

Report to
the Government of Uganda

PN-ABC-840

ISNAR R42

**REPUBLIC OF UGANDA
ESTABLISHMENT OF A NATIONAL
AGRICULTURAL RESEARCH
ORGANIZATION (NARO)**

International Service for National Agricultural Research (ISNAR)
United States Agency for International Development (USAID)

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LIST OF ACRONYMS

AA	-	Agricultural Assistant
AGDP	-	Agricultural Gross Domestic Product
AHRI	-	Animal Health Research Institute
AO	-	Agricultural Officer
APC	-	Agricultural Policy Committee
APRI	-	Animal Production Research Institute
DDG	-	Deputy Director General
DG	-	Director-General
DREL	-	Director Research-Extension Liaison
EEC	-	European Economic Community
FAF	-	Faculty of Agriculture and Forestry
FAO	-	Food and Agriculture Organization
FRIJ	-	Fisheries Research Institute Jinja
FRIN	-	Forestry Research Institute Nakawa
FVM	-	Faculty of Veterinary Medicine
GDP	-	Gross Domestic Product
HARI	-	Highland Agricultural Research Institute
IARCs	-	International Agricultural Research Centers
IDRC	-	International Development Research Center
ISNAR	-	International Service for National Agricultural Research
KARI	-	Kawanda Agricultural Research Institute
MAIF	-	Ministry of Animal Industry and Fisheries
MEP	-	Ministry of Environment Protection
MFAD	-	Manpower for Agricultural Development Project (USAID)
MINAG	-	Ministry of Agriculture
MPED	-	Ministry of Planning and Economic Development
MU	-	Makerere University
MUARIK	-	Makerere University Agricultural Research Institute, Kabanyolo
NARB	-	National Agricultural Research Board
NARI	-	Namulonge Agricultural Research Institute
NARO	-	National Agricultural Research Organization
NCST	-	National Council for Science and Technology
NRC	-	National Research Council
PRO	-	Principal Research Officer
PSC	-	Public Service Commission
PT	-	Principal Technician
RELO	-	Research-Extension Liaison Officer
RO	-	Research Officer
SAO	-	Senior Agricultural Officer
SARI	-	Serere Agricultural Research Institute
SMS	-	Subject Matter Specialist
SO	-	Scientific Officer
SPRG	-	Senior Principal Research Officer
SRO	-	Senior Research Officer
ST	-	Senior Technician
UFFRO	-	Uganda Freshwater Fisheries Research Organization
UNDP	-	United Nations Development Program
USAID	-	United States Agency for International Development
UTRO	-	Uganda Trypanosomiasis Research Organization
VTC	-	Variety Trial Centers

REPUBLIC OF UGANDA
THE ESTABLISHMENT OF THE NATIONAL AGRICULTURAL RESEARCH
ORGANIZATION (NARO)

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

This study for the establishment of a National Agricultural Research Organization was undertaken by a NARO Task Force designated by the Government of Uganda in cooperation with the United States Agency for International Development (USAID) and the International Service for National Agricultural Research (ISNAR). The main purpose was to plan for the consolidation of all agricultural research in Uganda in one semi-autonomous national research organization that will introduce improved methods and systems of planning, organization, and management of research for the maximum benefit of the agricultural economy of Uganda.

The Task Force concludes that it is appropriate and opportune for Uganda to consolidate its national agricultural research system in a semi-autonomous organization that will have the flexibility to organize and manage research in response to the urgent needs of Government, the development agencies, farmers and other producers and processors in the country. The Task Force reviewed the benefits to be derived from this type of organization for research and presents a strong rationale for strengthening the national research system by this strategy. The approach adopted focussed on the means for articulation and execution of research programs, appropriate structure and organization for effective management, and efficiency in resource use and output delivery for the achievement of national objectives.

The Task Force notes that Government, in endorsing the Working Group recommendations for the establishment of NARO in principle, appropriately recognizes agriculture in its widest sense, including crop and production systems agriculture, animal industry, fisheries and forestry. The planning for NARO has taken this into account in presenting an integrated approach for a research organization to respond to the needs of primary industry comprising all these elements.

The Task Force reaffirms the need for NARO to recreate and strengthen the capacity for research to service the agricultural industry by the rehabilitation and improvement of the means for research, the adoption of an appropriate research scope, systematic procedures in research policies and priorities determination; the introduction of improved and systematic methods of research planning and programming, the adequate funding of approved research activities, and the communication of research conclusions and findings to the clients of agricultural research.

The Task Force recommends mechanisms for the achievement of these through the NARB, the senior management of the organization, and the Research Institutes. The Board will provide guidance on research policies and priorities and the senior management and research institutes will translate these into research programs and projects in two-way flow systems with built-in mechanisms for priority setting, resource allocation, program articulation, and review at appropriate levels.

Establishment of NARO and Its Board

The Task Force confirms the need and desire to have NARO established and finds the idea widely acceptable. There will be the need for continuing consensus building and support from Government and officials as the processes for NARO establishment unfold according to the plan proposed.

The organization will comprise the Headquarters and the following institutes:

- Kawanda Agricultural Research Institute, Kawanda
- Namulonge Agricultural Research Institute, Namulonge
- Serere Agriculture Research Institute, Serere
- Animal Health Research Institute, Entebbe
- Highland Agricultural Research Institute, Kalengere (to be established)
- Forestry Research Institute, Nakawa
- Fisheries Research Institute, Jinja (formerly UFFRO)
- Trypanosomiasis Research Institute, Tororo (formerly UTRO)
- Animal Production Research Institute, Mbarara (to be established)

The Task Force reaffirms that among the benefits to be derived from the establishment and proper functioning of NARO would be

- (i) effective coordination of all agricultural research
- (ii) improved efficiency in the utilization of physical, human and financial resources
- (iii) improved flexibility in the administrative and financial management of research
- (iv) improved mechanisms and procedures for effective planning and management of research
- (v) avoidance of unnecessary duplication of research
- (vi) stimulation of increased productivity from research scientists
- (vii) improved consciousness for the development and maintenance of effective linkages with the clients of research in development

The Task Force recommends that in order to achieve the establishment and functioning of NARO, a National Agricultural Research Organization Statute be enacted as an enabling Statute providing for the composition, functions, powers and procedures of NARO and its Board (NARB). A draft Statute is recommended in Annex III and the working procedures and relationships to Government, the development Ministries and the NCST indicated.

A 10-step plan of action for the establishment of NARO commencing with the consideration and approval of the Task Force report, and concluding with the installation of a fully operational NARO by 1 July 1990 is proposed as follows:

- (i) consideration and approval of NARO Task Force Report (Sept.-Dec. 1988)
- (ii) finalization of draft Statute (Jan-June, 1989)
- (iii) enactment of Statute (Sept., 1989)
- (iv) constitution of the Board of NARO (Oct., 1989)

- (v) appointment of Director-General and senior management of NARO (Dec. 1989)
- (vi) transfer to and consolidation of the research institutes under NARO (Jan. 1990)
- (vii) organization and initial work planning of NARO (Feb.-April 1990)
- (ix) submission of first program and budget (Mar.-May 1990)
- (x) full operation as a legal and financial entity (1 July 1990)

The NCST is recognized as the umbrella Council for NARO and its board. The NCST will provide advice to Government and broad guidelines to NARO on national science and technology policies. The NARO will translate these into specific research policies, priorities and programs to service the agricultural industry.

The Task Force recommends that the Board of NARO should concentrate on the determination of policies, priorities, and resource allocation in agricultural research, and the Director-General and senior management should be concerned with the day-to-day management of NARO. A decentralized and collegial style of management, with program and financial accountability, is recommended for NARO and its institutes.

A Planning and Management Unit is recommended for the Directorate. The Unit and senior management of NARO will constitute a Technical Secretariat to collect, collate, analyze and provide information to service the Board.

It is recommended that the Board should, as soon as possible, prepare and approve a long-term strategic plan for agricultural research in Uganda.

The need to strengthen research management through the training and exposure of senior and middle-level managers is stressed.

NARO Headquarters

It is recommended that a headquarters to provide facilities for NARO, its Board and committees be established at a central location in the Kampala area. NARO headquarters should have easy access to Government policymakers, development Ministries, institutes, the University, and the national and international scientific and donor community.

A permanent building at a suitable location is recommended. It is estimated that an adequate permanent building providing approximately 1500 m² of space and facilities will cost about US \$870,000 and a further \$480,000 will be required for furnishings, equipment and transportation. Other physical requirements of land, communications, transport, water and power are indicated.

In the interim period, consideration should be given to temporary accommodation in hired or leased premises.

Manpower Development

The Task Force notes the significant progress made in manpower development for the national agricultural research system in the MFAD Project. Current efforts appropriately seek to build a self-sustaining research capacity in the country through

- (i) training of scientific personnel
- (ii) building the capacity of Makerere University in postgraduate education
- (iii) promoting the involvement of postgraduate education in current research problems in the country
- (iv) promoting the collaboration between the University and the rest of the national research system

The Task Force endorses the proposed 2nd phase of the manpower development plan which provides for the training of 14 MSc and 22 PhD candidates overseas and 35 MSc candidates locally in the next five years. In view of further needs that may arise from the balance of staff and further recruitment of staff in the reorganized NARO, it is recommended that additional training be provided for 10 MSc and 2-5 PhD candidates and 10-15 research support staff per year in the period 1989-1993.

The Task Force recommends that the conditions of service of NARO's professional and support staff be improved in line with comparable positions in the University scheme of service. It is recommended that a scientific scheme of service for NARO staff be negotiated with the PSC and the NCST. Such conditions of service should be designed to reward research performance and productivity and provide for progression on merit without diversion to administrative or management positions. This deserves early attention by the Board on establishment.

Funding

The Task Force reaffirms the need for funding for agricultural research to be adequate, stable, timely and flexible for the operation of research and the delivery of its output.

The following measures are recommended as necessary and urgent:

- (i) the increase of funding from the present level of 0.33% of AGDP to 0.5% AGDP in the current financial year and progressive increase at the rate of 0.1% per year to reach the level of 1% of AGDP in five years
- (ii) provision for a foreign exchange component in all funding of research
- (iii) Government-expressed and -executed commitment to fund and support agricultural research to provide the stable basis for the funding of agricultural research
- (iv) donor's sources of funding and assistance to be actively sought, especially in the foreign exchange component of research funds requirements-- the convening of a 'Consortium of Donors' by MPED to consider the funding of the organization of NARO is recommended
- (v) Government to explore other sources of funding, including the introduction of cesses on export values of commodities such as coffee, tea, tobacco, etc. which benefit directly from the output of research in improving productivity
- (vi) Government to encourage agro-based industries, philanthropic organizations and NGOs, possibly through tax exemptions and other means, to support and fund agricultural research
- (vii) NARO to generate revenue through its service activities and through proper investments as provided for in the Statute

Linkages

It is recommended that NARO should give special attention to both internal and external linkages that would enable it to receive inputs from, contribute inputs into, and deliver outputs to policy, development, and extension and user systems in the country.

Special attention is recommended for linkages with policymakers, extension and development (at commissioner, deputy commissioner, regional, zonal, district, extensionist and producer levels), the University, the NCST, national and international agricultural research institutions, the public, farmers, producers and processors.

Several linkage mechanisms are described and illustrated and it is recommended that these be put in place and allocated time and resources so that they can be fully functional and effective.

A major mechanism recommended for the research-extension linkage is the Directorate of Research-Extension Liaison at NARO headquarters and the Research-Extension Liaison Officers (9) to be based at the research institutes and supported by a strong Communication and Information Unit. This directorate will facilitate and promote linkages, but the entire organization will have responsibility for developing and maintaining all linkages.

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REPUBLIC OF UGANDA
ESTABLISHMENT OF A NATIONAL AGRICULTURAL RESEARCH ORGANIZATION
(NARO)

1 BACKGROUND AND INTRODUCTION

Agriculture has continued to be the dominant sector of the economy of Uganda. With the launching of the Rehabilitation and Development Plan, 1987-1991, which aims at a rapid recovery of the agricultural sector and the improvement and stabilization of its contribution to the Gross Domestic Product, the need for organized agricultural research to contribute more effectively and efficiently to development has become even more urgent.

The crucial role of agricultural research in the development and modernization of the agricultural sector was recognized by Government in setting up the Agricultural Services Task Force and a working group on agricultural research in 1987. The consideration and approval of the recommended strategy for strengthening national agricultural research (Uganda Agricultural Task Force -- Agricultural Research Group 4) by the consolidation of agricultural research institutions into a semi-autonomous National Agricultural Research Organization represents an important step in implementing Government medium-term objectives of improving the effectiveness of research inputs into the rehabilitation and development of the agricultural sector.

Attempts to review and reorganize the agricultural research system of Uganda date from the early '70s. These attempts are documented in the USAID-Ohio State University Report (1971), the IDRC Report (1982), the FAO Report (1984), and the FAO/ISNAR Mission Report (1986). These earlier reports pointed out the need to improve the organization and management of research and made some useful suggestions for structural, organizational and management reforms in the system.

At the time of the review of the agricultural research system undertaken by the Working Group of the Agricultural Services Task Force in 1987, agricultural research activities and institutions were scattered and uncoordinated in three Ministries: the Ministry of Agriculture and Forestry, the Ministry of Animal Industry and Fisheries, and the Ministry of Regional Cooperation. Subsequent actions by Government have resulted in the creation of a new Ministry of Environment Protection and the return of the former regional research institutions, notably Uganda Trypanosomiasis Research Organization (UTRO) and the Uganda Freshwater Fisheries Research Organization (UFFRO) to the parent Ministry of Animal Industry and Fisheries; the Serere research project on sorghum and millet to the Ministry of Agriculture; and the placement of forestry research and development in the new Ministry of Environment Protection. These changes notwithstanding, the constraints of planning, organization, management and funding of agricultural research as a catalyst in the development process have persisted. The improved organization and management of agricultural research as envisaged in the Task Force Report must therefore come to the forefront of the strategy for strengthening agricultural research.

The Government, in endorsing the recommendations for the reorganization of agricultural research under a semi-autonomous national research organization, has recognized agriculture in its widest sense, including crop and production systems agriculture, livestock and veterinary research, fisheries, forestry and environment, and has implicitly emphasized the integrated nature of the research approach for improved sustainable productivity in these subsectors. The National Agricultural Research Organization (NARO) to be established should therefore focus on the improved planning, organization and management of research with a view to improving the efficiency of the utilization of resources allocated to research and the impact of research activities and results on the broad agricultural sector. NARO will draw on the National Council for Science and Technology (NCST) for broad policy guidelines on scientific and technological research and will organize, carry out and manage research to address the priority development objectives of Government and the nation. In doing so, NARO will utilize its flexibility and improved management as a semi-autonomous research organization to respond to the specific needs of the parent and client Ministries, the development agencies and farmers on a continuing basis.

The purpose of the planning and system-building exercise embodied in this report is to provide the framework for the establishment of the National Agricultural Research Organization and to suggest guidelines for the operation of its governing body, the National Agricultural Research Board (NARB). In addition, recommendations are made regarding the operations of NARO and its constituent research institutes and on the issues of location, working procedures, organization and structure, staffing, conditions of service, funding and linkages to user Ministries and other clients. This is only the initiation of a process which must continue as NARB and NARO become fully established and consolidate their respective functions in the planning, coordination and management of agriculture research for development. The exercise has been carried out under the auspices of the Uganda Ministry of Planning and Economic Development (MPED) and the United States Agency for International Development (USAID) by a Task Force comprising two ISNAR staff members and three Ugandans from the Ministry of Agriculture, the Ministry of Animal Industry and Fisheries, and Makerere University.

The composition and details of the terms of reference of the NARO Task Force are given in Annexes I and II.

2 CURRENT STATUS OF AGRICULTURAL RESEARCH AND RATIONALE FOR STRENGTHENING THE SYSTEM

Most countries have benefited from investing in developing an agricultural research capability to continually improve the potential of their agricultural industry. The primary objective of a national agricultural research system is to provide information that will lead to increased productivity and a reduction of real costs of agricultural production. The potential for improvement can only be converted into realized production by the collaboration of government agencies and the private sector, including planners and policymakers, seed producers, manufacturers and suppliers, credit agencies, marketing, farmers, other producers and processors. It is the research organization's task to ensure that new information is reliable and is communicated to its collaborators in a form that is readily understood and appreciated.

To carry out this role effectively and efficiently, the national agricultural research system must

- (i) have the means to develop and carry out research programs effectively and communicate the interpreted results and conclusions to its clients
- (ii) have an appropriate organization and structure conducive to efficient management
- (iii) develop research programs that make efficient use of resources and are highly relevant to the priority development objectives of the nation

In addition, the research system must also have the capacity to fulfill secondary roles of a short-term nature, in particular responding to urgent requests for information from relevant development ministries and agencies. These roles can assume special importance in the case of national urgency, and the national agricultural research organization should be the best source of technical information about the country's agricultural potential and constraints.

2.1 Current Status of Agricultural Research

The current status of agricultural research has been reviewed in the Report of Working Group 4 of the Agricultural Task Force, 1987 (Strengthening of Agricultural Research in Uganda), and only a brief summary under the above headings is given here.

Means of research. In the current situation in Uganda, it is evident that deficiencies in the means of carrying out research are paramount. They include destruction and loss of infrastructure, inadequate funding, loss of staff, shortage of housing, lack of transport, lack of farm equipment and vehicles, lack of maintenance of scientific equipment, shortage of essential supplies, lack of funds to maintain subscriptions to scientific journals, lack of funds for staff training and participation in international scientific meetings, and severe problems of communication.

