

AN AGRICULTURAL INSTITUTE
OF THE
ARID ZONES OF VENEZUELA

— A Concept and a Challenge —

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PART A: GENERAL PHILOSOPHY

INTRODUCTION.

These comments refer to the concept of an organizational structure thought to be necessary to develop and train specialists in disciplines who can make significant contributions to the future agricultural development of the West Central Region.

1. The Purpose of a University

The recent auto-evaluation of UCO indicates a desire and a need to strengthen the various aspects related to a University — administration, curricula, teaching, student-faculty relationships, and research. Universities differ from industry and from governmental agencies mainly in their objectives. Industries are most often concerned with applying technology to utilize resources and make a profit; governmental agencies are commonly charged with assessing situations, initiating and maintaining works and programs for the good of the people under their jurisdiction; but universities have a role and responsibility that involves the development of intellect of people. Its profits are not measured directly in money, and much of the knowledge discovered does not immediately have application to social or economic problems. I am in full agreement with a recent statement from the University of Wisconsin which states that,

"the primary purpose of the University is to provide an environment in which faculty and students can discover, examine critically, preserve, and transmit the knowledge, wisdom, and values that will help ensure the survival of the present and future generations with improvement in the quality of life"

This emphasizes the concern for the future, and force us to review the past as a means of understanding the present and use our abilities to foresee the forces and interactions necessary for living a life of better quality in the years ahead. Wisdom and judgment values need to be based on the best available knowledge — and these are constantly changing as the challenges of the unknown are discovered. Within our own life time we are cognizant of the fact that much of what we learned in high school is obsolete by the time we are grown up and that much of what we will need to know in the future has not yet been discovered. Surely we need to improve our systems for managing the overwhelming amounts of information being generated — we must critically examine such knowledge, preserve the best of it and learn how to effectively transmit such knowledge

to the oncoming generations. Flexibility alone is not enough; it requires judgement and re-examination and wise modification if we wish to find solutions in all walks of life that help us accomplish the purposes of a university. A university has to create the proper environment for scholarly endeavor — it is more of an attitude than a physical situation because knowledge, wisdom, and values are products of the mind. Adequate facilities enhance the learning process so that the physical plant plays an important role but less so than the excellence of the professors.

2. Communications

There is little evidence that structuring, or organization, or supporting services and facilities can substitute for the quality of teachers and scientists in any institution. Good science is the product of good scientists, just as good art is the product of good artists. Reasonable channels of communication are essential — and here the structure of a university and its administration play crucial role. There is a real world with real people with real problems out there — and we must know what they are, who they are, and where they are if we are to follow a course that is future-oriented.

2.1 Agricultural Council

In trying to recognize the problems of agriculture in the arid zones of Venezuela it is vital that a consensus of the best minds familiar with the region offer advice and counsel. Such judgements are a main stream of communication to assist in the defining and evaluation of problems, the resources available and those needed, and encouragement to bring effective solutions to the complex segment of society known as agriculture.

2.2 Library

Internal structuring is designed to assist professors and students carry out their functions with a minimum of disturbance or frustration. The discovery of knowledge is an individual event occurring as a combination of thoughts, ideas, and suggestions which take on relevance to the beholder. Libraries are a major source of the accumulated knowledge and wisdom which underlies the acquisition of new knowledge. Thus the development, maintenance, and improvement in the availability to the world's store of information is needed to ensure that we do not waste precious time rediscovering common knowledge. Decision about that is required for the center of excellence to be developed here, and what can better be made available at other institutions are needed. Modern systems of communications, information storage

and retrieval, and reproductions should be examined by competent experts to assist in developing the capabilities anticipated for the institution.

