and even university technological agricultural education, as systems or sub-systems depends on adequate educational research that will help clarify objectives, priorities, and benefit-cost calculations. Research findings on emergent issues should also provide guidelines for the improvement of educational planning, curriculum revision, and policy-making. In particular, intermediate and university level technological agricultural education needs to explore the following areas:

1. Harmonizing the planning of manpower with the planning of agricultural education.
2. Improving occupational-educational linkages.
3. Increasing the contribution of agricultural education to rural change.
4. Providing educational evaluation at all levels.
5. Improving the teaching force.
6. Expanding and improving the extension education of universities and other institutions.
7. Advancing educational planning and management through the wide participation of all concerned ministries, agencies, and other interested institutions and groups.

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THE ROLE OF AGRICULTURAL EDUCATION IN THE DEVELOPMENT OF BANGLADESH AGRICULTURE

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EDUCATION PLAYS A VITAL ROLE in improving man's level of understanding and intellect and makes him a more useful and productive member of society. That is why education has been accorded so much importance in Islam. The Prophet of Islam directed his followers to travel far and wide in search of education.

Agricultural education in modern times plays a pivotal role in raising the level of technical skill and understanding of the farmers and others concerned in facilitating widespread adoption of modern technology and innovations in agriculture. Agricultural development necessitates increasing the application of scientific and technological advances. It is only through increasing the dissemination of agricultural education in various forms that this technology will have a greater chance of application on the farms. The purpose of this paper is to highlight the development and expansion of agricultural education in Bangladesh and the role that it has played so far in the modernization of Bangladesh agriculture.

For the purpose of this presentation, the system of agricultural education has been classified into two broad categories: formal and informal. In the formal system, knowledge of modern agricultural practices is transmitted to the students at the primary to university level. The informal system depends upon various institutions and individuals outside the formal schooling system, for example, training programs organized for farmers and various rural institutions, as well as the dissemination of agro-technical "know-how" through various communications media.

The formal agricultural education system in Bangladesh has been accorded growing importance because of its great potential to bring about agricultural modernization. The Government of Bangladesh has been particularly conscious of the importance of agricultural education at the primary and secondary levels, because of the large-scale dropout of students at these levels in rural areas. Only a small proportion go beyond the primary and secondary

levels to enter higher levels of education. It is therefore necessary that students in the primary and secondary levels be given sufficient grounding in agriculture to help them when they enter the farming profession after leaving school.

In order to facilitate the preparation of appropriate teaching materials for agriculture at the primary and secondary levels, the Government set up a Curricula and Syllabus Committee in 1960. In line with the recommendations of this committee, formal courses in agriculture were introduced in Classes V to X. Some general aspects of agriculture were also taught along with basic sciences in Classes III and IV. Subsequently, agricultural courses were introduced at the higher secondary level (Classes XI and XII). These courses were also introduced as elective subjects. In addition, the school authorities had the option of introducing agricultural courses wherever the required facilities for teaching agriculture could be provided.

The Government of Bangladesh subsequently constituted in 1976 another Curricula and Syllabus Committee, which has submitted two reports, one on primary education and the other on secondary education, with details of curricula and syllabi and instructions for teaching. The report on agricultural education at the higher secondary level (Classes XI and XII) is still in preparation.

In the light of the latest policy decisions of the Government with respect to primary education, there will be no formal and separate courses on agriculture at the primary level, but some basic information on agriculture will be given through specially introduced courses entitled *"Paribesh Parichiti"* (Introduction to Environment) in Classes I and III. Class I will be given general information on food and its sources and nutrition. Additional information on food and its preservation and nutrition will be given in Class II. It is only in Classes III to V that some aspects of modern agriculture will be included in the *"Paribesh Parichiti"* science group, along with general information on geography, geology, physics, chemistry, health, and nutrition. The contents of the syllabus for Classes III to V will include information on soil, water, plants, food and nutrition, population, and agricultural systems in Bangladesh, in addition to some general knowledge about agricultural development. In view of the wide dispersion of primary and secondary schools in the rural areas, qualitative improvements in

education will contribute greatly to raising the level of understanding and skill of these students, the majority of whom enter the agricultural profession either on completing school or as dropouts due to various compelling socio-economic reasons.