These deficiencies will have to be addressed vigorously so as to bring the research capability at least up to its former standard. However, in spite of these problems, there are still some active research programs at all the research stations, and contact with the international research community appears to be improving at a significant rate.

There are still some 214 scientists in the Ministry of the agricultural research services of the Ministry of Agriculture, Animal Industry and Fisheries, and the Ministry of Environment Protection, including some experienced staff (17 PhD and 112 MSc). In addition, there is a core of well-trained agricultural scientists at Makerere University (48 PhD, 36 MSc). This is a reasonable base to build on, but it must be pointed out that of these about 78 have not had appropriate postgraduate training for research, and a vigorous staff development program will be necessary.

A reasonably appropriate network of research stations is in place (even if they are currently far from fully operational). This is supported by suitable substations and a large number of Variety Trial Centers or equivalents.

Because of the shortcomings in the physical facilities and financial resources, the research programs being carried out are by no means the best that could be done with the trained research staff available.

Management, structure and organization. The effectiveness of the application of personnel and facilities in research depends on having an appropriate system of management. The organization and management of agricultural research is currently spread mainly among Makerere University and three Ministries: Agriculture, Animal Industry and Fisheries, and Environment Protection. Until 1 July 1988, the Ministry of Regional Cooperation had responsibilities for some of the programs and institutions of the former East-African Community. Some additional research work is also carried out in the Ministry of Industry, the Uganda Tea Authority and the Church of Uganda. Details are given in the Working Group Report.* The National Research Council has a mandate to coordinate research in the country; this will be strengthened on the imminent formation of a National Council for Science and Technology which will have a strong advisory role on all aspects of science and technology policy and application in the country.

Makerere University is a semi-autonomous institution primarily targeted on higher education, but with additional targets in research and extension. It has a collegial style of management that is very appropriate for research programming (but it is very short of operational funds to support a strong research program). It has recently established a Makerere University Agricultural Research Institute, Kabanyolo (MUARIK).

Research in the other main Government Departments and Institutes come directly under the various Ministries in a line management system that is essentially hierarchical in nature. This style of management is well

* Additional research work is carried out in the Department of Fisheries at Kajansi Experimental Station (4 research officers), the Fish Technology Laboratories (3 research officers), and part time by 35 Fisheries and Regional Fisheries Officers at sites in 4 major regions.

suited to regulatory operations, control of funds and production activities, but it is quite unsuitable for research. Research is recognized as doing best under a collegial style of management where, especially in the critical area of formulation of programs, the Director of Research is "first among equals." The Director of Research should, of course, be in direct control of administration and finance, but in the essentially uncertain nature of research, a great deal of delegation of responsibility and flexibility needs to be given to creative researchers at research station level.

In practice, at present the Director does not have effective administrative and financial control, and all researchers reported serious disruptions of research activities caused by bureaucratic delays in the release of funds, instability of funding and unexpected diversion of funds from research.

Program The immediate objective of staff and management is to determine the program of research and to carry it out. No country can carry out in one year all of the research experiments and studies to supply all of the information needed for development. For research systems with relatively limited resources, the choice of research program elements in response to national priorities for development is of crucial importance for the efficient use of resources. The systematic procedures adopted by management to determine broad priorities, long-term plans and annual programs are therefore very important for efficient research.

There are essentially three stages in formulating the research program:

- (i) determining priorities for research among major agricultural commodities and production factors
- (ii) determining the main research thrusts to reduce major constraints to productivity within high-priority commodities
- (iii) choosing the most relevant and urgent experiments and studies to be carried out within a main research thrust

The three stages involve critical decisions to be taken at three different levels of management -- national policy body, senior technical group in a research institution and at the level of researchers in a research station.

Currently, the programming procedures vary from Ministry to Ministry and among research institutes. Some procedures are good, given the limitation of funds and facilities; others are not very suitable. All could benefit by being more systematic. However, in particular, there is no central national body charged with assigning priorities and share of resources among agricultural commodities and production factors, which is a vital starting point for a national research programming process for the country.

Delivery of product The final step in the research process is the communication of conclusions from the research organization to its clients: policymakers, extension and development agencies, farmers and other producers and processors, and the scientific community. This depends primarily on close linkages with the extension services. The Working Group reported that these linkages, in general, were weak and that research stations had no clear idea about their roles in the research-extension linkage. This was due in part to a shortage of resources and to the fact that the machinery for the production of research/extension information and extension materials had broken down and the facilities in the Ministry of Agriculture destroyed. However, it was clear that there was no specific responsibility for research-extension linkage assigned to anyone within the research system.

2.2 Research Constraints to Agricultural research in Uganda

The Task Force concluded their review of the current situation in agricultural research by summarizing the main constraints to research as:

Means of research.

- (i) a substantial breakdown in existing infrastructure for research
- (ii) inadequacy of resources for the maintenance and pursuit of essential priority research in crops, animals and fisheries production
- (iii) instability of funding of agricultural research efforts
- (iv) inadequate pool of well-trained and experienced manpower

Management and program.

- (v) lack of effective coordination of national research
- (vi) inadequate mechanisms for research planning and programming
- (vii) inadequate supervision of research activities
- (viii) ineffectual mechanisms for the delivery of research results to clients (farmers, producers and development agencies)
- (ix) lack of incentives for career and human resources development in research

2.3 Rationale for Strengthening National Agricultural Research System

Means of carrying out research. There must be broad rehabilitation of the means of carrying out research to recreate the capacity of the research system to service the agricultural industry. It is not intended in this report to review in detail all the elements that need strengthening; the means (funding, staffing and distribution of stations) that affect management, organization and programming will be discussed later (Chapters 3, 6, 7). It is anticipated that the rehabilitation of the physical facilities will be supported in a separate, discrete project.

However, the broad policy consideration of the "scope" of the national agricultural research system affects all aspects of planning the strengthening of research.

Scope of research system. The scope of the NARO reflects both the demand for research to solve the range of problems of production and provide planning information, and also the supply of research capacity, finally represented by the level of investment in research that the Government considers appropriate. Many criteria must go into this assessment, but a widely used base for comparison in industry is the value of the production supported and improved by research. It is often used too in agricultural research in some commodity research stations, e.g., Coffee Research Foundation in Kenya is funded from 1% of the value of exports. The World Bank has adopted this principle in considering agricultural research funding and recommended (in 1981*) that all developing countries should immediately raise their level of national investment up to 1% of the agricultural part of the Gross Domestic Product (AGDP) and increase this to 2% by 1995.

The current level of investment for research in Uganda, estimated by the Working Group at 0.33% AGDP in 1983, is well below 1%, and even below the developing world averages of 0.69% AGDP (1970-74) and 0.94% AGDP (1980-85).

Whatever the decision of Government on the appropriate level of funding, it represents a limit for planning research activities and development of capacity. Researchers should have a reasonable minimum level of funding for research operations if their long training is to be used efficiently. The total annual investment per scientist (for his/her salary and support staff, operational funds and proportionate share of overhead and capital), together with the total level of funding, prescribes the number of researchers the system can support efficiently, and hence defines the capacity of the system.

It is clearly unrealistic and unhelpful to plan, in response to a large demand for research, for a research staff that would require a national investment rate of 1.5% AGDP, if in fact, the likely rate of investment is 0.5%.

In smaller research systems the allocation of shares of staff capacity to priority commodities becomes critically important. The "planned research capability" (or size of team and depth of research) for a commodity, class of livestock or factor is an important planning parameter that requires policy decisions and deeply affects the plans for developing the means of carrying out research (personnel, physical and financial resources).

Organization, management and programming. Agricultural research has developed steadily in a piecemeal fashion as Ministries have recognized the need for research support to their development activities. It has not necessarily developed the best organizational structure and management procedures conducive to efficient and effective research. At this stage of launching a major rehabilitation program for agricultural research, it is an appropriate time to consider how organization and management could be strengthened.

*Agricultural Research Sector Policy Paper, World Bank, 1981

Many arguments can be advanced in favor of moving to establishing a semi-autonomous national agricultural research organization (as many countries have done). It can easily accommodate a collegial style of management instead of the hierarchical style of management usually encountered in development Ministries. It can accommodate a scientific scheme of service which is more appropriate to research. While remaining fully accountable within financial rules, it has the opportunity of introducing more flexible financial procedures related to the urgencies and values of research activities and concerned with relatively small amounts of funds, rather than being stifled by the rigid bureaucratic procedures necessary to protect the use of public funds in large-scale development activities, which are not so critically sensitive to delays in operations.

It could be argued that such improvements in administrative and financial procedures could be introduced within existing Ministry structures. Experience from other countries suggests such changes are unlikely to succeed, and then only with considerable difficulty.

Moreover, there are profound advantages to be derived from a national agricultural research organization and governing Board in the all-important formulation of the national agricultural research plan and program. These advantages include the facts that

- (i) A suitably composed Board provides a national body that has the authority to interpret national development policies into national research policies, and to determine relative research priorities among competing commodities, production factors and regions that is not possible within Ministries. However, the particular development objectives of the Ministries will be effectively included in the research policy and program of NARO through the contribution of senior Ministry members of the Board.
- (ii) It can also more easily assess the importance of, and arrange for research on, farming or production systems that cover component commodities whose production development is the responsibility of different Ministries.
- (iii) Decisions on national research priorities by the Board provide the crucial starting point for the three-stage research program formulation.
- (iv) The priorities laid down by the Board provide the basis for comparison in any evaluation of performance of component research institutes in the organization.

In addition, a national agricultural research organization and Board is in the best position to reach decisions on "planned research capability" on commodities in relation to total national investment. The Board is also in a strong position to be the authoritative "voice for agricultural research" to the government and to argue the unified case for an appropriate level for investment in research to back development. A unified agricultural research organization and Board is also the most convenient institution to interact with and respond to policy guidelines from the National Council for Science and Technology.

These arguments, advanced in the Working Group report, have been appreciated by Government and agreement has been reached in principle to establish a National Agricultural Research Organization and Board as an important step towards strengthening the national agricultural research system. The following chapters set out in some detail how the new organization can be established to achieve the potential advantages and propose some of the management mechanisms needed to ensure efficient operation inside the organization and in linkages to outside bodies.

The output from the research system must be communicated clearly to its clients, especially the extension and the development services which are responsible for providing advice and recommendations to large numbers of farmers and producers. The NARO will institute strong linkage mechanisms between research and extension at several levels of management, from Commissioner level to extensionist/researcher level, so that a steady two-way flow of information is maintained. These management mechanisms are necessary whether or not research and extension are in the same Ministry. The institutes of NARO will also maintain a flexible capability to respond to urgent short-term queries from Ministries, recognizing that this is an essential service of a national research organization.

3 NATIONAL AGRICULTURAL RESEARCH ORGANIZATION

3.1 Establishment

The two previous chapters have given the background and rationale for the recommendation of Working Group 4 of the Agricultural Task Force for the establishment of a National Agricultural Research Organization (NARO) as a semi-autonomous organization to address problems in the priority areas of planning, organization and management of research for the development of the agricultural sector of Uganda's economy. This chapter addresses the process of establishment of NARO, presents a desirable organization and structure, and discusses the type and style of management that would ensure the benefits to be derived from such an organization. A draft Statute for the establishment of NARO is presented in Annex III, and a plan of action reflecting the urgency with which we believe the Government of Uganda would like to proceed with this development is given in Figure 3.2. The latter must be regarded as flexible and would depend on the time and speed of necessary Government and legislative procedures that must be brought to bear on establishing a legal and financial entity such as NARO.

Government has confirmed in principle that it is desirable to establish NARO. We have, from consultations and discussions at many levels in the national agricultural research system, been able to confirm that the establishment of NARO is feasible, widely acceptable and indeed considered urgent. Among the benefits to be derived from a well-conceived and properly administered organization, as indicated in the earlier report, are:

- (i) effective coordination of all agricultural research with more efficient utilization of human, financial and physical resources
- (ii) flexibility and effectiveness in financial and administrative procedures
- (iii) avoidance of duplication of research efforts
- (iv) improved mechanisms and procedures for effective planning and management of research
- (v) increased productivity from research scientists as a result of improved morale, working conditions and increased opportunities for intellectual activities
- (vi) improved framework for the development of mechanisms for effective linkage of research to development

It must be pointed out, however, that the mere establishment of NARO would not in itself bring about these benefits unless NARO were organized and managed as a research system with appropriate policy guidance, adequate and stable funding, and appropriate management mechanisms that would enable it to focus on development-oriented research and respond to the country's needs for improved agricultural productivity through technology development and application. The proposed structure, organization and management must therefore provide for promoting and facilitating the attainment of these benefits.

It is concluded and recommended that NARO be established as soon as possible as proposed in the Task Force Working Group 4 Report and in accordance with the Draft Statute presented in this Report (Annex III).

It is recommended that NARO should comprise the apex body of the Organization i.e., the Board and senior management of the Organization -- Director-General (DG), Deputy Directors-General (DDGs), Director, Research-Extension Liaison (DREL), and senior headquarters staff -- and the Directors and staff of the nine research institutes existing or proposed to be created in the areas of plant agriculture, agricultural production systems, animal industry, animal health, fisheries, and forestry (as follows):

- Animal Health Research Institute, Entebbe
- Fisheries Research Institute, Jinja (formerly UFFRO)
- Forestry Research Institute, Nakawa
- Highland Agricultural Research Institute, Kalengere
- Kawanda Agricultural Research Institute, Kawanda
- Namulonge Agricultural Research Institute, Namulonge
- Serere Agricultural Research Institute, Serere
- Trypanosomiasis Research Institute, Tororo (formerly UTRO)
- Animal Production Research Institute, Mbarara (to be established)

The number of research institutes, establishments, units and technical services could be increased by the Minister of Planning and Economic Development on the recommendation of the Board and in consultation with the participating Ministries as provided for under the Draft Statute. An organigram reflecting this composition is shown in Figure 3.1 and will be further discussed under structure and organization.

It is proposed that the DG, the DDGs, the DREL and the Planning and Management Unit shall constitute the senior management of the organization and provide the Technical Secretariat to the Board. This senior management team (Technical Secretariat) shall, subject to the approval of the Board, have major responsibility for researching policy, planning and evaluation requirements for NARO and for presenting these to the Board for determination. It shall assist in the development of a comprehensive research strategy to be considered and approved by the Board, and periodically carry out analyses and studies to provide the background for other Board decisions. The role of the Technical Secretariat in preparing suitable documentation for the consideration of the Board will be crucial. It would include analyses and preparation of documentation for the consideration of the Board on policy issues, priority setting, resource allocation, research capability requirements and development, manpower development and training, and all other matters within the competence of the Board. This role is particularly important in view of the fact that Board members are not full time. Their performance would therefore depend on the comprehensiveness and adequacy of the documentation presented to them as the basis of decision-making and guidance to NARO on appropriate research thrusts and emphasis.

3.2 The Board

The Board is proposed as the supreme authority of NARO with responsibilities for overall policy guidance and priority setting in relation to the economic and social policies of Government and the science and technology policy guidelines provided by the National Council for Science and Technology (NCST). It will have other responsibilities in determining and recommending financial and other resource requirements,

approving long-term research strategy and plans, ensuring the application of research findings, administering the funds and property of NARO and promoting other activities that would assure the effectiveness and efficiency of NARO as provided for under the functions of the Board.

In order to ensure that the Board and NARO are responsive and accountable to Government, to the development Ministries, development agencies, farmers and other clients in the agricultural industry, the composition of the Board proposed reflects broad representation from the public and private agricultural sector, institutions and Government including four commissioners in agriculture, animal industry, fisheries and forestry from the respective Ministries, agricultural scientists from the scientific community, the universities, the NCST; policymakers, farmers and agro-allied industries. This representation, would provide not only competence in the review and analysis of proposed agricultural research policies, priorities and programs, but also sensitivity to society's needs and opportunities for development, and overall responsiveness to national development goals and objectives.

3.3 Steps in the Establishment of NARO

It is proposed that NARO be established by the promulgation of the National Agricultural Research Organization Statute (Annex III) by the National Resistance Council, following the consideration of the draft Statute and its recommendation by the legal draftsmen and the Office of the Attorney-General.

The following steps and timing are envisaged in the process of establishment of NARO (these, as indicated earlier, must be regarded as flexible and would depend on the timing and speed of necessary Government and Council procedures):

	<u>Step</u>	<u>Authority</u>	<u>Probable Timing</u>
1	Consideration and approval of the NARO Task Force Report	Presidential Economic Council	September- December 1988
2	Finalization and recommendation of draft National Agricultural Research Statute	Planning & Economic Development & Office of the Attorney General	January- June 1989
3	Enactment & promulgation of the Statute	National Resistance Council	September 1989
4	Constitution of the National Agricultural Research Board	Minister of Planning & Eco- nomic Development	October 1989
5	Appointment of Director-General & senior management staff of NARO	Office of the President & NARB	December 1989

<u>Step</u>	<u>Authority</u>	<u>Probable Timing</u>
6 Transfer & consolidation of the Research Institutes under NARO	Office of the President, Ministries of Agriculture, Animal Industries & Fisheries, & Environment Protection	January 1990
7 Organization of NARO & initial work on planning and programming	NARB & NARO	February-April 1990
8 Preparation of first Program and Budget of NARO	NARO & NARB	March-May 1990
9 Submission of first Program & Budget of NARO to Treasury	NARB	end of May 1990
10 Beginning of operation of NARO as a legal & financial entity	Treasury, NARB & NARO	1 July 1990

The steps envisaged take into account the time-lag likely to be involved in the various considerations, the necessary consensus-building processes and the decision-making procedures of Government and its agencies. It is possible that with the greater urgency in tune with Government desire to have NARO established, these steps may be completed earlier and NARO made at least partly operational before 1 July 1990.

