

Report to the  
Government of Namibia.

ISNAR R56

# **Review of the Agricultural Research System of Namibia**

## *Report and Annexes*

Joint review by a team from the  
Ministry of Agriculture, Water, and Rural Development  
(Division: Agricultural Investigation)  
and the  
International Service for National Agricultural Research

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International Service for National Agricultural Research

AGROVOC Descriptors:

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CABI Descriptors:

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## List of Acronyms

ADB	African Development Bank
ADC	Agricultural Development Center
AgGDP	agricultural gross domestic product
AGRISSON	Agricultural Scientific Society of Namibia
CIAT	Centro Internacional de Agricultura Tropical
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo
DAI	Division: Agricultural Investigation
DANIDA	Danish International Development Agency
DARD	Department of Agriculture and Rural Development
DPPC	Directorate of Planning, Pricing, Marketing and Cooperatives
DRSA	Division: Research and Stock Assessment
EC	European Community
FAO	Food and Agricultural Organization of the United Nations
FINNIDA	Finnish International Development Agency
FNDC	First National Development Corporation
GDP	gross domestic product
GTZ	Gesellschaft für Technische Zusammenarbeit
IARC	international agricultural research center
IBYAN	International Bean Yield and Adaption Nurseries
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFAD	International Fund for Agricultural Development
IITA	International Institute for Tropical Agriculture
ILO	International Labor Organization
INSAH	Institut du Sahel
ISNAR	International Service for National Agricultural Research
MAWRD	Ministry of Agriculture, Water, and Rural Development
MEC	Ministry of Education and Culture
MFMR	Ministry of Fisheries and Marine Resources
MRC	Multidisciplinary Research Center
MWCT	Ministry of Wildlife, Conservation, and Tourism
NARC	National Agricultural Research Council or Committee
NARS	national agricultural research system(s)
NEPRU	Namibian Economic Policy Research Unit
NGO	nongovernmental organization
NISER	Namibian Institute for Social and Economic Research
NORAD	Royal Norwegian Ministry of Development Cooperation
ODA	Overseas Development Administration—U.K.
OECD	Organization for Economic Cooperation and Development
OFRC	on-farm research committee

PPMC	Planning, Pricing, Marketing and Cooperatives
RARPC	Regional Agricultural Research Program Committee
REF	research, extension, and farmers
RSA	Republic of South Africa
S&T	science and technology
SACCAR	Southern African Center for Cooperation in Agricultural Research
SADC	Southern African Development Community (formerly SADCC)
SADCC	South African Development Coordination Conference (currently called SADC)
SADPNN	Sustainable Agricultural Development Program for Northern Namibia
SAREC	Swedish Agency for Research Cooperation with Developing Countries
SARDEP	Sustainable Animal and Range Development Program
SIDA	Swedish International Development Authority
TNDP	Transitional National Development Plan
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development

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## Summary

Agriculture plays a large part in the economy of Namibia, second only to mining in contributions to exports and gross domestic product, and is by far the greatest source of employment for the majority of the population.

In the drive to increase the rate of development of the country, there is an urgent need to increase the productivity of agriculture, not only to increase exports and reduce imports, but also to improve the livelihood of the many people dependent on agriculture.

For crops, livestock, and forestry this is intrinsically difficult; the climate and soils are relatively inhospitable and substantial improvements in production technology are necessary to make the best use of these renewable resources. It is the role of research not only to point the way to increased productivity that will be worthwhile to producers and consumers in prevailing market conditions, but also to ensure that the basic renewable resources are at least maintained and preferably improved. This applies equally to marine fisheries research, though the national resource base for fisheries is relatively much better than for crops.

In the past, agricultural research policy has been to promote more efficient and increased production, mainly in the commercial sector. However, agricultural development policy has now changed to give more emphasis to the improvement of the well-being of the majority of the country's population. This implies a change in emphasis in national agricultural research policy and planning with respect to both commercial and communal farming.

Currently, in the public services concerned with renewable bio-resources, there are about equal numbers of research officers (20) allocated to each of crops and livestock research (Division: Agricultural Investigation, Ministry of Agriculture, Water and Rural Development (MAWRD)), fisheries research (Division: Research and Stock Assessment Ministry of Fisheries and Marine Resources (MFMR)); and wildlife research (Research Division, Ministry of Wildlife, Conservation and Tourism (MWCT)); while forestry (Directorate of Forestry, MAWRD) has only three researcher grade officers. A further 10 or so research officers in the Namibian Economic Policy Research Unit (NEPRU) and the Namibian Institute for Social and Economic Research (NISER) have been involved from time to time in research projects on economic and social science aspects of problems in agriculture and wildlife.

Officers in other directorates in MAWRD are also involved in aspects of research concerning agricultural production but the time they assigned for research in 1991 was small in relation to that of the Division: Agricultural Investigation (DAI). The University of Namibia, established in August 1992, hopes to become involved in agricultural research in the future, but is currently not so engaged. In the private sector, the five economists and sociologists at the First National Development Corporation (FNDC) have also done

research work intermittently on aspects of commercial agricultural enterprises, but not in 1991. The main contribution from FNDC in 1991 was the part-time research work of one Assistant Manager at the Musese farm in Kavango. The Rössing Foundation, which carried out some research in the past, decided in 1992 to discontinue its agricultural research activities.

