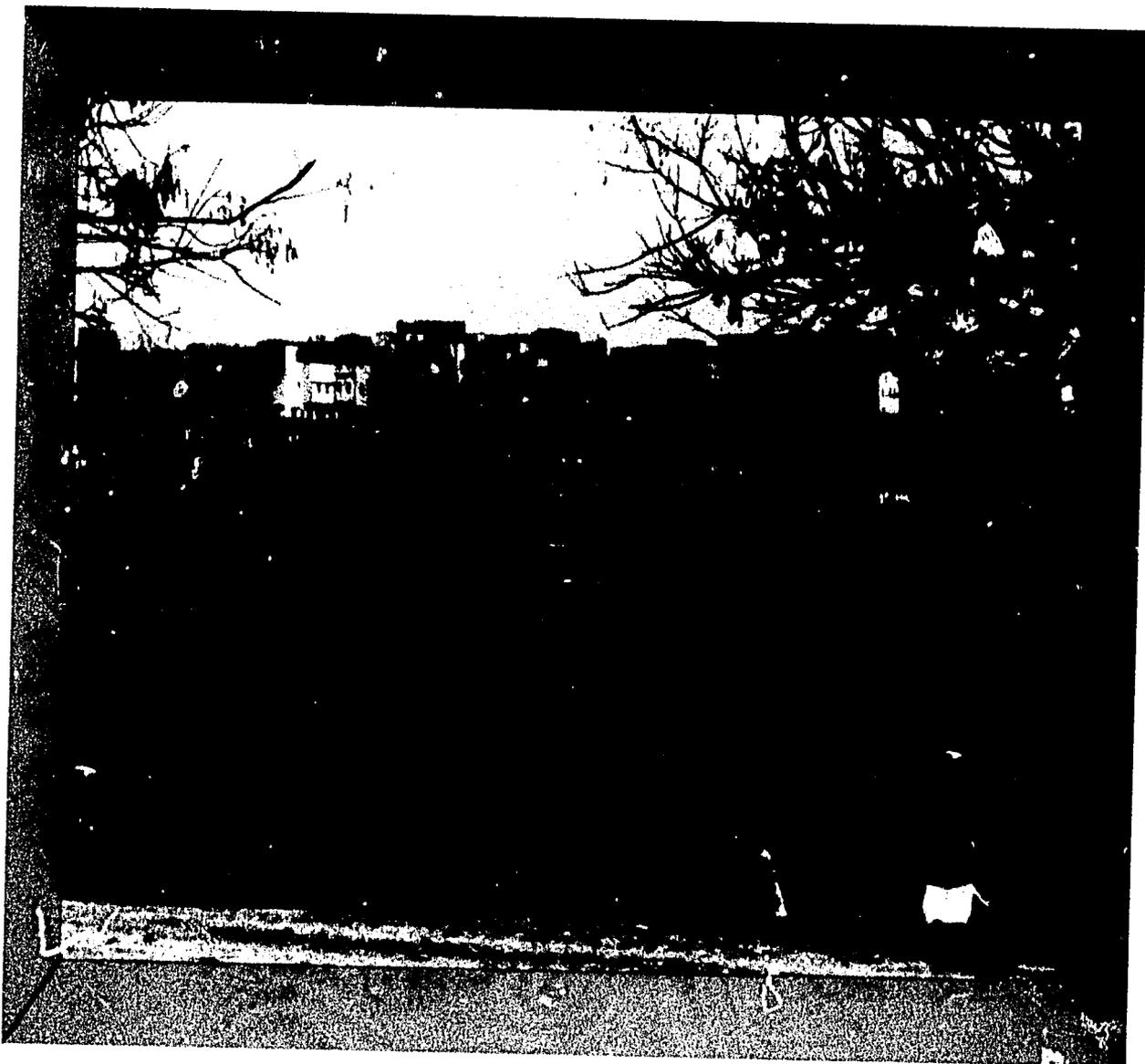


PD-ABB-202
6/2/88

SUPPORTING MOROCCAN AGRICULTURE IN THE 1990s

The Sustainability of the Hassan II Agronomic
and Veterinary Institute

Final Interim Evaluation Report
September 1988



A Collaborative Project:
Institut Agronomique et Veterinaire Hassan II
University of Minnesota
USAID

Agronomic Institute Project • USAID Project 608-0160

**SUPPORTING MOROCCAN AGRICULTURE IN THE 1990s:
THE SUSTAINABILITY OF THE HASSAN II AGRONOMIC AND
VETERINARY INSTITUTE**

Final Interim Evaluation

**Dr. James B. Lowenthal, Team Leader
Dr. Sherwood O. Berg
Dr. Robert Dunlop
Dr. Alice Morton**

**Washington, D.C.
September 12, 1988**

TABLE OF CONTENTS

	<u>Page</u>
TABLE OF CONTENTS	i
LIST OF ANNEXES	iii
LIST OF TABLES	iv
ACRONYMS	v
ACKNOWLEDGMENTS	vi
EXECUTIVE SUMMARY	vii
INTRODUCTION	xii
I. Context of the Evaluation	1
A. Economic Circumstances	1
B. Events of the Last Two Years - "Restructuration"	3
II. Mandate of the Evaluation	5
A. Focus of the Special Evaluations	5
B. Institutes of Higher Agricultural Education on the Eve of the 1990s	5
III. Accomplishments of IAV Since the Previous Evaluation	7
A. Training	7
B. Research	12
C. Extension, Outreach and Advisory Activities	13
1. Training	13
2. Outreach and Advisory Activities	13
D. Institutional Development	18
1. Administrative Capacity	18
2. Faculty Development	19
3. Student Development	23
4. "Restructuration"	24
5. Library	24
6. Computer Facilities	25
7. Student Placement	27

	<u>Page</u>
E. Regional and International Collaboration	28
IV. Sustainability Agenda	32
A. Financial Solvency and Resource Mobilization	32
B. Program Focus	32
C. Human Resource Development	35
D. Enhanced Research Capacity	36
E. Institutional Responsiveness	37
F. Linkages to the International Scientific Community	37
V. Recommendations for the 1990s	40
A. Recurrent Costs	40
B. Resource Mobilization	42
C. Program Priorities	45
D. External Relations	48
E. Project Resources	49
F. Inter-Institutional Arrangements	51
BIBLIOGRAPHY	54

LIST OF ANNEXES

	<u>Page</u>
A. Stakeholder Analysis, Methodology and Scope of Work	pp. 1-12
B. Persons Contacted and List of IAV Departments	pp. 1-6
C. Recurrent Cost Analysis	pp. 1-40
D. Institutional Development at IAV	pp. 1-11
E. Agricultural Economics	pp. 1-2
F. PL 480	pp. 1-5
G. Microcomputer Capability	pp. 1-5
H. Animal Science and Veterinary Medicine	pp. 1-6
I. IAV and the Private Sector	pp. 1-8
J. Strength and the Sustainability Issues of IAV Hassan II	pp. 1-7
K. Miscellaneous Recommendations	pp. 1-2

LIST OF TABLES

	<u>Page</u>
1. Number of IAV Graduates by Specialization: 1985/86-1987/88	9
2. Project Participant Activity Projected for FY 1988 - FY 1992	10
3. Moroccanization of IAV Faculty: 1967/68-1987/88	11
4. Professional Associations in Which IAV Faculty and Graduates are Actively Involved	15
5. List of Interdisciplinary Research and Studies Groups (Groupements d'Etudes et de Recherches: GERS) at IAV	20
6. Library Allocation Under the Project	26

ACRONYMS

AID	Agency for International Development
APESA	Année Préparatoire Aux Etudes Supérieures Agronomiques
CHA	Centre Horticole d'Agadir
CIHEAM	Centre International des Hautes Etudes Agronomiques Méditerranéennes (France)
CII	Centre International d'Irrigation
CIP	Centro Internacional de Patate (Peru)
CNERV	Centre National d'Etudes et de Recherches en Vulgarisation
CRSP	Collaborative Research Support Project
DDR	Direction de Développement Rural
DPAE	Direction de Planification et des Affaires Economiques (Ministry of Agriculture and Agrarian Reform)
DVRA	Direction de la Vulgarisation et de la Reforme Agraire (Ministry of Agriculture and Agrarian Reform)
EMI	Ecole Mohammadia des Ingénieurs
ENA	Ecole Nationale d'Agriculture (Meknès)
ENFI	Ecole Nationale Forestière des Ingénieurs (Sale)
ENIM	Ecole Nationale des Industries Minérales
ESL	English as a Second Language
FAO	Food and Agriculture Organization (United Nations)
GER	Groupement d'Etudes et de Recherche
GOM	Government of Morocco
IAV	Institut Agronomique et Vétérinaire Hassan II
ICARDA	International Center for Agriculture and Research in Dry Areas (Syria)
INRA	Institut National de la Recherche Agronomique
MARA	Ministère de l'Agriculture et de la Réforme Agraire
ORMVA	Office Régional de la Mise en Valeur Agricole
S&T	AID's Bureau of Science and Technology
UV	Unité de Valeur (elective or course)
WMS	Water Management Synthesis Project

ACKNOWLEDGMENTS

The Team would like to express its appreciation for the exceptional degree of support it received from IAV, the University of Minnesota, and USAID/Rabat in completing this evaluation. Both M'Hamed Sedrati and Larbi Firdawcy, IAV's Director and Secretary-General respectively, demonstrated unceasing willingness to aid the team in all its endeavors, from producing reams of data to arranging interviews and field trips. Excursions to Agadir, Marrakech, Errachidia, Meknès, and Fes were enriched by their presence. Don Johnson, University of Minnesota team leader, was equally helpful to the team in turning around data requests on a daily basis and assuring that team members received outstanding logistical support. Robert Hellyer, USAID/Rabat's Project Manager, and Randal Thompson, the Mission Evaluation Officer, worked closely with the team to coordinate Mission inputs, to keep the team focussed on key Mission issues, and to draft part of the private sector annex (see Annex I, co-authored by Thompson).

Additional thanks go to the ANE Bureau's Tish Butler whose skillful facilitation of the two-day team meeting prior to the evaluation contributed significantly to the team's understanding of the major evaluation issues; to Delane Welsch and Steven Clarke, Director of International Agricultural Programs and Morocco Project Campus Coordinator respectively at the University of Minnesota, for understanding, support, and patience in orchestrating the many elements of team preparation and report completion; to IAV's Strategic Planning Committee for the many extra hours its members devoted to interviews with the team during its stay in Rabat; to Azzeddine Ben Moussa, Mohamed Chehabi (IAV), and Mme. Bela (USAID/Rabat) for their groundbreaking analysis on IAV's recurrent cost structure; to Lynn Santacaterina and Quonin Habib for their unmatched ability in finding ways to provide timely and effective logistical support to the team.

Finally, the team would like to mention its special thanks to IAV's faculty, staff, and students who warmly and generously offered their time to assure that the report addressed the major issues facing the growth and development of Moroccan agriculture. Unfortunately, we were not able to do justice in the main body of the report or its annexes to the wealth of information provided by these individuals. Any errors in omission, analysis or fact remain the responsibility of the Evaluation Team.

EXECUTIVE SUMMARY

For almost twenty years, the Agency for International Development has cooperated with the Government of Morocco in providing faculty development and institutional support to the Hassan II Agronomic and Veterinary Institute (IAV). Three years ago, an impact evaluation conducted by AID's Program and Policy Bureau concluded that these efforts had resulted in the potential for creating a world-class institution of higher education and research. With only two years remaining in AID's core support project, AID scheduled a final interim evaluation to determine what steps the donor, the Institute, the GOM, and the U.S. university contractor could take to promote the Institute's sustainability.

From June 19 through July 16, 1988, a four-person team examined the issues associated with the medium and long-term sustainability of IAV. The team carried out over two hundred interviews with IAV administrators, students, and faculty, as well as IAV graduates and their employers, private entrepreneurs, senior GOM officials, and analyzed extensive project-related documentation. Before its departure from Morocco, the team reviewed the evaluation results with IAV, USAID/Rabat, University of Minnesota backstop and field representatives, the Minister of Agriculture, and senior officials of the Ministry of Finance.

In the period since the last evaluation (February 1986), IAV has continued to develop its reputation for producing highly qualified Doctorates, for providing trained manpower at the Bachelor's and the Master's level who are responsive to the needs of the Moroccan agriculture sector, particularly in the civil service and in public enterprises. Agronomic research conducted by IAV graduates has contributed to the goal of developing a Hessian Fly resistant variety of wheat. The benefits to Moroccan farmers of this single accomplishment may more than compensate for the total amount of financial resources invested in IAV in the last two decades. Other IAV graduates are nearing completion of agronomic studies leading to the introduction of a disease-resistant date palm variety capable of repopulating the date-palm plantations devastated by "bayoud." The application of these research results could have a tremendous socioeconomic impact on Moroccans living in the arid territories south of the Atlas Mountains.

In addition to the achievements of its graduates, IAV has been effective in mobilizing resources through contracts

with national and international organizations, for adapting programs to changing needs, in developing new programs to address new priority sectors, and in contributing directly to socioeconomic development in Morocco and in the region. One hundred thirty Doctorates will have been produced by 1992, an unparalleled output of high-level expertise in the history of AID support for higher education. In two recent high-level seminars on the challenges of agricultural and economic development in the 1990s (ANE Bureau's Symposium on Agriculture in the 1990s and BIFAD's "Getting Ready for the 1990s," September 1988), IAV was cited as one of the few institutions in the Third World capable of contributing significantly to the processes of generating and managing the technical change processes required to respond to those challenges.

Despite these achievements, however, IAV's continuing success confronts serious sustainability issues. GOM support for operating, teaching, and research expenditures is very low (approximately 25% of total GOM contributions to IAV operating expenditures, including personnel costs). An innovative accounting analysis of IAV's recurrent cost structure, conducted jointly by an independent Moroccan financial analyst, IAV, and USAID, revealed that the GOM is currently under-investing in maintaining the quality of IAV by approximately 6,000,000 Dh annually (\$750,000). In 1992, when USAID support for teaching and research will terminate, IAV will experience an additional recurrent cost gap of approximately 5.4 million Dh (\$675,000). In order to sustain or prevent deterioration of this unique human resources capability, the GOM will have to mobilize approximately 11.5 million Dh in real terms beginning in 1993. In addition, IAV must invest significant effort in the next two years to mobilize the resources required to complement its teaching and research programs. Many of the recommendations contained in Chapter V of the report address the strategic issues of resource mobilization.

The conclusion of project support for operating and teaching expenses in 1990 will further exacerbate this situation. The economy's increasing needs for Master's-level graduates with skills in quantitative and food policy analysis have outpaced IAV's evolving program in Rural Economics. In an effort to improve curriculum content and student placement, IAV is attempting to obtain recent data on the employment of its graduates and is beginning to formalize the systematic flow of feedback from user organizations. While IAV contributions to the productivity of Moroccan agriculture are truly impressive, IAV has provided little information

concerning its contributions to those organizations which must provide IAV with operating resources in the coming decade. Finally, with the growth in size of faculty and the multiple demands emanating from thirty-five departments at Rabat, the Agadir Complex, and three associate parastatal farm operations, IAV's current internal management and faculty governance systems are presently overtaxed.

IAV is aware of the sustainability issues and has initiated a strategic planning process to address them. The plan identifies five programmatic priorities for the Institute in the 1990s and establishes a two-year period (1988-1990) to mobilize the resources required to maintain the excellence resulting from AID and GOM investments in human capital. Based on the team's knowledge of the challenges facing Moroccan agriculture in the coming decade, the team fully supports the programmatic agenda described in the strategic plan: 1) support of agricultural productivity, 2) increased participation of the private sector in agricultural development, 3) socioeconomics and food policy analysis, 4) maintenance and enhancement of the natural resources base, and 5) water management.

In order for IAV to pursue the objectives of the plan and to increase the probability of medium and long-term sustainability, the team divided its major recommendations into six areas which are summarized below (program-specific recommendations are identified in the final chapter of the report and in related annexes):

1. Recurrent Costs

The GOM must make a greater effort to fund the true recurrent costs required to sustain the prior investments in human capital formation. Teaching, research, and non-salary operating line-items are the most underfunded, with an annual gap of 6 million Dh (\$750,000), increasing to 11.5 million Dh in 1992 when local cost support for training and research will terminate. Furthermore, the GOM must assure that PL 480 allocations for the capital investment budget are made available to IAV on a timely basis.

2. Resource Mobilization

In order to assure adequate funding support for IAV's mission as a premier institution of higher agricultural training and research, the GOM, IAV, and its partners (the American Title XII community and AID) must energetically pursue resource mobilization strategies. The GOM should consider mechanisms such as training

contracts, increased student responsibility for tuition and boarding fees, PL 480 support for teaching and research, income-generating exploitation of the experimental farms consistent with teaching and research objectives, and an increased number of fee-paying foreign students. IAV should continue developing research, training, and advisory proposals, including wherever possible international and national partners.

Because of world-class expertise in irrigation management, USAID/Rabat should consider contracting one or more components of the proposed Supplementary Irrigation project to IAV. IAV should examine the feasibility of joint collaboration with the GOM and the private sector in the establishment of a "parc technologique" in the food processing area à la The Research Triangle (North Carolina, USA). Title XII institutions must also begin developing strategies for increasing their collaboration with IAV in teaching, research, and advisory services. Finally, IAV should pursue with AID the possibility of post-project linkage support for scientific exchange and collaborative research.

3. Food Policy Analysis

In order to keep pace with the increasing needs in the economy for graduates with quantitative and food policy analysis skills (in 1992, Morocco will no longer benefit from preferential access to the lucrative EEC market), IAV must continue the substantial progress made in adapting its agricultural economics curriculum. Critically important will be the strengthening of collaborative teaching and research relationships with GOM organizations most in need of those skills (MARA's DPAA, the Pricing Division of the Ministry of Economic Affairs, etc.). Proposals such as those submitted by the Universities of California and Arizona will be useful to the extent that they increase the teaching and research competence of IAV faculty in quantitative and food policy analysis.

4. External Relations

IAV must improve its linkages with the potential and current users of its graduates and with the key organizations which provide material and non-material support for its training and research activities. Efforts in this area should include up-to-date knowledge of the placement of its graduates, systematic

and formalized mechanisms for obtaining feedback from user organizations, development of a professionally-produced set of public relations materials, and increased attention to marketing the benefits of IAV graduates to a wide range of private sector organizations.

5. Project Resources

As currently programmed, almost all of the remaining project resources support stateside participant training. The team believes that a maximum effort must be made to identify additional resources for short-term consultancies designed to improve curriculum (such as proposals from the Universities of Arizona and California), operating effectiveness, and resource mobilization. According to project records, only \$185,000 is now available for these purposes. Shortened tours of long-term TA and savings from over-budgeted participant training represent potential sources of funds for this activity. IAV should also move quickly to identify a highly-qualified Moroccan to begin on-the-job training in managing the administrative linkages with American universities.

The PACD should be extended to December 31, 1992 to allow all 130 doctoral candidates to complete their degree training. Current modalities for doctoral training should be maintained. What many have termed the "cadillac model" of doctoral training has clearly resulted in "cadillac" quality. Any non-training resources not expended for training prior to December 1990 should be made available for short-term advisory services, teaching and research support, including library acquisitions, and microcomputers during the two-year extension. The project should not be extended beyond 1992. Given the critical importance of higher agricultural faculties in the technical change process, however, USAID/Rabat may want to consider designing a follow-on activity to sustain the quality of IAV's scientific capability.

6. Internal Operating Effectiveness

Given limited resources for teaching and research, faculty participation in resource planning has been difficult to pursue. The team feels that IAV's increasing maturity, however, requires effective efforts be made to decentralize resource budgeting and allocate decision-making to departments.

The team strongly believes that AID and the GOM have created an exceptional capacity for training, research, and advisory services in Morocco and the African continent. On the eve of the 1990s, IAV is positioned to play a pivotal role in promoting the development and diffusion of productivity enhancing agricultural technologies, policy analysis, and collaborative research. The investment in human capital, however, is extremely fragile. Efforts undertaken in the next two years by IAV, the GOM, AID, and American university Title XII partners will determine whether these investments can be truly sustainable.

INTRODUCTION

Because the Evaluation Scope of Work specifies detailed analyses of the structure and functioning of IAV, its recent accomplishments, and strategies for the future, the following outline attempts to provide the reader with a rapid overview of the organization of the report. Readers only interested in strategic recommendations can proceed directly to Chapter V.

The report is divided into three main sections: the context of the evaluation, the achievements of IAV since the preceding evaluation in February 1986, and the strategies which will sustain the capability of IAV into the 1990s. Section one (Chapters I and II) deals with Moroccan economic circumstances on the eve of the next decade, the impact of the educational reform, the potential role which institutes and universities of higher agricultural education will play in the 1990s, and the mandate of the evaluation. Section two (Chapter III) describes the recent accomplishments of IAV and its faculty in providing highly qualified individuals to serve Morocco's agricultural sector. Section three addresses the "Sustainability Agenda" of the project (Chapter IV), i.e., what specifically should be sustained by IAV after the withdrawal of core external institutional development support, and then provides recommendations to IAV, the University of Minnesota and USAID/Rabat for improving the probability that the investments in human capital and institutional development will be sustained into the 1990s (Chapter V). Annexes provide additional program-specific recommendations, detailed analyses, and data which support the conclusions reached in the main body of the report.

I. CONTEXT OF THE EVALUATION

A. Economic Circumstances

Morocco is in the midst of an economic stabilization program following an extremely difficult period in the early 1980s during which growth in real per capita income declined and external debt exceeded the country's annual gross national product (GNP). Selected reforms have been initiated to open and liberalize the economy, including the introduction of fiscal-budgetary reforms, the dismantling of administrative controls and protectionist measures, and the rescheduling of external debt. Early indications are that economic growth has resumed as a result of policy changes.

Agriculture--the production of food and fiber--is critical to the continued economic and social growth of the nation. Presently, agriculture accounts for about 17% of the GNP and provides 40% of all employment. This compares with 28% and 55%, respectively, approximately 15 years ago. Since the 1970s, food production has failed to keep pace with increased domestic demand generated by such factors as rapid population growth, a high rate of rural to urban migration, and declining real prices for food. Likewise, self-sufficiency for such principal foods as cereals and edible oils has declined. The dairy industry is an exception, allowing a major increase in urban per capita milk consumption. Food imports have increased 10% per year.

In view of this deteriorating situation in food production, the government is giving very high priority to the agricultural sector. Looking ahead to the increase in population of 60% or more projected for the year 2000, the pressures can only increase. During the past 15 years, the total value of agricultural exports has been relatively stagnant. Presently, the agricultural sector accounts for about one-third of Morocco's commodity exports and 15% of total exports. This lack of performance reflects an annual growth rate in agriculture that has been adversely affected by successive droughts, not only in rainfed regions of the country, but also causing a severe shortage of water in irrigated areas.

Morocco's potential in the production of food and fiber is far from being fully realized. The potential for increasing cereals output on the basis of known technology has been estimated at 60% in an FAO study. Use of recent technology and improved cultural practices at the farmers' level for other crops has led to increases in yield between 40% and 120%. Experiences such as these highlight the importance of developing and mobilizing improved technology to provide for stable yields and increased output and of dealing with the expectations of the recurring droughts that characterize much of Morocco's agriculture.

The Institut Agronomique et Veterinaire Hassan II (IAV) in Rabat has a key role to play in the further development of the rural economy and food and fiber sector in Morocco. The Institute is the source of training for that segment of the nation's "mindpower" that will focus upon the challenges and opportunities in introducing modern science and technology into Moroccan agriculture.

IAV was created in 1966 by the Government of Morocco to become the center for higher education in agriculture. The royal decree creating IAV also gave it authority to conduct the research necessary to complement teaching activities, to offer continuing education and specialized professional training, and to be involved in extension programs. Moreover, the Institute was given the charge to ensure that the scientific knowledge generated be readily applicable to the improvement of agricultural productivity in Morocco and to the welfare of the Kingdom's farmers.

IAV is organized as an independent public educational entity with its own by-laws and regulations. It is governed by an advisory board composed of representatives of the Ministry of Agriculture and Agrarian Reform, the Ministry of Education, and the Ministry of Finance. Its budget is channelled through the Ministry of Agriculture. The Institute now has 2,300 students and 30 programs of specialization at two campuses. IAV's faculty is composed of 337 professors, 312 of whom are Moroccans. Foreign students, mainly from sub-Saharan Francophone African countries, comprise approximately 10% of the student population.

A number of international donors have contributed to the development of IAV since its creation. During the last 18 years, an intensive program of institutional development has been under way with the assistance of the United States Agency for International Development (U.S.A.I.D.). The program has been administered through a Title XII collaborative assistance agreement between the Institute and the University of Minnesota. During this period, 49 faculty members from IAV, ENA, and ENFI have completed their doctorate degree programs at IAV in conjunction with U.S. universities, while 80 are finishing advanced studies.

IAV has had a major impact on a broad range of agriculture-related activities in Morocco. The majority of Morocco's agricultural scientists, technicians, and managers are trained by IAV. Also, a number of professional associations and an alumni association have been created as links between IAV and the professional community (See Table 6).

B. Events of the Last Two Years - "Restructuration"

Since the last evaluation in 1986, several important processes have begun which affect the form and content of teaching and related research at IAV and which may generate potential impacts on the Institute's recurrent cost burden and its impact on the agricultural sector. A key event underlying these processes, and which generated some of them, is the acceptance by the Minister of Agriculture and Agrarian Reform (MARA) of the principle that there should be only one grade of Ingénieur in the agricultural sector, that of Ingénieur d'Etat (IE). This proposal was made by the Unions of Ingénieurs d'Application. While this principle has not yet been enacted into law, it has generated a process known as the "Educational Reform", which includes curriculum reform within the agricultural higher educational establishment, including at IAV. It has also had implications for the inter-institutional relationships among IAV, ENA, and ENFI.

The curriculum reform, in turn, is intimately related to the "restructuring" of IAV. It will have direct impact on the rate of student admissions, the ability of students to opt for certain specializations during their six-year course program, and on their marketability as IAV graduates seeking employment in the public and private spheres of the agricultural sector in Morocco and abroad.

The curriculum reform process has already, at minimum, reinforced the departmental structure as a bulwark of the faculty organizational and decision-making system. The departments--together with the multidisciplinary groups (groupements)--are also the key elements in decision-making and resource allocation for research. Departments are now critically involved in the selection of universities and courses in the U.S. with which faculty participant trainees at the doctoral level will interact. They also have a more active role in the placement of the faculty participant with the U.S. university's department and related choice of key advisors.

Part of the restructuring of IAV has included rearrangement of responsibilities among administrative Directions which report to the senior management of the Institute. A new Direction of Studies and Cooperation has been put in place; the Pedagogy Direction now includes Research, although decisions about the latter are developed with a faculty committee. The Administrative Services Direction has experienced the most rapid development, both in terms of staff, facilities, and scope. The Rural Development Direction (DDR) is operating at a high level of effort, after a difficult transitional stage following the death of its first director.

A final key element in the process of restructuring the Institute and positioning it for its role in the 1990s is the strategic planning activity. Discussed in detail in Chapters IV and V, this activity has been on-going for a year and a half, and has involved IAV faculty and senior management, as well as University of Minnesota faculty and administrators, and those of other U.S. universities involved in the "Partnership" sponsored by the project. A.I.D. officials have also been involved in the process, which has impacted on both the current Workplan of the Project and other emerging plans for IAV focus and orientation through the 1990s and beyond.

II. MANDATE OF THE EVALUATION

A. Focus of the Special Evaluations

In 1984, the Grant Agreement for Project 0160 "The Agronomic Institute" was amended to provide for two special evaluations, one in 1986 and one in 1988. These evaluations were intended "to focus on the assessment of institutional development and the linkages of Moroccan teaching, research, and extension institutions of which IAV is a critical component". The first evaluation was conducted in January - February 1986 and has been published as AID Project Impact Evaluation Report No. 65 (July 1987), entitled "The Hassan II Institute of Agriculture and Veterinary Medicine in Morocco: Institutional Development and International Partnership". The results of the 1986 evaluation demonstrated an unexpected degree of impact on the Moroccan agricultural sector (given IAV's relative youth) and identified a set of threats to IAV's medium- and long-term sustainability. The 1988 special evaluation focuses, therefore, on the teaching, research, and advisory accomplishments over the last two years and on IAV's strategy for assuring the sustainability of the human capital and institutional investments into the 1990s.

Analysis of the stakeholders in the evaluation and its results, as well as a detailed description of the methodology employed by the evaluation team are included, together with the Scope of Work, in Annex A.

B. Institutes of Higher Agricultural Education on the Eve of the 1990s

A final introductory comment on the role of institutes of higher agricultural education is appropriate. In the past three decades, AID has provided more financing for institutes and universities of higher agricultural education than any other donor (including the World Bank). This commitment to excellence in agricultural education spans support for Brazilian universities in the mid 1950s, for Indian, Pakistani, and Nigerian universities in the 1960s, and for North African, sub-Saharan African, and Asian universities in the 1970s and 1980s. Although the actual form of the university differs across context, each of the experiences derives in one way or another from the U.S. land-grant model combining teaching, research, and extension/outreach.

In 1985, AID's Office of Impact Evaluation began a three-year study of the effectiveness of its investments in agricultural education (IAV was one of the institutions selected for this study). The results were almost uniformly positive, even when support had terminated as long as seventeen years earlier. The study, which will be the

subject of an international conference in October 1988, demonstrated that agricultural universities can, and do, play major roles in the growth of their countries' economies. As AID and other donor agencies begin to grapple with new approaches to promoting economic growth and development in the 1990s, the performance of agricultural universities takes on strategic importance.

In ANE Bureau's Symposium on Agriculture in the 1990s (September 7-9, 1988) and BIFAD's "Getting Ready for the 1990s" conference (September 14-15, 1988), the strategic role of the agricultural university received priority attention. Increasingly, these institutions will bear the primary responsibility for the development, adaptation, and dissemination of technologies which will satisfy their countries' food requirements, generate foreign exchange earnings, and provide the critical surplus resources needed for transition to modern, industrial economies. For this reason, the sustainability of investments in higher agricultural education will be a special issue for those concerned with the development of Third World economies in the last decade of the twentieth century.

III. ACCOMPLISHMENTS OF IAV SINCE THE PREVIOUS EVALUATION

Overview: Chapter III groups accomplishments in the three broad categories of IAV functioning: 1) Training, 2) Research, and 3) Extension and Outreach/Advisory Services.

A. Training

The central mission of IAV is to provide quality higher agricultural education at prescribed levels and to develop leadership in the agricultural sector of the nation. In discharging these overall responsibilities, the institution must be sensitive to the advances in a number of highly scientific fields as well as to the evolving political, economic, social and cultural changes within Morocco. That the leadership and faculty of the Institute adhere to the principle of accommodating to such changes is attested to by the actions that have been taken since the most recent evaluation of the Project in 1986.

In pursuing the continuing review and evaluation of its teaching programs, IAV has not deviated from two major hallmarks of its development--first, an insistence on rigorous, high-quality teaching programs that measure up to standards of the highest international level; and, second, an appropriate mix or balance of "hands-on", practical experience with professional training to produce a graduate who can function effectively in Moroccan agriculture. In the last three years, the most important changes at the Institute have occurred in the further enhancement of the quality of its curricula and in emphasis and/or direction in selected areas of instruction. The principal actions taken are summarized as follows:

1. Introduction of actual on-farm experience for all students enrolling in the Institute. This was begun in September 1986 and is designed to test the student's attitude and disposition to "really wanting to work in rural areas and on rural problems," that is, to acquaint the student with the realities of his or her chosen profession. The program is in addition to the later "stage" experiences that provide particular field research skills and experience.
2. Modification of the third and fourth year programs (second cycle) to provide more specialized instruction at this level. Greater flexibility has been introduced into curricula and, within limits, students can opt for areas of concentration. The introduction of new units of instruction (UVs), and further specialization among the faculty as it has expanded, have contributed to this development. For example, students at IAV/Agadir can choose an

emphasis within horticulture leaning toward breeding or plant pathological concerns.

3. Complete re-examination of the fifth and sixth years (third cycle) of instruction. This review is being undertaken in response to a proposed action by the Ministry of Agriculture that would eliminate the Ingenieur d'Application (BSci) degree, and require all institutions of higher agricultural education to grant the Ingenieur d'Agriculture (MSci) degree. A restructuring of instruction in the third cycle was underway and well advanced in some departments before the proposed degree revisions; however, the proposed changes will call for substantial adjustments, influencing relations among IAV, ENA and ENFI, most of which have yet to be clarified.
4. Acceleration of the Doctorate in Agricultural Sciences (DES) degree under the aegis of the Project with greater interaction with U.S. graduate faculty counterparts, re-emphasis on thesis research being undertaken in Morocco on Moroccan issues, and continued planning for a greater portion of the academic preparation to be conducted at IAV.
5. Increased emphasis in course syllabi and curricula structuring to meet the needs of the private sector. This activity has been augmented by use of advisory councils and committees and efforts of the alumni association.