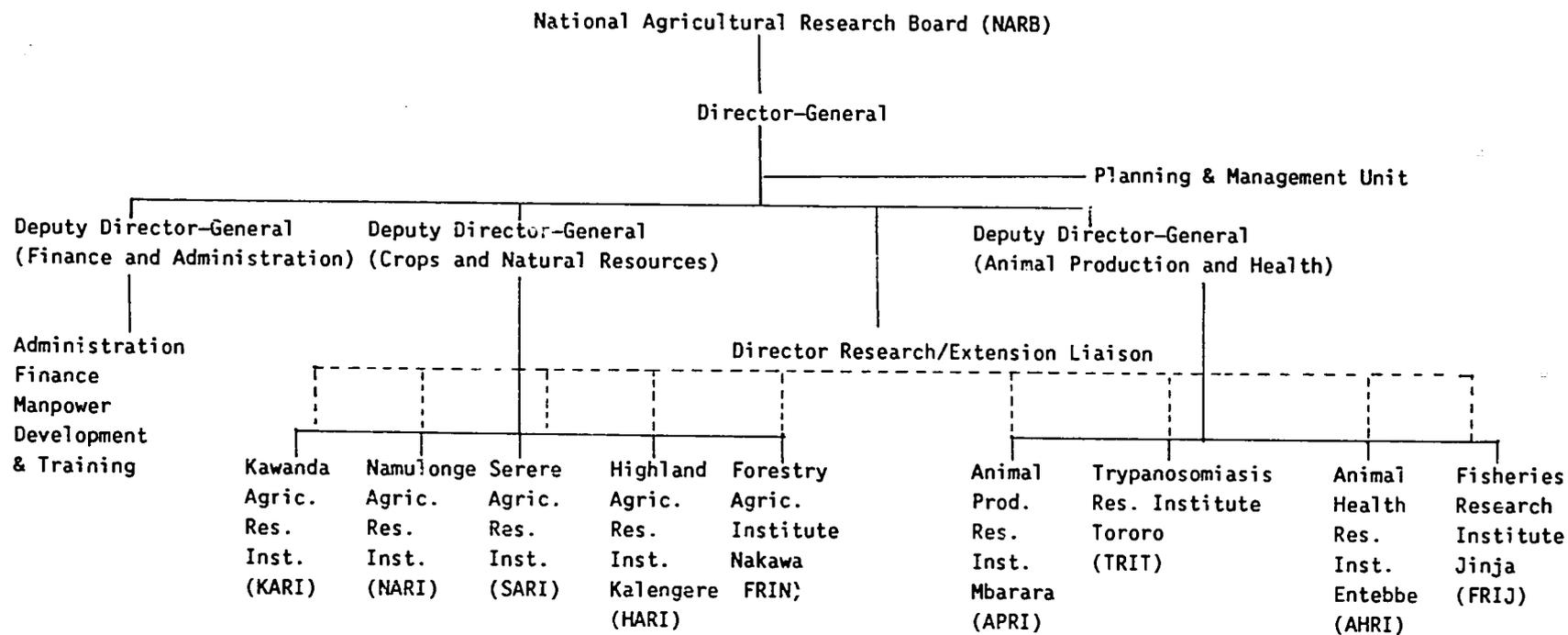
In the above circumstances, it would be necessary for some financial provision to be made for the establishment processes of NARO in the 1989/90 budget. It is therefore recommended that the Minister for Planning and Economic Development make a request to the Treasury for a single-line vote in the 1989/90 budget to provide the necessary seed money for the initial processes of establishment of NARO and the consolidation of research institutions and establishments into it.

3.4 Structure and Organization

The effectiveness and efficiency of a research organization is often a product of the structure, organization and management. It is important that the structure and organization is appropriate and that the management is oriented to the performance of the essential functions of the research organization, its expected output, and the development and sustenance of its linkages with its clientele.

The NARO Task Force endorses the proposed structure and organization in the Working Group 4 report, with some amendments to strengthen the management and analytical capacity of the apex body in the areas of planning, monitoring, and evaluation. As shown in Figure 3.1, the apex body of the organization under the Board will be headed by a Director-General, who shall be a distinguished person competent in research and research management matters.

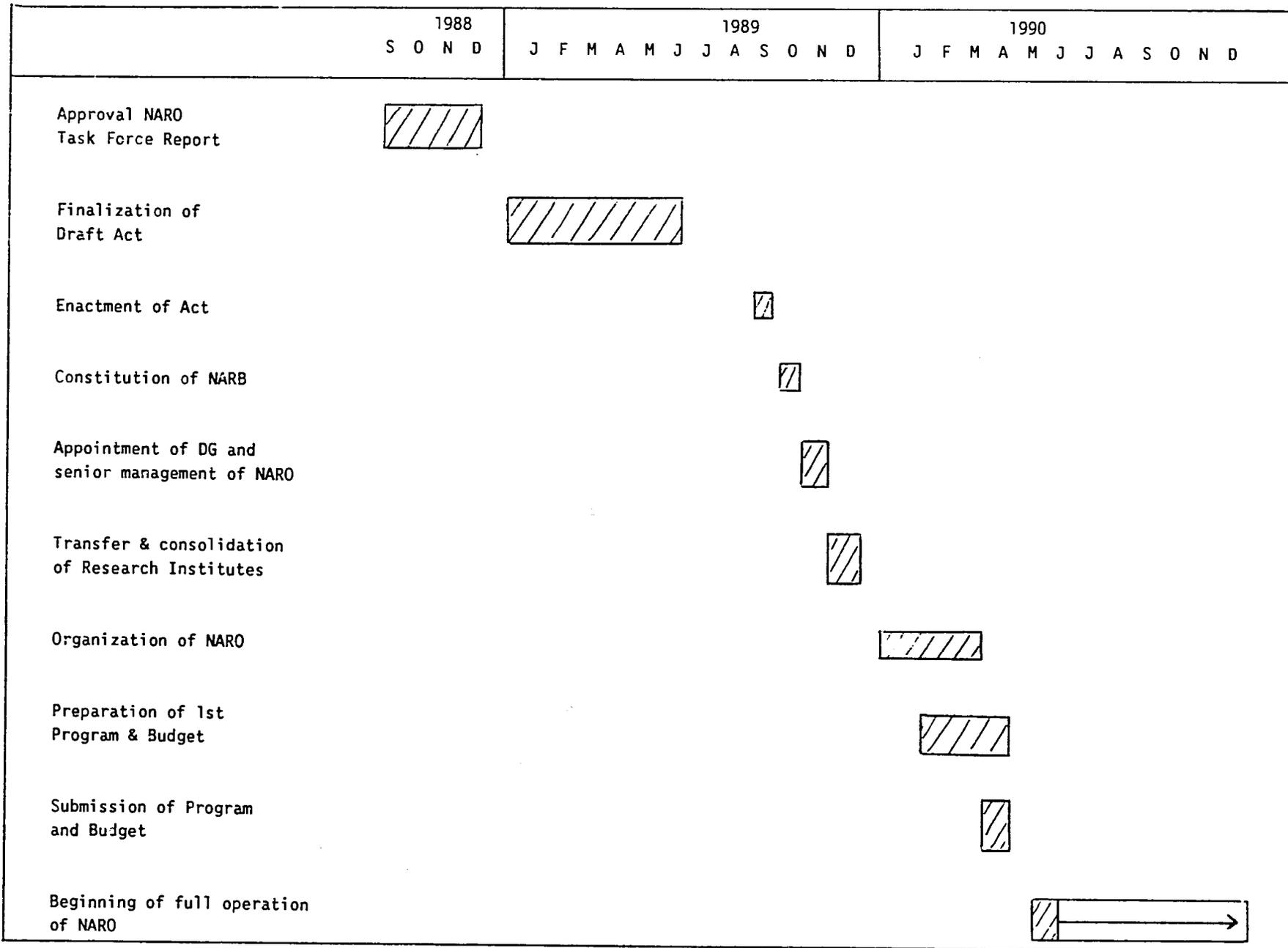
Figure 3.1 Organizational Chart for the Proposed National Research Organization (NARO)



———— Lines of Authority and Supervision

- - - - - Lines of Collaboration and Coordination

Figure 3.2 Milestone Chart of Activities for the Establishment of NARO



The Director-General will be assisted by three Deputy Directors-General for Crops and Natural Resources, Animal Production and Health (including Fisheries), Finance and Administration, and a Director of Research-Extension Liaison. These five officers and the head of the Planning and Management Unit to be responsible directly to the Director-General will constitute the Directorate of NARO and the senior management of the organization. Under their guidance, and in accordance with the policies and priorities determined by the Board, the senior management will be responsible for the organization and coordination of research in the areas of crops and natural resources and in animal production and health. The senior management will serve as a Technical Secretariat to the Board and will carry out the collection, collation and analysis of data as the basis for the deliberations of the Board in determining the agricultural research policies and priorities for the organization. This group would also ensure that the Board's decisions are appropriately communicated to the Research Institutes and are applied in the Institutes' formulation of research programs. The senior management will interact with the Directors of Research Institutes and their senior scientists in reviewing research program proposals and ensuring that these conform to the policies and priorities established by the Board and further articulated by senior management.

Two of the Deputy Directors-General will be responsible for providing policy guidance, scientific leadership and supervision for the Research Institutes under their jurisdictions. The third Deputy Director-General will be responsible for Finance and Administration and will provide financial and administrative services for the Organization and the Institutes. In addition, the third Deputy Director-General will have responsibility for Manpower Development and Training.

It is envisaged that both finance and administration would be to a certain extent decentralized to the Institutes so that once the resources are allocated to Institutes and programs, the office of the DDG (Finance and Administration) would only deal with establishing guidelines for financial procedures, collation of the Organization's budget in consultation with the Directors of Institutes and handling of the finances of the apex organization and the Board. A major responsibility of this office will be in the compilation of the accounts for auditing and in providing financial statements for management decisions. This would require some professional accounting and auditing staff, e.g., Chief Accountant, Accountants, and Internal Auditor. There would also be the need for strict adherence to acceptable and accountable standards of financial management compatible with and conducive to the functions and processes of research. On the administrative side, the DDG (Finance and Administration) will administrate services for the scheme of service and oversee all administrative matters concerning the Organization's personnel at the Headquarters and Institute levels. Personnel administration would include manpower development and training, and it is expected that some senior assistant would be provided to the DDG to develop and monitor manpower development and training plans for the organization on a continuing basis. Professional staff recruitment, deployment and promotion will be the responsibility of the Board and senior management as provided for in the Statute.

It is proposed that a Planning and Management Unit be established to assist senior management in the collection and analysis of data that both senior management and the Board would require in making important decisions on policies, priorities and resource allocations, as well as in formulating and reviewing the strategy and plans for national agricultural research. Initially, this unit would require a staff of only two senior scientists with expertise in socioeconomics and analytical capacities in technical agriculture. Such staff could be provided on secondment from the Agricultural Secretariat or the Ministry of Planning and Economic Development at the outset.

The Director, Research-Extension Liaison (DREL), will have special responsibility for ensuring close linkages with the extension, development and field services of the Ministries of Agriculture, Animal Industry and Fisheries, and Environment Protection. Details of how these responsibilities might be carried out are discussed in Chapter 8. The DREL will work closely with the Deputy Commissioners responsible for Field Services and will supervise and coordinate the work of the RELOs located at the Research Institutes. The DREL, with the guidance of the DG, will develop the general strategies for strengthening the linkages with the extension services and development agencies and supervise the development of a Communication and Information Unit to translate technical research information into suitable diffusion and training materials for the extension services and staff. The DREL will be assisted at the Headquarters by a Senior RELO and the senior staff of the Communication and Information Unit comprised of well-trained persons in the areas of

- a) communications and information
- b) crop and tree production
- c) livestock and fisheries production and health

A central library service will be required for NARO headquarters to complement the libraries maintained at the Institutes. This will hold common reference materials for the whole organization and maintain a union catalogue and cross-referencing system of holdings throughout the organization. It will also supervise and coordinate the modernization of the library service towards a computerized information retrieval system. A senior librarian at headquarters will be responsible for developing the library system and for supervising the associated documentation service.

The Research Institutes would constitute the levels at which policy and priorities set in relation to commodities, factors or classes of livestock would be translated into research and experimental programs. It is envisaged that research institutes would be relatively autonomous within the framework of the guidance provided by their mandates and Board decisions. Their principal roles, under the leadership of the Director, will be to articulate and formulate research programs that address the priorities, needs and concerns indicated by the policy and priorities determined at the apex of the organization, to execute such programs with the resources allocated, to interpret the results and conclusions, and to liaise with the extension services in the adaptation and testing of these findings within their mandate areas. These functions will only be performed efficiently if mechanisms are established for interdisciplinary interactions in the formulation of programs, at the Institute level, and in some cases in the execution of programs. Details of some of these mechanisms are discussed under Planning and Programming.

It is envisaged that the research activities of the Institutes will be by programs and projects worked out in accordance with the mandates of the research institutes and the priority guidelines of the Organization.

3.5 Mandate

The Team broadly endorses the mandates recommended for the nine research institutes in the Working Group Report of the Agricultural Services Task Force (1987) and recommends that as soon as possible the Board should deliberate on these mandates and approve or amend them in accordance with its assessment of the current and long-term requirements of the agricultural sector, the national strategy for agricultural research and in compliance with the functions proposed in the draft Statute for the establishment of NARO.

3.6 Planning and Programming of Research

Planning and programming are terms used very generally. Planning in the agricultural research system can mean arranging for the future acquisition and disposition of resources to carry out the research programs. Such planning includes manpower development, planning for a recruitment and training program, and financial and physical planning, besides planning for the research program. This section concentrates on planning the research program, and the research program is defined as the research work that is to be carried out in terms of specific experiments, studies, and activities.

Getting the research program right is crucial for the efficiency of the research system in generating the urgent information needed for accelerating agricultural development. It is worth careful attention by management to ensure that appropriate mechanisms and procedures are in place to give a good chance of reaching the best decisions on component elements of the research program.

As pointed out in Chapter 2, research program formulation requires priority decisions and review at three levels in management: at a top-level policy body, at the research organization and institute level and at research team or station level.* It should be noted that the third stage of program formulation inevitably involves a considerable degree of decentralization of decision-making. It is imperative that the sequence of procedures allows the central directorate to maintain some guidance on decisions made at Level 3.

At each stage the requirements are similar. There must be

- a group of appropriately trained and experienced personnel with authority to reach decisions
- a set of policies, and criteria based on them, to guide choices
- a flow of information to the group concerning the criteria
- some idea of at least the scope of the manpower and resources likely to be available to carry out the research work

* For more detail, see "Program Formulation in National Agricultural Research", M. Dagg and F. Haworth. ISNAR, 1988.

It is management's responsibility to see that these conditions are met in a way appropriate to achieving NARO's objectives.

3.6.1 Possible management mechanisms for program formulation in NARO

At policy level: broad priority setting. In its membership, the NARB is a very appropriate group with authority to reach decisions on research priorities and allocation of resources to major commodities, important factors of production or regions of the country. It will bring into its deliberations a full appreciation of the development and social policies of the country that research must serve.

The important criteria arising from these policies will concern the possible impact of a potential research product on the national economy and society. These criteria will depend on information concerning, the current value of the commodity, future demand for the commodity, area likely to be affected, urgency of need, distribution of benefits, etc. Other technical criteria will, however, also be involved that can seriously modify choices based only on social and economic aspects: these include the probability of research success and feasibility of application in practice.

The Board members themselves cannot collect the detailed information needed to apply the criteria to reach decisions. It is therefore vital for the Directorate of NARO to provide personnel to gather and process the required information to present to the Board. This will be a major responsibility of the Planning and Management Unit. It would be well advised to adopt a systematic approach to determining priorities.*

It is important for the Board to have a realistic idea of the likely level of funding for research and the number of research staff this will maintain efficiently. It can then allocate realistic shares of resources to commodities, factors, etc. This is the final output of the first stage of program formulation, which becomes the input to the next stage.

Senior technical level: developing a long-term strategy and research plans for Institutes. The research resource allocations to specific commodities, and factors, should be assigned by the Directorate to the Research Institutes with the appropriate mandates. They serve as guidelines for the research effort in different commodities, etc. The next step is to decide what research thrusts can be supported by the allocations to reduce the major constraints to productivity within a commodity, on a 5- to 15-year time frame. This leads to plans for staff recruitment and training, as well as for physical developments to match needed research efforts.

The Director of a Research Institute should be responsible for the decisions. An appropriate authoritative group to advise the Director would consist of the Heads of Departments in the Institute complemented by the appropriate DDG and Field Service Directors from relevant Ministries. The composite long-term plan from all the Institutes would be reviewed for overall consistency by the Organization's Directorate.

* See "Priority Setting in Agricultural Research". R.B. Contant and A. Bottomley. Working Paper No. 10, ISNAR, May, 1988.