This report focuses mainly on the work of the DAI which serves a large number of client farmers, and is the most affected by the changes in agricultural development policy towards increased emphasis on production and communal farmers. DAI was reviewed against a general framework, comprising formulation of agricultural research policies and plans; the management of the research program; and the management of the resources to carry out the program. In contrast with the situation in many African countries, DAI has many of the desirable features of an effective research organization. The research staff are reasonably well qualified with half holding master's degrees; and there is a large number (50) of research technicians, many of whom are very well qualified for supporting field and laboratory research. Salary scales are reasonably competitive with others of equivalent qualifications, and the scheme of service includes a good and appropriate system of merit assessment. Physical facilities for research are good and financial resources for research are reasonable, with no serious cash flow problems reported. However, the system does have its problems, some derived from the past.

DAI is relatively young. It was formed from the merging of sections concerned with research and demonstration from the Central Authority and 10 Representative Authorities. The Department of Agricultural and Rural Development inherited 29 research stations and demonstration farms, and a wide variety of responsibilities. The farms were distributed among divisions, and by 1992, 19 research stations and farms were under the jurisdiction of DAI. The research station facilities available for research are thus extensive, but grossly out of balance with the 21 research officers available to conduct research; there is a need for a drastic readjustment. This mismatch expresses itself in several different ways, and has a profound effect on research efficiency and effectiveness.

### *Resources for research*

Questionnaires returned by individual research officers showed that in 1991 they spent a substantial amount of their time on administration (26%), production (10%), and teaching and extension (18%). These activities detract from the time spent on research (38%). The research staff estimate is that only 7.2 person years were spent on research by 19 research staff in 1991. This is in part due to the proliferation of research stations and the nonresearch activity on some of the farms.

The total funding appropriated for research activities (not including salaries for full-time staff) for 1991-92 was R 4.181 million, equivalent to R 209,000 per researcher, or about US \$77,000 per researcher. This is a remarkably high figure, more than twice as high as would normally be considered an efficient rate of funding for research operations. This again reflects the high number of research stations and farms, some of which are maintained without much chance of research output because it is not possible to give enough researcher input. Several of the farms are providing valuable services to the farming community, but they are not research services, and therefore should not be charged to the research budget.

The estimated net allocation to DAI for 1990-91 was R 5.65 million (allocation less estimated funds for sales of produce and services returned to the Treasury). This is about 1.1% of AgGDP (agriculture's contribution to GDP), which is about the average for

southern African countries, but low for a small country, (and well below the levels recommended by the World Bank). Moreover, the figure is misleading as a lot of the funding is being used on development activities and not on research. The real support for research is much lower than it appears to be from the budget.

If the total expenditure level for DAI was maintained, but applied to legitimate research activities, more research personnel could be employed and focused on high-priority research areas. Farms surplus to research's operational capacity should be disposed of to other divisions or sold to the private sector.

### *Research program*

Almost all of the research program of DAI has in the past been focused on livestock and pasture research in large commercial ranches. A large part of the current program is still involved with livestock; a total of about five person-years out of 7.2 researcher years and by far the greater proportion of research technicians' time. There are several large-scale and long-term trials with livestock, seeking important answers to planning problems for the future both in commercial and communal farming systems. But there are also extensive service activities such as the maintenance of studs, bull and ram testing, etc. The pasture and range management research, which has provided essential information on safe stocking rates, is all confined to commercial ranching. This research activity is supported by the herbarium and research laboratories dealing with meat, plant, and soil analysis.

Some exploratory research trials on crops suitable for irrigation have been carried out, but work on rain-fed crops other than maize is relatively recent. Significant steps have been taken in the past year to improve facilities for research on the production of millet, the main cereal in the northern areas, but only 0.7 researcher years is currently available in DAI, backed by three research technicians who have received special training from SADC/ICRISAT. (One FNDC assistant manager contributes a further 0.6 person-years of research time on millet). Small amounts of researcher time were devoted to a range of other rain-fed crops such as groundnut, cowpea, pigeon pea, sunflower, etc. Plans for forestry research have been prepared, but currently little research work has been done because of a shortage of research staff: only 0.3 researcher years was available in 1991.

### *Research planning and programming*

Research planning and programming depend critically on national agricultural research policy. Before independence the policy was clear—to improve the efficiency of exports and production in the commercial sector of agriculture, together with the improvement of the natural resource base. With the current, increased emphasis on the majority of farmers in communal areas, the research policy is no longer so clear. There are indications for research to help maintain and improve efficiency in exports; to give guidance on conversion of communal farms to commercial farms; and to advise the extension services on how the large numbers of communal farmers can increase their productivity under existing production systems. These directions require quite different research activities, but the balance of effort among them is not yet indicated. Policy decisions are required urgently to facilitate long-term research planning and staff recruitment and training in the required disciplines.

In program formulation, detailed research program proposals arise mainly from research sections, and are reviewed by an ad-hoc Program Committee composed of senior officers of the Research and Extension Divisions. The research officers are in very good

contact with commercial farmers. They are well informed about commercial farmers' problems and understand the commercial farming system. In addition, they have been in good contact with research workers in the Republic of South Africa (RSA) operating in similar systems. Under past research policy, the programming procedure had a reasonable chance of being relevant to producer and national needs. However, for communal farming activities, contact with farmers, by both researchers and extension, is poor, the farming systems are complex and multi-valued, and there is little or no relevant research experience in RSA to draw on.

### *Highlights of recommendations*

A more intensive and systematic research program formulation process needs to be built up. The research planning process should begin on a national scale with a National Agricultural Research Council (or Committee, or Board) established to give leads on broad research requirements to all concerned research groups, and to highlight national research resource needs to the Government and donors. The Program Committee in DAI should also set out more detailed research plan guidelines for researchers **before** research proposals are developed for review.