Table 1 shows the areas of specialization of graduates of IAV over the past three academic years, compared to Ministry quotas. Of the total of 5,912 students enrolled over this three-year period, 1,883, or 19.6% were women. Among the same student population, 9.6% were non-Moroccan students meeting IAV degree requirements and sponsored through a Government of Morocco scholarship program.

The further professional development of the members of the faculties at IAV, ENA, and ENFI has reached a high-water mark in terms of successful completion of advanced degrees during the past two years. To date, 129 actual and potential faculty members from IAV, ENA and ENFI have participated in doctoral studies in the United States. As of June 30 1988, 48 of these candidates had earned their Doctoral degrees (10 from US Land Grant universities, 38 from IAV, and 28 from both US institutions and IAV). About 30 of these degrees were conferred in the last two years. Table 2 shows anticipated completion rates until the end of the Project. These developments have led, of course, to further "Moroccanization" of the faculties, one of the goals of the initial IAV/UM Project. As of this date, 93 percent of the faculty at IAV are Moroccans (Table 3)

=====

TABLE 1

**NUMBER OF IAV GRADUATES BY SPECIALIZATION
COMPARED TO MARA QUOTAS
ACADEMIC YEARS 1985/86, 1986/87, 1987/88**

CATEGORY OF STUDENT	MARA QUOTA	NUMBER OF GRADUATES		
		1985/86	1986/87	1987/88
1. Third-Cycle IAV Students				
Agriculture (20 spec. fields)	100	127	100	126
Veterinary Medicine	50	41	32	31
2. Second-Cycle IAV Students				
Food Technology	50	25	23	21
Rural Engineering	40	39	28	45
Surveying	40	32	19	37
Agricultural Machinery	10	19	20	17
Horticulture	25	33	28	20
Landscape Architecture	5		5	
Plant Protection	20	24	19	23
Fisheries	10	14	15	15
TOTAL STUDENTS	350	354	289	335

Source: U. Minn. Resident Team Leader

=====

=====

TABLE 2

PROJECT PARTICIPANT ACTIVITY PROJECTED FOR FY 1988 - FY 1992*

Participants	1988	1989	1990	1991	1992
In U.S.	9	4	-	-	-
Completing Doc. In Morocco	70	47	39	16	-
Doc. Com- pleted	51	79	91	114	130

* At end of each Fiscal Year

Source: U. Minn Resident Team Leader

=====

=====

TABLE 3
MOROCCANIZATION OF IAV FACULTY, 1967/68 - 1987/88

YEAR	NUMBER OF FACULTY			% MOROCCANS OF TOTAL
	MOROCCAN	FOREIGN	TOTAL	
1967/68	0	6	6	0
1968/69	1	17	18	6
1969/70	2	30	32	6
1970/71	4	38	42	10
1971/72	9	55	64	15
1972/73	12	58	70	17
1973/74	20	58	78	26
1974/75	29	92	121	24
1975/76	38	106	144	26
1976/77	49	126	175	28
1977/78	64	132	196	33
1978/79	86	127	213	37
1979/80	121	119	240	50
1980/81	166	124	290	57
1981/82	180	98	278	65
1982/83	196	72	268	73
1983/84	220	70	290	76
1984/85	237	59	296	80
1985/86	278	45	323	87
1986/87	304	34	338	90
1987/88	312	25	337	93

Source: U. of Minnesota.

=====

B. Research

The Project now has a total of 129 faculty in training for or having completed their doctoral degree. Of these, 48 have completed the doctoral dissertations and been examined in Morocco; many have also attained a PhD from universities in the U.S. All these have been evaluated by international examining committees. The remainder of the participants are expected to have completed their doctorates by 1992. This project will then have fulfilled its stated goals.

Coincident with the return of trained researchers and their subsequent post-doctoral visits to their counterpart departments in the U.S. to expedite publication preparation and review--as well as to further enhance their research proficiency--there has been a significant acceleration in publication of research results in refereed scientific or other scholarly journals.

This has been particularly remarkable in the departments in veterinary medicine, whose faculty have published 141 articles since 1980. Unfortunately, no cumulative information was available to the team on total publications by IAV faculty, since 1980 or before. Only 172 additional articles were recorded on a list provided by the Project Office, but the team was made aware that there are many more already published, in press, or in preparation.

The advent of microcomputer purchases under the project has transformed the capacity of IAV research faculty to process data and prepare information for publication. These have been given a high priority by many returned faculty in their thesis research allocations from project funds.

One cause for continuing concern is an apparent unevenness in equipping laboratories at the departmental level. This is related to a continuing situation of underfunding of the basic set-up costs essential to mount significant research activities. The project allotment for the returned faculty will contribute to the meeting of equipment needs but does not cover the basic needs for a better use of the expertise acquired by the faculty participants and other new or returned faculty. Access to current information in scholarly publications continues to be another serious deficiency. This is addressed below in the section on the library.

Overall, the record of research training, research investigation in the training mode, and research publication is a remarkable one. However, it must also be recognized that the situation is precarious. Sustainability has not yet been achieved. There is much more to be done before it could be claimed that self-sustaining intellectual capacity and its financial underpinning are both present with an assured future.

C. Extension, Outreach and Advisory Activities

1. Training

The function of agricultural extension in Morocco is performed by the Direction of Extension and Agrarian Reform (DVRA) of the Ministry of Agriculture. At the regional level, the DVRA is represented in the Ministry's 35 provincial-level offices, along with other key directions. At lower administrative levels, it has 156 centers which provide a variety of services to farmers in rainfed areas. In irrigated areas, it is also represented in the nine Offices de Mise en Valeur Agricole (ORMVAs), with 121 extension centers nearer the farm level. The Director of DVRA indicated that most of his professional staff at the national level are recruited from IAV and that many of the leaders and technical experts at the regional level are also from the Institute. Thus, IAV plays an important role in supplying trained manpower at a critical juncture in the transfer of technology process.

In extension activities, IAV plays an important role. It is, in a sense, a wholesaler, providing scientific and technological knowledge to extension specialists in the DVRA, including the latest results of on-going research, as well as information derived from doctoral dissertations, masters theses, and student "stages". For example, under the World Bank agricultural extension project, it is planned that extension agents will engage in two-week training sessions to improve their general knowledge and their effectiveness in the field and that specialized training for agents appointed to regions where crops need special care, such as citrus and vegetables, will be conducted. IAV staff will serve as instructors for many of these sessions.

During the past three years, IAV faculty members have initiated concrete development actions and have participated in research/ extension conferences, training sessions, and seminars covering a variety of subject-matter fields.

2. Outreach and Advisory Activities

At IAV, development outreach and advisory activities are undertaken at two different levels. At the Rural Development Direction (DDR), contract research/extension activities are undertaken on a projectized basis. At the departmental level, this is also possible, but the approach resembles less that of a consulting firm than that of contract research as done at U.S. land grant universities.

a. Rural Development Direction (DDR)

Formally established in 1983, as the IAV outreach arm, the core group has actually been working together on project-

funded applied and action research since 1979. Recent developments include increases in volume of work, improvements in internal organization, development of a statement of purpose, and a significant increase in the number and variety of projects being realized. The DDR is constituted of a multidisciplinary group of economists, sociologists and agronomists as core, but they are able to involve IAV departmental faculty members and their graduate students in project-funded research and pilot-project activities in Morocco and elsewhere in the region. DDR activities are discussed further in Annex D. The inability of IAV to charge overhead, including on work carried out through the DDR, has posed a considerable obstacle to increasing revenues for basic and applied research, as well as increasing incentives for individual faculty members and graduate students participating in sponsored activities. This has important implications for resource mobilization, which are addressed below.

b. Department-Level Outreach and Extension

In addition to teaching and research, several other activities related to development take place in many departments at IAV, and impact directly or indirectly on Moroccan agricultural production. Some examples follow.

* Several IAV departments are headquarters for Professional Associations (see Table 4) which were created at IAV's initiative in the 1970s. These associations, most of which are based on disciplinary commonality, organize seminars and symposia at IAV which are attended by personnel from MARA, regional extension services, private farmers, representatives from private industry, banks, teaching and research institutions, and other entities. During these meetings, questions related to Moroccan agricultural development are discussed. Proceedings are published in IAV's journal, "Hommes, Terre et Eaux" and broadly distributed throughout Morocco and abroad. These associations have allowed Morocco to become a member of several international associations, such as the European Association of Animal Production and the Commission Internationale des Irrigations et du Drainage (CIID).

* IAV faculty members are invited to present seminars to farmers and/or extension personnel in various regions of the country. In the area of animal production, for example, such seminars are organized especially during the regional "Fairs". In 1988, seminars were presented in the Tadla, Haouz, and Doukkala regions.

* IAV faculty members advise farm associations such as the dairy cooperatives (Colait, Kenitra), the Dairy Breeders' Association (Gharb), and the Sugar and Citrus Producers' Associations.

=====

TABLE 4

Professional Associations in which IAV faculty
and Graduates are Actively Involved

National Association of Nutritionists
Association of Agricultural Engineers
Association of Rural Works Engineers
National Association of Veterinarians of Morocco
Association of Water and Forestry Engineers
Association of Graduates of IAV Hassan II
National Association of Topographical and Geometrical
Engineers
Association of Graduates of ENA Meknes
Association of Graduates of ENFI Sale
National Association of Rural Engineers
National Association of Irrigation and Drainage Engineers
National Animal Production Association

Source: IAV

=====

* Two memoranda of understanding between IAV and ORMVAs have been signed for applied research and extension/outreach activities. These links with the ORMVAs of Ouarzazate and Tafilalet were signed in 1987 to create formal links between IAV departments and regional services of the Ministry. Specific areas of collaboration were identified including soil salinity and irrigation, soil fertilization, range improvement, cattle, sheep and goat breeding, and animal reproduction.

* Several IAV labs conduct analyses for private farmers, cooperatives, industry, and state-run agribusinesses. Among the areas covered are animal feed analyses, soil analyses, "mobile clinics" for animals, and horticulture and food technology analyses.

Described below are department-level examples of advisory expertise:

* **Agronomy Department:** Sponsorship of an Agronomy Diagnostic exercise in a selected ORMVA or DPA each year. Different location or site chosen each year. Participation by staff and third cycle students; exercise requires about 15 days. The region is inventoried for agronomic (plant and crop) diseases and deficiencies in cultural practices. The group develops recommended corrective practices; renders an oral report to cooperators; develops and leaves with cooperators and ORMVA or DPA leadership a written report. Initially, the Department "did the task on their own". Now, the value of undertaking has been recognized and partial costs are defrayed by the ORMVA or DPA. Professors and students benefit by observing and recording what is happening in the field (in "reality") and not only in laboratory or classroom.

* **Topography and Geodetics Department:** Production of topographic and other maps of varying scale for agencies in the Rabat/Sale area to assist in planning for forests, green areas and parks, and urban expansion.

* **Soil Science Department:** Cooperation with MARA/DVRA in providing the soil science portions of the 10-month in-service training program for in-coming provincial-level extension agents. Also, annual consultation with the personnel of the Citrus Producers' Association (CESMA) soil lab to update each other on the development and application of most recent soil testing techniques, including both instrumentation and procedures.

* **Nutrition and Food Economics Department:** Consultations and graduate student theses on food policy, including economics of food policy, in collaboration with the MARA/DPAE (Planning and Economic Analysis Direction).

* Department of Food Science: Consultations with various segments of the food processing industry, as well as faculty and student research, for improved processing and quality control.

c. Private Sector Outreach and Advising

A number of private-sector oriented activities have been developed and/or continued and amplified in the past two years at IAV. Among these are the following:

- * Placing two-year technician trainees for pay at farms, and other enterprises (Rabat and Agadir).
- * Placing first-year students on farms as stage d'exploitation for three months before beginning course work.
- * Placing MS students on farms, at agri-business firms, with machinery distributors, etc., for thesis work, which includes selection of applied research topic relating to setting.
- * Seeking more linkages with private sector entities other than farm enterprises for contract work.
- * Signing contracts with important farmers to provide expertise from IAV faculty and students to manage their farms.
- * Integrating Masters-level applied research at NADOR private aquaculture operation.
- * Including a tracer study of placement of graduates in 1987/88 Project Workplan.
- * Proposing to set up at IAV/Agadir a "Development and Continuing Education" Office with a sliding fee scale for services, to provide income for research support as well as legitimate pay supplements to researchers.
- * At IAV/Rabat, numerous other outreach activities with the private sector have been carried out, including those by the food sciences section and the veterinary section. The export-oriented food and agro-allied industry sector has an urgent need for food analysis services and a versatile food pilot plant. These intensive investment structures have been put on top of the request list by the faculty of the Food Science and Engineering Section since its inception.

D. Institutional Development

1. Administrative Capacity

A plan to improve the scope, staffing and efficiency of the Administrative Services Direction at IAV was developed and progressively realized over the past two years. This has allowed IAV to more adequately present and defend its budget, based on the real needs for better use of faculty expertise, and for high-quality training. It has helped in the clarification of IAV's debt situation and allowed the Institute to undertake the development of a variety of analyses. This unit can now provide computerized management and financial data on a very timely basis, organize ordering and distribution of commodities, and manage all student lodging, feeding and logistic support. There are, however, a number of key managerial activities which are reserved for others in the central administration of the Institute--the Director and the Secretary-General. These two individuals are the link to the Ministry of Agriculture and Agrarian Reform (MARA), through the advisory board (sometimes referred to as the "board of regents") of the Institute.

In the view of IAV senior management, enhancing the scope of Administrative Services, which has included centralization and formalization of certain formally more flexible procedures, "imposes discipline and respect of basic rules of management, especially when resources are scarce, and coordination of activities is a vital necessity". An issue remains to be resolved concerning the relative and respective autonomy of IAV administration and faculty. Resolving this issue is important for IAV's further institutional development and sustainability, and should receive early and continuing attention.

IAV's administrative capacity has certainly improved in the past two years. This is most radically demonstrated, as has been noted above, by the ability of the Administrative Services Division to generate current data on all aspects of recurrent costs, as well as capital expenditures before and during the evaluation team's visit.

Faculty organization has strengthened over the same time period. There is what may hopefully be a constructive tension between these two areas of evolving strength. A characteristic IAV approach has been the creation of *groupements d'études et recherche en...* or GERS. They are multi-disciplinary and/or inter-departmental.

This mechanism, which is similar to the field approach as practiced at Cornell, is a way of integrating the skills, research interests, and resource needs of a variety of individual faculty and their senior students from a range of disciplinary departments. The GER can include experts from

outside IAV--including from other schools as well as professional associations, enterprises, INRA and the like. Table 5 gives an illustrative list of GERS currently in operation. Each GER has a council with representatives of each unit included in it, and elects a coordinator for a period of three years. In the short term, it is recommended that GERS be the main building blocks of inter-institutional collaboration since they do not duplicate the departmental structure, allow for non-IAV membership, encourage economies of scale, and can involve research students.

One of the most successful is the GER on problems relating to the camel in Morocco. This GER is now building a structure to support its activities at the Agadir campus. There are some 40,000 camels in Morocco, and there are a number of interesting and significant research questions relating to uses of the camel. Another active GER is the GERP--on pastoralism--which is the group involved in the research activities financed by the World Bank in the Moyen Atlas on pasture management. The former GERM, a grouping of all those at the Institute working on microbiology, both in animals and plants, has been in existence for years, and has managed to provide a focus for a good deal of interesting work with extension implications as well as research and teaching support functions. The GERER (Renewable Energy) is another which involves researchers from three institutions in Rabat--the Faculty of Sciences, Ecole Nationale des Industries Minerales (ENIM) and EMI, the Ecole Mohamedia d'Ingenieurs, and in which IAV is very active. GERER organizes an annual Conference at the national level and publishes a bulletin every two to three months.

2. Faculty Development

Since its inception, IAV has been able, through judicious use of international cooperation with France, other European countries and the U.S., to develop and Moroccanize its faculty. Through projects like this one, it has been able to reorient faculty training objectives to some extent in line with changes in the needs of the agricultural sector as a whole, and the Government agricultural services in particular.

It is essential that the Institute be able to continue to adapt its faculty resource base in line with changes in sectoral demands. At present, this is particularly to be felt in response to emerging private sector needs. In the short-term future, this may continue to be the area of focus; in the medium term, GOM and private sector agencies may continue to express other needs for specialties that are not yet seen as relevant. Retraining and upgrading of existing cadres will continue to be significant as one of IAV's outreach functions.

TABLE 5

List of Interdisciplinary Research and Studies Groups
(Groupements d'Etudes et de Recherches: GERS) at IAV

<u>Subject Area</u>	<u>Departments at IAV</u>	<u>Institutions Outside IAV</u>	<u>Functions/ Activities</u>
1. Microbiology (GERM)	Microbiology, Contagious Diseases & Immunology; Avian Diseases; Food Hygiene & Preventive Medicine; Repro- duction; Soil Science; Food Microbiology & Biotechnology; Food Processing & Engineering; & Plant Pathology	Department of Biology in Faculty of Science- Mohammed V University	1. Conduct Periodic Seminars & Confer- ences; 2. Establish Morocco Society of Microbiology; & 3. Participate in Organization of International Conference of Comparative Virology-1985.
2. Small Ruminants (GER-CRSP/SR)	Animal Production; Reproduction; Physiology; Parasitology; & Human Science	Animal Production at ENA-Meknes; Animal Science- Univ. of Calif./Davis; Range Manage- ment-Utah State Univ.; Animal Science-North Carolina State University	1. Fund Research Studies on Small Ruminants in Tadla and Middle Atlas; Produce Technical Information Materials for Sheep Production in Morocco & Region; 2. Participate in Annual Program of National Assoc. of Animal Production (ANPA) on Topics of Sheep & Goat Production; & 3. Work with INRA on Grazing and Forage Utilization Studies.

TABLE 5 (cont'd)

<u>Subject Area</u>	<u>Departments at IAV</u>	<u>Institutions Outside IAV</u>	<u>Functions/ Activities</u>
3. Storage (GERS)	Agricultural/ Hydraulic Engineering; Plant Pathology; Zoology (Ento- mology); Food Chemistry & Biochemistry; Food Micro- biology; Agronomy & Plant Breeding; and Direction of Rural Development	National Office of Cereals & Legumes; Dept. of Civil & Mineral Engi- neering (Under- ground Space Center) Univ. of Minnesota	1. Conduct Research on Limitations & Advantages of Underground Storage (Supported in Part by a 3-year Grant from the Office of the Science Advisor, USAID/Washington). 2. Organize Symposium on all Aspects of Storage.
4. Renewable Energy (GERER)	Food Processing & Engineering; Agricultural Engineering/ Machinery	Faculty of Science: Mohammed V University; Dept. of Physics: Solar Energy; Dept. of Mechanical Engineering- Mohamed National School of Engineering; Dept. of Mechanical Engineering- National School of Mineral Industry.	1. Produce Regular Bulletin on Renewable Energy; 2. Organize Periodic 1-2 Day Symposiums on Renewable Energy Sources; and 3. Work with International Foundation for Science (IFS) to Organize Regional Conference of Solar Drying & Photovoltaic System (1988).
5. Camel (GERD)	Physiology; Anatomy; Reproduction; Agricultural Engineer; Microbiology; Parasitology; Nutrition	Animal Traction Studies of INRA (Arids Culture Center); Physics Dept.-Univ. of London; Physiology Dept. -Upsaala Univ.; Physiology Dept. -Cornell Univ.	1. Conduct Research on Environmental Physiology with Swedish & British Cooperation; and 2. Organize Symposium on the Camel (1990).

TABLE 5 (cont'd)

<u>Subject Area</u>	<u>Departments at IAV</u>	<u>Institutions Outside IAV</u>	<u>Functions/ Activities</u>
6. Range Management (GERP)	Animal Production; Ecology	Range Management Institute of Agriculture in the Mediterranean, Montpellier, France through support of the International Center of Advanced Studies in Mediterranean Agriculture (CIHEAM); ENFI, SNDE in Morocco; CEPE, INRA, SIME, CERPAM in France; IRA de Medenine in Tunisia; INIA in Spain	1. Participate in Organization and Presentation of 6-week Course in Range Management (1988).

The ability to adapt, and to maintain international standards of excellence in teaching and research, is one of IAV's greatest assets, and must be sustained over time. Faculty must be able to keep in touch with latest developments in their fields, engage in individual and collaborative research activities both at home and abroad, and have access to ideas and technology that will upgrade their teaching capabilities. Additional areas of expertise will have to be developed, either through reorientation of existing faculty or training of additional, new faculty members. There must be some allowance for attrition, through departure to the Moroccan public and private sectors, to regional institutions, and to international organizations and other countries. Eventually, there will also be attrition through retirement.

3. Student Development

IAV is one of the most difficult institutions of higher education to enter. The failure rates after the first year in all institutions have traditionally been high. At IAV, 500 students are selected among 5-6,000 applicants to enter the APESA--the first, common core year of studies. Of these 500, 30-40% are not allowed to finish the first cycle. The failure rate after the first year is relatively low, because of the high criteria used for selection at the entrance and APESA stages.

Teaching methods, which earlier emphasized memorization and rote repetition on exams, with little student participation in outside practicums and labs, are continuing to evolve. All faculty are involved in seeking better methods, and bring back from abroad a variety of approaches. With the return of numerous Project participants as faculty members, and the educational reform, the variety of pedagogical approaches has broadened. Student teaching evaluations have been introduced in some departments, and the microcomputer revolution is being felt in instruction as well as in administration and research.

Library and other documentation facilities are limited despite Project inputs, and the curriculum is still heavily science and math-oriented. The ability of the student to opt for one specialization rather than another has been curtailed in the past.

Students are exposed more than ever to English as a critical asset related to their disciplinary specializations. However, audio-visual aids and other materials in support of ESL are virtually unavailable to the Language Department, a unit which supports the entire teaching program as well as provides translation and interpretation services for the Institute.

A key positive element that has been unique to IAV has been the system of practical field "stages", allowing students to experience rural life, and become connected to Moroccan agriculture. Stages also permit hands-on experience in applying various research techniques, such as survey methods and in-depth interviewing. The system also provides students with exposure to faculty in a non-classroom setting, and with the opportunity to write up and analyze data collected.

4. "Restructuration"

There are a number of aspects of "restructuring" of the agricultural higher education establishment in Morocco which began in 1986-87. Together, they are sometimes referred to as "the educational reform". A key element in generating the reform, as was noted above, was the acceptance by the Minister of Agriculture of a recommendation from the Unions of Ingenieur d'Application to move toward a single-degree system, which would involve a six-year program at IAV, ENA, and ENFI.

This, in turn, has led to considerable efforts at curriculum reform at IAV and the other institutions, which are described in more detail in Annex D and elsewhere in this report for Human Sciences, and particularly for agricultural economics in Annex E.

The curriculum reform has also taken place in the context of a strategic planning process at IAV. Four areas of emphasis were identified as the first step of the process, and included in the Project's 1987-88 Workplan. These are discussed in detail in Chapters IV and V below. The IAV Strategic Planning Committee is continuing its analysis and intends to present a Draft Strategic Planning document by the end of 1988. This document will be circulated and discussed at the Section level within IAV. Comments and proposals will be received and reviewed by the Committee, resulting in an amended document. This document will be presented to the Institute's Conseil d'Administration (advisory board) for final approval.

5. Library

The nucleus of any major education and research institution is its documentation center or library. It is essential to be able to locate and have efficient access to the products of current research as well as to the established work in a field of study. Otherwise, state-of-the-art work cannot be undertaken effectively.

The AID mid-Project evaluation report of 1983 drew attention to the crisis in library development. It recommended a

project funding increase of \$500,000 to be spent over five years (see Table 6 for project allocations to the library since 1980). The Project also provided an HP-300 computer system to assist with establishing a data base of the library's holdings. The system has had operational problems, and searches require use of the nearby CDN (Centre de Documentation Nationale) which has the capability for on-line searches. As a result of the CDN capability, essential for effective research, the faculty and students can now obtain listings of references relevant to a research topic. For the most recent 6 months period, 220 such searches were completed.

Access to identified specific articles, book chapters, etc. is not satisfactory, however. The library's own holdings are relatively weak, and it is difficult to satisfy faculty expectations in obtaining the desired materials via photocopies or inter-library loans. Nevertheless, 1,083 items were obtained via prepaid photocopy services of the British Lending Library during the nine months from September 1987 to June 1988. Introduction of a newer system of electronic communication could help overcome the abstract search and retrieval problem.

6. Computer Facilities

One of the most striking areas of accomplishment since the previous evaluation is in the area of microcomputer capacity development. In the past thirty months, the inventory of IAV microcomputers has jumped to 107, of which 105 are IBM-compatible and two are Macintoshes (see Annex G for a detailed summary of microcomputers and peripherals, analysis of needs, and recommendations for future acquisition and use). Every department except the Languages Department, as well as the principal administrative services, has direct access to microcomputer technology.

The accounting department has transferred all of its reporting to Lotus 123 worksheets, including transactions dating from 1981. To the near astonishment of the team, IAV's Accounting Department had produced annual summary financial analyses prior to the team's arrival in Rabat. Only two years earlier, IAV was able to produce three-year summary data only by the final day of the month-long evaluation. All U.S.-financed dissertations are produced and edited on Project-financed PCs. Increasingly, research-related data analysis and display are produced on PCs. In anticipation of a seminar organized for food policy modelling, the Human Sciences Department received six IBM PS/2-50s.

The estimated dollar amount provided under the Project for microcomputers and peripherals since 1986 is \$194,000. The estimate for recurrent cost expenditures to maintain and

=====

TABLE 6
LIBRARY ALLOCATION UNDER THE PROJECT

Date	6-18-80- 9-30-86	10-1-86- 9-30-87	10-1-87- 9-30-88	10-1-88- 9-30-89	After 10-1-89
Act. Exp.	\$ 179,722	76,703	-	-	-
Est. Exp.	-	121,793	150,000	46,732	0
TOTAL PROJECT FUNDS			\$575,000		

Source: EAV and U. Minn. Project Office.

=====

renew this investment--plus the rest of the approximately \$500,000 investment made in microcomputers (plus one mini) by the Project, IAV and other donors--is 5,600,000 Dirhams over the next five years (see "Recurrent Cost Analysis," Annex C).

7. Student Placement

Until 1981, the Ministry of Agriculture and Agrarian Reform was in a position to hire almost all of the graduates of IAV as well as those from ENA at Meknes. Forestry graduates from ENFI went to Eaux et Forêts. Manpower development projections were made almost exclusively in terms of public-sector needs, and quotas could sensibly be assigned to each teaching establishment, and even to particular disciplines at particular degree levels. Coherence between demand and supply was further encouraged by the fact that IAV was bureaucratically coterminous with the Direction of Higher Education and Research in the Ministry, so that IAV senior management were heavily involved in the allocation of quotas throughout the whole agricultural education system.

After 1981, the Ministry no longer could absorb all the graduates; not everyone had an assured future as a member of the civil service. Nevertheless, the "administration" continued to be the major employer, both in veterinary medicine and in agriculture. IAV became a separate "public enterprise" or semi-autonomous body, but its student intake and outflow targets were still established through the same sort of macro-level manpower planning.

The law developing private sector practice of veterinary medicine was not enacted until 1984. By the time of the 1986 evaluation, there was a growing concern that IAV graduates in agronomic sciences, if not in veterinary medicine, might face short-term unemployment, as output failed to find an equivalent demand in the private sector.

The emerging demand for specialists versus generalists in the private sector has been a topic of lively debate for some years, and especially in the last year or so. Increasingly, IAV graduates will be required to seek employment in the Moroccan private sector, or abroad. An exception seems to be those with new degrees in agro-economics, who are immediately in demand in the civil service as well as, increasingly, in the private sector.

The relatively new National Association of Agronomists of Morocco has begun to take an active role in exploring the demand for Ingénieurs with various specialties (profiles). Meanwhile, under the Project, a placement study is to be carried out and will provide an important data base for all IAV graduate associations (see Table 4). IAV and these

associations are open to working on this continuing issue on a collaborative basis.

Within the Institute, faculty members on an individual and departmental basis are becoming more active in thinking about the career futures of their students. A number of them try systematically to help their students work on applied research problems that are relevant to particular niches, potentially leading to job placement following the research experience. Thesis research thus becomes, in some instances, an apprenticeship.

The Veterinary Medicine faculty, and the related Association, are also working on improving graduates' placement chances. They have developed an informal apprenticeship system working with veterinarians who are now in private practice.

E. Regional and International Collaboration

IAV continues to make impressive progress in establishing collaborative relations with regional and international organizations. Because of its international-class standards of excellence, IAV is frequently sought out by institutions from the developed world for collaborative efforts. Furthermore, it has established a unique role as a regional organization for Africa and the Middle East. The GOM has maintained its commitment to funding scholarships for foreign students who, as a result, still constitute approximately ten percent of IAV student population. Of the two hundred and fifty foreign students at IAV, only eight are financed by sources other than the GOM. Only one of the students is financed by a USAID Mission on the African continent.

Because a complete summary of international collaboration would be too voluminous to detail here, only a few of the most striking cases have been included.

1. The International Irrigation Center

The IIC, which is part of the Agricultural Engineering Department at IAV, was created in 1985 to provide in-service training to engineers and practitioners in the field of irrigation management. The IIC/IAV offers both national and international training programs. It is part of a worldwide network of irrigation centers formed with two other sister institutions--the renowned International Irrigation Center of Utah State University and another regional Center in Bangkok, Thailand.

The IIC/IAV has been offering short training courses for the last two years on on-farm water management in French. In both cases, a total of 44 international and national

participants attended. The foreign participants were from Mauritania, Mali, Chad, Niger, Cameroon and Haiti.

During the 1988 academic year, IIC/IAV is offering two short courses in French on different facets of irrigation engineering, including applied microcomputer use and on-farm water management. The Center also offers a "Program on Technology Transfer", which consists of study tours on specific topics related to irrigation management. This program is offered to foreigners interested in Moroccan irrigated agriculture as well as to Moroccans visiting other irrigation projects in other countries. A one-week study tour for six high-level officials from India and another for three high-level officials from Turkey were already organized in January and April, 1987, respectively. These groups visited the major Moroccan irrigation projects, and the program provided an excellent opportunity for the visitors to discuss and exchange ideas and views on their own experiences with Moroccan officials.

The Center has also worked closely with centrally-funded AID projects, S&T's WMS-II and ANE's ISPANE. WMS-II was instrumental in providing support to the Center and has examined continuing support through WMS-III (in design). IIC/IAV is also receiving support from Belgian technical assistance and the EEC. ISPANE has identified IAV as one of three support organizations capable of providing short-term training and advisory services to countries in the region. ISPANE is currently working with five members of the IAV faculty to design USAID/Rabat's Supplementary Irrigation project.

2. Water-lifting Technologies

In the 1986 Impact Evaluation Report, one of the primary examples of regional collaboration concerned the transfer of traditional water lifting technologies to Mauritania. IAV has continued to play an important diffusion role in this area, extending its efforts to other areas in Mauritania and more recently in Mali and possibly to Niger. In a related area of arid lands management, the FAO has requested IAV to provide short-term three-month training to twenty Mauritians at IAV's regional training and research center in Errachidia.

3. Rwanda's Graduate School of Agronomy

Another indication of IAV's maturity as a regional center of excellence is the extent to which Title XII universities are willing to collaborate with IAV in undertaking international development assistance activities. Most notable is IAV's role as a co-implementor with the University of Minnesota of USAID/Rwanda's institution building project at the Graduate School of Agronomy (GSA) in Butare. In April 1988, three IAV

faculty members conducted a workshop designed to identify specific areas in which IAV would train GSA faculty and researchers.

4. CRSP - Title XII

Morocco has been involved in the Small Ruminants CRSP since 1981. This program has been a major stimulus to research and collaborative training on sheep and goats. There has been good synergy with the University of Minnesota in these efforts. Funding reached nearly \$150,000 per year and is currently about \$60,000. Several departments at IAV have been involved: Animal Science, Physiology, Reproduction, Parasitology, Ecology, Human Sciences as well as ENA Meknes. There is a need to add a forages component from the Agronomy department. Morocco was the fifth and final country to be accepted into the CRSP program. It is particularly interesting that IAV was the only non-U.S. institution to be selected as a counterpart institution. The Secretary-General is on the Board of the CRSP. IAV has been asked to work on a Sheep Production Manual to be published soon in both French and English. The concept of CRSP is an important one and should be continued.

5. Pastoralism and Development Course

This was a 7-week (May 23-July 9, 1988) international course on Range Management involving three weeks at IAV/Rabat, 3 weeks at Montpellier University with one week on a range field trip in Spain in between, involving 15 sites. The course was given in French and was sponsored by CIHEAM. Its focus was the preparation, implementation and evaluation of programs of development involving range land. Students were drawn from Algeria, Morocco and Tunisia on the southern shore of the Mediterranean and from Spain, France, Italy and Yugoslavia on the North. Of the lecturers, 18 were from Morocco (13 IAV), 12 from France, 4 from other North African countries and 1 from FAO. Project funds played a pivotal role in training IAV investigators at the best range management centers in USA universities in the Western and South Western states.