In addition to national social and economic objectives, policies concerning scientific quality and integrity, personnel management and service to the client will be relevant at this stage. Accepting that the social and economic factors would have received due weight in decisions at Level 1, the criteria for choice at Level 2 will be mainly concerned with the probability and cost of research success and the feasibility of using the research product.

The output from the group should be a specification of main research thrusts within a commodity or system (e.g., identification of suitable tree species to raise residual soil fertility without serious reduction in intercrop productivity). This will serve as input to the next stage of programming.

Other major products from the group should be long-term plans for physical improvements necessary to staff recruitment and development, and advice to the policy Board or other planning bodies on technical prospects.

Researcher or research team level: short-term and annual research programs. The long-term plan of an Institute is heavily concerned with arranging for the means to carry out the research program in the future. Short-term programs are mainly concerned with the specific research work that will be done with current staff and facilities over a limited period of 1 to 5 years. The short-term program readily breaks down to component experiments, studies and activities, some of which can be done in the coming year in an annual program.

The essential task at this third stage of program formulation is to reach decisions on the detailed experiments and studies that will finally constitute the annual NARO program when they are aggregated with those from other teams, stations and Institutes in the country. The guidelines from the Senior Technical Group on the main research thrusts still leave wide scope for creative and imaginative choices by scientists among the hundreds of possible experiments. The critical requirement is to select the most effective, relevant and urgent experiments that should be done first, and not 5 or 10 years hence.

This is best done by an authoritative Reviewing Group that reviews individual proposals. Only in the smallest research institutions can the Director and most senior staff give detailed consideration to all research proposals. In most Research Institutes of NARO, it is probably necessary to have grass-roots, decentralized groups to carry out the careful review required. Monodisciplinary groups are appropriate if progress in a discipline is desired. But multidisciplinary groups are more appropriate if the policy target is to solve practical problems of productivity and profit for the farmer or producer.

Each reviewing group should be a "bottom-level" committee made up mainly of researchers involved in the research on a commodity, group of commodities or factor of production. A program leader or coordinator should be designated by the Director. One or two senior researchers should be included to give experienced guidance in research design. There should also be members acting on behalf of farmers and extension services. (It is usually necessary to have a proxy for farmers, and a socioeconomist would often be suitable. However, other representatives

will be needed in Institutes for a while due to the current scarcity of social scientists in the research services.)

Proposals for experiments and studies should come mainly from group members themselves and be presented for review with respect to quality and relevance. The technical quality of a proposal in terms of experimental design can be readily assessed and modified if necessary. The relevance is much more difficult and poses major questions of priority and appropriateness. Relevance reflects the urgency and usefulness of the information that the experimental data might lead to. Inevitably, the urgency and usefulness will depend on the need and judgement of the particular clients -- national planners? farmers? consumers? extension services? fellow scientists?

The criteria for guiding choices and setting priorities depend on the research policies prescribed by the Board and Directorate. The main groups of criteria still concern probability of research success and likelihood of use of the product. But here the likelihood of the farmer being able to use and profit by the product becomes very important, and the information flow to the group about the micro-situation of farmers is critical. Other criteria, at this stage alone, concern the personal satisfaction of the researcher, and management must be aware that they influence the choice and design of experiments.

The output from each Reviewing Group includes specific proposals for experiments and studies within prescribed research thrusts. They should be roughly budgeted and compatible with likely resources of personnel, facilities and funds.

Review of proposals. After the increasingly focussed planning stages, the procedure in the Reviewing Group is the first step in the subsequent review stages. Proposals approved by the Reviewing Groups are aggregated and reviewed by the Senior Technical Group of the Institute. They are checked for compatibility with the long-term research thrusts, balance of effort and fit within the likely budget. Individual projects may have to be dropped out or left in at this stage, but they are rarely modified for content or design.

The integrated NARO program should similarly be reviewed for overall balance by the NARO Directorate (DG, DDGs, DREL and Directors) before presentation to the Board for final review. It might again have to be trimmed if it is judged unbalanced with respect to the Board's priority guidelines, or if the expected funding is inadequate to meet the cost. The program approved by such a sequence can then be presented to the Government for financing and defended by the Minister and Director-General with some confidence.

In the full program formulation and review process, each group exercises both a planning and a reviewing function, but at separate times. The criteria for review are based on the criteria used, and guidelines established, in the earlier planning process. In due course, after the implementation of the program, evaluations of research progress will have to be made at each level. Again, the original criteria and guidelines play an important role in the evaluation.

Timing. The final program and budget must be ready each year in time for presentation to the Treasury. The annual reviewing sequence from Reviewing Group to Board must start at least 3 months before that deadline. However, the planning sequence in program formulation can be carried out thoroughly under less stress of time, as the discussions at Board and Senior Technical Group levels are essentially long-term, but with periodic reviews.

Budget. At the third stage of program formulation, the estimate of needed resources can be reasonably precise. Indeed, proposals should be carefully documented and costs estimated for presentation to the Reviewing Group. When finally approved, a more careful budget should be prepared in terms of staff time and operational costs. The aggregated program budgets can constitute powerful management tools at each level. If the documentation has been completed properly, this should enable a Director to know what experiments each member of staff is involved in, and to what extent, and what the total resources needed are likely to be.

It is strongly recommended that on establishment, NARO should introduce a systematic program formulation and review procedure, and require that formal "Senior Research Groups" and "Reviewing Groups" be set up in all Institutes with due authority to reach programming decisions appropriate to their levels of management. This should in time be accompanied by the introduction of a formal program budgeting system.

3.6.2 Management

One of the major improvements expected from the constitution of the research system into a semi-autonomous research organization is the introduction of a collegial style of management and improved flexibility necessary for effective and productive agricultural research. A collegial style of management, which is distinctly different from a hierarchical style of management characteristic of research in line Ministries, has the advantage of promoting collegiality and stimulating creativity and productivity among scientists. It is envisaged that the collegial style of management will be adopted in the organization and at the Institute level. This means that colleagues would plan and interact closely as colleagues, and not as superior or subordinate officers, in the articulation, formulation and execution of programs and in the review of programs and the interpretation of research findings and conclusions for the benefit of the clients of research. This management style has been demonstrated to give positive results from research and to promote a stimulating and productive research environment. It is a style of management that requires self-discipline and considerable awareness of accountability to clients, but we see no reason why Uganda's scientists cannot respond to this style and be as increasingly productive as their counterparts in other parts of both the developed and developing world.

It is appreciated that research management requires skills and attitudes that are not necessarily taught or acquired in postgraduate education. Research managers can acquire these skills through training and experience and by the process of learning on the job. It is important that special attention be given to the training of research managers in NARO as soon as possible after the establishment of the organization, and that provision be made for continual training and exposure of senior and middle-level managers to research management methodologies and tools.

Such training and exposure will be crucial to the elements of the research process such as planning, priority setting, programming, resource allocation and management, budgeting, monitoring and evaluation, and linkage development which must form the backbone of improved management in the new organization.

It is recommended that research managers in the system be encouraged and funded to undertake international and regional training in research management. In addition, the assistance of ISNAR, whose mandate is in the specific area of agricultural research management, should be sought for the organization and delivery of in-country research management workshops in the first few years following the establishment of NARO.

3.7 Relationships of NARO and Its Board to the NCST

The NCST is Uganda's major institution for advice to Government on the formulation and coordination of a national policy in all fields of science and technology. Its functions in the promotion and development of indigenous science and technology, the preparation of science and technology plans, the organization and training of science and technology manpower, and in the carrying out of scientific and technological research and development bring NARO and its Board firmly under the NCST. In other words, NARB will be one of the boards through which the NCST will execute and promote scientific and technological research and development as they affect the agricultural sector. NCST will, as provided for in its draft Act, provide broad guidelines on science and technology policies and NARB will be expected to translate those broad guidelines and policies into specific agricultural research policies and priorities and to organize research to address the priority problems of the agricultural sector through NARO. NARO will be the operational arm of the Board and will, through its headquarters and research institutes plan, organize and manage research for the benefit of the development Ministries, the development agencies, farmers, producers and processors and other clients of agricultural research. In operational terms, it is recommended that the NCST be represented by its Executive Secretary on the Board of NARO, and the NCST would be able to draw on the senior management and scientists of NARO to serve on such committees as the Agricultural Sciences Committee, the Natural Sciences Committee, and the Livestock and Veterinary Sciences Committee. NARO will keep the NCST fully informed of its interpretation of the broad science and technology policies regarding research policies and strategy for development-oriented agricultural research through its periodic preparation and review of strategy and plans for agricultural research.

It is expected that the NARB will be one of the first Boards to be created under the NCST umbrella. Other Boards likely to be created may include those for Medical Research, Industrial Research, Social and Economic Research and others. The draft Act for NARO will hopefully provide a useful basis for the consideration and elaboration of similar Statutes for other research boards.

The relationships indicated here are similar to the useful relationships that have evolved and are evolving in other developing countries with similar requirements for broad science and technology policies and specific agricultural research strategies and programs. This, for example, is broadly how the NCST Kenya relates to the Kenya Agricultural Research Institute, which is the equivalent of NARO, and

similar relationships, with salutary effects, exist between national science bodies and agricultural research councils and institutions in Zimbabwe, Zambia and many other countries in West Africa, Asia and Latin America.

4 NATIONAL AGRICULTURAL RESEARCH BOARD

4.1 Introduction

The National Agricultural Research Board (NARB), which is to be constituted under the proposed Agricultural Research Statute, will be the supreme agricultural research policy body of NARO. Its main function will be to determine agricultural research policies and priorities in relation to the economic and social policies of Government and the policy guidelines provided by the National Council for Science and Technology. In this role, the Board will provide guidance to NARO and its component research institutes in interpreting Government policies and development objectives into research programs that through their findings, will address the priority problems of agricultural productivity and development.

4.2 Composition

In order to ensure that the Board is able to perform the functions envisaged for it in a comprehensive and balanced way, it has been recommended that the membership of the Board reflect the major areas of agricultural activities that require services from and derive benefits from the products of agricultural research. It would thus be possible for the Board to reflect the policies and priorities of Government, its development agencies, the public and private sectors of agricultural development and the client communities. The Board's role in promoting the development objectives of the nation and the social and economic policies of Government through research and the application of research findings will find expression in the guidelines it gives to the senior management of NARO and the research institutes.

In furtherance of these objectives, it has been recommended that the Board include the Minister of Agriculture, Minister of Animal Industry and Fisheries, and the Minister of Environment Protection, with the Chairmanship rotating among them biannually, and other members to be appointed by the Minister of Planning and Economic Development as follows:

- four Commissioners representing agriculture, animal industry, fisheries and forestry
- one Commissioner representing the Ministry of Cooperatives and Marketing
- one distinguished scientist on the recommendation of the NCST
- the Deans of the Faculties of Agriculture/Forestry and Veterinary Medicine, Makerere University
- a farmers' representative
- one senior representative of the Ministry of Planning and Economic Development
- the Executive Secretary of the National Council for Science and Technology
- one representative of agro-allied industries
- Director of the Agricultural Secretariat

- Director of Medical Services (in view of the inclusion of human trypanosomiasis)
- Director-General of NARO (ex-officio)

This broad representation would be able to reinforce itself by exercising the powers to appoint two other persons as considered appropriate to a total membership of 20.

The composition, therefore, adequately reflects inputs from the relevant Ministries, the University, the scientific community, the policymakers and the clients of research in farming, forestry, fisheries and the agricultural and agro-allied industries.

It is provided that the Chairmanship of the Board shall rotate every two years among the Ministers of Agriculture, Animal Industry and Fisheries, and Environment Protection as key parent Ministries, but in view of the need to have Board matters channelled to Government, the Treasury, and other policymakers through one focal point, it is recommended that the Minister of Planning and Economic Development should provide this focal point.

4.3 Duties and Responsibilities

The duties and responsibilities of the Board are detailed under the functions of the Board in the draft Statute, Annex III. They are only summarized here.

As a legal entity to be established by a Statute enacted by Government, the Board is expected to advise the Government on the policies, priorities and requirements of agricultural research and to relate these policies and priorities to the economic and social development objectives of Government and the nation. In carrying out these duties, the Board will be expected to pay special attention to obtaining, through Government and other appropriate sources, the financial and other resources required for the implementation of the national agricultural research strategy and plans, to administer the property and funds of NARO, and to ensure the application of research findings of NARO and its component institutes for the development of agriculture in Uganda.

It is important to point out that the Board will not be expected to involve itself in the management of NARO and the Institutes. Its influence on these operational arms of the organization will be in terms of the guidance which it will provide through and in consultation with the senior management of the organization to the priorities and programs of the Institutes. Such guidance will be expected to come from the Board's articulation of and deliberations on the national research strategy, the long-term plans for research and the periodic evaluation of ongoing research in relation to the set goals and objectives.

In practice, and in view of the part-time nature of the Board's responsibilities, the extent and depth to which the Board would be able to analyze issues and offer direction and guidance to the organization would depend largely on the analytic depth of the materials placed before it for decision. The preparation of these materials will be the responsibility of the senior management of NARO headquarters in consultation with the directors of institutes.

The Director-General as the chief executive of NARO, in addition to being responsible to the Board for the day-to-day management of the organization will have a major role in the periodic preparation and collation of materials for the Board's decisions. In effect, the DG will be the head of the Technical Secretariat to be provided by the senior management of NARO and the Planning and Management Unit at headquarters. Although the deliberations of the Board would not be restricted to technical and policy matters, these will constitute their most important inputs into direction and overall management of research. The Board will, of course, be expected to deliberate on administrative matters such as appointments, promotions, conditions of service and related matters in accordance to the duties and powers assigned to it under the Statute. The initial efforts of the Board in this regard will be in the drawing up of a scheme of service and the establishment of guidelines and procedures for the evaluation of staff performance and the application of reward systems.

The Deputy Directors-General and the Director of Research-Extension Liaison will assist the Director-General in the overall management of the organization and in the particular areas of their responsibilities: Finance and Administration, Crops and Natural Resources Research, and Animal Production and Health Research.

The Board may, as required, delegate its duties and responsibilities to the Director-General and the senior management of NARO for the smooth operation of the organization, but on the whole, the Board will be the final authority on all organization matters as provided for in the Statute establishing NARB and NARO.

5 NARO HEADQUARTERS

5.1 Introduction

The establishment of NARO as a semi-autonomous research organization with facilities for the overall organization, direction and coordination of agricultural research will require the identification and installation of a headquarters. The headquarters will house the Directorate area of the organization comprising the DG, the DDGs, the DREL, senior staff of associated central units and the support staff necessary for the discharge of the functions of the Directorate and the units. The headquarters is essential as a focal point for the organization's relations to policymakers, the NCST, the research institutes and the clientele of agricultural research. It is also desirable that the headquarters of NARO have its own clear identity as the apex organization to which all the institutes and associated units will have equal access and a sense of belonging.

The headquarters should provide facilities for the performance of the functions of the Board, its committees and the senior management of the organization. It should also give flexible support to the research institutes and other related bodies. Such facilities will include those for meetings, conferences, planning, technical and economic analysis, library, communication, information and documentation, and financial and administrative management. In other words, the headquarters will be the hub of the organization and a meeting point for the planners, executors and users of the research efforts.

This chapter discusses where the headquarters should be located, what size of building will be required to accommodate the proposed headquarters staff and facilities, and the general physical requirements.

5.2 Location

The NARO Task Force, in deliberating on the location of the headquarters, considered the need for it to be centrally located in relation to its component units and to the various government and public agencies to which it should intimately relate. In particular, it was considered necessary that its location facilitate easy access to the Ministries of Agriculture, Animal Industry and Fisheries, Environment Protection, Planning and Economic Development, the National Council for Science and Technology, Makerere University and major representatives of the international donor, technical assistance, scientific and development communities. Other desirable features would be good communications (telephone and telex facilities, access to airport, good public transport and availability of public amenities such as hospital, schools and banks).

Based on the above considerations, it was almost inevitable that the Task Force would propose that the NARO headquarters be located in Kampala or in any suitable place within 10 km of the city center.

In the initial stages of the establishment of NARO, it is expected that the headquarters will have to be set up in hired premises. But it was considered very desirable that the headquarters should be housed as soon as possible in its own permanent building. Possible building sites on Government-owned land were, therefore, considered, but no consultations with Government authorities concerned with town planning have yet been made.

One possible location is at Nakawa, on the large piece of land adjacent to the Forestry Research Institute. Other sites considered were Namanve on the Kampala-Jinja Road, and near Lubowa Estates about 8 km on the Kampala-Entebbe Road.

5.3 Headquarters Staff

It is proposed in Chapter 3 that the permanent staff at headquarters will include

- 17 Senior staff
- 5 Directorate staff: DG, 3 DDGs and DREL
- 3 Accounting staff: Chief Accountant, Accountant and Internal Auditor
- 2 Administrative staff: Senior Administrative Officer and Administrative Officer
- 1 Senior RELO
- 1 Senior librarian
- 3 in the Communication and Information Unit
- 2 in the Planning and Management Unit

The total supporting intermediate and junior staff will amount to 60 persons, including staff for accounting, personnel administration, data processing for planning, printing and documentation, secretarial support, drivers, cleaners and general maintenance.

The headquarters will also provide facilities for Board meetings and conferences and for other temporary visiting scientists.