2.3 Extension and Publications

Another purpose of a university, and of most organizations, is to transmit its findings. There is a myriad of consumers of such informations, ranging from the campesino all the way to other scholars. Experiments are conducted to answer questions, and questions often indicate possible experiments, thus it is important that the knowledge acquired and the judgements derived be shared with others. Science in an intellectual vacuum is not desirable. Lines of communication must be encouraged and promoted. Scholarly treatises, popular bulletins, press and radio releases are but a few of the ways to create awareness of survival and improvement of the quality of living. We are all aware of the voluminous information that inundates us — there is more to read, see, and hear than we can reasonably comprehend — so quality becomes an important criterium, more so than quantity. A frightening aspect of communications is that we seem to encourage and promote the production and availability of informations — and yet the world is a strange and lonely place. The spewing out of words and sights and sounds is not necessarily meaningful communications — we must learn, and then teach others, how to listen. Really listen — to be sensitive to the crying anguish of a world that also wishes to communicate — to be heard, to be understood, and that is more than willing to place its trust and confidence in us.

3. Physical Facilities

Discovery is also a product of action. Action increases our capacity to learn and it is the noted teacher of wisdom. We do things in laboratories, greenhouses, and in the field — and we discover knowledge, we can better define and evaluate problems, and we test the hypotheses designed to increase our understanding. An organizational structure should assist in providing an adequate environment for action. In many instances routine tasks can be done by service laboratories, thereby permitting other minds to evaluate, synthesise, and interpret the raw data so generated. The routine characterization or production of raw data is not research; it is, however, a fundamental step providing fuel for the consumptive analytical mind of the student or researcher. Consequently, the needs of the researchers should be reviewed and attempts made to provide such services whenever and wherever possible.

4. Teaching

If a university is truly a place where one can discover and can examine critically, then it must also be a place for the preservation and transmission of this knowledge, and wisdom, and values. The teaching function is perhaps the main distinction between universities and other organized institutions. The quality of a university is measured by the excellence of its professors and their ability to carry out the purpose of the university. Babies are not born as teachers — they must develop into teachers — thus many of the desirable attributes can be learned. And perhaps the most critical attribute is attitude. Teaching, like research, is a way of thinking and doing. A good teacher is competent in the subject matter of his discipline, and that is expected and required, but much more significant is that a good teacher realizes that "learning is done by the learner". Students learn only to the extent that they possess elemental concepts for assimilating new information into their cognitive structure, and we are well aware that people are not created equal as far as their ability to comprehend new knowledge. There is a need for more individualized instruction if we wish to increase educational effectiveness; some people learn well through reading, others by listening, and yet others learn best by handling specimens and performing experiments. Recognition and better understanding of how people learn is permitting us to place less emphasis on long time retention of factual information and letting us re-enforce the means for assimilating information and making rational value judgements. To meet the challenges of the unknown future we need to develop each student's capacity for imagination, creativity, and ability to solve the highly specialized problems which are now confronting us, and will continue to confront us in the future. And this is dependent on the excellence of the teachers.

5. Scientists

The flesh that fills out an organized structure of an institute or university is the staff of professionals. A framework is needed so that these muscles can function properly. These professors have skills in various disciplines or, as I have called them, "science areas". Regardless of the school or departmental set-up each professor is a skilled artisan that helps make the purpose of a university a reality. As leaders they assist students and colleagues to discover, examine critically, preserve and transmit knowledge, wisdom, and values. They are important as individuals and as members of a team that has a very big mission. The overall strength or

Weakness of the university or institute is based on its ability to function efficiently and effectively. The better trained the staff, the greater are the total benefits.

5.1 Science Areas

A department or science area is established to enable those persons of similar training and interests to share their knowledge and talents on problems or tasks of mutual concern. There is some evidence to suggest that a critical mass of six or eight professors is needed to maintain and develop a department or science area as a separate entity designed to serve the needs of teaching and research, and to justify the additional expenses for administration and operational support. An analysis of the existing programs and the desired objectives for creating an agricultural center of excellence will suggest several alternatives for strengthening existing competencies and developing additional areas of science to meet the objectives.

6. Leadership

Without outstanding leadership to guide and direct such an institute, the parts may become stronger than the whole, thereby undermining the successful accomplishment of missions. A director should first of all be concerned with the future of agriculture in the region. He needs to be dedicated to building and maintaining excellence in all areas related to the training of agricultural scientists and related to solutions of the changing needs of the agricultural sector of the nation. It is important that he develops strong lines of communication with decision-makers so that the judgements and available alternatives may be shared in both directions.

