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9. ABSTRACT

This report is the result of an effort by the Government of Kenya and USAID to establish an estimate of requirements for academically trained agricultural manpower and for development of the educational system to fill these needs. It presents the results of: (1) a comprehensive manpower survey of professional and subprofessional agriculture manpower employed in 1977 and that which will be needed by 1983 and 1988; (2) an analysis of these needs and their implications; (3) a study of the agricultural education system with recommendations; (4) and a study of the effectiveness with which agricultural manpower is being used by the Ministry of Agriculture with recommendations for improving its utilization. Approximate costs for expansion of the agricultural education system are estimated. A discussion of issues related to the findings of the studies and their implications on sector policies, manpower deployment and program operations is included. Recommendations are made across a number of fields. The most important recommendation is for structuring an incentive system. A personnel system with greater internal promotional mobility is recommended. Training is practical work planning and control systems for field staff is recommended as critical to productive functioning of the large numbers of farmer contact agents. Increased allocations to transport are viewed as crucial to service delivery, as well as improvements in the flow of technical information from researcher to farmer. A recommendation is also made to enhance the entire planning/programming process. Other recommendations concern harmonization of schemes of service, adjustment of salary differentials, orientation and induction training, performance appraisal, leadership and human relations, estimates drafting, disbursement procedures, procurement, and personnel records.

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Professional and Subprofessional Agricultural Manpower in Kenya (Demand, Supply, Education and Utilization)

Submitted to:

**U.S. AID Mission to Kenya
and
Government of Kenya**

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INTRODUCTION

The fundamental report on Agricultural Education in Kenya by the Weir Commission was published in 1967. Ten years later national development had overtaken its manpower projections. It could no longer serve as an adequate basis for demand projections or as a guide for planning educational output capacities.

In that ten year period several other reports have dealt with issues of agricultural education and services. In 1970 the Crawford Report on Agricultural Extension Services dealt with staffing and training, particularly at the level of the Junior Technical Assistants. Two years later, the International Labor Organization Report on Employment, Incomes and Equality devoted attention to manpower requirements in agriculture, to guidelines for education and to issues of staff utilization. The Wamalwa Committee on Training (1972) discussed aspects of professional and subprofessional agricultural manpower needs and recommended that the lack of reliable manpower projections be remedied. It also commented on underutilization of facilities, duplication of efforts, and ineffective deployment of staff.

In the same period, the implementation of new agricultural programs, changes in the character and needs of the agricultural sector and policy decisions such as the phasing out of Junior Technical Assistants in the Ministry of Agriculture appeared to change training requirements profoundly. The increasing use of trained agriculturalists by the commercial sector also necessitated a reliable estimate of the needs of that part of the sector associated with agriculture.

To meet information requirements for the Fourth National Development Plan for 1979 to 1983, the Government of Kenya and the U.S. AID Mission collaborated in an effort to establish an estimate of

requirements for academically trained agricultural manpower and for development of the educational system to fill these needs. This report is the result of the effort.

SUMMARY

This report presents the results of:

- (1) a comprehensive manpower survey of professional and subprofessional agriculture manpower employed in 1977 and that which will be needed by 1983 and 1988;
- (2) an analysis of these needs and their implications for the expansion of existing training facilities or the creation of new ones;
- (3) a study of the agricultural education system in 1977 with recommendations for its incremental improvement;
- (4) a study of the effectiveness with which agricultural manpower is being used by the Ministry of Agriculture with recommendations for improving its utilization.

In addition, approximate costs for expansion of the agricultural education system and for implementation of other recommendations were estimated. On request of the Government of Kenya, a discussion of issues related to the findings of the studies and their implications on sector policies, manpower deployment and program operations was included.

1. Survey

The establishment based survey determined current staff and additional staff requested for the future (1983 and 1988) through interviews with unit managers in the public sector and in the private and mixed commercial sector. It was found that the public sector is the

dominant employer of academically trained agricultural personnel, employing over 75% of the graduates and diploma holders and almost all of the certificate holders. Within the public sector, the Ministry of Agriculture is the major user, employing in 1977 49% of all university graduates, 55% of all diploma holders, and almost 75% of the certificate holders.

Throughout the total sector, managers would like to increase the number of university graduates employed from 1062 in 1977 to 2699 by 1988, an increase of 152%; diplomants from 1737 to 3650, or 110%; and certificate holders from 4637 to 15,506, or 234%, including 3740 needed for replacement of JTAs in the Ministry of Agriculture.

Between 1977 and 1988, the proportions of graduates, diplomants, and certificate holders requested by the entire sector vary little from current staffing. However, there are significant shifts in these proportions for principal users within the sector. The Ministry of Agriculture hopes to increase the proportion of university graduates relative to diploma holders, while the demand for diplomants in the commercial sub-sector increases relative to bachelors, despite recent strong and effective competition for university graduates by the private sector.

Although a very large increase in certificate holders is requested, the distribution between the public and commercial subsectors shifts by only 5% in favor of the public sector.

About two-thirds of the university graduates and diplomants requested by survey respondents were in the agricultural generalist categories of general agriculture, land and farm management, animal husbandry, and veterinary medicine; remaining requests were for personnel with more highly specialized training. At the university level, specialist requests were concentrated on agricultural economics, agricultural engineering, range management, agricultural education, horticulture and home economics, in that order. Desired specialization among diplomants indicates approximately equivalent requests for specialists in agricultural economics, dairy husbandry and home economics; and smaller, but important demands for range management, horticulture, agricultural engineering and agricultural education.

The private sector identified much of its need for additional personnel in terms of management positions. University graduates are

needed to fill middle and upper management roles (executive, general manager, technical manager). Diplomants are sought as prospective plant and operations managers. A strong need for management talent was expressed by respondents from both public and private sector, yet principals of management does not form a regular part of either university or college curricula for agriculturists. This deficiency is not remedied by regular in-service training except in parts of the private sector.

2. Analysis

The manpower requests determined by the survey substantially exceed the educational supply capacity in Kenya for university graduates, diplomants and certificate holders. These requests represent the need for additional personnel which operational managers feel are needed to fulfill their responsibilities as they perceive them within the existing and foreseeable policy framework, programs and production opportunities. These requests are unconstrained by budgetary (fiscal) limitations. As such, they constitute an apparent demand within the current system of staff utilization, which could be met, - that is, become economic demand - only if funds became available to employ all the requested staff.

To estimate the number of people who could be employed in 1983 and 1988, prospective personnel budgets were calculated at high and low growth rates. Under the high estimate, the Ministry of Agriculture's personnel budget is expected to expand at a compounded annual rate of 8.5% (compared with a historical growth rate of 10.2%), while that of other public sector agencies and of the commercial subsector would grow sufficiently to satisfy the unconstrained requests. Under the low estimate, the MDA's personnel budget was held to a growth rate of 7% (the planning figure used by the Ministry of Finance and Planning), while that of other public sector agencies advanced at 10% and the commercial subsector remained unconstrained.

Then, the number of bachelors, diplomants, and certificate holders that could be employed in the proportions requested by the Ministry of Agriculture, other public sector agencies, and the commercial subsector at these budget levels was calculated. These demand figures were then expanded by applying detailed wastage figures which were

compiled by the survey, thus establishing the training demand on the educational system. Recommendations are as follows:

- University Level: From 150 current annual output in 1977 to 325 in 1985, with all of the increase in the Faculty of Agriculture
- College Level: From 250 current annual output to 500 in 1985
- Institute Level: From 375 current annual output in 1977 to 975 in 1983, 1575 in 1985, and 1875 in 1987

These estimates are conservative in that all additional student output has a high prospect of employment while variations in actual demand can be accommodated by modest adjustments in school intake. The recommendations will not fully satisfy needs as obtained by the survey, but they are close to the probable future demand and have the virtue of avoiding excess capacity.

Estimates and projections assume no significant changes in policies relating to the agricultural sector, nor in the structure and general performance of the various institutions serving the sector. General economic expansion or policies directed at expansion of the agriculture-related commercial sector would elevate the demand anticipated from the commercial subsector. Demand in the public subsector can, of course, be moderated by budget action. With these caveats, it is believed that the educational output levels are the lowest which should be considered.

3. Agricultural Education

While the manpower survey was underway, a separate team was reviewing the agricultural education establishment to consider the more qualitative aspects of agricultural education in Kenya. This work involved visits to the Faculties of Agriculture and Veterinary Medicine of the University of Nairobi, Egerton College, Embu, Bukura and AHITI institutes, Athi River and Naivasha training centers, and thirteen farmer training centers. These visits included interviews and discussions with the leadership and staff of each institution, and an examination of curricula, catalogs and records at each school. At each institution, all aspects of the educational process were examined, including the source,

qualifications and destination of students; the size, qualifications and other characteristics of faculty; the capacity and adequacy of facilities and training materials; capital and recurrent costs and budgets; and relationships with other educational institutions and with the operating agencies.

This process provided an unusually comprehensive view of the agricultural education system and formed the basis for the Team's judgments. The thirty-five recommendations discussed in Part II reflect this judgment, but are necessarily a synthesis of issues, problems and concerns which personnel at all levels discussed with the Team.

Because of long lead times in the educational development process, educators must anticipate needs for specialists before they appear as actual demand. In this regard, it was suggested that the Faculty of Agriculture carefully consider instituting a taught PhD. program, as well as the installation of degree programs in agricultural education, natural resources, range management, and home economics. With due regard for its historical development and the desirability of maintaining a practical orientation, Egerton College might increase the depth of concentration in specific subject matters, even at the expense of some general agriculture taught. Thought might be given to establishing a coastal agriculture institute at the certificate level, and to consider a food processing course to complement degree programs in food technology. Some part of the facilities at Naivasha Dairy Training Center might be devoted to a certificate level course in dairy technology, while a similar course in farm mechanization could usefully be established at Eldoret Farmer Training Center.

Relationships among educational institutions and with operating entities are closer and better in Kenya than in most countries. Even so, closer collaboration in the following areas could be beneficial: a reciprocal internship program between the Faculty of Veterinary Medicine and the MOA Department of Veterinary Services could provide students and faculty with practical experience and improve the technical skills of operating personnel. Increased support for production mode research at Egerton College could improve the flow of research results to farmers. Emulation of the Bukura Outreach Program by other institutions would help

farmers, improve local relations, and provide students with supervised field experience. Drylands development is a relatively new field where close collaboration on research and training between the Ministry of Agriculture, Egerton College and the Faculties of Agriculture and Veterinary Medicine is particularly desirable.

The budgetary limitations which reduced utilization of the Farmer Training Centers appear to have been alleviated. Attention should now be shifted to staff and facilities. Each FTC should have an appropriate and adequately funded farm under its control. FTC principals and faculty should have had field experience in the extension service before their appointment and receive training-the-trainer instruction before teaching. It is hoped that over time, certificate level teachers at these FTCs will be replaced by diplomants.

There is a critical need for in-service training of staff from all levels of the education system. This need includes the faculty and staff of the training institutions as well as professional and subprofessionals employed by other public and private organizations. In-service training is considered to be one of the most important responsibilities of both the education system and the operating agencies. Recommendations are made for establishing a training coordination unit and for possibly an in-service training institute.

The benefits of staff retraining to improve staff competence in response to increasing technological requirements is self-evident. Educational institutions of all levels should work together and with the government to consider plans for reducing the impediments to upward movement of capable and qualified persons between educational levels. The present need to repeat some aspects of course work at successive educational levels may, besides its cost, have the effect of depriving many employers of an optimum mixture of experience and education. This topic is also discussed in Part V.

4. Utilization

Questions on manpower utilization were asked in the survey in order to identify work performance problems which have affected efficiency and effectiveness of the agricultural services delivery system. Considerable

information was collected on the relationships between training and performance, supervisory practices, and the adequacy of logistical, financial, personnel and administrative support systems.

The results of the survey's utilization inquiries were employed as points of entry for subsequent interpretive interviews by a management specialist. Detailed analyses have resulted in recommendations being made across a number of fields. Only the principal ones are mentioned in this summary.

The most important recommendation is for structuring an incentive system which rewards meritorious job performance and lessens the emphases on seniority and formal educational qualifications. A personnel system with greater internal promotional mobility is urged, which will require restructuring of schemes of service and the use of merit selection panels.

In the field of supervision, training in practical work planning and control systems for field staff is recommended as critical to productive functioning of the large numbers of farmer contact agents.

Increased allocations to transport are viewed as crucial to service delivery, as well as improvements in the flow of technical information from researcher to farmer, for both of which suggestions are made.

Lastly, a recommendation is made to enhance the entire planning/programming process, using an annual calendar of activities, focused at the district level.

Other recommendations concern harmonization of schemes of service, adjustment of salary differentials, orientation and induction training, performance appraisal, leadership and human relations, estimates drafting, disbursement procedures, procurement, and personnel records.

5. Cost Estimates

Implementation of recommendations contained in Parts I, II and III of the report will require sizable capital investment and lead to recurrent operating costs. Estimates developed in Part IV and summarized below are approximate only. Detailed estimates must be made by an architectural engineering specialist after a preliminary implementation plan and schedule has been set. With these caveats, capital and recurrent

costs in K£(000) are estimated to be:

	<u>Investment</u>	<u>Annual Recurrent</u>
Faculty of Agriculture (expansion)	3410	867
Egerton College (expansion)	3548	1238
Institutes (expansion and establishment)	15840	1320
Additional Education Recommendations	368	25
Additional Manpower Utilization Recommendations	490	--
In-Service Training Institute	530	69
<u>Grand Totals</u>	24,186	3,519

6. Related Policy Issues

The conduct of this study provided an unusual opportunity for the Team to observe some characteristics and operations of Kenya's agricultural sector. During discussion of the draft report, the Team was asked to use the insights gained for extending commentary beyond the Terms of Reference, to explore some of the policy implications of the findings, to speculate about future trends in the sector and in the agricultural education system, and to offer suggestions for meeting the challenges encountered.

A number of issues raised by the survey are closely intertwined with aspects of current and future policy regarding the agricultural sector, the Ministry of Agriculture's function in future sector development, and the future of the agricultural education system. Part V of the report discusses some of these relationships, identifies some of the problems which may be encountered in the next two decades, and suggests alternative approaches for consideration.

I. MANPOWER ANALYSIS

A. SURVEY

1. Objective

The objectives of the survey were: (1) to determine the numbers of agricultural professionals and sub-professionals which the agricultural sector of Kenya will require by 1983 and by 1988 in addition to those in post in 1977; (2) to determine the status and effectiveness of training institutions; and (3) to determine the efficiency with which agricultural manpower is currently utilized in the Ministry of Agriculture.

The objective of the manpower study, however, is to specify, on the basis of the survey results, the number of people that need to be trained at the university, college, and institute levels to meet sector requirements; and to make recommendations for expansion of training institutions, and for improvement of personnel utilization in the Ministry of Agriculture.

2. Type of Manpower Survey

The Terms of Reference which were established in February 1977 by a collaborative effort of the Ministry of Agriculture and an ATAC team required an establishment based survey. The Terms of Reference specified that:

- a. "The head of each user agency or significant subunit thereof (including commercial users) will be interviewed to obtain interpretive information, and to ascertain the expectations for employing additional or differently trained staff in 1980, 1985 and 1990." ^{1/} (Projected Demand)
- b. "Each supplier agency will be surveyed to determine current enrollment and output, unused capacity (and its cause), and expected wastage." (Existing and Projected Supply)

^{1/} These figures were re-defined to read 1977, 1983, and 1988 to conform with the date of the survey and the ends of the fourth and fifth GOK plan periods.

- c. "The efficiency of preservice training and the effectiveness with which professional and subprofessional personnel are used are believed to be affected primarily by three things: (1) the relevancy of their educational qualification to the post to which they are assigned; (2) the adequacy of logistic and administrative support with which they are provided; and (3) the adequacy of their initial orientation and supervision and the subsequent course of inservice training and supervision. Each of these areas will be examined."^{1/}(Projected Utilization)

The survey was designed to collect a set of manpower demand data attuned to program objectives and constrained only by the professional judgment of program managers in MOA, other public sector agencies and the commercial subsector, at national, provincial and district levels. The objective was to determine the number and type of specialized agricultural personnel these managers felt they needed in order to fulfill their responsibilities and optimize their agency's performance or take advantage of business opportunities.

In order to obtain undistorted demand data from the sector, the term "expectations" in paragraph 2a. of the Terms of Reference was interpreted to mean "need". Otherwise, respondents' experience with past allocation procedures or current shortages of specialized agricultural staff could have distorted the results. This interpretation produced a relatively pure picture of total demand, distributed among educational levels and substantive fields of specialization.

Establishment based manpower surveys tend to yield higher demand figures in the public sector than are usually funded. However, application of successively more stringent budget and programmatic constraints would have forced respondents to set priorities for reasons other than program requirements. For example, instead of requesting a general agriculturalist and a farm management specialist, both of which are needed, a DAO might have had to choose between them. This procedure could have altered demand ratios among specialities and to a lesser extent among educational levels. This procedure was not considered to

^{1/} Complete Terms of Reference are found in Appendix A.

be appropriate since at this stage of Kenya's agricultural development, program priorities should be set by the central government, rather than the operating level, to conform with national goals. The unconstrained survey estimates provide the central government policy makers with an indication of true manpower needs associated with existing and proposed programs. This information can help them decide both how to allocate scarce manpower and may suggest the desirability of seeking operating methods which economize on its use.

3. Survey Mechanisms

a. Instrument

A questionnaire designed specifically for this survey was utilized to collect and record information (see Appendix B). Data was obtained through interviews with top and intermediate level officers, executives and managers in the public and commercial agricultural sector. In a few cases (less than 3.5%) where no interview was possible, questionnaires were completed by respondents and returned by mail. Their data content tended to be complete.

The questionnaire consists of six forms which address the following information areas:

- Form I: Turnover: A listing of staff by grade or job position title and information on recent staff movements (turnover) and reasons for them;
- Form II: Agricultural Manpower Demand: Numerical listing of in-post and required staff by educational levels and professional speciality for intervals of 1977-78, 1979-83, and 1984-88; and interpretative statements;
- Form III: User evaluation of present manpower training and job performance;
- Form IV: In-service training;
- Form V: Staff supervision;
- Form VI: Logistical support;
- Form VII: Professional and sub-professional women in agricultural manpower.

Most of the questions applied both to the public and to the private sector; but some only to one or the other. They were administered accordingly.

Survey questionnaires were designed to record both quantitative and qualitative information. Quantitative data solicited covered personnel in post, their educational background, terminations, retirements, and current (1977) and anticipated staff requirements for 1983 and 1988. This information was collected by thirteen agricultural specialities and eight managerial and research levels:

- General Agriculture
- Agricultural Economics
- Horticulture
- Food Technology
- Home Economics
- Agricultural Education
- Land and Farm Management
- Agricultural Engineering
- Range Management
- Animal Husbandry
- Dairy Technology
- Veterinary Medicine
- Animal Health

- Executive
- General Manager
- Technical Manager
- Loan Officer, Accountant
- Sales and Marketing Representative
- Research Scientist
- Laboratory Technician
- Agronomist
- Other

Data on these job categories were collected at four educational levels: Certificate Holders, Diploma Holders, Bachelors, and a group containing post-graduates, Masters and PhD holders. This format allowed for four times thirteen or 84 response categories with a provision for any special cases not covered.

The qualitative information included an assessment of the adequacy of academic training of staff relative to job requirements, the need for improvement or changes in curricula, the need for either specialized or general educational background in different job categories, adequacy of in-service training and of supervision (management), adequacy of logistical support, effectiveness of job performance, performance incentives and disincentives and the current and potential role of women in agricultural extension.

b. Respondents

To obtain demand projections, perspectives on education and training, and views on utilization issues, three groups were chosen for interviewing. The first consisted of key supervisory management personnel in the public sector who would be able to give authoritative information for their organizational unit and its sphere of responsibility. District Agricultural Officers, Provincial Directors of Agriculture, and Headquarters Division Heads and Directors were selected as those best placed to speak about the range of affairs under examination.

The second group of respondents consisted of Technical Officers and Technical Assistants who are principal field employees executing agricultural development programs and projects. They were surveyed on the adequacy of their training, supervisory practices, supplemental in-service training, and conditions of service. They also filled in job function lists so that their daily work role could be assessed and compared with their training backgrounds.

The third group of respondents consisted of managers in the commercial sector. Assessment of both quality and quantity of their manpower demands over the coming twelve years was the principal topic, but opinions on the conditioning economic outlook were also solicited. Together, these three groups carry operating policy and program responsibilities, supervise personnel, operate the administrative support machinery, and carry out practical business and field decisions and operations.

c. Data Collection Methods

The survey was conducted by three survey specialists with two manpower analysts assisting. All were at least at the Masters level by academic background, possessed experience in human resource development, and three had worked in Kenya prior to this study. Two spoke Swahili.

Preparation for the survey varied with the respondent. At MOA headquarters, staffing requirements had already been worked out in detail by most department heads just prior to this survey. In the field, as in most other agencies, staffing needs were usually developed on the spot (see description of interview, below). In the commercial subsector, private firms were highly confident about their needs in the next two years, but were unwilling to forecast beyond three. Mixed firms were better able to forecast, presumably because of their greater stability.

Description of Survey Interview. This section describes in detail the process used to obtain the demand data. The survey is not amenable to extensive statistical tests, so that confidence in the results depends on an understanding of the quality of the interview process. The following description was prepared by the survey team and is included here to describe the data collection process and the level of knowledge of the field officers and their staffs.

The survey interview would open with a computation of the present staff profile. The DAO and subordinate section heads would enumerate all staff under them, beginning with the DAO and other AO level staff, moving through the AAO, TA, and JTA levels. Next, immediate needs were estimated. Immediate needs were positions that fell vacant during the past year (other than at the JTA level),^{1/} and needed to be filled immediately if productive capacities were to be maintained at pre-vacancy levels. Without them the DAO was uncertain if a functional section under his authority could operate.

The question then focused on future needs. The interviewer would start by reminding the DAO and his subordinate staff of the present number of persons in a given position and then ask for an estimate of the number of persons they feel they require for that position over the period 1978-1983 and for the last period, 1984-1988. After completing the future needs assessment for present establishment skill positions, we would ask if there were any other skill areas needed for the district

^{1/} Junior Technical Assistants (JTAs) - (Junior Agricultural Assistants, JAAs, and Junior Animal Health Assistants, JAHAs) were not included in the manpower survey.

not presently covered by the establishment positions. Their response would be something like, "Oh yes, we need an irrigation specialist. But considering the needs of the district, he only need be at the TA level." We would ask him if this position could be covered by any of the present establishment skill categories and by any of the additional manpower already requested. If the DAO indicated he required a new position with an additional staff member, we would add a new category (e.g. irrigation specialist) at the appropriate staff level (e.g. TA) and the number required (e.g. one person, 1982). If, on the other hand, the DAO felt that the TAs requested were sufficient in numbers but at least one of them required an irrigation speciality in addition to his basic training, the interviewer would subtract one TA from the future needs columns and add that position into the new skill area position (e.g. if 10 new TAs in general agriculture were requested, one would be moved from the 'general agriculture' column and added to the 'irrigation specialist' column). After the numbers were computed, the interviewer would ask the DAO and his staff to justify their requests. We would say something like, "You have asked for an additional five TAs in Land and Farm Management. Why do you need these five additional TAs?" Their rationale clarified the numbers and acted as a check on the figures. In some cases, though very few, the rationale offered by the DAO and his subordinates could not support the figures. Adjustments were made accordingly in the estimates.

In most instances the projections reflect the manpower required for the district office to operate efficiently and productively in the foreseeable future under current administrative and service conditions and practices. The DAO considered the capacity of the district office to supervise new staff, the present and the future needs for the district's development. The projections are conditioned first and foremost by the need to flesh out the district's administrative structure. The district is divided into divisions, locations, and sub-locations. It is general MOA policy to deploy AO level personnel at district offices whenever available. Because of shortages of BSc graduates, however, many district headquarters posts are filled by TOs. In the interview setting, the DAO would assess the functional needs of each section he has at present and the additional ones he requires to meet the district's needs. For example, in one mixed crop-livestock district we found that the DAO had a crops officer and a veterinary officer at the AO level. The DAO indicated he required a Land and Farm Management officer to handle the growing number of integrated agricultural development projects, a home economics officer to oversee that increasingly important area, and a livestock officer to handle dairy development. In another District the DAO was also the district veterinary officer. He had no other AO level officers and relied on TOs. He believed that AO level officers were needed for crops and range management, but no others. The total additional AO level staff required was two. He felt this would be sufficient to handle the district's development in the foreseeable future.

Technical officers almost always serve as Divisional Assistant Agricultural officers. Where vacancies existed these were noted as existing 1977 needs. Similarly, where vacancies or present and projected

workloads required more staff at Technical Assistant levels for locations and sub-locations, estimates were made accordingly.

We were careful to avoid double counting in those cases where an AAO occupied a position which should really be filled by an AO. DAOs would indicate if the present individual needed replacing with an AO ("I really need a more trained individual in this position. My present officer is not equipped for it") or if the present occupant should keep the job. When the DAO felt he did not need to replace his AAO, by a different individual at the AO grade, he would usually argue for more in-service training which would permit promotion to AO level and award the pay which is commensurate with the duties the AAO was already performing.

Locations and sub-locations are staffed by TA (certificate level) and JTA personnel. The MOA is attempting to phase out all JTAs and to staff those positions with TAs. This policy finds general agreement in the field.

The manpower projections are conditioned, secondly, by the on-going changes and developments in a district's agricultural sector. Several of the districts are undergoing significant changes in the make-up of the agricultural sector. This was very evident in those districts which have, or had, large-scale, European-owned farms. The large farms are being broken up into five to fifteen acre smallholder units with mixed cropping and livestock (dairy cattle, goats). But the extension service's manpower is still at a staffing level commensurate with the requirements to service a small number of large-scale farms and is not adequate to handle the burgeoning number of small-scale farms. We found this to be the case in Kericho, Nakuru, Nyaharuru (Thompson Falls), Elgeyo Marakwet, Uasin Gishu, Trans-Nzoia, and Laikipia districts. Other districts in which new projects are scheduled need additional manpower above and beyond that required to flesh out the administrative structure. We found this to be true in Meru, Embu, Machakos, Muranga, and Kiambu.

Some of the districts are so large that fleshing out of the administrative structure is not sufficient to provide extension services to farmers. Baringo, Laikipia, West Pokot, Isiolo, and Kajiado districts fall into this category. Pockets of farmers are spread throughout these enormous districts. The need for staff at the sub-locational and locational levels to reach these farmers in any systematic fashion is quite considerable.

The DAOs and the senior staff at the district level have a remarkable grasp of their office's capabilities and limitations and of the changes in the agricultural sector of the district. They seem to know the productive capacities of their individual staff and the necessary manpower needed to maintain that level of output. They seem to grasp the sector changes occurring in the district and the implications this has for increased workloads and performance standards. They seem to have a clear idea of new projects that are scheduled for implementation in their districts over the next several years. Some of the DAOs have prepared projects, or requested inclusion of their districts in present projects and understand the significance of their requests on manpower

requirements. They seem to recognize the interrelationships of manpower numbers, individual productivity, workloads, size of area, and the supervisory and support services required.

4. Establishments Surveyed

For the purpose of this study the agricultural sector is defined as those agencies or firms which employ or will employ during the next two plan periods agricultural professionals or sub-professionals holding one or several of the following degrees: Certificate, Diploma, Bachelor, Master and/or Ph.D. Therefore farmers, traders, retailers, producers, and others not now employing, nor anticipating employment of personnel with this type of education are excluded. An exception are managers for a small number of absentee-owned farms which are operated and likely will be operated by certificate and diploma holders.

The following establishments were selected for coverage by the survey:

a. Ministry of Agriculture

i. Headquarters. All departments of the Ministry were covered. In 1977 the headquarters had 270 individuals posted in the field which are directly under headquarter's jurisdiction. They are as follows: 44 AOs; 8 ROs; 7 AHOs; 95 AAOs; 21 AROs; 11 AAHOs; and 84 AAs. A specific effort was made to avoid double counts from the headquarters and district surveys.

ii. Provincial Headquarters. Six provincial headquarters were visited and interviewed. The seventh, Garissa, returned a completed questionnaire with supplementary information.

iii. District Offices. The survey team visited 30 district offices and, in addition to the respective District Agricultural Officers, interviewed approximately 105 agricultural and veterinary officers and assistants.

Three district offices mailed in completed questionnaires; data for the remaining seven had to be estimated on the basis of interviews in neighboring districts, information from MOA headquarters and by drawing analogies with agriculturally and ecologically similar districts.

b. Other Public Sector

i. Other Ministries. Fifteen division heads or directors were interviewed from the Ministries of Education, Lands and Settlement, Natural Resources, Tourism and Wildlife, Water Development, Cooperative Development, Home Affairs and Finance and Planning. Also interviewed were the Directorate of Personnel Management and the Kenya Institute of Administration, within the Office of the President, for interpretive purposes.

ii. Educational Institutions. Although educational institutions were included in interpretive surveys, their future staffing was not included in the survey results as that is functionally dependent on demand and on policies of implementation. The demand for teaching staff is developed in Section IC, 3c: Planning and Implementation.

iii. Regulatory Bodies. Twenty five of thirty one regulatory boards and commissions, or 80 percent, were surveyed. These bodies have a relatively small demand for manpower. They draw either on young graduates (and some diplomants) or from the ranks of highly experienced senior government personnel. The manpower pattern is very similar among the regulatory bodies.

c. Commercial Sub-Sector

A classification problem was posed by the definition of Parastatal Bodies (status 040), Public Firms with Majority Control by the Public Sector (status 080) and Public Firms with Minority Control by the Public Sector (status 210). Since these classes are in constant change, it was decided that all regulatory agencies and commercially non-active bodies should be subsumed under 'Other Public Sector'; all other public firms under the 'Commercial Subsector' which includes public, private and mixed firms. Any misclassification would be minor and is, in any case, cancelled in the grand total demand estimate.

Nineteen of twenty five I.S.I.C. ^{1/}, ^{2/} subsectors and five other industry groups appeared likely to employ agriculturally trained personnel.

^{1/} International Standard Industrial Classification

^{2/} See Appendix C, Table C-7 and Table C-9

These twenty-four groups contain 390 firms.^{1/} A preliminary sampling indicated that it was highly improbable that any firm with fewer than 50 employees would utilize specialized agricultural personnel, reducing the total field to only 130 firms. Elimination of firms in the type of retail or refinement activities that would have no use for such personnel reduced the probable group to 104, all of whom were contacted.

Seventy-six of the 104 firms were interviewed ^{2/} and the rest were sent questionnaires. Twenty-four of the twenty-eight which were not interviewed did not return the questionnaires. A follow-up by phone calls revealed that they did not now employ nor did they anticipate future employment of the type of agricultural personnel included in the survey.

There is always a chance that the team, those interviewed, or the government officers who assisted in identifying any firms which might not have been listed in the 1974 Directory of Industries and special updated read-outs of the Central Bureau of Statistics, may have failed to identify some relevant firm. Given the extensive coverage of the sector it is probable that the survey accounted for more than 95 percent of the specialized agricultural personnel employed in the commercial sub-sector; and at least that percentage who now believe they might employ such staff in the future. It was found that only 28 firms employed trained agricultural staff. This is a very small number for a country with an agricultural base as large as Kenya's.

5. Other Data Sources

a. Complement Control Data

Personnel data were compiled from MOA Headquarter's Complement Control files for comparison of the field survey data. The comparison involved a conversion of positions and grade levels to the educational level classification used in the survey (see Section 6a below). It was not possible to compare data on a provincial level. However MOA

1/ See Appendix C, Table C-9

2/ See Appendix C, Table C-9

totals from the survey and from Complement Control could be compared (see Section 7c, below)

A 30 percent sample of the provincial personnel reports to Complement Control was utilized to determine retirement rates for the different grades.

b. Central Bureau of Statistics

Through the cooperation of the Directorate and staff of the CBS, it was possible for the study team to obtain unpublished and specialized data which made it possible to survey the private sector in a much more precise manner than would have been possible otherwise.

Similarly, data excerpts from unpublished files allowed the construction of growth rates which were important for verification of rates established from the survey data and utilized in the projections.

Economic Surveys and Statistical Abstracts were consulted for general trends of the economy and of the agricultural sector. GOK budgets for 1976/77 and earlier ones were utilized for calculations performed under Section I-C.

c. Three International Development Agencies were interviewed in addition to the Planning Departments of the Ministry of Agriculture and the Ministry of Finance and Planning to obtain an overview of the status of current and planned programs and projects.

6. Data Treatment

a. Equivalency of Educational Levels

A major objective of the manpower study is to determine the current and future needs for academically trained agricultural manpower so that output capacities of the agricultural educational system can be adjusted accordingly. Consequently, data are presented by educational levels and agricultural specialities. This involves a conversion of public and private job categories. The following conventions were adopted:

i. Public Sector All positions which are likely to be filled in the future with graduates were counted under the BSc+ ^{1/} category. This

1/ The designation BSc+ is adopted throughout the report to include bachelors, postgraduates, masters and PhDs.

includes all Agricultural Officers I and II in the salary grades J,K, and above. Positions of Technical Officers I, II, and III in the pay scales G, H, J, and K are treated as diploma holders whether or not each incumbent possesses that qualification. All Technical Assistants in grades E and F are treated as certificate holders.

ii. Commercial Sector. A similar convention was applied to the commercial sub-sector. Many executive positions in the commercial sector are filled with persons whose competence rests on prolonged experience and knowledge of the particular business branch, and there is no equivalency of job categories with educational degrees. Guidance was taken from industry itself. Positions which will be filled in the future with graduates, diploma or certificate holders are listed under those categories.

b. Data Compilation

Questionnaires were compared with notes which were taken at the time of the interview to amplify information recorded on the questionnaires. The quantitative and qualitative information was checked for consistency and then coded for computer compilation. Data were then compiled and summed by computer into educational and functional groups which are presented in a separate volume, Appendix G-1.

