

PN-ABG 878  
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*Human Resource Management No. 11*

TRAINING SERIES

Staffing Requirements and Staffing Pyramid  
for the Tanzania National Agricultural  
and Livestock Research System  
*A Case Study*

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October 1990



**Southern African Centre For Cooperation In Agricultural Research**

***ISNAR***

**International Service for National Agricultural Research**

*This paper was previously published in the proceedings of the SACCAR/ISNAR Regional Workshop on Human Resource Management in National Agricultural Research Systems (ISNAR 1989).*

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**Citation:**

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Mende, J. J. 1990. Staffing Requirements and Staffing Pyramid for the Tanzania National Agricultural and Livestock Research System — A Case Study. ISNAR Training Series — Human Resource Management No. 11. The Hague: ISNAR.

**CABI Descriptors:**

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Agricultural Research; Case Study; Management; Managers; Personnel Management; Research Workers; Scientists; Tanzania

**AGROVOC Descriptors:**

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Case Study; Research; Management; Managers; Scientists; Tanzania

# STAFFING REQUIREMENTS AND STAFFING PYRAMID FOR THE TANZANIA NATIONAL AGRICULTURAL AND LIVESTOCK RESEARCH SYSTEM A CASE STUDY

J. J. Mende<sup>1</sup>

## Introduction

This paper is a case study of the staffing system in agricultural and livestock research in Tanzania. It is designed to offer some brief lessons on approaches made by research managers to requirements in research staff. It provides an analysis of the existing staff and attempts to project future needs in human resources for the research system.

The paper is divided into four parts:

1. the structure of the NARS in Tanzania;
2. the current staffing systems of the NARS;
3. the staffing requirements of the NARS;
4. conclusions.

## The Structure of the NARS in Tanzania

### Previous Research Structures

There have been several attempts to establish an effective system for crop and livestock research in Tanzania ever since it started there during the early years of this century. In the pre-independence years, and for almost one decade after independence, the national agricultural research system (NARS) in the broadest sense included agriculture, livestock, fisheries, and forestry and wildlife. During the second decade after independence, the ministry was reorganized, and consequently, NARS in a narrower sense included only agriculture and livestock.

The Tanzania Agricultural Research Organization (TARO) and the Tanzania Livestock Research Organization, (TALIRO) were actually established in 1980 from research departments in the Ministry of Agriculture and the Ministry of Livestock Development, respectively.<sup>2</sup> When they were

created, both were semiautonomous parastatals, each headed by a director general responsible, through the respective councils, to the Ministry of Agriculture and Livestock Development (MALD). There was no linkage between them or with other research institutes or agencies.

The necessary steps and actions to be taken to strengthen the NARS were reiterated several times in different reports and forums. Included among these are the National Agricultural Policy, 1983; the Tanzania Agricultural Research Resource Assessment, 1985; and the UNDP/FAO and World Bank mission reports and Aide Memoires. The recommendations on the organization and management aspects agricultural and livestock research included the following:<sup>3</sup>

- consolidating the existing research institutions;
- focusing the research systems on major agroecological zones;
- improving and establishing linkages between research and extension;
- adopting a farming systems research (FSR) approach, with considerable emphasis on on-farm research, so that research could be more closely related to the technical and socioeconomic problems facing farmers.

### Current Research Structure

The revised organizational structure and management system for national agricultural and livestock research is illustrated in appendix 2 at the end of this paper. It was based on the following objectives and principles, most of which were defined in the Tanzanian National Agricultural Policy Final Report dated October 1982.

- Research should be consolidated and coordinated at the national level.