It is evident that to facilitate focused research for the benefit of communal farmers, there is an urgent need for research by social and technical scientists to understand and clarify the researchable constraints and opportunities to improve productivity and well-being of farmers in communal systems. Conclusions from such studies will be vital both to agricultural researchers and extension staff in formulating future action plans. Whether the necessary research input from social scientists comes from new recruits within DAI or is contracted from other MAWRD directorates or from agencies outside MAWRD will need an early decision. The reviewing team recommends that socioeconomic scientists be recruited into DAI not only as an integral part of the research group, but also as a strong link to other agencies.

The future disciplinary balance of research staff in DAI will almost certainly require a larger proportion of crops and environmental research scientists, and social scientists. A multidisciplinary team will need a research center in the mixed livestock-crop farming areas in the north. After inspecting a number of possible sites, the team strongly recommends Ogongo as the most suitable place for a nucleus of at least nine research staff. Among several comparative advantages would be the opportunity of interacting mutually beneficially with the staff of the Ogongo College who require similar qualifications. It is also conveniently close to the Extension Service headquarters in Owambo; it is clear that a closely concerted and collaborative effort from research, training, and extension is called for if any early impact through improved technology is going to be made.

If it is decided to establish such a multidisciplinary team, an urgent and vigorous recruiting training program will be required, as trained Namibian crops research staff is scarce. It may be necessary to engage expatriate staff on a temporary basis to cover the initial training period.

DAI should maintain and expand its valuable contacts with regional and international agricultural research institutions, and should develop more established linkages with other scientific and research institutions in the country, especially NISER and NEPRU, and work closely with the emergent University of Namibia, where the planned Faculty of Agriculture and Natural Resources could be important partner in the future.

The main recommendation is that a long-term strategic plan for national agricultural research be developed; this will require initial policy decisions as a basis for planning. It is recommended that the Government reaffirm its support for agricultural research contributions to speeding development by maintaining funding to DAI at, at least, 2% of AgGDP while focusing DAI's activities sharply on high-priority research. A National Agricultural Research Council should be appointed to provide primary guidance on allocations to research towards major national objectives, and to review accountable performance. A complementary Program Committee in MAWRD should determine the main, long-term program objectives within those national guidelines and in line with the MAWRD's component development plans.

These are the essential starting points for developing long-term research staff recruitment and development plans, and financial and physical plans to facilitate the necessary research activities.

Other recommendations concern management issues within MAWRD and include the following:

- \* MAWRD and DAI improve research program planning and reviewing procedures by setting up appropriate decision-making bodies using clear priority-setting criteria and procedures;
- \* MAWRD and DAI redress the serious imbalance of resources in DAI by reducing the number of research stations and farms to manageable proportions for the researchers available;
- \* a multidisciplinary research center with a target of at least nine research staff be established at Ogongo to work with extension services on the improvement of the communal mixed farming system in the northern areas. The DAI team should include social and economic scientists;
- \* stronger linkages be established with extension services and other national and international research agencies.

# Part 1 Report

# Chapter 1

## Introduction

When Namibia became independent there was a change not only in government and in national development and welfare objectives, but also in the structure of public administration. The former two-tier system of authorities was transformed into a central government. Responsibilities for agricultural and many other services were consolidated into new ministries and new objectives for the services were formulated.

After the first two years of this new organization, the Ministry of Agriculture, Water and Rural Development (MAWRD) considered it appropriate to review the agricultural research system. The objective was to restructure and strengthen it, to target its services more directly at national development objectives.

The International Service for National Agricultural Research (ISNAR) has worked extensively with the Southern African Center for Cooperation for Agricultural Research (SACCAR) of the Southern African Development Community (SADC) (formerly SADCC) to strengthen the management of the national agricultural research systems (NARS) in the SADC countries. Following a SACCAR/ISNAR workshop on agricultural research policy held in Windhoek, Namibia's MAWRD invited ISNAR to join a local team of agricultural research leaders to review the agricultural research system. The review was carried out with a view to the development of a national master plan to strengthen and target the system.

Broad terms of reference were agreed upon for the review, and the Overseas Development Administration (ODA) of the United Kingdom agreed to fund part of the operation. ODA's technical advisors had already identified the need for an improved agricultural research service in the country.

In July 1992 a plan of action for the team was developed by national team members and two ISNAR representatives. A questionnaire was prepared to be completed by individual researchers. Questions were included concerning personal details of qualifications, service, and time allocated to research in 1991. Another questionnaire was prepared for all institutes and units involved in agricultural and related natural resources research. Questions concerned research mandate, physical resources, and constraints.

Guidelines were drawn up for information gathering by the local team. Complete information was collected for individual researchers in the Division: Agricultural Investigation (DAI), those considered to be involved in agricultural research in other directorates in MAWRD, and for some units and nongovernmental organizations (NGOs). Only a broad outline was available for fisheries and wildlife research, however.

From September 28 to October 19, 1992 a three-person ISNAR team took part in the final stages of the review and analysis of the information. The team was completed on October 4 with the addition of Mr. C.M. Matanyaire from SADC/ICRISAT. After an initial briefing by Dr. Mbuende, Deputy Minister, and Dr. Shivute, Deputy Permanent Secretary, team members made visits to several research stations and colleges in the central and northern parts of the country.