PART B: ORGANIZATIONAL COMPONENTS

1. Modern Agriculture

The agricultural complex contributes to the well-being of a country and its people when all phases are functioning properly. Farming today is business, not just a way of life together with the industries that support farming as well as those that are supported by farming, they constitute a large segment of the population in this region. Some provide services and goods to the farmers, and others utilize farm produce in numerous direct and indirect ways. Food and fiber are produced on soils, with water and nutrients, in an existing climate and one must understand these resources to utilize them wisely. But there are many crops, and the efficient production of food and fiber requires many skills. Animal production parallels crop production in its need for understanding - breeding, selection, production, disease and pest control, harvesting and marketing are common to the production of many kinds of food and fiber. Modern agriculture uses modern machinery and provides buildings and equipment adapted to the local conditions. New technology is developed and applied to the aged-old problems of living and providing. And because fewer people are expected to produce food and fiber for more people, food quality, packaging, and new products are taking on greater significance in agriculture. Farming and agriculture would not exist except for people and so there needs to be continued concern and work done in helping these people manage their operations and to better understand the needs and desires of the people engaged not only in farming but in all of agribusiness and its relationships to the total economy.

Thus we see that no one segment or science area can be truly beneficial without the support and interaction with the other areas. To be an asset to the region an institute should build competence in all of these science areas for the accomplishment of broad based agricultural missions.

2. An Organogram

An organogram for an agricultural institute is proposed in Annex, for discussion and comment. It is based on the concepts and opinions expressed in the first part of these remarks. The overall framework is understood by many but what concerns people in an existing structure is where do they belong and what might happen to them if

3. Science Areas

Initially a "science area" is merely a means of grouping general areas of knowledge necessary for the functioning of agriculture. I have suggested six or seven areas, however, it could be subdivided into many more if desired. There is a normal tendency to consider these areas as departments within a school of Agriculture, and this has been done at many universities throughout the world, but that does not necessarily mean that they should be reorganized this way at UCO.

3.1 Task Force Reports

At this stage the main purpose of listing "science areas" is to designate groups of professionals whose knowledge and information about important areas of concern for agriculture can be brought together to develop advisory reports. The use of a Task Force approach is recommended. People in each of these areas should get together and develop a report on the status of knowledge of their subject matter that spells out what we know and what we need to know. This is a way of recognizing the problems in each area related to agriculture and then brainstorming to determine which problems are more important, separating out the broader ones as mission-oriented (interdisciplinary) and more specific ones as problem-oriented (usually within a discipline). Each Task Force would report on its findings and the collective information used to set some general guidelines for the development of a research program in agriculture for the region. If the concept of Task Forces continued then there could be rotating leadership to spread the work load around.

3.2 Natural Resources

Knowledge of the physical resources of any region is important to its potential development. The basic geology and geomorphology of a region help us understand past development of cities, transportation, agriculture and industry. Climatic data supplies us with information about differences and similarities within an area and assists us in judgments about irrigation and so forth. Soils are used for many agricultural and non-agricultural uses, and knowledge about them serves as the best means of transferring experience from one locality to another. Such information also helps us decide where new information will be required. In the arid zones the amounts, availability, and kinds of water must be known so that wise utilization of this precious resource can be

but the importance of forests to water supply, local climate control, and relevance to recreation and conservation make them valuable in an overall program of development. There are numerous facets of each resource with which a scientist may become specialized. For example, there is soil chemistry, soil physics, soil fertility, soil classification, soil microbiology, soil conservation, soil survey, soil management, and so on. Similar specialists could be listed for each resource or science area. The training of agriculturalists may require a minimum level of comprehension of many of these facets but post-graduates need additional guidance in one or more specialties so that they can become the leaders of the future.