- The organization of agricultural and livestock research organization should be redesigned to economize on costs in order to provide increased funding for the productive aspects of research.
- Links between research, training, and extension should be strengthened in order to facilitate technology transfer.
- Research programs should be based on agroecological considerations.
- Agricultural research should adopt a farm-oriented problem-solving approach to arrive at relevant extension packages.
- Research must take place with full farmer support since farmers know best what problems confront them. Research institutes should have balanced farm-based and station-based research programs.
- Education and training facilities should be expanded so that research manpower needs are met by planned recruitment and staff development.
- Government funding for agricultural research should be increased to reflect the importance of research in agricultural development.
- A well-stocked documentation center should be established for the whole agricultural sector and should disseminate agricultural research findings nationally and internationally.
- The following information and materials should be made available to agricultural producers and supporting services:
  - appropriate, reliable and detailed agronomic information for increased productivity with adequate protection of the resource base;
  - improved materials and prototypes on which to base increased production of crops, farm animals, and trees;
  - technologies to deal with biological hazards (pests, diseases, weeds, etc.).
- Technical and socioeconomic information for planning purposes should be made available to governmental and industrial decision makers. This would include the following:
  - information on new agricultural production opportunities (crops, animals, trees) for different agroecological zones;
  - technical information on storage, processing, transport, and handling of produce to minimize post-harvest losses;
  - estimates of land, labor, agronomic inputs, and capital needed to carry out national plans.

### Staffing Position in Tanzanian NARS

This section is on the staffing requirements and staffing pyramid for the NARS in Tanzania. It is worth noting here that the NARS in Tanzania is in a transitional stage at the moment, following the recent reorganization from the parastatal structure to the civil service, directly under MALD. The Tanzanian NARS is a large, diverse, and complex system that requires very comprehensive human planning and development for research efficiency and output. There are several issues still to be rectified.

The preparation of the Research Master Plan (RMP) and priority research programs, for example, need to be resolved first before any serious projections on manpower demand can be made. What this paper will give are only tentative manpower requirements, as perceived by research managers. It will have to be updated as soon as the ongoing exercise on research priority setting is completed. The focus is, therefore on the following:

- current professional and technical manpower;
- current methodology and ratios to determine future human resource requirements for research and their limitations;
- tentative human resource requirements for NARS research in Tanzania.

### Current Staffing for NARS in Tanzania

There are currently 3,462 total staff in research. Table 1 shows their distribution by research institutions, and their distribution by degree is shown below:

- 319 scientific staff (129 bachelor's degrees, 157 master's, and 33 PhDs);
- 561 technical staff (certificate and diploma);
- 1549 subtechnical staff (field attendants);
- 900 administrative staff;
- 130 accounting staff.

The majority of staff (44.7%) are subtechnical, followed by administrative personnel (26.0%), technical staff (16.2%), scientific staff (9.2%), and accounting personnel (3.8%).

Table 1. Staffing System by Designation/Grade, Agricultural and Livestock Research in Tanzania, March 1989

Parasitological Designation and Grade	Designation and Grade	Civil Service Salary Scale	Research Institution*					Total	Percent
			MALD**	TARO**	TALIRO**	UAC Mbeya	TPRI		
<b>Scientific</b>									
CSO	PRO I	MS 16	-	-	-	-	-	-	-
PSO I	PRO I	MS 14-15	1	-	-	-	-	1	-
PSO II	PRO II	MS 12-13	3	-	4	1	3	11	-
PSO III	SRO I	MS 10-11	-	2	-	3	2	7	-
SSO II	SRO II	MS 7-9	1	8	8	18	3	38	-
SSO II	SRO II	MS 6	2	44	9	10	5	70	-
SO I	RO I	MS 5	4	63	22	5	6	100	-
SO II	RO II	MS 4	8	-	14	10	8	40	-
SO III	RO III	MS 3	17	28	-	-	7	52	-
<i>Subtotal</i>			36	145	57	47	34	319	9.2
<b>Technical</b>									
PFO	CFO	MS 10	-	-	2	-	-	2	-
SFO I	PRO	MS 7-9	-	2	3	-	-	5	-
SFO II	SFO	MS 6	1	4	4	2	-	11	-
FO I	FO I	MS 5	1	35	22	4	2	64	-
FO II	FO II	MS 4	2	58	39	25	-	124	-
FO III	FO III	MS 3	31	128	24	21	3	207	-
FO IV	FO IV	MS 2	53	60	-	10	6	129	-
F Asst. III & IV	F Asst. II	MS 1	-	-	-	15	419	-	-
<i>Subtotal</i>			88	287	94	77	15	561	16.2
<b>Subtechnical</b>			55	986	292	151	65	1549	44.7
<b>Administrative</b>			NA	416	279	135	70	900	26.0
<b>Accounting</b>			NA	55	31	41	6	130	3.8
<b>Grand Total</b>			179	1889	753	451	190	3462	99.9

\*Expatriates are not included in these numbers.