Documents were made available and discussions and interviews were held with a wide range of senior scientists, officials, and administrators. These concerned agricultural and natural resources research in the directorates of MAWRD, the research divisions of the Ministry of Fisheries and Marine Resources (MFMR) and the Ministry of Wildlife Conservation and Tourism (MWCT), the University of Namibia, the Namibian Economic Policy Research Unit (NEPRU), the Namibian Institute for Socioeconomic Research (NISER), the First National Development Corporation (FNDC), the Rössing Foundation, and donor agencies including UNDP, EC, FAO, ODA, USAID, and GTZ (see annex 1 for terms of reference, and names of team members).

A final session was held with the Deputy Minister, the Permanent Secretary, the Deputy Permanent Secretary, and Heads of Directorates and Divisions in MAWRD to give a preliminary review of findings and to discuss the main issues arising. The ISNAR team then prepared a first draft of the report at ISNAR headquarters which was sent to members of the local team for comments and revision. The ISNAR team leader returned to Namibia to complete the final version of the report with the local team co-leader. The report was then presented to the Permanent Secretary of MAWRD.

Following this introduction of the report, there is a chapter on the role of agriculture and agricultural research as it relates to national development and welfare objectives (chapter 2). Chapter 3, the main descriptive chapter on the national agricultural research system, is followed by separate chapters on the management of resources for research and the management of the research programs. A discussion of some of the main issues arising is followed by a final section with conclusions and recommendations.

## **Chapter 2**

# **Agriculture and Agricultural Research**

### **Agriculture**

Agriculture looms large in the life of Namibia's people. It contributes 10% of the country's gross domestic product (GDP), second only to mining in terms of value. Mining has grown over the years and now makes the largest contribution to GDP (21% in 1991). While other industries based on renewable natural resources—fisheries and tourism, for example—also play an important economic role, agriculture still far surpasses these newer industries in providing employment and livelihood for the population.

Namibia's agricultural sector consists of two distinct subsectors: the commercial sector and the communal sector. The commercial sector is well-developed and capital intensive, consisting of about 4,200 farmers using some 44% of the arable land (36 million ha). Ninety percent of the sector's output comes from livestock. Cattle numbered 2.3 million head in 1992 and there were about five million sheep and goats. Livestock contributes some of Namibia's main exports. Beef is exported to both the Republic of South Africa (RSA) and the European Community (EC) (Lomé IV). Karakul pelts are exported all over the world. Large-scale crop production is less important in the commercial subsector and only takes place in the north where small areas are marginally suitable for dryland cultivation. The principal crop grown is maize. Wheat and sunflowers are grown on a smaller scale.

The communal subsector is characterized by subsistence production. Traditional labor-intensive farming practices are used with little external input. Further, this subsector's farmers have very limited access to agricultural finance, markets, and services. About 120,000 farmers make up the communal subsector, farming 42% of the arable land (33 million ha). Agricultural production is centered around cattle and sheep production and the cultivation of subsistence crops in some northern areas where there is adequate rainfall. The major grain crop is millet, which is supplemented with some maize and legumes. Among the major production constraints are overgrazing, lack of property rights, and limited access to information on markets and improved farming practices. Nevertheless, communal agricultural production increased three percent in 1990 as a result of good rains and stability within the country. Agricultural production in the commercial sector, however, declined three percent that year, mainly due to reduced cattle exports to RSA.

The single major constraint to agricultural growth in the communal subsector is the low and erratic rainfall which limits most of the country to livestock production. Despite this constraint, agriculture is almost equal to the government in providing formal employment and is, overwhelmingly, the major source of support for about 70% of the population.

### *Agriculture and rural development priorities*

In the General Policy Statement of Namibia's government, agriculture and rural development is one of the four priority sectors identified to help achieve national welfare objectives. Welfare policies are aimed at

- (a) ensuring that every citizen has access to public facilities and services;
- (b) raising and maintaining the level of nutrition, public health, and the standard of living of the Namibian people;
- (c) ensuring equality of opportunity for women; and
- (d) protecting and maintaining the ecosystems and living natural resources.

To improve agricultural development a number of policies could be pursued aimed at increasing export earnings from agricultural products, reducing imports of food, and satisfying domestic demand. By ensuring appropriate agricultural services for all of the Namibia's farmers, the government can pursue the social objective of increasing the well-being of communal farmers and reducing the large gap between communal and commercial sectors of agricultural production.

The preliminary draft statement of MAWRD on agriculture, forestry, and rural development for the draft Transitional National Development Plan (TNDP) recognizes that this gap is wide. It stresses the severely skewed distribution and development of land between commercial and communal subsectors, and the dominance of livestock production over crop production. In the past, research and other services have concentrated heavily on the commercial livestock sector. It is now recognized that more emphasis must be placed on increasing food and livestock production in the communal areas. This is particularly so in the north, where cultivation of dryland food crops is possible (though restricted to short season, drought tolerant crops). To this end, a major effort will have to be made to provide better farmer education and technical services in the communal areas. This would, first, help farmers to increase productivity under existing production regimes and, second, give them confidence to invest in new, more profitable crops.

At the same time, increased production and productivity within the commercial sector should be pursued, as this subsector has the potential to expand agricultural exports and provide for increasing domestic consumption. The subsector's output might be increased by opening up underutilized communal farming areas for commercial production. Where possible, diversification into new crops will be encouraged.