5.4 Building

The headquarters accommodation will, therefore, have to provide office space for the 5 Directorate staff, their personal secretaries, and other senior staff; a Board room that can also serve as a room for small conferences or workshops, with committee or seminar room; the accounts section; general typing pool; rooms for the supporting staff of the Planning and Management Unit and the Communications and Information Unit, including a library and documentation center, printing sections and some storage space. If headquarters are located in a single new building, space should be provided for a canteen, room for visitors, standard services, reception and general circulation. In addition, a workshop and vehicle parking space would be required.

Approximate space requirements would be about 1500 m², made up as follows:

-- 17 Senior staff at an average of 16 m ²	272 m ²
-- 30 Intermediate staff at 8 m ²	240 m ²
-- 30 Junior staff at 4 m ²	120 m ²
-- 4 Visitor's rooms at 16 m ²	64 m ²
-- 1 Board/Conference room 112 m ²	112 m ²
-- 2 Committee rooms at 30 m ²	60 m ²
-- 1 Library and Documentation Center	80 m ²
-- 1 Printing room/storage	40 m ²
-- Storage	80 m ²
-- Workshop	40 m ²
-- Contingency	60 m ²
-- Circulation, reception, toilets at 22%	270 m ²
-- Total	1,498 m ²

At the current costs for office buildings of Ush. 87,000 per m², the estimated cost of accommodating NARO headquarters in one specially built facility would be about Ush. 130 million (US \$870,000). Furnishings and equipment to a standard appropriate for the effective operation of the central organization of NARO would probably require an additional US \$480,000.

5.5 Other Physical and Operational Requirements

Land. A single 3-storey building and car park would require a minimum of about 0.5 ha, but it would be desirable to acquire at least 1 ha to allow for possible expansion in the future and for other related facilities such as a guest house.

It is also proposed that NARO should acquire land and construct at least five residential units for the most senior executive officers, and preferably for all 16 senior headquarters staff. In the interim, it is recommended that Government should allocate housing from its existing stock of houses for public servants.

Communications. NARO headquarters should be served by at least a number of general telephone lines through a switchboard, with some direct lines to the Directorate staff at headquarters. There should also be telex facilities and an internal communication system.

Transport. The DG, DDGs and DREL will be expected to travel widely between headquarters, the Research Institutes and field research stations. A staff car and one 4-wheel-drive field vehicle will be required by the DG, one staff car each for the DDGs and DREL, and a pool of three field vehicles to be shared by all senior staff. Two staff minibuses and one lorry, for handling large loads, would complete the transport pool.

Furniture and office equipment. Appropriate standard office furniture and equipment would be required. However, the main offices should be equipped with word processors (6) and photocopiers (4), and at least 3 computers, complete with voltage stabilizers, should be allocated to the Planning and Management Unit, the DDG (F/A), and to the other DDGs. The Board/Conference room should be well-equipped with overhead and slide projectors and a public address system. Special illustration and printing equipment will be needed in the Communications and Information Unit, and a computerized library and documentation service.

Water and power supplies. It is strongly recommended that a stand-by generator and a large water reservoir be installed at the NARO headquarters to ensure uninterrupted operations.

6 MANPOWER DEVELOPMENT FOR NARO

6.1 Introduction

Human resource development is a crucial long-term investment of a profound nature in research. The quality and relevance of agricultural research is known to depend largely on the quality of the research personnel, the resources available for them to carry out sharply focused, client-oriented research and the overall environment for research operations. Over the last 10 years in Uganda, the calibre of highly trained manpower in agricultural research developed in the '60s and early '70s has been substantially reduced and training for replacement has not kept pace.

The Working Group Report 4 showed that about 51% of the professional staff in agricultural research hold only first degrees in agriculture or science. Since most of the fundamental training in agricultural research skills takes place in postgraduate education, about half of the manpower as of 1987 was considered inadequately trained for the research functions assigned to them. The analysis of the research situation emphasized the fact that lack of adequately trained manpower had become a major constraint in the planning, organization, execution and management of priority research programs, and that isolation of the research system from the world scientific community had substantially reduced the productivity of the research staff.

6.2 Current Training Efforts

Uganda, with the assistance of USAID, has addressed these constraints through a two-phased Manpower for Agricultural Development Project (MFAD) (The Ohio State University/USAID/Uganda). The strategy in the first phase has been to emphasize short-term training of established research staff of the Ministry of Agriculture and the Faculty of Agriculture, Makerere University. During that phase about 65 Ministry and Faculty staff received updated training and retraining which redressed the constraint of isolation and acquainted about one-third of the staff with recent scientific developments in their field. This effort has helped to rebuild the confidence of staff and reestablished some essential linkages with knowledge systems. The second five-year period of the MFAD Project will emphasize long-term degree training (MSc and PhD) as part of the strategy to increase the pool of well-trained and competent research personnel in the national research system. The significance of the MFAD Project is the fact that it seeks to build a self-sustaining research capacity in the country by

- (i) training scientific research personnel for both the public-sector research service and the University
- (ii) building the capacity of Makerere University in in-country postgraduate training and therefore in long-term agricultural research manpower development for the country
- (iii) promoting the involvement of postgraduate education in the current research problems of the country
- (iv) promoting close collaboration between the University and the rest of the research system in addressing the priority problems of agricultural production

The first set of trainees under the MFAD Project (2nd phase) is expected to leave for overseas training in September 1988. Over the five-year period (1988-1993), a total of 14 MSc and 22 PhD candidates will be trained overseas, and 35 MSc candidates will be trained locally at Makerere University. Table 6.1 gives the numbers to be trained for Makerere University and the Ministry of Agriculture.

Table 6.1 MFAD Schedule of Training Assistance to Uganda's National Agricultural Research System 1988-1993

	<u>Degree</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>Total</u>
Makerere Univ. (Overseas)	PhD	6	6				12
	MSc	2	2				4
Ministry of Agriculture (Overseas)	PhD	3	4	3			10
	MSc	6	4				10
Makerere Univ. (Uganda)	MSc		8	2	2		12
Ministry of Agriculture (Uganda)	MSc		3	7	7	6	23
		—	—	—	—	—	—
TOTAL		17	27	12	9	6	71

It is anticipated that by 1993, the MFAD Project will have contributed a total of 71 well-trained research personnel to the national research system in fields such as agricultural economics, agricultural engineering, soil science, plant breeding and genetics, crop science, agricultural extension education, plant pathology, entomology and animal science. A special feature of the overseas training is the provision for candidates to combine overseas course work with thesis research in Uganda for their degree requirements. While this provision is somewhat expensive in terms of travel and supervision arrangements, it is most imaginative and appropriate, provides opportunity for the postgraduate research work to contribute directly to the solution of real problems in the country, and makes it easier to reintegrate trainees in the national research system on completion of their training.

The MFAD Training Project, at the rate of \$23,440 per year for overseas training and (\$1,333) per year for in-country training, represents a substantial investment in manpower development in Uganda. It should be regarded as a major contribution to the quantity and quality of staff in NARO and a foundation on which NARO must build in the future.

6.3 NARO Staff Development and Training

The current research senior and intermediate manpower situation in the national agricultural research system is summarized in Table 6.2, which represents an update on the manpower situation in 1987 (Working Group Report). The data presented in Table 6.2 show an improvement in the ratio of inadequately trained (BSc holders) to adequately trained (MSc and PhD holders) manpower. This is due partly to the inclusion of a large number of highly trained individuals (84) from Makerere University and partly to the return of some MSc trainees to the Ministries of Agriculture, Animal Industry and Fisheries, and Environment Protection. Despite this apparent improvement in the quality of agricultural research staff, a backlog of 78 holders of the BSc degree remain to be trained. It can be assumed from Table 6.1 that 43 of these will be trained under the NARO component of manpower development in the MFAD Project. The balance of 35 (plus 7 holders of postgraduate diplomas, who may wish to pursue further research-oriented training, and the net additions to the staff of NARO from recruitments following the organization of NARO and the institution of its programs) should be trained in accordance with the recommended schedule of 10 MSc and 2 to 5 PhD candidates per year in the period between 1988 and 1993, as recommended in the Working Group Report and pending the preparation of a medium to long-term manpower development plan for NARO. It is recommended that the preparation of this manpower plan should receive top priority as soon as NARO settles down and works out its long-term strategic plan for agricultural research in Uganda.

In the meantime, additional assistance should be sought from other donor sources to finance the extra training required to complement the training of professional staff being offered under the MFAD Project.

There is also the need to make adequate provisions for the training of research support staff over the period 1988-1993. The total of 416 research support staff in the institutions to constitute NARO, of whom about 50% would require some additional training or retraining, suggests that perhaps an increased rate of training at this level should be envisaged. The Working Group suggests the training of 5 per year from 1988-1992 as an interim measure. In view of the fact that this would take several years to train this essential cadre, perhaps this rate should be increased to 10-15 per year, and the necessary funding sought to give these staff short- to medium-term training as required at the IARCs and other appropriate national and regional institutions. Manpower training at this level should constitute an integral part of the training plan recommended for NARO.

6.4 NARO staffing

The total number of professional research staff of institutions which would constitute NARO currently stands at 214. Of these, about 85 are likely to pursue higher level research-oriented training in the next few years. It is not possible to estimate accurately the numbers of additional staff that would be recruited into NARO over the next five to ten years until NARO's programs of research have been worked out and the medium-term research strategy determined. The exercise which is likely to involve some rationalization, coordination, and long-term planning will have a profound influence on both the numbers and discipline distribution of staff, and should logically be the basis for staff projections in the medium to long term. In the interim, and based on the fact that there will be 9 institutes constituting NARO, an estimated average net addition

Table 6.2 Manpower Situation in Uganda's National Agricultural Research System (August 1988)

Research Station/Institute	Research Scientists					Research Support Staff		
	BSc	Postgrad Diploma	MSc	PhD	Subtotal	Technologists/Technician/SubTotal		
						AAO	AAs	
1. Kawanda - Agriculture	22	1	26	3	52	21	47	68
2. Namulonge - Agriculture	16		12	3	31	6	30	36
3. Serere - Agriculture	11		14	2	27	25	74	99
4. Kachwekano - Highland Agriculture	1		1		2	1	4	5
5. Mbarara - Animal Production	5				5	3		3
6. Entebbe - Animal Health	4	2	12	2	20	16	53	69
7. Tororo - Trypanosomiasis	11		8	3	22	7	23	30
8. Nakawa - Forestry	4	2	20		26			83
9. Jinja - Fisheries	4		16	2	22		6	16
10. Entebbe & Kajansi - Dept. of Fisheries		2	3	2	7			7
Subtotal	78	7	112	17	214			416
<u>Makerere University</u> (Agricultural & Veterinary Faculties)			36	48	84		29	29
Total	78	7	148	65	298	79	276	445

of 2 scientists per institute per year (18 scientists per year for NARO), would mean that about 90 scientists would be added to NARO by the year 1993, bringing the total number of staff to about 300 scientists, i.e. a 42% increase over a period of 5 years. This is probably a conservative estimate for a young, growing organization and should be regarded purely as an indicative figure which will be superseded by a properly developed manpower plan, based on institutional and program requirements, and the consideration of constrained demand and supply of professional staff in the short to medium term in Uganda.

Assuming the levels of net additions indicated above, it would be necessary to make provisions for the training of professional research staff at an additional rate of 18 per year, starting from 1989. This would increase the investment in training by about 80% per year in the first five years, and perhaps until a well-worked-out manpower development plan is produced and implemented.

A probable schedule of recruitment and training that takes these indicative figures of new additions would be as follows:

	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>Total</u>
Total No. of NARO staff	214	232	250	268	286	
Net addition (indicative)	18	18	18	18	18	90
No. to be trained	19	28	28	28	28	131

6.5 Conditions of Service

Planned investments in manpower development for agricultural research, the organization and equipping of research institutes and the provision of improved research facilities will not in themselves bring about a productive and effective research system. It is important that the conditions of service and the overall research environment should be conducive to improved productivity through the attraction and retention of stable research staff.

In Uganda, the conditions of service for agricultural research staff have not been as competitive as they should be in a nation that seeks to strengthen its economy through technology-based agricultural growth and development. The result is that a large number of qualified staff have, in the last 10 years, drifted from public-sector agricultural research to other institutions inside and outside the country, making it difficult for agricultural research to have the necessary quality and experience profile for staff. While the conditions of service in public-sector agricultural research may not be as competitive as in the private sector, they should be such as to attract and retain well-trained scientists of the calibre, training and experience required for productive research. In the case of Uganda, they should be at least comparable with conditions of service in such public institutions as the universities, certain parastatals and government agencies, where the training requirements are similar and emphasis is on performance and productivity.

The present scheme of service is not oriented to scientific research. It does not provide for scientific research career development and does not explicitly recognize and reward research performance and productivity. Based on the civil-service personnel classification, it does not provide a career structure suited to creative scientific research, and advancement is largely based on years of service and availability of established posts. Irrespective of performance, an individual may require 25 to 30 years to reach the level of Principal Research Officer, and progress beyond this point would depend on the availability of Director positions, which at present are limited to seven in the entire service (and probably nine in the reorganized NARO). This is clearly undesirable and counterproductive.

It is considered important and recommended that a scientific scheme of service that would provide for promotions and advancement based on merit and performance be introduced in NARO. Similar schemes of service have been adopted in countries like Kenya, Zimbabwe, Nigeria, Cameroon, Indonesia, India, Thailand and other Asian and Latin American countries. The main feature of such a scheme is to recognize and reward research performance based on the quality and relevance of research output and to provide for advancement in careers without diversion to limited management positions in the research service.

It will be the responsibility of the Board of NARO to evolve such a scientific scheme of service for NARO scientists and other staff in consultation with the Public Service Commission (PSC) and the NCST. It is suggested that such a scheme of service might take into account the following provisional outline of likely career progressions corresponding with income and experience profiles of research staff spread over a period of 20 to 25 years of service, as in Table 6.3.

A similar scheme of service with likely career progressions should also be developed for the Research Support Staff (technologists, technicians, assistant agricultural/livestock/fisheries/forestry officers and assistants). Table 6.4 provides for a similar career progression for research support staff over a period of 20 to 25 years.

These tables are provided basically as a guide for a detailed exercise on task analysis, job description, and required remuneration and reward systems and levels to be undertaken by the NARO Board when it is formally constituted. They draw heavily on equivalent grades requiring similar training and experience profiles in the university.

In addition, it should be noted that there may be the need for up to 10% supplementation applicable to professional institutions to be considered and applied to the salary levels indicated.

The overall research environment must make provision for other non salary benefits and perquisites to ensure the attraction and retention of qualified staff. These would include good physical facilities and living conditions, reasonable allowances, transportation, opportunities for training and professional development, opportunities to participate at national and international workshops, seminars and conferences, and other reward elements. Attention to these and other matters by the NARB should go a long way in building and maintaining a viable and stable research service in Uganda.

Table 6.3 Proposed Provisional Grading and Salary Structure for Researchers
(NARO, 1988)

Years employed	Recommended Salary Grade (Ush)	Recommended Entry points	University equivalent
1	57,361	Scientific Officer	Graduate Assistant
2	58,472		
3	59,583		
4	61,805	Research Officer II	Assistant Lecturer
5	62,916		
6	64,027		
7	66,249	Research Officer I	Assistant Lecturer
8	67,360		
9	68,471		
10	70,693	Senior Research Officer	Lecturer
11	71,804		
12	72,915		
13	74,026		
14	77,359	Principal Research Officer	Senior Lecturer
15	78,470		
16	79,581		
17	80,692		
18	81,803		
19	84,025	Senior Principal Research Officer/ Deputy Director	Senior Lecturer
20	84,577		
21	85,129		
22	85,681		
23	87,358	Chief Research Officer/Director	Associate Professor
24	88,469		
25	89,580	Deputy Director-General	Professor
26	90,691		
27	91,802	Director-General	Professor

Table 6.4 Proposed Provisional Grading and Salary Structure for Research Support Staff (NARO, 1988)

Years Employed	Recommended Grade (Ush)	Recommended Entry Points	University equivalent
1	40,800	Assistant Technician	Assistant Technician
2	42,720		
3	44,650		
4	46,560	Technician II	Technician
5	47,520		
6	48,480		
7	49,584	Technician I	Technician
8	51,806		
9	54,028		
10	56,250		
11	58,472	Senior Technician	Senior Technician
12	60,694		
13	62,916		
14	65,138		
15	67,360	Principal Technician	Principal Technician
16	68,471		
17	70,693		
18	71,804		
19	72,915	Senior Principal Technician	Principal Technician
20	74,026		
21	75,137		
22	76,248	Chief Technician	Chief Technician
23	77,359		
24	78,470		
25	80,692		

7 FUNDING OF AGRICULTURAL RESEARCH

7.1 Funding

Funding has been identified as a major constraint to the planning, execution and management of agricultural research in Uganda (Working Group 4 Report, 1987). It is therefore important that this issue be addressed comprehensively in an attempt to strengthen agricultural research and its capacity to produce and deliver outputs that would have major influences in increasing and improving productivity in agriculture.

The funding of agricultural research, particularly in the developing countries has many important facets. These include overall adequacy, stability, consistency, timeliness and rate of release, proportion of local to foreign exchange currency, and operational expenditure procedures. These facets need to be addressed through planning and management mechanisms that must recognize the nature of agricultural research and ensure that expenditures are made flexibly and in a timely fashion to facilitate the experimental and testing procedures crucial to the output of research.