6. International Conference on Milk Production

This was held at IAV Rabat on October 13-14, 1987. It involved the faculty of the Animal Science Departments at IAV, ENA and the University of Minnesota with an overview by the Directeur de l'Elevage. This conference was designed for extension workers and others who are in regular contact with producers. Attendees included people from seven Mediterranean countries as well as extension workers from all over Morocco. It had a very high impact and represents another example where the Project had a major impact on people involved with the dairy industry. The rapid progress

of Morocco's dairy industry in the last few years should be noted as one of the great success stories of its agricultural development. Urban milk consumption has increased to about 50 kg/year. Production in Morocco has increased substantially, but it is still only about 60% of total dairy products consumed.

IAV is also involved in a wide range of collaborative research with regional and international organizations. There is a regional (Mediterranean) collaborative research program on food legumes in which IAV and INRA are both involved. There is a regional project representative at Settat from ICARDA who also comes to IAV for meetings on collaborative research activities. A faculty member is the coordinator at IAV. This provides a formal linkage with the INRA research program at Settat, as well as the regional linkage. The particular subject of IAV research is chickpeas. ICARDA has created a Mediterranean work group on diseases in food legumes, and also is considering setting up regional training center programs, which may provide another venue for collaboration with IAV.

The IAV's Horticultural Complex at Agadir (CHA) is going to carry out a multi-disciplinary program on potatoes, under the leadership of IAV/CHA faculty. The regional CIP representative, who is based in Tunis, is providing initial funding which will go for student teaching and research. The idea is that after two years of initial work, CIP will help them to develop a national-level program, which CIP will "back".

IAEC is funding research on appropriate chemical treatment for fruit flies. IAV/CHA is going to be included in this multi-country study effort. IAV's Director is on the CIHEAM Board, and a faculty member is on the Scientific Consultative Council of this Mediterranean regional agricultural research organization, which funds a variety of seminars, short-courses, and research. After Nigeria, Morocco is the largest recipient of research grants from the International Science Foundation (FIS). Forty IAV faculty have received individual competitive FIS research grants.

IV. SUSTAINABILITY AGENDA

As mentioned earlier, one of the primary objectives of IAV's Second Interim Evaluation is to identify strategies for sustaining the investments in institutional development made over the past twenty years. Before moving to that set of recommendations, however, the Evaluation Team felt that it was important to describe the qualities or capacities which the institution needed to sustain following two decades of institutional support financing. This chapter, therefore, provides the Team's assessment of six critical elements which IAV must assure in the future if it is to maintain the international quality of its instructional, research, and consulting programs. The critical elements are: 1) financial solvency and resource mobilization, 2) program focus, 3) human resources development, 4) enhanced research capacity, 5) institutional responsiveness, and 6) linkages to the international scientific community.

A. Financial Solvency and Resource Mobilization

The capacity to meet recurrent operating costs, particularly for teaching and research, and investment costs in equipment, vehicles, and new physical structures will be the primary determinant of IAV's ability to maintain two decades of investments in human capital. Failure to sustain this capacity will lead to immediate deterioration of the human resources investment during the decade of the 1990s and beyond (see Section IV C below). The capacity to meet recurrent costs consistent with the human capital investments will require IAV and the GOM 1) to provide greater core (hard-money) support and 2) to examine a range of off-budget alternatives for generating funding. These alternatives must be compatible with normal teaching and research. Despite the local and foreign currency support provided by the Project and by IAV's increasing project/contracting activities, a significant recurrent and investment cost gap now exists, requiring immediate action as well as medium and long-term solutions.

B. Program Focus

In preparation for Morocco's next five-year plan, IAV administration has identified five themes which represent the critical areas of substantive involvement for IAV in the 1990s: 1) agricultural productivity, 2) agribusiness and the private sector, 3) food policy analysis, 4) natural resources conservation, and 5) water management. The Team examined critically these themes to assess the extent to which they reflect the major priorities for the growth and development of Moroccan agriculture. It is the Team's consensus that the themes selected by IAV administration do target priority areas of intervention and provide the programmatic basis for mobilizing material resources and national legitimacy

required to pursue its institutional objectives. The justification for the inclusion of these programmatic areas is described in the sections below.

1. Agricultural Productivity

Morocco's population is projected to increase by 60% between 1988 and 2000. This means that food production must increase by a similar proportion for self-sufficiency in agricultural production to stay at the same level. For people to be able to buy the same amount of food at the same price, there will have to be an increase of 60% in GNP distributed evenly among the 40 million people. The sustainability agenda for IAV in helping build such necessary agricultural productivity must include research and extension planning. The ultimate challenge to Morocco's agricultural and fisheries system will be to produce enough edible biomass of plant and animal products to feed its people on a renewable basis and, hopefully, contribute to the national economy through increased exports without further environmental degradation. This requires, first, that plagues of major diseases and pests of animals and plants be avoided. Therefore, veterinary medicine, plant pathology and entomology become extremely important. Second, the essential basis for plant productivity must be available: foremost in this continue to be the need for water, followed by improvement of the soil and of biological manipulation of plant and animal production and health. Agricultural engineering and biotechnology will have major contributions to make, along with improvements in farm management.

2. Agribusiness and the Private Sector

Two facets of agribusiness must be addressed. The first involves the placement of IAV graduates in the private sector. The second concerns the demand for and the potential contributions of IAV faculty in the private industrial arena as consultants and/or researchers. A great deal needs to be done if the potential contributions of IAV to the industrial and service activities of Morocco are to be fully exploited. It is imperative that the issue be addressed systematically at IAV, given that the private sector is now seen to be the major growth area for employment of graduates. Administrative leadership at IAV will be essential in developing and exploiting opportunities for employment and consultation.

3. Socioeconomics and Food Policy Analysis

Another major foci in IAV's draft strategic plan is strengthening teaching and research in social sciences, particularly in agricultural economics and agribusiness management. This area of program development has been the subject of extensive review and reappraisal by faculty

groups, the administration, and Project collaborators. Ensuing actions by IAV faculty have attempted to balance the composition of the socioeconomics curriculum and the quality of instruction with the wide range of problems confronting Moroccan agricultural development.

The results of these efforts have been impressive although poorly communicated to outside collaborators. First, in keeping with the philosophy of exposing virtually all of its students to the full range of agricultural sciences before focusing on a major area of emphasis, every student is required to take a substantial number of courses in the field of socioeconomics. Second, substantial revision of curriculum has occurred in the area of agricultural economics. Analyses of the structure of the teaching curriculum through the third cycle reveals an unusually high proportion of basic mathematics and applied courses in quantitative methods, an expanding set of specific agricultural economics courses, and a good supporting background in other socioeconomic and agricultural courses (see Annex E for a complete description of the program).

A typical student pursuing studies through the third cycle would participate in the following distribution of coursework:

<u>Field of Study</u>	<u>No. of Courses</u>
Quantitative Analyses	10
Agricultural Economics	16
Other social sciences	7
Agriculture-related	30

In reality, the quantitative component of the curriculum exceeds substantially the proportion found in Masters-level agricultural economics programs in the United States. What has not been adequately addressed in the curriculum development is the application of quantitative analytical tools to food policy issues in Morocco.

4. Natural Resources and Conservation

In the past five years, concerns about the deterioration of the natural resource base have greatly increased in Morocco and in all parts of the developing and the developed world. In Morocco particularly, natural resource management issues center on deforestation, soil deterioration, wind and water erosion, and over-grazing the rangelands. The 1986 Impact Evaluation raised the issue of natural resources management as one of the critical substantive areas to which IAV needed to devote additional resources and attention. The inclusion of Natural Resources Management and Environmental Conservation as one of the four programmatic priorities in

the draft strategic plan is well-founded and strongly justified. Agriculture, livestock, and forestry activities, on the one hand, and the maintenance and enhancement of the natural resources base, on the other, are inextricably linked. The integration of the natural resources conservation issue into all teaching and research activities is a critical IAV capacity which must be sustained into the 1990s.

5. Water Management

The limiting factor in increasing both agricultural production and agricultural productivity in Morocco is water. Morocco's next five-year plan identifies the mobilization of additional water resources as one of its major priorities. The King has announced that Morocco will build one additional major dam in each of the next ten years. The World Bank provides substantial support to Morocco in the area of small and medium-sized irrigation infrastructure. USAID/Rabat is considering providing funding for up to ten earthenwork structures for capturing water in the Atlas mountains. More important than capturing and mobilizing the water resource, however, is the management of this extremely scarce production factor. In the 1990s, water management will be a critical issue for the agricultural sector. IAV has already demonstrated regional and world-class expertise in this area and should make every effort to sustain this capacity into the coming decade.

C. Human Resource Development

While the theme of the IAV/UM/AID relationship over the past 18 years has been "institution building", the lynch-pin has really been "human resource development" (HRD). IAV has characterized its faculty development in two phases: 1) recruitment and participation of faculty in pre-doctoral training; and, 2) continued recruitment, doctoral training abroad, conducting of doctoral research at IAV and granting of the Doctorate ès Sciences Agronomiques degree. That the vision of the founders, the sagacity of the administration, the discernment of the faculty, and the faith and confidence of collaborating agencies have been rewarded in embracing this approach is clearly reflected in the quality of institution that IAV represents at this stage of its development. As an element--not only in sustainability of the institution, but more importantly, of continued growth and development to greater levels of performance--the factor of human resource development is paramount.

Close attention to the recruitment of highly qualified additional and replacement faculty members is vital. As IAV takes over both the coursework and research components of the local doctorate program, care must be exercised to ensure that faculty are not selected only from IAV graduates. One

of the hallmarks of the faculty as presently constituted is its diversity in doctoral backgrounds. A crucial problem in the future may be sustaining and nourishing the intellectual vitality, the creative capacity, and the professional commitment of the faculty and staff. Avoiding this possibility involves the convergence of a number of approaches for career development coupled with attendant resources requirements. Among these are access to research opportunities and sustained support: structured and focused in-service training; and publishing the results of research work in national periodicals and international referred journals.

Paramount among HRD needs is to foster an attitude and environment of scholarship. On the one hand, the GOM and IAV administration must demonstrate their commitment to this goal. On the other, the faculty of IAV must also show their dedication to excellence. Specifically, the GOM must allot the necessary resources to make it possible for faculty to keep abreast of the steady and continuing flow of new information in their fields in a current and timely manner, i.e., an adequate documentation resource and delivery system. Likewise, they must have facilities, equipment, supplies and support staff to ensure a productive base for research. Third, it is necessary to arrange for policies and funding for the exchanges of people and ideas that fuel the dynamism of modern research, along with provision of fellowships for the training of both post-graduate students and senior scientists.

D. Enhanced Research Capacity

Development of a strong, sustainable research program requires, as a basis, a dedicated, well-trained faculty with the motivation and capacity to undertake researchable investigations. However, the faculty must also recognize that to obtain the funds necessary for effective research, priorities must be established that appeal to those who provide the funds, e.g., the Government of Morocco via its Ministries of Agriculture and Finance, as well as other ministries, granting agencies that fund research, international donor agencies, and agribusiness enterprises. Because many of the major problems demanding attention today require cross-disciplinary approaches, faculty must transcend disciplinary territorialism and make a strong commitment to teamwork. They must also accept that they must surrender some degree of participation in research funding allocation to administrative groups to ensure continuity of support.

As the training phase of institutional development loses the big thrust it received from this Project, IAV must address the difficult issue of research administration. A systematic strategy will be necessary to sustain the high standards and aspirations that have been established. To maintain and

enhance its reputation internationally in agricultural research, special provisions must be made to feed the proven motivation of the young faculty. Visibility is developed through participation in linkages outside Morocco through visits, attendance and participation at international meetings and conferences, as well as through publications. Incentives must be developed including a budget to cover the full costs of travel, subsistence and registration on the one hand, and of publication on the other. The Government, IAV administration, and the faculty must accept the principle of rewards for achievements in research via annual performance-based evaluation of faculty for salary increases.

It is imperative that a central pool of funds be obtained and earmarked for the internal budgeting of high-priority research and to create opportunities for faculty to develop innovative research projects. One way this might be done would be to appoint a small number of Task Forces (e.g., on the five major themes currently being emphasized), to manage an allotment of resources for special inter-disciplinary topics. Criteria and information would be advertised and proposals solicited for multi-disciplinary projects that would be evaluated for awards of funds on a competitive basis (see Annex F).

E. Institutional Responsiveness

IAV's ability to continue to adapt to a changing socioeconomic environment is a critical element of institutional sustainability. This should be reflected in an on-going strategic planning effort, based on feedback from the various constituencies IAV is designed to serve. Equally important, however, is the maintenance of its ability to evolve its internal structures in terms of the imperatives of maintaining standards of excellence in teaching, research and outreach. As more and more faculty return to carry out doctoral research, and as more and more of them embark on post-doctoral careers, the needs for decentralization to groups and departments--as well as to committees representing the faculty as a whole--will increase. At the same time, however, IAV needs to continue to evolve core administrative structures to support the faculty in achieving its mission. The present public enterprise administrative model is not necessarily the most conducive one in this context. Hopefully, IAV will be able to continue to adapt it at the margin.

F. Linkages to the International Scientific Community

IAV has appropriately identified two directions for scientific linkages--one to the "North" or the developed countries' universities, the other to the "South" or the developing countries' institutions. A very substantial commitment should be made to ensure that the faculty build

strong and sustaining links to, first, their counterpart departments and institutions where they trained. This initial linkage should be expanded as contacts are developed through meetings, correspondence and exchange visits or fellowships. Funding must be provided for travel and living costs and, where hands-on research is conducted, for contributions to research costs. Funds are required for post-graduate stipends so that the balance between faculty and research fellows can be attained.

In-country linkages within IAV and between IAV faculty and INRA scientific staff can strengthen the call for outside funding. In particular IAV should build on its developing reputation as an institution capable of strong multidisciplinary research. The skills of grantsmanship need to be continually improved. IAV has indicated a strong commitment to continue training faculty from other countries in the Maghreb, and in Francophone Africa and beyond. It could play a unique role as part of an innovative arrangement in such activities. A consortium arrangement with key U.S. universities from the Project "Partnership" is currently being explored.

V. RECOMMENDATIONS FOR THE 1990s

Based on the sustainability agenda described in the preceding chapter, the Team has organized strategic guidance in five areas: 1) recurrent cost support, 2) resources mobilization, 3) program priorities, 4) external relations, and 5) inter-institutional arrangements. The guidance builds on and expands Chapter IV recommendations in order to enhance the international capability established by IAV over two decades of development.

A. Recurrent Costs

Although the issues of recurrent costs and resources mobilization are closely related, the evaluation team has attempted to retain an important conceptual distinction. The issue of recurrent costs refers to the gap between existing resources and actual costs of doing business. Resources mobilization refers to the strategies which an organization pursues in order to close the recurrent cost gap. In this sub-section, the team provides recommendations which relate to the measurement of the gap. In the following sub-section, the Team proposes a range of strategies for addressing the gap.

The Recurrent Cost Analysis, which is included in Annex C, arrived at the following major conclusions:

1. Personnel expenditures averaged 76% per annum during 1985-1988.
2. Failure in obtaining the full allotment of investment budget credits does not appear to be a result of either IAV non-compliance in submitting the appropriate information in the request, time delay nor a result of IAV's inability to program and earmark funds for investment expenditures; failure to receive promised credits (over 11 million Dh in 1987) does impact substantially on IAV's effectiveness.
3. GOM contributions averaged 82% of IAV's receipts from 1985 through 1988; IAV receipts averaged ten percent while contract projects accounted for the remaining eight percent.
4. IAV expenditures for teaching and research averaged four percent for the last three years.
5. Project contributions to local cost operations averaged sixteen percent of non-salary costs for the last three years and four percent of total operating costs financed through local currency (the Project contributes to local cost support for

the operating budget through \$10,000 dissertation grants to doctoral students); the University contribution to equipment expenditures averaged seven percent.

6. Project contributions to local costs are split almost equally between operating and equipment (55% vs. 45%).
7. The recurrent cost gap due to the withdrawal of Project local cost support will amount to 2.68 million Dh for operating cost support (12% of the non-salary operating cost budget) and 2.71 million Dh for equipment (7.5%).
8. The recurrent cost gap which exists because of the failure of the GOM to fund all non-Project expenses amounts to \$750,000 per year.

The bottom-line of the analytical accounting exercise, therefore, is that the GOM is under-investing annually by \$750,000 (6,000,000 Dh) in maintaining the quality of IAV's human capital. Furthermore, an additional local costs gap will be created in 1992 following the termination of the project amounting to approximately 5.4 million Dh (\$673,000).

In its reaction to the draft of the evaluation report submitted prior to the Team's departure from Rabat in July 1988, USAID/Rabat requested that the team develop "Rules of Thumb" to provide some indication of the degree of expenditure levels appropriate for maintaining the quality of human capital investments. The team was unable to obtain this information for Moroccan institutions of higher education comparable to IAV. In Annex D, however, we have provided some equivalent guidance for Title XII universities which may serve as an approximate standard for IAV. Our discussions with Ministry of Finance representatives in the DEPP indicated that this topic was a serious GOM concern. Comparative cost models would assist GOM planners in evaluating the cost trade-offs between expenditures in maintaining the quality of human capital and in creating new capital (physical or human).

RECOMMENDATIONS:

The GOM should fully fund the operating and capital costs budget of IAV in order to avoid deterioration of this international-level resource. The actual gap in current support required to maintain the quality of the resource is approximately 6.0 million Dh; this gap will increase by an additional 5.4 million Dh when local cost support from the project will terminate. It is assumed that GOM support for infrastructure and equipment investments (budget d'investissements) will continue in

a timely manner. To the extent that PL 480 resources are programmed against the infrastructure budget, failure to make these investments available will exacerbate the already serious under investment in IAV's human capital (see Annex F).

IAV administration should maintain the analytical accounting which was developed specifically for the recurrent cost analysis. This data should accompany IAV's annual request for GOM contributions to operating and equipment budgets. IAV should use this data to monitor the impact of its resource mobilization strategies on recurrent cost support.

The project should support a comparative analysis of the operating costs of GOM institutes of higher education, training, and outreach, including, to the extent possible, concrete measures of economic benefits.

B. Resource Mobilization

It is significant, we believe, that IAV has been able to mobilize so much international funding for national, regional and international-level applied and basic research relating to key agricultural problems such as irrigation, plant disease control, post-harvest losses, food packaging, and the like.

This does not count the potential resource represented by non-Moroccan IAV students, who constitute a potentially growing source of mobilization of funds, both in terms of new foreign student tuition, and of subsequent collaborative research and project implementation.

We would expect that, given trends observed, a greater proportion of applied research and extension efforts will be funded by GOM or other Moroccan sources in the medium and long terms. However, it is important to note that the bi-focal approach to resource mobilization, including both national level and international resource providers, is a reasonable risk reduction strategy. This strategy also conforms to the goal of the A.I.D.-funded project, which was to build an institution for teaching, research and outreach at an international standard of excellence.

In order to sustain this standard, continued contact with, and verification by, international funding sources is critical, as is discussed in the section in collaborative modalities. Here, we wish to emphasize that it is both appropriate and prudent that IAV continue to seek a substantial proportion of funding for in-country and collaborative research from non-GOM sources. Within that category, however, the proportion of Moroccan private-sector sources should increase over the medium term as the

socioeconomic context changes; in addition, needs for scientific research results will be increasingly perceived in the private sector.

Thus, we feel that IAV, with assistance from the Project, is taking a reasoned approach to mobilizing resources, which can be supported by improved marketing and public relations in Morocco, the region, and beyond. IAV's ability to seek external financial support should not, however, result in decreasing GOM capital and operating budget allocations. The Ministry of Finance's broader review of the status of all public enterprises of an "administrative character," including IAV, is designed to create a law governing the parameters for the funding of these agencies. The DEPP (MOF) has indicated that entities, such as IAV, should get appropriate operational budget support if they are to continue to sustain their excellence.

RECOMMENDATIONS:

IAV and USAID/Rabat work to design a "post-investment" project to include key elements that are necessary to assist the GOM and IAV to put in place those financial and institutional requisites to sustain the investment made in IAV. One possible basis for such a project would be the "post-project linkages" model recently proposed by BIFAD. Another is represented by the proposal by IAV, and largely accepted by its Partners under this Project, to create a new consortium of which IAV would be a full legal member.

In the interim, USAID/Rabat work with IAV and the DEPP to ensure that PL 480 resources can become additional, as is intended under the law, and are provided to IAV on a timely basis. Such resources should, we believe, be increased and allocated both to the capital budget and the operational budget of the Institute if guarantees can be put in place that they will be additional and forthcoming (see Annex F).

In particular, we recommend that a separate, recurrent cost research fund be set up under either the IAV "Project Account" or, preferably, under a special account opened by the Ministry of Finance, DEPP, to be replenished on an annual basis with PL 480 Title one LC sales proceeds and/or Title II monetization generations, and possible GOM surcharges on agricultural commodities which receive support prices. Access to these funds would be on a competitive basis, through grant applications prepared by individual faculty members, GER's, or departments at IAV. In any case, a portion of the grant would be attributed to support to teaching/research at the department and/or GER level.

IAV, in conjunction with senior officials of the Ministry of Foreign Affairs, the Ministry of Finance, the Ministry of Agriculture, and the Ministry of Higher Education should consider charging tuition to some or all of the foreign students applying for enrollment. The expenses of most of these students could be met by the sending country's own donor community (see recommendations on external relations below).

Dormitory fees have not been increased in twenty years. They should be adjusted to recover, at a minimum, operating and replacement costs for the lodging space.

Increasingly, ORMVA's will be priority customers for IAV research and training services and will be willing and able to pay market costs for those services. The agreement between the ORMVA of Tafilalet and IAV to establish an arid lands research and training center, capable of housing both national and international researchers is an important prototype mobilization activity. The activity, funded by a line-item in the Ministry of Agriculture's budget, will generate resources for IAV while remaining consistent with IAV's teaching and research mission. IAV should attempt to develop a limited number of similar relationships with public and private enterprises (see below).

IAV should investigate the possibility of establishing a mini-agro-industrial park, with financial and technical participation from the GOM and the food processing private sector (à la the Research Triangle in North Carolina or the Rutgers Research Park). Such a proposal has been developed by IAV's Food Sciences Division and deserves further consideration. Discussions with owners of medium-sized and large food processing enterprises revealed a strong interest by the private sector in such a venture.

IAV should continue to expand contract-training agreements with MARA and other public or parapublic enterprises. National budgeting processes in Morocco seem increasingly willing to provide funds for job-oriented contract training.

IAV should establish a committee to study the income-generating potential of its various production and service facilities. Soil testing is an example of services already being provided. The experimental farms, which barely operate on a break-even basis, provide another important avenue for mobilizing resources. Rather than pursuing each of these opportunities on an individual basis, IAV should establish institutional guidelines, negotiated with faculty and the Ministry of Finance, to allocate net

benefits from such operations.

C. Program Priorities

1. Agricultural Productivity

At the ANE Bureau's Symposium on Agriculture in the 1990s, experts cited continuing investments in agricultural productivity as one of the critical areas for impacting on rural incomes in the coming decade. Research similar to that conducted on Hessian-fly resistant wheat varieties, for example, will promise high returns in stabilizing average yields at a much higher level than present.

RECOMMENDATION:

IAV should develop its expertise in agricultural productivity in collaboration with GOM agencies (still to be exploited effectively) and with established expertise at counterpart universities overseas to bring the best minds to bear on these complex interdisciplinary problems.

2. Agribusiness and the Private Sector

RECOMMENDATIONS:

Complete the FAO survey on employment capacity in agriculture planning to better lay out what the real potential for IAV graduates is.

Establish a formalized linkage to the private sector via an office established at IAV (or in the Agronomists Association) to promote internships and employment opportunities for graduates in the private sector.

Establish a dynamic linkage to organizations relating to private sector industry commodity groups and other industry associations.

Consider the option of signing memoranda of understanding with Ministry of Agriculture and Agrarian Reform that some IAV of graduates would spend their year of government service in private sector settings.

Require that the needs of the private sector be evaluated and incorporated in the curriculum review process in development of course content.

Assure that IAV graduates have achieved a high level of competence in English, since English is the key commercial language in international trade.

Further study the expectations of the private sector. It is alleged that IAV graduates lack savoir faire for business settings. They need guidance to adjust to the culture of the private sector through resume development, interview skills, managerial competence, comportment, and the like.

3. Socioeconomics and Food Policy Analysis

The Evaluation team commends IAV for modifying, strengthening and broadening its efforts in the area of socioeconomic teaching and research. Notable changes have occurred since the last evaluation. The team makes the following recommendations to further enhance the quality of the curricula and enable students to participate more fully in the economy's requirements for food policy analysis; detailed recommendations are included in response to the evaluation scope of work.

RECOMMENDATIONS:

That courses of a micro-economic nature, such as production economics and firm analyses, be introduced in the 4th year.

That the electives in the third cycle be expanded to include price/commodity analysis, marketing analysis, and cooperatives.

That the Human Sciences Department schedule at least two structured professional development seminars or conferences in each of the next two years. These may include research methodology, such as a second conference on econometric modelling currently underway, or exploration of emerging economic issues in the agricultural sector.

That IAV develop a research agenda in socioeconomics and food policy by September 1988 to be funded by the Project for the next two years. The agenda should reflect the needs of "after care" (encouragement to embark on relevant research program based upon doctoral experience) for recent Project participants and the further career development of senior faculty. Important criteria would involve the investment of modest funds on critical emerging issues or on projects presently in limbo because of lack of critical equipment, analytical processes, and the like. For suggestions that involve substantial expenditures, such as the advanced analytical models proposed by the Universities of California/Berkeley and

Arizona, the Team suggests that discussion regarding collaborative efforts, joint funding and leadership roles be undertaken with MARA/DPAE and the Ministry of Economic Affairs.

4. Natural Resources and Conservation

One of the primary proposals developed by IAV to address the issue of natural resources management and conservation is the creation of an Arid Lands Research and Training Center in the ORMVA of Tafilalet (Errachidia). The Center is designed to attract national and international researchers interested in the specific developmental concerns of arid regions and to provide training for Moroccans and sub-Saharan Africans in implementing solutions identified by the Center's researchers. Among the issues which personnel of the ORMVA/T, in collaboration with IAV faculty, are now addressing include dune stabilization, development of drought resistant tree varieties, upstream (mountain and desert) windbreaks, flood and wind erosion control, and disease-resistant varieties of date palms. In designing the Center, IAV has worked closely with faculty and arid lands specialists from the University of Arizona. Currently, two IAV doctoral candidates are pursuing arid lands research in Tucson. IAV has also obtained substantial support from MARA's Division of Agriculture Training and Research for the construction of the Center.

While there has been some concern with the recurrent cost impact of this initiative on IAV, the evaluation team determined that recurrent costs during the start-up phase will be limited to transport costs associated with the travel of key IAV faculty (primarily Irrigation Department) to Errachidia. Investment costs will include the purchase of one seven-person van and the organization of an Arid Lands Conference with the University of Arizona. All operating costs for the Center will be met by the ORMVA of Tafilalet (either directly or via contract with IAV).

RECOMMENDATION:

Given the capital importance of natural resources management and conservation in the 1990s and the relatively low costs of pursuing this initiative, the team recommends that the funding proposed for a workshop in the 1988 Workplan be budgeted for the start-up costs of the Arid Lands Training and Research Center in Errachidia.

5. Water Management

Preceding sections have addressed the international-level capability of IAV in the area of water management and IAV's documented success in attracting resources and collaboration

from international organizations. Obviously, the team encourages IAV to maintain and develop its capacity in this area.

RECOMMENDATIONS:

USAID/Rabat should consider contracting with IAV's International Irrigation Center for the implementation of selected activities of the Supplementary Irrigation Project.

The IIC/IAV should pursue actively its role of providing French (and Arab) language short-term courses in the area of water management. IAV should draw on expertise from Utah State and other American universities, USDA, the Corps of Engineers, and AID centrally-funded projects to support the development and organization of these courses.

As an indication of support for the IIC as an important center of regional expertise, the GOM should consider separate line-item support for this activity.

D. External Relations

The Team believes that IAV can do more than has been contemplated in the past to emphasize to potential constituencies and clientele the services it is already performing, and intends to develop, to strengthen the agricultural sector of Morocco. The specific recommendations described below are intended to encourage a more aggressive "marketing" approach.

RECOMMENDATIONS:

That the Placement Survey of opportunities for IAV graduates and the actual placement of IAV graduates--including unemployment rates or lag-time employment rates by department--be completed by November 30, 1988 and the results published by January 31, 1989.

That the Placement Office be established not later than December 31, 1988.

That IAV schedule at least three "employment fairs" in the 1989 workplan.

That IAV establish a Private Sector Advisory Board and that the Board meet no later than December 31, 1988.

That IAV produce three public relations documents in FY 1989:

- a brochure in French and Arabic intended for Moroccan audiences;
- a brochure in French and English intended for U.S. and sub-Saharan African audiences;
- a video presentation intended for Moroccan television audiences;

That IAV find a way of underlining 1988-89 as the 25th anniversary of the Institute and organize a series of events which will forcefully bring IAV contributions and the Institute's priority developmental role in the 1990s to the attention of the Moroccan public.

That IAV use whatever project resources are necessary to support these public relations activities and that all public relations material be professionally produced.

E. Project Resources

Some of the sustainability recommendations should be supported during this critical two year transition period by a careful realignment of existing project resources. Others will benefit from supplementary sources of funding, including increased budget allocations from the GOM. The recommendations below, which address the realignment of existing resources, are based on the following assumptions:

1. That there has been consistent under-spending when considered in relation to the anticipated or estimated cost of faculty participants since the beginning of the project, due to unavoidable delays in selection and completion of individual participant programs. Thus, some funds may be available to reallocate to other program facets.
2. That in this transitional phase, more U.S. short-term Technical Assistance (TA), advisors and other consultants, is better than more long-term TA.
3. That more responsibility for managing project-related activities should be taken on progressively by IAV, starting immediately.
4. That there is only about \$183,000 so far remaining to be committed under the Project to nonparticipant

training-related activities (source: University of Minnesota financial data).

RECOMMENDATIONS:

That the PACD be extended until December 31, 1992 to allow financial support from available project funding for the completion of the number of doctoral students (130) specified in the amended project paper.

That the project terminate in December 1992 without further extension of time or funding.

That whatever funds can be mobilized in addition to funds required to support the training of doctoral candidates be allocated to: 1) short-term advisory assistance in support of training and research, and 2) equipment and material (library, laboratory, microcomputers) in support of training and research; and that these funds be available for expenditure by the project until the amended PACD.

That support for the extension agronomy resident advisor be terminated in July 1989, and savings realized from this be allocated to consultant visits and well-targeted short-term visits to the U.S. of IAV administrative staff and faculty.

That funding still available for the Documentation Center be spent in such a way that some funds go toward the central collection, rather than all being disbursed to departmental libraries (see Annex D).

That funds be provided, from the line-item for an administrative assistant and if necessary, from Project Office support funds, for IAV to hire a U.S.-trained Moroccan manager to work with the Resident Team Leader, the Secretary-General and the Director of IAV, and then take over the Project-related interface with U.S. university administrators for administrative matters.

That consideration be given to shortening the tour of the Resident Team Leader, so that he would be able to spend the last months of his tenure in Minnesota, consolidating Project systems and visibility there, working on the new consortium arrangements, and coming to Morocco on consulting visits for well-targeted activities. These visits could then continue through 1992, if required.

That consideration be given to creating a research fund which will be managed by the departments, under the supervision of IAV senior management and the Resident Team Leader. This fund would either come from the existing logistical support funds under the Project, from anticipated savings on the participant training budget, from PL 480 resources if this can realistically be done, or from funds which would be added to the Project. This research fund would be accessed competitively on the basis of proposals.

F. Inter-Institutional Arrangements

Because of the educational reform, all three higher agricultural faculties, IAV, ENFI, and ENA, will offer the six-year Master's-level degree program, creating the possibility of duplication of resources.

One mechanism which, over the short and medium terms, may help to maintain constructive linkages at the teaching and research level among the three schools is the GER--Groupement d'Etudes et Recherche (en).... GERs may provide a mechanism of integrating the skills, research interests, and resource needs of a variety of individual faculty and their senior students from a range of disciplinary departments. A GER can include experts from outside IAV--including from other schools as well as professional associations, enterprises, INRA and the like.

Continuing relationships with agricultural scientists and faculties in the developing and developed world, particularly the United States, will be essential to maintaining the quality of human capital development of IAV's staff.