These basic steps to improve primary productivity clearly must be supported and, indeed, guided by the development of infrastructural services. Market intelligence, and physical and socioeconomic surveys form a basis for sound policy making. MAWRD's draft statement sets out a general strategy for pursuing several developmental objectives. It does not, at this stage, quantify the relative balance of resources required within operational units.

Several donor agencies are working with MAWRD and the National Planning Commission on studies of specific development requirements. The International Fund for Agricultural Development (IFAD), for example, is supporting a survey of development prospects in the northern communal areas. The African Development Bank (ADB) is supporting a comprehensive survey of natural and socioeconomic resources in the northern

areas. Within this range of development-oriented activities, the research sections in DAI and the Directorate of Forestry are mainly concerned with improving primary productivity aspects of livestock, crops, and trees. (Similarly, the research divisions in fisheries and wildlife are concerned with the assessment of primary productivity.)

## **The Role of Research**

A variety of constraints must be overcome before Namibia can realize its full production and productivity potential. MAWRD is already working to alleviate constraints in the policy environment and provide the necessary services and infrastructure. However, increases in agricultural production will also depend on the development and diffusion of improved agricultural technologies appropriate for the socioeconomic conditions of the farmers.

An essential role of agricultural research is to contribute to achieving national development objectives by providing information on how to overcome production constraints while preserving natural resources. The research service should gather that information as rapidly and cheaply as possible, applying sound scientific principles and methodologies to reach valid and valuable conclusions on development possibilities. It is an important task of research to give encouragement or caution to government planners as indicated by the evidence. The efficiency and effectiveness of the national research system must therefore be ensured.

The national research service must be able to provide reliable information to its main clients: producers, processors, consumers, government planners, extension and development agencies, and national and international research colleagues. The relative importance of each should be decided at the policy level, depending on the balance of clients to be served according to national development and welfare objectives. However, any recommendation of improved practice made by research must be ultimately aimed at improving the well-being of the producer. It is otherwise unlikely to be adopted or lead to an increase in productivity or production, no matter how valid the scientific conclusions might be.

### *Scope and size of the agricultural research service*

Expectations from agricultural research should be considered in relation to the size and scope of the organizations established to carry out the set tasks. Agricultural research has had some notable successes in the past, particularly with regard to Karakul sheep, cattle, and pasture management in the commercially farmed areas. This farming system and the values of its operators are reasonably well understood.

However, the government's current development objectives call for expansion of the scope of the research service to cover at least two further farming systems: the communal farming system with its subsistence and small-market objectives and the newly formed crop and livestock commercial farms in communal areas with their large-market commercial objectives. For the research service to contribute significantly to achieving these new objectives, there will have to be a substantial reorganization of the work of existing research staff, an increase in the size of the research system, or both.

### *“Kinds” of research and national needs*

All production systems have many aspects that are worthy of research. However, only a few can be worked on each year because of limited research personnel and size of the research organization. Resource limitations influence the “kind” of research that can be undertaken. Figure 1 shows one classification of kinds of research suitable for crops and livestock. All national agricultural research systems must consider the whole spectrum of kinds of research and decide which is most urgent with the resources available.

The irreducible minimal effort of any NARS is testing and demonstration research to ensure that a new production technology is profitable (or otherwise beneficial) to the producer. This requires a yearly minimum of about 0.3 researcher-year per commodity, plus support staff time. If the technology proves not profitable enough, then some component of it may need to be modified by introducing an alternative available component (this is adaptive research which involves a yearly minimum of about 0.5 researcher-year per commodity). If no alternative is available and profitable enough, a new component of the technology may have to be generated using existing research techniques and knowledge (this is applied research which often requires contributions from several disciplines and perhaps a yearly minimum of two researcher-years). Beyond that, long-term applied or strategic research may be necessary. The time required for strategic research is very variable and, in many cases, it needs to be followed up with further work at the adaptive and testing levels.

Reviews of Namibia’s agricultural research system done prior to independence recommended that the country concentrate on testing and adaptive research and borrow results of applied and basic research done elsewhere. The Sustainable Agricultural Development Program for Northern Namibia (SADPNN) project proposal endorsed this focus on adaptive research. It suggested that Namibia, as far as possible, borrow promising technology available in the SADC region and elsewhere. However, it did strongly recommend one element of applied research, a breeding program on millet to exploit the indigenous lines of millet that are adapted to some of the adverse local conditions. The proposal also recommended that essential socioeconomic and physical survey work be done. This is strictly basic research. It is aimed at generating new knowledge that can be used constructively as a guide to other applied research needs.

In most countries, different groups are responsible for certain kinds of research. Figure 1 shows a tentative breakdown. In Namibia, as extension services are developed in the communal areas, they should be drawn in to help carry out some adaptive and testing research, especially on crops. The University of Namibia has only recently been inaugurated and its research agenda is not yet clear. However, its proposed Multidisciplinary Research Center might be well placed to offer research support at the applied and strategic levels rather than at the more site-specific adaptive or testing levels. Nongovernmental organizations (NGOs) are more likely to be involved at the adaptive and testing levels. However, the First National Development Corporation (FNDC) may have to consider some applied research to help it in its work to establish viable commercial farms in the northern communal areas.

The current structure, organization, and research staff resources are discussed in chapter 3 as a basis for considering how research can best proceed to serve the new national development objectives.