Overall adequacy of funding refers to the need for funding to be adequate for the scope of research envisaged. This includes adequate funds for the payment of personnel (salaries, benefits and allowances), their operations (field and laboratory experiments, travel and transportation, results and information processing and dissemination, etc.) and the maintenance and improvement of the basic infrastructure and equipment for research. In other words, funding should be adequate to keep the available manpower in an active and productive state to generate the expected output from research. Operational cost per scientist is often a suitable parameter for determining the adequacy of funding, and the calculation of these costs should take into account the partial dependence of research on essential supplies that have a foreign exchange component. In general, operational costs per scientist vary from very low to high in some developing countries (\$4,000 - \$20,000 per year) but should at least be of the order of \$10,000 per year per scientist. In Uganda, the operational costs per scientist in terms of the actual release of funds must be very low.

Overall adequacy of funding must also relate to the level of investment in agricultural research considered as appropriate in relation to the value of production supported by and improved by research. This latter is often measured in terms of the agriculture-generated part of the Gross Domestic Product (AGDP). Following a series of studies by a number of international agencies, it has been recommended (World Bank, 1981)* that developing countries should allocate 1% of their AGDP to agricultural research and that by 1995 this should be increased to 2% of the AGDP. These levels of investment are regarded as essential if agricultural research is to make a meaningful contribution to agricultural production and improvement. Indeed, many of the developed countries with strong and productive agricultural sectors invest between 2% and 4% of their AGDP in research, and in some cases, these levels are further supplemented by research investments of equivalent or higher order in the private sector.

*Agricultural Research Sector Policy Paper, World Bank, 1981.

The Working Group of the Agricultural Task Force (1987), from estimated data obtained from the Ministry of Planning and Economic Development, indicated that, in Uganda, only about 0.33% of the AGDP is allocated to agricultural research but pointed out that in recent years, fairly high proportions of these approved budget figures were not released. This level of investment is far below the level required to stimulate improvement of agriculture through research and far below the levels of 0.69% to 0.94% of AGDP recorded for 52 developing countries in the period 1970-1985 (see ISNAR Annual Report, 1987). The Working Group recommended that this level of investment be immediately increased to 0.5% in 1988 and then progressively increased by 0.1% each year for the next five years to reach 1% AGDP by 1993. This level of investment will make the existing staff and institutions more operational and productive and able to respond to the needs of agricultural development Ministries and agencies in this period of economic recovery. The present situation, whereby research personnel and institutions are maintained without adequate resources to operate leaves much to be desired and reduces the impact and efficiency of the research system. The NARO Task Force was not able to ascertain the extent to which this recommended reform has been adopted. It is therefore reaffirmed that this step needs to be undertaken urgently to establish the Government's commitment to the strengthening of agricultural research as part of its strategy for agricultural and economic recovery.

Stability in funding is another feature that must be ensured if research is to continue to be productive and responsive to development. Agricultural research by its very nature is medium to long term and must be supported through the various stages of problem diagnosis, technology development and generation, and technology testing and application. This means that research must have access to stable, and not fluctuating or erratic, funding during this period. Much of the ineffectiveness of research is due to erratic funding that makes it impossible for experiments and studies in improved technologies to be followed through to viable conclusions, adaptation and application. It is important that from a reasonable baseline of funding, annual allocations should not fluctuate violently and should be related to priority research programs with clear objectives and goals. This means that a reasonable consistency of funding should always be maintained once programs are articulated and approved.

Funding of agricultural research must respond to the timeliness required for biological and technical research. Research in agriculture cannot logically be funded by monthly or quarterly releases of funds, since agricultural operations and field experimentation needs are dictated by crop and livestock production cycles and agricultural calendars. It is for example, important that funds be available to cope with land preparation, planting, and crop and livestock maintenance operations as required, rather than on a monthly or quarterly basis which bears no relation to operational needs of research. Nonobservance of timeliness in the release of funds in accordance with agricultural operations leads to the inefficient utilization of funds and sometimes causes allocations to lapse.

In addition to the above requirements, it is important that the foreign exchange component of research funds should be recognized and provided for in the funding mechanisms for agricultural research. This is because some essential equipment and supplies have to be imported and can

only be available to research if it has access to foreign exchange allocations for such purchases. Operational funding should also be adequate and take into account the local costs of supplies, transportation and other important elements that would make the research personnel as fully operational as possible.

7.2 Sources of Funding

No government is ever able to fund all agricultural research required to support the agricultural industry of a country. The Government, especially in the developing agricultural economies of sub-Saharan African countries, has a duty to provide leadership in demonstrating the commitment to fund and support agricultural research as part of the strategy for agricultural growth and development. In many developed countries, much of the applied and adaptive research is undertaken by the private sector or the agricultural industry, thereby relieving Governments of a substantial part of the financial burden of research. The reverse is the case in many developing countries where governments have to take the lead in most strategic, applied and adaptive research because private or industry-based research are nonexistent or at their infancy. In addition, Governments help to mobilize other internal and external sources of funding and therefore must be seen as playing a far more crucial role in the funding of research.

7.2.1 Government sources

In Uganda, like many other African countries, Government is the major source of funding for national agricultural research. This position is logical in view of the fact that agriculture contributes about 60% of the national GDP and employs a substantial proportion of the active working population. But in order for the investment in research to be rewarded in terms of its contribution to improved agricultural production, it must be at a level higher than mere subsistence of the national research system, that is, at a level that would generate major outputs for the benefit of the agricultural development process. This level of investment, as indicated above, should be at least 1% of the AGDP. This allocation need not come only from direct Government grants, but could be derived from the mobilization, by Government, of both internal and external sources of funding to complement what the Government, faced with competing claims for investment, could provide as direct grants. In such a case, the Government would be emphasizing its commitment to research by providing the baseline grant which is topped up by other sources. The expression of this commitment in real terms is important and crucial to the mobilization of other sources of funding.

7.2.2 Donor sources

Donor sources of funding are important to many developing countries because of the component of foreign exchange which they largely represent. But donor sources must be regarded as a supplement to basic Government funding of agricultural research. Many donors are able and seem willing to assist Uganda in its economic and agricultural recovery strategy. Uganda should be able to make effective use of some of these donor sources of support in agricultural research. In order to do this more efficiently, and to channel the resulting resources into productive areas, it is important that Uganda should a long-term

strategic plan for agricultural research. This would be the first major responsibility of NARB and the basis on which a more accurate level of long-term investment in agricultural research could be established. It would be wise to utilize donor sources of funding more flexibly to provide for external requirements for equipment, supplies, training and other critical needs of research. By fitting donor sources of funds into a national research plan, donor assistance would be more efficiently utilized in line with nationally determined priorities and programs.

With the proposed establishment of NARO, some areas of development appear to be particularly amenable to donor assistance. These include the construction and equipment of NARO headquarters; the special training of NARO staff for increased planning and management responsibilities; the equipment and support of priority programs of research such as the adaptive research programs of the research institutes; the provision of new laboratory and field equipment for Kawanda, Namulonge and Serere; the provision of research equipment and facilities for the Animal Health Research at Entebbe; the provision of infrastructure and equipment for the Animal Production Institute, Mbarara; and the establishment and initial operational funding of the Highland Agricultural Research Institute proposed for Kachwekano. Once priorities are determined in relation to these developments, NARO should be encouraged, with the assistance of donor or international agencies, to prepare detailed projects for funding and implementation.

Previous and current investigations and consultations indicate that there is considerable interest in, and donor support for, a consolidated, comprehensive organization for agricultural research in Uganda. Many donors see the rehabilitation and strengthening of agricultural research as an important pillar for the recovery and diversification of the agricultural sector. Some of the donors and international agencies that have demonstrated interest in this area are USAID, World Bank, EEC, FAO, UNDP, GTZ, the Netherlands, and other bilateral donors. It is therefore recommended that in view of the need to coordinate donor inputs into strengthening agricultural research and its linkages in Uganda, the Ministry of Planning and Economic Development should, following the consideration and approval of this Report, convene a "Consortium of Donors" to consider the proposals for the establishment of NARO and indicate their respective inputs into the short-, medium- and long-term requirements of the Organization. Among projects that would be regarded as fundable by donors will be the construction and equipment of NARO headquarters, the establishment and equipment of the Animal Production Research Institute at Mbarara, the establishment and support of the Highland Agricultural Research Institute at Kachwekano; the support of manpower development and training for NARO institutes; the strengthening of forestry research, the funding and strengthening of research extension linkages, support for research management training for research directors and managers in NARO and other projects that may be identified subsequently. The joint preparation of projects by donors and Ugandans in these areas should be encouraged for the period of establishment and consolidation of NARO and for future implementation of the medium- to long-term national agricultural research strategy and plan to be developed by NARO and its Board.

7.2.3 Other sources

Uganda should be able to mobilize other sources, especially internal sources, for the funding of agricultural research. Other developing countries have developed viable funding for research related to the improvement of production of such commodities as tea and coffee. Kenya funds both its Tea and Coffee Research Foundations from taxes levied at about 1% of the export value of these commodities and collected through their respective marketing authorities. Similar arrangements could be made for the funding of coffee tea, cotton, and other aspects of agricultural research in Uganda. The imposition of such levies at a level determined as appropriate for Uganda should not affect the prices paid to producers but should enable the industry and the marketing sector to contribute to essential research for the improvement of productivity. Other commodities that could be considered for the generation of funds from taxes or levies include tobacco, cocoa, hides and skins. Taxes on these at about 1% of earnings would generate about \$4-5 million per year and could provide a solid, consistent and growing base for funding agricultural research.

In addition to the above, agrobased industries, philanthropic organizations and other nongovernmental agencies (NGOs) should be encouraged to support specific research programs and projects and, if necessary, exemption from taxation should be provided for such contributions to research. Examples of these include the Uganda Tea Growers Corporation, Kibimba Rice Company, Kiira Sawmills, Leather and Tanning Industries, Uganda Tea Authority, Uganda Livestock Industries Ltd., Agricultural Enterprises Ltd., etc. NARO will generate some revenue from research activities leading to some agricultural production and from services such as soil/plant analysis, disease diagnosis and treatment, etc., rendered to private producers and processors. This internally generated revenue is not expected to be very large if NARO is to remain a research organization and not be diverted to commercial operations for which it may have no comparative advantage.

In addition, the NARO Board should, within the limits of propriety, be able to invest available funds in early-maturing investments such as Treasury Bills and shareholdings in selected viable commercial concerns. Such investments will only be undertaken with expert and reliable advice and in compliance with the provisions of the Act. These latter sources of funds are not expected to be of major importance in the funding of research but should complement the above sources. As a research organization, NARO will not be expected to operate strictly commercial units of production since such activities are likely to divert its attention from the primary function of development-oriented research. It should, however, take full cognizance of the economic feasibility and social acceptability of the improved technologies that it will develop for the benefit of farmers, producers and processors.

8 LINKAGES OF NARO

While it is proposed that NARO should be a semi-autonomous organization, it must have very wide linkages and interactions as far as the research and operational programs are concerned. The interactions are wider than any Ministry, and even wider than the country. It is a task of the apex management of NARO to facilitate these linkages as far as possible.

The national agricultural research process is concerned with deciding what program to carry out, implementing the program, and communicating the conclusions to its clients. The essential purpose of NARO is to provide information and materials that will improve development prospects for producers, consumers and the national economy. To achieve these objectives, NARO must develop and maintain effective linkage mechanisms with its clients in order to communicate its useful conclusions. All linkages cost time and money, and to maintain its output, they are worth a significant share of the organization's time and resources.

At the other end of the research process, component groups within NARO require inputs of information on which to base decisions on research policies, long-term strategy and short-term research programs. This input process also requires effective linkage mechanisms with the organization's suppliers of information, and they also deserve a share of the organization's time and resources.

The particular balance of allocation of resources (especially time) among deciding the program, implementing the program, and communicating the conclusions will depend on policy and management decisions by the apex management and should be considered carefully from the broad perspective of the research system as a whole. However, linkages should have a significant share of the time and attention of research staff, and management must plan and budget accordingly. Such an expected distribution of research staff effort should be reflected in the job descriptions for research personnel.

8.1 Range of Linkages

Effective linkage mechanisms of external* bodies with NARO are desirable:

- for input to priority setting and programming, with policymakers, national economic analysts, scientific community, extension agencies, micro-economic analysts, producers and processors
- for implementation of the program, with extension, producers, University and the private sector
- for communicating conclusions, with extension, producers, policymakers, University and the scientific community
- for feedback to research after program implementation, with producers and extension

*Internal linkages within NARO are also vital: they are dealt with under management and planning and programming.

Linkages will not be effective unless appropriate mechanisms are established by management and the organization ensures that the mechanisms are used, by monitoring their operations.

The precise mechanisms suitable to Uganda will depend on the particular structure and form of governance, especially with regard to linkages with policymakers. An illustrative list of possible mechanisms is given in Table 8.1. In this table, there are broad divisions in terms of areas of interaction. The first column in each division gives the bodies or institutions interacting with NARO, and the corresponding mechanisms in NARO facilitating input to and output from NARO are given in columns 2 and 3.

The list is not meant to be exhaustive, and there is plenty of scope for imaginative and innovative mechanisms to be introduced. At the same time, the list is already long and each mechanism represents a claim on research time and funds, if only to bring dispersed participants together in periodic meetings. Once again, management will have to establish priorities among competing claims, so that linkage activities fit within the resources likely to be made available.

Criteria for priorities will have to be established, which is a matter for the Board and senior management of NARO to determine. However, mechanisms to deliver the output from research, especially via extension services, are extremely important: national research has no purpose if there is no impact. This is true whether the program is highly relevant or only poorly targeted. The input linkages are essentially concerned with ensuring a better program, both in quality and relevance.

8.2 Management Mechanisms for Linkages

Possible management mechanisms fall broadly into the following areas of interaction:

8.2.1 Linkage with policymakers

There are a number of senior policymaking national committees and Ministries that should influence agricultural research policy and broad priority setting. The National Agricultural Research Board is designed specifically to bring those policy directives to bear on NARO and to check that performance is in line with the priorities set.

NARO participation in meetings of the Agricultural Policy Committee or in appropriate strategic meetings of the Agricultural Secretariat could be a source of guidance for research policy. NARO participation in the latter meetings could be an effective mechanism for delivering appropriate output from NARO to policymakers.

The main output from NARO to policymakers will consist of technical information on possible development opportunities. A more effective mechanism would be occasional review papers for NARB and APC prepared at the specific request of NARB or APC on particular topics in which NARO has a distinctive comparative advantage.

Table 8.1 Possible Mechanisms for Linkages of NARO
with Other Bodies and Institutions

INTERACTING BODIES	LINKAGE MECHANISMS	
	INPUT TO NARO	OUTPUT FROM NARO
1. <u>POLICY</u> National Resistance Council President's Economic Committee Agricultural Policy Committee NCST Ministry of Agriculture Ministry of Animal Industry & Forestry Ministry of Environment Protection Ministry of Planning and Economic Development Agricultural Secretariat	(i) <u>Policy guidance and priorities</u> Membership of NARB NARO participation in subcommittee of APC and Secretariat meetings	(i) <u>Information on technical constraints and opportunities</u> DG/DDG/Directors Reports to NARB Occasional review papers to NARB, APC NARO participation in subcommittee of APC and in Agricultural Secretariat, formal and informal
2. <u>EXTENSION</u> (and other development agencies) Extension and Production Divisions of Ministries	(i) <u>Priorities and long-term Plan</u> Membership of NARB	(i) <u>Technical advice on opportunities</u> DG/DDG/Directors participate in planning meetings in Ministries
(i) Commissioner level		
(ii) Director, Field Services level	Participation in long-term planning in Senior Technical Group	DREL and Director participation in field service strategic planning meetings
(ii) <u>Implementation</u> Joint Technical Committee meetings to determine extent of collaborative programs		

Table 8.1 (continued)

INTERACTING BODIES	LINKAGE MECHANISMS	
	INPUT TO NARO	OUTPUT FROM NARO
(iii) District Officer level	<p>(i) <u>Identification of short-term problems/programming</u> Participation in Reviewing Groups at Institutes</p> <p>(ii) <u>Implementation</u> Joint agreement on details of collaboration on-station and on-farm or producers' site trials</p>	<p>(i) <u>Communicate conclusions</u> Dept. Heads/RELO/Researchers Formal annual meetings to review progress Publications for Extension staff Participation in training courses Open days Informal contacts with SMS</p>
(iv) Extension level	<p>(i) <u>Information for programming: identification of farmers' and extension problems</u> Formal and informal contact with RELO and researchers</p> <p>(ii) <u>Implementation</u> (with producer)</p> <p>Participation in design and implementation of trials, including on-farm trials (originated in Research)</p>	<p>(i) <u>Communicate conclusions</u> RELO/Researchers Short-term advice in informal contacts Publication for extension staff Participation in training courses Open days</p> <p>Participation in design of demonstrations and on-farm trials (originated in Extension)</p>

Table 8.1 (continued)

INTERACTING BODIES	LINKAGE MECHANISMS	
	INPUT TO NARO	OUTPUT FROM NARO
3. <u>UNIVERSITY</u> Faculty Boards of Agriculture and Forestry, and Veterinary Medicine Faculty staff	<p>(i) <u>Policy guidance</u> Membership of NARB</p> <p>(ii) <u>Long-term planning and programming</u> Joint research Committee NARO/University Participation in Senior Technical Group in RIs Participation in Reviewing Groups Participation in implementing research program</p> <p>(ii) <u>Staff Development</u> Postgraduate training of research staff</p>	<p>(i) <u>Communicate conclusions</u> (background for curriculum development, illustrations) Informal contacts Participation in teaching, seminars, Faculty Research</p> <p>(ii) <u>Joint Research Program</u> Facilitate and fund agreed-upon Faculty research Provide facilities for postgrad research</p>
4. <u>NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY</u> Members of Council, Executive Secretary and Staff of Council	<p>(i) <u>Policy guidance</u> Membership of NARB NARO staff membership on Specialized Committees</p> <p>(ii) <u>Long-term research strategy</u> Occasional review of NARO Long-term research strategy and progress reports</p>	<p>(i) <u>Communicate conclusions, advise in relevant sciences</u> NARO staff participation on Specialized Committees Participation in conferences Periodic reviews of national contributions in applied science</p>

Table 8.1. (continued)

INTERACTING BODIES	LINKAGE MECHANISMS	
	INPUT TO NARO	OUTPUT FROM NARO
<p>5. <u>NATIONAL AND INTERNATIONAL AGRICULTURAL RESEARCH INSTITUTES</u> Other research groups in Uganda, international agricultural research centers, national research institutions, world scientific community</p>	<p>(i) <u>Technical information and training</u> Visits to and from research centers Attendance by NARO staff at short courses Participation in conferences Library, reprint services</p>	<p>(i) <u>Communicate conclusions</u> Participate in conferences Publications in national and international journals</p>
<p>6. <u>PUBLIC</u> All citizens, farmers' and producers' associations, cooperatives</p>	<p>(i) <u>Policy</u> Membership of NARB</p> <p>(ii) <u>Program</u> Consultation and discussions with farmers, fishermen and consumers Surveys</p>	<p>(i) <u>Communicate conclusions</u> Publications in extension literature Articles in newspapers, radio, and TV Open days</p>

8.2.2 Linkages with extension and development agencies

Research and extension must be closely linked. Research is concerned mainly with generating improved technology and materials to improve producers' productivity. Extension is essentially concerned with disseminating information on the same technology and materials to large numbers of producers in order to meet both national and producers' objectives. Research, extension and producers are all part of one continuum for improved productivity. The effective output and impact of research is heavily dependent on communicating its conclusions clearly and convincingly to extensionists. The immediate client of research is extension and other development agencies. Both research and extension have the producer as the ultimate client.