\*\*These institutions have already been consolidated under MALD and are headed by the commissioner of research and training.

NOTE:

CSO = Chief Scientific Officer  
 PSO = Principal Scientific Officer  
 SSO = Senior Scientific Officer  
 SO = Scientific Officer  
 PFO = Principal Research Officer  
 SRO = Senior Research Officer  
 RO = Research Officer

CFO = Chief Field Officer  
 PFO = Principal Field Officer  
 SFO = Senior Field Officer  
 FO = Field Officer  
 F Asst = Field Assistant

MALD = Ministry of Agriculture and Livestock Development  
 TARO = Tanzania Agricultural Research Organization  
 TALIRO = Tanzania Livestock Research Organization  
 UAC = Uyolet Agricultural Centre  
 TPRI = Tropical Pest Research Institute

**Staffing systems of scientists by grade and educational qualifications.** The staffing groups for the NARS have been defined into two groups here, i.e., by grade (status) and by educational qualifications for the professional staff, whose competence, organizational skills, and research entrepreneurship are considered to be crucial. However, it is worth noting that the distribution between these groups is determined over time by the effects of promotions, recruitment, and attrition rates.

The current staffing pyramid of professional and technical personnel by grade is shown in figures 1 and 2. There are nine grade levels in the professional cadre and eight grade levels in the technical cadre. According to the current schemes of service in the civil service, a young researcher joining the NARS at the age of 25 will reach the topmost grade level (Principal Research Officer I) when he/she is about 49 or 50 years old, assuming that there are regular intervals of promotion.

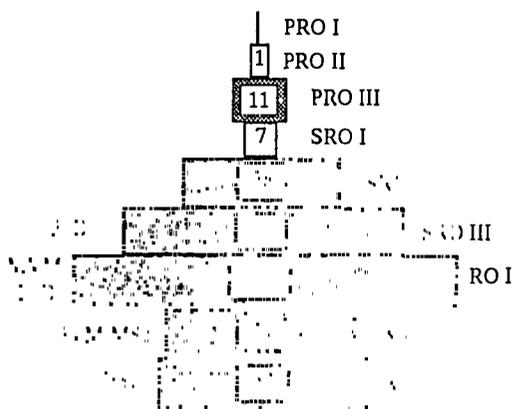


Figure 1.

Pyramid of Agricultural and Livestock Research Professional Staff, March 1989

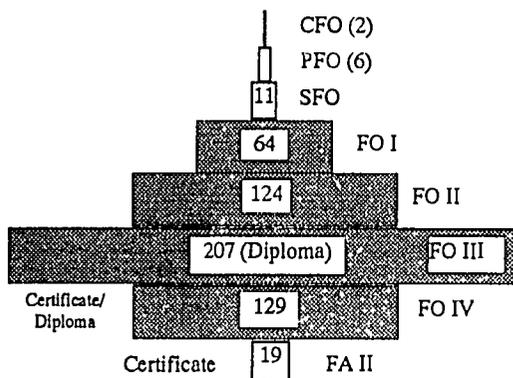


Figure 2.

Pyramid of Agricultural and Livestock Research Technical Staff, March 1989

In the case of the professional staffing pyramid, the following can be seen:

- There is a clear bulge in the middle grades. About 65.3% of the scientists are within the three middle grades (R.O. I - S.R.O. II);
- Only 28.8% of the scientists are in the bottom two grades (R.O. III - P.R. II), only 6% of them are in the upper three grades (S.R.O. I - P.R.O. II), and none are in the highest grade (P.R.O. I) in a research system that has operated since the early years of this century.