RECOMMENDATIONS:

That in the short-term, every attempt be made to encourage ENA faculty and advanced student participation in appropriate GERs. Further, that efforts be made through the administrative councils of all relevant institutions to emphasize maximization of limited resources, such as those of the CNERV, rather than increasing fragmentation of effort with attendant diseconomies of scale. Professional associations, as well as membership associations such as those of IAV and ENA graduates, can continue to work to reduce rather than emphasize points of conflict and competition for scarce training and research resources.

That IAV support the proposal to create a confederation of associations of agricultural

scientists and veterinarians to reinforce positive tendencies toward collaboration.

That IAV and USAID/Rabat actively pursue the possibility of continuing linkages grants as described in the AID Administrator's cable to the field, STATE 257345 (dated August 9, 1988). The grants, not expected to exceed \$100,000 annually, would provide critical support for faculty exchange and collaborative research.

That IAV participate actively in the institutional networking relationships established during AID's international conference on higher agricultural education scheduled for October 1988.

BIBLIOGRAPHY

AID, The Hassan II Institute of Agriculture and Veterinary Medicine in Morocco: Institutional Development and International Partnership, AID Project Impact Evaluation Report No. 65, Washington, D.C., July 1987.

AID, Proceedings of the ANE Bureau's Symposium on Agriculture in the 1990's, Washington, D.C., September 1988.

Besri, Mohamed, Situation de la Recherche et du Chercheur Marocain dans le Domaine Agronomique (paper given at Congress of Federation of Arab Councils of Scientific Research, Damascus), December 1987.

Brooks, Kenneth N. and Hans M. Gregersen, Trip Report, February 8, 1988.

Caldwell, Elwood, Comments on IAV Mission and Priority Statement, May 26, 1987.

Development Alternatives Inc., Building for Institutional Sustainability: Midterm Evaluation of the Planning Economics and Statistics for Agriculture Project, November 1987.

Hammond, Jerome W., Trip Report, September 16-December 7, 1986.

IAV Hassan II, Seminaire sur la Recherche Agronomique a la Faculte d'Agronomie de l'Universite Nationale du Rwanda, Rapport de Mission, June 1988.

IAV Hassan II, Agronomic Institute Project Morocco, Work Plan 1987-1988, September 1987.

IAV Hassan II, Agronomic Institute Project Morocco, Annual Report, 1986-1987, March 1988.

IAV Hassan II, Draft Strategic Plan, December 1987.

IAV Hassan II, The Mission of IAV, Draft.

IAV Hassan II, Project Habitat Rural: Note de Presentation, June 1986.

IAV Hassan II, Systeme Actuel des Stages à l'IAV Hassan II, 1988.

IAV Hassan II, Note de Presentation de la Direction du Développement Rural, June 1988.

IAV Hassan II, Presentation of Horticulture Department, n.d.

IAV Hassan II, Presentation of Agriculture Engineering Department (Machinisme Agricole), September 1987.

IAV Hassan II, 1987-1990 Workplan of the Department of Plant Pathology, n.d.

IAV Hassan II, Proposal for the Establishment of a Regional Development Office (Cellule), CHA Agadir, (working document), January 1987.

IAV Hassan II, Presentation of the Horticultural Complex at Agadir, n.d.

IAV Hassan II, Department of Human Sciences, Comments on Trip Report of Jerome W. Hammond, October 1987.

IAV Hassan II, Department of Human Sciences, Principes et Modalités de Coopération en Sciences Humaines, January 1987.

International Monetary Fund, Morocco - Staff Report for Review under Stand-by Arrangement, April 3, 1987.

Lockhart, B., Trip Report, December 30, 1987.

Proceedings, Morocco: Partnership Program in Institution Building: The Mid-Program Conference, University of Minnesota, May 6-7, 1985.

Swearingen, Will D., Moroccan Mirages, Princeton University Press, 1987.

USAID/Rabat, Morocco: Country Development Strategy Statement (CDSS), FY1990, February 1987, Annex A through D.

USAID/Rabat, Project Paper, Morocco: Agronomic Institute, 1980.

USAID/Rabat, Project Paper, Hassan II Institute of Agriculture and Veterinary Medicine, Project 608-0160, Amendment No. 1, Morocco, July 1984.

USAID/Rabat, Project Paper Amendment No. 4: Dryland Agriculture Applied Research, March 1988.

USAID/Rabat, Midterm Evaluation Report, Agronomic Institute Project, September 1984.

USAID/Rabat, Project Paper Amendment, Agronomic Institute Project, February 1985.

World Bank, Appraisal Report, Agricultural Research and Extension Project, November 3, 1987.

Zouggari, Ahmed, Les Stages et la Connaissance du Milieu Rural, Atelier sur la Recherche en Agro-Economie et Sociologie Rurale, March 1988.

ANNEXES

ANNEX A

STAKEHOLDER ANALYSIS, METHODOLOGY AND SCOPE OF WORK

A. Stakeholder Analysis

A wide range of parties have a proprietary interest in the accomplishments and sustainability of IAV. Foremost, of course, is the IAV administration which is concerned with the continuing development of an institution which has been mandated by His Majesty King Hassan II to address the needs of the agricultural economy for trained manpower. On the basis of this mandate, the administration has mounted an impressive effort to build a world-class institution of higher education and research. The faculty is clearly interested in the sustainability of an institution to which it has demonstrated incredible commitment. The identification with an international-level scientific institution has provided a source of motivation which cannot be explained solely on the basis of material incentives. IAV is one of the most exclusive institutions of higher education in Morocco. Students who invest either four or six years in advanced training want to be assured that the investment in time will be rewarded with attractive employment opportunities immediately following graduation. Agricultural sector employers, whether in the civil service, public enterprises, or private farms or agribusinesses want to be assured that IAV graduates possess a mix of skills and experience which is responsive to the particular needs of the employing enterprises. The Ministry of Finance is concerned that public enterprises which receive central budgetary support from the GOM are performing effectively and efficiently the services for which the support is provided. Evaluation results could lead to an increase or a decrease in that support.

The contractor, the University of Minnesota, which has invested almost twenty years in collaborating with the GOM to build a center of excellence, is interested in results which will demonstrate the impact of that collaboration to professional colleagues, the Minnesota State Legislature, to Minnesota or American farmers who might benefit from agricultural innovations, and to AID as a justification for future efforts. The Asia/Near East Bureau's Division of Agriculture and Rural Development takes a special interest in the sustainability of institutions of higher agriculture training and research. The priority role of these institutions in the 1990s in developing, diffusing, and adapting agricultural productivity-enhancing technologies has been increasingly demonstrated and is the focus of a special ANE Bureau action research initiative. Finally, USAID/Rabat, as the major financing partner of IAV, is concerned that the funds provided to the GOM for specific

purposes are, in fact, being spent for those purposes and that the impact of the outputs is related to improved socioeconomic living conditions for Moroccans.

This special evaluation does not attempt to address the perspectives of all the interested parties to the same degree. While results touch on the interests of all the parties, the evaluation focuses on questions raised by three parties: IAV, the University of Minnesota, and USAID/Rabat. IAV is interested in developing a strategic plan that will guide the Institute in identifying priority human resource needs of the agricultural sector. It has requested the evaluation team to review proposed activities which attempt to mobilize resources to meet those needs. The University of Minnesota is interested in continuing its exemplary support for the training of IAV doctoral students and contributing to the building of the institution. It has requested the team's input on activities which would enhance this mission. USAID/Rabat is concerned that the resources available to IAV for the remaining two years be deployed in a way that will maximize the probability of project sustainability in the absence of external donor support and has asked for the team's input on this question.

B. Methodology

From June 19 through July 16, a four-person team examined the issues associated with the medium and long-term sustainability of IAV. All four members of the team had prior experience with the IAV project. Two members had either led or served on previous evaluation teams. Two other members had served or were currently serving as senior officials at the university contractor responsible for implementing the project. In early June, ANE Bureau's Office of Evaluation conducted a team planning meeting in Washington to develop a collaborative approach to the evaluation. During the course of the two-day event, which was facilitated by one of AID's top evaluation specialists, team members met with university project backstop officials, USAID/Rabat's Agricultural Development Officer, and IAV's two top administrators. Specific outcomes of the workshop included a detailed examination of the scope of work, an identification of the issues at stake for the concerned parties, a workplan, a preliminary report outline, and individual drafting responsibilities.

In Morocco, the team carried out wide-ranging interviews with over 200 individuals, including IAV administrators, students, and faculty, as well as IAV graduates and their employers, private entrepreneurs, senior GOM officials, all members of the long-term resident technical assistance team, and USAID/Rabat staff associated with Project oversight. The team analyzed extensive Project-related documentation provided by USAID/Rabat, the technical assistance team, and IAV faculty and administrators. For the recurrent cost analysis, the team constituted a working group composed of an independent financial analyst, a representative from USAID/Rabat's Controller's Office, IAV's accountant, and a team of accountant auditors commissioned by the Regional Inspector General's Office in Dakar to review the University of Minnesota's local currency expenditures. Under the supervision of the team leader and the expert financial analyst, the working group produced a detailed analysis of IAV's operating and investment budget and expenditures for the last three calendar years, along with projections for the period following the withdrawal of USAID support (see Annex C). The recurrent cost analysis design was reviewed by a member of Harvard University's Institute for International Development contract team currently providing assistance to the GOM's Ministry of Economic Affairs. The HIID associate was one of the leading economists in AID's 1982 Sahel Recurrent Costs Study.

The team participated in a series of field trips over its first two weekends in country. For the first field trip, half of the team visited IAV's Horticultural Complex at Agadir (CHA) and MARA's Dryland Research Center at Settat, while the other team visited the ORMVA of Tafilalet at Errachidia and Meknes. For the second field trip, the whole team visited both Meknes and Fes. On all the field trips, team members interviewed representatives of institutions associated with IAV (the National School of Agriculture at Meknes, the ORMVA), met with private-sector entrepreneurs, and with small, medium, and large farmers. Throughout its stay in Morocco, the team participated in IAV events related to the evaluation scope of work (dissertation defenses, professional presentations, etc.). Before its departure from Morocco, the team reviewed the evaluation results with IAV, USAID/Rabat, University of Minnesota backstop and field representatives, the Minister of Agriculture and Agrarian Reform, and senior officials of the Ministry of Finance.

C. Scope of Work (see next page)

SPECIAL EVALUATION OF IAV HASSAN II, June 20 - July 15, 1988

I. PURPOSE OF THE EVALUATION

The Evaluation Plan of The Agronomic Institute Project, as described in The Project Grant Agreement (Article IV), calls for two special evaluations to be conducted in 1986 and 1988. These evaluations were designed to "focus on assessment of institutional development and the linkages of Moroccan teaching, research, and extension institutions in which IAV is a critical component." The first evaluation was held in January-February 1986 and has been published as A.I.D. Project Impact Evaluation Report No. 65 (July 1987) entitled "The Hassan II Institute of Agriculture and Veterinary Medicine (IAV) in Morocco: Institutional Development and International Partnership." (See Annex A for evaluation summary and evaluation). The present evaluation is therefore the second of these scheduled evaluations and will occur approximately 2 1/2 years after the first evaluation and about 2 years before the PACD (April 1990).

The purpose of the present evaluation is to:

- (a) Measure progress made toward the achievement of project outputs and purpose since the last evaluation;
- (b) Determine how best to focus the project activities during the remaining two years (to April 1990) of the project in order to achieve project purpose and maximize sustainability of IAV prior to the PACD;
- (c) Assess the adequacy of current financial resources to complete key activities recommended in (b) above and review the financial viability of IAV in absence of outside donor financing for a period of five years after 4/28/90.

II. BACKGROUND

The first of three AID funded projects for the Institute began in 1969 and was implemented by the University of Minnesota. The purpose of the first project was to assist the Institute in planning its curriculum and in developing Moroccan advanced teaching and research capabilities in soil and plant sciences relevant to Morocco's agricultural development needs. Initial goals were to enable Morocco to "improve the quality of its higher education in agriculture by providing exposure to modern teaching, research, and problem-solving methods and to provide highly trained Moroccan manpower to assist in the development of the agricultural sector."

Under the first project, priority orientation in teaching and research was given to the needs of third-cycle students in the fifth and sixth years of their 6-year program, who were training for the Ingenieur d'Etat degree, a degree roughly equivalent to an M.S. degree in the United States). Less attention was paid to instruction for second-cycle students in their third and fourth years studying for their Ingenieur d'Application or B.S. degree).

During much of the 1970s, most of the A.I.D. assistance effort was used to support a small contingent of four to six resident expatriate advisers at the Institute. These individuals acted as advisers to the Moroccan faculty and

assisted in course design and some teaching, but a significant portion of their time was spent on research and on supervising students engaged in research. At no time did any of the advisers assume administrative roles within the Institute.

In 1973, both the Institute's program and the scope of the A.I.D. project were enlarged to include horticulture. In January 1974, the second project broadened the program to include veterinary medicine, making the newly titled Institute of Agriculture and Veterinary Medicine one of the few schools in the world combining full curricula in veterinary medicine and agricultural sciences in the same program and with students sharing a common body of coursework and practical field studies during their first 2 years.

In January 1974, the IAV faculty was authorized by Royal Decree to begin preparations for a graduate program that would grant Moroccan Doctorate in Science degrees. Although the first of these doctorates was not granted until 1982, the expectation of such a program gave additional impetus to the Institute's collaborative program with A.I.D. and the University of Minnesota. The efforts to accelerate the process of training Moroccan faculty to the U.S. Ph.D. level and to deepen the Institute's capacity to conduct quality agricultural research became more intense and involved many more Moroccans in participant training programs at U.S. land grant institutions. Moroccan candidates in U.S. Ph.D. programs increased from three students studying horticulture in 1978 to 129 students who had studied or were studying for their Ph.D. degrees in 14 fields in 1987, with 59 having already finished their comprehensive preliminary examinations. Forty-four of these candidates have completed all requirements for and been awarded the IAV Doctorate es Science. In addition, the three successive A.I.D. projects have permitted the training of 31 Moroccans to the M.S. level and the supplementary instruction of 210 Moroccan third-cycle students in various scientific fields at U.S. land grant universities. Considerable funding was set aside for U.S. faculty advisers to travel to Morocco to supervise dissertation research.

While the level of A.I.D. project funding increased sizably during the 1980s, under the third project the number of expatriate advisers still remained small - usually four to six. A number of these advisers remained on assignment for four to six terms and became quite familiar with the IAV faculty and the needs of the Institute. The University of Minnesota went to considerable effort to ensure that the terms and length of service of their faculty in Morocco would add rather than detract from their tenure prospects at the University of Minnesota.

From 1970 to 1987, the Institute's program gradually became more diversified, with course offerings added in such fields as food technology, biochemistry, rural engineering, surveying, agricultural machinery, and marine science. The Institute has also continued to supply student candidates for the Ingenieur d'Application degree to the National School of Forestry in Sale and the National School of Agriculture in Meknes. Finally, in 1981, the Institute's Horticultural Center in Agadir opened its doors as the first major agricultural school in southern Morocco.

In sum, the Institute has evolved in the space of two decades from 12 students taking their basic science training from non-Moroccan faculty in temporary facilities at Mohammed V University to its present status with approximately 2,300 Moroccan students and 346 faculty members (of which 85 percent are Moroccans) on its own campuses in Rabat and Agadir. The Institute now offers the Moroccan equivalents of the U.S. B.S., M.S., and Doctorate es Science degrees in selective disciplines in agriculture and a doctorate in veterinary medicine. In addition, it trains approximately 250 non-Moroccan African students under the same conditions as its Moroccan degree candidates and pays the scholarship costs of all of these students from Government of Morocco budgetary allocations.

The purpose of the present project is to develop a "land-grant type" institution that is: (1) producing well trained people in critical areas whose scientific and technical skills are relevant to national agricultural development needs of Morocco and who are actively contributing to such development; (2) producing scientific information and solving practical problems through research; (3) assisting appropriate government and private agencies and institutions in disseminating such information; and (4) being involved in broad based agricultural development activities in Morocco. The training program is the centerpiece of this institutional development project. By the PACD, the IAV faculty of 335 will include 128 PhD's in key disciplines and another 31 MS level faculty that were trained with support from this project. Numerous non-degree training and professional experiences for senior faculty were also provided by the project. However, the fundamental question remains: Are the institutional arrangements in place to support the proper functioning of the faculty to carry out these four objectives following termination of the USAID-funded project.

The 1986 impact evaluation addressed the issue of institutional sustainability by noting that "the success of IAV in meeting its objectives for training top-quality researcher/trainers for the agriculture sector is unique among similarly financed USAID efforts in Francophone Africa." The evaluation determined, however, that the striking success of IAV is a fragile accomplishment: "The Institute is entering a phase when strong charismatic leadership in program and institutional management is being replaced by more routine bureaucratic authority. Increased attention to organizational planning and budgeting, personnel and facility management, and computerized information systems will be required to facilitate successfully this transition. The school is confronting an extremely critical recurrent cost financing burden which is impinging on its ability to maintain an effective teaching and research program and to retain highly motivated staff. An issue related to the recurrent cost crisis is the ability of the Institute to pursue a research agenda which responds to uniquely Moroccan concerns in the absence of non-donor tied research funds. As a result of serious difficulties experienced by the Moroccan economy, IAV graduates will have to seek employment increasingly in the private sector, a sector which has demonstrated concern for the relevance of job-related training provided by the Institute. The success which IAV has enjoyed in preparing its own doctoral students in Morocco, many of whom will continue as tenured IAV faculty, may paradoxically eliminate a valuable input of diversity for the teaching faculty. Finally, the IAV has placed little emphasis on the integration of extension, farm management, and economic sector analysis skills into its program."

III. STATEMENT OF WORK

The evaluation team will complete the following tasks:

(A) Institutional Functions and IAV's Relationship to other institutions

IAV must produce graduates with qualifications appropriate and responsive to the needs of Moroccan public and private sector agricultural institutions. Therefore, IAV must possess a curriculum which adequately prepares its graduates for future employment and provides them with skills which they can apply to solving Morocco's agricultural development problems. In addition, the research and extension activities of IAV must be linked to other agricultural institutions and must address issues relevant to Morocco. The evaluation team should assess the extent to which IAV currently meets these needs in the following specific areas:

1. Training and Curriculum Development

The 1986 impact evaluation found that IAV needed to further develop three critical areas in their curriculum: (1) curriculum development of economic sector analysis related to Agriculture development; (2) IAV curriculum to meet the demand of private sector requirements; and (3) curriculum development of extension methodology. The evaluation team should assess the adequacy of efforts that both IAV and the contractor have made to further develop these areas during the last 2 1/2 years.

It has been noted in evaluations of several different projects over the last few years that cadre working in agricultural institutions lack the requisite skills to conduct economic analyses necessary for planning and policy making. IAV graduates are currently not adequately trained in this area to meet the demand of these institutions. The evaluation team should assess the existing and planned curricula in order to recommend how IAV and the contractor can maximize development of this discipline in the two remaining years of the project and to produce the number of graduates demanded by the public and private sector.

IAV has almost met the demand of the public sector for graduates in many disciplines. However, it has not provided all the required skills to graduates to satisfy private sector needs. The evaluation team should assess what IAV and the contractor have done to respond to the previous evaluation recommendation to further develop its responsiveness to the private sector and make recommendations for steps to take in the remaining two years of the project.

The evaluation team should also assess whether IAV is graduating the appropriate number of students in its various disciplines and degree levels (M.Sc. or doctorate) or whether the balance should be changed. This analysis is particularly important in light of the reduction of employment opportunities for IAV graduates and the budget constraints faced by IAV. With limited resources, IAV must be sure that it does not produce too many students in disciplines with little demand. The evaluation team should review the placement of recent graduates of IAV as well as any existing agriculture sector manpower plans in order to make this determination. The evaluation team should determine whether IAV has a mechanism in place to deal with the problem of demand and disciplinary balance in the future.

The evaluation team should examine the role of IAV in the agricultural education system in Morocco, relative to MARA, the National School of Agriculture at Meknes (ENA) and the National School of Forestry at Sale (ENFI) and 2 year agriculture technician training programs. This should include an assessment of which disciplines should be emphasized by IAV relative to these other institutions and how IAV's curriculum can complement that of the others. The team should make recommendations of how to better coordinate the educational efforts of these institutions to prevent redundancy and harmful competition for resources.

The evaluation team should review the project plans for short and long term training and for short and long term technical assistance to determine whether these plans respond to the concerns identified above. The team should make recommendations for how to alter the plans and to better allocate project resources over the next two years to assure that IAV can be responsive to these identified concerns in the long run.

2. Agricultural Research

The evaluation team should examine the stated mandate and the effectiveness of linkages between IAV and other institutions dealing with agricultural research. The team should look at linkages to other Moroccan institutions, with particular attention paid to the linkage with INRA and with MARA in terms of setting national agricultural research priorities and in terms of the relative division of research program emphasis. The team should also look at linkages with North African, African, American, European, and international research organizations. The team should assess the contractor's performance and determine how to best focus project resources in the remaining two years of the project to assure that IAV has established its research role vis-a-vis these institutions, is adequately collaborating with them, and is producing relevant and complementary research.

3. Agricultural Development/Extension

The evaluation team should assess the effectiveness of the stated IAV mandate in extension and linkages between IAV, the Agricultural Extension Division (DVARA) of MARA, ENA, ENEJ, private sector agro-industries, and the Moroccan agricultural community. The team should make recommendations for strengthening the role of IAV in supporting extension activities where appropriate.

Within this area, the evaluation team should also review the appropriateness of the proposed National Resources and Environment initiative (Section IIC of the 1987/88 work plan) in light of the recurrent cost issue and remaining limited project resources needed to complete other institution building activities.

The evaluation team should assess contractor's performance and determine the best use of remaining project resources for the extension component for the two remaining years of the project so that IAV's capacity to offer useful expertise that can be linked to the agriculture sector will be well defined and IAV's role will be well established.

4. IAV's Advisory Role

The evaluation team should also assess IAV's role as an advisor to the GOM and to MARA on agricultural policy and programs and make recommendations as to how the GOM might make more use of the intellectual resources available at IAV. In addition, the evaluation team should determine how the resource of trained faculty at IAV could be made available to international agencies such as ICARDA, ILLRAD, FIS, USAID, and FAO in formulating their policies and recommendations on programs and activities in Morocco, Africa, and the region.

5. Clientele Review

In order to continue to be responsive to the Moroccan agricultural sector, IAV must have a mechanism in place in order to receive feedback from its major clients and to adjust its activities in accordance with client needs and demands. The evaluation team should examine IAV's, the contractor's and MARA's views who the major clients of IAV are (or should be) and assess the effectiveness of current feedback channels. Specifically, the team should determine whether there are advisory committees of farmers, agri-businesses, ORMVAs, other governmental agencies, or other mechanisms for communication and review of IAV's performance. The team should make recommendations for strengthening this system, if necessary.

(B) Institutional Processes

IAV must develop an internal organizational structure to support its role in the Moroccan agricultural sector. In addition, IAV must assure that it has adequate financial resources to support its ongoing and planned activities and hence to guarantee its sustainability following donor support. The evaluation team must assess the effectiveness of IAV's internal processes of budget planning and allocation, incentive systems for faculty and students, administrative decision making, and support services to ensure sustained quality and excellence. The team should also assess IAV's capacity to meet its recurrent costs following the PACD of the Agronomic Institute and its capability to engage in strategic planning to be responsive to future conditions. The team should assess in particular:

1. Recurrent Costs

Institutional strength can be judged in a number of ways. Perhaps the single most important factor is the financial question. Will IAV be able to maintain its teaching, research and development activities in the absence of outside-donor financing? The 1986 Impact Evaluation noted that: "A threat to the viability of the Institute is the issue of recurrent costs. The operations budget has stagnated in all areas related to teaching and research. For example, neither the library nor the teaching supply budget line-items has been increased in the past ten years. Most of the increases in GOM operating subsidies is eaten up by IAV personnel costs which amount to 87 PCT of total operating costs. IAV's capability of maintaining its physical plant is being rapidly eroded by inflation. IAV has managed to meet its obligations by negotiating with donors for partial operating budget support, by stretching out repayment schedules to suppliers, and by robbing Peter to pay Paul (switching funds from credit accounts to debit accounts). In the

near term it appears that donors may have to assist IAV in meeting recurrent cost burdens. (Should the Project extend its 80,000 dols annual contribution to the operating budget beyond 1987 when it is scheduled to phase out). The GOM must recognize, however, that delay in facing this problem will severely jeopardize IAV's continuing viability."

The evaluation team should determine whether IAV will be able to meet the costs of operations for the five years following the PACD. The team should obtain budget projections from IAV or work with IAV to produce these budget projections and compare the projected costs with the projected revenues to be expected from the government. The team should also assess whether there exist alternative sources of revenue or whether IAV should begin to develop such alternative sources, such as tuition, research grants and contracts from both within and outside of Morocco, and possibly an endowment fund. If projected receipts fall short of costs, the team should recommend strategies for generating additional revenues and develop proposals for reducing programs if sufficient revenues cannot be realistically anticipated.

The evaluation team should evaluate the effectiveness and efficiency of IAV's internal program structure and budgetary allocation procedures to determine whether savings can be generated by improving organization and procedures. For example, the team should answer such questions as "Are faculty requests realistic, i.e., are they adequately reviewed? Are savings possible? Are budgets submitted in timely fashion How are funds allocated to the various administrative levels? To what extent are fiscal matters and responsibility centralized or decentralized? Are budgets in line with program priorities? Is financial management effective?"

The evaluation team should make recommendations for how the project can better assist the IAV solve the issue of recurrent costs in the remaining two years of the project including providing technical assistance to help them develop the skills to address the budgetary issue.

2. Adequacy of Institution Wide Support Services

The evaluation team should review the library and data processing services. The team should determine whether the support services receive adequate budgetary support and whether IAV maximizes the utilization of its data processing center. The team should make recommendations for better management of these support services if required.

3. Faculty Incentives for Institutional Sustainability

It is imperative that the faculty, once trained and fully established, be properly and continually motivated to contribute their skills fully to serve the functions of the Institute. The evaluation team should review the plans and policies for faculty development and improvement, methods of assessing teaching performance, and for encouraging continued professional growth. Specifically, the team should answer the following questions: "Are there provisions for sabbaticals, publications, attendance at professional meetings and other incentives to maintain a high quality faculty? Are salaries and benefits sufficient to maintain the current high quality of the faculty? Are adequate research funds available? What encouragement is given to scholarship and to publishing research results? Are faculty given a major voice in planning the evolution of teaching programs?"

tab'

4. Administrative Processes.

In order to be a sustainable institution, IAV must develop formal administrative systems and "ways of doing business." The evaluation team should determine the effectiveness of the administrative processes at IAV, including program emphasis and priorities, student selection, course selection and presentation, examination procedures, general operations of the university, and other administrative functions which support the Institute's goals. The team should make recommendations for how the project can better provide IAV with guidance to improve its administrative processes during the two remaining years of the project, including recommendations for the type of technical assistance which would best help IAV address these issues.

IV. METHODS AND PROCEDURES

After reviewing the project files, the evaluation team should conduct in depth interviews with key IAV administrators and faculty, University of Minnesota staff, INRA administration and Aridoculture Center, ENA administration and faculty, ENFI administration and faculty, Enseignement Agricole administrators, Ministry of Agriculture staff, USAID staff, selected students, and representatives from the agriculture private sector.

The evaluation team should plan a 2 day pre-departure meeting to be held on June 6 and 7 in Washington D.C. to review the SOW and other documents and to formulate any requests for IAV, University of Minnesota in country team and USAID to prepare data for use in country.

The evaluation team should plan four weeks in country. All arrangements for hotels, travel in country and other needs of the teams e.g. secretarial will be provided for under the contract.

The team will have a briefing session at time of arrival in country, two weeks after their arrival, and prior to leaving the country. At the first briefing session, the team will review the scope of work with USAID, IAV, and University of Minnesota staff and also present a plan as to how the team will collect information to answer the questions and what criteria will be used to measure progress. At the second briefing session, the team will discuss preliminary findings and obtain the comments from USAID, IAV, and University of Minnesota staff. The draft report should be ready at the time of departure from country. USAID, IAV, and the Minnesota team will provide feedback and comments to the evaluation team regarding the draft report, and the final draft report will be submitted to USAID/Morocco within two weeks after receipt of these comments.

The team will conduct a collaborative evaluation, facilitating, to the extent possible, the participation of key individuals from IAV, USAID and Minnesota in the evaluation. The Mission Evaluation Officer and Project Officer will work daily with the team.

V. COMPOSITION OF EVALUATION TEAM

The team will be composed of four individuals. One individual, James Lowenthal, an AID Agricultural Officer, sociologist, and expert on institutional sustainability, will serve as Team Leader and will direct the

team in particular in their efforts to address the recurrent cost and broader institutional sustainability issues. A second individual will be a senior expert in Veterinary Sciences and an experienced educator and administrator. A third individual will be a senior expert in Agricultural Sciences and an experienced educator and administrator. A fourth individual, trained in anthropology and organizational development, will focus on institutional sustainability issues and organizational linkage issues in particular. At the Team Planning meeting on June 6 and 7, the division of the evaluation tasks by team member should be decided and then conveyed to USAID Morocco upon arrival in country.

VI. REPORTING REQUIREMENTS

A draft report discussing the findings and recommendations of the evaluation will be prepared in English and distributed for review by IAV, AID and U of M team by the middle of the fourth week in country. The report will be in accordance with the reporting requirements contained in AID's Asia Near East Bureau Procedural Guidelines for Evaluations. A copy of the reporting requirements will be supplied to the evaluating team at the June 6 and 7 predeparture meeting. The report should include discussion of all issues cited in section IV (Statement of Work) and make recommendations when appropriate.

68

ANNEX B

PERSONS CONTACTED AND LIST OF IAV DEPARTMENTS

The following represents a partial listing of the more than 200 contacts initiated by the team in the course of the evaluation. In several cases, where more than one representative of the same organization was encountered, only one representative was included. The list does not include the names of more than twenty Moroccan and foreign students interviewed, nor the many Moroccan farmers visited in the field.

NAME	FUNCTION/AFFILIATION
<u>IAV</u>	
Sedrati M'Hamed	Director
Firdawcy Larbi	Secretary General
Ait Kadi Mohamed	Chairman, Dept. of Irrigation Engineering
Hnini Driss	Director, Administrative Services
Chihabi Mohamed	Accounting Division Chief
Tapiero Simon	Accounting Division
Salhi Mohamed	Director, Instruction and Research
Alaoui Mustapha	Chairman, Dept. of Human Sciences
Senhaji Faouzi A.	Chairman, Dept. of Food Technology
Guessous Fouad	Chairman, Dept. of Animal Sciences
Narjisse Hamid	Animal Sciences Department
Achaaban Mohamed Rachid	Dept. of Anatomy
Agbani Mustapha	Chairman, Dept. of Agronomy & Plant Breeding
Merzouk Abdelaziz	Chairman, Dept. of Soil Sciences
Doukkali Med. Rachid	Economist, Dept. of Human Sciences
El Khyari Thami	Economist, Dept. of Human Sciences
Zagdouni Larbi	Economist, Director DDR
Benlemlih Said	Chairman, Dept. of Physiology
Goumari Ahmed	Chairman, Dept. of Appl. Math
Ben Azoun Abdeslam	Zoology Department
Mazih Ahmed	Zoology: Entomologist
Chtaina Nouredine	Plant Pathology Department
Fatmi M'Barek	Plant Pathology Department
Achouri Mohamed	Plant Pathology Department
Amellouk Aomar	Soil Science Department
Lahlou Kassi A.	Chairman, Dept. of Reproduction

Rachid Achaaban	Dept. of Anatomy
Terrab Abdelhaq	Dept. of Nutrition
Eddebbagh Abdelaslam	Dept. of Animal Sciences
Fassi Fehri M.M.	Chairman, Dept. of Microbiology
Amesrouh Belkacem	Director, Documentation Center
Demnati Driss	Economist, DDR
Amane M'Barek	Agro-Economist, DDR/Dept. of Human Sciences
Hafidi Brahim	Plant Pathology: Virology (Agadir)
Hilali Abderrahmane	Director, Agadir Horticulture Center
Alami Youssef	Landscape Architecture: Espace Vert
Omar Mao	Teacher of English: Language Dept.
Amellouk Aomar	Soil Science
El Otmani Mohammed	Horticulture Dept.
Bassou Ratiba	English Dept.
El Fadl Abuellatif	Horticulture: Irrigation and Plant Water Relationships
Ben Ismail Moulay Cherif	Horticulture: App. Plant Morphogenesis
Ait Oubahou Ahmed	Horticulture: Postharvest Physiology
Sarehane Mohamed	Zoology: Entomologist
Aaouine Mohammed	Tissue Culture, Agadir
Cheikh Nouredine	Plant Physiology, Agadir
Mokhtari Mimoun	Floriculture, Agadir
Choukrallah Redouane	Chairman, Horticulture Dept., Agadir
Jean-Pierre Marfin	Marine Biology, Agadir
Benaoda Tlemcani N.	Landscape Architecture, Agadir
Fakir Maria	Sociology/Economics, Agadir
Choukrallah Redouane	Chairman, Horticulture Dept., Agadir
Bartali El Houssine	Irrigation and Equipment Dept.
Ben Moussa Mohamed	Irrigation and Equipment Dept.
Debbarih Abdelhafid	Irrigation and Equipment Dept.
Bouderbala Najib	Dept. of Human Sciences
Mme. Benabdenbi Laila	Director, Studies and Cooperation
Hamliri Ahmed	Toxicology and Pharmacology, Vet. Med.
Zaki Abdellatif	Language Department
Garouaz Khadija	Language Department
El Haddad El Mostapha	Language Department
Baiz Mohamed	Language Department

Benjelloun Sabah	Nutrition Department
Herzeni Abdellah	Dept. of Human Sciences, Sociologist
Mejjati Alami	Plant Ecology Department
Zougari Ahmed	Dept. of Human Sciences, Stages
Hammoudi Abdellah	Dept. of Human Sciences
Besri Mohamed	Plant Pathology
Dakkak Allal	Dept. of Parasitology and Vet. Med., Director of Vet. Med. Section
Stitou Mohamed	Soil Science
Jenane Chakib	Ag. Machinery
Dahman Saidi Abdeslam	DDR/Ag. Machinery
Demmati Driss	DDR/Sociologist
Baddy Mohamed	Oceanography and Marine Research Dept.