Extensionists and producers also have an important input into research programming and the choice of experiments. It is important that the technology or materials produced are relevant and genuinely "improved" as far as the producer is concerned: they must meet his difficulties and increase his well-being and/or net income. Extensionists and producers can provide valuable definitions of problems to be tackled by researchers and feedback on how trial solutions meet the producers' needs.

Appropriate linkage mechanisms are needed to facilitate this two-way traffic, whether research and extension are in the same Department, Ministry or in separate institutions. These mechanisms (horizontal linkages) are needed at each level of management, as indicated in Figure 8.1.

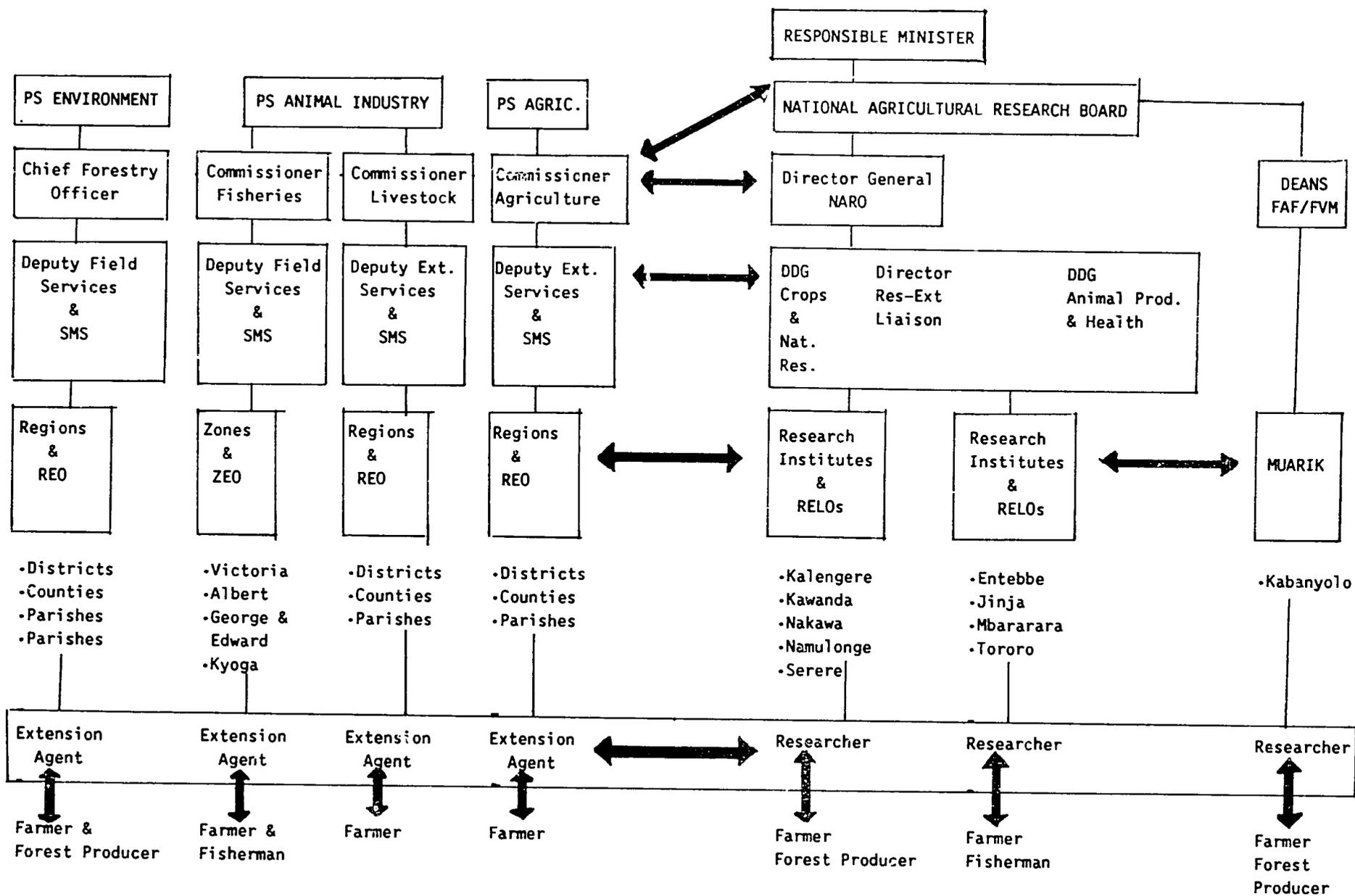
It is proposed that new RELO positions be created in Research Institutes of MARO to focus attention on these important linkages, with a DREL and senior RELO at headquarters to coordinate the major functions of communicating conclusions to extensionists and producers.

Commissioner level The appropriate mechanism for input from Commissioners into NARO research policy is the NARB, supplemented by direct meetings with the DG, DDC and Directors of Institutes.

The main contribution from NARO to the Ministries at the Commissioner level would be technical advice on new opportunities and constraints to development proposals. A suitable mechanism would be invited participation of the DG, DREL and appropriate DDCs and Directors at planning meetings in Ministries.

Deputy Commissioner (field activities) level The Deputy Commissioners are charged with translating policy guidelines into broad operational plans at the national level. They should be in close formal and informal communication with the DREL. The Deputy Commissioners can provide information about the future potential capability of extension services that would be an essential input to the long-term planning exercises of Institutes in NARO. This should be facilitated by formal invitations to appropriate Deputy Commissioners to participate in meetings on long-term planning in Research Institutes. Similarly, appropriate Directors and DREL should be invited to participate in equivalent planning meetings in development departments or extension divisions.

FIGURE 8.1 A Framework for Research-Extension Linkages



There are many important areas of linkage that operate at lower levels of management but agreement to deploy resources to facilitate these linkages should be reached at Joint Technical Committee meetings at Deputy Commissioner-Director level at least annually. Participation could be kept to a relatively small number, such as the Deputy Commissioner, Directors and RELOs of appropriate Institutes, a few senior regional or Zonal officers and DREL. Its main functions would be to discuss and agree on the extent of collaboration during the year and on activities including participation in training courses for extension staff; open days and shows; preparation of advisory bulletins for extension staff, producers and processors. Details should be worked out at lower levels and recommendations tabled at the meetings. The RELOs would have an important role in servicing the Joint Technical Committee meetings.

The Communications and Information Unit at headquarters under the Director, Research-Extension Liaison, would also receive guidance from these Joint Technical Committee meetings for the content of its program.

Regional, zonal and district officer level Extension staff at this level will interact mainly with program and team leaders, and researchers in Institutes, with the RELOs serving as facilitators of interaction.

The main input from extension to the Institutes will be in identification of short-term problems that will influence the short-term programming phase in program formulation in the Institute. The appropriate mechanism is therefore participation by selected regional or District Officers, or SMSs, on appropriate Reviewing Committees for specific groups of commodities or production factors.

Contributions from Research Institutes to extension could be substantial in communicating research conclusions through formal annual meetings, publications for extension staff and in open days organized by extension. Informal contacts of national, regional or district SMSs with staff could also be very important. In addition, research staff may be able to contribute usefully to specific extension programs in the region. Full details of regional and district programs should be made available to Institute Directors and RELOs.

The RELO has a substantial role in firming up details of proposals and ensuring the extent of the interaction. The RELO may have to make the original innovative suggestions for interaction. The RELO will also have to monitor the implementation of the collaborative projects subsequently approved, and may be responsible for organizing workshops, training courses, and experimental work and trials involving individual researchers and extensionists, both on-station and off station.

Extensionist and producer level Linkages at this level between individual extensionists and researchers bring benefits through mechanisms similar to those at district officer level. Formal and informal contacts of extensionists with RELOs and researchers provide leads on identification of producers' problems, and extension service difficulties in disseminating newly recommended practices. Researchers can communicate conclusions to extensionists through short-term advice in informal contacts, publications for extension staff, participation in training courses and through open days and shows.

However, collaborative linkages between extensionists, researchers and producers that result in jointly conducted off-station trials are among the most important linkages of all in bringing input from the producers to research and benefits from the output of research directly to the clients.

There are several kinds of off-station trials. Some are managed through researcher or extensionist, simply using the producer's facilities. These are an expansion of on-station trials to different physical and biological environments; extensionists often supervise such trials.

Off-station, producer-managed trials should always involve both researcher and extensionist. Trials with technologies still in experimental stages should be researcher-designed with extension assistance. Demonstration trials with recommended practices should be extensionist-designed with research assistance. Producer-managed trials are essential for sampling farmers' socioeconomic environments and for producing deep insight into the mutual concern of researchers and extensionists to satisfy producers' demands for technologies appropriate to their normal or modified environment. They lead to a more highly relevant on-station research program, and extension workers gain knowledge, skills and confidence through greater involvement.

However, they do take a lot of organizing and usually involve significant requirements for transport (reduced when supervised by local extension staff). The off-station trials are also often larger than equivalent on-station trials. They are therefore rather more expensive per trial in time and funds, although arguably more informative. The number of such collaborative trials must be carefully considered in light of the comparative value.

Proposals for off-station trials can arise from diagnostic surveys in districts, in Review Group discussions, from formal and informal meetings of researchers and extensionists, or from identification of urgent common concerns among producers, extensionists, and researchers in a "problem domain" (such as the "banana weevil problem" in Masaka).

RELOs and SMSs should ensure that the detailed arrangements and organization for trials are fully worked out and documented adequately.

8.2.3 Linkage with Makerere University

Makerere University (MU) is a very significant resource in agricultural research and training in Uganda. In the Faculty of Agriculture and Forestry and Veterinary Medicine, there is a concentration of 84 well-trained staff (48 PhD, 36 MSc). While the main concern of the staff is education some 30% of their time is expected to be devoted to research and they could make a considerable contribution to the national agricultural research program organized and coordinated by NARO.

The potential input from MU to NARO would be considerably more than information to guide priority setting and programming, important though this would be. MU would also participate directly in the implementation of assigned elements of the national research program, contributing the research facilities in the laboratories and at the Makerere University Agricultural Research Institute, Kabanyolo (MUARIK). It would also contribute directly in training of NARO staff, the supply of scientific officers and postgraduate research education.

The output and assistance from NARO to MU could also be substantial. The steadily increasing understanding of the natural resource base and of production systems of Uganda and of how productivity can be improved provides a better background for teaching and for curriculum development, besides supplying realistic local illustrations and case studies. NARO staff also could complement Faculty staff in teaching short courses in their own specialties, in participating in seminars and in assisting in supervision of, and provision of facilities for, postgraduate students and other student projects. Moreover, NARO could facilitate and fund jointly approved research programs in specific areas.

A satisfactory mechanism ensured for University participation in policy guidance and broad priorities for research is ensured through the Deans' membership of NARB.

Individual Faculty staff members could be invited to participate in Senior Technical Group meetings for long-term planning of research in Research Institutes. Others could be invited to Review Group discussions of the immediate program if they were actively involved in the research topic of the Group.

The main mechanism proposed to facilitate linkages is a Joint Research Committee with equal membership from MU and NARO which will have a wide range of functions including joint planning of research and review of research proposals, the arrangements for supervision of postgraduate research students and the organization of seminars. The Committee will submit proposals to the Directorate of NARO, and then to the NARB, for funding of MU research activities in approved priority areas of national research. In particular, it is proposed that MUARIK should take the lead in specifically agreed-upon research areas for which it can maintain a comparative advantage in research capability in the country (e.g., agricultural mechanization, agreed upon horticultural crops and micro-economics of production systems).

NARO would enter into similar arrangements with any other research institution in the country that has similar comparative advantages to contribute to the national research program.

8.2.4 National Council for Science and Technology

The relationship between NCST and NARO and its Board is discussed in Section 3.7. The NCST is Uganda's major institute for advice to Government on the formulation and coordination of a national policy in all fields of science and technology. NARO and NARB will come firmly under the policy direction of NCST as far as national policy in science and technology is concerned. NARB will be one of the operational Boards through which NCST will promote and guide the carrying out of scientific and technological research and development as they affect the agricultural sector. The NCST may from time to time call for a review and evaluation of the performance and progress made by NARO with respect to its mandate and strategic plan.

The major input that NCST would bring to NARO would be policy guidance and advice on major research priorities and long-term strategic planning. It could also lend its weight to NARO's program and budget proposals and champion appropriate schemes of service for scientific research personnel.

The most suitable linkage mechanisms for policy guidance would be NCST's active membership of NARB. Additional interaction concerning long-term strategic planning for NAROs and/or Institutes could arise through NARO staff being members of appropriate Specialized Committees, and perhaps through occasional reviews of the performance of NARO or its Institutes.

NARO's contribution to NCST would be mainly in specialized advice on the relevant sciences and technologies based on research experience and conclusions reached. Suitable mechanisms would be NARO staff membership of Specialized Committees and periodic reviews by NARO staff of NARO's national contribution in the applied sciences.

8.2.5 National and international agricultural research institutions

The annual increment of world knowledge that can be interpreted readily for direct application in Uganda is likely to be significant in comparison with the annual increment of new knowledge generated within Uganda. Researchers in NARO have a responsibility to keep abreast of world advances in their specialized fields in order to exploit new methodologies, technologies, and materials for Uganda's benefit as rapidly as possible, and to avoid needless studies of problems already satisfactorily solved elsewhere.

The task of maintaining linkages with sources of world knowledge is indeed formidable but of great importance in providing critical inputs of information to both long-term research planning and short-term programming. Information from national economic analysis and surveys within Uganda can be of great help in the setting of broad priorities. The range of possible mechanisms for maintaining these linkages include visits by NARO staff to leading national and international research centers and visits of staff to Uganda from such centers; introduction and exchange of germ plasm; short-term training courses at IARCs; participation in conferences; utilization of a well-stocked, up-to-date library; reprint services, etc.

The communication of research conclusions from NARO to the world scientific community can be accomplished through attendance at conferences, but is more commonly done through publications in scientific journals, or by informal personal contacts.

8.2.6 The public, farmers and other producers and processors

Communication by NARO to and from the ultimate clients of research is clearly of considerable importance but is often neglected by researchers. Input from farmers and producers to NARO at policy level may come directly or indirectly at NARB level, but very important inputs to researchers in Reviewing Groups at the final micro-programming level should be sought through consultations and discussions with primary producers and through surveys and on-farm or off-station trials.

Communication of research conclusions to producers and consumers of agricultural products should be in a readily understandable form. The new positions of Director of Research-Extension Liaison and RELOs in Research Institutes should be diligent in facilitating such communication from research staff.