The Ministry of Agriculture and Forests in Bangladesh has presently no direct involvement in the administration of education at the primary and secondary levels. Nevertheless, in view of the great importance of agricultural education at these basic levels, the Ministry instructed its field level staff to assist the primary and secondary schools in teaching agriculture wherever practicable. This was necessary because of the shortage of teaching staff and teaching materials. Horticultural education has also been introduced at selected primary schools with assistance from UNICEF and in cooperation with the Ministry of Agriculture and Forests. Under this program, a number of summer and winter vegetables with greater nutrititional value are being cultivated by primary school students to whom packets of seeds and other inputs have been distributed. Training programs for selected primary school teachers were organized at each of the country's 47 Primary Training Institutes. Teaching materials for agriculture were also prepared and widely distributed to the primary school teachers covered under the program. The instructors and other officials of the Primary Training Institutes were also given training to enable them to teach agricultural subjects more effectively. In addition, seminars, conferences, and workshops were organized at various levels for this purpose.

At present, separate agricultural courses are being taught as elective subject to Classes VI to X in selected secondary level schools in rural areas. The Curricula and Syllabus Committee has recommended that agricultural education be presented as one of the four *"Kormomukhi Shikkha"* ("Work-oriented Education") with four main subject areas: agriculture, industry, social welfare, and home economics, which should be started in Class VI and continued up to Class X. This committee has also spelled out detailed course contents for agriculture in the above-mentioned classes.

Presently, agricultural courses have been introduced in a selected number of higher secondary level schools (Classes XI and XII). For such courses, agriculture is one of three compulsory subjects, the others being chemistry and biology, while any of the seven

subjects such as mathematics, physics, or economics can be taken as optional subjects. So far, 60 private colleges have introduced agricultural courses at intermediate level. There has been, in recent years, a tremendous demand in rural communities for the introduction of agricultural courses at the intermediate level, for which increased Government involvement and funding are being sought. Unfortunately, due to various constraints, optimum results could not be derived from the introduction of such courses. These problems relate particularly to inadequate and untrained staff, insufficient teaching materials and aids, lack of adequate training facilities, and the unavailability of demonstration farms with the required facilities. This is an area in which the Ministry of Agriculture and Forests is becoming increasingly involved, with a view to making some useful contributions toward the improvement of teaching in agricultural education.

It should be understood that it is not an easy task to make an educational system strongly biased in favor of agriculture, particularly in those countries having a predominantly subsistence-oriented agrarian economy where returns from agriculture are still not high enough to give it much status. With the agricultural profession gradually becoming more profitable there has been a commensurate increase in public demand and pressure in Bangladesh to broaden the scope of agricultural education both in qualitative and quantitative terms. The Ministry of Agriculture and Forests has also been in touch with the Ministry of Education and other concerned agencies with a view to removing some of the impediments in the dissemination of agricultural education through primary, secondary, and higher secondary levels.

In regard to higher education in agriculture, a substantial breakthrough has been made in Bangladesh. One College of Agriculture and one University of Agriculture are already functioning. The graduates of these two institutions are primarily manning various agencies under the Ministry of Agriculture and other allied organizations, especially in the field of extension, research, input management, and irrigation. Besides, their services are being increasingly utilized by credit and cooperative agencies.

Great emphasis has been placed on improving the quality of agricultural education at these two institutions. Teachers at these institutions are being increasingly involved in research, extension,

and various other development programs so that they gain valuable experience which can be passed on to their students. They are also becoming increasingly involved in the study and evaluation of various development activities of the Government, particularly those of the Ministry of Agriculture and Forests. These efforts are aimed at making the teaching of higher agricultural education more pragmatic, realistic, and productive. The University of Agriculture, in particular, is becoming involved in training officials of agricultural extension and allied agencies. One Graduate Training Institute has already been set up in the University for this purpose.