University of Minnesota

Terry Roe	Dept. of Ag. Economics
C. Eugene Allen	Dean, College of Agriculture
Alan Ek	Head, Dept. of Forest Resources
Roy Wilcoxson	Dept. of Plant Pathology
Richard Goodrich	Head, Dept. of Animal Sciences
Bert Stromberg	Dept. of Vet. Pathobiology
Bud Markhart	Dept. of Horticultural Science
Steven Clarke	Campus Project Coordinator
Delane Welsch	Director, International Agricultural Programs
Donald Johnson	Team Leader, Rabat
Dale Hicks	Extension Agronomist, Rabat
Jack Garrett	Animal Science Specialist, Rabat
Hector Malano	International Irrigation Center, Utah State University
Elwin Stewart	Dept. of Plant Pathology (Mycology)
William Olson	Dept. of Large Animal Clinical Sci.
Raymond Sterling	Director, Underground Space Center
Stanley L. Diesch	Acting Director of Int'l. Programs in Vet. Med.

USAID/Rabat

Charles Johnson	Director
Rollo Ehrich	Agriculture Dev. Officer (ADO)
Ronald Stryker	Deputy ADO
Robert Hellyer	IAV Project Officer
Paul Crawford	Agricultural Economist
James Smith	Program Economist
Randal Thompson	Evaluation Officer
Richard Warin	Controller
Bela Maipid	Financial Analyst
Kenneth Scofield	Program Officer

Government of Morocco

Demnati Ottmane	Minister of Agriculture and Agrarian Reform (MARA)
Bensouda Moulin	Director of Extension, MARA
Serghini Hassan	Director, Agricultural Education and Research, MARA
	Director of Planning, MARA;
	Secretary, Assoc. of Ag. Economists
Sasson Albert	Chief, Economic Affairs Division, MARA
Naanani Mokhtar Ouassini	Chief, Planning Division, MARA
	Director, Public Enterprise Div., Ministry of Planning
Faraj L'Houcine	Director, National Institute for Agricultural Research (INRA)

Other

Ben Suda	Academic Director, ENA Meknès
Driouchi Ahmed	Chairman, Dept. Ag. Econ., ENA (met in Minnesota)
Boulif Mohamed	Dir. of External Relations, ENA
Hassib	Agroeconomist, ENA
Serghini	Agricultural Economist, ENA
Abdelazziz	Director, INSEA
Benabderazzik Hassan	Director, Agroconcepts
Alaoui Omar	Economist, Agroconcepts
Sedrati Azzedine	Veterinarian, Biological and Chemical Institute, Rabat
Charani Bahija	Animal Science, ENA
A. Amaq Douf	Veterinarian, Casablanca
Hassan Essadki	Director of Administrative Affairs, SOGETA

Wally Tyner	Agricultural Economist, USDA/Ag. Planning Statistics Project, MARA
Clive Grey	Economist, HIID/Economic Pricing Project, Pricing Division, Min. of Econ. Affairs
A. Ben Moussa Jimmye Hillman	Certified Public Accountant Agricultural Economist, University of Arizona
Alain de Janvry	Agricultural Economist, Univ. of California, Berkeley
J. Dirk Stryker	Team Leader, Pricing and Incentive Study, Tufts University, Fletcher School
Robert Schroder	Visiting Scientist, Imperial College, London
Stan Dennis	External Examiner, Kansas State University
Horst Leipold	External Examiner, Kansas State University
Sedrati Abdelhamid Mohamed Nouri Sabbari H. Larbi M'Arafa Ahmed Layachi	Director, FRUMAT Director, COLAIT, Tafilalet Director, ORMVA, Tafilalet Governor, Errachidia Center for the Promotion of Moroccan Exports, Casablanca
Khalil Jabrane Berdai Mohamed Thomas R. Famula G. Eric Bradford Trevor Hughes Wynn R. Walker Richard Riddle Giles Rafsnyder Mohamed Kamel	CISE, Casablanca CICALIM, Casablanca Univ. of California, Davis Univ. of California, Davis Utah State Univ., ENA Meknes Utah State Univ., ENA Meknes MIAC, Sociologist MIAC, Ag. Economist Director, Dryland Research Center, INRA/Settat
David Keith	MIAC, Project Director, INRA/Settat
James Shroyer Roger T. Cortbaoui	MIAC, Agronomy Regional Director, CIP, Tunis

LIST OF DEPARTMENTS AT IAV HASSAN II

- Department of Soil Science
- Department of Forestry
- Department of Plant Ecology
- Department of Agronomy and Plant Genetics
- Department of Human Sciences
- Department of Languages
- Department of Applied Mathematics
- Department of Animal Production
- Department of Zoologie (RABAT, AGADIR)
- Department of Hygiene and Basic Food Industry
- Department of Microbiology and Contagious Diseases
- Department of Animal Reproduction and Artificial Insemination
- Department of Medical Surgical Pathology
- Department of Pharmaceutical Toxology
- Department of Parasitology
- Department of Pathological Anatomy
- Department of Comparative Anatomy
- Department of Avian Pathology
- Department of Therapeutic Physiology
- Department of Agricultural Engineering
- Department of Cartography-Photogrametry
- Department of Topography-Geodesics
- Department of Food Science
- Department of Nutrition and Food Economics
- Department of Industrial Food Technology
- Department of Food Microbiology and Biotechnology
- Department of Biochemistry
- Department of Horticulture (RABAT, AGADIR)
- Department of Plant Pathology (RABAT, AGADIR)
- Department of Marine Sciences (RABAT, AGADIR)
- Department of Landscape Architecture (RABAT, AGADIR)
- Department of Agricultural Machinery

ANNEX C

RECURRENT COST ANALYSIS

In order to address the critical recurrent cost issues, a recurrent cost analysis of IAV's operating and investment budget was undertaken by a team of financial analysts and accountants. The methodology adopted for this study was designed to account for the mission of a graduate agricultural faculty and the specific sources and uses of revenue of IAV. It analytically distinguishes between type of expenditure, teaching and research vs. faculty, for example, type of budget, whether investment or operating, type of income, GOM, contract project, fees for services, etc., and relative contributions of the University of Minnesota to the operating budget. Almost all of the data is for a minimum of three years (and up to eight years in one case), including the current budget exercise. The analysis also traces the operating and investment cost gaps which result from delays or failures in the provision of the GOM contribution. Finally, the analysis projects the recurrent cost gaps in 1990 (end of University of Minnesota budgetary support for non-participant training activities) and 1992 (end of University of Minnesota support for participant training). The French-language version of the report was translated by the University of Minnesota.

**UNIVERSITY OF MINNESOTA - IAV HASSAN II
COOPERATION**

FINANCIAL ANALYSIS

In the framework of collaborative assistance among the Hassan II Agronomic and Veterinary Institute, USAID and the University of Minnesota - begun in 1969 and strengthened since 1980 by a project due to end in April 1990 - the University of Minnesota requested a team to carry out a financial analysis. This analysis was to assess the impact which the termination of American aid will have on the means which IAV Hassan II would have at its disposal.

The team entrusted with this task was made up of Mr. James Lowenthal, who was the team leader responsible for the broad mid-term evaluation and Mr. Azzedine Benmoussa, Accountant, who was responsible for the financial analysis, acting as coordinator and representative of the University of Minnesota and IAV Hassan II.

The team was asked to determine:

- IAV's real and budgeted expenses and receipts for the 1986-1988 period and, if possible, for the preceding years;
- The contributions made by the Government and the University of Minnesota, as well as the other funding sources of IAV's financing; and
- Projections for IAV's expenses and receipts for the year 1990, according to various hypotheses.

The team worked from June 22 to July 8, 1988 and drew up this report, which is structured in the following way:

Chapter I	: IAV Presentation
Chapter II	: Accounting and budget procedures
Chapter III	: Analysis of the Accounts
Chapter IV	: The Project's contribution to the operations of IAV
Chapter V	: Principal Recommendations.

It should be noted that the team's work was based on information furnished by the IAV Hassan II and the University of Minnesota. Further, the team's role was not to certify this information, but rather to use and process it in order to carry out this evaluative analysis.

CHAPTER I

IAV HASSAN II PRESENTATION

The goal of this chapter is to present the main characteristics of the IAV Hassan II and to give a perspective on its financial resources and their use.

I.1 Creation:

The Hassan II Agronomic and Veterinary Institute, an establishment for higher public education endowed with financial autonomy, was created in 1966. It is subject to the financial control of the State.

I.2 Goals:

The main goals of IAV are:

- To provide instruction in the biological, physical, economic and human sciences.
- To contribute to the studies and research which this teaching necessitates.
- To train agricultural professionals and veterinarians.

I.3 IAV Resources (to 12/31/87):

Since the beginning of 1988, IAV has been carrying out an inventory of its physical plant and equipment.

I.3.1 Land Resources:

IAV Hassan II owns private property made up of the following:

Locale	Surface Area	Use	Date of Acquisition	Number of Lodgings
Institute Headquarters	40 Ha	Buildings/ 8Ha	1966	14
Horticultural Complex at Agadir	86 Ha	Buildings and Farms	1976	31
Gharb Farm	375 Ha	Citrus Fruit, Animal Husbandry (Research)	1970	12
Tadla Farm	265 Ha	Animal Husbandry Cereal and Industrial Crops (Research)	1971	8
Bouknadel Farm	91 Ha	Being set up Horticulture.	1986	3

Based upon studies already carried out, the normal maintenance of buildings and lodgings necessitates an annual financial amount on the order of 5,000 000 DH. (repairs, water-proofing, painting, remodeling of student housing, etc...).

I.3.2 Motor Pools:

Category:

Assigned to:	Service Vehicles	Cars
Institute (Headquarters)	30	16
Horticultural Complex at Agadir	5	1
Gharb Farm	3	1
Tadla Farm	1	1
Bouknadel Farm	-	-
Projects	8	51
TOTAL	47	70

Five years old or better: 32 23

Taking into account the state of the motor pool, its renewal will necessitate a minimum investment of 15,000 000 DH for the next five years, for an average yearly investment of 3,000 000 DH.

I.3.3 Agricultural Implements: (excluding small implements)

Assigned to:

Category	Institute Headquarters	Agadir	FARMS		
			Gharb	Tadla	Bouknadel
- Trailers	1	1	14	4	-
- Traction Implements	1	1	7	4	-
- Harvesting Implements	-	-	8	5	-
- Other	-	2	12	2	-

Taking into account its current state, the renewal of agricultural implements necessitates an investment of 6,000 000 DH, for a yearly average of 1,200 000 DH.

I.3.4 Computer Hardware:

	Headquarters	Horticultural Complex at Agadir
HP300 Computer (1983)	1	-
6/43 H.B. Mini (1982)	1	-
Micro-computers	114	8

107 micro-computers were purchased under the Project and 11 by other projects.

The renewal of computer hardware necessitates an investment of 5,600 000 DH for the next five years, of which:

- 2,400 000 DH for the year 1990
- 800 000 DH for each of the following years.

I.3.5 Livestock to 12/31/87:

	Headquarters	Tadla Farm	Gharb Farm
Cattle	6	-	431
Sheep and Goats	56	1,600	1,420
Camels	17	-	-

I.3.6 Library:

Number of works as of 6/30/88: 24,457
of which the following were acquired
by the Project: 1,785

The annual investment in library materials has been valued at 1,230 000 DH per year.

I.3.7 Debits, Credits and Treasury to 12/31/87:

Credits: 1,371 000 DH
Debts: 19,593 000 DH (a)
Treasury: 1,769 000 DH

(a) these debts can be broken down as follows:

Moroccan Retirement Fund 6,800 000 DH
+ R.C.A.R.*

Electricity and Water 10,000 000 DH
(RED + ONE)

P.T.T. 1,000 000 DH
(Post Telegram Telegraph)

Other Debits (IAV Suppliers) 1,793 000 DH

* Régime Collectif d'Assurances et de Retraite - Collective Insurance and Retirement Administration.

I.4 Students:

I.4.1 Student Enrollment:

Approximately 2,000. This figure has been fairly constant since 1980, and can be broken down as follows:

- 1,424 resident students (in student housing)
- 576 day students

The number of foreign students, included in the 2,000 figure, is 150-200.

Years	83-84	84-85	85-86	86-87	87-88
Students	2,073	2,145	1,927	1,979	2,006

I.4.2 Breakdown of the Number of Students (1988) by Cycle:

- Preparatory Year I and II (APESA)	887
- 2nd Cycle	656
- 3rd Cycle	281
- Specialized Adjoints Techniques (a)	122
- Contrôleurs Adjoints (a)	60

(a) Two years of training after the baccalauréat.

I.4.3. Student Participation in Housing Costs:

152 DH / month / student (insurance included) except for APESA : 46 DH / month; these amounts haven't changed since 1968.

The State awards scholarships to students in amounts varying from 433.40 to 712.83 DH / month.

The amount of these scholarships does not figure as receipts or as expenses in IAV Hassan II's budget.

I.5 Personnel: (at the end of June 1988).I.5.1 Evolution of the Work Force.

Category	Years	1984	1985	1986	1987	1988
- Teacher- Researchers		<u>290</u>	<u>296</u>	<u>323</u>	<u>338</u>	<u>337</u>
- Nationals		220	237	278	304	312
- Foreigners		70	59	45	34	25
- Administrative, Technical and Service Personnel		<u>269</u>	<u>293</u>	<u>241</u>	<u>342</u>	<u>380</u>
- Administrative		82	82	82	83	90
- Technical (1)		93	107	110	114	130
- Service (2)		94	104	109	145	160
TOTAL		<u>559</u>	<u>589</u>	<u>564</u>	<u>680</u>	<u>717</u>
- Permanent and Temporary Personnel		<u>346</u>	<u>409</u>	<u>433</u>	<u>367</u>	<u>363</u>
- Perm. Pers.		91	91	90	69	84
- Temp. Pers.		255	318	343	298	305
- Foreign Instructors on Mission to IAV		<u>50</u>	<u>52</u>	<u>62</u>	<u>57</u>	<u>68</u>

(1) Ingénieurs d'Application, Specialized Adjoints Techniques, Agents Techniques...

(2) Various Workshops (garage, woodworking...)

I.5.2 Distribution of Personnel (at the end of June 1988):

Service	Category	Common Law Statutory and Contractual Personnel	Temporary and Contractual Personnel (mean)
Institute (Headquarters)		642	107
Horticultural Complex at Agadir		64	31
Gharb Farm		7	129
Tadla Farm		3	116
Bouknadel Farm		1	6
TOTAL		717	389

I.5.3 Thesis Defense:

IAV teacher-researchers who received a Doctorat-ès-Sciences or PhD from 1978 to 1988.

YEAR	NUMBER
Total at the end of 1981	16
1982	9
1983	11
1984	16
1985	34
1986	53
1987	59
1988 (5/30)	68

I.6 International Cooperation:

Principal Contracts:

- USA
- France
- Germany
- Belgium
- International Organizations

85'

CHAPTER II

ACCOUNTING AND BUDGETARY PROCEDURES

This chapter succinctly describes the flowchart of IAV's financial structures, its budgetary process and buying procedures currently in force.

The fiscal year corresponds to the civil year, that is to say, from January 1 to December 31.

From a technical standpoint, IAV is under the Ministry of Agriculture and Agrarian Reform.

From a financial standpoint, IAV is under the Ministry of Finance, which is represented within IAV by a financial controller and an accountant (See Table II-1).

There are two parallel Accounting Offices, IAV's and the Accountant's (Ministry).

IAV's Accounting Office runs according to the regulations of public accounting. It is based upon the annual budget and respects the principle of the separation of the functions of orderer (the Director of IAV) and of payer (the Accountant from the Ministry of Finance and the Director of IAV Hassan II).

The principal terms used are:

Engagement: An operation which engenders expense.
(Director)

Liquidation: Verification of the reality of the expense and of service rendered (Materials Service).

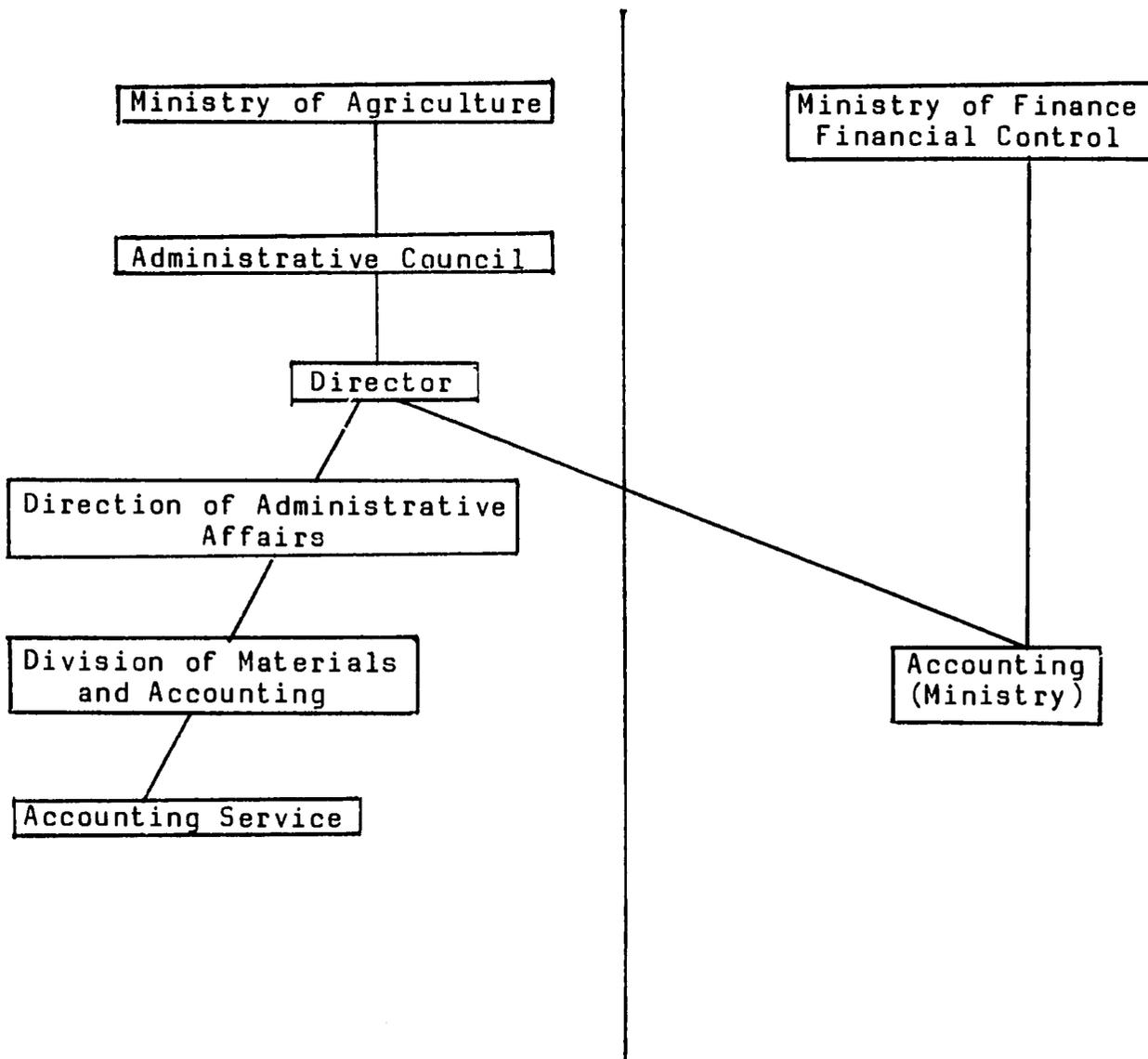
Written Payment Order: Order to pay the debt (Director).

Payment: Freeing the organization from its debt. (Accountant from the Ministry of Finance + Director).

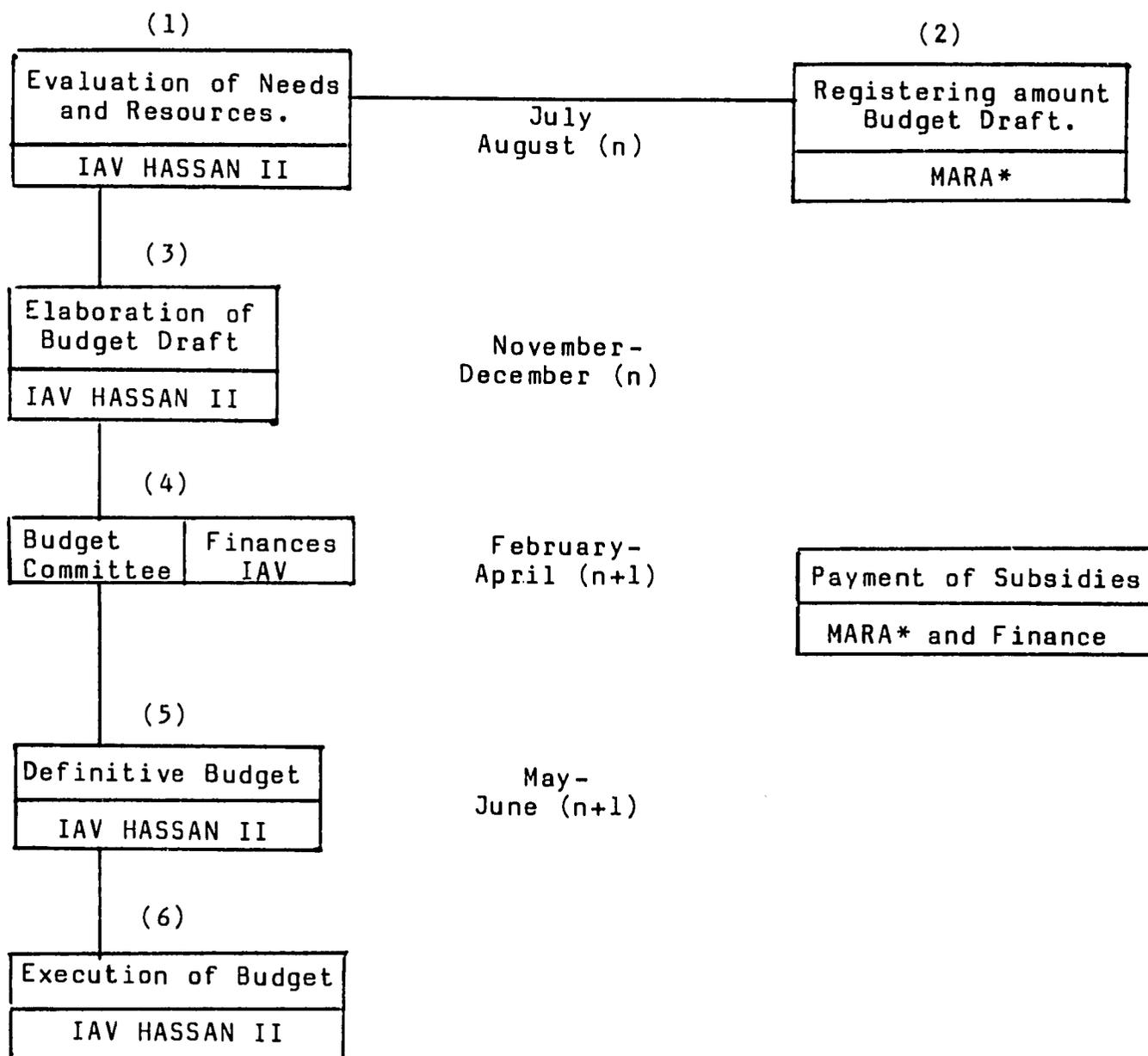
IAV has no general accounting office, nor material nor analytical accounting (there is a codification process currently underway for material accounting).

It is important that IAV acquire efficient management tools and a trustworthy information system in order to keep track of its finances and resources as well as management information necessary for its orderly operation.

II.1 Flowchart of Financial Structures at IAV Hassan II.



II.2 Description of Budgetary Procedures at IAV Hassan II

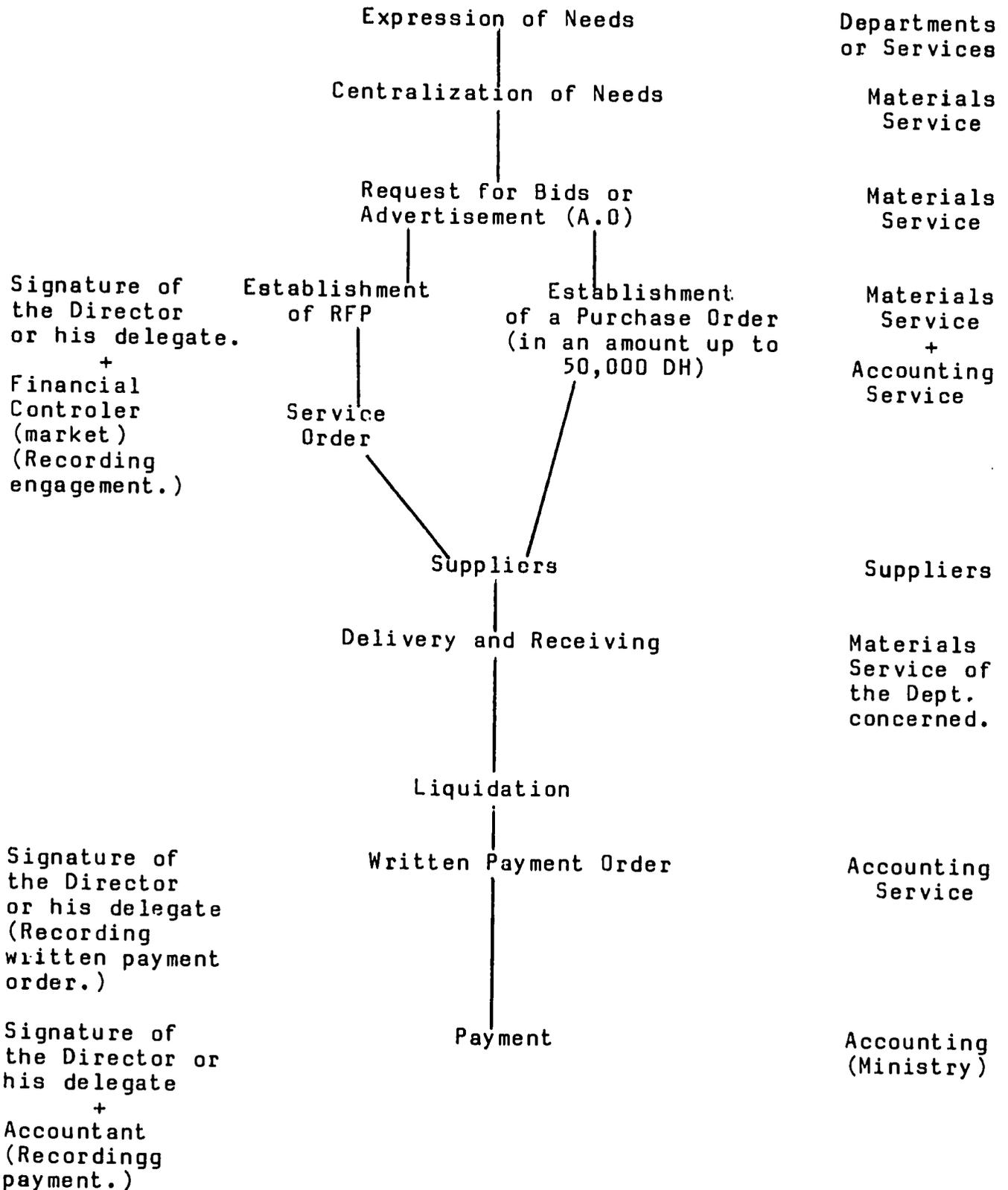


The payment of subsidies takes place in an irregular way during the course of the year. At the end of June 1988, IAV Hassan II had only received 21,750 000 DH of the 73,189 000 appearing in the budget.

The budget for year "N" is only approved in the sixth month of year "N+1."

* Ministry of Agriculture and Agrarian Reform.

II.3 Buying Procedures at the IAV Hassan II



N.B.: Extensions of time for payment are a function of the availability of funds. There are 60 to 90 days between the time an invoice is received and the time it is paid.

CHAPTER III

ANALYSIS OF THE ACCOUNTS (RECEIPTS AND EXPENDITURES)
OF IAV HASSAN II

We have tried to present different syntheses of the accounts of the IAV in order to permit the evaluation team to extract the information necessary for its study.

The following data should be taken into consideration while reading the following tables:

- 1 - The figures furnished by IAV have not been audited.
- 2 - The various budgets established by IAV (budget for the Institute, for Agadir, for the farms) are grouped in order to furnish an overview and an analysis of IAV as a whole.
- 3 - For the years leading up to, and including, 1987, the sums taken into consideration for expenditures are those which relate to engagements and for receipts, those which relate to bank deposits.
- 4 - For the purposes of analytical accounting, the Institute has been divided into sections:
 - Teaching and Research,
 - Boarding,
 - The Agadir Complex,
 - The Gharb Farm,
 - The Tadla Farm,
 - The Bouknadel Farm,
 - Common and Auxiliary Services,
 - General Administrative Service,

These auxiliary services are:

- Maintenance Services,
- Workshops,
- The Motor Pool,
- Groundskeeping,
- Artisans.

General Administrative Services are:

- The Directorship and General Secretariat of the IAV,
- The Accountant (from the Ministry of Finance),
- Accounting, materials, administrative and general affairs services.

The weight of the general budget was spread out among the various sections named above, taking into account the budgets established by entity. The figures were taken as is and without modification. Personnel costs were split among sections as a function of the number of personnel.

General Administrative Services were divided among the other sections in a way proportional to the latter's total expenditures.

Common and auxiliary services were divided between the "teaching and research" and "boarding" sections as a function of their total expenditures.

This being the case, we have presented the following tables:

- 1 - The evolution and comparison of total credits requested, obtained and realized for operations and equipment.
- 2 - The evolution of total receipts and expenditures.
- 3 - Synoptic table of the division of charges by kind.
- 4 - Breakdown of receipts by nature.
- 5 - Table of the division of expenditures by section for:
 - 1986
 - 1987
 - 1988
- 6 - Receipts and expenditures by section, compared over three years:
 - Teaching and Research,
 - Boarding,
 - The Complex at Agadir,
 - The Gharb Farm,
 - The Tadla Farm,
 - The Bouknadel Farm.

III.1 Evolution and Comparison of Total Credits Requested, Obtained and Expenditures

III.1.1 Operations:

In thousands of DH

Years	Credits Requested	Credits Obtained		Actual		
		IAV Income	Subsidies	Receipts		Expendts Engaged
				IAV Inc.	Subs.	
1985	63,916	8,599	39,036	8,930	39,036	47,177
1986	(3) 74,220	7,029	43,208	5,721	43,207	46,645
1987	66,212	8,041	55,376	6,156	47,035	52,274
1988	71,149	7,247	(1) 61,790	12,711	21,000	32,668

- (1) 10 million DH are to cover a salary increase for teacher-researchers beginning 1/1/88.
 (2) Situation as of 6/30/88
 (3) Reabsorption of the debt: 19,000,000 DH

III.1.2 Equipment (Capital, Investment):

In thousands of DH

Years	Credits Obtained (b)	Actual (2)	
		Savings on the Budget for the Year	Expenditures (a)
1985	3,300	3,300	2,303
1986	1,000	1,000	5,320
1987	11,000	-	14,975
1988	12,000	750	2,230

- (a) Takes into account credits carried forward.
 (b) Does not take into account credits carried forward.