ANNEX I
COMPOSITION OF THE NARO TASK FORCE

1. Professor J. Mugerwa, Makerere University--Chairman
2. Professor T. Ajibola Taylor, ISNAR--Co-chairman
3. Mr. T. Bucyanayandi, Ministry of Agriculture--Member
4. Dr. M. Dagg, ISNAR--Member
5. Dr. Y. Ssentongo, Ministry of Animal Industry and Fisheries--Member

ANNEX II
TERMS OF REFERENCE OF THE NARO TASK FORCE

The following terms of reference were approved by the Ministry of Planning and Economic Development:

- To determine feasibility and carry out necessary planning for the creation of a NARO-type organization
- To make recommendations on the composition and responsibilities of NARB
- To aid GOU in drafting the act for the establishment of NARO and NARB
- To determine physical requirements for NARO headquarters
- To suggest overall working procedures for NARB
- To determine a time frame for establishment of NARO and suggest ways for the phasing in or consolidation of all present agricultural research efforts into NARO
- To determine NARO's initial organizational structure, staffing needs and conditions of service
- To recommend viable sources of funding for the establishment and maintenance of NARO
- To determine how NARO can best liaise with extension and be sensitive and responsive to farmers' needs

THE NATIONAL AGRICULTURAL
RESEARCH ORGANIZATION
STATUTE 1988

THE NATIONAL AGRICULTURAL RESEARCH ORGANIZATION
STATUTE, 1988

A STATUTE to Provide For the Establishment of The National Agricultural Research Organization, its Administration, Powers and Functions and Other Matters Connected Therewith

ESTABLISHMENT FUNCTIONS AND COMPOSITION OF THE
NATIONAL AGRICULTURAL RESEARCH ORGANIZATION

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| Establishment
of a National
Agricultural
Research
Organization | 1. There is hereby established an Organization to be known as the National Agricultural Research Organization which shall be a body corporate with perpetual succession and a common seal and may sue or be sued in its corporate name and may do or suffer all such other acts and things as bodies corporate may lawfully do or suffer. |
| General
Powers of
the Organi-
zation | 2. The Organization may do all such things as are calculated to facilitate or are incidental or are conducive to the better carrying out of its functions and may, without prejudice to the generality of the foregoing <ol style="list-style-type: none">(a) acquire, take on lease, purchase, hold manage, and enjoy any property moveable or immovable and may sell or otherwise dispose of the same;(b) open, operate and close any current, savings or deposit accounts in any Bank decided upon by the Board;(c) enter into such contracts as it may deem necessary. |
| Functions
of the
Organization | 3. The functions of the Organization shall be to, <ol style="list-style-type: none">(a) organize and carry out research in the fields specified in the fifth schedule in accordance with such policies and in such priorities as may be determined by the Board;(b) carry out, independently or in cooperation with any appropriate person, body of persons, agency or institution, such surveys, studies, investigations and analyse the same as the Board may consider necessary;(c) cooperate with other organizations or institutions of higher learning in the organization of training and research programs; |

- (d) liaise with other research bodies both public and private organizations or organizations within and outside Uganda;
- (e) disseminate research findings and conclusions in suitable forms to all persons concerned with the research and in particular to planners, policy-makers, development agencies, farmers, other producers, processors and the scientific community;
- (f) cooperate with and provide information to the responsible and participating Ministries and liaise with the National Council for Science and Technology in matters pertaining to research policies;
- (g) sponsor and organize National and international research conferences, seminars and workshops;
- (h) organize and participate in the training of extension personnel;
- (i) do all such things as may be necessary, desirable or expedient to the carrying out of its functions

Composition
of the
Organization

- 4. (1) The Organization shall comprise the Research Institutions set out in the third schedule to this statute.
- (2) The Minister may, in consultation with the participating ministries, amend the third Schedule to this Statute.

THE BOARD

The National
Agricultural
Research Board

- 5. (1) The governing body of the Organization shall be the National Agricultural Research Board which shall consist of,
 - (a) the Minister responsible for Agriculture
 - (b) the Minister responsible for Animal Industry and Fisheries, and
 - (c) the Minister of Environment Protection
 - (d) ex-officio members,
 - (i) a commissioner for Agriculture
 - (ii) a Commissioner for Veterinary Services and Animal Industry
 - (iii) a Commissioner for Fisheries
 - (iv) a Chief Forestry Officer
 - (v) a Commissioner representing the Ministry of Cooperatives and Marketing

- (vi) the Dean, Faculty of Agriculture and Forestry, Makerere University
- (vii) the Dean, Faculty of Veterinary Medicine, Makerere University
- (ix) a Senior Officer from the Ministry of Planning and Economic Development
- (x) the Executive Secretary of the National Council for Science and Technology
- (xi) the Director of the Agricultural Secretariat
- (xii) the Director of Medical Services, and,
- (xiii) the Director-General of the Organization

(e) three members appointed by the Minister as follows,

- (i) an experienced agricultural scientist, appointed on the recommendation of the National Council for Science and Technology;
- (ii) a representative of farmers;
- (iii) a representative of the agro-allied industries;

(f) two other members as the Board may consider appropriate.

Chairman
of the
Board

6. (1) The Chairmanship of the Board shall rotate biannually between the Ministers of Agriculture, Animal Industry and Fisheries, and of Environment Protection

(2) The Board shall elect a Vice-Chairman from among its members, who shall perform the functions of the Chairman in the absence of the Chairman.

Powers of
the Board

7. The powers of the Board shall be,
- (a) to formulate policies and priorities for agricultural research in relation to the economic and social policies of the Government as spelt out in the guidelines provided by the National Council for Science and Technology;
 - (b) to advise and recommend to Government on the financial and other resource requirements for the implementation of the national agricultural research strategy;

- (c) to ensure the implementation and application of the results and recommendations of research activities in the development of agriculture and social welfare in the country;
- (d) to administer the property and funds of the Organization for the better carrying out of the functions of the Organization;
- (e) to consider and approve any research programs and to assign the same to institutions within and outside the Organization;
- (f) to receive on behalf of the Organization grants, gifts, donations, fees, subscriptions and other moneys payable to the Organization and to make disbursement therefrom;
- (g) to regulate, the manner of appointment, the terms and conditions of service, conduct and discipline of the officers and employees of the Organization and to administer the same;
- (h) to appoint such officers and employees as it may deem necessary for the better carrying out of the functions of the Organization;
- (i) to advise the Minister on the management planning and coordinating of agricultural research activities at various levels including the setting up of new research institutes, establishments, units, and technical services;
- (j) to arrange and carry out periodic reviews and evaluation of research activities and the supervision of research institutions;
- (k) to delegate any of its powers to any member of the Board or any other Officer of the Board;
- (l) to do all such things as may be incidental to the better carrying out of the provisions of this Statute.

- Meetings of the Board
8. (1) The Board shall meet for the discharge of its duties at least once every six months or upon the request in writing to the Chairman by at least one third of the members of the Board, at such time and place as the Chairman may appoint.
- (2) The Chairman shall preside at all meetings of the Board at which he is present and in his absence, the Vice-Chairman shall preside.
- (3) One third of the members including the Chairman shall form a quorum at every meeting of the Board.
- (4) The Board may invite any person to act as consultant or adviser at any of its meetings.
- (5) Questions proposed at any meeting of the Board shall be determined by a simple majority of votes of the members present and voting, and in the case of equality of votes, the person presiding at the meeting shall have a second or casting vote.
- (6) Subject to the foregoing provisions, the Board may regulate its own procedure.
- Remuneration of Members
9. Members of the Board or any other person attending any meeting of the Board may be paid such remuneration or allowances as the Minister may, in consultation with the Minister responsible for Finance, determine.
- Board's Committees
10. The Board may appoint such committees as may be necessary and may regulate the procedure for such committees.
- Research Committee
11. (1) The Board shall appoint a Research Committee which shall consist of a chairman, not less than five members of the Board and such other persons who are not members of the Board as the Board may determine.
- (2) The Research Committee shall, in consultation with the Technical Secretariat, review research programs and agricultural research strategy made by research institutions and make recommendations thereon.

- (3) The Secretary to the Board shall be the Secretary to the Research Committee.

STAFF

- Director-General
12. (1) There shall be a Director-General who shall be appointed by the President on the advice of the Board on such terms and conditions as may be specified in his instrument of appointment.
- (2) The Director-General shall be the Chief Executive Officer of the Organization and in the performance of his duties be responsible to the Board. He shall be a full-time employee of the Organization.
- (3) The Chairman may, from time to time, in writing, direct the Director-General to submit a report on any matter affecting the affairs of the Organization.
- (4) Subject to the provisions of this Statute, and the general supervision and control of the Board, the Director-General shall be responsible for the management of the funds, property and business of the Organization, and for the administration, organization, and control of the staff of the Organization.
- Deputy Directors-General
13. There shall be 3 Deputy Directors-General and such other Directors as the Board may appoint on such terms and conditions as may be specified in their instrument of appointment.
- Secretary
14. (1) There shall be a Secretary to the Board who shall be appointed by the Board on such terms and conditions as it may deem fit.
- (2) In addition to any other functions that may be conferred upon him by the Board, the Secretary shall have the custody of the seal of the Organization, and be responsible for the,
- (a) taking of the Minutes of the meetings of the Board;
- (b) keeping of the records of all transactions of the Organization.
- Other Staff
15. (1) There shall be such other officers and employees as the Board may from time to time, determine.

- (2) Public Officers may be seconded to the Organization.
- (3) Nothing done by an Officer or employee of the Organization shall, if done bona fide for the purposes of carrying the provisions of this Statute into effect, subject him to any civil liability.

FINANCIAL PROVISIONS

Funds of
the
Organization

16. (1) The Funds of the Organization shall consist of,
 - (a) grants from the Government;
 - (b) loans from the Government, Organizations or any persons;
 - (c) grants and donations that may be received from sources within and outside the country;
 - (d) any moneys that may become payable to the Organization in the discharge of its functions.
- (2) All income and moneys of the Organization shall be deposited to the credit of the Organization in a bank approved by the Minister and shall not be withdrawn save in accordance with the manner provided by the Board.

Borrowing
Power

17. The Organization may, subject to the provisions of this Statute, and with the approval of the Ministry of Finance borrow sums required by it for meeting any of its obligations, or performing of any of its functions under this Statute.

Estimates

18. (1) The Board shall, within a period of three months before the end of each financial year, make and submit to the Minister for submission to the Minister responsible for Finance, for his approval, estimates of the income and expenditure of the Organization for the next ensuing year.
- (2) No expenditure shall be made out of the funds of the Organization unless the expenditure has been approved by the Minister responsible for Finance under the estimates for the year in which such expenditure is made, or in any other estimates supplementary thereto.

- Accounts
19. (1) The Organization shall keep books of accounts of all its income and expenditure and proper records in relation thereto.
- (2) Subject to such directions as the Minister responsible for Finance may give, the Organization shall prepare, in respect of each financial year, a statement of accounts which shall include,
- (a) a balance sheet, a statement of income and a statement of surplus or deficit;
- (b) such other information in respect of the financial affairs of the Organization as the Minister responsible for Finance may require.
- Audit
20. (1) The accounts of the Organization shall, in respect to each financial year, be subject to audit by the Auditor-General or an auditor appointed by him.
- (2) The Board shall ensure that within three months from the end of each financial year, a statement of accounts of the Organization is prepared and submitted to the Auditor-General for auditing.
- (3) The Auditor-General shall audit and deliver to the Board a copy of the audited accounts together with his report thereon not later than three months from the date of his receipt of the statement of accounts from the receipt of the audited accounts and Auditor-General's report thereon, cause to be delivered copies thereof to the Minister who shall present the same to the Cabinet.
- Investment of Surplus Funds
21. Such funds of the Organization as are not immediately required for use shall be invested in such manner as the Board may, with prior approval of the Minister after consultation with the Minister responsible for Finance, determine.

MISCELLANEOUS

- Agricultural Products 22. (1) The Products specified in the First Schedule thereto are declared to be agricultural products for the purposes of this Statute.
- (2) The Minister may, on recommendaiton of Board, and after consultation with the participating Ministers, amend the First Schedule hereto.
- Annual Report 23. The Board shall within three months after the end of each financial year, send to the Minister a report on the activities of the Organization, including achievements and Future plans of the Organization.
- Rights of Patent 24. All rights of Patent in discoveries, inventions and improvements on apparatus and machines, shall vest in the Organization but may be made available for use in the public interest.
- Service of Documents 25. Any notice or document required to be served on the Organization, may be served by leaving it at the office of, or by sending it by registered post, to the Director-General.
- Regulations 26. The Minister may, by statutory Instrument, make regulations generally for the better carrying out of the provisions of this Statute.
- Interpretation 27. In this Statute, unless the context otherwise requires,

INTERPRETATIONS

"agricultural product" means any plant, animal or thing whatsoever which is declared in terms of Section 3 to be an agricultural product for the purposes of this Statute.

"agricultural research" means research into the production, treatment or handling of an agricultural product, including research required for a better understanding of the processes involved in or the environment necessary for the production of an agricultural product.

"appointed member" means a member of the Board appointed under paragraph (a) (b) (c) and (d) of subsection 1 of Section 5.

"Board" means the National Agricultural Research Board established by subsection 1 of Section 5.

"Director-General" means a Director-General of the National Research Organization.

"Director" means a Director of a Research Institute of the National Agricultural Research Organization.

"Minister" means the Minister responsible for matters relating to planning and economic development.

"Participating Minister" means the Minister responsible for matters set out in the second column of the second schedule and as indicated in the fourth schedule

"Organization" means the National Agricultural Research Organization

"Research Committee" means a research committee advisory to the Board and established by or under Section 11.

"Research Institute" means a Research Institute established by or under Section 4 (1).

"Scheduled Ministry" means a Ministry listed in the Second Schedule.

FIRST SCHEDULE (SECTION 22)
DECLARATION OF AGRICULTURAL PRODUCTS

1. Any animal, animal product or product obtained from animals.
2. Honey and any other bee product.
3. Any poultry, poultry product or product obtained from poultry.
4. Any fish, fish product or product obtained from fish.
5. Any plant, plant product or product obtained from plants, including trees or produce grown or naturally found in a forest or other products from forestry.

SECOND SCHEDULE
SCHEDULE OF MINISTRIES

<u>Ministry</u>	<u>Area</u>
Ministry of Agriculture	Agriculture
Ministry of Animal Industry and Fisheries	Livestock & Fisheries
Ministry of Environment Protection	Forestry & Environment

THIRD SCHEDULE
PROVISIONS AS TO THE NATIONAL AGRICULTURAL RESEARCH BOARD

1. Save as hereinafter provided, an appointed member shall hold office for such period, not exceeding three years, as the Minister may specify in the instrument of appointment and shall be eligible for reappointment.
2. An appointed member may at any time, by notice in writing addressed to the Minister, resign his office, and any such resignation shall have effect from the date of receipt of the notice by the Minister.
3. If the Board so recommends, the Minister may by notice in writing addressed to an appointed member, terminate the appointment of such member without assigning any reason therefor, and such termination shall have effect from the date of receipt of the notice by the member or from such date as the Minister may specify.
4. The Board shall appoint a person from the senior management of the Organization to be the secretary of the Board, and the secretary shall attend all meetings of the Board but shall not be entitled to vote thereat.
5. Save as hereinafter provided, the Board may regulate its procedure as it thinks fit.
6. The Board shall meet not less than twice in each year.
7. Co-opted members of the Research Committee and any other person permitted to do so by the Board may attend any meeting of the board and participate in its proceedings, but shall not be entitled to any vote at such meeting.

FOURTH SCHEDULE
RESEARCH INSTITUTES

<u>Research Institutes</u>	<u>Participating Ministries</u>
Kawanda Agricultural Research	Agriculture Animal Industry & Fisheries Institute Environment Protection (KARI)
Namulonge Agricultural Research Institute (NARI)	Agriculture Animal Industry & Fisheries Environment Protection
Serere Agricultural Research Institute (SARI)	Agriculture Animal Industry & Fisheries Environment Protection
High Altitude Research Institute (HARI)	Agriculture Animal Industry & Fisheries Environment Protection
Forestry Research Institute Nakawa (FRIN)	Environment Protection Animal Industry & Fisheries Agriculture
Animal Production Research Institute (APRI)	Animal Industry & Fisheries Agriculture Environment Protection
Trypanosomiasis Research Institute Tororo (TRIT)	Animal Industry & Fisheries Agriculture Environment Protection Health
Animal Health Research Institute (AHRI)	Animal Industry & Fisheries Agriculture Environment Protection Health
Fisheries Research Institute Jinja (FRIJ)	Animal Industry & Fisheries Environment Protection Agriculture

FIFTH SCHEDULE
DETAILS OF FIELDS OF RESEARCH TO BE UNDERTAKEN

<u>Research Institute</u>	<u>Fields of Research</u>
Kawanda Agricultural Research Institute	Major cash and food crops Farming systems Soils Crop protection Plant introduction and quarantine services Other fields as per approved mandate
Namulonge Agricultural Research Institute	Major industrial and food crops Crop/animal production systems, pastures Other fields as per approved mandate
Serere Agricultural Research Institute	Major cereals, root crops, legumes and oilseeds for dry area, pastures Semi-arid production systems Seed research and production Other fields as per approved mandate
High Altitude Research Institute	Major highland subtropical and semitemperate crops Soil/water conservation High altitude production systems; agroforestry, horticulture Other fields as per approved mandate
Forestry Research Institute	Forestry Forest products and utilization Agroforestry Other fields as per approved mandate
Animal Production Research Institute	Cattle (beef, dairy) Sheep and goats Pigs, poultry Bees Animal production systems Other fields as per approved mandate

Research Institute

Trypanosomiasis Research
Institute

Animal Health Research
Institute

Fisheries Research Institute

Fields of Research

Animal and human
trypanosomiasis
Tsetse ecology and control
Other fields as per approved
mandate

Animal health and disease
problems (except
trypanosomiasis)

Freshwater fisheries
Aquaculture and fish
production systems
Other fields as per approved
mandate