Qualitative information collected in interviews and recorded on questionnaires and interview notes were utilized in the treatment and discussion of results in subsequent sections of this chapter as well as in Part III of this study: Manpower Utilization.

c. Wastage

Training requirements are determined by expected manpower demands as well as by losses from the agricultural manpower sector. These losses consist of retirement, deaths and persons leaving for employment outside the sector.

i. Retirement. Retirement rates were calculated for the different professional grades from a 30 percent sample of the provincial personnel reports as they are made available to MOA Complement Control. These were

checked against an independent calculation, based on the average length of service. Before rates were finalized, they were discussed with Complement Control and adjusted where necessary. Rates for the private sector are derived from interview information.

Retirement rates vary considerably from job grade to job grade and from specialization to specialization depending on entry age as a function of education and on the year a speciality, program or job category was established. Rates are also affected when staff has been retained beyond retirement age resulting in superannuation, or when the cadre is so young that individuals will not reach retirement age in this study period.

Rates also vary between the 1977/83 and 1984/88 periods. These rate changes are to be expected as long as the public and private sector expand and as long as new disciplines are being phased into education and service.

A detailed discussion of retirement rates by educational levels and specializations is found in Appendix D1.

ii. Outflow. The objective of the study is to determine training requirements for the total (public and commercial) agricultural sector. Because of the total sectoral objective the only important outflow is the exit of trained staff from the agricultural sector as a whole. Other rates describe merely intra-sectoral transfers and have no influence on over-all supply. In effect, the public sector will only be able to meet its requirements when the demand of the commercial sector is met since the demand of the private sector is limited only by its estimate of an individual's marginal utility and not by any fixed budget.

There are minute losses from both the public and the commercial sectors to private, non-commercial farming. For convenience of computation, losses other than by retirement have been computed only from the commercial sector and then usually at a rate of one half of one percent.

Rather detailed intra-sectoral transfer rates were collected in the course of information compilation. These rates are presented in Appendix D2(A) and wastages from sub-sectors of interest are calculated in Appendix D2(B).

d. Survey Data Expansion

i. Public Sector. As indicated above in Section 4, survey coverage of the sector was very high. Survey data did not require expansion to arrive at total sub-sector values for MOA headquarters, nor for provincial offices. Of the 40 districts, 30 were visited and three responded by mail. Data for the other seven districts were assembled prior to computer compilation, as discussed in Section 4a (iii), so that the district data entered computation as a quasi-total sample.

The functions and manpower demands of the regulatory boards are very similar. The 80 percent sample of these bodies was expanded by 20 percent for each speciality in each educational level. It should be noted that the computer print-outs in Appendix G1 and G2 present only the 80% sample. Tables in the text, however, have been expanded to represent one hundred percent coverage (see Appendix E).

ii. Commercial Sector. All sub-sectors were covered. Ten sub-sectors could not be sampled completely, but the characteristics of the establishments not covered in each sub-sector were known. Thus expansion could be performed on a firm-by-firm basis. For details see Appendix E.

e. Projections

i. Public Sector. The public sector was able to estimate its manpower requirements well through 1983 and with less certainty to 1988. The only striking exceptions are the responses from all the districts. None of the interviews and none of the questionnaires returned by mail yielded any demands for 1984 to 1988, the fifth plan period. This may have resulted from two primary causes: (1) An uncertainty in predicting policies and allocations in general as these are made from headquarters, possibly with limited input from districts; (2) personnel requested for the 1977-1983 period were considered by the district officers to be sufficient to perform any additional functions which are thought necessary to cover in the 1984-1988 period. Obviously, personnel added in the 1978 to 1983 period would still be available in the next plan period. The lack of response for the last time period also implies that little fundamental change was envisioned in extension methods or agricultural practices which would alter manpower demand level and composition beyond 1983.

The survey team probed this phenomenon during interviews and it appears that respondents considered the requests for personnel needed now (1977-78) and those requested through 1983 as sufficient to meet their needs until 1988. With this interpretation, survey responses must be considered numerically complete through 1988 and therefore no growth rates were applied to the public sector demand figures.

ii. Commercial Sector. In the commercial sector, private enterprises were highly confident about needs in the next two to three years, but were unwilling to forecast beyond 1983. Most were unwilling to forecast beyond three years. The private sector responds sensitively to economic opportunities, and will adjust its staff to meet them. Since it can outbid the public sector for specialized staff when these opportunities warrant their use, it has less need to plan their acquisition in advance. The mixed firms (status 080 and 210) were better able to forecast than the strictly private firms, presumably because of their greater stability; but few were able or willing to estimate demand for the 1984-88 period.

In order to arrive at demand figures for both plan periods, growth rates were applied to the commercial sector survey data. The projection mechanism was set up so that growth rates were applied when the respondents gave an in-post (1977) figure or a request for 1983. If neither were given for any speciality, no projection to 1988 was made. Similarly, no projection was made if respondents indicated that no additional personnel were needed.

Growth rates were (1) derived from the survey itself; (2) calculated from special data extractions provided by the Director of the Central Bureau of Statistics from the computer files of the bureau; and (3) drawn from published statistical materials. Hiring patterns over the last years (as well as intended future hires) were ascertained in interviews and the data then converted to growth rates. A tabulated distribution of Wage Employment in Agricultural Industry by Sector, 1972-76 (special extraction, courtesy CBS) allowed the construction of approximate growth rates for different professional levels for the Central Government, Other Public Establishments and for the Private Industry. These could be checked against rates derived from published economic and statistical reports.

Growth rates were applied in the private sector under the assumption that the economy will continue to expand and hence the private sector will continue to hire at similar rates, in addition to Kenyanizing positions. Interviews indicated a recent swell in hiring, especially of bachelors, which may have temporarily attenuated the pronounced need of the private industry for prospective young executives. We projected therefore at a somewhat reduced average rate for the fourth plan period and allowed an acceleration in the fifth plan period for private industry.

A detailed discussion of growth rates is found in Appendix D3. The calculation mechanism designed for applying growth rates is discussed in Appendix F. Growth rates applied to individual specialities and educational levels are listed with the output tables in Appendix G2.

7. Survey Uses and Limitations

a. The Establishment Based Survey ^{1/}

Numerous methods of conducting manpower surveys and forecasting demand are reported in standard texts, and variations of these abound in practice. Basically, there are two pure models and one which integrates both approaches.

The first is a projection method. It projects past trends into the future. In a developing sector where changes are expected to occur relatively quickly, this method is unsatisfactory as it may perpetuate existing shortcomings and not respond to emerging activities or policy priorities of the sector.

A second method, the target oriented approach, essentially sets policy objectives to be achieved and then determines organizational structures, manpower qualifications and numbers which planners estimate will be required to reach those targets in a planned time span within an allocated budget.

The Terms of Reference of the study specify that current and future manpower requirements be determined by interviewing administrators, managers, executives and policy makers in the agricultural sector. This calls for an establishment based survey. That survey combines the two approaches above. It requires the key program and project management

^{1/} "Establishment" in this context refers to an organization and its constituent subdivisions which provided manpower information.

personnel to define current personnel needs and likely future requirements in the light of current and proposed programs based on the managers' past experiences. This is seen as preferable to the assessments of a planning team far removed from program operations.

As described in Section 2, above, the establishment based survey does not apply any budget constraints, nor does it use interview techniques which might limit or channel responses. Instead, it seeks to relate manpower demands as directly as possible to attainment of program objectives.

One of the important aspects of the present approach is that it does integrate into the survey response a wealth of information on operating conditions in the service organization and in the client sector. It takes into account the usually intricate knowledge of district and provincial operating personnel about farmers, farms, inputs, marketing, credit and related economic and cultural features which are generally not specified even in the target oriented approach but which may profoundly affect personnel needs.

Another important aspect of this survey is that it does not touch on the structure and organization of manpower deployment or policy changes. It assumes that the national economy and the agricultural sector do not significantly change over the forecasting period; that the relationships among agricultural products remain fairly stable, and that efficiencies in services will probably improve only gradually although the sector may continue to develop and grow. Similarly, no revolutionary changes will occur in overall agricultural policies, technology or elsewhere in the agricultural sector which will require manpower of different competence and composition than now exist.

The establishment survey does clearly indicate required numerical changes in educational levels, and in proportions of professional specialists needed to adapt staffing to recent and anticipated changes. It does deal with the manpower requirements of known future programs; it does not take into account programs and policies not known to the respondents.

Because service delivery structure and economic and policy structures are perceived to change slowly or may be perceived as being beyond the control of the respondent, the manpower response to future needs is largely in terms of numerical staff increases rather than in

improvement of the efficiency in the system. Similarly, changes in the proportions among educational levels and among specialist categories estimated by respondents are based on the need to meet service and production targets without assuming a significant change in structure or efficiency of the delivery system.

In other words, the establishment based survey relies on the fact that large organizations and large sectors change only slowly. Since the establishment based survey reflects the perceptions and judgments of key executives and appointed government officials who manage significant units of the sector, it provides an important input into the judgment of policy makers whose responsibility it is to improve the performance of the sector.

b. Interpretation

The survey results represent the best estimate of manpower needs as judged by program management and business managers for fulfilling responsibilities as perceived by them within current conditions and outlooks. Because these estimates are not constrained by budget, they are attuned more directly to program objectives within this environment than estimates derived from the annual budget approach process, both in quantity and in the ratios between educational levels and professional specialities.

Because of their unconstrained nature, the apparent demand will in general be higher than probable budget allocations will make possible. However, since they reflect program needs most directly, they can be utilized as an input to policy determination on types and numbers of personnel who must be trained to achieve national agricultural objectives. The survey in essence provides an effective shortcut to determining manpower needs without analyzing in detail reasons, motivations, programs and policies under which requests were made. In practice, it is extremely difficult to identify and weigh the influence of each of these factors even with detailed surveys.

Apart from the detailed demand structure the survey provides, the data is most useful because of the questions that must be raised when comparing the survey results with the current staff in post. The gap reflects

the effect of budget limitations and judgments made at successive management levels. Does the indicated shortfall result from budget deficits alone, or does it imply unclear objectives, overly ambitious targets, unsuitable project or program designs, inefficient operating methods, or inadequate staff support? Can programs or operating methods be altered so that existing or prospective staff can more closely fulfill their responsibilities? Can the work be more precisely targeted so that it can be accomplished by existing and prospective staff? Can efficiency or staff be improved by providing better logistic and administrative support?

When, as is done in the next section, the consolidated base data of the public sector is constrained at anticipated budget levels, it provides a reliable basis for estimating training requirements for the agricultural sector. The funding constraint assures that no more personnel will be trained than can be absorbed by the (public) sector. The utilization of the proportions of different types of staff identified by the survey assures that the numbers who are trained at each output level will be needed in those proportions.

Since the survey was not intended to deal with policy issues (and hence is not structured internally to do so), it is not possible to adjust its demand and forecast figures to an alternative policy and service framework. That can only be accomplished by estimating the impact on manpower requirements of a specific future policy change and adjusting the survey data to resulting program and project manpower estimates.

Manpower requirements for activities connected with policies and programs that were in effect at the time of the survey are included in the demand figures. For example, additional manpower requirements for the implementation of IADP programs are included for those districts in which the program was being implemented or known to be scheduled.

In the private sector, present requirements reflect the current shortfall in professionals needed to optimize business opportunities. Estimates for the near future were based on economic outlook as seen by the industry at this time. Estimates by businesses are likely to be on the conservative side. There is a hesitancy to overcommit or to commit

at all unless business opportunities can clearly be identified. In addition, even though the survey was confidential and respondents by and large gave detailed and open accounts, there is a natural reluctance to reveal expansion plans.

c. Accuracy and Consistency

The survey instruments and procedures were field tested before the actual survey was mounted. No provisions were made for a sample resurvey for ascertaining accuracy and consistency of responses through repeated interviews. In light of the survey procedures (see Section 3, above) it is probable that those interviewed would identify similar needs for manpower in response to conditions and objectives which were well recognized at the time of the survey.^{1/}

An indication of the accuracy of the survey procedure can be obtained by a comparison of in post data from the survey with MOA Complement Control data (Table 1).

Table 1. Comparison of In-Post Data Derived from the Survey with Complement Control Figures.

<u>Degree</u>	<u>Complement Control</u>	<u>Survey</u>	<u>Difference</u>	
			<u>Number</u>	<u>Percent</u>
BSc+	462	525	63	13.6
Diplomants	879	842	37	4.2
Certificates	3443	3442	1	0.0

The relatively high difference between Complement Control data and survey data for bachelors derives in part from the inclusion in the survey of recently hired graduates who were not yet registered in Complement Control. Fifteen of these were positively identified from survey notes, reducing that error rate to 10.4%. These error rates are within or close to the reporting lags to be expected, and are small relative to the

^{1/}Spot checks by MOA headquarters appear to confirm the consistency of field responses.

projected requirements.

Demand figures derived from unit managers are likely to be most accurate over the near term and are probably quite sound through 1983. Thereafter, accuracy is expected to diminish, both because of decreasing ability to forecast needs, and because the environment which determines manpower requirements (economic, policy, program, client, technology) will have changed. Repetition of this manpower survey in approximately five years will thus provide a more accurate basis for the Fifth Plan Period.

An indication of the consistency of the needs expressed can be obtained by comparing essential ratios derived from the data (Table 2). The consistency of the 1977 and 1983 ratios is striking, whether these are based on constrained or unconstrained figures.

We read this information to mean that if past budgetary trends were to be continued the ratio of farm households per agent (127 to 1 in 1977) would be approximated (121 to 1) in 1983. However, program managers in the districts do not feel they are reaching all their clientele with current MOA staffing. The number of people they feel they are short in 1977 would, if available, reduce the farm-agent ratio to 97:1 in 1977. It is noteworthy that the unconstrained requests for 1983 yield very similar result; with a ratio of 92 rural households to one agent managers feel they could service their clientele properly.

There also appears to be notable consistency in the managerial relationship demonstrated by ratios between contact agents and managerial-technical personnel. The fact that there is little change in ratios in 1977 in post and requested staff implies a realistic appreciation of what can be achieved in the short run given current technology, organizational structure and clientele. The fact that these ratios drop by one third by 1983 suggests a belief that technology will become more demanding and introduction of programs like IADP will require improved management effort and capabilities. Because of the survey interview experiences in over 30 districts and provincial headquarters (see Sections 3b and 3c, above), we would like to attribute these internal consistencies to the informed responses of the officers interviewed rather than to statistical coincidence.

Table 2

Relationships Among Farm Households, MOA Contact Agents and Managerial Technical Staff

	1977		1983	
	In Post	Requested	Budget <u>3/</u> Constrained	Requested <u>4/</u>
Rural Households <u>1/</u>	1,300,000		1,600,000	
Contact Agents <u>2/</u>	10,240	13,340	13,250	17,433
Managerial-Technical <u>5/</u>	1,370	1,825	2,330	3,630
Ratios:				
Number of Rural Households to each Contact Agent	127	97	121	92
Number of Contact Agent to each Managerial-Technical Staff Member	7.5	7.3	5.7	4.8

1/ Projected frp, ILO manpower study at 3.5% annual growth

2/ JTA's and TA's combined

3/ At 10.2% annual growth, i.e., past long-term trend (see note

4/ Directly from survey

5/ BSc+ and diplomants

B. DATA PRESENTATION AND ANALYSIS

1. Survey Data

a. Personnel Requests. The consolidated personnel requests obtained from the survey are summarized in Table 3. The data are classified by educational levels: Bachelors^{1/} and other university degrees, diploma holders and certificate holders. The data have been further disaggregated by the principal users: Ministry of Agriculture, Other Public Sector agencies, and commercial subsector (see Section A4 for description of each user class). The numbers in each category are presented as current staffing and additional requests over time as follows:

- Personnel in post in 1977: This is the actual number of people in office, as distinguished from authorized establishments, which include vacancies.
- Additional staff needed in 1977: These include existing vacancies plus respondents' estimates of how many additional people are believed to be needed in 1977 to handle current workload.
- Additional staff requested by 1983: This includes unfilled 1977 needs plus respondents' estimates of how many additional people will be needed by 1983 to cope with anticipated workloads.
- Additional staff requested by 1988: This, too, is a cumulative figure and sums the requirements foreseen for the period 1984-88 to those for 1977-83.

The personnel requested by 1983 and by 1988 as summarized in Table 3 are additions to the 1977 in post staff. To arrive at the total staff desired in post in 1983 and in 1988, the 1983 and 1988 request figures are added to the 1977 in post figures, respectively. These in-post figures are given in Table 4.

^{1/}Ph.Ds, Masters and Bachelors are summed to a category designated throughout the report as BSc+.

Table 3

Basic Survey Data on Personnel Requests^{1/}

	In Post	Additional Staff Requested		
	1977	1977	1983	1988
<u>Ministry of Agriculture</u>				
MSc	--	5	182	289
BSc	--	215	1022	1513
BSc+	525	220	1204	1802
Diplomants	842	238	1062	1554
Certificate Holders	3442	3095	7191	8632
<u>Other Public Sector Agencies</u>				
MSc	--	4	79	179
BSc	--	31	195	440
BSc+	316	35	274	619
Diplomants	552	213	622	1127
Certificate holders	957	103	1213	2562
<u>Total Public Sector</u>				
MSc	101	9	261	468
BSc	740	246	1217	1953
BSc+	841	255	1478	2421
Diplomants	1399	451	1684	2681
Certificate holders	4399	3198	8404	11,194
<u>Commercial Sub-sector</u>				
MSc	23	11	37	62
BSc	198	29	172	216
BSc+	221	40	209	278
Diplomants	338	30	617	969
Certificate holders	238	233	413	572
<u>Grand Total</u>				
MSc	124	20	298	530
BSc	938	275	1389	2169
BSc+	1062	295	1687	2699
Diplomants	1737	481	2301	3650
Certificate holders	4637	3431	8817	11,766

Source: Manpower Survey

^{1/}Personnel Requests = Number of additional posts requested, cumulative to the indicated year.

Table 4

In Post 1977 Staff Distribution and
Requested In Post Distribution in 1977, 1983 and 1988 ^{1/}

	<u>--In-Post--</u>		<u>Requested In-Post</u>					
	<u>1977</u>		<u>1977</u>		<u>1983</u>		<u>1988</u>	
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
<u>Ministry of Agriculture</u>								
BSc+	525	10.9	745	8.9	1729	12.1	2327	13.8
Diplomants	842	17.5	1080	12.9	1904	13.3	2396	14.3
Certificates	<u>3442</u>	<u>71.6</u>	<u>6537</u>	<u>78.2</u>	<u>10633</u>	<u>74.6</u>	<u>12074</u>	<u>71.9</u>
Total	4809	100.0	8362	100.0	14266	100.0	16797	100.0
<u>Other Public Sector</u>								
BSc+	316	17.3	351	16.1	590	15.0	935	15.2
Diplomants	557	30.4	770	35.3	1179	29.9	1684	27.4
Certificates	<u>957</u>	<u>52.3</u>	<u>1060</u>	<u>48.6</u>	<u>2170</u>	<u>55.1</u>	<u>3519</u>	<u>57.4</u>
Total	1830	100.0	2181	100.0	3939	100.0	6138	100.0
<u>Commercial Sub-sector</u>								
BSc+	221	27.7	261	23.7	430	21.1	499	19.1
Diplomants	338	42.4	368	33.5	955	46.9	1307	50.0
Certificates	<u>238</u>	<u>29.9</u>	<u>471</u>	<u>42.8</u>	<u>651</u>	<u>32.0</u>	<u>810</u>	<u>30.9</u>
Total	797	100.0	1100	100.0	2036	100.0	2616	100.0
<u>Total Sector</u>								
BSc+	1062	14.3	1357	11.7	2749	13.6	3761	14.7
Diplomants	1737	23.4	2218	19.0	4038	19.9	5387	21.1
Certificates	<u>4637</u>	<u>62.3</u>	<u>8068</u>	<u>69.3</u>	<u>13454</u>	<u>66.5</u>	<u>16403</u>	<u>64.2</u>
Total	7436	100.0	11643	100.0	20240	100.0	25551	100.0

Source: Table 3

1/Note: This table, unlike the others, presents the total staffing pattern, i.e., 1977 in-post plus staff desired in-post in 1977, 1983 and 1988.

2. Analysis of Unconstrained Requests

The survey results represent the best estimate of manpower needs as perceived by program management for fulfilling responsibilities as perceived by program management within the current environment as perceived by program management. These estimates are not constrained by budget or other factors which are extraneous to program management's perception of task performance. In particular, the perceptions of managers at one level are not directly modified by the perceptions of managers at a superior level as might be expected in staff allocations or in budgeting procedures.

The survey does not yield the same results as would be obtained from the preparation of the annual budget. In that case staffing levels are generally set by authorities who presumably are more knowledgeable about budget limitations and program priorities than about lower level field operations and implementation requirements.

Because the data are not budget constrained, the staff requested in an establishment-based survey such as this are usually more numerous than could be hired by probable budget allocations. However, since they reflect program needs as seen directly by each operational level, the unconstrained survey results yield useful indicators of the quantity, quality and distribution of manpower needs in the sector.

The public sector is the dominant employer of academically trained agricultural personnel, using over three-fourths of the bachelors and diplomants and almost all the certificate holders. Within the total agricultural sector, the Ministry of Agriculture is the major user. It alone accounted for 49% of the bachelors, 48% of the diplomants, and almost 75% of the certificate holders in 1977 (from Table 3).

The commercial subsector, which includes both private and mixed public ownership firms, employs only 20% of the bachelors, 19% of the diplomants, and only 5% of the certificate holders. These shares used by the commercial sector appear remarkably low in a country whose economy is as heavily dependent on agriculture as is Kenya's.

In the total sector the requested distribution of educational categories varies little from 1977 to 1988 for the sector as a whole: 12 to 15 percent for bachelors, 19 to 21 percent for diplomants, and 64 to 69 percent for certificate holders (Table 4). However, this overall pattern obscures significant differences in the proportions of educational levels within agencies, both in 1977 data and over the study period.

(a) Ministry of Agriculture. MOA managers feel understaffed in all major educational categories for the work they have to perform and the responsibilities with which they are charged. The degree of current understaffing (the additional staff requested in 1977 as a percentage of the 1977 staff in post) is felt most severely at the certificate level (90%). There are also significant shortfalls at the diplomant level (28%) and at the BSc+ level (42%) (Table 5). Recalling survey limitations discussed in section IA.7, it would appear that management is perceiving shortcomings in performance and is attributing a significant part of this to staffing limitations. However, a sense of insufficient performance at the operating level may also be caused by ill-defined or by unrealistic goals and by inappropriate or inadequate deployment, support and supervision of staff.

The 1977 request data indicates a slight preference by MOA for BSc+s over diplomants, and this trend continues, converting the preferred staffing from a ratio of 0.6 bachelors : 1.0 diplomant in 1977 to a ratio of 1:1 in 1988. Part of this shift may result from the restaffing of positions which are to be filled with university graduates but which are now staffed by diplomants because of a shortage of bachelors. It may also reflect awareness of increasing complexity and technification of agricultural operations and the consequent need for managers and specialists with a university education. Yet, there is much latitude in the substitution between bachelors and diplomants because the functions required of particular positions may require talents associated with both types of degrees. Thus, both educational levels supply managers and specialists for MOA, particularly in field operating positions. This flexibility contrasts strongly with the fixed roles of the certificate holders and the JTAs as contact agents with the farmer clientele.

Table 5

Current Felt Understaffing

	1977 <u>In Post</u>	1977 <u>Requested</u> <u>In Post</u>	<u>Perceived</u> <u>Understaffing</u>
<u>Ministry of Agriculture</u>			
BSct	525	745	42%
Diplomants	842	1080	28%
Certificates	3442	6537	90%
<u>Other Public Sector</u>			
BSct	316	351	11%
Diplomants	557	770	30%
Certificates	957	1060	10%
<u>Commercial Sub-sector</u>			
BSct	221	261	18%
Diplomants	338	368	9%
Certificates	238	471	98%

Source: Table 3

The great initial need for certificate holders appears to be largely an effort to catch up with a sense of the amount of work to be done with clients and the numbers of staff required to do it, given current levels of productivity and administrative support difficulties. This partially intuitive grasp of the situation by respondents can be expressed numerically in terms of service ratios. If the 6800 JTAs are summed to the certificate holders who are in post in 1977 (since both are contact agents) and compared with the estimated number of rural households, the resultant ratio is 127 rural households to one contact agent (Table 2). If the contact staff is enlarged by the number of certificate holders requested in 1977, this ratio improves to 97:1, very close to the projected 1983 ratio of 91:1.

Filling the needed 1977 posts would change only slightly the ratio between contact staff and the management/specialist personnel from 7.5:1 to a new ratio of 7.3:1. However, this ratio changes noticeably in favor of supervisory and specialized personnel in 1983 to 4.8:1. That request represents a 36% increase of management capability and specialized knowledge over the 1977 ratio. This expansion of the management and specialist staff relative to contact agents is particularly interesting since the desired ratio of contact staff to rural households is essentially stable at about 93:1. However, it is not possible to decide from the survey information whether this represents increasing technical requirements in general, a need for better technical support or supervision, anticipation of the more complex requirements on small farms or some other factor.

(b) The Other Public Sector (OPS) agencies appear to have been better able than the Ministry of Agriculture to satisfy current personnel needs. Current shortfall in this subsector amounts to only 11 percent of BScs and of certificate holders in post, which is probably close to the normal, frictional vacancy rate. However, OPS agencies require 38 percent increase in diplomants to fill their needs for that level (Table 5). This shortage may be due to the MOA scholarship program which gives MOA first call on most Egerton graduates. However, once this initial need is satisfied, the proportions among educational levels requested for 1983 and 1988 are essentially similar to the 1977 in post figures (Table 4).

As a whole, the OPS uses a much lower proportion of contact staff to management and specialist personnel than MOA does -- around 1.5:1

as compared with 2.5:1 in MOA, based on certificate holders only, with JTAs excluded. Partially, this reflects the fact that many of the OPS agencies perform regulatory rather than operating functions. It may also reflect greater MOA access to certificate holders.

(c) The Commercial Subsector (COMM) has an 18% shortage of bachelors. This deficit clearly represents a shortage of supply. The commercial subsector should be able to satisfy its needs on purely economic grounds, i.e., it will always be able to pay for the marginal utility of personnel required. Currently, it has a strong need to fill its middle management and specialist needs with bachelors and is competing strongly for new graduates. In 1977 the private sector absorbed about half of the graduating class, but supply has not caught up with need.

The commercial subsector has been able to satisfy its needs for diplomants in the past. Most of these are employed in the quasi-governmental firms where they are mostly found in the supervision and management of production or other operational departments. These firms project a growing need for diplomants in the future, relative to other educational levels. COMM feels a strong pent up need for certificate holders in 1977, but needs for subsequent periods appear to grow slowly so that the cumulative demand for certificate holders stabilizes at about 3.5% of the staff of the total agricultural sector.

The Ministry of Agriculture has a multiple role as producer, user and moderator in the education of academically trained agricultural personnel. It produces all of the certificate holders in its own institutes. It participates on the Board of Directors of Egerton College and provides scholarships to three-fourths of its students. It is the leading user of personnel in all three educational categories--half of the bachelors and diplomants, three-fourths of the certificate holders. Yet, as the principal enunciator of agricultural sector policy, it must seek equitable distribution of trained personnel to assure that other public sector agencies and the commercial subsector do not suffer from their lack.

The unconstrained requests represent need as seen by user agencies and may be of particular value to MOA in its moderator role. An

unconstrained MOA user would tend to dominate the market for bachelors as completely as it has dominated that for certificate holders. The MOA requests account for two-thirds of the unconstrained demand for bachelors through 1988, leaving the commercial subsector only a ten percent share by 1988 (Table 6). It gives up some of its share of diplomants to other public sector agencies but maintains its three-quarters share of certificate holders.

Throughout this survey MOA program managers expressed concern over unfilled vacancies as well as their felt need for additional staff. Many cast blame on the commercial subsector for these deficits. The commercial subsector only accounts for 20% of the bachelors and diplomants and only 5% of certificate holders in post in 1977. If all user needs were filled, COMM's share through 1988 would decline to about 10%, 25% and 50% of bachelors, diplomants and certificate holders, respectively.

MOA carries an important responsibility in the careful distribution of this important resource among the different national users. It might even consider positive incentives to encourage a more equitable distribution. It is unusual that in an economy dominated by agriculture (four-fifths of the labor force, one-third of gross national product, and the second major earner of foreign exchange) the commercial sector should use so few trained agricultural staff.

Table 6

Distribution of Current (1977) Staff and New Personnel Requests
Within Educational Levels by User Class.

	<u>--In-Post--</u> <u>1977</u>		<u>---New Personnel Requested---</u>					
	<u>No.</u>	<u>%</u>	<u>1977</u>		<u>1983</u>		<u>1988</u>	
			<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
<u>Bachelors</u>								
Ministry of Agriculture	525	49.4	220	74.6	1204	71.4	1802	66.8
Other Public Sector	316	29.8	35	11.9	274	16.2	619	22.9
Commercial Sub-sector	<u>221</u>	<u>20.8</u>	<u>40</u>	<u>13.5</u>	<u>209</u>	<u>12.4</u>	<u>278</u>	<u>10.3</u>
Total	1062	100.0	295	100.0	1687	100.0	2699	100.0
<u>Diplomants</u>								
Ministry of Agriculture	842	48.5	238	49.5	1062	46.2	1554	42.6
Other Public Sector	557	32.1	213	44.3	622	27.0	1127	30.9
Commercial Sub-sector	<u>338</u>	<u>19.4</u>	<u>30</u>	<u>6.2</u>	<u>617</u>	<u>26.8</u>	<u>969</u>	<u>26.5</u>
Total	1737	100.0	481	100.0	2301	100.0	3650	100.0
<u>Certificates</u>								
Ministry of Agriculture	3442	74.3	3095	90.2	7191	81.6	8632	73.4
Other Public Sector	957	20.6	103	3.0	1213	13.8	2562	21.8
Commercial Sub-sector	<u>238</u>	<u>5.1</u>	<u>233</u>	<u>6.8</u>	<u>413</u>	<u>4.6</u>	<u>572</u>	<u>4.8</u>
Total	4637	100.0	3431	100.0	8817	100.0	11766	100.0

Source: Table 3

C. RELATING SUPPLY AND DEMAND.

1. Estimating the Demand

a. Relationship between Need and Demand.

The requests for additional specialized staff obtained by the survey are the felt needs of the program managers who are responsible for work performance. These needs are real, since they represent these managers' best appraisal of what is required to do the job. However, these needs are not demand. Manpower demand, in the economic sense, requires an ability to hire the needed staff. These needs could become effective demand only when funds become available to hire the total requested staff.^{1/}

For reasons discussed in section A2 of this chapter, the survey was designed to obtain program-related needs as defined by unit managers, unconstrained by budget limits. However, as a practical matter, the requests can only be met to the extent of available funds. The current funds available to public sector agencies do not permit satisfaction of the needs identified in 1977, nor will prospective budgets allow employment of the additional staff needed in 1983. Satisfying the 1977 needs would require a 64% increase in the MOA budget, for example, while that budget would have to grow at a compounded annual rate of 20% from the 1977 level in order to meet 1983 requests. Neither increase is a realistic possibility.

Before we can determine the number of people who must be trained at professional and subprofessional levels in the agricultural sector, we must establish the number of people who can be employed in the future. In other words, we must find out how much of these requests, or needs, can be considered to be demand by constraining them at expected budget levels. In the commercial subsector, personnel budgets come from operating revenues. In the public subsector they are allocated from national tax revenues.

b. Commercial Subsector.

The economic outlook undoubtedly influences hiring decisions in the commercial subsector, but we have been unable to find any indicator which would correlate with employment of specialized agricultural personnel. For example, hiring of such staff has exceeded the growth rate of the

^{1/} When faced with staff needs which cannot be satisfied with available budgets, one must either limit expectations or alter methods. While the study addressed only the first alternative, Parts III and V suggest approaches to the second.

gross domestic product over the last years: GDP grew by 12.4%, 0.2% and 4.7% in 1974, 1975 and 1976, while hiring rates of bachelors, diplomants and certificate holders were 10%, 17% and 21%, respectively ^{1/}. The growth rate for the chemical fertilizer and pesticide industry was 2.5%, while the hiring spread of particular establishments within that industry branch was 13-40% for bachelors, 8-25% for diplomants, and 5-11% for certificate holders.

In the absence of a consistent relation between available economic indicators and approximate hiring rates it was decided not to constrain the requests by the commercial subsector. The requests in this subsector were already conservative and based on short-term rather than long-term economic outlook. The factors used to project commercial sector manpower requests to 1983 and 1988 were also conservative. We note that this subsector uses fewer trained agriculturalists than either of the other two major users. An increase in employment of specialized agricultural manpower by the commercial subsector might be more productive than an equivalent increase in the public subsector, given current modest levels in the former.

c. Public Subsector.

In the public subsector, the number of personnel who can be employed are established by the agency budgets. Therefore, an estimate of demand can be established by selecting probable personnel budget levels for 1983 and 1988. Since the survey gives the desired proportions of bachelors, diplomants and certificate holders for those years, it is possible to calculate the numbers of each level that can be employed under the then applicable personnel budget.