This staffing pattern should cause some concern for recruitment/career planners because there is a small pool at the lower grades, while the middle grades are very large. The upper grades are very thin, and the topmost grade is vacant.

Possible causes for this type of grade structure:

- BSc graduates enter the service as research officers grade III and BVM graduates enter as research officers grade II. According to the existing scheme of service, they can be promoted to the next grade levels within three years.
- Many of the BSc/BVM researchers are encouraged to pursue MS/MVM studies. On successful completion of their courses, they may qualify for promotion to research officers grade II/I, respectively.
- Promotion from middle grades to higher grade levels (apart from possession of higher educational qualifications) requires researchers to have published between two and four scientific papers since their last promotion.
- In short, it appears that there are too many researchers who are promoted and/or enter into the middle grade levels from the lower grade levels. Then, there are very few promoted to the higher grades from the middle grades.
- Unnecessary stagnation at the middle grades may cause frustration and, hence, decrease research efficiency and output. Ideally promotions should not be tied to managerial posts only, as seems to be the case here (see figure 1). It is hoped that a separate promotion stream to the topmost grades, based on recognition of research performance, will be created. This should have career scales without limitations of the number of posts at specific grades, provided job descriptions and evaluation criteria for promotions are strictly followed. The need for such an incentive scheme has been underscored as one of the more important items to be built into the research master plan that is currently under preparation.

**Staffing system of scientists by educational qualifications.** The distribution of educational backgrounds in the staffing system of the NARS can be used to help establish objectives for the recruitment of different types of skilled or qualified personnel. It can also be used to plan the recruitment and training required to achieve these objectives. As shown in table 2, out of 319 scientists, there are 33 PhDs, 157 with a master's degree, and 129 with a bachelor's. These scientists are supported by 561 trained technicians at certificate/diploma levels. Figure 3 shows the distribution of scientific staff by degree level. Those involved in agricultural research are deployed in 19 programs (17 programs on crops, one on soils, and one on farming systems research). However, those involved in livestock research are deployed in five programs:

1. animal breeding

2. nutrition
3. range and pasture development
4. vaccine production
5. pest and disease control

The following information can be derived from these figures:

- The ratio of professionals to technicians is 1:1.8.
- The ratio of PhDs to other degrees is 1:8.7.

These ratios are a subject for consideration, based on ratios for research staff in both developed and third-world coun-

**Table 2. Staffing System by Educational Level, Agriculture and Livestock Research, Tanzania, March 1989**

Educational Level	Research Institutions*					Total	Percent of Total
	MALD	TARO	TALIRO	UAC Mbeya	TPRI		
PhD	4	16	4	6	3	33	3.8
MSc/MVM	12	76	24	34	11	157	17.8
BSc/BVM	20	53	29	7	20	129	14.7
Dipl/Cert	88	287	94	77	15	561	63.7
Total	124	432	151	124	49	880	100.0
Percent of total	14.1	49.1	17.1	14.1	5.6	100.0	
Ratio of scientists to technicians	1:2.4	1:2	1:1.6	1:1.6	2.5:1	1:1.8	

NOTE: Staff in the Veterinary Investigation Centres (VICs) are not included because they are now in extension.

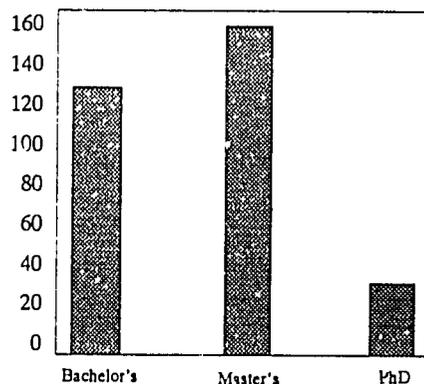
\*Except for UAC, Mbeya, and TPRI, these institutions have been merged under the Ministry of Agriculture and Livestock Development (MALD).