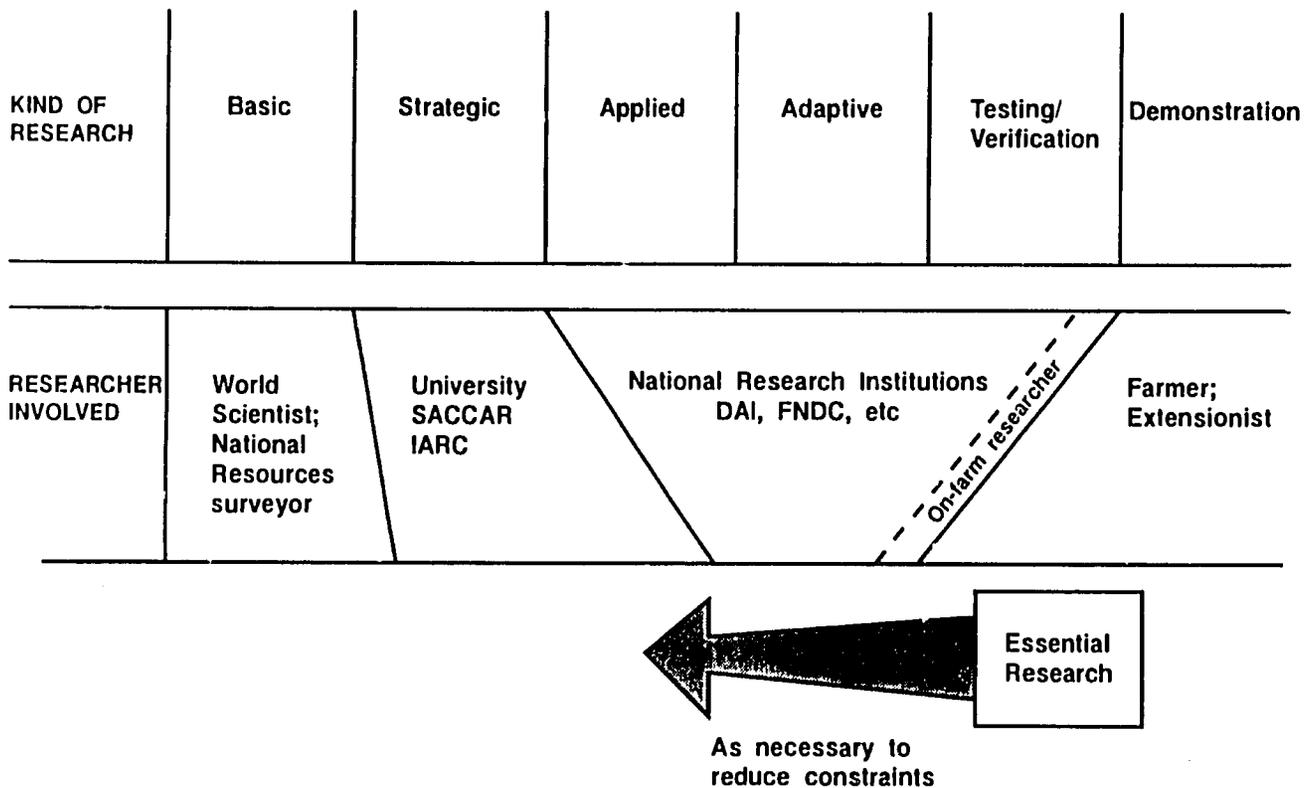
Inevitably, research resources likely to be made available will fall short of desirable requirements. A careful system of priority setting for research programs and researchers’ time will be essential. This is discussed under “program formulation” in chapter 5.

# Policy for Science and Technology

Agricultural research applies science and technology in the service of agricultural development. National agricultural research policy is thus always a blend of national agricultural development policy and national science and technology policy. Indeed, in about half the countries in Africa, the national agricultural research system falls under the ministry responsible for science and technology, rather than the ministry responsible for agriculture. They are alternative homes as the two strands are interwoven in national agricultural research policy.

Each has a legitimate claim to responsibility: the ministry of agriculture for the content and relevance of the research program and the ministry of science for the quality and validity of the program, the quality of researchers and research facilities, and the competence and efficiency of the service. National policy on science and technology is therefore of considerable importance to the national agricultural research service.

Figure 1. Spectrum of kinds of research in a national agricultural research system. Indication of kinds of researchers likely to be involved in Namibia.



A review of the national organization and management of science and technology in Namibia<sup>1</sup> was carried out recently by a team from SADC, which included Prof. K.E. Mshigeni from the University of Namibia. It showed that historically Namibia followed South Africa's model of a council for scientific and industrial research. The council's main role was to "coordinate all scientific research" and provide funding for research projects it deemed of high priority.

This sense of setting priorities and funding projects was carried over in 1981 to the Namibian Committee on Research Priorities. However, the body was not very effective. Currently its functions are carried out by the National Planning Commission. A commission established by the president has now recommended that a body be established to coordinate all aspects of science and technology research and to oversee the implementation of science and technology policy. Namibia currently does not have such an umbrella body, nor an explicit policy statement on science and technology.

The report cited above records that in the absence of a central coordinating body, the ministries are responsible for coordinating the programs of the research institutions falling under them (and provides a list of some 10 institutions falling under four ministries in Namibia). It notes that some permanent secretaries considered that the evolution of a national science and technology policy could be based mainly on sectoral development policies. Meanwhile, there are no explicit sectoral policies for science and technology.<sup>2</sup>

From the national agricultural research system's point of view, there would be merit in having an interministerial body to coordinate research on agriculture at least (see the later proposal for a National Agricultural Research Council or Committee (NARC)). This would be a committee of an all-embracing National Council for Science and Technology, if such a body was established, or even a subgroup of a broader Natural Resources Research Committee (NRRC). NRRC would coordinate research in land, water, agriculture, forestry, fisheries, and wildlife.