02

III.2 Evolution of Total Receipts and Expenditures
1985 to 1988

III.2.1 Income

In thousands of DH

Type	Deposits						Budget		
	Years	1985	%	1986	%	1987	%	1988	%
<u>State Subsidy</u>		<u>42,336</u>	<u>75%</u>	<u>53,209</u>	<u>84%</u>	<u>47,035</u>	<u>79%</u>	<u>73,790</u>	<u>86%</u>
- Equipment		3,300	6%	10,000	16%	0	0%	12,000	14%
- Operations		39,036	69%	43,209	69%	47,035	79%	61,790	72%
<u>IAV Income</u>		<u>8,930</u>	<u>16%</u>	<u>5,721</u>	<u>9%</u>	<u>6,156</u>	<u>10%</u>	<u>7,467</u>	<u>9%</u>
- Headquarters		5,049	9%	2,356	4%	2,430	4%	2,530	3%
- Agadir		359	1%	456	1%	396	1%	550	1%
- Gharb Farm		2,997	5%	2,357	4%	1,815	3%	2,939	3%
- Tadla Farm		525	1%	552	1%	1,515	3%	1,278	1%
- Bouknadel Farm								220	0%
<u>Project Income (DH)</u>		<u>5,253</u>	<u>9%</u>	<u>4,050</u>	<u>6%</u>	<u>6,247</u>	<u>11%</u>	<u>4,185</u>	<u>5%</u>
- Nat. Org.		1,763	3%	561	1%	1,707	3%	979	1%
- Internat. Org.		3,490	6%	3,489	6%	4,540	8%	3,206	4%
TOTAL		56,519	100%	62,980	100%	59,438	100%	85,442	100%

III.2.2 Expenditures

In thousands of DH

Type	Engagements						Budget		
	Years	1985	%	1986	%	1987	%	1988	%
<u>Operations Exp.</u>		<u>47,177</u>	<u>89%</u>	<u>46,645</u>	<u>81%</u>	<u>52,274</u>	<u>72%</u>	<u>69,657</u>	<u>82%</u>
- Headquarters		42,997	81%	42,132	74%	46,910	65%	63,220	75%
- Agadir		1,159	2%	1,207	2%	1,691	2%	2,000	2%
- Gharb Farm		2,311	4%	2,343	4%	2,605	4%	2,939	3%
- Tadla Farm		710	1%	963	2%	1,068	1%	1,278	2%
- Bouknadel Farm								220	0%
<u>Equipment Exp.</u>		<u>2,303</u>	<u>4%</u>	<u>5,320</u>	<u>9%</u>	<u>14,975</u>	<u>21%</u>	<u>12,000</u>	<u>14%</u>
<u>Project Exp.</u>		<u>3,823</u>	<u>7%</u>	<u>5,355</u>	<u>9%</u>	<u>4,928</u>	<u>7%</u>	<u>3,093</u>	<u>4%</u>
- Nat. Org.		952	2%	1,235	2%	1,709	2%	812	1%
- Internat. Org.		2,871	5%	4,120	7%	3,219	4%	2,281	3%
TOTAL		53,303	100%	57,320	100%	72,177	100%	84,750	100%

N.B. Project expenditures do not include foreign currency expenditures made outside Morocco.

(2)

III.3 Synoptic Table of the Distribution of Charges by Kind

In thousands of DH

Years Line Items	Engagements				Budget			
	1985	%	1986	%	1987	%	1988	%
Purchases (1)	7,043	14.9%	6,875	14.7%	7,696	14.7%	8,470	12.2%
Personnel Costs	35,777	75.8%	36,217	77.6%	38,264	73.2%	53,057	76.2%
Taxes	0	0.0%	4	0.0%	3	0.0%	3	0.0%
T.F.S.E (2)	1,232	2.6%	877	1.9%	3,122	6.0%	4,315	6.2%
Transpor- tation	434	0.9%	645	1.4%	647	1.2%	669	1.0%
Teaching and Research (3)	1,777	3.8%	1,512	3.2%	1,383	2.6%	1,826	2.6%
Misc. Adm. Costs (4)	914	1.9%	513	1.1%	1,159	2.2%	1,316	1.9%
TOTAL	47,177	100%	46,643	100%	52,274	100%	69,656	100%

- (1) Feeding students, fuels, lubricants, maintenance products.
- (2) Maintenance of buildings and equipment, water, electricity, heating.
Motor vehicle insurance, equipment related to dormitories / dining rooms.
- (3) Purchase of laboratory / research animals and their feed, books and periodicals, laboratory furnishings, directed visits and study trips.
- (4) Office furnishings, phone and mail fees and installation, social services, international exchanges (subsidies and contributions).

GN

III.4 Breakdown of Income by Type

In thousands of DH

Years Line Items	Actual		Budget 1988
	1986	1987	
<u>Subsidies</u>	<u>53,209</u>	<u>47,035</u>	<u>73,790</u>
- Operations	43,209	47,035	61,790
- Equipment	10,000	0	12,000
<u>IAV Income</u>	<u>2,812</u>	<u>2,826</u>	<u>3,030</u>
- Student Lodging/Food Fees	1,720	1,566	1,740
- For. Stud. Lodging/Food Fees	248	395	200
- Meals for Visitors	46	7	50
- Student Insurance	214	232	255
- Participation, water & elec.	0	6	20
- Participation, housing	0	33	40
- Misc. Income	464	282	295
- Clinical Income	2	3	10
- Financial Products	118	302	300
- Extrabudgetary Income	0	0	120
<u>Farms</u>	<u>2,909</u>	<u>3,330</u>	<u>4,217</u>
- Gharb Farm	2,357	1,815	2,939
- Tadla Farm	552	1,515	1,278
<u>Project Receipts</u>	<u>4,050</u>	<u>6,247</u>	<u>4,185</u>
- Nat. Organizations	561	1,707	979
- Intern. Organizations	3,489	4,540	3,206
TOTAL	62,980	59,438	85,222

95

III.5.1 Table of the Distribution of Expenditures by Section: 1986

In thousands of DH

Entities Line Items	Cum. Sum	Tchnng. & Res.	Board	Agadir C.H.A.	Gharb Farm	Tadla Farm	Bouk- nadel Farm	Com. Aux. Ser.	Gen. Adm.	Pers. on Mission
Purchases	6,875		3,740	838	1,233	460		604		
Pers. Fees	36,217	27,012	811	3,641	1,245	532	20	1,444	1,315	197
Taxes	4							4		
T.F.S.E.	877	96	110	120	71	11		469		
Transportation	645	628		7	1	9				
Tchnng. & Res.	1,512	1,402		110						
Misc. Adm. Fees	513	383		19	8	19		16	68	
TOTAL	46,643	29,521	4,661	4,735	2,558	1,031	20	2,537	1,383	197
Com. & Aux. Ser.		2,191	346					(2,537)		
Gen. Adm.		1,074	170	128	8	2	1	(1,383)		
TOTALS	46,643	32,786	5,177	4,863	2,566	1,033	21	0	0	197

Auxiliary Services: maintenance, workshops, motor pool, groundskeeping, artisans.

Distribution Key:

- Auxiliary Services: total entity / sum of concerned entities * Aux.Serv.
- General Administration: total entity / sum of concerned entities * Gen. Adm.

III.5.2 Table of the Distribution of Expenditures by Section: 1987

In thousands of DH

Entities Line Items	Cum. Sum	Tchnng. & Res.	Board	Agadir C.H.A.	Gharb Farm	Tadla Farm	Bouk- nadel Farm	Com. Aux. Ser.	Gen. Adm.	Pers. on Mission
Purchases	7,696		4,195	922	1,387	481		711		
Pers. Fees	38,264	28,624	893	3,639	1,249	588	25	1,498	1,585	163
Taxes	3							3		
T.F.S.E.	3,122	879	862	379	174	61		758	9	
Transportation	647	622		20	1	4				
Tchnng. & Res.	1,383	1,279		104						
Div. Adm. Fees	1,159	893		23	13	6		85	139	
TOTAL	52,274	32,297	5,950	5,087	2,824	1,140	25	3,055	1,733	163
Com. & Aux. Ser.		2,579	475					(3,055)		
Gen. Adm.		1,334	246	140	9	9	1	(1,733)		
TOTALS	52,273	36,210	6,671	5,227	2,833	1,143	26	0	0	163

Auxiliary Services: maintenance, workshops, motor pool, groundskeeping, artisans.

Distribution Key:

- Auxiliary Services: total entity / sum of concerned entities * Aux.Serv.
- General Administration: total entity / sum of concerned entities * Gen. Adm.

III.5.3 Table of the Distribution of Expenditures by Section: 1988

In thousands of DH

Entities Line Items	Cum. Sum	Tchnng. & Res.	Board	Agadir C.H.A.	Gharb Farm	Tadla Farm	Bouk- nadel Farm	Com. Aux. Ser.	Gen. Adm.	Pers. on Mission
Purchases	8,470		4,500	930	1,550	598	105	787		
Pers. Fees	53,057	41,157	879	5,598	1,369	653	85	1,407	1,669	240
Taxes	3							3		
T.F.S.E.	4,315	1,285	1,275	513	268	109	50	800	15	
Transpor- tation	669	639		20	5	5				
Tchnng. & Res.	1,826	1,700		126						
Div. Adm. Fees	1,316	922		105	20	17	5	197	50	
TOTAL	69,656	45,703	6,654	7,292	3,212	1,382	245	3,194	1,734	240
Com. & Aux. Ser.		2,788	406					(3,194)		
Gen. Adm.		1,185	173	189	145	36	6	(1,734)		
TOTALS	69,656	49,676	7,233	7,481	3,357	1,418	251	0	0	240

Auxiliary Services: maintenance, workshops, motor pool, groundskeeping, artisans.

Distribution Key:

- Auxiliary Services: total entity / sum of concerned entities * Aux.Serv.
- General Administration: total entity / sum of concerned entities * Gen. Adm.

98

III.6 Expenditures and Income by Section, Compared over a Three-Year Period

III.6.1 Teaching and Research (Rabat Headquarters)

In thousands of DH

Line Items	Actual		Budget 1988
	1986	1987	
Personnel Costs	27,012	28,624	41,157
T.F.S.E. (1)	96	879	1,285
Transportation	628	622	639
Teaching and Research (2)	1,402	1,279	1,700
Misc. Admin. Exp.	383	893	922
Common & Aux. Serv.	2,191	2,579	2,788
Gen. Adm.	1,074	1,334	1,185
TOTAL	32,786	36,210	49,676

- (1) T.F.S.E. Maintenance of Buildings and Equipment, Water, Electricity, Heating, Pharmaceutical Products, Dormitory/Dining Equipment, Vehicle Insurance
- (2) Tchng. & Res. Purchase and Feeding of Laboratory/Research Animals, Purchase of Books and Periodicals, Directed Visits, Study Trips, Training costs.

99

III.6.2 Dormitories/Dining Halls

In thousands of DH

Line Items	Actual		Budget
	1986	1987	1988
Purchases	3,740	4,195	4,500
Personnel Costs	811	893	879
T.F.S.E. (1)	110	862	1,275
Common & Aux. Serv.	346	475	406
Gen. Adm.	170	246	173
TOTAL	5,177	6,671	7,233
Income	1,811	1,830	1,830

(1) T.F.S.E. Maintenance of Buildings and Equipment,
Water, Electricity, Heating,
Pharmaceutical Products, Dormitory/Dining Equipment,
Vehicle Insurance

III.6.3 Horticultural Complex at Agadir

In thousands of DH

Line Items	Actual		Budget 1988
	1986	1987	
Purchases	838	922	930
Personnel Costs	3,641	3,639	5,598
T.F.S.E. (1)	120	379	513
Transportation	7	20	20
Teaching & Research	110	104	126
Various Mgt. Costs	19	23	105
Gen. Adm.	128	140	189
TOTAL	4,863	5,227	7,481
IAV Income	456	369	500
Subsidies	804	1,300	1,500
Total	1,260	1,696	2,000

(1) T.F.S.E. Maintenance of Buildings and Equipment,
Water, Electricity, Heating,
Pharmaceutical Products, Dormitory/Dining Equipment,
Vehicle Insurance

(2) Tchng. & Res. Purchase and Feeding of Laboratory/Research
Animals,
Purchase of Books and Periodicals, Directed
Visits, Study Trips, Training Costs.

III.6.4 Gharb Farm

In thousands of DH

Line Items	Actual		Budget 1988
	1986	1987	
Purchases (1)	1,233	1,387	1,550
Personnel Costs	1,245	1,249	1,369
T.F.S.E. (2)	71	174	268
Transportation	1	1	5
Various Mgt. Costs (3)	8	13	20
Gen. Adm.	8	9	145
TOTAL	2,566	2,833	3,357
Income	2,357	1,815	2,939

- (1) Seed & Plants, Fertilizer, Chemicals, Cattle Feed, Spare Parts.
- (2) Maintenance of Buildings & Equipment, Water, Electricity, Custom Work.
- (3) Office Furniture, Telephones and Mail.

III.6.5 Tadla Farm

In thousands of DH

Line Items	Actual		Budget 1988
	1986	1987	
Purchases (1)	460	481	598
Personnel Costs	532	588	653
T.F.S.E. (2)	11	61	109
Transportation	9	4	5
Various Mgt. Costs (3)	19	6	-
Gen. Adm.	2	3	36
TOTAL	1,033	1,143	1,401
Income	552	(a) 1,515	1,278

(1) Seed & Plants, Fertilizer, Chemicals, Cattle Feed, Spare Parts.

(2) Maintenance of Buildings & Equipment, Water, Electricity,

(3) Office Furniture, Telephones.

(a) Income for 1987 includes deposits for 1986.

III.6.6 Bouknadel Farm

In thousands of DH

Line Items	Actual		Budget 1988
	1986	1987	
Purchases (1)	-	-	105
Personnel Costs	20	25	85
T.F.S.E. (2)	-	-	50
Transportation	-	-	-
Various Mgt. Costs (3)	-	-	5
Gen. Adm.	1	1	6
TOTAL	21	26	251
Income	0	0	220

(1) Seed & Plants, Fertilizer, Chemicals, Cattle Feed, Spare Parts.

(2) Maintenance of Buildings & Equipment, Water, Electricity,

(3) Office Furniture, Telephones and Mail.

CHAPTER IV

CONTRIBUTION OF THE PROJECT TO IAV OPERATIONS

The following data should be taken into consideration while reading the following tables:

- 1 - The information was given to us by the University of Minnesota and IAV Hassan II.
- 2 - The amounts which appear in these tables have to do with local expenditures made in dirhams.

These amounts do not include:

- Salaries for American teachers,
 - Scholarships and other study costs for Moroccan students and teachers in the USA (in foreign currency),
 - Computer costs financed in foreign currency,
 - Costs, salaries, indemnities and plane tickets for advisors.
- 3 - Expenses incurred in dirhams, given by the University of Minnesota were divided as follows:
 - Entries: - TDY Staff
 - Other Direct Costs
 - Research Team Members
 - Data Storage/Analysis

These were added to the "participant training" line item. This last line item was broken down into three entries in order to reconcile it to the IAV Hassan II budget.

- 4 - The budget year goes from October 1 to September 30. Reconciliation with the IAV budget is done as follows: For example, the 1987 IAV Hassan II year is reconciled to the 1986-1987 year at the University of Minnesota.

This being the case, we have presented the following tables:

- IV-1: Expenditures in dirhams undertaken since 1980 by the Project;
- IV-2: The Project portion (dirhams) with respect to IAV expenses (other than personnel costs);
- IV-3: The Project portion (in dirhams) with respect to the IAV's investment budget;
- IV-4: Total Project contribution.

In order to evaluate the total impact (dirhams and foreign currency) of the Project's contribution to the budget of IAV Hassan II, we have listed the Project's total expenditures (annual average) and we have broken them down (estimates) into operational costs and investment costs (Table IV-4).

These amounts do not include general technical assistance costs.

We then set up (Tables IV-5 and IV-6) projections for operational and investment budgets at IAV Hassan II (excluding personnel costs) for the period 1989-1992, and adding, beginning in 1990, the year of the end of the Project, the amounts (dirhams and foreign currency) from Table IV-4.

Beginning in 1990, IAV will therefore have to add to its budget the amounts which, up to that point, had been financed by the Project.

IV. IAV - AID - MINNESOTA

IV.1 Expenditures in dirhams incurred since 1980

In thousands of dirhams

Type	Years	06/80 09/80	10/80 09/81	10/81 09/82	10/82 09/83	10/83 09/84	10/84 09/85	10/85 09/86	10/86 09/86	10/87 04/88	TOTAL
Technical Assistance Project Administration		154	400	538	513	736	987	972	1,110	691	6,101
- Teacher & Student Training		3	151	185	370	415	853	1,025	2,129	1,421	6,552
- Tchng & Res. (1)		3	71	69	310	250	528	571	1,419	980	4,201
- T.F.S.E. (4)			80	116	20	88	189	275	360	171	1,299
- Misc. Mgt. Costs (2)		-	-	-	40	77	136	179	350	270	1,052
Materials & Furnishings (3) (Equipment)		-	1	21	120	69	2	396	961	453	2,023
TOTAL:		157	552	744	1,003	1,220	1,842	2,393	4,200	2,565	14,676

- (1) TDY Staff, Maintenance and Program Costs, Short-Term Participants, Research Collaboration, Research Team Members.
- (2) Other Direct Costs.
- (3) In-Country Transportation, Library Development.
- (4) Third Cycle Participants, Faculty Participants (tuition & fees) Invitational Travelers, Data Storage Analysis.

IV.2: The Project portion (dirhams) with respect to IAV costs (other than personnel costs).

Operations

In thousands of DH

Type	Years	Actual				Budget	
		1986	%	1987	%	1988	%
IAV Hassan II costs (other than personnel costs)		10,426	88%	14,010	82%	16,599	83%
Project costs (other than technical assistance)		1,421	12%	3,090	18%	3,500	17%
TOTAL:		11,847	100%	17,100	100%	20,099	100%

IV-3: The Project portion (in dirhams) with respect to IAV's investment budget.

Investment

In thousands of DH

Type	Years	Actual				Budget	
		1986	%	1987	%	1988	%
Capital Expenditures IAV Hassan II		5,320	93%	14,975	94%	12,000	92%
Capital Expenditures Project (local expenditures)		396	7%	961	6%	1,043	8%
TOTAL:		5,716	100%	15,936	100%	13,043	100%

N.B.: Project costs for 1988 have been given as in the budget.

IV-4: Total Project Contribution (Annual Average)

In thousands of dirhams

Line Items	Total	Investment	Operations
Computers	1,000	850	150
Libraries	800	750	50
Contribution to Third Cycle Training	1,600	960	640
Contribution to Research Work of Doctoral Students	550	275	275
Prof. Dev. Programs	1,740	-	1,740
Research Work of the American Team	250	150	100
TOTAL:	5,940	2,985	2,955

Technical assistance costs (overhead, local personnel costs and other costs tied to the operations of the project) have not been included in the total expenditures above.

IV.5: Projection of Operating Cost Budgets (1989-1992) at IAV Hassan II (excluding personnel costs)

In thousands of dirhams

Line Items	Years	1990	%	1991	%	1992	%
<u>IAV Hassan II Budget</u> (excluding personnel costs)		<u>18,839</u>	<u>88%</u>	<u>20,158</u>	<u>88%</u>	<u>21,569</u>	<u>88%</u>
- Purchases		9,537		10,204		10,919	
- Taxes		3		3		4	
- T.F.S.E.		4,910		5,254		5,622	
- Transportation		771		825		883	
- Tchng. & Res.		2,091		2,237		2,394	
- Var. Mgt. Costs		1,527		1,634		1,748	
<u>Contribution of the Project</u>		<u>2,680</u>	<u>12%</u>	<u>2,680</u>	<u>12%</u>	<u>2,955</u>	<u>12%</u>
- Doctoral Students		0		0		275	
- Library		50		50		50	
- Computers		150		150		150	
- Contribution to Third Cycle Training		640		640		640	
- Research Work of the American Team		100		100		100	
- Prof. Dev. Programs		1,740		1,740		1,740	
TOTAUX:		21,519	100%	21,838	100%	24,524	100%

The above projections were made from the figures of the 1988 budget, increased by 7% per year (normal rate of increase for the budget at IAV Hassan II).

IV.5: Projection of Investment Budget at IAV Hassan II

In thousands of dirhams

Line Items	1990	%	1991	%	1992	%
<u>IAV Hassan II Budget</u>	<u>33,400</u>	<u>92%</u>	<u>35,800</u>	<u>93%</u>	<u>30,300</u>	<u>91%</u>
Construction & Renovation of Buildings	9,000		8,000		9,000	
Scientific Equipment	4,000		5,000		5,000	
Transportation Equipment	2,800		3,500		3,500	
Agricultural & Herd Equipment	1,500		1,500		1,500	
Documentation	1,500		2,000		2,000	
Studies & Research	3,500		4,000		4,000	
Other Equipment	1,600		800		800	
Reconditioning of Equipment	3,500		4,000		4,500	
Reabsorption of the Debt	6,000		7,000		-	
<u>Contribution of the Project</u>	<u>2,710</u>	<u>8%</u>	<u>2,710</u>	<u>7%</u>	<u>2,985</u>	<u>9%</u>
- Doctoral Students	0		0		275	
- Library	750		750		750	
- Computers	850		850		850	
- Contribution to Third Cycle Training	960		960		960	
- Research Work of the American Team	150		150		150	
TOTALS:	36,110	100%	38,510	100%	33,285	100%

The above projections were based upon figures from the five-year plan.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

V-1: Conclusions

- The IAV Hassan II - USAID - University of Minnesota Project has contributed in a significant way to building teaching and research institutions in the Kingdom of Morocco by:

- training at the level of the third cycle (Master of Sciences) and the Doctorat ès Sciences Agronomiques (Doctorate in Agronomic Sciences) of a significant portion of the human resources of the Ministry of Agriculture and Agrarian Reform (250 Ingénieurs d'Etat), of IAV Hassan II, of ENA at Meknes and of ENFI at Salé. 129 teachers will have their doctorates in agronomic sciences in 1992;

- equipping the various laboratories of the three establishments, of the computer center and of the center for agricultural documentation (Library) of IAV Hassan II;

- participating in meeting operating costs of various laboratories by furnishing chemical products, small equipment and miscellaneous furnishings, and by maintenance of equipment;

- opening more than 30 American universities to students and teachers of IAV Hassan II;

- visits made by about 50-60 American professors to IAV Hassan II, ENA and ENFI each year, which have contributed to training teachers and to setting up research projects;

- creating and reinforcing scientific linkages among American and Moroccan teachers and researchers to facilitate the setting up of joint groups for study and research projects (International Center for Irrigation, I.S.P.A.N. etc.).

The average total contribution (dirhams and foreign currency) of the Project (excluding technical assistance and related costs) comes to approximately 6,000,000.00 DH per year at the rate of:

2,955,000.00 DH for operational costs, or 12.5% of the budget,

2,985,000.00 DH for investment, or 7.5% of the budget.

With the end of non-participant-related expenditures under the Project coming in April 1990, the annual budget of IAV Hassan II will decrease by about 6,000,000.00 DH.

In reality, the impact of American assistance is much more significant than the overall percentages calculated above indicate.

In fact, American assistance is concentrated under certain budgetary line items and represents a significant portion of the total allocations for these line items (computers, third cycle training, library..).

As regards the investment (capital) budget, American assistance brought to the average for the years from 1986 to 1988 really represents not 7.5%, but rather 21.5% of IAV's investment budget.

It should be stressed, however, that IAV Hassan II's deficit in the areas of operations and investment has only been partially covered by American aid; covering the decrease of resources consequent to the end of this Project from 1990 on will not make up the total deficit.

V-5: Recommendations

Complementary sources of funding will need to be put into place in order to permit IAV Hassan II to continue its training and research mission at the level required by the imperatives of Morocco's social and economic development.

No decrease in costs can be envisioned, since these are already under the minimal threshold compatible with the normal operations of an establishment of higher learning.

It is possible to envision an increase in IAV Hassan II's income by:

- increasing room and board charges which have not increased since 1968;
- authorizing service delivery activities and putting into place an adequate procedure for using income generated from such services;
- the appropriate management of the farms;
- increasing the number of paying foreign students;
- developing research contracts with national and international organizations.

Nonetheless, the resources to be expected from such increases are not very great.

IAV Hassan II should also develop a management information system for adequate management, which implies especially:

- rethinking its Table 2 organization;
- acquiring appropriate general and analytical accounting systems;
- reviewing channels and procedures currently in force.

ANNEX D

INSTITUTIONAL DEVELOPMENT AT IAV

This Annex provides background material on a variety of institutional dimensions of IAV. It is not intended to be exhaustive, but rather to supplement summary statements made in the main body of the report, particularly so as to assist the reader who is unfamiliar with IAV and/or the Project.

A. The Educational Reform

In 1986-87, a reform of agricultural higher education began in Morocco. This reform has had a number of significant impacts on IAV as well as on other, related institutions of higher education in the agricultural sector, including lower-level agricultural schools. Although the Institute is still operating under the same law (text), as are the National School of Agriculture at Meknes (ENA) and the National School of Forestry at Sale (ENFI), a number of changes have already been instituted, or are about to be made, in terms of degree courses and curriculum, and relationships among these institutions.

A key element in the genesis of the reform was a move supported by the Association des Ingenieurs d'Application to move toward a single grade of Ingenieur in all agriculture-related fields in Morocco. This recommendation was accepted by the Minister of Agriculture and Agrarian Reform, after a series of wide-ranging discussions. The major immediate implication for higher education in agriculture has been the suspension of intake at all three institutions of candidates for the four-year Ingenieur d'Application (IA) degree, also referred to as the "filière courte".

B. Strategic Planning

In preparation for the transitional phase of the project, and as an internal activity related to the "restructuring" of the Institute, a strategic planning exercise began in 1986-87. This exercise was undertaken by an inter-departmental committee, which worked with the senior management of the Institute to best represent the combined thinking of all the faculty. Draft documents were circulated at the department level for comment and several iterations of the process took place. The first, partial draft strategic plan elaborated four areas of emphasis for the 1990s. These were felt to represent both the best summary of needs in the agricultural sector for the period, as well as areas of comparative advantage for teaching, research and outreach at IAV. They are not seen as definitive or exhaustive at the moment, however.

In May, 1987, the IAV strategic planning "team", consisting of six faculty representatives and one from the senior management of the Institute, traveled to Minnesota to meet with a University of Minnesota "team" composed of College of Agriculture administrators and some faculty. AID representatives were also included, as were representatives from a number of key universities in the "Partnership". This week-long exercise led to a number of resolutions concerning the future relationships between and among IAV, Minnesota, and other universities in the project-created "partnership". Key among these was the resolution that an attempt would be made to create a new consortium of which IAV would be a full and equal member. This consortium would, then, be able to bid on projects for implementation in the region, for example, on A.I.D. or other-donor-funded projects to carry out participant training or implement projectized agricultural development activities.

Plans for a series of seminars and conferences on the major topical components of the strategic plan were also developed. The first was held in Spring 1988.

C. Curriculum Reform

Faculty and administrators at IAV, ENA, and ENFI have been involved in intra- and inter-institutional committees to redesign their respective curricula to take into account the teaching and research implications of the "reform". This means, at a minimum, the elimination of the "filiere courte" as a separate program leading to a degree, and the reorientation of the second cycle so as to link automatically with a further two years of combined instruction and supervised research.

(1) Stages

A first step--related but distinct--has been the realignment of the student field experience or stage system which has been a key characteristic of training at IAV. At the suggestion of the Minister of Agriculture and Agrarian Reform, the introductory stage, which had involved all students in a several week experience of discovering the rural world, has been changed to involve teams of two students each in working on a farm for the first three months of the first (APESA) year. These stages du travail en exploitation are run collaboratively by IAV and ENA, but at the Horticulture Complex at Agadir, are run somewhat

1/16

differently, and succeeded by more discipline-related field experiences than is the case at IAV/Rabat and ENA.

(2) Course Duration and Content

The second step has been to define and flesh out curriculum revisions for the second part of the first year, and the three following years of the "second cycle". This has led to two major changes. First, a basic unit of instruction, known as a "unit of value" (unite de valeur or u.v.) has been defined, which is composed of a set number of class and practicum contact hours. Second, a series of u.v.'s have been designed to be offered as "electives" in the fourth or fifth years of course work. These will, then, prepare the student for his or her disciplinary option in the fifth and sixth years (third cycle or Master's program). The revised curriculum which has been drafted by the departments, supra-departmental committees and inter-institutional committees now presents a large number of u.v.'s, some of which will be required and some of which, elective. This system will allow for more flexibility; students who are able to demonstrate aptitude for a particular disciplinary specialism by taking the required and elective u.v.'s corresponding to that specialism and doing well may be allowed to opt to continue in that specialism in the fifth and sixth years. It is also possible that some switching from one discipline to another may be allowed as the system is implemented and refined, just as moving from one institution to another at the beginning of the third cycle may be permitted.

(3) Avenues for Upgrading Skills

A further change flowing from the Reform has been the addition of a third avenue for graduates holding an IA degree or less to be granted the same grade as a third-cycle degree holder, that is, of Ingenieur d'Etat. This is the "Examen d'Aptitude Professionnel" which examines the IA who has a minimum of three years of experience post-graduation to sit a series of examinations for a week, covering all the course topics that would have been studied had the individual, plus an oral interview. This is in addition to the Concours d'Acces au Troisieme Cycle which, based on the results of written and oral exams, allows IA's with more than three years of practical post-graduate experience to matriculate into the Master's (Third Cycle) program leading to the degree of Ingenieur d'Etat. It is also additional to

the Concours Professionnel, which allows a person with twelve years of experience to sit an exam to become an IE.

(4) The Department System

A fourth important change since the Impact Evaluation of 1986, but which does not derive from the Reform, is the development and consolidation of the departmental structure at IAV. The first faculty and subject-matter organizational system at IAV was that of "blocs", mobilizing multi-disciplinary knowledge in support of teaching. By 1983, this system had been replaced by a system of disciplinary departments (departments), service departments--which might be multidisciplinary--and a system of sections (sections) which grouped together departments in supra-disciplinary units, each with a section leader whose functions resembled somewhat those of a U.S. university dean. In addition, at that point in time, the Institute was also experimenting with formalizing the land-grant-style divisions among instruction, research and extension (outreach) by creating three analogous directorates (directions), respectively of Instruction (Pedagogie), Research (Recherche), and Development (Developpement).

As of 1988, the most significant changes have to do with the relative strengthening of the departments, and the comparative weakening of the section structure. As is shown in Annex B, there are now 29 disciplinary departments and three service departments at the Institute. However, of the nine sections that existed in 1986, only the vestiges of the three broadest ones--Agronomy, Food Science and Engineering, and Veterinary Medicine--have survived.

There is a considerable amount of sentiment to the effect that there are still too many departments at IAV. This is to some extent an artifact of the evolution of the curriculum and degree structures which are critically supported by the project. They are also probably one reasonable short-term response from those not trained in the Anglophone system, who are used to the "laboratory" system where one professor has a number of research students, and the lab is the major unit of organization. Meanwhile, many of the larger departments have divided themselves semi-formally into cellules, sections, or other sub-departmental units. These tend to reflect teaching or research commonalities with a broad disciplinary mix, such as plant pathology, or plant ecology. The Veterinary Medicine section has a large number of departments, but this is typical of Veterinary Medicine schools in the U.S. as well.

At present, the absolute number of departments does not seem to be a critical problem. If in the short-term future, there is likely to be a continued decentralization of management authority and/or budgetary responsibility to the department level, it may be wise to reduce the number of departments. This may happen as a result of natural growth in the number of returning faculty at the doctoral level, and the realignment of courses and specializations in line with the curriculum reform.

Many departments have now organized themselves as genuinely corporate units, and have statements of purpose, rules governing most matters of daily interest, criteria of performance in teaching and research, and--in some instances--annual workplans. Departments are also now asked to prepare annual estimates of research funds needed and related equipment needs. Additionally, each department presents a summary of its achievements for the year to be published in the IAV Annual Report (Rapport d'Activité), which is prepared by the Director of Instruction. What has not occurred, however, although it has long been discussed, is any kind of budgetary decentralization to the department level. To facilitate interaction with faculty at the supra-department level, there are a number of special committees that have been formed, including that for the educational /curriculum reform and the strategic planning committee.

(5) The Rural Development Direction (DDR)

All DDR contracts with national and international clients are signed by the Director of IAV. The unit has separate budget and accounting mechanisms and all activities are projectized. Staff may also contribute to teaching on a demand-driven basis, and give topical seminars. Key facets/aspects of DDR follow:

- * participatory, action-research pilot projects should lead to integration of results into teaching and outreach programs.
- * 16 discrete projects have been implemented since 1979, of which 11 have been initiated since 1983. Donors include FAO, ICARDA, IDRC (Canada), AID, World Bank, and UNDP. Other funding comes directly from GOM agencies, such as the DVP in MARA, although donor funding may underlie it.

at present, the DDR is thought to generate approximately 11% of total IAV revenues (see recurrent costs analysis, Annex C).