The budget growth rates which should be used to establish the 1983 and 1988 funding levels are somewhat arbitrary, since they will vary from year to year in conformance with a political-administrative process. Therefore, we use a high and a low personnel budget growth rate to establish a probable range of demand.

^{1/} Non-compounded, annual linear growth rates; estimated from unpublished wage employment data provided by the Central Bureau of Statistics.

The long term, inflation adjusted budget growth rate of the Ministry of Agriculture was 10.2 percent^{1/} with more than three fourths of this recurrent budget supporting personnel emoluments and benefits. It is improbable that an establishment as large as MOA can maintain such a high growth rate, so we have chosen 8.5 percent as a high rate. The low rate is the seven percent growth rate established as a target by the Ministry of Finance and Planning.

Other Public Sector (OPS) agencies tend to be smaller and to have considerable autonomy over hiring personnel. For them, a low growth rate of 10 percent has been chosen, while the unconstrained requests set the high level. That is, at the high level, the budget is expected to grow at that rate which would permit hiring of all the staff requested by OPS agencies.

The base (1977) budget is set by multiplying the approximate median salaries of the three education levels (KSh1500, KSh1050, and KSh550) by the number of positions of each level in post in 1977 (Table 6(a)). It is possible to use constant salary figures for the calculations because the growth of the personnel budget is calculated in constant money terms^{2/}.

Table 6(a)

Education Class	Salary Level	MOA		OPS	
		In Post 1977	Cost	In Post 1977	Cost
BSc+	KSh1500	525	785,500	316	474,000
Diplomants	KSh1050	842	884,100	557	584,850
Certificates	KSh550	3442	<u>1,893,100</u>	957	<u>526,350</u>
Base Budget			3,564,700		1,585,200

Source: Table 3

^{1/}Republic of Kenya. Request for Fourth World Bank Education Credit, Annex III/B2/3, footnote 7: "The trend in the annual budget vote for recurrent expenditure for the Ministry of Agriculture during 1961/62-1975/76 has been an average increase of 10.2 percent in constant currency (applying a GDP deflator of 30 percent for the period)."

^{2/}It is also assumed that payroll related costs (fringe benefits) will bear a constant relationship to personal emoluments or that the global budget will be adjusted separately to reflect changes in this relationship.

The budget available for hiring additional staff in 1983 and 1988 (cumulative, 1977-1983 and 1977-1988) is established by applying the budget growth rate to this base budget for successive years until 1983 and 1988 respectively. Because the requests represent personnel additional to those in post in 1977, the base budget must be subtracted from the projected budgets for 1983 and 1988. These calculations are shown in Table 7A.

An additional calculation is required to account for the substitution of the 6800 JTAs by certificate holding TAs. MOA policy requires phasing out of JTAs, and their substitution with TAs on a one-for-one basis over the next twenty years. Calculated on a straight line basis, this substitution represents an effective demand for about 340 additional certificate holders each year, which is not included in the survey requests. Furthermore, the base budget supporting the JTA staff also grows at seven to 8.5 percent per year, but the staff level is fixed at 6800 positions. Therefore, as the budget grows, there will be a surplus which will become available for hiring additional staff. The personnel requirements and budget calculations which result from this policy are presented in Table 7B.

To calculate the additional number of positions which can be staffed at each educational level with the expected budget increase we must first determine the proportionate costs to be allocated to each level. This is done by multiplying the number of additional personnel requested in the survey by the respective salary levels (K£1500, K£1050, K£550), summing the total, and calculating the percentage of this total attributable to each class (Table 8).

The apportionment percentages from Table 8 are applied to the expected growth in the base budget by 1983 and 1988 to determine how many pounds will be available to hire staff from each educational level. This amount is then divided by the estimated median annual salary to determine the number of individuals who can be hired. The same process is applied to the JTA budget surplus and to the other public sector budgets and the number is entered in Table 9.

Two other elements of demand enter the totals shown in Table 9. First, the number of certificate holders needed by 1983 and 1988 to

**Calculation of Budget Available for Personnel Expansion
at Assumed Growth Rates**

A. Increments Available from Expansion of BSc+Diplomants-Certificates Budget

	MOA		OPS
	At 7% (K£000)	At 8.5% (K£000)	At 10% (K£000)
Base Budget	3665	3565	1585
Projected to 1983	5350	5816	2808
Less Base Budget	<u>3565</u>	<u>3565</u>	<u>1585</u>
Available for Expansion in 1983	1785	2251	1223
Projected to 1988	7504	8746	4522
Less Base Budget	<u>3565</u>	<u>3565</u>	<u>1585</u>
Available for Expansion in 1988	3939	5181	2937

B. Increments Available from Surplus in JTA Budget after TA Substitution

Year	(1) Number of JTAs	(2) JTA Cost (K£000)	(3) Budget Growth (K£000)	(4) Excess (K£000)	(5) Number of TAs	(6) TA Cost (K£000)	(7) Surplus (K£000)
<u>At 7% Growth Rate</u>							
1977	6800	2380	--	--	--	--	--
1983	4760	1666	3572	1906	2040	1122	784
1988	3060	1071	5010	3939	3740	2057	1882
<u>At 8.5% Growth Rate</u>							
1977	6800	2380	--	--	--	--	--
1983	4760	1666	3883	2217	2040	1122	1095
1988	3060	1071	5838	4767	3740	2057	2710

Source: Table 3. The number of JTAs was obtained from MOA complement control and rounded to 6800.

- (1) Number of JTAs expected to be in post.
- (2) Number of JTAs multiplied by an average salary of K£350.
- (3) Growth in 1977 cost at indicated growth rate.
- (4) Excess of column (3) over Column (2), which becomes available for hiring TAs.
- (5) Number of TAs expected in post, when substituted for JTAs on a one-for-one basis.
- (6) Number of TAs multiplied by an average salary of K£550.
- (7) Surplus of column (4) over column (6), which is available for hiring other staff.

Table 8

Calculation of Cost Apportionment

<u>Education Level</u>	<u>Annual Unit Salary</u>	<u>1983</u>			<u>1988</u>		
		<u>(1)</u>	<u>(2)</u>	<u>(3)</u>	<u>(1)</u>	<u>(2)</u>	<u>(3)</u>
		<u>Requested Number</u>	<u>Annual Cost (K£000)</u>	<u>Apportionment %</u>	<u>Requested Number</u>	<u>Annual Cost (K£000)</u>	<u>Apportionment %</u>
<u>Ministry of Agriculture</u>							
BSc+	K£1500	1204	1806	26.3	1802	2703	29.7
Diplomants	K£1050	1062	1115	16.2	1554	1632	18.0
Certificates	K£550	7191	<u>3955</u>	<u>57.5</u>	8632	<u>4748</u>	<u>52.3</u>
			6876	100.0		9083	100.0
<u>Other Public Sector</u>							
BSc+	K£1500	274	411	23.7	619	928	26.4
Diplomants	K£1050	622	653	37.7	1127	1183	33.6
Certificates	K£550	1213	<u>667</u>	<u>38.6</u>	2562	<u>1409</u>	<u>40.0</u>
			1731	100.0		3520	100.0

Source: Table 3

- (1) Number requested in survey.
- (2) Number requested multiplied by annual unit salary
- (3) Percentage of budget which must be allotted to each educational level to maintain the proportions requested in the survey.

Table 9

Demand for Personnel at Two Budget Growth LevelsA. Low Estimate (MOA grows at 7%, OPS grows at 10%, COMM is unconstrained)

	1983			1984		
	<u>BSct</u>	<u>Dipl</u>	<u>Cert</u>	<u>BSct</u>	<u>Dipl</u>	<u>Cert</u>
<u>MOA New Positions</u>						
Base Budget Growth ^{1/}	313	275	1866	780	675	3746
JTA Budget Surplus ^{2/}	137	121	820	373	323	1790
JTA Substitution ^{2/}	-	-	2040	-	-	3740
MOA Subtotal	450	396	4726	1153	998	9276
<u>OPS New Positions</u>						
Base Budget Growth ^{1/}	193	439	858	517	940	2136
<u>COMM New Positions</u>						
Unconstrained Request ^{3/}	209	617	413	278	969	572
Subtotal (Direct Requirement)	852	1452	5997	1948	2907	11984
Trainers Required ^{4/}	129	190	--	129	225	--
<u>Total Effective Demand</u>	<u>981</u>	<u>1642</u>	<u>5997</u>	<u>2077</u>	<u>3132</u>	<u>11984</u>

B. High Estimate (MOA grows at 8.5%, OPS and COMM subsector growth is unconstrained)

	1983			1988		
	<u>BSct</u>	<u>Dipl</u>	<u>Cert</u>	<u>BSct</u>	<u>Dipl</u>	<u>Cert</u>
<u>MOA New Positions</u>						
Base Budget Growth ^{1/}	395	347	2353	1026	888	4927
JTA Budget Surplus ^{2/}	192	169	1145	536	465	2577
JTA Substitutions ^{2/}	-	-	2040	-	-	3740
MOA Subtotal	587	516	5538	1562	1353	11244
<u>OPS New Positions</u>						
Unconstrained Request ^{3/}	274	622	1213	619	1127	2562
<u>COMM New Positions</u>						
Unconstrained Request ^{3/}	209	617	413	278	969	572
Subtotal (Direct Requirement)	1070	1755	7164	2459	3449	14378
Trainers Required ^{4/}	129	180	--	129	225	--
<u>Total Effective Demand</u>	<u>1199</u>	<u>1935</u>	<u>7164</u>	<u>2588</u>	<u>3674</u>	<u>14378</u>

Sources: 1/ Tables 7A and 8
2/ Tables 7B and 8
3/ Table 3
4/ Table 13

substitute for the JTAs in the Ministry of Agriculture are entered from column (5) of Table 7B. Second the number of additional professional and subprofessional staff who will be needed to staff the institutions to train the new staff must be estimated. The number of additional trainers required depends on the additions to output capacity of the educational establishment which is required to meet prospective demand at the desired ratio of students to teachers.

2. Determining Supply Requirements

a. Training Requirements

The demand represents additional positions which can be established. However, there is a constant loss of personnel through retirement, resignation, and death. The number of people who must be trained (the training requirement) to satisfy the demand must be large enough to offset this sectoral outflow or wastage rate.

The various sectoral wastage rates were calculated for each speciality, educational level and user and these rates were applied to the staff requested in the survey (see Section A6c above and Appendices D and G2). These rates can be combined into a single wastage rate factor for each user agency and educational level by comparing the summarized request figures from Table 3 with the summarized training requirement figures from Appendix G2 (Table 10).

Multiplying the demand defined in Table 9 by the appropriate wastage rate factor for each user agency and educational level yields the number of people who must be trained by 1983 or 1988 to satisfy the demand. These training requirements are presented in Table 11.

Table 10

**Wastage Rate Factors for Converting
Position Requests to Training Requirements**

<u>Education Level</u>	<u>1983</u>			<u>1988</u>		
	(1)	(2)	(3)	(1)	(2)	(3)
	<u>Staff Requested</u> <u>No.</u>	<u>Training Requirement</u> <u>No.</u>	<u>Wastage Rate</u> <u>Factor</u>	<u>Staff Requested</u> <u>No.</u>	<u>Training Requirement</u> <u>No.</u>	<u>Wastage Rate</u> <u>Factor</u>
<u>Ministry of Agriculture</u>						
BSc+	1204	1244	1.033	1802	1913	1.062
Diplomants	1062	1105	1.040	1554	1670	1.075
Certificates	7191	7622	1.060	8632	10056	1.164
<u>Other Public Sector</u>						
BSc+	274	292	1.066	619	689	1.113
Diplomants	622	655	1.053	1127	1269	1.126
Certificates	1213	1333	1.099	2562	2931	1.144
<u>Commercial Subsector</u>						
BSc+	209	327	1.565	278	407	1.464
Diplomants	617	718	1.164	969	1492	1.540
Certificates	413	438	1.061	572	811	1.418

(1) From Table 3

(2) Summarized from Appendix G2

(3) Factor by which demand must be multiplied to determine training requirements

Table 11

Estimated Training Requirements to Meet
Effective Demand

A. Low Estimate (MOA grows at 7%, OPS grows at 10%, COMM request is unconstrained)

<u>MOA Training Requirement</u>						
Base Budget Growth	323	286	1978	828	726	4360
JA Budget Surplus	142	126	869	396	347	2084
JA Substitutions	-	-	2162	-	-	4353
MOA Subtotal	465	412	5009	1224	1073	10797
<u>OPS Training Requirement</u>						
Base Budget Growth	206	462	943	575	1058	2444
<u>COMM Training Requirement</u>						
Unconstrained Request	327	718	438	407	1492	811
<u>Subtotal Training Requirement</u>	998	1592	6390	2206	3623	14052
<u>Trainers Required</u>	138	190	--	144	253	--
<u>Total Training Requirement</u>	1136	1782	6390	2350	3876	14052

B. High Estimate (MOA grows at 7%, OPS and COMM subsector requests are unconstrained)

	1983			1988		
	<u>BSc+</u>	<u>Dipl</u>	<u>Cert</u>	<u>BSc+</u>	<u>Dipl</u>	<u>Cert</u>
<u>MOA Training Requirement</u>						
Base Budget Growth	408	361	2494	1090	954	5735
JA Budget Surplus	198	176	1214	569	500	3000
JA Substitutions	-	-	2162	-	-	4353
MOA Subtotal	606	537	5870	1659	1454	13088
<u>OPS Training Requirement</u>						
Unconstrained Request	292	655	1333	689	1269	2931
<u>COMM Training Requirement</u>						
Unconstrained Request	327	718	438	407	1492	811
<u>Subtotal Training Requirement</u>	1225	1910	7641	2755	4215	16830
<u>Trainers Required</u>	138	190	--	144	253	--
<u>Total Training Requirement</u>	1363	2100	7641	2899	4468	16830

Sources: Tables 9 and 10

b. Training Capacity

i. Output Capacity

Training capacity is here taken to mean the annual output which can be achieved by institutions operating at full rated capacity. This is necessarily a somewhat arbitrary figure since intake, dropout, and failure rates vary from year to year, and output can be pushed beyond rated capacity if necessary. Table 12 shows the rated capacity applied to each educational institution, and the total output which these institutions would produce cumulatively from 1977 through 1983 and through 1988.

Table 12

Output Projections at Present Production Capacities
of Major Agricultural Training Institutions

	<u>Maximum Output Capacity</u>	<u>Cumulative Output 1977-1983</u>	<u>1977-1988</u>
BSc+ (University of Nairobi)			
Faculty of Agriculture	75	450	825
Faculty of Veterinary Medicine	<u>75</u>	<u>450</u>	<u>825</u>
Total BSc+	150	900	1650
Diplomants (Egerton College)	250	1500	2750
Certificate Holders (Institutes)			
Embu	125	750	1375
Bukura	125	750	1375
AHITI	<u>125</u>	<u>750</u>	<u>1375</u>
Total	375	2250	4125

ii. Shortfalls in Training Capacity

Subtracting training requirement (Table 11) from the cumulative output capacities in Table 12, reveals training deficits of magnitude for all educational levels at both high and low growth rates (Table 13). The deficits are greatest for certificate holders, but are also substantial for university graduates and diplomants, particularly in the second half of the study period.

Table 13
Shortfalls in Training Capacity

	1983			1988		
	<u>BSc+</u>	<u>Dipl</u>	<u>Cert</u>	<u>BSc+</u>	<u>Dipl</u>	<u>Cert</u>
<u>Low Estimate</u>						
Training Capacity	900	1500	2250	1650	2750	4125
Training Requirements	<u>1136</u>	<u>1782</u>	<u>6390</u>	<u>2350</u>	<u>3876</u>	<u>14052</u>
Shortfall	236	282	4140	700	1126	9927
<u>High Estimates</u>						
Training Capacity	900	1500	2250	1650	2750	4125
Training Requirements	<u>1363</u>	<u>2100</u>	<u>7641</u>	<u>2899</u>	<u>4468</u>	<u>16830</u>
Shortfall	463	600	5391	2149	1718	12705

Source: Tables 10 and 12

If training capacity to cover these deficits were available today, the 1988 shortfalls at the low estimate could be met by additional annual outputs of 64 BSc+s, 102 diplomants and 902 certificate holders. At the high estimate level, the requirements would be 114, 156 and 1155, respectively. However, there is a significant lead time of five to nine years before new output can come on stream from new institutions, or from significant expansion of existing institutions:

Project preparation	- 1 to 2 years
Project authorization	- 1 to 2 years
Construction and staffing	- 1 to 2 years
Training of students	- <u>2 to 3 years</u>
Total	- 5 to 9 years

The impact of these time lags on required capacity is serious. If all the 1988 training shortfall at the low demand level were to be met by new institutions with a seven year lead time from 1977, it would require additional capacities of 175, 281 and 2482 for university, college and institutes. Much of this capacity would be to start catching up in 1984 with unmet demand, and output would become surplus to real needs after 1988.

The requirements are obviously too great to deal with through temporary expedients. Delays in increasing permanent installed capacity will make it much more difficult to satisfy future demand.

3. Recommended Output Capacity

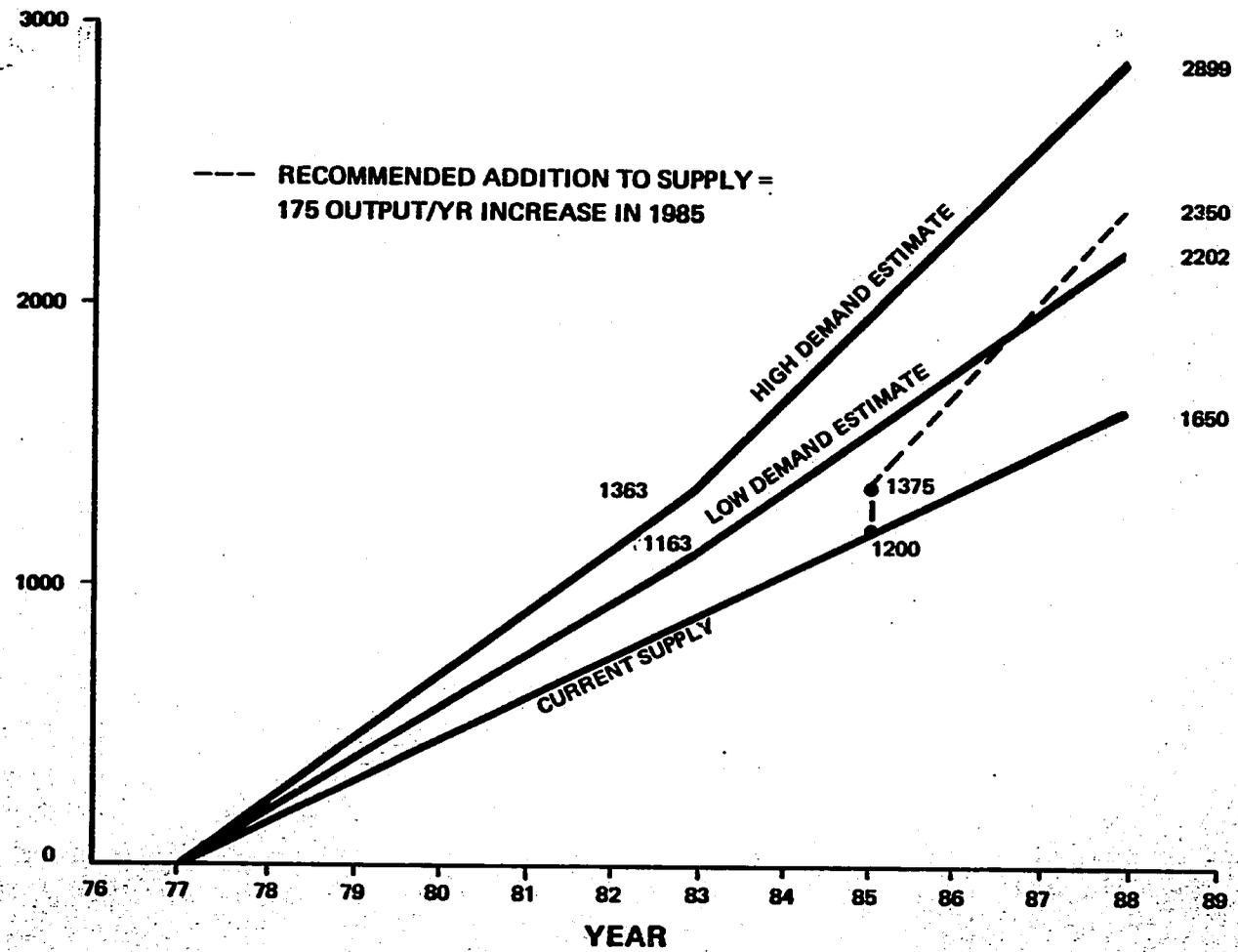
A conservative approach was used to estimate the need for additional installed capacity. The lead times required for the different types of institutions to begin producing additional outputs were calculated. Then, starting at this point, output trendlines were fitted to a graph on which current output trendlines had been plotted, along with the demand trendlines at the low and high budget estimates. The objective was to establish at the earliest point an output trendline which would exceed the low budget estimate demand trendline before 1988 but would parallel the high budget estimate trendline.

This design reduces the probability of creating excess capacity, yet approximates probable demand. If public sector budgets reach the high estimate or commercial demand is greater than expected, it will still be possible to expand output by taking advantage of some anticipated margin in design capacity, expected improvements in facility utilization, or by temporary overcrowding. Barring serious economic problems, demand is not expected to recede to the low estimate. Should it do so, however, a temporary lowering of intake levels could rapidly adjust output to demand and eliminate recurrent costs of training excess numbers.

a. University and College. The creation of additional capacity to produce bachelors and diplomants should parallel the high estimate demand curve. The near term demand for both is strong. MOA is replacing some diplomants with bachelors, but its requirements for additional diplomants remains high. The commercial sector is beginning to use larger numbers of diplomants than in the past to fill in plant management positions. Although the long term demand for diplomants is expected to decline in favor of bachelors, this trend is expected to be gradual.

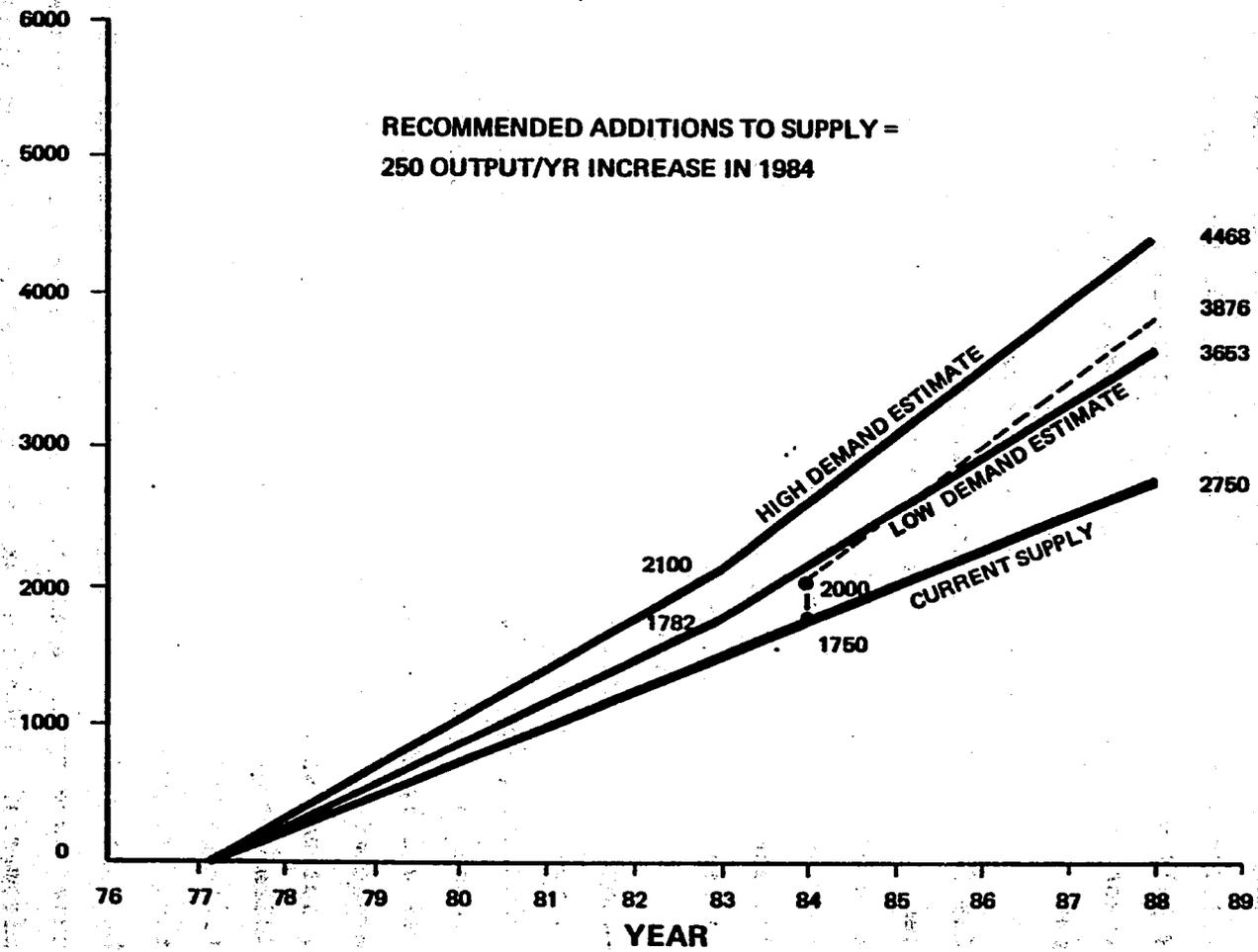
Increasing university capacity by 175 graduates per year, with output commencing in 1985, will approximate the anticipated effective demand accumulated to 1988 (Figure A). An increase in installed college capacity of 250 diplomants per year, with output starting in 1984, will surpass the low estimate demand line in a few years (Figure B). This is intentional, since we believe that some of Egerton's output will and should be diverted to BSc training before the supply of diplomants exceeds demand.

Figure A. Bachelor Demand & Supply



(a) 94

Figure B. Diplomat Demand & Supply



b. Institutes. The projected shortfall in certificate holders is numerically the most serious problem. The sector starts with unfilled requests for certificate holders of nearly 3,500 in 1977, and this heavy demand continues to grow through 1988, reflecting the belief of District Officers that current staff is inadequate to serve existing clientele at present productivity levels. Part of this demand may also reflect the redirection of much of the national agricultural assistance program to smallholders and the desire to maintain appropriate ratios between the large number of client farmsteads implicit in this policy and the size of the extension staff. The result is an increase in demand for certificate holders that vastly exceeds current output.

The problem is made even more serious because of the MOA policy for replacing JTAs with certificate holding TAs. The Ministry currently employs 6800 JTAs who are to be retired or retrained over the next twenty years. In either case, existing JTAs will be replaced on a one-for-one basis by certificate holders who must be trained. This establishes a demand for 3740 certificate holders by 1988 in addition to those requested in the survey (Table 7B).

The unknowns which influence our recommendations for expanding institute capacity are several and contradictory. Possible increases in TA productivity through better deployment, training and supervision, if instituted, may not express itself in numerical savings in staff but rather by an increase in the number of smallholders who will be served and by the provision of better service. A tailing off in demand is expected at some time as a full complement becomes established in MOA, but the size of that complement is unknown and subject to future policies. There is as yet no evidence of an equivalent demand for certificate holders in the Other Public Sector or the Commercial sub-sector. If such demand developed before the MOA complement was established, it would further aggravate training requirements. However, if it never developed, demand for TAs would be reduced to replacement requirements. Therefore, we have hesitated to recommend satisfaction of the entire demand expected, even at the lower budget estimate, in order to avoid the creation of excess capacity. The recommendation is to expand output capacity by 600 in 1983, another 600 in 1985, and another 300 in 1987. This quintupling of annual capacity, great as it

seems, will still not meet the low estimate of effective demand by 1988 (Figure C).

c. Planning and implementation. The recommendations for increasing output capacity are thought to be conservative. Therefore, a phased program to pick up the shortfall should be initiated as soon as possible. Each year of delay increases the installed capacity needed to achieve a particular level of staffing in a given target year.

An illustrative phasing for expanding capacity of Egerton and the institutes is diagrammed in Figure D. This program allows only five years for bringing new institutes into production and six years for Egerton college expansion. Both are believed to be near the minimum time required.

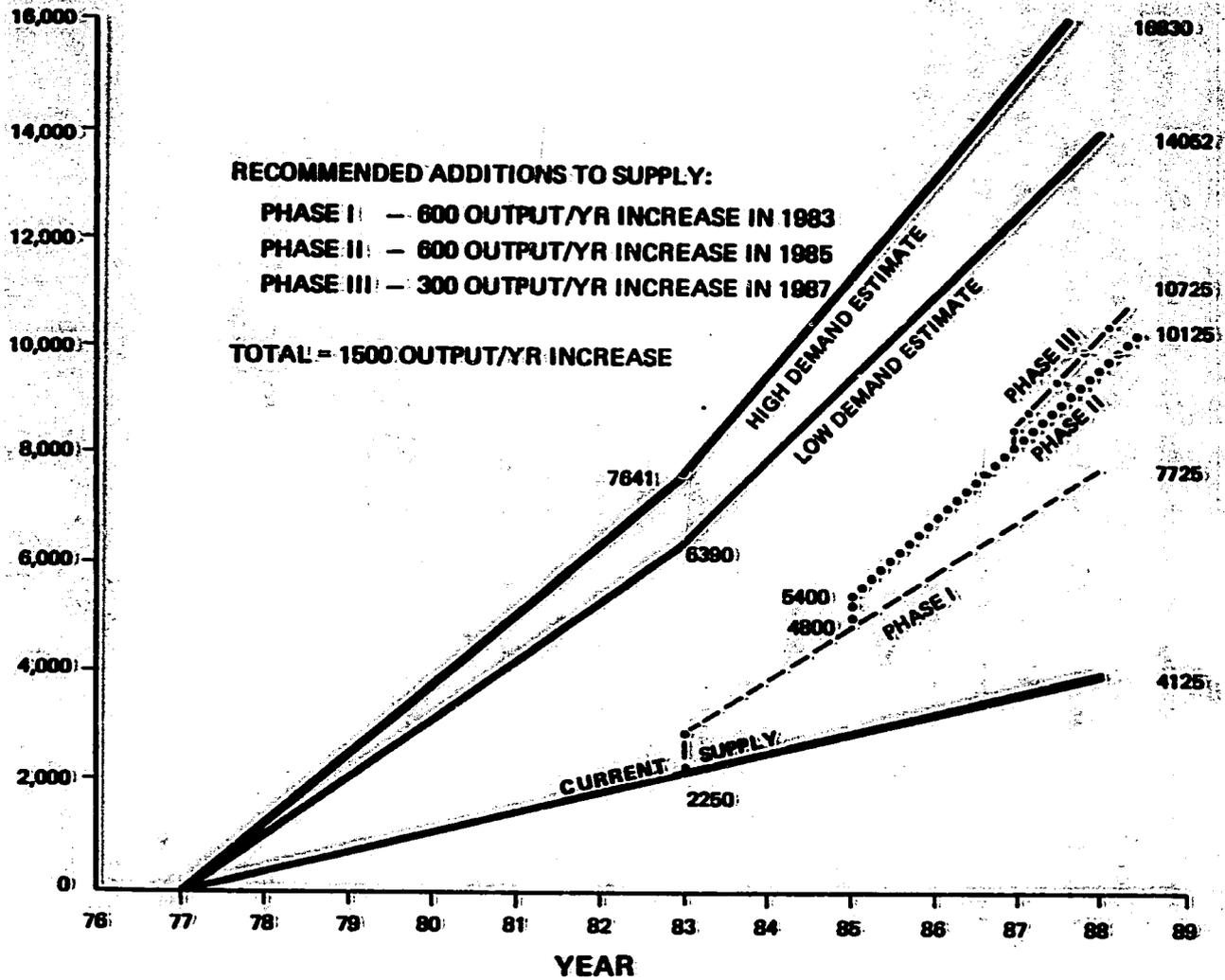
The output capacity figures must be adjusted upward in planning physical institutional capacity to account for academic wastage-- dropouts, failures, or deaths among students before they have completed their courses. Currently, these rates appear to be averaging at or under 10 percent at all three academic levels, but records are not always clear. We have used 10 percent as the academic wastage rate throughout our projections of physical capacity.