3.3 Crop Sciences

Because of the climatic conditions there is a wide variety of crops that are, and can be, grown in this region. There are grains, fruits, horticultural crops, tubers, fibers, and so forth. Facets include breeding, selection, physiology, pathology, biochemistry, quality, production, harvesting, storage or processing, rotations, nutritional requirements, weed control, and other management needs.

3.4 Entomology

With dry-land and irrigated farming systems adjacent to each other the pest and disease control for crops, gardens, pastures, and forests are multiplied. Chemical and natural means of manipulating the ecology of an area are both of concern. A better understanding of crop ecology as well as general plant ecology may become increasingly important to protecting the environment while at the same time we are using it.

3.5 Animal Sciences

Although man can survive on vegetable protein he usually desires to also have animal protein in his diet. Growth and production requirements for livestock and wildlife are different in arid zones compared with other zones. Breeding, selection, nutrition, shelter, and disease control are all significant facets for each kind of animal life and important to a viable agriculture.

3.6 Agricultural Engineering

An agriculture develops so does its consumption of energy, and modern farming methods depends on new technologies for preparing

for processing food and fiber products. Machinery and buildings for crops and animals and people must be suited to the region and its particular characteristics. There is a tremendous need to move, store, and use wisely the water resources for all segments of the society as well as for farming and other agricultural enterprises, thus the significance of this science area.

3.7 Food Sciences

The production of foodstuffs alone will not feed an urbanizing country. Better ways to package products to reduce waste, new processes for preparation and storage, improved quality, safe and healthy produce, and consumer education are all important to assisting agriculture contribute to the regional economy. This area of agricultural science has a great deal to do with the quality of life that people will be able to have, and needs to have its place in agricultural programs.

3.8 Agribusiness and Rural Sociology

Farming and all the supporting agribusinesses make agriculture a vast, complex sector of today's society. Economics, accounting, farming management, land management and marketing are some of the facets that assist the parts and help integrate them into a whole. The social aspects of agriculture always needs better understanding as this concerns people - how they can achieve their goals for living a life of improved quality and also maintain a concern for the future generations. New technologies or strategies may fail or be accepted very slowly and we need to understand why, and to assist in the gradual improvement without destructive disruption of values and codes of living.

4. Supporting Services

A professional can usually best serve the interests of agriculture by applying his mental skills. He is trained to recognize, define, and evaluate situations and propose alternative solutions and judgements. If he spends all of his time collecting raw data he is being overpaid; if his advice is not sound some phase of his mental problem-solving is weak.

There needs to be many supports for any program, but here the main concern is with various laboratory and other services.

4.1 Library

In most instances libraries are to assist people. They help make available portions of the world's store of information so that problems can be recognized or defined more easily, help eliminate duplication of efforts, and make value judgements more clear. Information availability and ease of retrieval are important to students, staff, and professors, and essential for a strong teaching and research program.

4.2 Statistical Services

Because most science is quantitative there is an increasing need to manipulate and interpret numbers obtained in information gathering. Many of today's interpretations are statistical in nature, yet not all people can be specialized in statistics in addition to other subject matter areas so that assistance with design, computation, and analysis of results is increasingly provided. There may be a need or desire to develop these skills and services as a separate "science area" or even within the agribusiness area, rather than rely on the other agencies such as ERCO or other university schools. Computer services most surely will be separate because of cost and expertise, however, consulting services of some manner would be desirable.

4.3 Laboratories

As research or service becomes more specialized to meet the changing needs of agriculture in the years ahead it may be expedient to develop various laboratories that would conduct routine analyses as well as have the capability or equipment for specialized research experiments. Because these depend so much on funds and direction of development of an institute only some examples will be given.

4.31 Soil and water. Routine characterization of soil and water samples. Particle size, exchange capacity and ions, pH, soluble salts, engineering properties, etc. Perhaps routine soil testing of farmer samples if service not provided elsewhere.

4.32 Plant Materials. Tissue testing, spectrochemical analysis of elements, organic matter, digestibility, metabolites, enzymes, seed germination and certification, disease identification.