Priority has to be given to agricultural education not only at the primary and secondary levels but also at higher educational levels. Both types of education are essential to the all-round development of agriculture, as they are mutually supportive and reinforcing.

Some sort of formal agricultural education is presently being given to prospective employees of various agencies serving the agricultural-rural sector. They are also being offered training at the Thana Training and Development Center (TTDC). This center is an improved and expanded system of rural administration promoting interdepartmental coordination and combining services, supplies, and training which are easily accessible to the villagers. Under such a program, farmers receive intensive training from the various officials of agriculture and allied agencies posted at the thanas where TTDCs are located. These centers are innovative institutions which have been operating quite successfully over the years, contributing substantially to the production of a large number of trained agriculturists and to the development of rural infrastructure through Rural Works and Thana Irrigation Programs.

Farmers are also being advised by agricultural extension and other concerned agencies on various technologies in agriculture. Under the Farm Broadcasting Program of Radio Bangladesh, farmers are being reached regularly to educate them on improved agricultural management practices. Priority has also been given to the development of appropriate agricultural research findings so that these can be transmitted to the farmers through extension and various communications media, as well as through students at various levels of formal agricultural education.

No one would deny that the stage of development of agricultural education is indicative of the state of agricultural develop-

ment of any country. Without an effective and efficient agricultural education system no country can hope to make substantial progress in the process of agricultural development. In Bangladesh, such a process has already been started in earnest.

This conference has given us the unique opportunity and privilege of discussing such an important issue, of sharing mutual experiences, and of learning from one another. The deliberations of this conference and recommendations emanating from it will prove highly beneficial to the participating countries of this region and will help them reorient their strategies toward making agricultural education a more powerful and effective vehicle for ushering in rapid modernization and development of agriculture. I congratulate the organizers for their wisdom and efforts in successfully convening and conducting this conference.

DISCUSSION SUMMARY

The importance of middle level agricultural education for farmers was stressed. It was pointed out that UNESCO is also concerned with problems of developing areas and promotes adult education. This organization has adopted the concept of integrated rural development. It was stated that UNESCO works closely with other international organizations involved in rural development. Some speakers called for seminars on rural development.

The need for an association of colleges of agriculture in the Middle East was stressed. It was pointed out that some of these colleges, i.e. Mosul in Iraq, may be better equipped than most US colleges. It was also stated that Iraq is involved in rural development and that places in agricultural colleges are allocated according to government estimates of national demand.

The concept of planning educational training for specific terminal objectives was debated. Some felt that programs should be tailored to meet the requirement of the graduate at each educational level. Others felt that an educational system should be open-

ended, allowing the student flexibility to advance from one level to another if he so chooses. Thus, it would be possible for somebody with a terminal diploma from a middle level institution to advance to university level. The point was made that students from secondary schools are better equipped educationally than those from agricultural secondary schools. The root causes of this discrepancy should be examined. The constraints to the effectiveness of education at all levels also need to be examined.

CONFERENCE CONCLUSIONS AND RECOMMENDATIONS

Preamble

From many standpoints agriculture is the most important industry in the Middle East, and there is need to enhance the image of agriculture as a professional discipline, thus encouraging outstanding youth to enter the field.

General Conclusions and Recommendations

1. Governments, international agencies, and agricultural educational institutions should give top priority to food, nutrition, and educational needs in their respective areas, taking into consideration that these are basic activities in the agricultural and rural development field.
2. Agricultural colleges should be encouraged to participate in the planning of national rural and agricultural development projects, and they should be called upon as a valuable resource in assisting in such planning.
3. At the present time, there is inadequate utilization of technically trained agricultural graduates in the Middle East, and it is recommended that attention be given to more effective placement and subsequent utilization of technically trained men and women.
4. Since rural women in the Middle East are already heavily involved in the processes of agriculture, it is recommended that steps be taken to provide them with access to village-based projects in agricultural methods, sanitation, nutrition, and others; women should be involved at all levels (local, provincial, and national) in the planning of appropriate projects.
5. There is need for greater coordination and more integration of existing resources for meeting basic food and nutrition needs of the Middle Eastern countries.
6. There should be cooperation and coordination between agricultural colleges and international agencies involved in agricultural and rural development programs.