Table 14. Relationship Between Output Capacity and Physical Capacity

	<u>Recommended Annual Output Capacity</u>	<u>Adjusted for Academic Wastage</u>	<u>Course Years</u>	<u>Required Physical Capacity</u>
University	175	192	3 yrs	576
Egerton	250	275	3 yrs	825
Institutes	1500	1650	2 yrs	3300

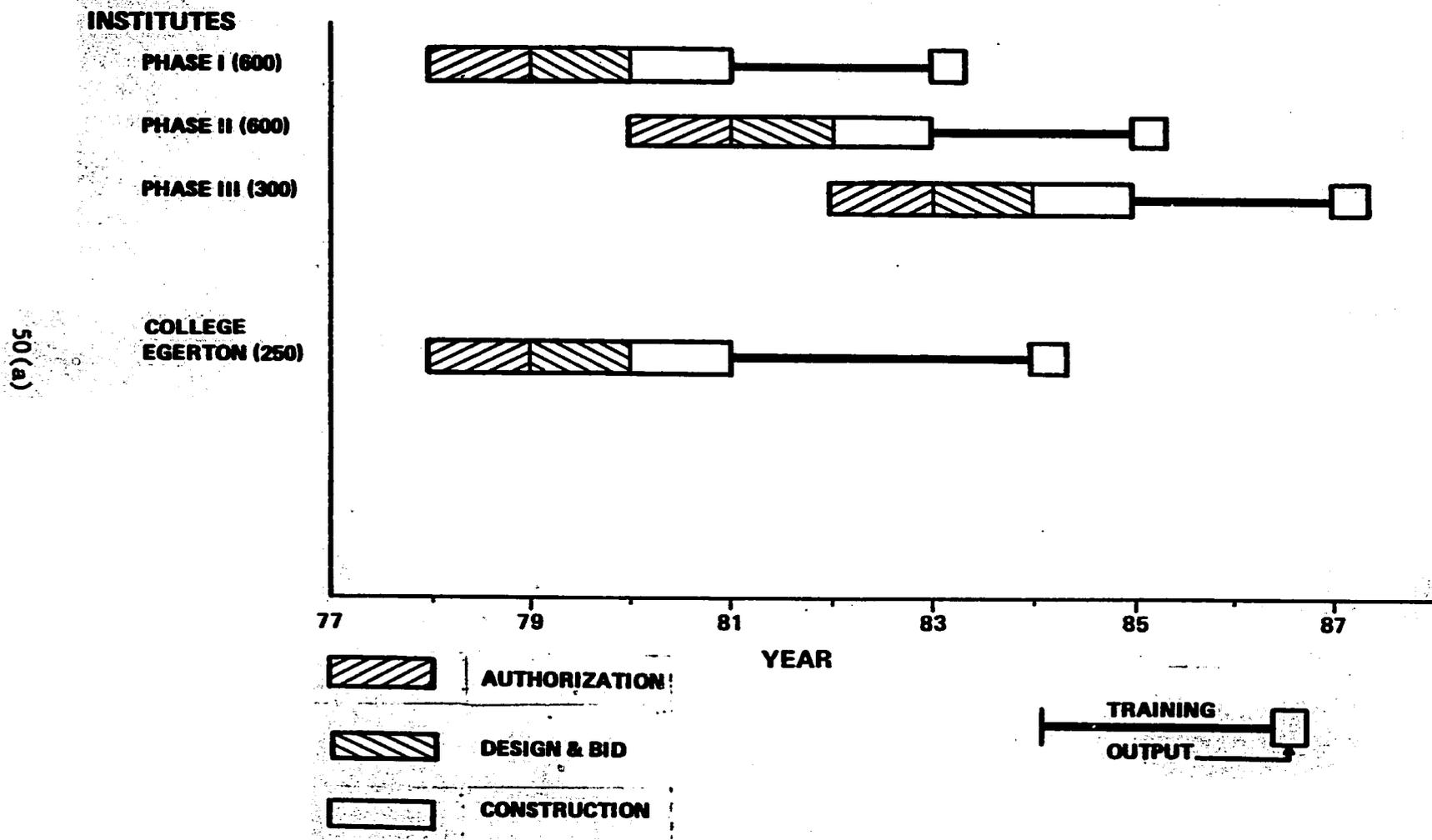
The required physical capacity can be established by expanding existing institutions at the university and college level, but new institutes will be needed to train all of the certificate holders

Figure C. Certificate Holder Demand & Supply



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Figure D. Diagram of Phasing of Recommended Additional Capacity





demanded. The size and location of these new institutions may require the intervention of an experienced architect specialized in educational institutions. We lean towards the establishment of several small (150-250 annual output capacity) institutes rather than fewer larger (300-500 annual output) institutes. Although the latter offer some economies of scale, the former permit closer faculty-student relations and are easier to manage. The greater number of faculties who gain experience in institute management and operations will ease the selection of cadres for expansion in the next phase.

One final calculation is required, and this concerns the derived demand for educators to train the additional staff requested. Some of the new staff will be trained in existing institutions, so existing output capacity of these institutions is subtracted from the training requirement. After arriving at a tentative estimate of the additional output capacity required, the size and educational level of the additional teaching staff which will be required is estimated by applying standard student/teacher ratios to the student body (Table 13). The results have been entered in Table 10.

Table 15
Estimate of Derived Demand for Teaching Staff

	<u>1977-83</u>	<u>1983-88</u>
<u>BSc+</u>		
New Output Capacity	175	175
Student Body $\frac{1}{2}$	551	551
Students/Teacher Ratio	9	9
Derived Teacher Demand	61 BSc+	61 BSc+
<u>Diplomants</u>		
New Output Capacity	250	250
Student Body $\frac{1}{2}$	787	787
Students/Teacher Ratio	11.5	11.5
Derived Teacher Demand	<u>68 BSc+</u>	<u>68 BSc+</u>
<u>Total BSc+ Level Educators</u>	129	129
<u>Certificates</u>		
New Output Capacity	1200	1500
Student Body $\frac{1}{2}$	2520	3150
Students/Teacher Ratio	14	14
Derived Teacher Demand	180 Dipl	225 Dipl

$\frac{1}{2}$ /Annual output capacity x years of course x .05 (one-half of 10% drop-out rate) equals size of student body.

D. SPECIALIZATION

This section discusses differences in demand among various specialities which are most common in the agricultural sector.

The survey distinguished twelve substantive agricultural specialities:

- General Agriculture
- Agricultural Economics
- Horticulture
- Food Technology
- Home Economics
- Agricultural Education
- Land and Farm Management
- Agricultural Engineering
- Range Management
- Animal Husbandry
- Dairy Technology
- Veterinary Medicine

Eight additional categories were frequently encountered. Five of these are related less to agriculture than to managerial levels and functions of the private sector. Three other categories - research scientist, laboratory technician and agronomist were also frequently separated from the other specialities. However, the counts in these three classes are likely to be incomplete as many of their members are included in one or more of the substantive fields.

These classes, then, were defined as:

- Executive
- General Manager
- Technical Manager
- Research Scientist
- Laboratory Technician
- Agronomist
- Accountant/Loan Officer
- Sales/Marketing Representative
- Other

1. Reliability and Interpretation of Data

Data of particular specialities is not as reliable as the aggregated data. Numbers are smaller, so that it is risky to compare growth rates and frequencies. Respondents tend to interpret needs in certain specialities in terms of work association resulting in such incongruities as a high level of demand for certificate holders in veterinary medicine. That is, requests for specialities which do not exist at a given educational level may be taken as an indication of demand for a corresponding specialization appropriate to that level. In effect, this may identify a not so latent demand. The survey was not set up to verify this finding in the analysis of the results. However, it might be desirable to investigate further these indications for planning of curricula.

The majority of positions which use academically trained agriculturalists require a general agricultural background rather than a particular specialization. Some specializations, e.g., agronomy, were masked by their incorporation into "general agriculture", because crop science is so basic to the larger category. Certainly the category of "general agriculture" contains a number of requests which could possibly have been identified more specifically. However, it is likely that requests for highly trained generalists reflects the tendency to improve service performance by trying to substitute personal qualifications for lack of a strong and appropriate information management and delivery system.

Because of these limitations, we recommend that the data be used as indicative rather than directive. With this caveat, we have identified a number of features which may assist educators in planning the distribution of academic disciplines.

2. Areas of Emphasis

Each educational level was analyzed separately (Table 14). In each, two or three broad specialities comprised the bulk of demand. These major areas - general agriculture, veterinary medicine, land and farm management, animal husbandry - probably reflect a need for broad general agricultural training. A set of four to six secondary areas probably reflect the felt need for true specialization.

		General Agric.	Agric. Economics	Horticulture	Food Technology	Home Economics	Agric. Education ^{1/}	Land & Farm Management	Ag Engineering	Range Management	Animal Husbandry	Dairy Technology	Veterinary Medicine
Masters + PhD													
In Post	1977	33	11	3	0	1	3	6	9	4	6	0	1
Additional Requests	1977/83	100	35	6	1	6	9	5	18	7	28	1	7
Additional Requests	1977/88	144	89	9	1	9	13	11	36	12	48	3	12
Bachelors													
In Post	1977	259	75	8	10	8	19	36	27	30	78	0	227
Additional Requests	1977/83	489	72	52	8	44	53	64	51	72	103	13	205
Additional Requests	1977/88	682	162	66	14	57	62	90	84	85	140	17	458
BScT (BSc + MSc + PhD)													
In post	1977	292	86	1	10	9	21	42	36	34	84	0	228
Additional Requests	1977/83	589	107	58	9	50	62	69	69	79	131	14	217
Additional Requests	1977/88	826	251	75	15	66	75	101	120	97	188	20	470
Diploma Holders													
In Post	1977	375	95	22	0	66	34	84	15	52	237	42	88
Additional Requests	1977/83	482	182	73	3	116	64	405	80	66	314	30	141
Additional Requests	1977/88	767	267	84	3	118	67	716	81	89	732	44	222
Certificate Holders													
In Post	1977	1984	140	13	3	85	61	172	26	120	1241	50	387
Additional Requests	1977/83	2605	458	161	9	650	151	783	107	193	2384	111	827
Additional Requests	1977/88	3733	798	218	27	715	177	1024	127	279	3071	175	963

Table 16- Distribution of 1977 Staff and of Additional Staff Requests for 1983 and 1988 by Academic Specialization. Total Agricultural Sector ^{2/}

^{1/} Not including potential requirements by Ministry of Education

^{2/} These figures are requests and are not subjected to the constraint analysis which would lower effective demand but not internal proportions of the requests.

Source: Basic Survey (non-expanded requests), Appendix G-1, Grand Total.

a. University

The two "generalist" categories are general agriculture and veterinary medicine (Figure E). These broad categories, which together account for 56.6% of the BSc+ survey request of 1983 certainly incorporate a requirement for an undetermined number of highly specialized individuals. However, most of this request reflects the need for a university-level general agricultural background in individuals who are destined to become program managers.

A relatively wide array of six "specialist" categories (agricultural economics, horticulture, home economics, agricultural engineering, range management, and animal husbandry) reflects the need for university level talent across a wide range of disciplines. Although the number of individuals requested in each category is small relative to the generalist categories, the requested growth increments are quite high from a small base. Within these six disciplines, agricultural economics and animal husbandry reflect the highest demand.

Data on MSc demand may be less reliable because of small numbers. However, its strong concentration in a few areas may be instructive. The large number of MScs in the general agricultural category probably reflects both the need for agronomic specialists and the desirability of highly academically qualified managers in research and technical staff offices. Beyond this, there are exceptionally strong demands in agricultural economics, animal husbandry and agricultural engineering.

b. College

The "generalist" disciplines are general agriculture, land and farm management and animal husbandry, which together account for 62.7%, 61.4%, and 74.1% of the 1977 in post, 1983 request and 1988 request, respectively (Figure F). The land and farm management and animal husbandry disciplines are the real growth areas, 1988 demand in both areas growing to over 700 from 1977 staff levels of 85 and 237, respectively.

The major "specialist" disciplines desired from Egerton are seen as agricultural economics and home economics, with a smaller but

Figure E Distribution of 1977 Staff and of Training Requests for 1977-1983 and for 1977-1988 for Masters and Bachelors by Academic Specialization

MASTERS AND BACHELORS

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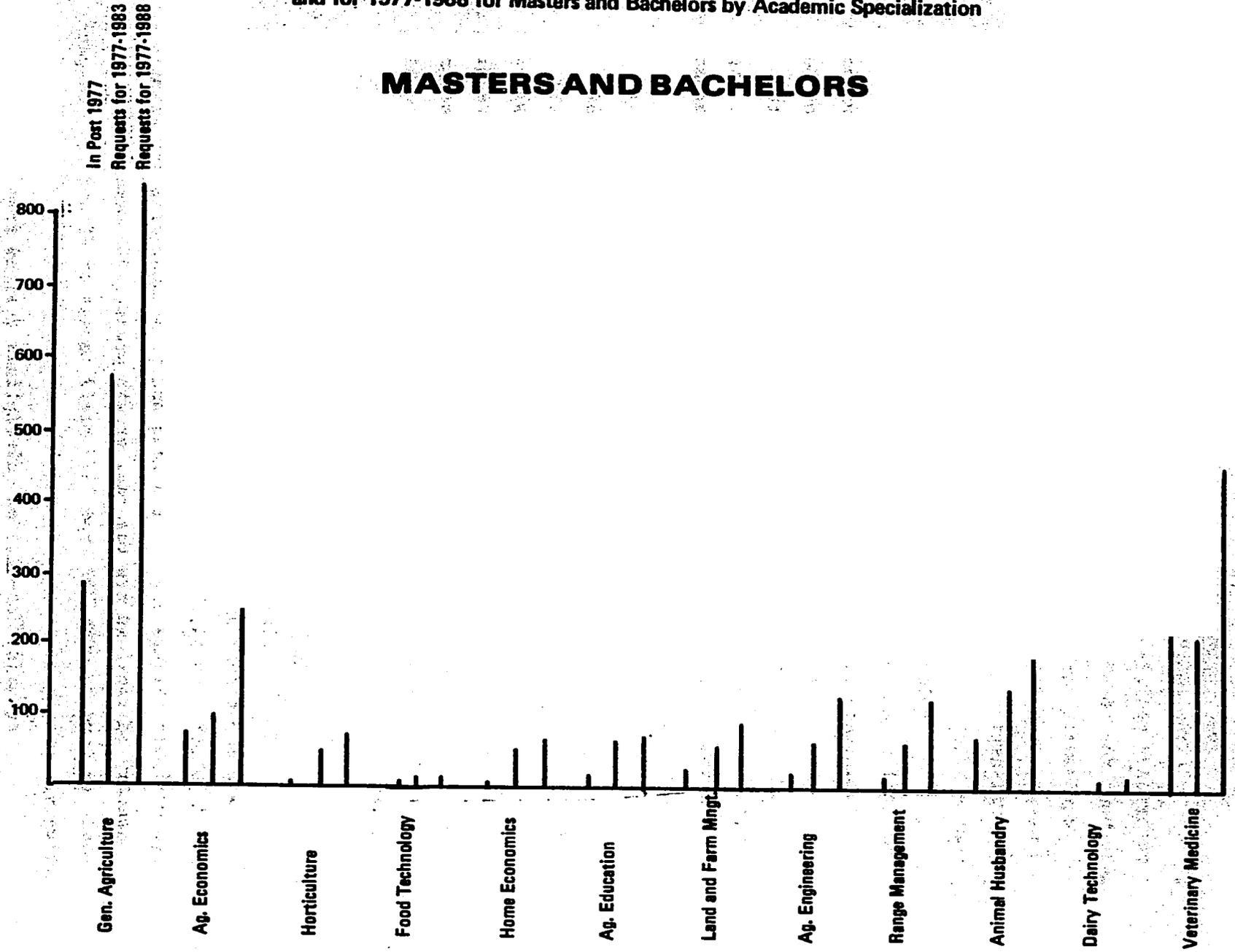
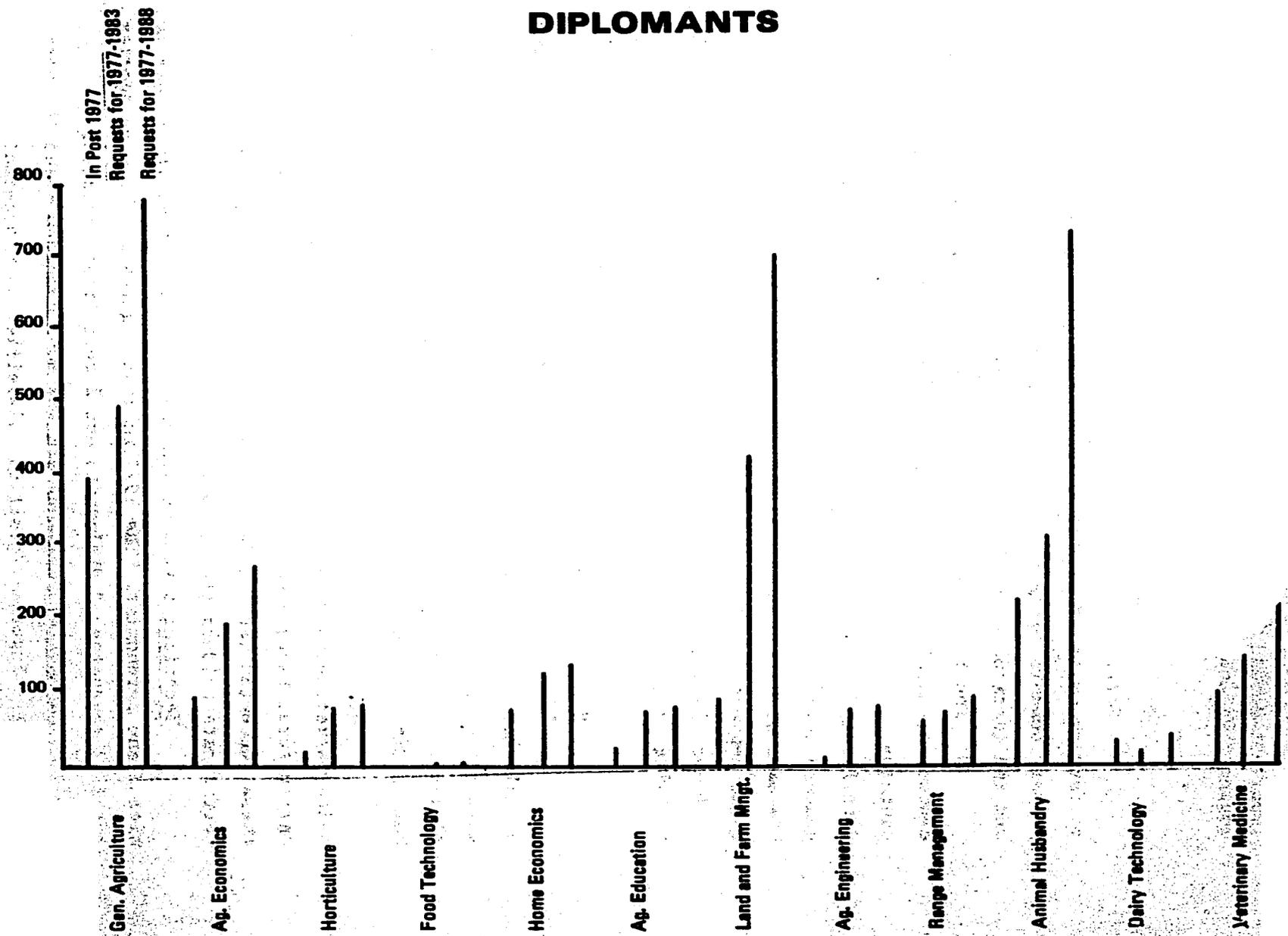


Figure F. Distribution of 1977 Staff Requests for 1977-1983 and 1977-1988 for Diplomants By Academic Specialization

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important demand in horticulture, agricultural education, agricultural engineering and range management.

c. Institutes

Certificate holders tend to provide direct advisory assistance to farmers or to work as aides to specialists. As would be expected, the primary need is for general agriculture or broad animal health background, and the institutes are geared to provide this.

The four areas of "specialization" requests are agricultural economics, home economics, land and farm management and veterinary medicine. We do not interpret this demand for specialization at the certificate level in the same way as we would at the university or college level, i.e., as a major leading to subsequent work specialization. Instead, we believe that it reflects the hope for greater emphasis of these subjects in the preparation of certificate holders, some of whom will work in areas where this background will provide a basis for on-job training (Figure G).

d. Commercial Categories

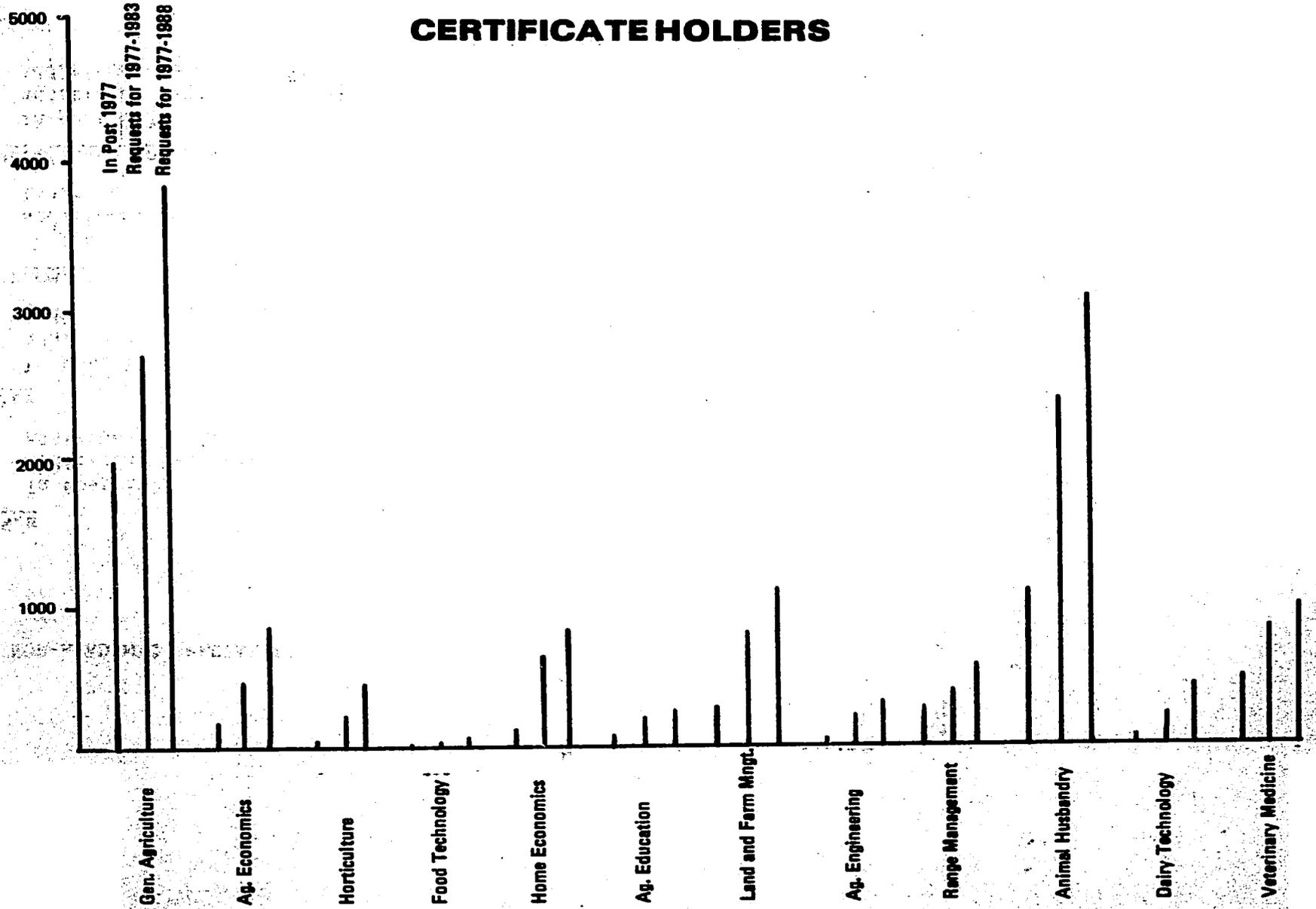
In addition to requesting substantive specialities, commercial establishments used nine primarily non-specialist categories which in turn can be grouped into managerial, technical and non-agricultural classes. All three academic levels contribute to these three classes, but in different ways.

Non-agricultural categories include loan officer/accountant, sales/marketing representative and "other" - positions in which an agricultural background might be useful but is nonessential. In 1977, these accounted for a total of eight graduates, 91 diplomants and 78 certificate holders (Table 15).

Technical positions are research scientists, laboratory technician and agronomist. The 1977 in post figures in these categories total 32 graduates, 3 diplomants and 2 certificate holders.

Managerial positions are the most numerous - and the most interesting. Together, positions classified as managerial used 124 graduates, 254 diplomants and 88 certificate holders. They reflect an

Figure G Distribution of 1977 Staff and Training Requests for 1977-1983 for Certificate Holders by Academic Specialization



NON-ACADEMIC SPECIALITIES

	Executive	General Manager	Technical Manager	Accountant/Loan Off.	Sales Repr.	Other	Research Scientist	Laboratory Tech.	Agronomist
	<u>MANAGERIAL</u>			<u>NON-AGRICULT.</u>			<u>TECHNICAL</u>		
<u>MScs</u>									
In Post 1977	7	4	22	2	0	0	3	0	1
Additional Requests by 1983	8	5	14	3	0	0	13	0	5
Additional Requests by 1988	19	10	30	9	0	0	15	0	9
<u>BScs</u>									
In post 1977	20	28	43	3	2	1	9	11	8
Additional Requests by 1983	4	18	21	16	3	3	5	0	13
Additional Requests by 1988	5	19	36	41	3	3	5	0	14
<u>Diplomants</u>									
In post 1977	0	51	203	76	15	0	1	2	0
Additional Requests by 1983	0	58	147	13	9	0	10	1	0
Additional Requests by 1988	0	64	171	34	9	0	10	1	0
<u>Certificate Holders</u>									
In post 1977	0	0	88	66	12	0	0	2	0
Additional Requests by 1983	0	0	183	7	0	0	0	2	0
Additional Requests by 1988	0	0	190	16	0	0	0	2	0

Table 17.- Commercial Sector Employment in Non-academic Specialization for 1977 and Additional Employment Requests for 1977/83 and 1977/88.

Source: Basic Survey (non-expanded requests) Appendix G-1, Grand Total

important feature of academic preparation and personnel utilization which is frequently overlooked - the fact that a very high percentage of academically trained personnel are needed in management. Their specialized backgrounds may or may not be essential to their positions. However, their intellectual training strengthens their ability to deal with several related issues simultaneously and to use their deliberations to arrive at a logical conclusion.

Executives and General Managers occupy administrative-managerial positions as division heads or plant managers. Technical managers who hold MSc or BSc degrees are primarily concerned with the management of operational divisions, such as sales divisions or plants, or sub-units of plants. Diploma holders are also found in these positions although they are more likely to be supervisors of repair shops, maintenance operations, or in charge of specific technical support units. At the certificate level, this designation corresponds to foreman, for example in the sugar industry, where they supervise planting, cultivation and cutting of cane.

Major employment and major requests are centered in the class of technical manager. Naturally, the employment pyramid gets narrower towards general managers and executives and therefore the numbers are smaller in the upper educational levels. The 'technical manager' may well be a crucial link in commercial-industrial operations. It is he who must have solid knowledge of his field and also be capable of integrating into his professional repertoire the technical, scientific, administrative and managerial components which he has not encountered in his academic training. The prospect for continued profitable operation rests on his day-to-day operational decisions.

The size of this managerial category led us to probe in interpretive interviews the nature of this demand. Our findings in this regard are instructive.

Common to the three categories of executive, general manager and technical manager is an ability for which the private industry pays a premium and for which the public sector is in constant search, wherever more than routine work is required. Managerial ability by and large is the ability to recognize and understand different aspects of a problem.

how these aspects relate to each other, how each of them responds to a particular action; consequently, also the ability to find a solution to multi-faceted problems. Since most problems in the modern sector are multi-faceted, there is a considerable demand for people with this managerial ability.

One characteristic of a manager is that he can make independent decisions based on an evaluation of the most critical aspects of a problem so that the decision results in the solution of the problem. Careful interviewing revealed a demand for these capabilities beyond expectations. These people are sought for in the industry at practically all levels; top and middle management, as well as in the technical divisions down to foremen. In the public and governmental sector they are in increasing demand at provincial and district levels.

It appears that respondents felt that one of the common prerequisites for the ability to function as a manager is a bachelor degree. This is not to be understood simply as a convention of "the higher the degree, the higher the appointment." Discussions with provincial officers and with executives in industry show that they believe that required abilities are associated with graduates of universities and are rarely found below that educational level; and that the ability to deal with complex problems increases with postgraduate studies up to the masters degree. After that a certain narrowing of interests and flexibility is implied in discussion.

This appears to be one of the main factors for an increasing demand for bachelors and masters. One should expect that industry will fill some positions now filled by bachelors with masters, to the extent that masters are becoming available.

It is not surprising that we found a relatively high rate of turnover in this management category in the commercial sector. Industry consciously follows a selection process in which it identifies those individuals who, in addition to professional competence, show initiative; ability to recognize, analyze and solve problems, and to effectively collaborate with and manage lower level staff.

Industry prefers to hire graduates after about two years of experience in government and then train them in the particulars of their operation. Usually, a graduate stays for about two years with the same

company before management decides on his future value to the company. This decision is commonly based on expectations of managerial capacity.

The scarcity of managers constitutes a major bottleneck to development of the agricultural sector, be it in the public or in the commercial sector. It would be highly desirable to expose graduates and diploma students to aspects of management which have proven to be standard equipment of management and which can be taught. In view of the role which university graduates play and will play in the development of Kenya's agricultural economy, this subject should be an integral part of regular curricula.

In planning for the future supply of specialists one must keep in mind that these requests reflect current supply and service deployment conditions. If, for example, the MOA service delivery system should be reorganized to deliver better information more effectively or, should national agricultural policy priorities change, then one would expect demand for specialists to change to correspond to those directives. (See Survey Limitations, Section A7).

The recognition of the desirability of new specialities or of different proportions among specialities is apt to be recognized earlier at senior policy and program levels and in the educational institutions than by managers of field units. Policy makers and education leaders must anticipate needs because of the lead time required to produce specialists once the need for their services is recognized. The exercise of this responsibility requires exceptional judgment, however, since the final demand is determined by the user.

II. EDUCATION AND TRAINING

This portion of the report presents the conclusions and recommendations of the Education Team of the Professional and Sub-Professional Agricultural Manpower Study Group. The conclusions and recommendations were developed by the two members of the Education Team based upon visits to all institutions, including some 13 Farmer Training Centers (FTC's); as well as interpretive interviews with the Principals, staff and students of these institutions, and through discussions with Ministry of Agriculture personnel and other members of the study group. Further, they have been closely integrated with a careful analysis and review of the survey results and manpower projections developed by the Manpower Unit and further tempered and integrated with the results of the Utilization Unit.

Specifically, the Education Team was guided by Section II.D. of the Terms of Reference which states: "Each supplier agency will be surveyed to determine current enrollment and output, unused capacity (and its cause), and the expected wastage. Approved plans for near term expansion and their expected impact will be examined, as will possible ways for handling increased enrollment and their financial implications. These data will establish the immediately available supply and that which can be achieved (up to rated capacity, including approved development plans) and the costs of achieving rated capacity."

A. METHODOLOGY

The implementation plan of the Terms of Reference indicated that the Education Unit was "to assess the capability and quality of preservice agriculture education and training at the graduate, diplomate and certificate level; the in-service training programs available through specialized schools or scholarships; and the farmer training provided by the Farmer Training Centers." The Education Team divided its responsibilities into five distinct tasks as follows: (1) review of written reports and documents, (2) institutional visitation and assessment,

(3) interpretive interviews at the institutions, and with Ministry of Agriculture and other appropriate personnel, (4) analysis of survey and projection data, and (5) application of the combined information as to need for and capability of agricultural manpower training in Kenya. Written reports, documentation and reference material reviewed by the team varied from official Government of Kenya documents to informal memoranda, time schedules and other materials reviewed at the institutions. A complete list of the reference material is included in Appendix H.

During the visitation and interpretive interview stage, the Education Team visited the Faculty of Agriculture and Faculty of Veterinary Medicine at the University of Nairobi; Egerton College; the Embu, Bukura and AHITI agriculture institutes; Athi River and Naivasha training centers; and 13 Farmer Training Centers. The team also conducted detailed interviews with the Dean of the Faculty of Education of the University of Nairobi, the Director of Veterinary Services and Head of Land and Farm Management of the Ministry of Agriculture and other key personnel within the Ministry of Agriculture.

Prior to embarking upon a visitation to the training institutions, the team developed two outlines which it utilized as a basis for gathering information. The first was of a general nature and provided for the gathering of information on: (1) enrollments, including at least a three-year history, admissions process and admissions requirements, information relative to where the school leavers go, and sources of sponsorship; (2) curriculum - how it was developed, changes which have been made, plans for change, areas of concentration, information on class sizes and methods of class scheduling; (3) faculty and staff, including numbers and training, adequacy of numbers in relation to student enrollment, and information on turnover from retirement, resignations and reassignments; and (4) both recurrent and capital budgets.

The second outline was designed to elicit information on the training and quality of the teaching staff which would permit the team to develop some conclusions with regard to the need for training of the teaching staff and whether this training should include teaching methodology and subject matter discipline, or both, and whether or not this training could be accomplished within Kenya or would require overseas training.

It is appropriate to note that during the course of the Education Team's activities, the existence of a number of studies and plans, beyond those listed in the references, were made known to the team. Foremost among these was the recent work of the National Commission on Education. However, the specific details of these reports were not available, and their current status is unknown. Government approval, and more important, the timing of implementation of recommendations of these reports undoubtedly will have an impact on some of the conclusions and recommendations included here. To the extent possible the team took these items into consideration. But it must be recognized that in the absence of details these were largely impressionistic interpretations and had to be considered in that light.

Finally, it is important to emphasize that the recommendations contained in this report, while reflecting the team's judgment, are necessarily a synthesis of issues, problems, concerns and programs which personnel at all levels shared with the team during interviews and institutional visitations. The team was very much impressed with the depth, openness and frankness with which these capable and qualified individuals discussed the issues. To the extent that the team was successful in understanding the concepts and ideas presented and the relationship among them, these recommendations thus stem from the thinking and vision of the leadership of Kenyan agricultural education. As such, hopefully they are cast within the Kenyan governmental and societal framework and within the realm of realistic implementation.