tries. TALIRO, for example, was using a ratio of one scientist to three technicians in determining their recruitment needs. Personnel and training managers, therefore, would be concerned with establishing whether the staff with PhDs had sufficient funds and research facilities, whether the MSc staff had the scope to pursue a PhD, and whether they should be encouraged to do so lest the BSc holders would be left to become "super technicians." The trend in training efforts is clearly shown in figure 3 where we are beginning to have an inversion of the professional staff pyramid. This is an encouraging trend for any NARS, particularly in the third world. These research systems have not reached a constant size and, hence, are expected to continue expanding, based on strategic planning and priority setting.

### Staffing Requirements for the NARS in Tanzania

As stated earlier, the Tanzanian agricultural and livestock research system is in transition, following the recent major structural reorganization in which TARO and TAMIRO were dissolved and their research functions amalgamated within MALD under the commissioner of research and

training (see appendix). As a result, there has been an enormous investment of labor in the preparation of the research master plan. Therefore, realistic projections of research manpower requirements can not be made before prioritized



**Figure 3.**  
Distribution of Scientific Staff by Education

research plans are drawn out. What follows are some of the attempts previously made by the research systems in Tanzania to project manpower requirements and their limitations.

### Criteria Used in Staff Recruitment

There have been no rigid, concrete criteria on staff projections and recruitment for research. However, for purposes of determining staffing levels, managerial judgments based on past experience and the experience of similar organizations have been used. These have also been based on what research managers would "like" to have and, to some extent, on what they can afford – as indicated by approved annual budgets. Research managers normally respond to the following questions:

- How many researchers are needed at a given period?
- What types of researchers are needed?
- What kinds of educational qualifications are required?
- In which disciplinary fields should they be?

The former TARO, for example, indicated that it did not have strategic human resource planning but relied on established and funded posts. The former TALIRO, on the other hand, responded to such "wish questions" based on specific staffing ratios as follows:

- Staff are recruited on the basis of the mix of skills at three levels, i.e., scientific officers who are assisted by laboratory technicians/field officers, who are in turn assisted by laboratory/field assistants.
- A ratio of 1:3 scientists to technicians is used.
- Research managers are projected separately, depending on the number of research institutions and the size and number of departments per institute.

With these criteria in mind, the research managers indicated in 1987 that they would need 672 additional researchers (261 BSc, 283 Master's level, and 128 PhDs, see table 3) between 1988 and the year 2000 for both agricultural and livestock research.

This represents an average of 56 additional researchers per year with different educational qualifications and from different scientific disciplines for the seven zones and 34 institutes.

The major limitation in using an end-user method like this to get "wish lists" is the tendency to disregard budgetary constraints. The research managers tend to base their manpower needs on expected expansion and through fear that their annual personnel allotments might be cut by the ministry of finance. However, using the "wish lists," the research

**Table 3. 7** Expectations of Demand for Highly Trained Manpower, by Specialization for the year 1988 to 2000

Specialization	Bachelor's	Master's	PhD	Total	Percent of Total
Crops (General)	5	24	13	42	6.2
Crop Breeding	–	21	18	39	5.8
Crop Protection	29	106	20	155	23.1
Horticulture	1	3	2	6	0.9
Soil Science	1	7	3	11	1.6
Animal Science (General)	64	18	3	85	12.6
Animal Nutrition	–	–	–	–	–
Animal Breeding	–	3	2	5	0.7
Range and Pasture Mgt.	50	34	8	92	13.7
Hides and Skins	–	–	–	–	–
Veterinary Science/Med.	68	44	7	119	17.7
Technical Specialities	2	6	7	15	2.2
Agricultural Engineering	10	5	1	16	2.4
Agricultural Economics	7	4	2	13	1.9
Irrigation	–	–	–	–	–
Home Economics and Food Sci.	–	–	–	–	–
Extension	1	2	–	3	0.4
Agricultural Education	–	–	–	–	–
Research	–	3	4	7	1.0
Accounting	10	–	–	19	2.8
Admin. and General Mgt.	–	3	–	3	0.4
Other	4	2	38	44	6.5
Total	261	283	128	672	99.9
Percent of Total	38.8	42.1	19.0		

system may end up having too many researchers, with the result that physical resources and operating funds will be inadequate. Researchers will have trouble conducting the research they were hired to do, and they will become frustrated and demoralized. Besides, the potential supply of highly trained personnel from our local universities, particularly at the Master's and PhD level, is uncertain.