Conclusions and Recommendations for Higher Agricultural Education in the Middle East

1. Higher agricultural education should always be enriched with practical field experience during the course of study.
2. A basic knowledge of human nutrition should be required of agricultural college graduates. (The knowledge may be provided by a required course.)
3. Agricultural college students should be trained in community service and development.
4. Agricultural colleges should organize refresher courses, short courses, and round table discussions to be offered on a continuing basis.
5. Agricultural colleges should involve their alumni in evaluating, at regular intervals, the type of training they have received and the training currently being offered.
6. The professional staff of agricultural colleges should be in constant touch with local people and familiar with current rural and agricultural problems in order to improve their teaching and research methods and to guarantee their relevancy.
7. Agriculture college students should be given experience in identifying problems and learning where to find answers (such as effective use of libraries and utilizing research results). Case studies may be used to advantage.
8. Agricultural colleges should place more emphasis on recruiting students from agricultural-rural areas.
9. Professors in the different colleges of the Middle East, after acquiring experience in the area, should write textbooks in their specialities, adapted to local conditions.
10. Professors should attend international congresses and conferences in their field of specialization, and institutions should attempt to seek all possible sources of funding for travel.
11. Additional emphasis in the curriculum of agricultural colleges should be given to communicative skills, human sciences, pedagogy, and international development (such as the world economic order).
12. Agricultural colleges should coordinate their programs with the needs of the employers of the graduates of the colleges.
13. There should be an ongoing exchange of ideas and much greater communication among all agricultural colleges of the Middle East and Arab World.

Conclusions and Recommendations for Sub-Collegiate Agricultural Education in the Middle East

1. The teaching of agriculture and nutrition in rural areas should be instituted at both the primary and secondary school levels. (This should be accomplished through formal instructional means as well as indirectly through farm youth organizations.)
2. The mass media should be utilized to provide learning for all, including those who are illiterate.
3. Fully equipped farms or production training units ranging from small to large, and involving various levels of investment and technology, should be established in intermediate institutions to enable students to learn the required skills.
4. The objectives of each level of education should be agreed upon and publicized.

Conclusions and Recommendations for Agricultural Extension in the Middle East

1. Greater integration and coordination between various development programs in rural areas are high priority needs.
2. Extension and research personnel should communicate and enter into dialogue so that research findings can easily and promptly be disseminated and applied.
3. Extension must be viewed by national agricultural and rural development leaders as a two-way process so that researchers are made aware of the needs of farmers without delay.
4. Extension should be an important function of university programs, including training.
5. In view of the reportedly slow growth of agriculture in response to extension work over a long period, agricultural universities should do research on factors responsible for this state of affairs.
6. Extension programs should be responsive to the recognized needs and aspirations of farmers and rural people. (This can best be done by getting farmers and villagers involved in both planning and implementation.)

CONFERENCE OVERVIEW

THE CONFERENCE on the Role of Agricultural Education in the Development of the Middle East attracted a wide cross section of representatives from the different agricultural sectors of countries in the Middle East and the Arab World, as well as from international organizations involved in the development process. More than 200 persons attended the opening ceremonies. Of these, 92 participants, in addition to FAFS faculty members, research assistants, and graduate students, attended half or more of the conference sessions. The participants represented 14 countries, 15 international and nine national organizations or agencies, and several commercial firms in the private sector. The participants included deans of agricultural colleges in the region; high-ranking government officials from ministries of agriculture, education, and planning; administrators and regional representatives from international organizations; and leading agri-businessmen.