B. UNIVERSITY OF NAIROBI

The Faculty of Veterinary Medicine was initiated in the mid-1960s. Other university level (BSc, MSc or PhD) agricultural personnel were prepared outside Kenya until 1970 when the Faculty of Agriculture was established at the University of Nairobi.

1. Faculty of Agriculture

The genesis for the Faculty of Agriculture at the University of Nairobi, which was initiated in 1970, can be found in the recommendations of the Commission on Agricultural Education which was chaired by Dr. J.R.Weir and is commonly referred to as the Weir Report. As originally envisioned, the Faculty would have an annual intake of 40 students in five departments: Crop Production, Soil Science, Agricultural Economics, Applied Plant Sciences and Animal Production. Located at Kabete, some 14Km north of Nairobi, and adjacent to its 500 acre field station, the Faculty has produced 217 graduates at the Bachelor of Science level since 1973.

Virtually since its inception, and certainly from the time the first graduates completed their program in 1973, the Faculty has been under considerable pressure to increase its size and output in order to keep up with manpower demands.

Because of the increasing demands from the private sector as well as other available opportunities, however, only about half of these find their way to positions with the Ministry of Agriculture. The team was told that only twenty of the fifty-four 1976 graduates assumed positions with that agency.

The Faculty has made rather remarkable development strides in view of its relative newness. It has already expanded its intake to 95 new undergraduates annually. A year ago it established a separate department of Agriculture Engineering and the former Department of Applied Sciences has become the Department of Food Science and Technology, both offering BSc degree programs. Programs presently offered at the Faculty of Agriculture are:

- BSc in Agriculture
- BSc in Food Science and Technology
- BSc in Agricultural Engineering
- Postgraduate Diploma in Irrigation
- MSc in Agricultural Extension
- MSc in Plant Breeding
- MSc in Agricultural Marketing
- MSc in Agronomy
- MSc in Animal Production
- MSc in Soil Science

In addition, the Faculty has under consideration proposals for a BSc in Agricultural Education, a MSc in Agricultural Economics, a MSc in Plant Pathology and a MSc in Range Management.

The Faculty of Agriculture has gone through an intensive self-study to determine what changes might be desirable and what steps should be taken to increase its capacity to provide trained manpower. As the Education Team reviewed the development of the Faculty of Agriculture and the results of its self-study for future development, the critical issue which had to be confronted was whether or not it was in the best interest of Kenya to move forward with these plans or to consider establishing a new, second Faculty of Agriculture at a separate location. It was the conclusion of the Team that the best of several alternatives considered, at least for the present time, is to continue with the development of the Faculty at its present location.

As was pointed out earlier, the Faculty of Agriculture is a relatively new entity. Its first BSc students have only been "in the field" for four years. In order for the Faculty to continue to grow into a complete and mature university, continued development will have to occur. To assume that such developments could occur at the same time that a new Faculty was attempting to become established would provide just too much strain on both financing and available trained Kenyan manpower with the result that the Education Team feels that both the existing Faculty and the new would suffer unnecessarily. In terms of cost-effectiveness, immediacy of need for trained manpower, and need for further maturation of the Faculty of Agriculture, expansion at the present site is the most appropriate course.

There is every likelihood that ultimately the Government of Kenya will need to establish a second Faculty of Agriculture. The Education Team, however, feels that at the earliest this is 10 years away. Based upon that conclusion, the Education Team would offer the following additional suggestions for consideration.

a. General Development Program

Recommendation No. 1. The development plans for the Faculty of Agriculture to provide for a greater intake of students at the present site should move forward with an expanded enrollment target. The Faculty should treat with care their evaluation of new program areas to insure that the manpower supply and demand do not become imbalanced by too large an increase in certain programs.

Already the Faculty has increased its intake from the envisioned 40 students to 95 students per year. The present proposal, as developed through the self-study, calls for increasing intake to 180 per annum at the undergraduate level. Added to this are students for the MSc and planned PhD programs, so that by 1981-82 there would be just over 700 students enrolled in agriculture. This intake would more than double current capacity of the Faculty of Agriculture. Even so, it would yield fewer graduates than the 250 which are needed from this Faculty to meet the total 325 output requirement for university graduates.

The bulk of the students would be enrolled in the General Agriculture program with limited numbers in Food Science and Technology, Agricultural Engineering and Agricultural Education. This plan also calls for the initiation of the Agricultural Education program with an initial intake of 20 students in 1978-79. This proposed mix needs to be critically evaluated in terms of the manpower demands. Educational planning is always a very difficult process, but it is even more critical to Kenya where the manpower needs of the country must continue to be the foremost guiding criteria for program development. The suggestion here is only that the Faculty of Agriculture continuously evaluate and adjust both its intake and its mix of programs in order to provide as near a balance as is reasonable with the demand for specialized agricultural manpower.

Recommendation No. 2. Plans should be developed for implementation of a taught PhD program.

Some will question the implementation of a PhD program at the Faculty of Agriculture, arguing that with limited financial resources it is more cost-effective and a better use of resources for the funds to go to other educational development activities. The Education Team believes that this emphasizes short-range economies at the expense of longer term benefits. Earlier discussion emphasized the need for continuing development and maturation of the Faculty of Agriculture. An important element of that maturation process is development of a complete and comprehensive PhD program.

Two points need to be emphasized here. First, the Faculty already has a limited program for work with PhD candidates. In this program the candidates take the course work at foreign universities and then return to Kenya to complete the research and write a dissertation. It is this distinction between a joint PhD program and a taught PhD program that is important. All that is required for the latter program to become fully operational is the offering of a few doctoral courses, principally in science, statistics and research methods, along with appropriate faculty staffing for doctoral candidate supervision.

Second, with the planned expansion on the immediate horizon, and with the long-range probable need for establishment of a second Faculty of Agriculture, there will be an increased requirement for PhD personnel to staff both the expanded University program and Egerton College. It would be unfortunate if two decades from now the entire PhD level teaching staff in the country had earned their degrees in foreign countries. There will be a continuing need for overseas training, at all levels, in order to provide for the needed infusion of new ideas and technologies, but international training should not be an exclusive source of PhDs.

Recommendation No. 3. The Faculty of Agriculture and the Government should work toward a plan whereby capable and qualified diploma holders can be sponsored for a BSc and where they can, through admissions and curricular arrangements, complete their program in less than the three years required of new incoming students.

It is our understanding that the Government is eager to sponsor capable and qualified BSc holders to acquire the MSc, and that the Faculty of Agriculture has evolved a course selection process whereby students who need improvement in a specific area may do so through the selection of specific courses, including undergraduate courses. This concept is highly desirable and deserves encouragement, and is one which should also be applied to qualified and capable diploma holders seeking the BSc. Under present conditions, diploma holders from Egerton College have only two alternatives for upgrading their educational qualifications: (1) If they can obtain sponsorship for an overseas program, they can utilize this

avenue for obtaining a higher level degree. (2) They must resign their government position, apply as an individual to the Faculty of Agriculture, and if admitted, complete a three-year program.

Several years ago, because of the specific differences in entrance requirements, this approach was perhaps justified. However, the success of those Egerton graduates who have received substantial "credit" toward their degree objective for courses taken at Egerton from accredited overseas institutions combined with the increased academic capability indicated by an increasing number of students applying to both the Faculty of Agriculture and Egerton College, would suggest that this same process could occur in Kenya.

Perhaps such credit transfers should initially be limited to those Egerton graduates who had appropriate science qualifications to meet Faculty of Agriculture admission requirements at the time they entered Egerton. An increasing number of such qualifiers are enrolled at Egerton. For example, Egerton interviewed approximately 3,000 candidates for the 1977-78 class. Of these, 600 were "A" level candidates, 38 of whom had principal passes in sciences; twenty-two of the 38 were admitted. Surely, these students, after completing three years of work at Egerton College, and who meet the same basic requirements as those students admitted to the University, should receive some form of credit and not be required to "start over" with a three year program. In view of the needs for trained manpower, it is an unnecessary expense and an increasingly difficult morale problem.

b. Future Areas of Emphasis

The manpower survey has identified a number of specialties of relatively high anticipated demand. University management will obviously consider this evidence in developing departments and counselling students. Beyond these, a university has an intellectual responsibility to anticipate needs before they become generally recognized and to move to meet them. To this end, we offer the following suggestions:

Recommendation No. 4. The Faculty of Agriculture should come to a conclusion on, and implement as soon as possible a degree program in Agriculture Education.

As is mentioned in the introduction, one of the items which was called to the attention of the Education Team was the work of the National Commission on Education. While the details of the Commission's total work were not available, the team was told of one aspect which is critical to this recommendation.

One proposal, it was reported, would call for the extension of agriculture as a taught subject into the primary school system with greater emphasis on agriculture at the secondary level. At present, the majority of teachers of agriculture at the secondary level are provided by Egerton College. With this increased emphasis, however, and with need for expanded course content at the upper secondary level, the demand for trained teachers of agriculture will be staggering. There are well over 500 secondary schools at present and the last information available (1974) indicated that there were only 93 which offer agriculture as a taught subject. Therefore, even to implement the program at existing secondary schools will require a five fold increase in numbers of trained secondary teachers. Add to this some four thousand certificate level primary school teachers and the staff which will be required to train them, and the need for a degree program in agricultural education becomes evident. Obviously, Government approval of commission recommendations and timing of implementation will affect the actual numbers and level of teachers needed.

Recommendation No. 5. The Faculty of Agriculture should move forward with the development of a degree program in Natural Resources to include both forestry and fisheries. It is suggested that consideration be given to development of a broad-based natural resources program to include conservation and development of forestry and fisheries resources. Close coordination with research station activity in this substantive field will be required.

Several years ago, Egerton College offered a diploma program in forestry. This was dropped in 1968, however, because "there was no evident need for trained manpower in this area". Subsequent events, principally the rapid expansion of cultivated area and the short supply of energy, lead the Education Team to believe that conservation and development of forestry and fishery resources are going to be increasingly important to Kenya and that there will be a growing demand for natural resources

specialists at all levels.

The impression received from various interviews is that activity in the forestry field at this point largely emphasizes policy control. This effort needs to continue, but equally important is the development of forest resources for future utilization. One example is the increasing production of charcoal by the rural population. Development of rapid growing varieties, reforestation and appropriate conservation efforts are all key ingredients to a developmental program which could have a significant human and economic impact on Kenya's future. It is for these reasons that the team calls for a coordinated program among all segments involved.

At present there is little activity at the educational institutions in fisheries; and yet this field could hold significant promise for the future in food supply, recreation, and tourism.

Recommendation No. 6. The Faculty of Agriculture should re-evaluate the study of the Range Management program and consider it for implementation.

The team is aware of a Faculty of Agriculture study on the subject but there is some question as to whether or not this study involved to the extent it should, field personnel and donor agency specialists (USAID, World Bank, Canadian Government, and others). In view of the Government policy with regard to the development of the vast low production rangelands, there is strong evidence of need for as many as 40 BSc level personnel in range management within the next two years with an additional 30 or more over the next five years. In view of this it might be more appropriate to establish a full Department of Range Management, or perhaps Range Ecology, than to further consider only a MSc level program at this time. At least, a new study should be conducted, involving all appropriate personnel with a focus on the field requirements and the curriculum necessary to support these requirements. Whatever program is evolved, it is critical that it include strong emphasis on Kenyan ecology and the social aspects of the people served. Further, there should be a close liaison with the Range Management program at Egerton so that the programs will be complementary.

Recommendation No. 7. A BSc program in Home Economics with an agricultural orientation should be developed within the Faculty of Agriculture.

There was virtual unanimous agreement among those interviewed that the output of specialists in Home Economics at the BSc level needs to be increased. Further, because of the relationship of the rural agriculture development policy, home economics training needs to be closely integrated with and related to agricultural training.

In the process of developing this program there needs to be a close dialogue with Kenyatta University College where the only current BSc program in home economics is offered. Some consideration was given to two alternative solutions: suggesting that Kenyatta University College's curriculum be changed to emphasize the relationship to agriculture, or suggesting that the home economic program of Kenyatta University College move to the Faculty of Agriculture. Both, in the judgment of the Evaluation Team, have serious drawbacks.

Although we are agricultural education specialists, we cannot ignore the fact that agriculture is not the only sector which requires trained home economists. To take the only available program and tailor it to meet the need of one sector and ignore other needs would be a mistake. Further, it would be difficult and very expensive to add sufficient agricultural facilities at Kenyatta University College to accommodate the Home Economics personnel who are to serve the Agricultural sector. And, it is obvious from the acceptance of the Egerton home economics graduates in the field that a significant agricultural component is important. The performance of these personnel at the Certificate Schools and the Farmers Training Centers, where they are assuming administrative positions as Principals and Deputy Principals as well as teachers, is excellent. They are well accepted by the other teachers, by the farmers and by farmers' wives. They involve themselves in agricultural production activities as well as the more traditional home economics instructional program and this obviously has had a favorable impact on their acceptance. Perhaps the dialogue suggested between the Faculty of Agriculture and Kenyatta University College will result in a program whereby the two can work together

to meet the needs of the rural areas.

2. Faculty of Veterinary Science

The Faculty of Veterinary Science of the University of Nairobi, which was established many years ago, has the basic responsibility of preparing personnel to serve as Veterinary Officers of the Ministry of Agriculture's Veterinary Service Department. USAID has been the primary external source of funding for this facility and its instructional program. A current technical assistance contract continues to provide personnel support as well as overseas participant training.

Until 1976, students from other African countries comprised the majority of the student body; only about 20 to 25 percent were Kenyans. This changed in 1976 and this year's total intake of 86 are Kenyans. With this has come the issue of whether or not this number of trained veterinarians can be absorbed within the Kenyan economy in the years ahead, and a number of studies have been done on this subject.

The survey indicated an apparent need of 586 for the speciality of Veterinary Medicine by 1988, which could be filled by about two-thirds of the current capacity. However, it is known that some graduates of the Faculty fill animal husbandry positions rather than those described as veterinarian. Even so, we would not recommend further expansion of the capacity of this faculty unless a policy level decision is taken to alter the probable future demand.

Present government policy places veterinarians at the district level where they are primarily involved in disease control activities. Their concerns and responsibilities are largely limited to control and movement of herds and animals rather than treatment. Should treatment, rather than control, become the factor governing the need for this speciality, demand would obviously grow more rapidly.

The issue, is not whether treatment would be useful, but whether such a significant change in policy is financially possible and desirable relative to other demands for funding. This is a question which the Government of Kenya must resolve within its development priorities. With regard to the overall operations, regardless of the size of intake, the following is suggested.

Recommendation No. 8. The Faculty of Veterinary Science should establish a closer working relationship with graduates of its program and with the Department of Veterinary Services.

This cooperation should involve (among other things) exchange of staff, joint research, intern training for veterinary students, a well organized mutual involvement in curriculum review, and development of a program of continuing education for the provincial and district veterinary officers.

During the review, it became clear that there is a disappointing lack of coordination and cooperation between the Faculty of Veterinary Science, the Veterinary Services Department of the Ministry of Agriculture, and the graduates of the Faculty of Veterinary Science serving in the field. Irrespective of what policy the Government of Kenya follows with regard to the provision of veterinary services, it is critically important to the welfare of veterinary services and veterinary training in Kenya that a more cooperative and positive relationship be developed among the concerned elements.

To properly serve the need of the country, the Faculty of Veterinary Science needs the input from those in the field with regards to curricula development. At the same time the research activities of the Faculty of Veterinary Science need to be appropriately funded and related to the veterinary problems in the field, and the faculty need to be involved in the research activities of the field stations.

A program whereby faculty members periodically spend a year at a research station, and research station personnel spend a year at the Faculty of Veterinary Science should be actively pursued as it is at most major Veterinary schools. The knowledge and skills of veterinarians practicing in the field need up-dating through a continuing education program that only the Faculty of Veterinary Science can provide.

Veterinarian training could be significantly improved by an effective program in which students would intern with veterinary field staff. According to the Director of Veterinary Services, one important area where the graduates of the Veterinary Science program appear to be weak is in diagnostic abilities and in presenting a succinct summary of their diagnosis. This was confirmed by other interviews which indicated

that the graduates are not appropriately equipped in practical methods of animal restraint, a critical element in appropriate diagnosis and treatment of animals. It is the opinion of the Team that these skills can only be gained through a well-organized and supervised intern program. While an intern program of sorts exists, it does not appear to be of sufficient duration to provide adequate grounding in the application of their training.

The Team is confident that initiation of the suggested cooperative activities will ultimately lead to many others that in turn will lead to the betterment of both the Faculty of Veterinary Science and the Veterinary Services Department.

C. EGERTON COLLEGE

Perhaps the most highly developed agricultural training institution in Kenya, Egerton College continues to play a vital role in the preparation of academically trained agricultural manpower. As has been concluded by every study in the field of agricultural education in Kenya over the last 10 years, this team too was very much impressed with the quality of the programs which have been developed by Egerton's Board of Governors, Administration and Academic staff.

Egerton College was established in 1939 in a high potential mixed farming area in the Kenya highlands 15 miles from Nakuru, to train European farmers and farm managers. It is rich in a history of practical and applied agricultural training. In 1961 it was transformed from a totally European to a predominantly Kenyan institution and its basic objective was changed from that of training farmers to training Technical Officers for the Ministry of Agriculture. When Siriba College was transformed from a diploma level agricultural institution to a teacher-training college in 1965, Egerton became, and remains today, the only diploma level agricultural training institution in Kenya.

In 1967, Egerton College had an enrollment of 393 and offered three year diploma programs in Range Management, Animal Husbandry, Agriculture and Agricultural Engineering, along with a two-year course in Dairy Technology. Ten years later, it has added programs in Home Economics, Agricultural Education, Farm Management, Horticulture, moved the Dairy

Technology program to diploma level, and its enrollment has increased to 670. (The school actually enrolled more than 700 during 1976/77, but the Government has reduced the number of students sponsored pending the results of the manpower study.)

Although nearly all of the graduates of Egerton College assume positions with the Ministry of Agriculture or parastatal agricultural organizations, it is not a government institution. It is directed by a Board of Governors who are appointed by the Minister of Agriculture. This form of governance has served the institution extremely well and is a pattern which could be emulated in the future.

Through the years, Egerton has regularly enrolled a number of students from other African countries. There were 123 in 1975 and 102 in 1976, but the number of foreign students dwindled to 49 in 1977, and it is unlikely that there will be significant numbers in the future. While this has the advantage of providing additional space for Kenyans, it is hoped by the Education Team that the instructional programs at Egerton will continue to be available for at least limited numbers of students from other African countries under the sponsorship of their governments.

In many ways similar to the issue which confronted the Education Team with regard to the Faculty of Agriculture, the question of the future of diploma level education in Kenya was difficult and complex. Should Egerton be expanded? Should a second diploma level school be initiated in a different part of the country? How much and how fast can an institution be expanded before "growth problems" outweigh benefits? There is a danger that an institution's size, if it becomes too large or grows too rapidly, will have a negative impact on its purposes and goals, and perhaps on its quality. Because of this, the Government of Kenya may need to establish additional diploma level institutions just as it will need eventually to initiate a second Faculty of Agriculture. The time has not yet arrived, however, and cost-effectiveness considerations combined with the immediate need for diploma level personnel would indicate that further expansion of Egerton is the appropriate course of action to follow. As part of that expansion, the Education Team does see potential at Egerton to help meet some of the demand for BSc personnel by carefully upgrading selected programs to the BSc level. It is recognized that

offering both a diploma level and BSc level programs side by side can create difficult problems if not carefully planned and controlled. The curricula, the academic staff and the students selected for participation would need careful and sensitive review. However, in many respects it should not be any more difficult than offering BSc and MSc programs side by side. In terms of manpower needs and program potential the Education Team would view both the Home Economics and Agricultural Education programs at Egerton as areas which might receive early consideration for such an endeavor. If such a pilot program, closely coordinated with the Faculty of Agriculture, is feasible within the Government of Kenya structure it would strengthen both institutions, help meet immediate manpower needs and reduce the significant strain which will be placed on the Faculty of Agriculture as it strives to accomplish the planned expansion and additional development goals. Within this context, the following conclusions and recommendations are offered:

Recommendations No. 9. The diploma level programs at Egerton College should be expanded with regard to intake as well as numbers of programs offered. New programs should be developed, as with current implementation of the Food Technology and Animal Health programs, as needs are identified.

Adequate land and present facilities at Egerton College could be expanded to increase its enrollment by at least 100 students, and perhaps more, with limited capital expenditure. Primary costs would be related to additional residence hall space and perhaps some expansion of the Library. There would of course be a requirement for additional teaching staff. The Education Team feels, however, that serious consideration should be given to a major capital input which would allow Egerton to increase its total enrollment to about 1500 students. This is a doubling of capacity, but Egerton has the stability to absorb this increment without adversely affecting its basic purposes and goals. If this capacity were to be established by 1983, it would provide the 500 annual output of diplomants recommended in Chapter II.

Egerton should carefully analyze needs with a view to initiating new programs. Like the Faculty of Agriculture, one of the programs which needs to be increased significantly for reasons stated earlier is the Agricultural Education and Extension program. A new program in Food Technology is to be initiated soon, with the first students scheduled to enroll in 1978. This program is sponsored by the Danish Government and the first of the consultants was scheduled to arrive shortly after the Education Team visited the campus. Consideration is also being given to the development of a Water Resources program within the Engineering Department. If carefully geared to the national development plans, this program could be a valuable and welcomed addition to Egerton's course offerings.

The Education Team was also impressed with the advances the College has made with regard to restructuring its programs so that student evaluation is based upon completion of each course, or subject, as opposed to relying upon a single final examination at the completion of a total program. This move should also provide a basis for the allowance of transfer credits by the Faculty of Agriculture for work completed at Egerton, for it establishes a basis for evaluating a student's achievements and capability in individual subject areas.

Recommendation No. 10. Egerton College and the Government should work toward a plan whereby capable and qualified certificate holders can be sponsored for the diploma course where they can, through admissions and curricular arrangements, complete their program in less than the three years required of new incoming students.

Just as has been recommended for diploma holders wishing to earn BSc degrees, it is desirable to provide additional mobility paths for certified Technical Assistants to grow and develop professionally. As a first step, the present sponsorship program should be expanded and should include those who meet experience and performance qualification standards, as well as academic ones. Efficiencies in the training process could also be achieved by recognizing both the formal and experienced-based knowledge levels of Technical Assistants. A shortened program that fills in the gaps in professional preparation could then be devised which specifically meets the needs of these staff in the different specialty areas.

Recommendation No. 11. The Board of Governors and the Academic Staff at Egerton College should reevaluate the potential need and appropriateness of reinstating a diploma program in forestry and natural resources.

The basis for this recommendation was touched upon during the discussion of the same subject matter program at the Faculty of Agriculture. In view of increasing world-wide concern with petroleum energy and the costs associated with it, the Government of Kenya, as other governments, will be faced with an increasingly critical situation. As fossil fuels become excessively expensive a critical need will arise for the development of renewable fuels, including charcoal.

Recent research has produced fast growing hardwood varieties which can be utilized in reforestation programs. Additionally, the activity in the Sahelian areas in the development and planting of drought-resistant varieties which improve soil fertility might well be adapted to the expanded use of the drylands areas of Kenya. With all of these factors put together, the Education Team is of the opinion that there will be a growing need for multiple level trained manpower in this discipline in the future. We recognize how difficult it is to reestablish a program once it has been phased out; in this instance there is justification for doing just that. In this process the broader aspects of natural resources, including fisheries, should not be overlooked.

Recommendation No. 12. The academic staff and administration of Egerton College should consider further revision to the curricula to provide more depth in specific subject matter areas with less emphasis on general agriculture. The exceptions to this are the Agricultural Education and Home Economics programs whose students need continued exposure to broad agricultural production courses to the extent the curriculum will allow.

It is difficult and often presumptuous for those involved in academic programs in another country to try to tell the academic staff of successful institutions what the content of their academic programs should be. Certainly, no one can become an "expert" on the specifics of curriculum development and needs of another country in the short period of this study. For those reasons, the Education Team has hesitated to

make specific suggestions relative to curricula arrangements. In this instance, however, the suggestion is based largely on comments and suggestions from students who have completed their programs and are now in the field.

Two additional comments are needed. First, the team was very much impressed with the efforts which Egerton College has made in contacting its former students and urging input on curricular changes. Many graduates with whom the Team talked were very positive in their attitudes about this approach and welcomed the opportunity to share their experiences and needs as they perceived them. Second, the balance between general agriculture on the one hand and depth in a specific discipline on the other is a delicate one which must be carefully considered and continuously reviewed. However, Egerton graduates obviously had a felt need for more training in their specific discipline. Some of this training can certainly be accommodated within subsequent in-service training programs. But there was sufficient expression of need to suggest that the curriculum in most programs should be reevaluated. This is particularly true of the relatively new program in Farm Management where a need was expressed for such items as specific instruction and exercises in surveying, farm planning, farm budgeting and the like. This same program should also be reviewed in terms of the current Government program for development of the low productivity range lands and that program's manpower needs.

As is usual, there are exceptions to the general rule. In this case there are two programs which should guard against too much emphasis on pedagogy and depth in a particular discipline -- Agricultural Education and Home Economics. In the case of the first, while those leaving the Agricultural Education program certainly need to be able to communicate and to teach the subject matter, it is also critically important that they have sufficient agricultural training to be effective. The wisdom of including agriculture subjects within the Home Economics curriculum has been proven and this needs to continue. There will be an increasing need, however, to broaden the home economics courses so that graduates feel more confident with the various home economic skills. It is hoped that this can be achieved without sacrificing too much of the agricultural courses.

Recommendation No. 13. Egerton College should receive appropriate financial support so it can continue and expand its applied "production mode" research activities. This will require the establishment of additional teaching positions so the currently excessive teaching load can be reduced.

The Weir Report of 1967 provides an excellent description of the need for theoretical research and the relationship of such research to a University program. It does not, however, discuss applied production research in any detail. There is a role for both types of research in a rapidly developing agricultural economy, and the practical application of Egerton's curricula and programs makes it particularly appropriate that its role in the applied research field be expanded.

In theoretical research, the purpose is to test new ideas, develop new varieties and new breeds. In applied research, these results are applied in a regular production mode to prove their applicability to commercial enterprises. An important secondary benefit of applied, or production, research is that it disseminates and communicates the results of basic research to a much wider audience.

The Education Team was impressed with the initial Egerton College Bulletin on research which was published just prior to the team's visit. Five hundred copies of this publication were printed and sent to all research stations, senior extension agents at the district and province level, teachers of secondary schools and institutes, and the relevant faculty at the University. Expansion of this activity will serve Kenya well, by disseminating the results of production research and by stimulating additional theoretical research at the University.

One of the significant elements of an applied research program which should not be overlooked is its importance to the on-going instructional program and the leading role which the students should have in conducting actual applied research activities. Involvement of the students, either through classes or special project activity, in test plot management, record keeping, care and management of livestock trials, and in writing and presenting research results is a significant instructional tool which needs to be emphasized. Further, the team would suggest that consideration be given to stationing a small core of extension agents at Egerton on

rotating basis to work with the academic staff and the students on the research activities as well as putting research results into bulletin form for dissemination. This activity would serve the dual purpose of placing into the hands of all of the extension staff up-to-date farming practices and techniques as well as providing a form of limited in-service training.

The expansion and further development of these research activities however, requires that the teaching staff at Egerton have adequate time to supervise and participate in such activities. Additional teaching posts will be needed so that the currently excessive teaching load can be reduced.

D. THE INSTITUTES

1. Background and Current Situation

The three certificate level institutes carry the major responsibility for providing agricultural instruction to students who form the cadre of extension agents of the Ministry of Agriculture. These three institutes -- Bukura Institute of Agriculture, Animal Health and Industry Training Institute (AHITI), and Embu Institute of Agriculture -- offer two-year programs with five instructional departments. These are Agricultural Engineering, Crops, Animal Production, Farm Management and Extension and Home Economics. However, AHITI, as evident by its name, has significantly greater depth in animal health and other specialized courses associated with this discipline, including Hides and Skins and Artificial Insemination.

The oldest and best established of the institutes is Embu. This institute is located about 80 miles north-east of Nairobi on approximately 200 acres of good agriculture land. The institute also has use of an additional 600 acre farm at Ndomba. Embu was initiated in 1940 and was raised to its present status in 1950. Its physical capacity was increased from 50 to 150 in 1962, and increased again to an enrollment of 250 as a result of the Weir Report recommendations.

AHITI was authorized in the mid-1960's with its first students accepted in early 1966. It is located on a very small six-acre parcel at Kabete close to the Veterinary Research Laboratories, the Faculties of Agriculture and Veterinary Science of the University of Nairobi, and the Central Artificial Insemination Station. AHITI is at virtual full capacity,

with an enrollment of 140-150 students in the Animal Husbandry Assistant, Range Management Assistant, and Hides and Skins Improvement programs for the last five years, in addition to the special one-year artificial insemination and leather-craft courses. A significant limitation on the AHITI program is the lack of adequate farm operations. The institute has, however, developed a program through cooperation with the Ngong Farm operated by the Veterinary Services Department. AHITI students, in groups of 30, spend 13 weeks in residence at the Ngong Farm where they receive instruction and work experience. While this helps to fill what would otherwise be a significant void in the instructional program, it is not an ideal arrangement. The program at AHITI is also closely associated with the two specialized training programs at the Naivasha Dairy Training Center and the Athi River Meat Training Center. There is a particularly close relationship with Athi River because many AHITI graduates proceed to the meat training program.

Bukura, located on 400 acres some 40 kilometers north of Kisumu, is the newest of the agricultural institutes. It opened in 1974 with an intake of 90 students. It has a planned physical capacity of 250, but has not yet reached this figure. In 1975/76 the enrollment was 159; in 1976/77 it was 209 and will be approximately 230 during 1977/78. The present staff is not at full complement, largely due to the unavailability of senior staff housing. Because of its relative isolation from nearby communities, housing is not available for rent. The housing problem should be resolved when housing presently under construction is completed. The Institute will continue to experience difficulty in maintaining staff, however, because of the lack of public schools.

2. Proposed Expansion

During the course of the review of the certificate level institutes, the Education team was made aware of a proposal to the World Bank which would significantly increase the size and capability of these institutes. In view of the projected demand for certificate holders and the number of qualified applicants who want to enroll in these schools, such expansion is overdue. For the current year, the three institutes admitted only a total of 370 of nearly 3,000 applicants interviewed; and

the interview list had been screened from a number at least triple that size. The Education Team is generally supportive of the proposals for expansion and offers the following recommendations with regard to the certificate level institutes.

Recommendation No. 14. Ndomba. The proposal to establish an Animal Health Institute (certificate level) at Ndomba with the double the capacity of AHITI should be implemented. The curricula of the new school should continue to emphasize Animal Health because of its relationship to the preparation of meat inspectors at Athi River Meat Training Institute. However, with its additional capacity the programs in general agriculture should be broadened.

There are plans for expansion of the Athi River Meat Training Institute which will require a greater number of AHITI graduates. With the expanded capacity this school should broaden its program offerings so that the course offerings and curricula of the four institutes will more closely parallel each other. This is not to imply that the four certificate schools, or others which might be developed, should be molded into identical institutions. Each will, and should, have its own areas of special emphasis. However, the core programs for the preparation of extension staff should more closely parallel each other.

One alternative for achieving this coordination of the core curricula for the institutes would be to establish a national committee to consider and advise on this aspect of the educational program. There is a potential disadvantage to this approach, however, for it establishes another review level which might slow development, stifle individual initiative, or even prevent the institutes from establishing much needed close ties with the communities in which they are located. A better alternative would be to hold regular meetings of the principals and key personnel of the institutes, coordinated through the Ministry of Agriculture's training office. This approach will insure needed dialogue and coordination where required, but still permit the development of specialized emphases as required at each of the institutes. The Education Team would argue strongly for coordination among the institutes on a number of issues, including the development of a more parallel core

program. However, we would argue equally strongly against any type of standardized national tests as a qualification for all students leaving the schools to receive their certificate.

Recommendation No. 15. Embu Institute will need access to additional land so that its intake can be increased.

Embu currently utilizes the 600 acre farm at Ndomba in its instructional program. If this farm is selected as the site for a new institute, it will cease to be available to Embu. It is doubtful that Embu could carry on its present program, much less expand its capacity, without the availability of additional farm land.

Recommendation No. 16. Present development plans formulated by the Ministry of Agriculture for Bukura should be continued.

This suggestion relates to the plans reviewed with the Education Team, mostly related to capital development, which will enable Bukura to become fully and effectively operational at its present planned capacity. Although Bukura may eventually need to be expanded, we believe that the institute needs to become more stabilized and resolve the various "start-up" problems it has encountered before further expansion.

Recommendation No. 17. Plans should be made to establish a certificate level program which would specialize in coastal agricultural production and related agricultural business in the Coastal Province.

It is our impression that coastal agriculture can play an important role in increased agricultural production in Kenya. Although efforts are made at all of the training institutions to expose students to agricultural production in this area, this is achieved mostly through field trips and, on occasion, special projects. However, none of the institutes can devote the attention needed to this agricultural area because of their other curricular responsibilities. Appropriate training in coastal agriculture and related businesses will help significantly in the development of this segment of the agricultural sector as well as in the overall development of that geographical portion of Kenya.

Recommendation No. 18. Specialized Training. Naivasha Dairy Training Center should implement a certificate program specializing in dairy training.