4.33 Pesticide Residues. Detection of chemical residues on and in

- 4.34 Veterinary services. Animal diseases and control, autopsy, health clinic, etc.
- 4.35 Food quality. Sample testing for nutritive value, digestibility, palatability, microbiological studies, and other basic and applied diagnoses.
- 4.36 Equipment Consulting. Assistance on special design or needs of machinery, buildings, or equipment. Irrigation systems, etc.
- 4.37 Accounting, Farm management, census reduction, marketing reports, and other agricultural economics functions.

5. Research

Every professional is a potential researcher so that research is not a separate division but a state of being or action of an individual. The procedures for initiating, maintaining and conducting research projects should be formalized to the extent necessary for budgeting, financing and accounting. The scope of research projects distinguishes mission-oriented research from problem-oriented research. Problems requiring inputs from many specialist in different agricultural disciplines which must be integrated to affect solutions is mission-oriented research. When you work on more isolated problems within your own specialty or discipline that is problem-oriented research. Most of us do better when "doing our own thing" but the problems we work on should have some relevance to larger problems (missions). In many cases mission-oriented research projects or proposal are a convenient way to focus attention on priorities. For example, there is mission-oriented research on the management of agricultural waste (notably farm manure) in the USA, however, most people involved are working on specific sub-projects within their areas of competency. The results will be combined into comprehensive program for management.

Because project proposal need approval, assistance in financing, and means of reporting, it is desirable to have administrative help. Somebody, or some office, can effectively handle such affairs so I've suggested an assistant to the Associate Director. Such a position could start as only an aid to the administrative structure and at some later time become a decision-making, authoritative position if so desired.

6. Resident Instruction

The teaching functions of a university are vital to its success and continuance. A director of resident instruction acts as a coordinator of many activities related to teaching involving not only the professors but also the students. Very often policy is suggested by working committees of the faculty with student representation; guidance can be provided by the director. Of special concern is the curricula which must be periodically reviewed and revised to make education as meaningful as possible. The number of credit hours for courses, the establishment of a basic core and options available to students constantly needs updating, as well as the keeping of student records. Improved teaching is often dependent on additional training of professors and staff, and such an office can evaluate and assist in a program of staff improvement. Postgraduate work, special seminars on teaching methods, guest lectures, visiting professors, part-time instructors, wider availability of visual aids and accessory instructional materials, review panels, and so forth are all concepts that the office of resident instruction can assist with. Attracting students to agriculture and training them in the best way possible means that the opportunities and challenges must be presented to students in high schools, and that counseling and guidance for enrolled students must be considered. The demands and challenges of offering instructional programs expand as the staff and its leadership are motivated to achieve excellence in meaningful learning.

7. Extension and Communication Arts

Much of the acquisition of useful knowledge and its application takes place away from the campus. Explaining the results of research and demonstrating its application to lay groups is a continuing need. An institute of agriculture has to be concerned with the functioning of the many phases of agriculture — farming and the production of food and fiber, the processing and distribution of food and fiber, the health and living conditions of those engaged in agriculture, the provision of supplies and services required by agriculture, the interrelated business skills, and, of course, the relation of agriculture to the rest of society. There are many governmental and private agencies involved in these same phases so integration and cooperation are significant in truly significant assistance programs.

One aspect of extension is concerned with training people with adequate skills and knowledge to contribute to the numerous specialties needed. Some people do well working with the public, whereas others seem to be able to use their capabilities best in research activities.

Another aspect of this area is developing and providing lines of communication necessary to extend knowledge to people of different levels of comprehension. Popular bulletins are best for some groups, research publications are needed by others. Skills in how to prepare and present various kinds of information assist extension personnel, teachers in the class room, researchers explaining their results and alternatives and presenting concepts to legislative bodies. Such skills are important to the efficient and effective functioning of an institute or university.

The responsibilities carried by this area assist the on-going programs of research and teaching and also help the internal framework keep aware of the potential needs of the real working world of agriculture throughout the region. An institution unresponsive to the region, the country, and the world's needs to survive and help provide each person the opportunity to have a life of better quality is hardly worth supporting.