The countries represented were Bangladesh, Egypt, Federal Republic of Germany, Iraq, Jordan, Lebanon, Pakistan, Saudi Arabia, Sudan, Syria, Turkey, United Arab Emirates, United States, and Yemen Arab Republic. The following international organizations were among those represented: Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD), Food and Agriculture Organization of the United Nations (FAO), Ford Foundation, Gulf to Gulf Corporation, International Center for Agricultural Research in the Dry Areas (ICARDA), International Labor Organization (ILO), Mennonite Central Committee, Middle East Council of Churches, Rockefeller Foundation, Save the Children Federation, United Nations Development Program (UNDP), United Nations Economic Commission for Western Asia (ECWA), United Nations Economic, Social and Cultural and Organization (UNESCO), United Nations World Food Program, and United States Agency for International Development (AID).

The opening ceremony was given full coverage by television, radio, and the press. In his opening address, H. E. Amin Al-Bizri,

Lebanese Minister of Agriculture, spoke of the role of the American University of Beirut in the development of the Middle East and called on the delegates to start a "Green Revolution." Welcoming addresses were also delivered by the President of the University, Dr. H. E. Hoelscher, the Dean of the Faculty of Agricultural and Food Sciences, Dr. J. L. Fischer, and the Chairman of the Conference Organizing Committee, Dr. A. T. Saad.

The keynote address was given by Mr. C. H. Raullerson, Assistant Administrator, AID, Washington, DC, who drew from his personal experience, as well as the international experience of the past 25 years, and asked what valid conclusions, if any, could be made for the benefit of the countries present from either the past or the present international scene. He brought a perspective to the conference which many agriculturists have tended to overlook or ignore. All who heard his speech were made to feel that a new day is dawning for *all*.

In Plenary Session I, the participants in the conference were given a better understanding of the food, nutrition, and agricultural situation in the Near and Middle East from the perspective of the four major sets of actors in the national development process: (a) the planning agencies and ministries of finance – responsible for formulating overall strategies for national development and allocating scarce resources (including sector budgets) at the national level; (b) the operating ministries, such as agriculture and rural affairs – responsible for implementing programs and policies; (c) private and public suppliers of goods and services – responsible for making productivity-increasing goods and services available to agriculture and the food industries; and (d) educators – responsible for manpower development and training. Following the Plenary Session, a brief, provocative paper shaped the issues and outlined alternative strategy choices.

A paper on technology choices led into Plenary Session II, narrowing the focus of the conference toward the specific issues facing training and educational institutions. Two papers in Plenary Session II described the US and European models for development and their education-research components, along with an indication of their adaptability to the Near and Middle East; a third paper indicated what could be learned from sectoral analyses. The discussion of the models stressed what *is* and *is not* applicable in the Near and Middle East.

The orientation of the conference then shifted from "what is" to "what ought to be"; papers and discussions began to emphasize the specific business of education and training. Dean Robins asked whether higher and other forms of education could be improved by first identifying what is needed in the end product (graduate) and then, through the process of backward chaining, determining what should be the content of educational programs. The answer was affirmative, and as a result the challenge to which those in higher education must respond was greatly expanded. Higher education impacts on all levels of the development process, i.e. it trains the trainers, influences the pattern of non-formal education, and establishes the limits to development.

By the time the conference had entered its final stage, it was truly a working conference. In all sessions, the participants were thinking through what was being said in the papers and through discussion and constructive debate reorienting themselves in terms of their own jobs and roles in life. It became clear that major benefits from the conference would occur as a result of changes in participants' own jobs and positions upon their returning home. The final official business of the conference was devoted to a discussion and approval of general conclusions and recommendations covering the role of higher agricultural education, sub-collegiate agricultural education, and agricultural extension in the development of the Middle East.

The social program included a reception at Marquand House hosted by AUB President Hoelscher, dinners hosted by Dean Fischer and by the Agriculture Chapter of the AUB Alumni Association, an international dinner organized by the FAFS students, and a luncheon at the Agricultural Research and Education Center (AREC). The receptions, excursion, coffee breaks, and dinner meetings served as important opportunities for informal dialogue among participants. A post-conference excursion to AREC and the ruins of Baalbeck was organized for the participants.