The importance of science and technology policy for agricultural research would in no way be diminished by NARC being a subcommittee; it would still be the point at which agricultural development policies and objectives blend with science and technology policies. A science and technology policy statement could provide critical guidance on scientific standards and values. Such guidance is particularly important for developing research activities and researchers' performance guidelines (which often do not gain prominence in development-oriented ministries). The national expectations or objectives, as expressed in a formal science and technology policy, are an intrinsic part of the priority setting and program formulation process in a national agricultural research system (chapter 5).

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<sup>1</sup> Namibia country paper in "Organization and Management of Science & Technology".

<sup>2</sup> In conclusion, the team reviewing S&T organizations in SADC countries suggested all countries should have an explicit S&T policy and a central body with functions to support and implement the policy. It cites the Tanzanian example and gives the functions of the Tanzanian Commission for Science and Technology. The commission has considerable powers to coordinate research, to allocate funds for research, and to monitor research and development programs in any national research institution.

## **Chapter 3**

### **The Agricultural Research System**

The term “agricultural research” is often widely interpreted to mean research on the management of all renewable natural resources, including crops, livestock, wildlife, forestry, fisheries, soil, and water. In Namibia, components of research on natural resources management are spread through three ministries and a number of parastatal and nongovernment organizations. In most cases, these components operate individually rather than as part of a national research system. Because at the time of this review neither the fisheries nor the wildlife research groups considered themselves part of the national agricultural research system, this report focuses on agricultural research in MAWRD. In particular, research conducted by DAI is explored. A comparative framework of the national research effort on natural resource management is compiled based on information provided by other research groups.

#### **Structure and Organization**

At present the major responsibility for agricultural research rests with DAI. There are, however, several other institutions and agencies also involved partially in agricultural research as follows.

\* Ministry of Fisheries and Marine Resources (MFMR):  
Division: Research and Stock Assessment

\* MAWRD:  
Permanent Secretary  
Directorate of Planning, Marketing, Pricing and Cooperatives  
Deputy Permanent Secretary  
Directorate of Agriculture  
Division: Agricultural Investigation  
Division: Extension  
Directorate of Agricultural Training  
Directorate of Veterinary Services  
Directorate of Forestry

\* Ministry of Education and Culture (MEC):  
The University of Namibia  
Namibian Institute of Social and Economic Research  
(Future Multidisciplinary Research Center)

- \* Ministry of Wildlife, Conservation, and Tourism (MWCT):  
Research Division
- \* National Planning Commission
- \* Namibian Economic Policy Research Unit (NEPRU)
- \* First National Development Corporation (FNDC)
- \* Rössing Foundation
- \* (Farmers)

No formal organization or mechanism draws these groups together into a coordinated national research effort; even the informal linkages are weak. Within MAWRD, however, there is currently a plan to combine research and training in a new directorate.

It has been suggested that better integration and improved efficiency of research would be achieved by establishing an autonomous agricultural research institute with parastatal status; and that such an organization might be best associated with the new university, where quality research methods and values are well understood and continually reinforced. Such autonomous or semi-autonomous agricultural research organizations are well known in other parts of Africa and elsewhere in the world. They are usually advocated when agricultural research has become moribund in a heavily bureaucratic ministry for agriculture where most weight is put on development activities. Often in such cases, research is starved for funds and recognition.

A more autonomous agricultural research institute might enjoy some of the following advantages:

- \* freedom from a heavy and inflexible bureaucratic load that takes no account of the urgency of research operations;
- \* better appreciation of the values and performance of research;
- \* more appropriate scheme of service for research scientists;
- \* collegial rather than hierarchical style of management;
- \* more realistic funding arrangements and clearer accountability of performance to national financial authorities;
- \* more attractive to external donor support;
- \* less disruptive short-term political interference in research work that is often long-term in nature;
- \* more opportunities for effective interministerial collaboration.

The main disadvantages are that national agricultural research can become too academic and

slip out of touch with the urgent need to contribute to national agricultural development. Moreover, essential linkages to extension and other service agencies can be weakened and direct accountability to the immediate clients in the ministry responsible for agriculture may be reduced. Finally, the ministry responsible for such an institute may have less weight than the ministry for agriculture in securing national funds for research.

Research now receives fair recognition within MAWRD. Financial support is good relative to the small size of the research force. Bureaucratic holdups are not common. Performance assessment is good for research scientists and conditions of service are reasonably competitive with equivalently qualified personnel (with some significant exceptions). Even if change were desirable at present, there is no other equivalent ministerial home for a semi-autonomous agricultural research institute. There is no Ministry for Science and Technology and the university is very young. The government has had a reasonable record in supporting long-term research programs. So far there has not been much chance to assess attractiveness to donors.

There does not appear to be a strong case for early change in the macro structure of agricultural research as far as DAI is concerned. There is, however, considerable room for micro-structural improvement. Especially in mechanisms for interagency collaboration and future planning and programming, with respect to the extension service, other directorates, and the organizations and agencies outside the ministry. These issues, more concerned with the management of the research program, are explored in chapter 5.

### *Human resources*

The total number of research officers working full time on agricultural and natural resources research in 1992 was about 62, distributed as follows:

MAWRD	Division: Agricultural Investigation	21
MFMR	Fisheries Stock Assessment and Research	21
MV/CT	Research Division, Wildlife and Conservation	20
		<hr style="width: 10%; margin-left: auto; margin-right: 0;"/> 62

There were also part-time contributions from the five directorates and divisions, and four institutes and agencies. However, these were difficult to quantify.