8. The Associate Director

The job of an associate director is difficult because he must be sensitive to the needs of the many people and areas under his supervision, and at the same time present and defend administrative policy thought to be in the best interests of the whole organization. He is the main person concerned with the research program and should be, or have been, a noted researcher who understands and appreciates the design, conduct, and use of research efforts. Because he is also the channel or link to the teaching and extension programs it is desirable that he also have teaching experience. It is important that this person can summarize and evaluate the strengths, weaknesses, and potentials of the components of the organization to be able to assist the Director in presenting and representing the Institute to other segments of society.

9. Administrative Services — Business and Personnel

The operations of any unit are facilitated by people who handle the numerous details of business transactions, accounting, and

record keeping for the personnel of the institute. Economics are affected by judicious buying of supplies and equipment and assistance in compiling budget requests and justifications release important time of the professionals so that their skills are more efficiently utilized. As monies are often allocated in block sums, in addition to funding of special mission projects, an accounting service can readily be provided to assist the directors as well as the individual researchers, teachers, and staff members.

Personnel services are concerned with the rights, obligations, and duties of the people employed by, or having relationships with, the institute. It can help advertise positions available, establish qualifications for some positions, negotiate and handle part-time wages, maintain personnel files needed for promotions, and so forth. Such an office is necessary to assist the directors in managing a complex organization and providing information for liaison with central university administration. The functions are varied and increase as the university itself expands and embraces more disciplines or specialties.

10. Advisory Agricultural Council

It is impossible for one small group of individuals located on a campus to be as well informed about the problems of agriculture throughout a region as it would like to be. There are many experts and well-informed people who are concerned with society and agriculture and it is wise to ask for their counsel and advice. It is important to obtain advice about business, other industries, financial status and credits, governmental agencies and their programs, as well as opinions of the progressive farmers, and of course, legislative representatives. The number of members may be 20 or 30 depending on the availability and desires of the institution. Representation should be broad, should be rotating (2 or 3 years), and such a council likely offers most help through their own committee structure. The directors can benefit greatly from the knowledge and experience of people concerned with agriculture, but who are outside of the university structure. The function of an agricultural advisory council is to help the institute be aware of problems and policies outside of the university that are important in developing a strong, useful institute that can operate for the good of society.

11. The Director

It is apparent that the leadership of a diverse organization as discussed here is very important if the parts are to contribute to the smooth functioning of the whole. The director should be a well-trained, mature person with vision and desire for an agriculture compatible with the region's resources. He must relate well with his own personnel and be able to express their needs and judgments to other agencies and governmental bodies who can effect policies using such information. The director should be a first-rate scientist because this is agricultural science, but he must also believe and convey a philosophy of excellence and integrity. A leader leads in the development and deployment of his available resources so that the whole benefits and so do the individuals involved. An experienced person with a PhD would set a desirable precedence indicating that such an institute wants the best.