Near the conclusion of its activities the Education Team was asked to evaluate the possibility of expanding the program of the Naivasha Dairy Training Center so that a certificate program specializing in dairy training could be implemented. Up to this point, Naivasha has provided a one-year specialized program to students who are sponsored by the dairy industry itself. It is located in the heart of the dairy industry of Kenya, and, through the assistance of several international agencies, has developed excellent facilities and program. It is evident, however, that there will be an increasing demand for certificate level staff in this important agricultural speciality, and Naivasha is the logical place to prepare them. Careful attention must be given to the development of a certificate program at Naivasha so that the original purpose of the center is not lost. There is no reason, however, that both programs cannot succeed, in the same way that AHITI has been able to conduct a special artificial insemination course along with its certificate program.

Recommendation No. 19. Plans for expansion of the Athi River Meat Training Center should be implemented, and a study on expanding a portion of the program to diploma level should be undertaken.

The proposal to the World Bank requesting financing for expanding certificate level schools contains a request for expansion of the Athi River Meat Training Centre. This Centre runs two five month courses per year of 22 students each. Students are selected by the Director of Veterinary Services and based largely upon geographical provincial representation. Until January 1977, the school was supported and directed by the FAO, and was established as a meat training centre to serve all English speaking African countries. Accordingly, in previous courses a good number of non-Kenyans were enrolled. There is a provision for 20% of the spaces to be reserved for non-Kenyans, but some problems associated with sponsorship have developed.

The proposal for expansion would triple the size of the school so that it would train 60 students per term and 120 per year. The planned

expansion is based upon what the Education Team was told was Government policy to ultimately place meat inspectors in butcheries at each location, and perhaps sub-location. To adequately staff these butcheries and provide for leave, etc., will require three meat inspectors for each site. This program will require nearly 200 individuals and will obviously need to be phased over an extended period of time. The Athi River Centre will need to be expanded considerably to fully staff the program. This expansion is closely related to the AHITI program. Without expansion of AHITI, expansion of Athi River is not possible.

The Team would also suggest that a study be undertaken of the possibility of expanding at least a portion of the Athi River program to the diploma level. Such a study should look carefully at curricular requirements, the duration of the program and the relationship to other expansion plans. It is the impression of the Team, that with perhaps minor modification of the curriculum, an extended time frame of six months or so might well help to fill the need for diploma level personnel. The Team recognizes that there are a number of ramifications of the proposal which will need careful evaluation, including the relationship to academic preparation and entrance requirements at the time the students entered AHITI, and the potential impact on and relationship to government service position classifications.

Recommendation No. 20. The Outreach Program developed at Bukura Institute should be considered for implementation at the other certificate level schools.

The "outreach" program is one of the apparently very successful programs initiated at Bukura Institute. This program is based upon the concept that most of the Institute's students will become extension agents and need the ability to communicate with and offer assistance to the farmers. The outreach program permits second year students to work with farmers on a direct basis as "intern" extension agents. The work is carried out under supervision of the academic staff, who feel that the program has been well received by farmers in spite of the relative youth of the students. Because of this success, the Institute has been asked to expand the outreach program. A successful program of this nature has

significant benefits to the students. The Ministry of Agriculture and the staffs of the other Institutes should evaluate the applicability of this program and its possible implementation at all Institutes.

Recommendation No. 21. There is a critical need by all of the staff at the certificate level institutes for frequent and intensive in-service training.

Details of this recommendation, and a proposed method of implementation are included in Recommendation No. 27 under the heading In-Service Training and Curriculum.

E. FARMER TRAINING CENTRES

Perhaps no agricultural training agency has been the subject of as many reviews, studies and evaluations as the Farmer Training Centres. Problems and short comings associated with the operations of this heterogeneous grouping of centres have been well documented. Because the Farmer Training Centres were only one segment of the institutional review included in this relatively short study, the Education Team did not interpret the Terms of Reference to include a detailed assessment of each FTC within Kenya. Instead, the Team attempted to gain an overall perspective of their operations and delineate to the extent possible commonality of objectives and problems.

It would be difficult, if not impossible, to treat all these centres as a single uniform group with typical characteristics and with specific recommendations applicable to all. Certainly there are threads of commonality, particularly among the small scale FTCs. They have as their purpose the training of small farmers; each must work with and rely upon the extension agents for development of courses and recruitment of trainees. But, there are different histories, different administrative structures and different operational procedures which must be taken into consideration. However, the FTCs can be grouped into four broad categories: (1) Large Scale FTCs with different courses and purposes; (2) Small Scale FTCs operated directly by the Ministry of Agriculture; (3) Small Scale FTCs operated with grant assistance from the Ministry of Agriculture but governed by an independent Board of Governors; and (4) Small Scale FTCs

operated with grant assistance of the Ministry of Agriculture, through the National Christian Council of Kenya. The Education Team, in an effort to gain a broad perspective, visited a total of 13 FTCs. This included FTCs in each of the four categories.

The FTCs during 1976/77 and the current year, now appear to be receiving sufficient funding so that many of the shortcomings pointed out in the many prior studies are being resolved. There is no question in the Team's opinion that the lack of adequate financing, and the difficulties which that implies, was the primary source of most of the major problems encountered by the FTCs. It inhibited adequate course planning, hampered adequate communications with extension staff, prevented instructional use, blocked utilization of farms where farms were available, and resulted in a deterioration of morale and motivation among the FTC staff. While all of the FTCs visited indicated that additional funds could be used, virtually all also noted that the increased funding which has become available has helped significantly. Evidence obtained during the visits from visual impressions, review of course attendance for the last three years and courses currently scheduled, and budgetary data all confirm this. With this background the following conclusions and suggestions are offered. Several are not new. They have been suggested in one form or another in other studies and reports, but we feel they are important to further improvement of the FTCs.

Recommendation No. 22. Within the framework of the Government of Kenya's civil service program, efforts should be made to provide incentives or fringe benefits for the Principals, teachers and senior staff of the FTCs so that these posts will attract the best personnel and provide the motivation for them to continuously improve the operations of the FTCs.

Personnel at the FTCs are on call 24 hours a day and have significantly more responsibilities than personnel in similarly classified positions. Above all, however, the FTCs are a key link between the work of the extension staff and rural development. The personnel who staff them must look upon the important responsibilities of their positions with motivation to continuously improve the course offerings and operations.

Problems of staff turnover and lack of motivation will continue as long as these positions are less rewarding, financially and professionally than comparable positions in the service.

Recommendation No. 23. a) Individuals should have at least three years of field experience before being assigned to Principal posts at the FTCs.

b) Principals assigned to FTCs should be provided an intensive short-course in administrative techniques and procedures, personnel management, and fiscal affairs in addition to their training in Agricultural Education at Egerton (or the University when this program is initiated).

c) All teaching staff at the FTCs should have had field experience prior to their posting.

These three suggestions are linked because they are obviously interrelated. They are mentioned by FTC staff, Ministry of Agriculture administrative personnel, and District and Provincial personnel responsible for extension programs as second only to funding problems in terms of concern. If the Principal and teaching staff of the FTCs are going to be effective in the development of courses to meet farmers' needs and operate a program that will be responsive to farmers' concerns, they must understand and be familiar with the problems which the farmers face. The training institutions from which FTC staff come attempt to provide their students with a solid background in this area, but there is no substitute for personal experience in the field. Such experience will also provide FTC staff with an appreciation of the extension staff's day-to-day operations and should make for better communication and working relationships between the FTC staff and the extension agents in both recruitment and follow-on activities.

A number of principals assigned to FTCs fresh out of Egerton experienced difficulty because they had not had the field experience which would have given them greater maturity in understanding the farmer/FTC relationship. In addition, a number found themselves in difficulty with financial records before they realized or understood the need for proper fiscal controls and management.

Finally, it must be understood that the farmer is a person who may not be articulate and who has had little, if any, training in a formal sense. However, he does possess a knowledge of the art and practical science of farming, gained from generations of intimate association with the soil. This is often ignored or misunderstood by new extension agents or FTC instructors and causes a mutual lack of respect which makes the learning atmosphere very difficult. An appreciation of the farmers' unique knowledge, gained by FTC staff through prior successful field experience working closely with them, should do much to improve the farmers' reliance on the instruction offered at the FTCs.

Recommendation No. 24. Every FTC which is to be used for teaching agriculture should have an appropriate and adequately funded farm under its direct control and supervision for teaching and demonstration purposes.

Most of the FTC's visited did have adequately operating demonstration farms, but some did not. Farm demonstration and practice is an integral part of any agricultural instruction program. At the level at which the FTC's are operating, it is an absolute must. To be effective, it must be under the operational control of the FTC staff. If it is not possible to provide this instructional resource to some FTCs for any reason, then such FTCs should be used for programs other than farmer training.

During the course of the review it was suggested that the FTC farms might be used to help overcome the limitations on development of agricultural instructional facilities in the program which might grow out of proposals of the National Commission on Education. This should present no particular problems if such use can be scheduled to avoid conflict with farmer courses. There is a decided seasonality of FTC instruction to coincide with farming chronology. The Team would caution, however, that care be taken so that the primary responsibility of the FTCs is not eroded through inadvertent non-availability of its own instructional resources.

Recommendation No. 25. One-half of the capacity at Eldoret FTC should be devoted to a certificate level program in farm mechanization.

Some general agriculture in this course is desirable, but the program needs strong emphasis on farm mechanization with a heavy percentage of time devoted to practicals. The program might be similar in intent to the special training program at Athi River Meat Training Center, but at the certificate rather than post-certificate level.

Operation and associated maintenance and repair of farm machinery is of increasing importance in both the public and private sectors. This is accompanied by the need for a mechanization technician to fill the slot below the BSc and diplomant level agricultural engineers within extension services as well as in the private sector. The details of a program to develop such technicians and its specific location will of course be determined by an evaluation and review by the Ministry of Agriculture. However, the Team was impressed with the equipment and personnel of the Eldoret large-scale FTC. When this capability is compared with a decreasing future demand for large-scale farm managers, there is considerable cause for Eldoret to be strongly considered as the locus for this program.

Recommendation No. 26. As certificate level FTC teachers leave their positions, consideration should be given to replacing them with diploma level personnel on a carefully planned "phasing-in" basis.

This is a long-range program, and will need to be evaluated in light of the availability of trained manpower. However, in the years ahead the Education Team believes there will be a continuation, and perhaps acceleration, of two emerging trends. First, the future clientele of the FTCs are going to be a new generation of farmers, many of whom will have already received some agricultural training. Some Form II and Form IV leavers are currently reported to be participating in FTC courses. As the overall educational program develops, and particularly if the recommendations of the National Commission on Education are implemented, such attendance will increase in frequency. Second, it can be anticipated that the broadening role and responsibility of the FTCs will continue with new programs and differing utilization. As these two trends emerge, it

is also appropriate to plan for a staff trained to a higher level.

Those responsible for FTC operations need to be sensitive about adapting programs to meet the sometimes unique needs of their community. The staff of the FTCs should be encouraged to serve the emerging needs of the progressive areas of the farming community. For example, the Team is of the opinion that representatives of the private agribusiness industry have a good deal to offer in such areas as finance, fertilizers and herbicides, seeds and machinery. Cooperation with this sector by inviting them to participate in instructional courses or offering facilities for short courses prepared by agribusiness could assist in the overall promotion of better practices and production as a service to the farmers. Similarly, the FTCs would strengthen their programs by working closely with the Extension program to use some of the FTC farm area to demonstrate new practices or varieties developed by research stations. Some FTCs are now active in this regard, but most rely entirely on their own background rather than using the full range of MOA talent to serve the farmers in this important way.

Finally, a special mention should be made of the healthy growth of the Isinya Masai Training Center. The dedication of the staff and its willingness to adapt programs to meet the particular needs of the Masai is an excellent example of securing maximum results and benefits from minimum monetary investment by the Government of Kenya.

F. IN-SERVICE TRAINING AND CURRICULUM

Kenya places exceptionally heavy reliance on the academic education of its extension service personnel. Agents (other than JTAs) are trained in pre-service institutions and are then dispatched to the field. They are expected to rely on their own professional resources in advising farmers, supplemented by the occasional technical supervision of senior staff and very widely spaced ad hoc courses.

The amount and quality of systematic in-service training appears to be far below what is needed. The formal pre-service education is essentially a preparation for the absorption of experience rather than the acquisition of information. Academic education never imparts sufficient knowledge to an individual to enable him to fulfill his complete role.

The value of a technological education is only partly in the technology required, since this technology will change over time and in response to conditions. Rather, a technological education provides a framework into which different technologies can be fitted to the specifics of differing environments.

Whether a certificate holding TA (or any other staff) will be an effective change agent depends not only on his technical education, but on how this education is reinforced by subsequent training and supervision. Better and more pre-service training will not alone remedy the deficiencies which have appeared.

Closely connected to the continuous career-long need for in-service training is the requirement for a flow of locationally specific and applicable information as the content of such training. In-service training should be conveying information that is targeted for particular areas, farmers and technical situations. It must necessarily arrive at the right time in the cropping calendar so that its communication to farmers will be effective. Thus, the need for in-service training is not only a matter of providing more supplemental knowledge for agents. It is also a question of providing better and more timely inputs of applicable information^{1/}.

To facilitate improvements in in-service training, five principal problem areas have been identified. The first is the general insufficiency of high quality in-service training for extension agent personnel. Second is the lack of training in technical and instructional skills fields for trainers at pre- and in-service institutions. The third is the need for curriculum improvement and installation at certificate and FTC institutions. Fourth is the absence of specialized management training for agricultural administration functions. The fifth area is the need to train supervisory personnel in the process of training needs assessment and planning skills. Taken together, these problems reflect the absence of an authoritative organizational mechanism with adequate staff facilities and operating funds for planning and directing coordinated efforts. The discussions and recommendations which follow attempt to set

^{1/}On other aspects of information flows, see Utilization Chapter Recommendation No. 25.

out approaches which should be helpful.

1. In-Service Training Program

As has been mentioned in Recommendation No. 21 regarding certificate level institutes, there is strong evidence that the majority of staff at the institutes have been at their posts for many years and have had no opportunity for in-service training. The certificate institutes are basically the "trainers of the trainers" because their graduates staff the FTCs and the extension service. Some efforts to improve in-service training are made through arrangements by the provincial and district offices largely at the FTCs, but these efforts are sporadic and generally related to the implementation of some new specialized program. What is needed is a centralized focus on the in-service training activities. Accordingly, the following is suggested.

Recommendation No. 27. An in-service training program should be established to provide planning, development, and coordination of in-service training on a national basis.

This program needs to be well financed in order to provide courses at both residential centres and through extensive mobile units working in districts. Early emphasis should be placed on certificate level institute and FTC personnel, with second priority on other TAs and JTAs.

It is visualized that the recommended program would assume a national responsibility for planning, coordinating and arranging for carrying out most in-service training in agriculture. There are alternative views as to whether or not in-service training can be provided most effectively at a single location or whether on-site efforts are best. The alternatives are discussed below. Either way, a number of requisites need to be met throughout the whole process. They are:

- Refresher, updating, and rebriefing courses, seminars, and meetings are a constant need of almost any group of professionals or sub-professionals. With time, much information obtained at pre-service levels has been distorted, forgotten, or superseded. Therefore, up-dating seminars are as important as basic training. Their neglect is at the

expense of the farmers.

- Technically specialized provincial and district AOs and AAOs should do much of the agent training. They are likely to be the best informed and most credible instructors, and to possess the motivation to communicate well. Generalists and supervisors with primarily administrative responsibilities are unlikely to possess up-to-date information, and might pass on misinformation. Similarly, the FTC personnel who are normally utilized to train field personnel have not usually had the benefit of refresher courses themselves, nor are they of sufficiently high status to have full credibility in the eyes of their TA and JTA colleagues.

- A core cadre of agricultural training specialists for in-service training work should be selected because of their ability to translate complex information into proper packages, sequences, and methods. They should coordinate their work with that of the local technically specialized provincial and district personnel in conjunction with extension and training officers. The importance of relating the development of staff skills to the local technical situations cannot be over-stressed. Any adjustments of standard technical recommendations to be taught must necessarily be based on specific knowledge about local conditions.

To be truly effective, in-service training efforts will have specialized needs which will have to be anticipated, planned for and adequately funded. The following indicate some of those uppermost in our minds:

- Facilities: seminar and lecture rooms, offices, farm/demonstration plots.

- Personnel: numbers adequate to survey, identify, plan for, and carry out priority training exercises on-site and in the field. Managerial, technical, and professional training skills will be required.

- Supplies and Equipment: audio-visual and mobile units in particular.

- Funding: adequate and flexible in order to meet special needs, e.g., special guest lecturers or demonstration materials.

● **Outside Personnel Resources:** available outside talent from a variety of sources (government officials, private industry, university and Egerton faculty, international donor agency), should be utilized whenever possible.

An in-service training program will need some level of coordination at the national level in order to ensure uniformity of coverage, availability of teaching staff and facilities, and consonance of training priorities with national objectives. At the same time, such a Training Coordination Unit within the Manpower Development Division will need to keep itself informed about the agricultural calendar in the various regions and other factors which influence the availability of staff and facilities. These sometimes competing demands will have to be worked out by the Training Coordination Unit and the Provincial and District Extension and Training officers in an annual plan.

Staff development is a complex process which has a multi-year planning horizon. It is perhaps the most important management tool available to large organizations like the Ministry of Agriculture. Therefore, the Training Coordination Unit will need a competent staff of adequate size and stature to assure an effective program.

The Training Coordination Unit does not have to be located centrally in the MOA headquarters, but could be located in some permanent training facility. The desirability of a headquarters location (strong current policy orientation, direct access to policy and program leaders, centralized communications systems and personnel files) is somewhat offset by the inevitable diversion of capable staff to other duties and the difficulty of maintaining a long term orientation in the face of distracting short run emergencies. One must always remember that if the staff of the Training Coordination Unit is as good as it must be, its members will be encouraged to do all kinds of jobs which require competence; and they will be offered alternative employment. These opportunities for diverting talent from their primary function are more common at headquarters than in decentralized locations. If the critical needs for an in-service training program are to be met it is going to take the undivided dedication and attention of staff to focus totally on this program.

Although the Team is not wedded to a specific location, consideration should be given to locating the in-service Training Coordination Unit at Egerton College. There are other alternatives to be sure, but in terms of existing structures, Egerton appears to have the advantage. The Faculty of Agriculture is a possibility but if it is to expand its graduate program as recommended, it would have limited space for this activity. The presently contemplated program expansions will also strain the Faculty's administrative and instructional capacity. The existing institutes have neither the land nor the academic/administrative base. Other government sites do not have the required agricultural atmosphere nor the agriculture-oriented academic base that is essential.

The training itself should be offered at that location which best serves the training objective. Depending on that objective, either residential or off-site training may be appropriate. Certainly the Training Coordination Unit must assure that any underused facilities of the FTCs as well as those of institutes, Egerton College, or the Faculties of Agriculture and Veterinary Medicine are used in this program.

At some time, the MOA may wish to develop its own in-service training facilities. Once a major staff development program gets underway in an organization as large as the MOA, it can rapidly outstrip the facilities which are available "on loan" from pre-service educational institutions. It would probably develop a routine training demand which can effectively use proprietary installations. However, agricultural staff becomes available for training on a seasonal basis. In-service training will always have a decided seasonality factor which should be adjusted to by use of facilities temporarily available from other sources. This is another important factor in locating the Training Coordination Unit at an institution like Egerton which already has complete agricultural training facilities and has developed effective logistical supporting arrangements.

Perhaps the best approach, in view of the needs, is a blending of the centralized-decentralized alternatives in a Phase I and a Phase II with immediate initiation of the program through a national headquarters office; and then moving toward a separate facility and location at a later date. In evaluating the alternatives to be utilized, factors which

must be taken into consideration are geographic accessibility, facilities (including housing, classroom, laboratories and other instructional units) agricultural (machinery, cropland, crops, and animals), logistic support, administrative abilities, and the ability of the teaching staff to meet particular needs of various groups. All of this requires emphasis on a coordinated program with national planning and priority setting, based on training needs assessments made at the diverse local levels.

2. Curriculum Improvement and Training the Trainers

The problems of updating trainers in their technical specialities and making real progress in curriculum revision at the certificate and FTC institutions are closely interrelated. As noted earlier, an in-service training program should give attention to these educational centres and staff as a priority. Meaningful curriculum revisions at institutes and improvements in course content at FTCs will probably take place only when the teaching staffs are brought up-to-date with the latest findings and applications in their specialized fields. More importantly, the revised curriculums will only be implemented when they are the product of internally generated efforts. Despite all of the fine efforts expended on curriculum development, it is doubtful if they are being effectively utilized. Those who must carry out the curriculums should naturally be intensely involved in the process of developing them.

Recommendation No. 28. In-service training is an important necessity and must take place before effective curriculum improvements can be made. In fact, curriculum revision and improvement can and should be made a part of in-service training activities.

3. Training Methods and Materials

Closely related to the above technical training of the trainers is the subject of teaching methods. The professionalization of pre- and in-service staffs in training methods and materials is a major instructional skill area which can ensure heightened impact and reduce time and costs of courses. The need for improved teaching applies to all institutions from FTC's through universities. As it has been some time since proper trainer training has occurred,

Recommendation No. 29. Arrangements should be made to give training the trainers instruction to all training institution faculty and to provincial and district training officers.

In carrying this out, the KIA, the Institute of Adult Studies, the Ministry of Education, and the Bureau of Educational Research are some of the locally available resources which could contribute expertise.

4. Management Training

The utilization section of this report makes a number of recommendations for particular training programs in the supervisory, logistical, and financial areas of management for all levels of the organization. Due to the considerable size of the managerial and supervisory ranks, a number of trainers will be required to direct and implement these courses. This management training effort should be accomplished primarily "in-house," within the Ministry of Agriculture. Other institutes already have considerable training agendas and backlogs for common cadres and other specialities; and it would be unlikely that the Ministry could obtain all the required training as soon as it is needed. Furthermore, while the Ministry would want to call on particular resources of other organizations, there is likely to be a continuing call for sectorally specialized management training for some time to come. Thus, the training is better done as part of the Manpower Development Division's efforts. Should the earlier recommended in-service training institute be established, the management training functions could logically be transferred to that location.

Recommendation No. 30. A management training specialist and staff with strong operating support should be secured to design, coordinate, and carry out the management training efforts recommended in the chapter on manpower utilization. This training should take place whenever possible within the context of a practical improvement effort being carried out, in the manner of an action-research/consultancy. While many skills are appropriately taught in a classroom situation, others should be directly connected to the daily problems faced in the field by officers. In this way the training can be made relevant to and directly assist agricultural administrators in the performance of their duties.

5. Training Needs Assessments and Planning

The operation of an effective in-service training system begins with each supervisor's assessment of the training needs of his or her subordinates. This probably needs to be done annually or semi-annually. Devising a training plan to meet the needs means considering everything from informal talks at meetings, through locational, divisional, and district seminars, all the way up to longer residential courses. The costing, scheduling, and staffing of these ventures must then be done, with the costs being contributed to the district's estimates.

To assist busy supervisors in this process requires that provincial and district extension and training officers be equipped with the above skills, along with as many supervisors as possible. The central capability involved is the ability to specify behavioral training objectives in terms of the skills which participants can exercise at the completion of a course. The assessment and programming of training should be done as carefully as programming for technical crop efforts. Thus, it is essential that:

Recommendation No. 31. Officers responsible for making assessments and staff training plans should receive instruction in these fields.

The Extension and Manpower Development Division should develop and distribute forms and guidelines for making assessments, as well as design a screening and collating process for responding to plans which require centralized resources of the in-service training system.

6. Training Incentives

A definite impression has been received that the incentives for skill development at in-service courses is presently insufficient. As such up-dating is of major importance, some motivator is required to insure compliance.

Recommendation No. 32. Some form of individual participant evaluation should be carried out at the end of most (but not all) in-service training courses.

The results should be reported to supervisors and become a

permanent part of the employee's personnel file.

7. Miscellaneous

A number of officers seem justifiably concerned that there is little time devoted in formal agricultural training to the subject of rural social science studies. It becomes especially vital when employees are working outside their own communities (and sometimes even when working with them). Awareness of the socio-cultural-economic dimensions of agricultural development and the diagnostic tools with which it can be handled are seen as especially relevant. Therefore,

Recommendation No. 33. Training in concepts for understanding and analyzing differing socio-cultural and economic situations, with emphasis on possible intervention points, should be given to extension staff at in-service courses.

The recently established Kenya Agriculture Teachers Association is viewed as a healthy development for agricultural education in Kenya in general. The Association might be helpful as well in identifying in-service training needs and priorities. The government might consider officially recognizing this group as a quasi-official organization and providing needed support in the form of funding a position for the Executive Secretary of the organization and other needed services.

G. FACILITY UTILIZATION

By and large, based upon the visitations to the training institutions and subsequent review of their time schedules, most facilities are now being utilized effectively. However:

Recommendation No. 34. Utilization standards for all teaching facilities should be developed for each instructional level to serve as criteria of need for additional facilities.

At the present time, the basic tool utilized for determining facility needs is what might be termed a "head count" capacity. This is obviously appropriate for certain facilities such as hostels and common rooms. For instructional facilities, however, many educational

institutions have developed utilization criteria based upon such factors as hours of use, as well as occupancy. The Team feels it would be to the ultimate benefit of agricultural education in Kenya if steps were taken to develop appropriate standards as criteria in determining needed instructional facilities. Obviously, because of differing functions and therefore differing needs, the standards should not be identical for all elements of an institution or for the differing levels of institutions.

The concepts of planned facility utilization is a relatively recent development in education. Instructional facilities can generally be categorized into three groups - lecture, laboratory and special purpose (research laboratories, computer, etc., facilities). In several institutions it was noted that laboratory facilities sat vacant while lecture facilities were being utilized. And, conversely, laboratory facilities were being used but lecture facilities were not. Furthermore, during normal meal times all students ate at the same time and all instructional facilities sat vacant.

As financial resources for institutional development have become more scarce, educational institutions realized that they must make more efficient use of available facilities. Obviously, differing types of educational facilities and different levels of instructional programs require different criteria of utilization. But it is not uncommon in the United States for lecture facilities and laboratories to be utilized continuously from 7 am to 10 pm.

One specific example is provided to illustrate the impact of this concept. In the early 1960's the California State Universities and Colleges utilized only the time from 8 am - 5 pm Monday through Friday, that is, a total of 45 hours per week. After careful study and evaluation of teaching methods, class scheduling and instructional programs, the time base criteria was changed to 8 am - 10 pm, thus making available an additional 40 hours per week, an increase of almost ninety percent. At one of the 19 campuses in the California State University and Colleges, this changed the rated capacity of the institution from 12,000 to 15,000 students.

However increased facility utilization does not give a one-for-one increase in capacity nor a one-for-one saving in expenditures. But it will significantly decrease capital and equipment expenditures per student.

H. DRYLANDS DEVELOPMENT

In the process of the Team's review, a number of appropriate and very much needed developmental efforts in the drylands areas were mentioned. For example, the Faculty of Agriculture is considering a proposal for the establishment of an "out-station" at which basic faculty research, along with MSc and PhD instructional research would take place. Egerton College either has, or is in the process of developing a 500 acre facility. There may be others.

Recommendation No. 35. There is a need for continuing development of training and research activities in the drylands area. The various elements of the Ministry of Agriculture, the Faculties of Agriculture and Veterinary Medicine and Egerton College should consult on these programs.

Development of the drylands is certainly important and should be encouraged, not only in terms of production agriculture, but as mentioned earlier as a potentially significant afforestation area. Consultation and discussion among the entities involved should ensure the widest possible diversification and coordination of effort.

I. PRIORITIES

Recommendations contained in this education section represent 'global' views of expansion and growth of the education system based upon the demand as reflected by the survey. The recommendations are presented in a sequential mode and so do not represent any order of priority. It is doubtful that the Government can release the resources necessary to implement all of the recommendations simultaneously. Accordingly, one of the key judgments which must be made by government officials is which areas of improvement should receive priority treatment.

Top priorities should reflect a consensus as to the objective to be reached and the treatment which is likely to have the greatest impact on that objective. The largest group of individuals in the Ministry of Agriculture are the TAs and JTAs, so it appears reasonable that improvement of their performance would have a strong impact. Such improvement will require attention both before they get into service

and on the job. A demand for more than 16,000 certificate holders has been identified over the next two plan periods. A conservative approach to satisfying that demand requires the development of a total output capacity of more than 1800 certificate holders by 1987.

In our opinion development of an effective in-service training program is one of the most important things which the Ministry can do to improve its effectiveness, and we have gone into some detail about such a program in subsection F of this chapter. Within such a program, priority consideration should be directed toward the desperately needed in-service training requirements of the teaching staff at the certificate schools. Moving in this direction will accomplish two important goals. First, by concentrating on a limited part of the larger system, it will provide the structure, administrative processes and experience needed for establishment of a broader in-service training program. Second, it will have an impact on the quality of training that the certificate schools are providing to prospective extension agents. The mere increase in the numbers of certificate holders is not in itself sufficient to improve Ministry performance.

Key to the improvement of the capability of the certificate holder is the improvement in the adequacy of their training. And, the key to this is to update the knowledge and effectiveness of the teaching staff at the certificate level schools. As is noted above, there is considerable evidence that many of the teaching staff at the institutes have not had the opportunity to keep up to date with their substantive fields, or to understand and become a part of the implementation process of national and district agricultural development plans. An important by-product of this emphasis on in-service training of institute faculty, we believe, will be meaningful revision of the curricula of the certificate institutions, as well as graduates who are better prepared to receive subsequent in-service training.

III. MANPOWER UTILIZATION

The two principal avenues for increasing the effectiveness and efficiency of agriculturally specialized manpower are (1) better education and (2) better utilization. Better utilization requires better management, including supervision, support and incentives.

To learn how effectively agricultural manpower was used, specific questions on manpower utilization were asked as part of the survey, in order to identify problems and bottlenecks which have affected work performance in the agricultural services delivery system. This chapter reports the findings from the survey and subsequent interpretive interviews, and suggests actions which should be taken to relieve the difficulties which were identified. Only those problems which are both important and susceptible to useful remedial action are discussed.

Utilization analyses are primarily concerned with the means by which personnel are motivated, supervised, and financially and administratively supported. Particular attention has been focused on the following areas:

- Performance incentives
- Supervisory practices
- Budget and financial processes
- Logistical and administrative support services

Work performance is affected by all of these. Inadequate incentives to diligent work usually result in a minimum effort, time-saving attitude to employment. Supervisory practice which does not provide proper leadership as well as control must naturally be avoided. Funding needs to be timely and adequate, and supplies should be available at the right times and places. Failure to assure the satisfactory backstopping implied by these functions may cause the wasteful utilization of expensively produced agricultural manpower. Improved performance occurs when the material and social rewards of hard work are combined with the technical and administrative supports required to perform the assigned tasks.

A. PERFORMANCE INCENTIVES

1. Promotion Opportunities

A complex of four basic concerns characterized the respondents' opinions about the promotion opportunities. They are: (1) the schemes of service as now implemented tend to block promotions between ranks; (2) appointments and promotions are tied to educational qualifications, and insufficient training opportunities are provided to allow staff to establish the qualifications for their advancement; (3) the criteria for advancement appear to many to be vague and to be based neither on merit nor seniority; and (4) vacancies which permit promotion appear to occur in very limited numbers.

There was a widespread consensus on these matters, which was also reflected in past reports and analyses. The consequences of the situation appear to be lowered work effort, unsatisfactory attitudes, reduced impact with clients, and higher turnover than is desirable. The situation is most serious at the Agricultural Assistant level where the bulk of trained extension agents are to be found.

The lack of inter-class promotion from JTA to TA, from TA to TO and from TO to AO, represents barriers based on educational qualifications, and not on performance ratings.

Widespread skepticism about the performance appraisal system leads to further difficulties; older personnel feel that their experience is overlooked, while younger staff believe that merit plays no part in advancement decisions. And all technical officers are faced with the limited number of vacancies in more specialized fields at the senior levels, as well as the ceiling on salary advancement at salary grade level "K".

An unfortunate constellation of negative forces have emerged which taken together do much to dampen morale and work performance. The important motivators of hard work - increased salary and social status - are not allowed to play their full and positive roles as prime incentives. As work performance is in large part a function of perceived competitive opportunities to advance one's career through promotion, the key to marked performance improvement is presently lacking. Spurring competition in performance should be a principal aim of a personnel system which

espouses the values of merit, equal opportunity to get ahead, and practical developmental impact. The more open the competition, the more results-oriented will be the employees.

The system which has evolved over the years and was appropriate at earlier stages of development does not appear suited to present conditions. Indeed, the exceptionally high requests for additional staff given by supervisory management personnel in the survey indicates that their assessment of needs are based on the low productivity of present staff members relative to their potential. Creating an incentives package which would spur individuals to fulfill their work potentials at each level is likely to result in greater cost effectiveness as well as greater impact on agricultural development.

The recommendations which emerge from this examination attempt to lay the groundwork for deciding upon and implementing a more suitable system.

Recommendation No. 1. More promotional opportunities across the major job groups should be provided to JTAs, TAs, and TOs.

The objective should be to fill more positions at each level with experienced personnel from within the service, chosen by merit selection panels. We suggest the following approach:

a. A high level working party, under the chairmanship of a senior Ministry of Agriculture official, should be established to decide the details of how such a system should work. Representatives from the Directorate of Personnel Management, Ministry of Finance and Planning, and Public Service Commission should be asked to serve on the working party or as consultants as needed. An independent consultant specialized in personnel system incentives should be retained as chief technical advisor to the working party.

b. The scope of work for the working party should include (but not be limited to):

(i) Defining what the criteria for promotion should be. Consideration should be given to a range of factors such as years of experience, technical knowledge, planning capabilities, supervisory abilities, learning capacity, impact on clients, and so forth. This

multidimensional assessment should lead to criteria which emphasize meritorious performance on the job rather than entry qualifications. Schemes of service which equivalence factors others than educational levels and seniority will be required.