This document represents the proceedings of the conference. Those who read the various papers should benefit because they include many ideas for consideration. The Conference Organizing Committee asked for and received thought-provoking papers. They are based on extensive field observation, experience, and research. The recommendations merit special reading because every effort

was made to attune them specifically to conditions in the Near and Middle East, and many convey strong opinions about what should and should not be done. This document, like the conference itself, is a product of talent, dedication to purpose, and zeal. As was recognized in another conference recently, this is a powerful combination.

Finally, it seems fitting to conclude by quoting Minister Al-Bizri's optimistic view of the future. "We wait impatiently for the day when we can witness the armies of the world made up of farmer soldiers riding tractors instead of tanks and planting the soil with wheat and other grains instead of bombs."

Adib T. Saad, Chairman
Conference Organizing Committee

CONFERENCE PROGRAM

Tuesday, April 24, 1979

15:00	Registration and Coffee, Agriculture Building.
16:30	Opening Ceremony and Welcome Addresses, Agriculture-Science Lecture Hall. Dr. A. T. SAAD, Chairman, Conference Organizing Committee, AUB. Dr. H. E. HOELSCHER, President, American University of Beirut. His Excellency A. Al-BIZRI, Minister of Agriculture Lebanon. Dr. J. L. FISCHER, Dean, Faculty of Agriculture, and Food Sciences, AUB.
17:00	**Keynote** Address: What We Have Learned from Twenty-five Years of Agricultural Development: An International Perspective. Mr. C. H. RAULLERSON, Assistant Administrator, AID, USA.
18:30-20:00	Reception at Marquand House.

Wednesday, April 25, 1979

8:00	Registration, Agriculture Building.
9:00	**President's Address**: Appropriate Choices of Technology for Agriculture and Food Systems Development. Dr. H. E. HOELSCHER, President, AUB. Chairman: Dr. J.L. FISCHER, AUB. Rapporteurs: Mr. M.N.H. Miah, Bangladesh. Dr. N.S. Kawar, AUB.
10:00	Coffee.
10:30	Plenary Session I. Agricultural Institutions and Human Resources Serving the Agricultural Sector in the Middle East:

A Situation Report and Problems from the Perspective of:
A Planner. Dr. A. FAROUK, Member, Planning Commission, Bangladesh.
An Operating Ministry. Mr. A. AJAJI, Deputy Minister, Ministry of Agriculture and Water, Saudi Arabia.
An Educator. Dr. S. QASEM, Dean, Faculty of Agriculture, University of Jordan, Jordan.
A Purveyor of Inputs and Services. Mr. F. NAJJAR, Director, Najjar Agricultural and Trading Co., Lebanon.
Moderator: Dr. G. EL-HARIRI, Dean, College of Agriculture, University of Aleppo, Syria.

12:30 Lunch Break.

14:30 Discussion Session A.
Planning for Meeting Basic Food-Nutrition Needs and Agricultural Development.
Chairman: Dr. M. S. KAKLI, Chief, Agriculture and Food, Planning Commission, Pakistan.

15:15 Discussion Session B.
Role of Higher Education for Meeting Basic Food-Nutrition Needs and Agricultural Development.
Chairman: Dr. B. ALAWI, Dean, College of Agriculture and Forests, Mosul University, Iraq.
Rapporteurs:
Mr. T. Kivanc, Turkey.
Dr. R. Tannous, AUB.

16:00 Coffee.

16:30 Discussion Session C.
Role of Extension in Agricultural Development.
Chairman: Mr. H. NAJJAR, Najjar Agricultural and Trading Co., Lebanon.
Rapporteurs:
Dr. A. Kassem, Syria.
Dr. F. Al-Haj, AUB.