A more serious effort in establishing staffing requirements for research in Tanzania will be made after priority setting and programming have been completed.

## Conclusions

This paper has focused on staffing in the Tanzanian NARS and on the approaches that have been used to determine staffing requirements for research, along with the limitations of these approaches. Since a master plan for research is currently being drawn up, no attempt was made here to come up with concrete manpower requirements. The requirements indicated in this paper were based on a survey done in 1987 using the end-user method; the matching of demand and supply is still a problem.

## Notes

1. J. J. Mende is a senior agricultural training officer and head of the Sectoral Manpower Planning Unit within the Commission of Research and Training, MALD, Dar es Salaam, Tanzania.
2. The Ministry of Agriculture and the Ministry of Livestock Development were formed in 1980 and merged again in 1984 to form the current Ministry of Agriculture and Livestock Development (MALD).
3. The ministry has started to implement most of these recommendations.
4. The compulsory retirement age in Tanzania is 55.

## Bibliography

- MALD. 1982. Tanzania National Agricultural and Livestock Policy Report. Government Printer, Dar es Salaam, Tanzania.
- Mende, J. J. and A. M. Mianga. 1988. Agricultural and Livestock Manpower Requirements for Research and Extension, Tanzania. Paper presented at the SACCAR Workshop on Manpower Planning and Development, Maseru-Lesotho 22-24 August.
- Rugumyambeto, J. A. and L. A. Msambichaka. 1987. A study of High Level Agricultural Manpower and Technical Assistance. Draft Report. (Limited circulation).
- Shao, F. M. 1988. Organizational and Planning Aspects of Crop and Livestock Research in Tanzania. Paper presented at the workshop on Development of a Master Plan for the NARS. AICC Arusha, 25-30 April.
- Tanzania Country Report. 1982. The UNDP/FAO Study on National Agricultural Research.
- World Bank. 1987. Tanzania National Agricultural and Livestock Research Project Preparation Report.

## APPENDIX 1 Proposed Zones

<b>Zone</b>	<b>Zonal Center</b>	<b>Research Stations</b>	<b>Training Institute</b>	<b>Coverage</b>
Lake	Ukiriguru	Malya LPRC, Maruku, Lubaga Mwamala, Mwanhala, Bwanga Kituntu, Mabuki	MATI Ukiriguru MATI Nyegezi MATI Maruku	Mwanza Shinyanga Mara, Kagera
Southern Highlands	Uyole	Mitalula, Mbimba, Ismani Kifyulilo, Igeri, Ndengo Suluti, Nkundi	MATI Uyole	Mbeya, Ruvuma Iringa, Rukwa
Northern	Salien	West Kilimanjaro, Lyamungu Miwaleni, Hanang	LITI tengeru	Kilimanjaro Arusha
Southern	Naliendele	Mtopwa, Nachingwea	MATI Naliendele	Mtwara, Idindi
Central	Mpwapwa	Hombolo, Kongwa, PRC	LITI Mpwapwa	Dodoma, Singida
Eastern	Ilonga	Mlingano, LPC Tanga, Katrin Kibaha, Marikitanda, Chambezi, Mpiji, Muheza, Horticulture	MATI Ilonga MATI Mlingano LITI Morogoro LITI Buhuri	Morogoro, Pwani, Tanga, Dar es Salaam
Western	Tumbi	Mtanil. (Chunya) Seateri Male (Iringa)	MATI Tumbi MATI Mubondo	Kigoma, Tabora

## APPENDIX 2

### Proposed Organization of the Research and Training Department, MALD