(ii) Defining how merit selection panels should be constituted and how they should function, so that justice is done and seen to be done. Where possible, the participation of client farmers should be structured into such panels to represent their interests and take advantage of their knowledge.

(iii) Defining the mechanisms for promotion, examining such paths as direct promotion, promotion through sponsorships at educational courses, promotion through successful completion of an approved departmental in-service promotion course, and so on.

It seems likely that approved in-service departmental up-grading courses are indeed justified for qualified JTAs and TAs who meet certain experience and performance standards. However it is done, the principal of expanding promotional opportunities is one which should yield a number of cost-effective benefits. Some of them are:

- Lower direct training and education costs will be required to achieve agricultural production objectives, as relatively fewer of the scarce, higher cost university graduates and diplomants will be needed.
- Less supervisory control time, expense and concern will be needed to ensure conformance with planned efforts, as disincentives to performance will have been reduced.
- Lower turnover among staff may be expected as the conditions for retaining the best rather than the less gifted will have been met. Skills imparted by experience and on-the-job training will be retained for the good of the service.
- A healthy and creative personnel composition which mixes academically qualified but inexperienced staff with internally promoted and field-seasoned staff will be created.
- A mobility path will have been established for productive "late bloomers" and those not gifted at test taking, with positive effects on morale.

- The increases in efficiency and effectiveness expected from recommended improvements in other aspects of agricultural administration will be easier to achieve with improvement in promotion incentives.

2. Compensation Differentials

Inequity in salaries is perceived by the TA staff relative to the TO level. At present TAs receive about one-half of the salary of Technical Officers, although both entered pre-service training with similar secondary school background. However, the latter received three years of training as compared with the TAs two years. This one year becomes a permanent penalty of half salary proportions. A somewhat similar situation is emerging for TOs relative to AOs.

Recommendation No. 2. The large differentials in remuneration between TA, TO and AO levels should be reexamined by the Directorate of Personnel Management and adjusted in accordance with job analysis and evaluation studies. Otherwise, a serious disincentive will be perpetuated.

At the same time there are areas where compensation differentials should probably exist, but do not. There is an immense increase in supervisory responsibilities and complexity of tasks in the District and Divisional Agricultural Officer positions, for which no additional salary or recognition is given. This appears to be most inequitable, as colleagues of these officers carry less sophisticated workloads, but are paid the same. The principle of "unequal work, unequal pay" is being violated in practice. Furthermore, there is one less reason for subordinates to aspire to such a position if all it brings is an increased workload without a compensating salary reward. Thus:

Recommendation No. 3. Consideration should be given to establishing the posts of District Agricultural Officers and Divisional Assistant Agricultural Officers at a higher grade or providing an acting allowance so that heavier managerial burdens are suitably rewarded. Similar consideration should be given to DVOs and DLOs.

3. Increments and Other Merit Performance Recognition

Promotions appeared to be the only significant recognition given to excellent work achievement, and few opportunities for promotion are available. Other methods of recognizing, rewarding and reinforcing positive efforts either do not exist or are seldom used. While salary and status are obviously the most effective for these purposes, other methods could be devised which express the appreciation of senior management for the efforts of their staff. Such recognitions are significant motivators.

Recommendation No. 4. The previously recommended merit selection panels should also serve as panels to recognize exceptional performance.

The panel should be empowered to award letters of commendation and other forms of recognition for staff, with these actions becoming a permanent part of their personnel files. The same panels should be empowered to double increments, when warranted.

The dangers inherent in this as with the preceding recommendations are acknowledged. There is always the potential for manipulative misuse of powers which could distort the intention and meaning of an administrative system. Only careful design and monitoring of such a system can prevent abuse. The risk, however, is one which we believe should be taken.

4. Schemes of Service Harmonization

At present the Ministry of Agriculture is at a disadvantage with regard to the Ministry of Cooperative Development and the Ministry of Lands and Settlement. The former places individuals who have passed a two-year certificate course at salary grade "F"; the latter does not block promotion of TAs to TO status, but promotes them directly on merit. These situations obviously would affect MOA recruitment of staff, and be perceived by MOA TAs as inequitable.

Recommendation No. 5. Schemes of service among competing ministries should be harmonized.

B. SUPERVISION

The provision of performance incentives alone does not guarantee higher performance. It is only one necessary but not sufficient condition for assuring efficiency and effectiveness of staff performance. Another essential condition is the adequacy of supervision provided staff at each level. Four major elements of supervision were assessed in the study: orientation and induction training; work planning and control; performance appraisal; and leadership and human relations.

1. Orientation and Induction Training

Technical and Agricultural Officer levels receive adequate orientation training at headquarters sessions. Technical Assistants, who are the foundation of a technically trained extension system, receive only informal and unsystematic orientation, if any. Survey respondents indicated that little if any orientation and induction training is ever given to new employees in the field. This is most unfortunate as such training is considered one of the most important influences on new employees' adjustment, job satisfaction, and productivity in almost all types of organizations. Those few assistants who had received the benefits of informal guidance at a new post, recalled it with keen appreciation; most indicated regret that it had not been provided at the time they joined the service. In the light of these findings, the following recommendations are made:

Recommendation No. 6. A model program of orientation and induction training for Technical Assistants joining the Ministry of Agriculture should be drawn up by the Extension and Manpower Development Division.

This should be done in consultation with such other resources as the Personnel Division, the Kenya Institute of Administration (KIA), the Directorate of Personnel Management and field officers. An inexpensive mimeographed "new employee handbook" incorporating the orientation and induction training information should be developed and widely distributed.

Technical and Agricultural Officers expressed pleasure and satisfaction with their orientation, and indicated only one severe

shortcoming with the training: It did not cover the managerial systems which they are supposed to operate. An increase in preliminary understanding of how these systems work would significantly mitigate new officers' frustrations, unnecessarily lengthy learning by experience, and the costly consequences in terms of staff and farmer time and funds.

Recommendation No. 7. Orientation and induction training for Technical and Professional officers should be lengthened by a week or so to include initial orientation to MOA management systems (budget and financial processes, logistics procedures, supervisory responsibilities and work programming).

Consideration was given to suggesting that such orientation and induction training be established within pre-service educational institutions. However, this alternative was rejected. Current curricula are full, so something would have to be given up. Finally, it was felt that it would be best to wait until staff were actually on the job. Their receptivity to learning about administrative procedures would be at its highest when actually confronted with such issues.

2. Work Planning and Control

Information from the survey and interpretive interviews indicated that careful work planning and control is neither widespread nor systematically carried out; but almost all officers are aware of the need for such a system. The procedures that go into a planning and control system are crucial to clear understandings between supervisors and subordinates about goals and targets, approaches to be used, scheduling and work completion dates, progress monitoring and the criteria upon which performance will be evaluated. This is naturally a particularly difficult task in the field of agricultural extension where individuals work in widely scattered geographic locations, using their own initiative and subject only to intermittent supervision. It is all the more important, therefore, that a system of supervisory practice be established to deal with such situations.

Recommendation No. 8: Training in work planning and control should be provided to all officers carrying direct supervisory responsibilities. These include specifically the Location Agricultural Assistants, Divisional Assistant Agricultural Officers, and District Agricultural Officers. Other provincial and district level TOs and AOs should also receive this training because of the indirect supervisory duties implied in their technical support functions and to prepare them for assumption of direct supervisory responsibilities in the future. An independent agricultural management training specialist should be secured to design, test, install and monitor the supervisory training system and subsequent performance.

As a performance incentive, this recommendation is probably second in importance only to the provision of promotion opportunities.

3. Performance Appraisal

Both the incentives and the work planning and control operations are dependent on an objective assessment of personnel performance. If individuals are not held accountable for their contributions to previously specified organizational objectives, there will be no way to judge the relative quality of their performance. If their work effort cannot be measured, then there is no basis for rewarding superior achievement or correcting inadequate performance. Thus, the appraisal system is an absolutely essential part of utilization improvement efforts.

Information collected in the field indicated that inadequate attention is being given to continuous as well as annual staff appraisal reporting requirements. This seems to be due to a variety of causes, among which are the time consuming nature of the assignment, skepticism about its efficacy, lack of objective performance indicators due to absence of planning and control systems, and lack of skills training in filling in forms. In support of the efforts now being made to implement the system properly, it is recommended that:

Recommendation No. 9: The importance of the performance appraisal process and the analytic skills required to fill in the forms

should be taught to all officers carrying supervisory responsibilities. As a corollary, officers with supervisory performance appraisal responsibility should have their performance monitored and appraised in part on the quality of supervision given to their subordinates.

4. On-the-Job Guidance and Training

Closely related to the work monitoring and control function is the type of supervisory activity which guides and trains subordinates on-the-job. When subordinates require advice to correct errors, learn new techniques, and deal with particular problems, the opportunity for promoting staff development, agricultural goal achievement, and sharpening of skills is considerable. It should be done in a supportive manner as this will be more likely to motivate the staff. The more this type of helpful guidance and training can be done informally, on site, in the field, or in conference and staff meetings at each administrative level, the less will be the need for release time and supplementary training. The techniques of this kind of supervisory behavior should be taught.

Recommendation No. 10: Officers carrying direct and indirect supervisory and technical support functions should receive instruction in on-the-job training techniques and coaching/counseling approaches to skill transfer and performance improvement.

5. Leadership and Human Relations

Many problems in the field were found to be rooted in the lack of preparation given to supervisors in how to deal with the man-management problems they encounter. Sometimes this was expressed as attitudinal difficulties, at other times, in lack of behavioral skills. Proper work planning, control, performance appraisal and training of subordinates requires familiarity with various management approaches to leading, motivating, and coordinating. While some individuals possess these gifts almost instinctively, this supervisory skill must be developed in most of us. A particular skill which usually needs attention is

interviewing technique. Others include communications, conduct of staff meetings, and facilitation of interpersonal and intergroup cooperation.

A major problem which requires separate emphasis is the general field of human relations. Overly authoritarian leadership styles are apparently common in daily work situations. Supervisors may interpret overt deference and surface compliance as conformance with orders. This would seem to be a mistake, and an unfortunate one. For the reaction to abrasive uses of authority is to lower work effort where it can be safely concealed. This is, of course, easily done in field work situations. The proper and positive employment of authority through the exercise of leadership and good human relations is preferable.

Recommendation No. 11: Training in leadership and human relations should be given to all officers carrying direct and indirect supervisory responsibilities.

C. ESTIMATES AND FINANCIAL MANAGEMENT PROCESSES

A number of problems with estimates drafting and financial management processes which cut down on the efficiency and effectiveness of staff were identified. One set has to do with the drafting of budget estimates, and the skills, administrative support, and formats required. The second set concerns the procedures used for timely transmission of the flow of funds to the places and persons needing them.

1. Estimates Drafting

Estimates difficulties usually originate at the drafting stage. There is no reason why professional agricultural officers should be as skilled at estimates construction as financial officers, not having received specialized training nor had 12 months of experience each year. Nonetheless, because of this the submissions made are not always of as high quality as they should be, nor are they often on time. This creates problems for officials screening and justifying the figures. Most officers interviewed who were involved in estimates construction

indicated that their skills in this field were inadequate and requested further training. Therefore, it is recommended that:

Recommendation No. 12: Training programs should be undertaken in estimates drafting and budget management directly relevant to divisional, district and provincial agricultural programs and projects. An independent estimates planning consultant/trainer should be secured to be part of the Extension and Manpower Development Division and work with a curriculum advisory group to design, test, train and monitor estimates drafting training and implementation.

All officers who presently carry estimates drafting duties, or make major inputs into them, should attend. DAOs and their financial planning staff assistants should receive priority. Relevant staff from the Finance and Establishments Office, the Treasury, KIA and other centers of estimates expertise should be solicited for advice and assistance.

There is a need for sufficiently senior and properly skilled finance officers at each organization level. At present senior professional officers cannot be freed from administrative routine in order to concentrate on major policy, planning, and implementation issues. They are often burdened with delegable tasks.

Recommendation No. 13: The finance officers selected to work with Headquarters Division Heads, Provincial Directors of Agriculture, District Agricultural Officers, Principals of training institutions, and Heads of Research Stations should be capable of relieving these supervisors of administrative details. New bachelors level financial administration staff should be provided. While university graduates in commerce, finance and accounting are preferable, other arts and science graduates with supplementary training would make for considerable improvement.

Much budgeting is done on the traditional incremental basis. Annual submission increases are often calculated at standard across the board percentages and are then consolidated in major Ministry division

categories. Little or no distinction is made among geographical areas. And more importantly, the expenditure items are not associated with their individual outputs. It is not often known how much it really costs to execute a particular crop or livestock extension effort. Thus, it is impossible to determine what it costs to obtain a certain result. Rarely are the targets to be achieved specified, and, therefore, the effectiveness of the personnel cannot be determined accurately. Empirically based rational approaches to cost-effective program design and selection cannot be carried out without additional results specification and the attribution of certain costs to particular programs.

Progress towards these goals is seldom easy, but it is necessary. Improvements in estimates construction could be based on the existing system with more practical programmatic displays of financial data. Such steps would help both planners and managers as well as financial monitors to fulfill their duties. To make progress on this matter it is suggested that:

Recommendation No. 14: Initial formulations of estimates on a performance and program basis should be undertaken in a few districts as a worthwhile experiment to explore their form and utility. The above mentioned estimates consultant should be assigned this task in his design work. (See Recommendation No. 12.)

2. Allocation and Disbursement Processes

Interviews with headquarters and field staff indicated that frequent delays in the allocation and disbursement processes seriously impede the progress of work. Delays which affect morale and those which prevent physical work accomplishment are both common. Slow processing of vouchers and delayed imprest authorizations, authority to incur expenditure (AIE) issuances, and estimates reallocations are the critical areas. The subjects range from refusals to reimburse staff for a butcher's meal bill from a very remote area without bars and restaurants to the late payment of moving or other allowances. Months may pass, each one serving as a further irritant and disincentive to

full work effort. Similarly, over-lengthy processing has delayed issuances and reallocations which hold up project implementation. Opportunities for progress are lost, staff time is wasted, and farmers lose faith in the Ministry's field agents.

Some significant progress has apparently been made recently in the AIE field with the establishment of a Central Accounts under the Director of Agriculture's office. Nonetheless, most field personnel still feel the problems intensely.

A variety of causes contribute to the problem, ranging from improperly made out vouchers, through inadequate numbers of processing staff at headquarters, to regulations requiring headquarters and Treasury clearances. There is sometimes an atmosphere of fault finding and finger pointing which is not warranted in discussions of these causes. With the very best will and intentions in the world, there will always be a controversy between those whose functions are financial control and those who need to respond rapidly to field situations. Notwithstanding this natural conflict, one senses on the parts of all concerned a willingness to look at each situation as a practical matter and to evolve means of coping with the difficulties being encountered. The following recommendation seeks to take advantage of this mutual concern.

Recommendation No. 15: A high level working party under the chairmanship of the Principal Finance and Establishment Officer of the Ministry of Agriculture should be established to examine possible improvements to the major disbursement procedures which could be recommended on a practical issue by issue basis. Principal members should be administrative and professional officers from headquarters and field and Treasury officials. An independent systems and procedures consultant should serve as technical advisor to the working party.

The scope of work of the group should include (but not be limited to) consideration of the following:

a. relocation of disbursement facilities and Treasury staff and strengthening of provincial and/or district treasury facilities;

- b. delegation of imprest authorization authorities;
- c. Deconcentration of some Treasury clearance authorities to Ministry and field offices;
- d. Strengthening of Treasury and/or Ministry inspectorate auditing capacities to monitor Ministry and field offices' conformance with regulations;
- e. easing restrictions on estimates reallocations amongst some expenditure objects; and
- f. revision of finance regulations to ensure both effective development action and proper control mechanisms.

As noted somewhat earlier, there are occasionally misunderstandings among spending and monitoring officers. Oftentimes, this is due to a lack of helpful person-to-person communications, unclear understanding of each other's roles, and a lack of knowledge about and identification with the practical field work objectives. To advance the expeditious flow of work, it is suggested that:

Recommendation No. 16: Treasury Directorate of Personnel Management and Ministry of Agriculture financial officials should take frequent field trips to stay in close personal contact with field officers and conditions. Where possible, the work of these officials at headquarters should be reallocated so that individuals can follow specific districts and develop expertise in them.

D. LOGISTICS

Two considerations dominate this category of organizational analysis: (a) the adequacy of funds for transport operations, travelling and accommodations, farm inputs, and housing; (b) the systems and procedures utilized in arranging for the procurement and supply of the appropriate materials, equipment, and information at the needed times and places.

1. Funding Levels

a. Transport Operating

Information on the transport issues indicated lessened but still serious and continuing problems in the following areas:

- Inadequate numbers of vehicles have been provided.
- The types of vehicles provided are not always appropriate for the functions being performed, cause higher running costs than need be, or cannot cope with the terrain.
- The conditions of many vehicles are poor, causing considerable repair costs and long out-of-service periods.
- Operating funds for petrol are insufficient to make the number of trips required to perform duties properly in many areas, despite pooling of cars.
- Drivers are in short supply (though this may be purely a temporary occurrence).
- Maintenance and repair sums are insufficient.

Underlying these problems are such matters as:

- The allocation of petrol is based on a formula of so many gallons to a particular type of vehicle or engine capacity. This formula appears to neglect the frequency of utilization of a vehicle and the size and terrain of the geographic area it must cover.
- The monthly and mileage allowances for private vehicle use are insufficient, especially in difficult terrain.
- Loan funds for private vehicle purchase have become insufficient due to inflation, and repayment rates are too high relative to salaries.

These problems have resulted in frequent cases where the nonproductive "down time" of many field personnel has been 50% for many months out of a year. Such a situation affects all aspects of field work, especially the frequency and extent of farmer contacts, and the amount and quality of supervision provided to agents. In addition, the efficiency of TA and JTA personnel in reaching farmers is constrained

by lack of motorcycles and bicycles in many areas. Correcting this factor alone would probably double work output. In combination with better incentives and supervision, significant returns might be earned from such an investment. Removing reasons for inadequate extension staff performance permits them to be held more strictly accountable.

Misuse of vehicles inevitably occurs in any organization and is a serious matter. However, it is not as worrying as the short-fall in delivery of agricultural services. Limiting the supply of petrol because of significant misuse does not correct misuse as much as it blocks the delivery of advice and information. The result is neither alleviation of the evil nor facilitation of agricultural development. Some level of loss due to misuse probably needs to be accepted as one of the costs of being in the rural development business. Control systems can and should be devised to keep it within bounds but not at the expense of farmer interests.

In the light of all these considerations, the following recommendation is made:

Recommendation No. 17: A high level working party under the chairmanship of a senior Ministry of Agriculture official should be established to deal with the varied transport operations issues. Principal members should be Ministry and Treasury officials. An independent transport systems and procedures consultant should be secured to serve as technical advisor.

The scope of work for this party should give specific consideration (but not be limited) to the following matters:

- (1) the petrol allocation formula;
- (2) the numbers and types of vehicles required;
- (3) numbers of drivers, their records, and maintenance skills;
- (4) transport programming methods;
- (5) utilization monitoring and control methods;
- (6) influence of seasonality on utilization;
- (7) adjustment of vehicle, motorcycle, and bicycle purchase and loan amounts, and repayment schedules;
- (8) raising of mileage and monthly allowances.

These and other matters should be considered on a careful district by district survey of work program functions, service area geographic characteristics, vehicle stocks, present and projected personnel assignments, and so forth. The major output of the working party should be a transport estimation, programming, and utilization methodology suitable for institutionalization within the Ministry. Close coordination with the consultants and trainers working on management and estimates and financial procedures should be maintained to integrate efforts where appropriate.

b. Travelling and Accommodations

This was the second most widely mentioned area of inadequate funding levels. Travel and accommodation appear to be primarily a function of technical and supervisory work schedules, transport availability, training program attendance, and officer travel outside the district. In those districts in which transport was relatively adequate, travel and accommodation amounts were clearly inadequate. In those areas in which transport was a major problem, travel and accommodation amounts were underexpended.

Recommendation No. 18: Because of their interdependency, additional funds should be allocated to travelling and accommodations, in line with increases in the transport operations item. These two expenditure items need to be more closely integrated in future estimates exercises.

c. Farm Inputs

One-third of the districts reported inadequate funds for farm inputs. As this item supports field days and demonstrations (two of the major group approaches employed in extension work), the shortages are central to the delivery of agricultural services.

Recommendation No. 19: Additional funds will be needed for inputs for demonstrations in certain districts. Increased care should

be exercised in the estimation and screening of funds for farm inputs to insure proper integration with extension work programs.

d. Housing

Inadequacies in the numbers and conditions of staff houses exist in certain districts, divisions, and locations where it seriously affects morale. Where housing is located far from work sites, it makes it difficult to supervise subordinates properly, and causes considerable petrol wastage. Housing is a special problem in the more marginal, semi-arid areas, and these may need special attention.

Recommendation No. 20: An up-to-date examination of the housing situation should be undertaken in liaison with the Ministry of Works. Needs should be ranked by priority, taking into consideration the variations in work areas, and the savings to be made by proper locations. Some concentration of funds in the neediest areas will be required. In others, increases in allowances are justified in light of inflation.

2. Logistical System and Procedures

The systems and procedures employed in arranging for the procurement and supply of the appropriate materials, equipment, and information are important factors in achieving proper personnel utilization. The arrival of the required goods and services at the times and places needed makes possible the smooth operation of an agricultural technical assistance delivery system. Recommendations have been developed to deal with five major areas of concern: procurement and supply programming, tendering, vehicle boarding, personnel records, and research-extension information flows.

a. Procurement and Supplies

Delay in procurement of supplies has proved to be a stumbling block in many past efforts. In recognition of this, the Ministry has developed and used with good effect a set of management techniques to integrate the efforts of public, parastatal, and private

organizations and their subunits. The recent joint implementation planning of the Cotton Development effort can serve as a useful model.

Recommendation No. 21: Work programming, supplies scheduling, and responsibility assignment charting techniques developed in the Cotton Development Program should be applied to most program and project operational planning activities. The proposed management training specialist in the Extension and Manpower Development Division should arrange on-the-job and off-site (away from station) training in this subject.

b. Tendering Procedures

Delays and difficulties in tendering, ranging from relatively minor specification alterations to the purchase cost levels at which tendering procedures must be utilized, occasionally cause severe bottlenecks. The frequency, extent and consequences should be closely analyzed in order to derive helpful suggestions to expedite the flows of goods and services. It is understood that a group of Crown Agent consultants are presently at work on improving the procurement and supplies systems; Ministry officials should ensure that the difficulties being encountered are brought fully to their attention.

Recommendation No. 22: To deal with continuing issues, tendering procedures should be examined by a working party of Ministry of Agriculture, Ministry of Works, and Treasury officials to recommend improvements in the system.

c. Vehicle Boarding

The bottlenecks caused by the boarding procedures are well known. Their removal will have a significant impact on services delivery to farmers.

Recommendation No. 23: Vehicle boarding processes should be reexamined by a working party of Ministry of Agriculture, Ministry of Works, and Treasury officials, to expedite replacement of transport facilities.

d. Personnel Records and Information System

Interviews indicated a number of difficulties in the personnel record system which affect personnel, especially those in the field. Delays in personnel actions with regard to appointments, transfers, salaries, promotions, and so forth directly influence the morale and productivity of employees. Misplaced personnel files, lost records, and excessive correspondence flows compound the matter. All of these serve as massive "dissatisfiers" which sap commitment to the organization's goals. Some officers have gone so far as to design and duplicate certain personnel records in their own offices, in order to have the information on hand with which to make decisions.

Manpower and staff development planning on a regular basis would be made easier if personnel records and information could be kept in forms which could be cross-tabulated without having to mount time-consuming analytic exercises. At present, reasonably good records are kept in different locations and forms, for different purposes, but cannot be easily collated to provide an up-to-date picture of personnel situations. Concentration of personnel records in a single system would expedite and improve both routine and strategic decisions.

Recommendation No. 24: A working party should be established to design and implement an improved personnel records and information system under the chairmanship of a Ministry of Agriculture official, and with the cooperation and participation of the Directorate of Personnel Management. An independent personnel management information systems consultant should be contracted to serve as technical advisor.

e. Research-Extension-Farmer Information Flows

Research is one of the crucial inputs into the agricultural development process. The flow to farmers of information upon which they can base their production decisions should be as rapid and error-free as it is possible to make it. The major problem is that the flows of communications through organizations are subject to blockages, bottlenecks, and distortions. It is a sad truth that the greater the number

of people who pass on a message, the less accurate that message will be. The improvement of research-extension-farmer flows depends, therefore, on devising an organizational system which minimizes the number and maximizes the quality of filters through which technical material must pass; and involves those producers and distributors of information who are best motivated and most capable of communicating and receiving the technical messages. The two groups of persons who meet these criteria are the researchers themselves, and the provincial and district specialists whose responsibility it is to see that TA and JTA agents are well informed.

At the present time, there appears to be awareness on all sides that there is not a sufficient flow of information among the relevant parties. The recent directive reactivating the Provincial Research Advisory Committees and associated activities are a first step in the right direction. However, there is no institutionalized mechanism for continuous facilitation of these needed functions.

Recommendation No. 25: The Agricultural Information Center of the Extension and Manpower Development Division should be enlarged and strengthened with funds and specialist personnel who are skilled at obtaining, interpreting and transmitting technical information. The Research Division should appoint an Information Officer with a technical background to be the principal liaison and facilitator to ensure that researchers get their findings across to extension agents and thus to farmer users through a variety of channels. Together, their major functions would be:

- (1) To perform facilitative brokerage functions in:
 - a. seeking out research results;
 - b. arranging for them to be analyzed from farm management perspectives;
 - c. translating them into understandable recommendations for farmers, agents, and agricultural educators;
 - d. disseminating the recommendations.
- (2) To facilitate informal interchanges on a continuing basis among researchers and users at provincial and district levels.

It should not be thought that annual meetings will resolve all outstanding issues in this area. They are designed to allow each concerned party to put its cases and influence decisions. The feed-in of practical farmer concerns and resource constraints from the field, and the feed-back of what part research plays in responding to these needs, should lead to improved and more relevant services. It is suggested that the experience of the Extension Research and Liaison Service of Ahmadu Bello University in Northern Nigeria be reviewed for comparative perspectives.

E. PLANNING/PROGRAMMING CYCLE

Only a few events in the annual planning/programming cycle have been specified and target dated. All are connected with the estimates process and have to do with submission of forward budget projections, revised estimates, draft estimates, and establishment proposals. As noted earlier, these are not always performed on time nor with sufficient accuracy and comprehensiveness, and suggestions have been made to improve this situation. Nonetheless, there is the larger question of the whole annual planning/programming process of which the four financial proposals are only important parts. There are a number of other functions which should supply information for these submissions but which are so ill defined that they are not carried out, or are done only sporadically. Some of the more powerful planning/programming techniques are rarely used in the budget development process, and then only for large national projects. Formalization of the following activities in the cycle should help to improve both the planning and programming stages:

Planning

- Review of technical and economic research findings
- Analysis of the results of past policies, programs and projects
- Problem and opportunity analysis and the evolution of new, improved or modified programs to deal with them
- Development and application of national and local decision criteria to meet tests of desirability, feasibility, and consistency

Programming

- Specification of outputs and objectives
- Analyses of workload and productive capacity
- Target setting
- Activity specification, time estimation, and scheduling
 - Budget programming (cash flow)
 - Logistical programming (supplies and equipment)
 - Manpower programming (establishment numbers and staff training)
 - Assignment of responsibility for above functions
- Periodic operations reviews and evaluations

These functions tend to organize the work load around projected activities with common objectives and lead to greater efficiency in their achievement. Each can be placed in logical sequence so that particular days or weeks can be scheduled in advance as the time for the performance of the functions. A straightforward calendar of events would then have been created which each managerial level can follow.

The performance of the planning and programming functions at the district level runs into two constraints -- time and planning expertise. The districts are primarily implementing levels at which the operation of ongoing programs and projects takes up most of the time available. The key officers are usually burdened with continuing duties, leaving little time for longer term thinking and programming. In addition, they seldom have specialized training or experience in the planning/programming process. Nonetheless, these district and divisional officers do possess information that is crucial to the formulation of feasible policies, programs, and projects. Their perspectives on local area conditions are particularly valuable in defining and interpreting national needs and objectives.

One possible method of incorporating this local expertise into the planning process is to use provincial level planners as internal consultants and facilitators for district level planning. These provincial personnel, who would be expected to possess an understanding of planning and programming technologies, could guide the conduct of technical and economic analyses, and stimulate and facilitate the participation

of district agricultural officers in planning for their areas. Such provincial staff would serve as the vital linkage between districts and headquarters in defining national and sectoral economic and social objectives and decision criteria. They would assist field staff to analyze their situations and evolve programs, which interpret national objectives at the local level; and they would help the field staff to evolve a better perspective on the distribution of their time between planning the work and doing it.

In the Integrated Agricultural Development Program (IADP), as well as other special projects, many management techniques were developed to improve resource utilization. It is time to diffuse these planning and programming technologies as standard operating procedures and tools for agricultural administration. Experimentation with some districts to test methods and related material for diffusing these techniques is recommended.

Recommendation No. 26: A calendar of the annual planning/programming cycle should be drawn up in which the lead time and accomplishment of each step is target dated. The calendar should identify specific dates and agenda for consultative meetings with provincial planning advisors.

a. Planners should be appointed to provincial levels to serve as facilitators of district level efforts, as qualified personnel become available.

b. The planning/programming approaches should be carried out on an experimental basis in a few districts to test and refine the technology.

c. The estimates consultant/trainer and the management training specialist recommended earlier should be utilized as resources for carrying out the experiment.

F. PRIORITIES

Recommendations in this chapter are seen as those major efforts which should be mounted to bring increased efficiency and effectiveness to the service. In order of priority, the performance incentives must

necessarily go first. Without them, it is unlikely that other improvements will yield significant benefits.

Two other areas should be singled out for high priority attention. The work planning and performance appraisal aspects of supervision are the type of improvements which affect most individuals in their daily work experience. It is in the supervisory relationship that the human and technical aspects of agricultural administration come together to create job satisfaction and achieve agricultural development impact. Finally, the improvement of transport is crucial to the productivity of field agents. With it they can do their jobs, and be held strictly accountable for results.

Two approaches were taken in making the recommendations. First, training courses were recommended where skills development is required. The institutional framework within which the recommended training can be conducted is covered in the chapter on education, under the in-service training section. Second, where a mechanism for careful examination and decision making is needed, a working party with an independent consultant is recommended. The importance of the independent consultant is twofold: first, he is independent of the organization with which he must perform his services, and can therefore speak purely from a professional standpoint; second, he provides the responsible committee chairperson and members with the capacity for carrying out their assignments without becoming overburdened with time consuming technical details.

IV. COST ESTIMATES

Implementation of recommendations contained in Parts I, II and III of the report will require sizable capital investment and lead to recurrent operating costs. Estimates given below are approximate only. Detailed estimates must be made by an architectural and engineering specialist only after a preliminary implementation plan and schedule has been set.

A. BASIS OF ESTIMATES

1. Cost Figures

Capital expansion costs for the university and the institutes are based on the GOK document for the Fourth World Bank Education Credit. Capital costs for Egerton are estimated by comparing university and college facilities and adjusting costs accordingly. A 30% additional cost increase and contingency factor has been allowed over the capital cost base estimates.

Recurrent annual costs for the Faculty of Agriculture are from a recent study by the Faculty of Agriculture itself (KSh1268/student); that for Egerton is estimated at KSh1,276/student by comparing Egerton facilities and services with those of the university and adjusting costs accordingly. Average recurrent costs at the Institutes are derived from analysis of the annual budgets of the last three years of Embu, Bukura, and AHITI institutes. A 15% cost increase has been applied to recurrent cost base figures.

These calculations resulted in the following rounded cost figures:

	Cost KSh/Student	
	<u>Capital</u> ^{1/}	<u>Recurrent</u>
Faculty of Agriculture	5,900	1,500
Egerton	4,300	1,500
Institutes	4,800	400

^{1/} Including capital costs for student boarding and academic staff accommodations, equipment and furniture; excluding land, sewage, water and other infrastructural costs.

2. Capacities

Annual output capacities needed are to meet the estimated demand for graduates, diplomants and certificate holders calculated in Section I.C. In estimating the costs for establishment and operation of this additional capacity, we have used two additional capacity definitions. Occupational capacity represents the size of the student body in residence on a long term basis, normally the output capacity times the number of years of the standard curriculum. Design, or intake, capacity is higher than the output capacity because of attrition of the student body for health, scholastic or personal reasons. A 10% attrition factor is applied to the occupational capacity to achieve the desired output capacity without overcrowding. The design capacity is used here for calculating capital expansion costs. These capacities are summarized in Table 18.

Table 18
Current and Projected Annual
Capacities of Educational Institutions

	<u>University</u>	<u>College</u>	<u>Institutes</u>
<u>Current</u>			
Output Capacity	150	250	375
Occupational Capacity	450	750	750
Allowance for Attrition (10%)	<u>45</u>	<u>75</u>	<u>75</u>
Design (Intake) Capacity	495	825	825
<u>Recommended Additions</u>			
Output Capacity	175	250	1500
Occupational Capacity	525	750	3000
Allowance for Attrition (10%)	<u>53</u>	<u>75</u>	<u>300</u>
Design (Intake) Capacity	578	825	3300
<u>Total Projected</u>			
Output Capacity	325	500	1875
Occupational Capacity	975	1500	3750
Allowance for Attrition (10%)	<u>98</u>	<u>150</u>	<u>375</u>
Design (Intake) Capacity	1073	1650	4125

B. ESTIMATE OF EXPANSION COSTS

1. University

Application of student unit costs to the design capacity yields capital costs of K£3,410,200 and recurrent annual costs of K£867,000 in order to achieve the recommended expansion in output capacity of 175 bachelors per year.