Thursday, April 26, 1979

9:00 Lecture Statements.
Agricultural and Rural Development: Issues and Strategies.
Dr. J. L. FISCHER, Dean, Faculty of Agricultural and Food Sciences, AUB.
Implications for Education of Recent Experiences in Agricultural Sector Analysis.
Dr. J.T. RIORDAN, Deputy Chief, Rural Development Division, AID, USA.
Chairman: Dr. A. W. WATSON, ICARDA, Syria.
Rapporteurs:
Mr. H. Al-Salahi, Yemen Arab Republic.
Dr. B.A. Stewart, AUB.

10:00 Coffee.

10:30 Plenary Session II.
Models of Institutions for Human Resources Development in Agriculture: Case Studies and Their Relevance to the Middle East.
Speakers:
US Model. Dr. O. G. BENTLEY, Dean, College of Agriculture, University of Illinois, USA.
European Model. Dr. H. C. WELTZEIN, Director, Institut für Pflanzenkrankheiten, University of Bonn, Germany.
Third World Innovation. Dr. A. A. S. HEIBA, Regional Advisor in Agricultural Projects, ECWA, Lebanon.
Moderator: Dr. A. MIDANI, Deputy Representative, World Food Program, Lebanon.

12:30 Lunch Break.

14:30 Discussion Sessions.
Training of Human Resources for Meeting Basic Food-Nutrition Needs and Agricultural Development. The Role of Higher Education: An Input-Output Approach.

Lecture Statement: Dr. J. S. ROBINS, Dean, College of Agriculture, Washington State University, USA.
Session A.
How Would the Current Graduate of a Middle Eastern College of Agriculture Be Described?
Chairman: Dr. A. S. TALHOUK, Senior Entomologist, AWRC, Saudi Arabia.
Rapporteurs:
Mr. H. Mobarak, UNESCO, France.
Dr. J. Asmar, AWRC, Saudi Arabia.

15:45 Coffee.

16:15 Session B.
How Should the Future Graduate of a Middle Eastern College of Agriculture Be Described?
Chairman: Dr. A. G. H. KHATTAB, Dean, Faculty of Agriculture, University of Khartoum, Sudan.

17:00 Session C.
The Role of Women in Meeting Basic Food-Nutrition Needs and Agricultural Development in the Middle East.
Chairman: Dr. B.A. SCHICK, Visiting Lecturer in Nutrition, University of Jordan, Jordan.
Rapporteurs:
Dr. A. M. Ali, Sudan.
Dr. J. Turnlund,AUB.

19:00 International Dinner.

Friday, April 27, 1979

9:00 Plenary Session III.
Higher Agricultural Education Systems in the Middle East.
Speakers:
Curricula and Methods of Instruction. Dr. F. BADR, Professor, College of Agriculture, Egypt.
Faculty: Qualifications and Professional Development. Dr. N. B. BASNYAT, Dean, Institute of Agriculture and Animal Sciences, Nepal.

Extension and Adult Education. Mr. N. AYDIN, Deputy General Manager, Planning, Research, and Coordination, Ministry of Agriculture, Turkey.
Sub-Collegiate Agricultural Education. Dr. S.E. NOAH, Officer, Regional Agricultural Extension, Education and Training. FAO, Egypt.
Moderator: Dr. H. TAYIM, Director, AWRC, Suadi Arabia.
Rapporteurs:
Dr. A. W. A. El-Moursi, FAO, Lebanon.
Dr. M. Nimah, AUB.

11:00 Coffee.

11:30 Discussion Session.
Agricultural Education Systems in the Middle East.
Chairman: Dr. S. AL-HAJ, Vice President, Council for Development and Reconstruction, Lebanon.

12:15 General Session.
Recommendations.
Chairman: Dr. N. DAGHIR, Associate Dean, Faculty of Agricultural and Food Sciences, AUB.
Rapporteurs:
Mr. M. A. A. Mohammad, United Arab Emirates.
Dr. H. Henderson, AUB.

Saturday, April 28, 1979

7:30 Trip to the Agricultural Research and Education Center (AREC) and Baalbeck.
Lunch at AREC.

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