Making the DDR a viable entity both institutionally and in financial terms has been a difficult task. A basic organizational premise, largely encouraged by an initial AID grant was that the DDR staff should be young, energetic researchers who were not members of the Moroccan civil service. The "shop" was to be managed by a senior IAV faculty member but staffed by contract researchers. Research was to be highly focussed, and related to a series of investigations in particular agro-ecological zones of Morocco selected in tandem with the stage aspect of IAV's teaching program. To the extent possible, the DDR was to be integrated with teaching and research through the integration of faculty and students involved in thesis work and supervision, so that the unit would form an integral part of the IAV version of the "land grant" model. At the same time, however, it was to be as self-financing as possible, and its research results were to lead either to better-designed GOM and donor-funded projects or local action/NGO projects funded from a variety of sources, including IAV.

This kind of "contractor" approach has been difficult to live out in the Moroccan context. "Bureaux d'Etudes" (consulting firms) have a mixed reputation, but are increasingly accepted, especially by outside donor agencies, as the source for most project-related analyses. IAV, as a semi-autonomous public enterprise, does not have the means to charge overhead for its services, and wishes to have the DDR function integrated with its teaching and research mission. The result has been that DDR staff are frustrated because, while bringing in a considerable amount of revenue, they have no basis on which to fund their legitimate overhead expenses, such as internal management support.

The overhead issue has at least two implications. First, there is the overall contribution that a generally-accepted overhead rate would make to covering IAV recurrent costs, including those of the DDR. Second, there is the implication for willingness of non-DDR staff (IAV faculty) to work for the DDR at competitive rates rather than for outside consulting firms. The latter model, which is beginning to be followed by some faculty, poses problems both in terms of recurrent cost recovery and in terms of substantive contributions to knowledge, teaching and

extension at the Institute. Additionally, it has been seen as inappropriate by Ministry of Finance personnel, insofar as it seems to constitute "moonlighting" while drawing full salary.

An established overhead model would encourage faculty to consult through the DDR instead, since their time could be billed at competitive national and international hourly rates which would, then, provide "fair" competition to the consulting firms. The short-term drawback is that DDR-supplied consulting resources would cost the client nearer the market rate than is presently the case.

(6) Documentation Center

During 1978-80 the goal was set for IAV to become Morocco's National Center for Documentation in Agriculture and Veterinary Medicine. A base annual budget of 320,000 Dirhams was provided specifically for the purchase of documents. However, no provision was made for increasing this budget and it proved to be grossly insufficient for the established goal. The resulting shortage of funds stifled further growth over the period 1980-85. Journal subscriptions were particularly hard hit. Even though strong representation was made to the Government to increase this vital budget, the Ministry of Finance did not provide the needed funds.

Regrettably, the idea of creating a national resource library at IAV had to be shelved temporarily. An interim objective of meeting only the highest priority needs of the Institute was set, with the hope of returning to the original goal when funds permitted. The library limped along with minimal acquisitions until 1985.

There are now 424 current journal subscriptions of which 324 are regular subscriptions from IAV or USAID funds, the remainder being exchanges or gifts. The library's biggest concern is maintaining and meeting further increases in this level after the special Project funds allocated to the library are expended. Provision of adequate funding for the IAV library must become one of the highest priorities of the GOM if the goal of a national reference library for agricultural and veterinary sciences is to be realized, and if a decline in standards is to be avoided. It is the opinion of the evaluation team that the current level of high-quality academic periodicals is too low, the present

121-

"minimal" number leaving a frustrating deficiency of access to current scientific developments in many fields.

Use of the library by other Moroccan faculties is growing, indicating the increasing impact and importance of the national role of IAV as a reference center. The external consultant (retired Professor of Library Science at Rutgers University) views the library as still in need of a massive injection of resources for materials plus some additional staff. The Project funds breathed life into a dismally underfunded library system. These funds allowed a more than five-fold increase in the rate of acquisitions and permitted the attainment of a degree of academic credibility. The funds were distributed according to formulas developed by the former Director of the Documentation Center. The recommended broad distribution by categories was 40% journals, 35% books and monographs, 15% computer searches and 10% photocopying costs. Further departmental allocations were regulated by a formula.

There is an access problem to library materials because the documents are located in 30-35 separate departments. This makes access to these materials very difficult for people from outside the department and creates demands for personnel and space to manage the departmental holdings. It would seem desirable to have a single central library properly staffed, and, say, two or three nuclear branches on the Rabat campus and one at Agadir. The team views the entrenched departmental model as a serious constraint on the goal of maximizing use of library materials and the objective of promoting cross-disciplinary and interdisciplinary research on selected themes of high national priority.

There has been a further problem of poor communication between the library administration and the faculty. A system has evolved where most (almost all) departments/faculty do not respond to requests for prioritized lists of desired materials by subject areas. Instead, urgent requests are made as need arises and the library responds as best it can and as resources permit. There needs to be developed, preferably with the help of libraries and faculties external to Morocco--and through IAV faculty who travel overseas--appropriate lists ranked by priority and with costs, so that a true "minimum" base budget requirement can be set (e.g., mandatory books; vital journals; highly desirable journals; desirable journals; desirable books,

etc.). Outside requests have fallen mainly into two categories: 1) journals; and 2) theses for M.S. or Doctorates at IAV.

Finally, the issue and implications of: 1) the priority of languages used to report scientific information today; and 2) the languages in which Moroccan students at IAV have ready ability (Arabic and French, while the world scientific literature is now dominated by English) must be addressed. Faculty requests for documents are over 95% for publications in English. These are largely at the research level and not as accessible for students for that reason as well. The outcome has been that students tend not to use the library documents, depending on handout notes and memorization until they reach the thesis stage.

There needs to be more consultation with students and external consultants as well as IAV faculty on the selection of library materials because there are important ramifications for the quality of education. It seems that an important role exists for the Department of Languages to develop English-language reading and comprehension skills earlier. Otherwise, the students will be unable to exploit the essential literature of modern academia.

The library at Agadir should be upgraded; it is mandatory if the faculty is to expand its research efforts and second-cycle students are to spend their third and fourth years at Agadir. Subscriptions to current professional journals in selected fields are necessary. The librarian should be afforded the opportunity of short-term technical training. The Rabat library is commended for the computerization of its holdings; this should be extended to the library at Agadir, thereby further solidifying the working relationships between the two sites.

(7) Rules of Thumb for Planning and Budgeting

Individuals engaged in educational planning and development have long sought tools or guidelines that would allow them to respond effectively in allocating resources to meet current and future institutional needs. The search for better ways of matching instructional staffing patterns to curricular requirements, utilizing existing facilities, and justifying modifications and changes in classrooms, laboratories and experimental areas are recurring challenges to educational administrators.

The following are selected "rules of thumb" in planning and use of educational resources based, in part, upon experience in American higher education. They certainly are not exhaustive, and they are not to be construed as recommended planning standards. They are illustrative. They are not to be used or applied without considerable review and analysis of a particular institution's programs, characteristics and plans. As one attempts international comparisons, the matter of relative costs, as, for example, the relative costs of teaching faculty and/or highly specialized scientific or technological equipment in different regions of the world, may become very important and an over-riding consideration.

1. Distribution of Operating (Non-Capital) Costs
 - a. Instructional Faculty 80%
 - b. Non-Faculty Expenditures 20%

2. Ratio of Students to Faculty
 - a. Undergraduate
 - * Non-Science 18/20 to 1
 - * Science 13/15 to 1
 - b. Masters 10/12 to 1
 - c. Doctoral/Medical/Veterinary Science 5/ 6 to 1

3. Maximal Class Section Size
 - a. Lecture 300
 - b. Recitation 25
 - c. Laboratory 60

4. Departmental Staffing (Percent of Instructional Faculty; Balance in Graduate Assistants)
 - a. Lower Division Undergraduate 60%
 - b. Upper Division Undergraduate 80%
 - c. Graduate 100%

5. Clerical Staff (Ratio of Faculty to Staff)
 - a. Social Sciences/Humanities 6/8 to 1
 - b. Engineering and Physical Sciences 4/5 to 1

6. Library
 - a. Stack Space Per Volume (Sq Ft) .083-0.10
 - b. Study (Seating) Space Per Station (Sq Ft) 25-35

7. Class Laboratories (Assignable Sq Ft Per Station)

<u>Academic Programs</u>	<u>Division</u>	
	<u>Lower</u>	<u>Up/Gr</u>
Agriculture	60-70	60-70
Communications	35-45	55-65
Education	30-50	30-50
Engineering	50-90	75-125
Natural Resources	60-70	60-70
Physical Sciences	55-65	85-95
Business Management/Economics/ Foreign Languages/Mathematics	25-35	25-35

125

ANNEX E

AGRICULTURAL ECONOMICS

The attainment and maintenance of the teaching program on accepted international standards of content and quality--a goal of the highest order in the Institute--is, to a large degree, dependent upon the orientation and quality of the faculty members. During the past three years, four persons associated with the Department of Human Sciences (DHS) have pursued Doctoral-level training. One (econometrics) has returned and resumed his full-time duties; a second (consumption economics) was invited to join the faculty as a "functionnaire" in the Department during the visit of Evaluation team; a third (production economics), possessing both Doctorate and PhD degrees and assigned to ENA, has taught relevant courses very effectively at IAV; and the fourth (developmental economics) is teaching in the Department but has not achieved "functionnaire" status and is available for staff augmentation at an appropriate time and under appropriate circumstances.

The entire staff has engaged in professional improvement activity. During the past three years, these have included special up-grading seminars and short-term, intensive, scholarly study abroad. In the last three years, several faculty career development seminars and conferences have been sponsored or participated in by DHS staff. During the period of the Evaluation Team visit, the staff was participating in a structured two-weeks' seminar on the research methodology employed to explore the linkage among the agricultural sector, the national economy, and the international trade community. Professionals from MARA/DPAE and MARA/DPP, after attending preparatory sessions sponsored by IAV, were also in attendance.

With a teaching load involving a high number of contact hours, an unusually high commitment to the operations of the "stages", and the supervision of 12 to 20 Masters-level candidates, the workloads of the faculty members are becoming staggering. Furthermore, the demands for the services of this department are likely to continue to rise in the immediate future. The latter is almost inevitable in the evolution and maturation of the Institute. Two forces prompt this development. Firstly, other departments in the Institute, such as food technology, agricultural engineering and veterinary medicine, are approaching the Department for courses tailored to their specific needs and for inputs into research efforts believed to have high economic incidence. And, secondly, particularly with further privatization of the agricultural sectors, and moreover, as outlined in the IAV Strategic Plan, the need for a new curriculum in agribusiness management will be upon the Department and the Institute.

Understanding the rural environment, including the behavioral aspects of agricultural change and modernization, has been a hallmark of education at IAV. Understanding of social and economic factors in agricultural development has also been a key concern in design and implementation of student and faculty research. As the Institute improves and expands its capacity for teaching and research in agricultural economics, including quantification, it must also sustain its exceptional tradition of multidisciplinary, including in the human sciences. The Institute was fortunate to begin with a multidisciplinary orientation and inclusion of social science and qualitative research along with agricultural sciences. In this way, IAV has pursued a path which many U.S. universities are just embarking upon. Through these orientations, the Institute's ability to interact with agriculturalists at all socioeconomic levels has a good chance of being sustained.

Recommendations additional to those presented in the main body of the report follow:

- * That DHS, based on the results of the current manpower study, be prepared to outline an appropriate agribusiness management program to include staffing, library and equipment needs by September 1989. The Team believes strongly that the function of providing more, and perhaps somewhat specialized, economic instruction and development of an agribusiness management curriculum should be lodged in what is presently DHS. We do not believe that the courses in economics and management should be allowed to proliferate within every major department. To maintain quality control, to capitalize on expertise and to maximize use of scarce resources, the function should be centralized. However, the "service" role and responsibility of DHS to other departments must be clearly understood, recognized and acknowledged.
- * That funds be provided under the project to complete the analysis of stage data proposed initially under the INRA project MOA with IAV.
- * That IAV and INRA continue to discuss reactivation of collaborative socioeconomic research, either in Chaouia or elsewhere. Terms of reference for such collaboration--including responsibilities of each party--should be carefully elaborated in a collaborative manner and clearly specified in advance. This should be done, if possible, by January 1989.

ANNEX F
PL 480

Background:

In FY 1984, USAID/Rabat began to work with the GOM to program some PL 480 local currency sales proceeds (LC) to support counterpart contributions to A.I.D.-funded projects in the agricultural sector. Among the reasons for this departure from prior practice was A.I.D.'s awareness that IAV and INRA were both suffering from a lack of both capital and recurrent cost support from the GOM, and that this was beginning to put at risk project-sponsored accomplishments.

In the case of IAV, difficulties were encountered in a number of areas, including the purchase by the GOM of tickets for participants traveling to the U.S. under the A.I.D. project; costs for power and water, and costs associated with project-sponsored research by returned doctoral candidates--including equipment and transportation for field work. Construction costs connected with expansion of laboratory and office facilities and construction and repair of buildings on the research farms were also identified as posing constraints to project progress.

At that time (summer 1983), an A.I.D. policy paper on recurrent costs had recently been released, and it argued that PL 480 LC could not be used to support counterpart recurrent costs unless the Mission in question had carried out a recurrent cost study for the program as a whole. At that point in time, USAID/Morocco decided that a full-scale recurrent cost study was not appropriate, and that a more timely solution would be to work with the government to attribute LC to cover capital costs.

Table F-1 shows the amounts in Dirhams jointly programmed by year for IAV Hassan II capital costs. It should be noted that the amount for 1985 was planned for capital costs relating to all agricultural training activities, including those at IAV.

Senior management at IAV, as initial discussions were taking place--as well as other senior MARA officials--indicated to USAID staff that in their experience, PL 480 LC funds were never additional, as they are supposed to be under the legislation. Rather, when they are taken into account by the Ministry of Finance of the GOM, they are "subtractional" -- that is, they are used to replace GOM funds that would otherwise have been budgeted for the activities or line items in question. In some instances, however, it appeared that they were doubly subtractional insofar as they were "deducted" from the amount the GOM would otherwise have allocated for the activities were its own funds available,

=====

TABLE F-1

Fiscal Year	Dh Amount
1984	5,400,000
1985	21,915,000
1986	10,000,000
1987	11,000,000
1988	12,000,000

=====

but also never were transferred to the institution in question.

In fact, this appears to have been the case for the most recent fiscal year, FY 1988. During the visit of the evaluation team, USAID officials met with representatives of the Ministry of Finance to discuss Title I local currency attributions. These had been programmed against a number of entities, for capital expenditures, including "Projets /Elements assistes par l'USAID". Among the latter were both IAV Hassan II and INRA as well as the DPAE of the Ministry of Agriculture which was also being assisted under an A.I.D. project. Of a total attribution of 12 million dirhams, only 750,000 dirhams had been disbursed to IAV in 1987, and none in the first quarter of 1988. As has been seen in Annex C, Recurrent Cost Analysis, the 12 million dirhams in question made up the entire capital (investment) budget of IAV for 1988. According to USAID officials interviewed, the MOF representatives, who were actually from the Tresorerie Generale which is the division that relates to IAV concerning its "Project Account", had no answer as to why there was this disparity, or what had happened to the rest of the funds.

In the teams's discussions with a different set of MOF officials, those from the Direction des Entreprises Publiques et Participations (DEPP), who have very recently taken over the control of institutions of IAV's type, including IAV, we could not get an answer either. They suggested that either the Ministry of Agriculture had not put forward the request for 12 million dirhams for IAV, or else that they had been disbursed by Finance to the MARA, but had been allocated elsewhere on the basis of some internal MARA priority decisions.

In checking with IAV senior management, with the Minister of Agriculture, and with USAID/officials, the team was only able to learn that MARA did include the 12 million for IAV in its request to MOF, since for joint programming purposes, AID signs off on this request. Before leaving Morocco, the team asked IAV senior management to meet with the appropriate officials in MARA/DPAE to clarify the situation. USAID officials were also going to explore the matter further.

Proposal for a PL 480 LC Funding for In-Country Research:

During the process of carrying out the evaluation, as has been discussed elsewhere in the body of this report, one of the key concerns--as in 1983 and 1986--is the sustainability of IAV's institutional capacity to carry out research on

Moroccan problems at an international standard. As we have shown, funds for research, especially for equipment and supplies, are extremely short, despite a multi-faceted effort on the part of individuals, departments and the Institute's senior management to obtain funds from a variety of sources. As one visiting U.S. faculty member put it, "unless we are careful, the IAV faculty participants under the project may be at the pinnacle of their careers as researchers" when they return from their postdoctoral visits to their U.S. campuses, since after that, they may never have as much research funding and as high a level of motivation. While this may be putting it a bit too strongly, the paucity of reliable funding for research over the medium term, that is, for the 1990s, is a matter for serious concern.

At the same time, there is precedent for attempting to use PL 480 local currencies to support recurrent as well as capital costs of agricultural research. This has been done for the past three years under the A.I.D. program in Tunisia, where LC Dinars were attributed to cover operating costs of a set of mutually-identified agricultural research activities. In order to make the system work, the funds were to be programmed through the GOT's Office de Cereales, a semi-autonomous agency with a status similar to that of IAV in Morocco. Although there have been delays in researchers obtaining these funds as they transit from the Ministry of Plan through to the Ministry of Agriculture structures, the system has been approved and operated by the USG and the GOT for some time (see RONCO PL 480 reports 1984-1988).

In the team's final debriefings with IAV, the DEPP and the Minister of Agriculture and Agrarian Reform, as well as with USAID officials, we raised the possibility of creating an IAV research fund using PL 480 local currency sales proceeds. In general, responses were positive given that the mechanism could be worked out. The Minister of Agriculture was considerably more definite, however. He stated that he had a similar idea for some time, since it was clear that IAV could not be expected to carry out research without proper funding. He said that he had thought of creating such a fund with the proceeds of a surcharge on commodities with fixed floor prices under the cereals marketing reform which is part of ASAL II with the World Bank. He used the example of corn. After some discussion, he proposed that such a research fund for IAV could be created and replenished using PL 480 LC or proceeds of a surcharge, e.g., on corn, or perhaps a combination of both. He made the point that the Ministry of Finance would probably not object as long as the source of the fund were off-budget in this way, since this would not set a precedent for other entities to "demand" similar funds.

While this would not meet A.I.D.'s wish for the GOM to provide more regular core funding for IAV operating costs, it would go some way toward solving the problem of research funding from Moroccan sources in the medium term. What is also significant is that the Minister volunteered to "battle" along with USAID/Rabat officials to convince the Ministry of Finance that this idea should be implemented.

Such a research fund, to cover operating costs, should, ideally, be additional to funds allocated either by the GOM from its own resources, or from PL 480, for capital costs. It should be characterized by a separate account, preferably but not necessarily one for which AID would also have signature rights, and should be solely for the purposes of funding research at IAV (although such research could and probably should include collaboration with researchers at other institutions). Within IAV, this research fund should be administered by the same system and personnel as the IAV "Project Account", but should be managed by a faculty committee, with funds allocated to individuals, GERs and/or departments on a competitive basis.

Design of criteria for awards of these funds, as well as other elements of the fund management system, should be developed by IAV senior management and faculty, with advice and technical assistance from the University of Minnesota under the Project, and appropriate A.I.D. officials. The level for the proposed fund should be determined by an assessment of research funding needs, both capital and operating or recurrent; this assessment may be based, in part, on the recurrent cost analysis whose results are presented in Annex C.

If this proposal is to be accepted and implemented, it would be well if it could be outlined before the PL 480 Title I negotiations take place between the USG and the GOM in the next two months.

132

ANNEX G

MICROCOMPUTER CAPABILITY

IAV's microcomputer capability compares well with other institutes of higher education in Morocco. The National Institute for Statistics and Applied Economics, one of Morocco's most prestigious institutes of economics training, has a microcomputer lab equipped with Apple IIe's and first generation IBM PC's (two disk drives). The National School of Agriculture in Meknès has approximately sixteen IBM-compatible and Macintosh microcomputers.

The Department of Applied Mathematics and Statistics manages the microcomputer lab and is responsible for providing microcomputer instruction to all undergraduate and graduate students. Until 1983, the lab was limited to five terminals connected to a Honeywell-Bull minicomputer purchased in 1981. The lab now consists of nine IBM microcomputers with additional IBM PS/2-30's expected in the near future.

IAV has established a Computer Committee responsible for identifying needs, reviewing equipment and software specifications, and allocating new equipment. In reality, the University of Minnesota Project Office and central administration play a preponderant role in the acquisition and distribution of microcomputer material. Approximately 110 IBM computers and associated hardware and software will have been acquired by the end of the project, an impressive quantity for any development project (see Tables G 1-3).

Given the extensive administrative effort required to physically procure, distribute, and install this number of computers, it is not surprising that far less effort has been devoted to some of the strategic "user" issues involved in maximizing the benefits of microcomputer technology at IAV. While any detailed review of these issues is precluded by the limited time the team spent in Rabat, the team would like to introduce one "procurement"-type recommendation for consideration by the Computer Committee and the University of Minnesota.

As a result of the dramatic gains in 80286 and 80386 technology during the past twenty-four months, the cost of XT IBM-compatible (8088) technology has decreased significantly. An IBM-compatible XT with a ten-megabyte hard disk, one disk drive, monitor, and dot matrix printer now costs approximately \$1,000 in the U.S. XT machines are excellent workhorses for the majority of student and faculty data-bases, spreadsheet, and word-processing applications required at IAV. Because of the significant price differential between the low-cost IBM compatible machines and the new PS/2 machines now being purchased by the project

=====

TABLE G-1
COMPUTERS CURRENTLY AT IAV
June 30, 1988

Microcomputers provided by Project Funds	107
Microcomputers provided by GOM's other donor funds	13
H.P 300 Minicomputer (Project funds)	1
Honeywell Bull Minicomputer (Other donor funds)	1
TOTAL	122

=====

134

TABLE G-2
PROJECT FUNDED MICROCOMPUTERS

Section	Department	IBM XT	IBM AT	IBM PC	IBM PS	MAC	PRO PRT	GRAPH PRT	EPSON PRT

Administration									
	Actes					1			
	Admin. IAV			2			2		
	Library		1				1		
	Pedagogy				1		1		
	Stock			1			1		
	U of M			2			1		1
	Agadir	1	1	2	4	1	3	1	
	APESA			1	3				2
	E.N.A.	1	1	3	2		4		
	E.N.F.I.	1	1	2	1		1	1	1
	Small Ruminants	11							
Agronomy									
	Agronomy		1	2	1		2	1	
	Animal Science	1		2					2
	Ecology & Range			1	1		1		
	Forestry		1				1		
	Human Sciences		1	2	7		5	1	
	Math	1		3	5		2		
	Soil	1	1	1				2	
Veterinary Medicine									
	Anatomy			1			1		
	Avian Disease				1		1		
	Hidaoa			1			1		
	Medicine			1	1		1		1
	Vet. Microbiology			1			1		
	Parasitology			1			1		
	Pathology			1			1		
	Pharmacy			1					
	Physiology	1						1	
	P.M.C.	1							
	Reproduction			2	1		2	1	2
	Toxicology			1			1		
(ENTA) Food Technology									
	Food Biochemistry			1	1		2		
	Food Technology	1	1				2		
	G.I.A.	1							
	Human Nutrition			1	1		1		
	Food Microbiology				1		1		
Horticulture									
	Horticulture	1					1		1
	Plant Pathology			1	1		1		
Hydrology & Equip.									
	Hydraulique	1	1	4			1	3	1
Agricultural Machinery									
	Ag. Machinery	1		2			1		
Topography									
	Topography	2	2	1			1	1	
	Total	15	12	46	32	2	46	12	11
	Total of IBM:	107							
	Total Printers:	69							

123

TABLE G-3
NON-PROJECT FUNDED MICROCOMPUTERS

Department	Person	Provided By	Computer	Printer
Actes	Ettalibi	ACCL	(2) Macintosh SE Macintosh II	Macintosh Laser
Admin. IAV	Secretary	IAV	IBM First Personal System 2	Proprinter SL
Animal Science	Bourfia	CRSP	IBM AT	IBM Graphics
Food Technology	Benjilali	IFS	Apple II E	Epson RX 80
Ecology & Range	Mejjati	Dept.	Compaq	Citizen 120D
Human Science	Secretary	IAV	Hewlett Packard Model 150II	Hewlett Packard Think Jet
Human Nutrition	Lemtouni	Cornell U.	IBM XT	
Hydrology	Melano	Utah State	Televideo IBM AT Compatible	Hewlett Packard Laser Jet
	Ait Kadi	Utah State	Hewlett Packard Model Vectra	Epson FX100
Ag. Machinery	Jenane	GTZ	Hewlett Packard	
Topography	Cherkaoui	Canada	IBM PC (2) IBM XT	Epson SX80 (2) IBM Graphics

176

(between one-third and one-half the cost), the project could greatly expand student and faculty access by acquiring IBM-compatible XTs. Because of the simplicity of these machines (defective parts are easily replaceable) and the increasing access to computer maintenance in Morocco, the project can also avoid the frustrating delays which have been caused in the past by computer malfunction.

RECOMMENDATIONS:

To the extent that funds can be made available, that the project allocate approximately \$100,000 for the acquisition of 50 additional IBM-compatible XT machines, related peripherals and software.

That every faculty member whose training is being supported by external donor financing be provided with funding to acquire his own personal computer. Attempts to impose standards on the acquisition of a single brand or configuration will be both unproductive and unsuccessful. The key issue is that of IBM-compatibility.

ANNEX H

ANIMAL SCIENCE AND VETERINARY MEDICINE

Livestock production and health are major priorities of Moroccan agriculture and of human nutrition. The organization of the Ministry of Agriculture recognizes these priorities by its structure called Direction de l'Elevage (Livestock Direction). L'Elevage has three administrative components: Animal Production; Animal Health; and Horses. Another division of the Ministry, INRA, is assigned the Research function. However, the animal production and health focus of INRA seems to be low at present. Thus at the government level, there needs to be a strengthening of the research funding for veterinary science and animal production. An appropriate method to achieve this would be to foster cooperative efforts between L'Elevage and IAV.

Morocco needs to formalize the linkages between L'Elevage and IAV. It also needs to ensure inter-disciplinary collaboration between Animal Science and Veterinary Medicine with other cross disciplinary inputs, such as Agronomy, Agricultural Economics and Agricultural Engineering, where appropriate.

The implications of Morocco's policies and priority needs have implications for the academic curriculum as well. For example, in 1980, a law was developed to allow private veterinary practice. Prior to this change, all IAV graduates in Veterinary Medicine were absorbed by the government. The Decree of Application of the Law was approved in 1984. A major swing has occurred in the occupation of graduates, with the majority now entering private practice. By 1988, there were about 65 in this category. However this is likely to be a difficult existence except in areas where livestock farmers have larger enterprises. The country has been divided into zones and L'Elevage can contract via its "Mandat Sanitaire" with private vets to carry out some of the government work. Some zones still lack veterinarians.

Using formulas based on the numbers of livestock units per veterinarian, L'Elevage tries to establish norms of adequate coverage. Established norms vary from 20,000 sheep plus 5,000-10,000 cattle per vet in mixed farming areas to 100,000 sheep per vet in the Eastern Region where there are many sheep and few cattle. Such formulas indicate a potential demand for about 4,000 veterinarians. Under the new law and policy the Ministry (L'Elevage) will continue to have responsibility for legally controlled diseases of animals, i.e., the control and prophylaxis of contagious diseases, and for public health aspects of veterinary medicine. The critical parameter and goal is the attainment of improved income for the consumers, the ordinary people,

so that they can afford the livestock products they would like to consume. This would help assure viability for the small farmer and employability for IAV graduates in animal science and veterinary medicine.

As noted above, there are three facets of livestock production in Morocco as represented in the three subdivisions of the Livestock Direction (L'Elevage). Of these the Animal Production base is the largest single component of agriculture in Morocco. As it is largely dependent on pasture grazing supplemented by conserved forages and crop by-products, the area of forage production agronomy needs to be strengthened at IAV. Animal science is well represented both at IAV and ENA. It seems to be acquiring a critical mass of competent faculty and developing a research effort and graduate training focused on Moroccan needs. As the orange juice industry expands, a by-product based on processed orange peel has been developed and studied. Its nutritional value for sheep was characterized at IAV.

The Animal Production Association of Morocco is a vigorous and enthusiastic group committed to the advancement of animal agriculture. The Head of the Department of Animal Science at IAV, Dr. Fouad Guessous, has given leadership to the young close-knit organization. The members are drawn from a wide spectrum of activities including education, extension, research, industry, livestock production, veterinary medicine and technical support. They represent academia, dairy production and milk product quality, poultry production and feeds, Timahdit and D' Man sheep and other sheep breeds, and the broad range of animal industries.

The group organizes at least two seminars each year where research results, extension surveys, new developments in animal production, and Ministerial policies are presented and discussed. The Association has recently become a member of the European Association of Animal Production. A review journal is published by 3 associations with the help of IAV. The theme for the next symposium is under active discussion and planning. The focus will be on the very timely topic of "Cereals-Animal Production Interaction" looking at animal production within rain-fed agriculture. This major aspect of Moroccan agriculture resembles the wheat-sheep system in the productive regions of Australia and requires strategic planning to make the most of available resources by careful selection of lambing periods, use of amonia/urea-treated straw, etc.

One of the success stories in animal agriculture has been the development of pasteurized milk and dairy products in

129

the most progressive regions. Recent importations of Holstein-Fresian cattle from the U.S.A. and Europe have had a significant impact. However, disease losses are a major problem. Veterinary Medicine and Animal Nutrition face a major challenge to bring animal health and productivity up to the international standards attained in developed countries. Major advances in modern parastatal cooperative milk processing through Co-Lait plants serving major centers are setting a new standard. Even in Errachidia there is a small ORMVA/Co-Lait center that is striving under difficult conditions to emulate the high quality achievements and food safety standards attained at the larger centers. An impressive range of products and containers has already been made and public acceptance/demand is growing.

An increase in milk production of more than 5-fold has been achieved since 1972 in the large plants. This is now about 40% of total production. A large proportion of the commercial milk is now pasteurized and UHT milk is being produced at one plant. Butter, yoghurt and buttermilk production is expanding. Cheese is becoming available in the towns. Further genetic improvement is being attempted by expanding artificial insemination and frozen semen. There are plans to develop progeny testing schemes.

Excellent cooperation between the Departments of Animal Science in Morocco and Minnesota led to a joint Dairy Conference that attracted participants from several Mediterranean countries in 1987. The focus was on practical aspects of dairy herd management appropriate for Morocco, and it was regarded as very successful. This augurs well for further improvement in human nutrition in the region, where there is still great scope for further expansion with domestic production only meeting about 60% of the demand for milk.

The parastatal agency, SOGETA, inherited a lot of good farming lands when Morocco obtained independence. These are progressive enterprises and offer one avenue of employment for IAV graduates.

There is great potential for further USA-Morocco cooperative efforts to improve sheep production. Work at ENA has evaluated the factors that contribute to neonatal losses in Timahdit lambs, correlating them with the level of animal management, plane of nutrition and hygiene on the properties that are mainly owned by Berber families. A Sheep Producers Day held in February, 1988 was very well received by Middle Atlas farmers. All presentations were made in Arabic and over 70 attended.

The preferences of the people for different meats have shown that lamb is their favorite meat. However sheep meat makes up only one-third of red meat consumption, with cattle providing 50% and goats the remainder. About 35% of total meat is now derived from poultry and this is increasing.

At Errachidia, studies are in progress on how the high fecundity of the D'Man sheep (household sheep kept for lamb production in some regions) might be exploited in animal production. A very effective program at IAV has been the Small Ruminant CRSP, which promoted multi-disciplinary research including nutritional studies in the Animal Science Department and genetic and reproductive components in the Department of Reproduction seeking optimal productivity. The Physiology Department has a commendably sharp focus on environmental adaptation of livestock and related metabolic aspects of physiology. Cooperative efforts should become a habit of mind. There are some signs of excessive competitiveness and incoordination. A conscious effort must be made to capitalize on the potential for cross-disciplinary enrichment of research and graduate training initiatives. It is quite possible to promote excellence in disciplinary studies without a "Hegemony" attitude.

There is a need to provide better practical experience and field training for veterinary and animal science students as well as better access to farm animals for teaching and research. Perhaps cooperative projects on forage production and its utilization by livestock could be developed with INRA. Evaluation of new species such as medics (legumes) has shown considerable promise. This effort should be expanded.

Many Moroccans are dependent upon sheep and goats moving over seasonal pastures for their subsistence. The traditional system of pastoral nomadism, where it existed, is gradually giving way to a fixed family dwelling with migration to summer pastures and tent-living then returning to the base. There is also a growing trend to integrate crops and pastures in a farm enterprise. One constraint is the competing claims to pasture territories and the shared use of some public grazing lands and water. One very important project is a multi-disciplinary study in the Middle Atlas region which established the territorial land rights and distribution among sub-tribes and families in the existing socio-political setting before proceeding to develop advice on land and vegetation use management and stocking rotations by seasons.