Recommended Additional Output	175
Additional Design Capacity	578
Recurrent Annual Costs per Student	1,500
Total Recurrent Annual Costs	867,000
Capital Expansion Costs per Student	5,900
Total Capital Expansion Costs	3,410,200

2. Egerton College

A similar calculation for the recommended expansion of Egerton College yields an investment cost of K£3,547,000 and an annual recurrent cost of K£1,237,500 to increase annual output of diplomants by 250 per year.

Recommended Additional Output	250
Additional Design Capacity	825
Recurrent Annual Costs per Student	1,500
Total Recurrent Annual Costs	1,237,500
Capital Expansion Costs per Student	4,300
Total Capital Expansion Costs	3,547,500

3. Institutes

It was recommended that the output capacity of these schools be expanded from current levels of 375 by 600 in 1983 and by another 600 in 1985 and by 300 more in 1987 to raise the total annual output to 1875. This increment is still well below effective demand rates and does not include a potential Ministry of Education demand of perhaps 300-400 per year. However, the 1500 increase in annual output is a quintupling of current institutional capacity, with attendant planning and management problems, and the demonstrated demand for a greater level of output is

nearly a decade in the future. A review of the situation in five years should relieve uncertainties in time for further expansion of the system.

The first source of increased capacity is to expand Embu and Bukura Institutes to an occupational capacity of 500. AHITI (Kabete) lacks room for expansion, so a new AHITI (Ndomba), with an occupational capacity of 250 has been proposed.

The next schools to be built might include a coastal institute and a dryland agricultural institute in recognition of the expansion of agriculture in these two regions. A seventh school might emphasize range management, while the eighth could fill in any other ecological deficiency. Together these institutions would provide an increase in output of 1500 certificate holders a year, at a capital cost of KSh15,840,000 with recurrent annual operating costs of KSh1,320,000 (Table 19).

Table 19
Capital Investment and Recurrent Costs for
Expansion of Certificate Level Agricultural Training (In KSh)

	<u>Additional Design Capacity</u>	<u>Recurrent Annual Costs (at KSh400/student)</u>	<u>Capital Costs (at KSh4800/student)</u>
Embu Expansion	275	110,000	1,320,000
Bukura Expansion	275	110,000	1,320,000
Ndomba	550	220,000	2,640,000
Coastal	550	220,000	2,640,000
Drylands	550	220,000	2,640,000
Range	550	220,000	2,640,000
Other	<u>550</u>	<u>220,000</u>	<u>2,640,000</u>
<u>Total</u>	3,300	1,320,000	15,840,000

4. In-Service Training Institute

The In-Service Training Institute recommended would conduct both residential and mobile training programs. It is envisioned that the in-service training function would be most cost effective if located at Egerton College to take advantage of the existing staff, facilities, and academic-administrative structure. Annual recurrent and capital costs are estimated in Table 20. Per student unit costs cannot be calculated

with any precision at this time because of uncertainties as to average training load.

Table 20

Estimated Capital and Recurrent Costs for Establishing
and Operating an In-Service Training Institute (K\$) 1/

Annual Recurrent Costs

Professional Staff	31,700
Other Staff	11,500
Operational Costs	30,000
Special Fund for Guest Lecturers	<u>5,800</u>
Total : Recurrent Costs	<u>79,000</u>

Capital Costs

Classroom Facilities	
Two (2) Seminar Rooms	19,500
One (1) Lecture Room	16,300
Administrative Staff and Related Facilities	
Staff Housing	190,000
Student Residence and Dining	130,000
Sub-Total	394,800
Equipment at 5%	20,000
Audio-visual and Related Specialized Equipment	<u>32,500</u>
Sub-Total	447,300
Transportation	
Two (2) Mini-Buses or Vans with Specialized Instructional Equipment	18,000
Two (2) 4-Wheel Drive Vehicles	26,000
Two (2) Small Vehicles	13,000
One (1) Large Bus	<u>26,000</u>
Sub-Total	83,000
Total : Capital Costs	<u>530,300</u>

1/ These figures are based on minimum desirable physical facilities for a proprietary in-service training facility. Costs are estimated on the basis of similar facilities at national training institutions.

5. Other Recommendations

a. Education and Training

Most of the recommendations made by the Education Team can be accomplished within established resources, or are covered in the institutional capacity expansions treated above. Two recommendations which do involve additional costs to the educational institutions are the addition of a BSc course in Home Economics (Recommendation No. 7) and a course in Production Mode Research at Egerton (Recommendation No. 13).

i. BSc in Home Economics. The annual recurrent costs for this program are included in the estimates for general university level expansion. Accordingly, the only additional costs would be for capital expenditure for specialized facilities and equipment:

Two 20-student laboratories of 175 m ² each	350,000
Equipment at 5% of construction costs	<u>17,500</u>
Total Capital Costs	367,500

ii. Production Mode Research. Funds for performance of research are expected to come from within the Egerton College operating budget or from contracts with MOA. The primary cost to Egerton will be to release faculty from their heavy workload. Over the last three years, Egerton's student/teacher ratio has been about 12.6 : 1 with a student population of 700. If the ratio were reduced to 11.6 : 1, an additional nine teaching positions would be required. Depending upon the level of the additional positions, approximate costs would be about K\$25,000 per year.

b. Manpower Utilization

Several of the recommendations included in Part III would require technical advisory services. These services total seven man-years of assistance (Table 21). Assuming cost per man-year of technical advisory services of US\$70,000 (K\$28,565), the total cost would be US\$490,000 (K\$199,675).

Table 21

Estimated Cost of Technical Advisory Services
to Fulfill Manpower Utilization Recommendations (In US\$)

<u>Rec. Number</u>	<u>Title</u>	<u>Title</u>	<u>Man/Months</u>	<u>Costs</u>
1	Personnel System Incentive Consultant		6	\$ 35,000
8	Agricultural Management Training Specialist (Work Planning)		24	140,000
12 & 14	Estimates Drafting Training and System Implementation		24	140,000
15	Disbursement Procedures Improvement		12	70,000
17	Transport Systems and Procedures Improvement		6	35,000
24	Personnel Records and Information System		12	<u>70,000</u>
			<u>Total Cost</u>	<u>\$490,000</u>

6. Summary of Costs

The preliminary estimates yield the following capital and recurrent costs:

Table 22

Summary of Capital and Recurrent Costs (In K£000)

	<u>Investment</u>	<u>Annual Recurrent</u>
Faculty of Agriculture (expansion)	3,410	867
Egerton College (Expansion)	3,548	1,238
Institutes (expansion and establishment)	15,840	1,320
Additional Education Recommendations	368	25
Additional Manpower Utilization Recommendations	490	--
In-Service Training Institute	<u>530</u>	<u>69</u>
	24,186	3,519

V. RELATED POLICY ISSUES

The conduct of this study has provided an unusual opportunity for the team to observe some characteristics and operations of Kenya's agricultural sector. During discussions of the draft report, the team was asked to use the insights gained to extend its commentary beyond the terms of reference. It was asked to explore some of the policy implications of the findings, to speculate about future trends in the sector and in the agricultural education system, and to offer suggestions for meeting the challenges encountered.

Following this mandate, and responding to specific questions raised in the discussions of the draft report, these policy implications were expanded upon and clarified in the revision of other chapters of the report. A number of the issues which were identified as outgrowths of the survey are intertwined with aspects of current and future policy. They are not isolated problems which are subject to some ideal technical solution, but depend very much on the way Kenya wants the sector to develop. The nature of these issues and the way they will be resolved will be affected by the policy decisions and program actions taken to direct the future development of the sector.

The issues can be grouped in two categories: (1) Those which relate to the agricultural sector and the Ministry of Agriculture's contribution to sector development and (2) those which relate to the future characteristics of the agricultural education system. They are discussed below under these headings. These comments and suggestions have been presented, not with the expectation that they will solve the problems identified but that they may contribute to the debate which precedes such solutions.

A. THE AGRICULTURAL SECTOR

The rapid pace of economic development in Kenya can lead to socioeconomic imbalances, both in the distribution of resources and in

the distribution of benefits. Constant monitoring of this situation is needed to assure a desirable balance between growth and equity. This problem is particularly acute in the agricultural sector, where the sheer size, traditionalism, and dispersion of decision making cause sector growth rates to lag behind the rest of the economy. Kenya has taken this into consideration in its development planning and is actively engaged in trying to incorporate the lower income smallholders into its modernizing economy. This objective in turn leads to the need to examine the characteristics of the agricultural sector, MOA's place in the sector, and the way in which MOA conducts its operations.

1. The Agricultural Sector as a Production System

Agricultural output is the primary source of the benefits which flow from the rural sector, whether these are measured in terms of gross national product, foreign exchange, employment, or the welfare of rural families. There is a strong presumption that increases in the development and transmittal of improved technology will lead to increases in agricultural output, if not immediately, then after farmers have had an opportunity to incorporate the technology within their farming systems. Indeed, the survey was structured so that respondents' estimates of manpower needs were to be related to achievement of production potential.

However, it is extremely difficult to trace a direct cause and effect relationship between a single factor of production and a particular increase in output. While additional specialized manpower may be necessary to develop and extend technology needed for expanding production, it is by no means sufficient to increase production, and in particular, marketable production. A number of other conditions must be met simultaneously, only some of which are under MOA control.

Extension agents must not only reach their farmer clients but must also be effective in delivery of information. Individual agents cannot be expected to have the knowledge to advise a farmer on all the tasks of farming or even on all aspects of a given crop. Hence, there needs to be a continuous targeted flow of information to agents, geared to the level of farmers served and the type of crops to be planted. This information should be relevant to the farm situation, adapted to the

characteristics of the farmers who will use it, and timely with respect to the crop. Development and maintenance of such a flow of information requires a technical support system which can identify the agricultural calendars and needs of each ecologic region and client group, develop technology, prepare it for transmittal, orient and train agents in both the technology and in effective modes of its delivery to farmers. Aspects of such a technical support system are discussed in Subsection 2, below.

The best advice will not have much impact on production if productive agricultural inputs such as improved seed, fertilizer and insecticides are not available or if the farmer lacks the savings or credit with which to buy them. An effective input delivery system must assure the availability of productive inputs in the right amount, at the right time, and at acceptable prices.

Given good technical advice, productive inputs, and credit or savings, farmers will still not produce more than that required for family consumption unless they have access to a marketing system where potential profits bear an attractive relation to efforts expended and risks accepted. Thus, with the delivery of information and production packages must go an effective marketing system.

Monetary return alone is not an adequate incentive. Unless desirable non-farm producer and consumer goods and services are available, there is no particular incentive to produce a marketable surplus. It is important that the national market recognizes the needs and desires of the rural population and meets them by providing a steady flow of consumer and producer goods.

Farmers will still decide individually on which crops to plant, minimizing their risks and optimizing income according to their experience and perception of the market. National interests in terms of food production, exports or import substitution, employment opportunities, or rural welfare will not be realized unless farmers are able to anticipate a benefit adequate to cause them to adjust their production decisions. The national policy arm must be alert and capable of coordinating the factors of production which are the policy instruments that affect farmers' decisions.

The Ministry of Agriculture is at the hub of sector policy.

Yet, of all the essential factors of production - technology, productive inputs and the means to buy them, marketing and incentives - only the production and delivery of technology is under its direct control. MOA does not control farmers' decisions nor even a significant level of factor inputs. It is largely responsible for developing and extending technology, seed and planting stock, and for extending other types of information, but price relationships are determined by the market or various regulatory boards, while productive inputs and credit are provided by other public and private entities. The Ministry's input is essential to a desirable production decision, but it is not sufficient to achieve a particular level of agricultural output.

The success of the Ministry's efforts are very much dependent upon the way in which these efforts are coordinated with actions of other agricultural sector institutions. And nowhere is this relationship more important than in the integration of the traditional smallholder into the national economy (see Subsection 3, below).

Although the Ministry of Agriculture is the largest user of academically trained manpower, it is not the only user. Other public sector agencies and the commercial subsector also have needs for this scarce resource. MOA, in its policy role, must strive to achieve an optimum distribution among these competing users (see Subsection 4, below).

2. Improving the Effectiveness of the Ministry of Agriculture Extension Service

The Ministry of Agriculture performs a broad array of functions in addition to the development and extension of technology, including production of seeds and planting stock, education of specialized agricultural staff, the operation of plant and animal quarantine and protection services, regulation of agricultural inputs, and provision of a number of other services to farmers. However, its most pervasive service and the one which directly affects the rural welfare is the agricultural extension function.

The agricultural extension service is a mechanism for delivery of technology and other information to the farmer. As such, it should respond through its structure and approach to the particular production

objectives and client groups it is intended to reach. No single, ideal type of extension service system should be expected to perform equally well in reaching the diverse client groups or in meeting such diverse objectives as production for domestic food, for exports, or for industrial raw materials.

Table 23 provides a useful typology of extension programs. More than one type may exist in a country at the same time. Kenya provides examples of the first two. The national agricultural extension service is an example of the traditional government service, while the commodity-oriented service of the Kenya Tea Development Authority is characteristic of the integrative government service.

The Ministry of Agriculture has a good structure for the performance of traditional extension activities, but low productivity. We attribute current low productivity to:

- (1) Too much reliance on pre-service academic preparation of staff and not enough stress on formulating and implementing the management framework which will assure a high level of productivity.
- (2) Too much reliance on the general technical assistance role of the farmer contact agent, and not enough on his technical support, i.e., on preparation of specific packages of information for the contact agent and on programming him to deliver them effectively.

These deficiencies are mutually reinforcing, since a person with an outdated education and poor work methods will be unable to effectively adapt new technical information that he receives for transmittal to his clients. They are, however, problems that respond to effective planning, i.e., the identification of objectives and the programming of activities to achieve those objectives.

a. The Management Framework

Raising the pre-service educational entrance requirement will have only a marginal effect on subsequent performance unless this educational experience is focused on the job objectives and used as a base on which to systematically accumulate appropriate operating experience.

Table 23

Typology of Extension Services

1. Traditional Government (most Western extension services)

Authority: Laissez-faire, normative. Provides reliable, tested information, but decision to use it is left to individual.

Services: Limited. May provide not only technological information but also information on input and credit, and marketing sources, terms, and conditions, but does not provide inputs, credit nor markets.

Clientele: General rural community with emphasis on farmers and their families.

2. Integrative (or Objective-Targeted) Government (IADP or Commodity-Based Service).

Authority: Directive. Farmer retains decision over participating in program, but program options are limited. If he participates he agrees to the package.

Services: Comprehensive to local distribution point. Government is responsible for assuring delivery of all inputs, credit and marketing services, through government-controlled or coordinated mechanisms.

Clientele: Selected target group, usually limited to a particular income class in a prescribed geographic area.

3. Government Controlled (Government Farms)

Authority: Government controls the production decision, either by fiat or by direct participation in the production process

Services: Comprehensive, at the farm level. All provided by government

Clientele: Farm personnel

4. Private Associative (Farmers' Associations)

Authority: All decisions except the production decision, including hiring, firing responsibility over the extension agent (who is an employee of the association) are in the hands of the association.

Services: Generally comprehensive, at the association distribution point. The association normally provides inputs, credit, and marketing services to its membership.

Clientele: Members of the association.

High productivity does not come about haphazardly. It begins with the careful identification of objectives and targets, the specification of functions and responsibilities, the establishment of schedules and work norms, and the training of staff in each of these. Supervisors must be capable of defining the job which each staff member must do, instructing him in how to do it, helping him to accomplish it, and assuring that he does it well, on time, and with a definite number of farmers. The staff members must have appropriate incentives to perform, be supported by adequate administrative and logistical systems, and be motivated to perform by effective leadership. This problem was dealt with in some detail in the chapter on utilization, but it merits additional emphasis.

b. Technical Support

Development of an agricultural information center in MOA to expand and improve the use of mass communications is a crucial initiative which deserves wholehearted support. A comparable effort is needed to establish a technical support system for the field extension agents. The current technical support system is, in our opinion, too diffuse and relies too heavily on individual initiative at every level.

Agriculture is a complex field which permits the dissipation of almost limitless technical assistance effort with little apparent improvement, unless that assistance is focused and programmed as to content, priority and timing. Contact agents, and those who advise them directly, are usually not sufficiently experienced or technically informed to be able to perform this programming.

An incentive technical support system must include the following elements:

- An agricultural calendar for cultural processes associated with important crops in each significant ecological zone
- Technological packages of the most suitable practices for each crop in the zone
- Information on agricultural input availability and price, and on market outlets and anticipated price conditions at harvest.

- Provision for staff training seminars on each part of this information and how to transmit it, at its appropriate time in the calendar
- Back-up technical specialists to help the contact agent adjust the technological package to peculiar local conditions and to deal with problems as they arise
- Regular evaluation of the local performance of each technological package, with resultant feedback of any weaknesses into the research and information branches

Such a support system does not eliminate the need for agricultural training. However, it develops the agent's talents by providing an appropriate framework for internalizing his experience. Above all, it assures the programming of the contact agent to maximize his impact on activities of national priority.

3. The Structure of the Agricultural Sector

The current agricultural sector can be divided into four basic groups of actions and actors:

1. Technology development and its extension, primarily by the MOA
2. Other services (credit, inputs, marketing, processing) provided by the commercial subsector under regulation by other public sector agencies
3. Production of agricultural products with good technology and commercial intent by large and medium sized farming establishments or by smallholders associated with public, private or mixed commercial organizations such as the Kenya Tea Development Authority, some of the cane sugar corporations, and others.
4. Production of agricultural products with traditional methods by smallholders who are only marginally associated with the marketing economy.

Until recently, most of the concern has focused on the first three of these groups and on their interrelationships. With IADP, the MOA began seriously to concentrate on the relationships among Groups 1, 2 and 4. The (1+2+4) relationship, which we call the "smallholder" relationship, is quite different from the (1+2+3) or "commercial" relationship.

As the Ministry expands its efforts to incorporate the more traditional smallholders into the economy, these differences will increasingly influence sector structure. Desirable and feasible mechanisms for successful implementation of the smallholder relationship will also have to be developed, and this will require better knowledge of the characteristics and aspirations of smallholders.

a. Consideration of an Alternative Sector Structure

Until fairly recently, there was an apparent assumption that the smallholder relationship differed from the commercial relationship only in the technological and entrepreneurial limitations of the smallholder. By this view, the problem was seen to be one of moving the smallholders from Group 4 into Group 3 so that they could become members of the (1+2+3) relationship, but no restructuring of the sector establishments was considered to be essential. Credence was lent to this viewpoint by the fact that some smallholders did indeed become successful commercial farmers. But more recently there has been a growing recognition that the smallholder who can become successful in the commercial relationship is an exception and usually belongs to one of the groups producing high value commodities such as coffee, tea or sugar.

The great mass of smallholders may never be able to enter through their own means into the commercial relationship as it is presently structured. Most are so beset by problems of economies of scale in acquisition of credit and inputs, marketing of produce, and influence over pricing decisions, that they will not be able to sustain an effective improvement in their situation. The commercial subsector cannot profitably incorporate these smallholders into its production and marketing mechanisms. Nor can MOA hope to get budget and staff to deal with more than a fraction of the smallholders if it continues with present methods of extension.

The smallholder relationship obviously requires an additional element - the organization of smallholders into economic interest groups (cooperatives, mutual aid societies, corporations, etc.) which will enable them to achieve some of the economies of scale accessible to Group 3 farmers. The benefits of association are well recognized in

Kenya, as demonstrated by the expanding cooperative movement with its central supporting system of the Ministry of Cooperative Development, the Kenya National Federation of Cooperatives, and the Kenya Cooperative Bank. The success of this movement, however, has been founded largely on its work with Group 3 farmers in the commercial relationship. Cooperative unions and societies composed of more traditional smallholders producing mostly food crops are generally poor and weak, reflecting the deficient economic base and inadequate managerial and entrepreneurial training of their members. There is growing awareness that these cooperatives must have at least a temporary subsidy of management talent in the form of trained personnel to handle the distribution of credit, inputs, marketing services. We suggest that this should include personnel to handle technical advice.

Our reasoning is a logical extension of that which led to the Integrated Agricultural Development Program: Improvements in agricultural productivity require not one input, but several. Technical advice will be effectively converted to improvements in production only when it is provided in conjunction with productive inputs, the means to acquire them and the incentives to use them. When dealing with traditional smallholders, these conditions are achieved only when the smallholder is a member of an organization which provides these to him. The assignment of TA's directly to cooperative unions, responsible to union management for improving the technology of their members, assures the concentration of their efforts on a select group of farmers who, through that organization, can meet the conditions which make that technology effective.

These technicians at the cooperative level will still not be effective unless they are programmed by the MOA with timely information of good quality. They must be supported by well prepared specialists who have full access to an effective agricultural information system and to the research department.

This concept raises administrative policy questions for the MOA. Should personnel assigned to cooperatives be MOA employees, or be hired directly by the cooperative with a temporary subsidy from the MOA? If the former, should current MOA staff be assigned to cooperatives, or only new hires? What share of the current MOA effort may be diverted to this arrangement, and what part should remain performing its functions

in the traditional manner? Can the MOA develop its technical support system to effectively program technicians assigned to cooperatives? And what does this imply with regards to central organization, staffing and objectives?

These structural changes would not initially add to the manpower requirements indicated by the survey. Instead it is seen as a move towards more effective deployment, with the demand for certificate holders shifting from MOA to the coop system.

b. Unique Characteristics of Smallholders

The farmers in Group 4 are quite different from the farmers in Group 3; and probably vary more widely within this category than the other groups. They are on different economic levels, and they have different needs. Their needs and aspirations must be known in order to plan and implement programs to change their behavior in ways which will increase their economic productivity. Among the things which must be learned about this smallholder group, in addition to their numbers, location, economic status and educational level are the following:

- Their perception of their immediate needs and long term hopes
- Their perception of risks and rewards in their rural existence
- Their responsiveness to various kinds of incentives or advisory services
- Their capacity for integrating new methods into their farming systems

Obtaining this kind of information will require interviews by sociologists and anthropologists and an economic evaluation. These studies are important, for it is probable that the answers to these questions will reveal a set of conditions which are so different from those of farmers in the commercial group that methods and information for Group 4 will have to be different from those suited for Group 3. If so, the MOA will need to develop and adapt information and extension methods to improve the production of the smallholder group.

It is interesting to consider that agents who are successful in serving the commercial group (because of past experience and personal

idiosyncrasy) may not be appropriately oriented to deal effectively with smallholder problems. It may be necessary for MOA to develop two lines of supporting systems, one of which remains directed towards satisfying the needs of the commercial relationship. This line concentrates on mass communications, responds to queries from the general public, responds campaigns and training courses, solves problems. The other line would be directed to programming the cooperative based technicians with standard technical packages which can be time-phased and coordinated with the agricultural calendar and availability of inputs in order to assure the integration of all factors needed by the smallholder to increase his productivity.

4. The Distribution of Specialized Agricultural Staff

The current distribution of personnel in the agricultural sector is as follows (in percentages):

	<u>MOA</u>	<u>OPS</u>	<u>COMM</u>
BSc+	49.4	29.8	20.8
Diplomants	48.5	32.1	19.4
Certificates	74.3	20.6	5.1

Unconstrained, the requested distribution by 1988 would be:

	<u>MOA</u>	<u>OPS</u>	<u>COMM</u>
BSc+	61.9	24.9	13.2
Diplomants	48.5	31.3	24.2
Certificates	73.6	21.5	4.9

Constrained at a 7% budget growth rate for MOA and a 10% rate for the Other Public Sector, the resulting effective demand would yield the following composition by 1988:

	<u>MOA</u>	<u>OPS</u>	<u>COMM</u>
BSc+	55.7	27.7	16.6
Diplomants	39.6	32.2	28.1
Certificates ^{1/}	69.7	24.0	6.3

^{1/} Excludes planned JTA substitution. With 3740 additional certificate holders included, distribution would be 76.5%, 18.6%, and 4.9% for MOA, OPS, and COMM.

The MOA, by its sheer size, exerts an extraordinary impact on the demand, so that MOA users, even when limited by a tight budget, would dominate the market for both bachelors and certificate holders, ending up in 1988 with an even more dominant position than was held in 1977.

However, in addition to its role as user, MOA also functions as a producer and moderator. In its position as policy leader, it must also be concerned that scarce agricultural personnel are distributed within the total sector in a productive manner. Almost surely, the allocation of 75% of the certificate holders to MOA is not an optimum allocation. Neither, perhaps, is the small share of all three educational levels held by the commercial subsector. However, these are the proportions which are currently sought by the principal users.

Both the other public sector agencies and the commercial subsector tend to satisfy their needs by hiring experienced personnel from MOA, although recently the commercial subsector has gone directly to the university for bachelors. Both of these subsectors have an edge over the MOA in hiring particular individuals and MOA personnel frequently complain that they lose too many people, particular to the commercial sector. However, the unequal distribution of personnel in favor of the Ministry of Agriculture indicates that MOA has not fared too badly.

Even with an adequate supply of trained personnel, the MOA will never be able to compete in salary levels with the commercial subsector for any individual whom that subsector feels will provide a marginal utility. However, there are a few ways in which the problem can be ameliorated besides accepting this as one of the public sector's contributions to commerce and industry.

1. Protect Key Positions by salary and allowance differentials. This can be done for only a few slots in research and administration where the individual's loss would cause very serious program damage.

2. Shift Work Loads to other users. If other users are raiding MOA staff to do the same type of work which MOA is doing, investigate the possibility of shifting that type of work to the competitor.

3. Select Program Activities which are within the competence of the staff available to perform them. This may require limiting the possible scope of MOA activities to targeted geographic areas, commodities

or populations.

4. Select Project Designs which are compatible with staff availability. Under current program methods, MOA lists an unfilled need for 3400 certificate holders. Since there is no reasonable means of filling this need in the next few years, consideration should be given to deployments which minimize staff needs.

5. Use Work Methods which maximize the productivity of less experienced or less competent staff members who remain available. This refers particularly to work planning, definition of tasks, establishment of performance norms, and providing good training and supervision.

6. Avoid Non-Monetary Disincentives by creating working conditions, perquisites, recognitions, administrative supports, challenges, etc., which will attract and bind personnel to the public sector.

An inquiry into why the commercial subsector doesn't use more agricultural professionals and subprofessionals may be worthwhile. Perhaps opportunities are being overlooked. If so, perhaps there are incentives which government can employ to encourage hiring of more trained personnel in the commercial subsector which would permit more rapid Kenyanization while providing higher returns to investors.

B. SPECULATIONS ON THE FUTURE OF AGRICULTURAL EDUCATION IN KENYA

In the course of preparing the report the Team was asked its opinions on a number of issues which the present study was not specifically designed to answer. The two principal areas concern the creation, coordination and differentiation of education programs; and the separate question of whether a two or three tiered agricultural education system is desirable. While definitive answers cannot be attempted at this stage (as further detailed study would be required), it is possible to make some observations and speculations on the issues which may be of assistance to policy makers in their own considerations.

1. Two-Tiered vs. Three-Tiered System

There appears to be no intrinsic advantage of a three-tiered (bachelor-diploma-certificate) system over a two-tiered (professional-vocational) system, or vice versa. Any apparent advantage or disadvantage

of one system over the other has at its root those rigidities in the existing educational system which limit the movement of students from one level to another, and which are carried into subsequent career patterns. These arbitrary rigidities influence the cost of training as well as the future salaries of graduates from different educational levels and consequently influence any subsequent cost benefit calculation.

Many countries have evolved two-tiered systems, but have incorporated greater flexibility and variety within these two levels. The variety in institutional orientation accommodates to the diversified job and professional requirements placed on the system's output, while the flexibility permits an individual to develop and utilize his talents, by facilitating both upward and lateral movement within the educational system. However, this variety and flexibility can be obtained within a three-tiered system; the concept of course equivalency discussed in the next subsection offers a mechanism for increasing mobility within the system.

A nation's agricultural education system should reflect the sector's needs. Kenya's current three level system appears to us to be an effective response to current needs, and we have recommended an expansion in all three educational levels. In the short run, there are very good reasons for continuing this system. There is an impressive need for vocational school graduates - certificate holders - to help incorporate large numbers of smallholders into the progressive agricultural economy. The costs of producing a certificate holder whose annual salary is KSh550 from a two-year institute are much lower than those of a three-year diplomant whose annual salary is KSh1050. In the long run, it will probably be desirable to fill many upper level management positions with university graduates, but in the short run there is no way for a young university to produce the numbers required. Diplomants must fill most of these management positions for many years to come.

A more interesting speculation is how the agricultural education system may evolve over time. It would seem quite reasonable that an institution as capable as Egerton College, now enrolling many students who are fully prequalified for university level work, would soon begin to offer a bachelor degree to selected students in selected disciplines.

Such a course of action need not alter its applied agriculture orientation, nor interfere with its continued production of diplomants. Neither should the awarding of Bachelors of Science by Egerton College compete unduly with the same degree awarded by the University of Nairobi. The latter will continue to dominate the specialist field.

At some point in time, the certificate level institutes will have to move to a three year course as growing sophistication of the agricultural sector requires personnel who have more technical background than can be provided in two years. When this occurs, someone will have to make a decision as to whether the graduate of such an institute continues to receive a certificate or is to be awarded a diploma.

2. Coordination and Differentiation Among Education Programs

The coordination and transferability of course credit among institutions has already been touched upon in Part II. Recommendations Nos. 3 and 10 of Part II contend that earlier coursework be recognized and accepted for credit when graduates of one level pursue a higher qualification. Another aspect of this situation will become important when more than one institution offers the bachelors degree and (a) students seek to transfer between institutions or (b) the equivalency of degrees from different institutions is questioned.

This suggested that it would be in the long term interest of Kenya for those responsible for agricultural education to seriously consider mechanisms which facilitate inter-institutional transferrability of credits. Recognizing the historical development of educational programs in Kenya, we believe that the concept of "course equivalency" could well provide a mechanism which would prevent expensive duplication of effort and provide an upward mobility path for agricultural personnel.

Within Kenya there are presently three levels of agricultural education, which lead to three distinct career paths with virtually no movement or transferrability among them. Yet, within this system, there is a great deal of duplication of course work. Recognizing that each level of institution requires different entrance qualifications of its students, and that there are significant differences in staff, we believe that there is still potential for some movement.

Concepts which are successful in one part of the world are not automatically transferrable to another. It is possible, however, to adapt the experiences of some countries to the needs of others. The course equivalency concept developed in the United States is one which merits consideration.

In the United States, for example, there are also three types of training institutions: (1) two-year community or "junior colleges", (2) four year colleges and universities which offer only bachelor's or master's degrees, and (3) diversified universities heavily involved in research which offer instruction through the PhD and post-doctoral levels. Each has different entrance requirements for students and qualifications for teaching staff. However, there is transferrability of course work among these three types of institutions through the mechanism of course equivalency.

The concept is generally referred to as "articulation" and has as its basis the agreement among teaching institutions that the same individual subject matter, once mastered by the student, should be recognized, irrespective of where the course was taught or the prequalification of either teaching staff or student. The critical question is: Does the student have the same information when he completes the course?

This determination is made by an evaluation of the course or class content. Is the material covered the same? Are the same or similar texts and references used? In the early stages of development of this concept, understandable concern led to evaluation of previous course work by giving the student a "challenge" examination. If the student succeeded, his previous work was recognized. Experience soon demonstrated that students who successfully completed courses of comparable characteristics received comparable scores on these examinations. Consequently, evaluation is now performed on course content through conferences of the respective teaching staffs.

Not all work given at a junior or community college is transferrable, since many of the courses are aimed at occupation or skill areas. However, the key is an evaluation of the courses which the student took and his capability when he completed them, rather than the fact that he took those courses at a junior college.

One could speculate that if the course equivalency concept were investigated by those responsible for agricultural education in Kenya, a number of similarities of course content at all levels would be found. This would permit some students with a certificate level education to complete the three-year diploma program in less than three years, and others holding a diploma to complete a BSc without having to take the full three years at the university.

The other aspect of this situation has to do with making available degree programs which serve distinctly different purposes, although identified by the same name, i.e., the Bachelor of Science. Again a parallel with the United States is offered by way of explanation. There is a grouping of fully developed universities with extensive teaching, research, extension and public service responsibilities (Land Grant Colleges and Universities). These universities offer degree programs through PhD and post-doctoral level with significant components devoted to basic and theoretical research. Within Kenya it is this role that the Faculty of Agriculture of the University of Nairobi, as it continues to grow and mature, will fill.

There is another group of agricultural colleges and universities in the U.S. (many of which are referred to as State Colleges or State Universities) which also offer B.Sc. programs, but they do not offer a PhD program, and several do not offer the masters program. While they are involved in research, the research activities are of a less theoretical nature. The basic differences between the full-fledged research-oriented universities on the one hand and the more applied colleges and universities is one of emphasis and orientation.

Each of these groups performs a very useful role in the preparation of professionals for agricultural development. Many of the university graduates - particularly those who obtain postgraduate degrees - fill research or extension specialist positions where a high degree of theoretical knowledge is required. Most of the graduates of the state colleges become operating managers or extension agents where a broader, more practical orientation is needed. There is some overlap in initial employment, just as there is in later career development in the management hierarchy. This is to be expected, for both types of institutions provide

a degree that is academically equivalent; the differentiation is in orientation, rather than quality.