PART C: SOME CONCLUDING REMARKS

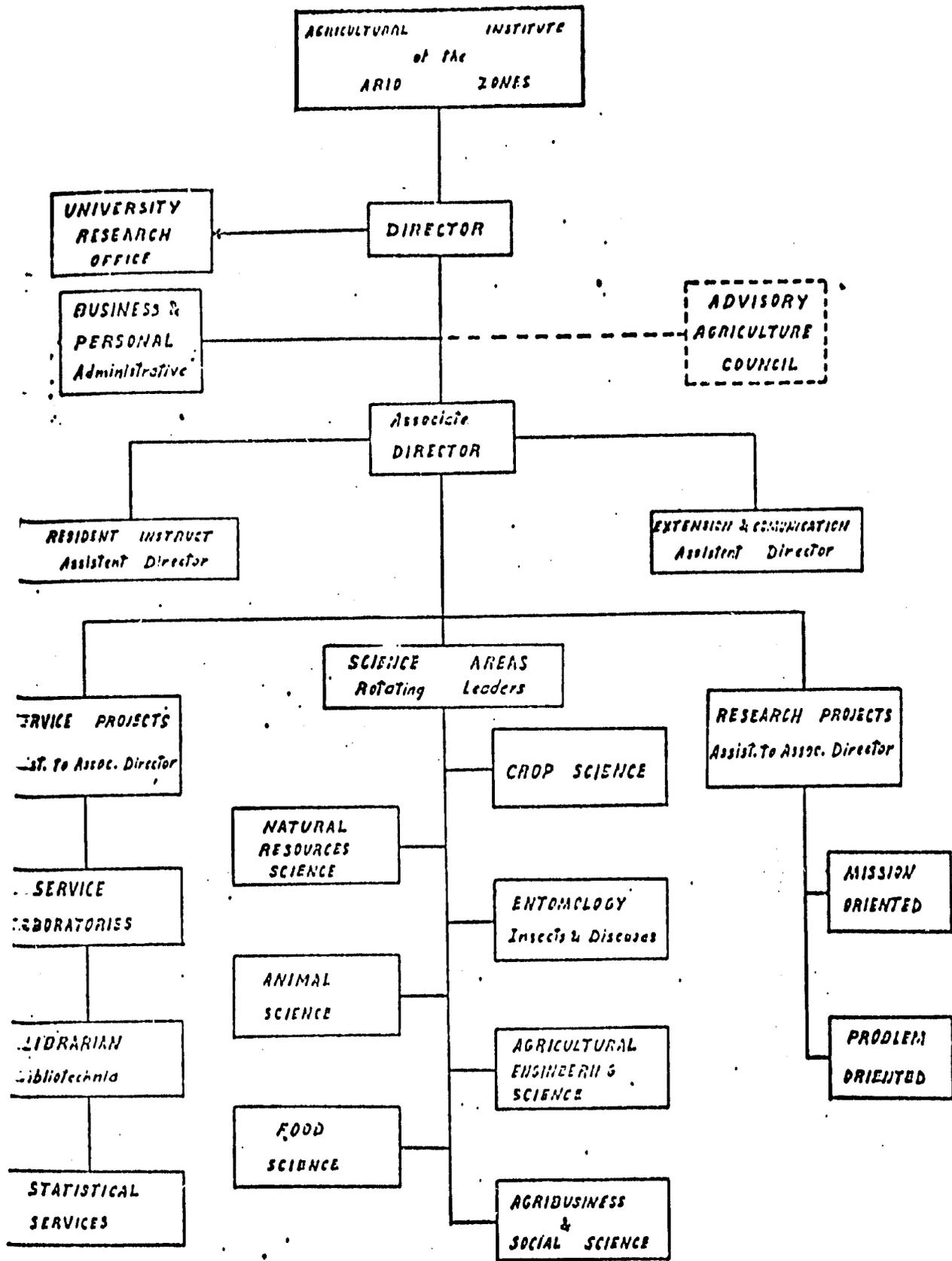
An Agricultural Institute of the Arid Zones is a concept of an organization intended to be concerned with the development and improvement of agriculture in the arid zones of Venezuela. The details are brief and probably do not do justice to some aspects of a viable agriculture that is compatible with the rest of the economy, and for this I apologize.

My belief is that the role and place of agriculture in protecting the environment yet wisely utilizing the available resources is so vitally important that a broad vision and action program is essential. To build excellence in only one or two segments of agricultural science is to deny the region the acquisition and use of the best minds and talents available - and, to me, that is unwise human ecology. The arid zones have definite limitations for expansion and growth of agriculture but learning to fully utilize the resources is a challenge so stimulating that the life-time of many scientists should be contemplated.

If someday we learn to cheaply de-salt sea water, will we know what to do and where to do it in this region? What might the consequences of natural disasters be on the population that could be supported in the region? Will we have trained minds that adapt to new challenges and solve problems even better than we have been able to do?

Yes, an Agricultural Institute of the Arid Zones of Venezuela is a concept, a vision, a philosophy - but also a potential reality. Are you ready to accept the challenge?

R.W.A./ldoh



ANNEX: Draft of the Organogram