Although sheep are the major animals in the system, goats play an important subsidiary role making up about 10% of the

small ruminant population in that region. They broaden the use of pasture forages through their browsing habit and different growing behavior. The marketing of sheep tends to be seasonal while goats are marketed or eaten as required, thereby providing a degree of nutritional and financial stability over time.

One very exciting development has been the development of an international range management course on Pastoralism and Development. This is a joint effort between IAV and the University of Montpellier. A 7-week course was developed with 3 weeks each in IAV and Southern France along with a week in between on a bus tour of 15 stops in Spain to review animal production and range management practices. The program used 35 lecturers, 18 of whom came from Morocco (mainly IAV with a few from INRA), 11 from France and one each from Algeria, Tunis, and FAO. There were 21 students from the Mediterranean region and the course was considered to be very successful. The FAO is keen to see a similar program developed for the Near East region. Experience gained through the Minnesota Project with its broader training linkages at centers noted for range management in western and southwestern university centers in the U.S.A. provided a base for the course material supplemented by French and German expertise and the local doctorates.

Morocco has about 12 million rural inhabitants and 20 million hectares of rangelands yielding an estimated 50% of the animal feed resources of the country. Also about 36% of the sheep are in the pastoral system. Control of parasitic and infectious microbial diseases is an important aspect of small ruminant productivity. The IAV has made major commitments to these areas but they need to be expanded further. Current knowledge of infectious diseases of sheep has been assembled by an international team in a two volume text orchestrated by a professor of microbiology at IAV. Research under way includes studies of the important viral disease, sheep pox. Other doctoral candidates are working on mycobacteria and enterotoxemia. The high incidence of bovine tuberculosis in Morocco calls for an expanded effort in both medical and veterinary aspects accompanied by a national campaign to improve nutritional and social conditions.

The Parasitology Department is very active and participates in the parasitological management of the Middle Atlas range management program. Work on the important hemoprotozoal disease of cattle, theileriasis, is very important. Promising developments are attending the adaptation of the organism to tissue culture with a view to developing an effective vaccine. There needs to be a greater focus in

veterinary medicine at IAV on population medicine, epidemiology and animal health management. Echinococcus hydatid disease is a huge problem for public health. Control should involve a joint attack on rabies and echinococcus via elimination of the feral dog carriers. Rabies vaccination and anthelmintic treatments will reduce the risk to humans. Other tapeworms and strongylosis have important economic impacts.

One doctoral student is developing a vaccine from the outer membrane protein of a salmonella species, the causative agent of fowl typhoid. Protection of laying hens against such pathogenic organisms to avoid shedding the infectious agent in the eggs is the goal. As it is transmitted transovarially, this bacterium is an important economic problem with far-reaching implications for the poultry industry. This is also a problem of international dimensions.

One desirable goal for IAV would be to improve the coordination between the various veterinary departments that work on infectious diseases and public health. There is a need for specialized training in veterinary epidemiology, disease prevention and public health that could serve as a hub for the various initiatives currently in progress. The resulting focus would lead to improved teaching and research under a mantle of goal-oriented priority setting.

Another important aspect of range and pasture production is mineral nutrition especially with respect to trace elements. A very thorough doctoral thesis was completed recently under the Minnesota Project on selenium status of plants and animals throughout Morocco. The Department of Biochemistry and Toxicology has identified new toxic chemicals in native Moroccan range plants.

The more applied aspects of veterinary medicine require special attention and subsidization during their difficult developmental phase at IAV. Clinical programs need to be expanded and improved to provide a stronger basis for teaching in the professional education program. A similar situation exists in the departments of Anatomic Pathology. These fields face the intrinsic problem of building programs large enough and diversified enough to meet educational needs and having the capacity to respond to national needs when serious diseases occur. At the same time, the staff need to have sufficient time available to engage in important research activities. This will be very challenging, and a comprehensive plan should be developed for teaching competence and time management to encompass the demands of research, service, and post-graduate training.

The changing roles of the veterinarian in caring for food animals has added a new dimension to the demand for training. This is the evolving area of herd health management for the prevention of animal and human disease and strategic planning of livestock management for optimum productivity under existing but changing environmental conditions. An interdisciplinary effort involving L'Elevage, Animal Science, Veterinary Medicine and other departments will be required. It will be necessary to develop a group having this focus if the full potential of this new approach is to be realised. It is very important to underpin such an initiative with the capacity to make accurate diagnosis of diseases as they occur and to be able to investigate in depth the more important problems. Coordination with the diagnostic laboratories and enhancement of their capacity will be a necessary prerequisite for this process. One foresees a growing demand for continuing and workshop education for both veterinarians and producers. Success in this overall strategy would place Morocco in a leading position in the region, thereby generating increasing opportunities for international cooperation and disease control.

The camel is a livestock species that is growing in importance in the Maghreb, particularly in Morocco as it promotes the development of the former Spanish Sahara region. There, the people are dependent upon the camel for meat, milk, transport and hides. A camel husbandry congress was held in 1987 in Algeria sponsored by CIHEAM and the Government of Algeria. At IAV, the Department of Reproduction is developing a research unit at Agadir. There is interest in the Animal Science Department in examining the role of nutrition in reproductive performance. The Department of Anatomy has an active camel research program with a focus on renal concentrating ability and respiratory adaptation to environmental conditions, collaborating with a professor from London University. An important new disease of camelid species (camels, llamas) with high mortality has been encountered involving an infectious agent.

Equine species are prevalent in Morocco with many working and riding horses, mules and donkeys. Unfortunately these animals tend to be malnourished and mistreated. They receive very little veterinary attention. It is to be hoped that these situations can be addressed and improved. Morocco has a rather low number (? about 1,500) of high quality horses suitable for racing or showing. Although African Horse Sickness has been eradicated for over 20

14/1

years, it is difficult to exploit the excellent potential for a strong horse industry in the international arena because of quarantine restrictions (e.g., 60 days in the U.S.A.).

The Département d'Hygiène et Industrie des Denrées Alimentaires d'Origine Animale (HIDA OA) works closely with the Département d'Océanographie et Ressources Halieutiques. The former group works with hygiene and production of food products of animal origin while the latter deals with the production, storage, and marketing of marine organisms. Both areas are of importance in Morocco and both have considerable potential for further expansion. As marine aquaculture develops, Morocco is well situated to expand its industrial development in this field. Part of the Department (DORH) is based in Agadir.

The HIDA OA department focuses on microbiology and food safety with the intention of developing research in microbiotechnology as a primary stream. The faculty has specialists in meat and dairy products and hygiene as well as hygiene and production of fish and other sea products. The veterinary students receive courses in Aquaculture, Hygiene and Inspection of Fish and Sea Products, Dynamics of Fish in the Ocean, and Marine Pollution. On-site field training in the harbors and laboratory classes in aquatic and fish microbiology is available. There is a strong interest in food hygiene among veterinary students. A start has been made on attracting international funding but the Department needs strengthening in equipment and resources.

Pet animals generally tend to be seriously underprivileged and abused. It is to be hoped that this situation will change as the economy and life style of the people improve. It is a time of change and there is a growing number of dedicated pet owners. IAV should give leadership to the social evolution of animal companionship and the human-animal bond. Feral animals continue to constitute an enormous problem, particularly for the fight against rabies which is still widespread in Morocco.

In conclusion, livestock production and health is a vital cornerstone of the Moroccan economy and of the subsistence of many of its people. It is an identified priority of IAV's strategic plan. As IAV builds a critical mass of faculty with the doctoral graduates of the Minnesota Project added to the pre-existing graduates of European programs, resources must be provided to ensure that their research potential to contribute to national needs is realized and achieves sustainability.

ANNEX I

IAV AND THE PRIVATE SECTOR

By Randal Thompson and Robert Dunlop

A. Components of the Issue

The issue regarding IAV and the Private Sector has two major parts. The first involves the placement of IAV graduates in jobs in the private sector. The second involves the demand for IAV faculty by the private sector for short-term consultancies and research projects.

B. Conceptualization of the Issue

1. Defining the Realm

When we talk about IAV and the private sector, what do we mean? We are really talking about all of those "non-administration" opportunities and activities where the expertise of the IAV graduate might be useful. These "non-administration" opportunities can then be further divided into "industry" and "services". "Industry" includes private and semi-public or parastatal enterprises. Agro-industries include such products as fresh foods, processed foods, wine, agro-chemicals, veterinary medicines, cut flowers, and so on. "Services" includes such things as agricultural and veterinary consulting services, private veterinarians, banking, and insurance companies.

2. Defining the Issues

The issue regarding IAV and the "private sector" has always been put in terms of "How can IAV adjust its curriculum and its style and marketing techniques to better meet the needs of the private sector and to place more graduates into private-sector positions?" However, the issue has another dimension. That is, is the private sector ready for the IAV graduate, or does the private sector have to evolve first before we can expect that it will demand the skills of IAV graduates?

In addition, we need to look at what type of "private sector" type IAV could or even should be providing. Should IAV be providing a top-level, highly-trained technician and professional, or should IAV be training the future management and entrepreneur cadre of the agro-industrial sector?

3. The Nature of Morocco's Agro-Industrial Sector

Agro-industry in 1980 consisted of 700 firms employing almost 38,000 workers with a total production of almost 10.2 billion Dirhams. The total gross value added by the sector was nearly 1.6 billion Dirhams in that year. From 1978 to 1983, agro-industry accounted for about a quarter of all industrial investment and slightly more than a fifth of job creation in industry. The largest firms are located in the production of tobacco (one state-owned firm employing over 2,750 people), beer and malt (620 employees per firm) and sugar (336 employees per firm). Firms in the bakery/pastry subsector, on the other hand, were relatively small, employing an average of 13.2 persons each. Hence, in agro-industries, firms are dominated (as in the entire industrial sector in Morocco) by small- and medium-sized firms and a great number of "mom-and-pop" firms which are not even included in the statistics gathered. Parastatals are generally the largest employers of people.

Food processing firms include canned vegetables, fruit juices, canned olives, olive oil and wine. There are some 75 cereal processing and 306 bakery and pastry firms, 12 sugar processing plants, and an increasing number of dairy firms.

Because Moroccan industry, in general, and agro-industry, in particular, are dominated by small firms, the demand for IAV graduates is not very large. These firms do not see the necessity to employ highly-skilled manpower at a high wage rate, since many of them are run by "self-made" men who value on-the-job training more than formal university training. When seeking skilled manpower, therefore, these firms are more likely to hire the "lower" level agricultural cadre, including technicians and Ingenieurs d'Application. At most, these firms may hire one or two IAV graduates. Hence, IAV's current private sector strategy is limited. A great deal of "marketing" needs to be done to convince firms that their investment in IAV graduates will pay off. In addition, the market needs to grow so that firms have heightened pressure to be competitive and increase production and to, thus, raise the level of employees.

4. The Agro-Industrial Services Sector

A wide range of opinions and perspectives was detected among people working in agribusinesses or related services. There are sharp differences of opinion about the potential for private veterinarians in Morocco. The Livestock Direction of MARA, employing a desired animal-to-vet ratio, estimates that Morocco needs 4,000 trained veterinarians. However, one veterinary product firm strongly disagrees, alleging that because of the low level of average income in Morocco, people do not demand animal products. Hence, people produce a lot less than they have the potential to. In addition, poor farmers who have small herds are not willing to pay for veterinary services because cost of these services is too high relative to their perceived value of the animal. Hence, they would not demand a vet even if one were available. This may be a transitional problem as adjustments occur in the livestock sector.

The economists at Agro-Concepts feel that there will be a growing need for agricultural and veterinary services to be provided by private consultants. They cite the example of the poultry business where all aspects of the industry are private including extension. They state that this is also beginning to happen in the livestock sector. Thus, there could be a future for IAV graduates in these areas.

C. Presentation of Findings, Conclusions, and Recommendations of the Evaluation

1. Perceptions and Realities of the Private Sector as Expressed by a Sample of Firms

In interviews of private sector and parastatal firms, a range of attitudes was perceived toward how well IAV graduates fulfill the needs of industry as well as a range of attitudes from IAV training at IAV for the jobs they perform in industry. We present nearly raw data from these interviews here advisedly--so as to help IAV faculty and management become aware of some of the stated perceptions which may not be stated as clearly to IAV personalities themselves as they are to "visiting firemen".

Positive perspectives were obtained from Frumat and CoLait, relatively large firms who employ a significant number of IAV graduates in food technology. Here, both management and IAV alumni expressed that IAV training was relevant. No suggestions for improving the curriculum of IAV were provided because there was a general expression of satisfaction. In these firms, IAV graduates are used both to provide the technical expertise required at various points in the production process such as lab analysis and to actually manage the production process such as lab analysis and to actually manage the production process from start to finish. In this latter function, they play a critical management role. They stated that by-and-large they pick up specific management skills needed on the job, and that IAV could not have offered them much more in terms of management.

A contact at CMPE in Casablanca was more negative. He is in charge of agro-industries for the Moroccan Center for Export Production. He received his Ingenieur d'Application Degree in Food Technology from IAV in the late 1970s. He went to work for ODI (Office of Industrial Development). He said his Degree from IAV made it possible for him to be hired only at the lowest entry level position. While at ODI, he determined that IAV had not prepared him to work in the private sector. He said he lacked the management training and skills and knowledge of the culture of private enterprise. Realizing that he lacked the proper skills, while at ODI, he studied economics at the University. He still felt that he lacked requisite skills and so he then went to Georgia State to earn an MBA Degree. He feels strongly that IAV should provide more management training as well as more hands-on experience in the private sector during the students' training. He feels that IAV should build up linkages with the private sector, begin to change people's misperceptions about IAV graduates (according to him, they are not adequately appreciated and are hired at a lower level than they should be), and begin to obtain feedback from the private sector which can be used to transform IAV's curriculum in a direction which would pride better trained IAV graduates.

He believes that IAV does a good job producing strong technicians but forgets human relationships, general culture, communication skills, organizational behavior,

social marketing, etc. He recommends that IAV begin to have "portes ouvertes" (open houses) like the management university does (ISCAE in Casablanca) in which private firms are invited to campus to hear presentations of the university about student training and to allow students to make direct contacts with the firms. He also recommends some kind of private sector committee arrangement in which private firms could begin to provide their perceptions directly to IAV and to eventually effect a transformation of IAV to be more suitable to the private sector.

He also stated (a point of view was repeated by Agro-Concepts) that firms prefer to hire graduates from French schools. They will hire lower-level agricultural technicians and fill their top management positions by French-trained Moroccan cadre or by foreign technicians. Thus, the higher-level IAV graduates are competing with their French-trained brethren as well as with foreigners and are in a rather difficult situation when demand is not high enough to accommodate both IAV-trained and French-trained professions. Evidently, Moroccan firms are willing to pay the relatively high price of the top skilled manpower only when it has been molded in France.

It is important to note that he is evaluating the IAV graduate from the perspective of "Is IAV producing people who can be leaders and managers in the private sector?" The issue here is "should IAV even be doing so? Should its curriculum be "management-oriented?" These questions should be confronted and dealt with over time as IAV builds up its contacts in the private sector and a give-and-take, feedback relationship is established. The point of view is that there still remains a huge need for the Moroccanization of high-level management and that IAV graduates should be trained to fill in the positions vacated by foreign technicians.

Another somewhat negative perspective was obtained from CICALIM, a poultry feed company. The owner is a veterinarian trained in Toulouse. He has one IAV veterinarian working for him. The vet graduated from IAV in 1976, under the "old" system. The vet serves as a technical manager. He supervises the production of feed, decides the nutritional mix, trouble shoots on farm, etc. The owner stated that he would not hire a

vet from the new system because IAV's curriculum has become too theoretical and has lost its practical bent. He said that in spite of the fact that he runs a large firm (which has about 20% of the market), he only has a place for one IAV graduate. He provides "stages" for students from Meknes, but has never been asked to provide "stages" for students from IAV. He would be willing to do so and feels that such experience would better prepare graduates for private sector positions.

The owner of a BCI (veterinary medicine company) also provided a rather negative perspective. He imports vaccines, manufactures oral medicines, and deals in a variety of other activities such as the importation of Holstein, the production of tomatoes, bananas and cut flowers, and so on. At BCI, he has 27 employees and 2 IAV graduates. One IAV veterinarian served as his general manager. He believes that IAV has a great challenge facing it to better adapt to the needs of the private sector and that IAV must change its mode of operation as well as its curriculum if it is to meet the needs of the private sector in the future.

He states that IAV vets do not have enough experience working in the private sector while they are students and that there are not enough management courses in the IAV curriculum. He believes that currently the major constraint to the use of vets in the private sector is the relatively limited domestic market demand for animal products and animal related products and services. He believes that the employment problem of the small farmer and the poor in general must be dealt with before this demand will increase. He has had to diversify his activities in order to survive in the private sector. The demand for veterinary drugs is not sufficient to support a modern factory and hence he operates far below capacity. He believes that one of the most important venues for IAV graduates in the future lies in their being inventive, dynamic entrepreneurs who will begin new enterprises and attempt to create a market for their products and services. He believes that IAV vets should obtain a better education in animal production because the future holds the increased demand for larger scale animal production units rather than individual farmers who would demand private vets.

He does not feel that employment fairs would help bridge the gap between IAV and the private sector. He feels that IAV should sign an Agreement with the Ministry of Agriculture such that IAV graduates spend their one year of "Civil Service" working in a private firm rather than working in the administration.

Agro-Concepts hired one IAV graduate, an agricultural economist with whom they had a very positive experience. However, this graduate was rather unusual because prior to working for Agro-Concepts he had experience teaching in France and working for international organizations. Agro-Concepts' head economist said that in the livestock sector, people do not take high level engineers. They would rather hire lower paid livestock technicians from Meknes and if they hire any high paid people, take those educated in France. He did say that the livestock sector is in the process of "privatizing". The "vet" sectors in the country are being zoned and the country is planning a privatization zone by zone. There will therefore be room in the future for more IAV grads to work in the private sector in various vet-related areas, including artificial insemination services, marketing of semen, technical services to livestock producers, extension, etc.

2. Assistance to Private Business by IAV Faculty Consultants

Agro-Concepts has employed several IAV faculty consultants. However, they find that the Moroccan tax laws militate against using more of these consultants. They are taxed 45% of salary for hiring and hence fear hiring too many.

Clearly, there are more and other views to be gathered, but this was not possible for this sub-team in the time available. Other parts of the report should be read in conjunction with this section, especially Chapter III C and Chapter IV.

3. Conclusions

- a. From the interviews, it can be concluded that many firms are currently hiring IAV graduates, but that many of these firms see unresolved problems standing in the way of increasing the employment of these graduates.

152

- b. IAV graduates currently compete with French-trained Moroccans and foreign technicians. The current culture still favors these latter two groups. People who do hire Moroccan-trained agriculturalists and veterinarians prefer the lower-level, lower paid technicians. The IAV higher-level graduates are hence caught in the bind of competing with these other groups.
- c. The structure of Moroccan industry, with a few large firms (generally parastatals) and a huge mass of very small firms reduces the demand for IAV graduates. The former prefer French-trained managers and the latter cannot afford IAV graduates and do not readily see the pay off in terms of higher production of investing in these "expensive" people.
- d. Many firms feel that IAV is not currently preparing its graduates for the future of the Moroccan private sector. Many feel that IAV should be training the future managers of the country in the agricultural sector and hence should include more management courses as well as more cultural courses in the IAV curriculum.
- e. Many people feel that IAV should do a far better job in outreach to the private sector and marketing of IAV graduates to firms. They feel that untapped potential lies out there and that the major problem is "selling" the graduates.

ANNEX J

STRENGTH AND THE SUSTAINABILITY ISSUES OF IAV HASSAN II

by Dr. M. Sedrati and Dr. D. Johnson

The Hassan II Institute of Agronomy and Veterinary Medicine (IAV) has grown from a single Moroccan faculty member in 1969 to a university-level training and research institute with 350 faculty members and 2,300 students. IAV's accomplishments are impressive. Its highly-trained faculty, 93 percent Moroccan, participates widely in government, international and private organizations. Its educational standards are comparable to those in top U.S. and European agricultural institutions. Its innovative curriculum integrates teaching, research and practical fieldwork. Its graduates occupy management positions in government agencies, state-run and private enterprises. IAV also plays an important regional role in training students from other African countries. Research studies for the Master's degree and for the Doctoral degree have made important contributions to solving the agricultural production problems of Morocco. These findings, as they are applied to plant and animal production systems, will result in a significant improvement of agricultural output and the economic situation.

IAV's experience demonstrates that institutional development requires the sustained commitment of financial and technical assistance over long periods of time. Long-term commitments from A.I.D. and the University of Minnesota as well as strong and continuous Moroccan leadership facilitated IAV's growth during its first 19 years, but much remains to be done to secure IAV's financial status and ensure continued excellence in teaching and research. IAV's administrative structure must be appropriate to a large, complex organization and cope with budgetary constraints that could limit retention of qualified faculty. At the same time, manpower needs in Morocco are changing and IAV is adjusting its training to meet private sector manpower requirements.

SUMMARY OF DEVELOPMENT EXPERIENCE

The Hassan II Institute of Agriculture and Veterinary Medicine (IAV) was established by a Royal decree in 1968 as a university-level agricultural training and research institution. It recruited its first faculty member in 1969. The first A.I.D. contract provided Technical Assistance (TA) for the Soil Science department and 1 year of training for 6-8 students (the 5th year in the M.S. program at IAV) in the fields of Range Science, Agronomy, Soil Science and Plant Pathology during the period 1969-1977. The second A.I.D. contract provided TA for Range Science, Soil Science,

Agronomy, Plant Pathology, and Horticulture and training for 8-20/year students in the IAV M.S. program in the same fields as the TA plus Agricultural Economics, Animal Production, Human Nutrition, Food Science Technology, and Fisheries for the period 1977-1979. These 2 contracts provided partial training for 80 M.S. students and allowed IAV to begin recruiting and building its Moroccan faculty for future training to the doctoral level in a subsequent contract.

The major A.I.D. contribution to IAV development is occurring in the 10 year period 1980-1990. This is the current contract, which is funded at a level of \$28.5 million and provides technical assistance (TA) in Horticulture, Agronomy, Plant Pathology, Animal Production and Veterinary Medicine; one year of training for 170 MS students in all fields of Agriculture; and Doctoral training for 130 faculty members from all departments in Agriculture and Veterinary Medicine. All the A.I.D. development activities have been initiated through contractual relationship with the University of Minnesota.

IAV is the only school in a Francophone country combining full curricula in veterinary medicine and the agricultural sciences in the same program, with students sharing a common body of coursework and practical field studies during their first two years. Since 1969, IAV has built four degree programs, developed Moroccan faculty from "scratch" and grown to exceed most U.S. land grant institutions in size. IAV has graduated approximately 3,300 four-year agricultural technicians, 360 veterinarians and 1,300 six-year agricultural specialists. Of these graduates, over 75 percent are employed by government, 13 percent by agricultural training institutions and 12 percent by the private sector.

In addition to these impressive contributions to agricultural development in Morocco, IAV plays an important regional role by training students from other African countries. Each year, the Government of Morocco provides scholarships for approximately 200 non-Moroccan students to attain degrees at IAV. IAV faculty serve as consultants on a number of agricultural projects in other African countries. Also, through an International Irrigation Center, in collaboration with Utah State University, and through participation in a Range Management and Rural Development Course with CIHEAM, it is beginning to provide continuing education training for technicians in the Mediterranean region and for Africa.

The 1986 evaluation identified various factors contributing to the success of IAV's development.

- * Moroccan leaders are strongly committed to develop an institution serving local needs. After assessing higher education systems in several countries, they are developing a unique institution appropriate for Morocco. The process of investigating, evaluating and adopting or rejecting outside elements fosters an esprit de corps among faculty, administrators and students.
- * IAV is highly selective in choosing students and faculty and based its teaching and research programs on accepted international standards. Morocco has a high quality secondary school system that trains graduates for diplomas in science and math. IAV selects its students from among the best available and continues to demand high performance from them. IAV faculty are carefully selected for their academic merits, their willingness to seek research support and their commitment to IAV and its goals.
- * IAV leadership exercises entrepreneurship in mobilizing resources and building needed constituencies. IAV administrators negotiate external donor support without relinquishing control of the IAV program. By creating scientific and financial linkages with several donors, they reduce IAV's dependence on any one donor. They push the government for budget increases. They provided leadership for the formation of National Professional organizations and faculty members serve in these organizations in their ongoing activities and thus maintain ongoing contact with all aspects of Agriculture and Veterinary Medicine.
- * IAV develops an innovative curriculum to integrate teaching, research and practical fieldwork. The curriculum is unusual in that students are exposed to the full range of agricultural sciences before they focus on a specialty. Also, a series of field training exercises supplement classroom instruction and encourage students to apply theoretical knowledge to real problems in multidisciplinary teams. This model may be appropriate for undergraduate training in many Third World countries.

157

- * IAV administrators and faculty are exceptionally open to evaluation by outsiders and fostered a positive attitude toward continual self-evaluation, adaptation of useful outside ideas and improvements of the existing program.
- * Several outstanding Moroccans provided unusual continuity of leadership. For example, IAV's second director served 18 years, infusing the institution with his unique style of personal leadership.
- * A.I.D. has made a long-term commitment to IAV's development and continues its assistance in spite of a negative first project evaluation and several differences of opinion on how IAV should evolve.
- * University of Minnesota faculty and staff provide dedicated and sustained assistance. Several faculty have served more than one tour and have been faculty advisors in Minnesota during intervening periods. The University also arranged and coordinated the participation of over 30 U.S. land grant institutions in training and research efforts with IAV.
- * IAV developed incrementally, with leaders being careful to achieve necessary preconditions before expanding the teaching and research programs. A.I.D. assistance has also been incremental--first in soil sciences and agronomy and later in veterinary medicine, forestry, animal sciences and other disciplines.

SUSTAINABILITY ISSUES

Recurrent Costs

IAV's support from the Government of Morocco is inadequate to maintain the quality of the teaching and research program. IAV personnel must continue to receive improved salary compensation to maintain a highly competitive and quality faculty and staff. Without financial incentives, the retention of highly trained and motivated faculty members may become a problem.

In the future, more local funding will be needed to enable IAV to function as a training and research institution if external assistance grants are withdrawn or reallocated to other activities in Morocco. Additional funds will be generated from research contracts and consulting services,

157

from providing services to the private sector and from increasing the number of foreign students financed either by their own governments or external donors. The average per student expenditure at IAV is \$4,000, compared to \$25,000 in Europe or the United States.

The recurrent cost for IAV is justified as it has shown outstanding cost effectiveness in its training program to date. In addition the quality of the research studies produced in the process of training Master's and Doctoral candidates has been such that it is and will bring much benefit by increasing agricultural production, e.g.:

- * The identification of the Hessian Fly problem in cereal production was done by 2 IAV Master degree students in collaboration with a Project TA in 1983. After being documented, further work by other scientists publicized the importance of this problem in Morocco. This work may also have an influence on controlling this insect problem in the U.S. and other countries. Estimates suggest that the value of this one contribution may eventually exceed the total cost of the project.
- * Research studies on the epidemiology of selenium deficiency disease in lambs have shown that proper control of this animal production problem could result in an increase of 44.5 million DH in income to sheep producers in the Tadla and Oujda areas of Morocco.

Utilization of the Human Resource

The professional career of all faculty members is either embryonic or in its infancy. All faculty with Doctoral degrees have had them for 6 years or less. This number is less than one-sixth of the total faculty, so the majority of the faculty are still working on their degrees and thus have not become fully productive in research, advanced training programs or extension. There is evidence that they will be utilized if continued support is available during the next 5-10 year period.

- * IAV faculty have received over 40 grants of \$12,000 to \$30,000 from the International Foundation for Sciences.
- * IAV faculty have received approval for support from the Program in Science of Technology Cooperation of A.I.D. (e.g., a grain storage study to modify traditional underground storage to reduce storage losses).

- * IAV faculty are participating in the Small Ruminant Collaborative Research Support Program (SR-CRSP) in the areas of Animal Nutrition, Range Management, Rural Development, Reproduction, Physiology and Parasitology.
- * IAV faculty are conducting rural development activities in Mali and Mauritania through an FAO-funded project.
- * IAV faculty in Social Sciences, Agricultural Economics, Animal Production, Range Management, Reproduction, and Parasitology are conducting a rural development study in a Middle Atlas range area. This project is through a World Bank development project for this region.
- * IAV faculty in Veterinary Medicine, while providing practical clinical training for veterinary students, offer private animal owners and producers health care at an appropriate professional fee. Several agreements with private owners and parastatal societies have been formalized e.g., reproduction management for the Adarouch Ranch and private horse owners.
- * IAV faculty in the Agronomy, Food Science, and Plant Pathology departments are providing professional assistance to the sugar beet and cane industry through a multi-year contract.
- * IAV faculty in Soil Science, Food Science and Technology are providing laboratory services on a fee or contract basis for soil samples and laboratory tests for quality control of dairy and other food products.

Professional Growth and Development of the Faculty

To continue to develop and mature, faculty members at IAV must maintain ongoing contact with the international scientific community. At least every 2 years faculty need the opportunity to exchange their research findings with scientists in other countries including the United States. As has been shown in many situations, these exchanges will not only benefit Morocco but will also benefit the other country as well. In the ongoing Doctoral-level programs, contact with the scientific and technical community outside Morocco is needed to maintain a high quality program with a broad scientific base.

Documentation Center Development

The backbone of a high quality educational institution is a readily available source of scientific information. This is essential for a quality academic program at all levels, for a research program both to document the results of the ongoing research and provide the scientific information necessary to support the program. It also serves as a resource for other users from the national and regional community.

Much progress has been made in developing this resource but there is a continuing need to maintain and improve the quality. IAV has asked for and received support from MARA to provide funds; they have also asked for and received support from other donors e.g., Rotary International, Canadian Government, and several faculty members at U.S. universities have all donated significant collections of scientific journals. Though progress has been made, there is need for continuing donor support in this area.

Availability of Scientific Equipment and Supplies

Scientific equipment and supplies are available in Morocco but most all items must be imported and consequently are expensive and frequently not available on a timely basis. To insure the quality of training programs for the Ingenieur d'Etat and to have a cost-effective research program to supply Moroccan agriculture with relevant production information, an outside source of scientific supplies and equipment is essential. A portion of these items will be supplied through research grants but a recurring and essential need for these items exists to support a quality training program.

Development of Continuing Education Programs for Morocco, the Mediterranean Region and Africa

The faculty of IAV in collaboration with faculty of U.S. universities can provide programs in continuing education for specialists in all fields of agriculture and veterinary medicine. The training needed by Moroccans currently working in various governmental agencies and in private industry can be made available to persons in similar fields from other Mediterranean countries and Africa. Currently, programs have been initiated in the field of Irrigation and in Range Management and Rural Development. These training programs can be conducted in Morocco with donor support and be more cost effective than if done in Europe or the United States. In addition, the material presented will be more applicable to the region.

ANNEX K

MISCELLANEOUS RECOMMENDATIONS

- * That the stage system be maintained, and efforts continue to organize and store data collected by the stagieres in a database on Moroccan agriculture for use at IAV and elsewhere in the country.
- * That greater attention be given by U.S. university advisors to preparing IAV faculty participants as teachers as well as researchers, with some emphasis on innovative teaching technologies.
- * That those IAV administrators to receive short-term training at Minnesota in academic affairs administration also, as appropriate, be given some exposure to appropriate technology available to improve teaching methods.
- * That IAV continue its efforts to ensure that the experiences of foreign students are positive socially as well as academically, and that their needs are met during the summer holidays.
- * That IAV, as part of its strategic planning process, develop--through the departmental committee structure-- a plan for faculty development and upgrading, both in research and teaching, for the period of the 1990s. The plan should be realistic but still allow for the kind of adaptive flexibility that should be a hallmark of such an institution in a rapidly developing country.
- * That the Language Department receive, through Project support, at least minimal audio-visual materials in support of teaching, a micro-computer for teaching and documentation development purposes, and if at all possible, access to AID participant training funding for studies toward the Doctorate in ESL by one M.S. holder in the department.
- * That the University of Minnesota develop guidelines in writing for access to \$10,000 research support funds by Doctoral candidates which will include methods for billing and reimbursement. This will help to prepare faculty for later managing ordering and billing requirements under an IAV-managed research fund and avoid disallowances by A.I.D. auditors.

- * That sufficient time be built in for IAV/DDR and other staff resources to be able to collect and analyze data and review results at key intervals with INRA colleagues and with AID. IAV has suggested a three-year time frame. This collaborative research arrangement, if reactivated, should be between the two Moroccan entities. Funds could be shifted to the Minnesota project from the INRA/MIAC project if this would achieve management improvements. A decision should be reached by December 1988.

162-