In the questionnaires, information was sought from individuals about time spent on agricultural research in 1991. In MAWRD, responses from the directorates showed that most of this research effort came from DAI (table 3.1). Most of the directorates and divisions responded that no agricultural research was being carried out by the staff, although this might have been too narrow an interpretation of "agricultural research". This might especially hold for the Directorate of Planning, Pricing, Marketing and Cooperatives (DPPMC), where marketing surveys in the northern communal areas and participation in the Drought Warning and Food Information Study are included in their activities.

In addition to DAI in the Directorate of Agriculture, only two directorates indicated that they carried out agricultural research. Both were relatively small in terms of researcher time. In the Directorate of Agricultural Training, five agricultural training officers reported that they participated in research activities on the experiment stations of the division's colleges. On average, however, this accounted for only 8% of their time—a total contribution of 0.40 person years in 1991. This may be an underestimate, as not all training officers at Neudamm responded. During the past two years most training officers were intensively

involved in the development of a new curriculum. As in the past, in the near future they will be more involved in research.

Table 3.1. Estimates of time spent on research by respondents in MAWRD

Ministry of Agriculture, Water and Rural Development (MAWRD)	Respondents	Person years
Directorate of Agriculture Division: Agricultural Investigation (DAI) Engineering Extension and Development	19	7.2 0 0
Directorate of Training	5	0.40
Directorate of Forestry	1	0.35
Directorate of Veterinary Services		0
Directorate of Rural Development		0
Directorate of Planning, Pricing, Marketing and Cooperatives		0

In 1991 in the Directorate of Forestry only one of the three foresters qualified for research was considered to be involved in research—to the extent of 0.35 person years. However, new recruits are expected to increase forestry research in the near future.

Outside of the ministries, the main contributors to agricultural research have been the social sciences research institutions, NEPRU and NISER, both of which carry out studies from time to time on agriculture-related issues (as well as other topics). In 1991-92, NEPRU had nine and NISER, 10 research staff. In 1991 they contributed a total of about 3.3 person years to agricultural research.

Among parastatals and NGOs, FNDC has done field trials in the northern communal areas to gain information to guide the development of commercial crop farming on government land in these areas. Currently, most of this effort is focused on the farm at Musese, in Kavango, where an assistant farm manager contributed 0.7 person years to research in 1991. In many ways, all the farm development carried out by FNDC can be considered a form of operational agricultural research, with large scale interventions by managers. The five economists and sociologists in FNDC analyze production economics and crop budgets to assess the effects of these interventions. However, they reported they had not done any agricultural research in 1991.

While in the past, the Rössing Foundation conducted research trials in northern communal areas, it has decided to discontinue agricultural research activities in 1992.

The University of Namibia was established formally on August 31, 1992, replacing the preceding Academy. It plans to have a Faculty of Agriculture and Natural Resources in due course, starting in 1994, and may begin to carry out research on agriculture-related topics in its Multidisciplinary Research Center (MRC), planned to be established in 1993. Meanwhile, the university is not active in agricultural research.

## **Fisheries Research**

Marine fisheries has been recognized as an important resource from Namibia's earliest days. In the 1920s the country's first fisheries research unit was established. The unit was transferred to South Africa in 1969, however, and it was not until 1978 that it was returned to Namibia. In 1982 a new fisheries research section was established. Rapid staff increases followed in 1988 with the recognition that jurisdiction over fishing up to a 200 mile limit would be assured with independence in 1990.

With jurisdiction came the need for more intensive monitoring and assessment of the immensely valuable marine fisheries resources. The staff was increased from six researchers to the current 21. The real value of fisheries increased almost fourfold during 1988-92, and this increase is forecasted to continue.

Fisheries research sections deal with demersal and pelagic fish, both freshwater and marine line fish, crustaceans, mammals, and sea plants. These commodity sections are supported by research sections on the physical environment and plankton supplies, and on intertidal flora and fauna. Large research vessels and up-to-date, sophisticated equipment are required for the important task of assessing deep water stocks. Accurate assessment information is essential for policy decisions pertaining to fishing operations and allocation of quotas for catches of different fish. There is also some work on fishing gear and freshwater fisheries.

### *Management, human resources, and facilities*

Two distinctive features in the management of fisheries research in Namibia are the Sea Fisheries Research Fund and the Advisory Council. While the Sea Fisheries Research Fund provides resources for marine fisheries research operations, the salaries of permanent staff and for freshwater fisheries research operations are funded through normal ministry channels. The sea fisheries fund is financed by a cess on all quota species landed. The rate varies by species. Overall it is about 0.5% the value of the landed fish. This provides the research service with a consistent and coherent source of funding.

The Advisory Council, chaired by the Permanent Secretary, provides policy guidance for the use of the fund. It reviews all research program proposals and scrutinizes the budget. A few ministry officials are included in its membership of about 15. The majority are representatives of the fishing industry. No research scientists are members, although they do attend meetings. The system helps researchers maintain close linkages with industry and ensures research's accountability to its main clients. It also facilitates a more flexible use of funds for the special needs of research than is usually possible in a development-oriented ministry.

The research staff is well qualified. Four researchers hold post-doctorate degrees, six hold master's degrees, and 11 hold bachelor's degrees (honors). Because of recent growth, the staff is relatively young and has benefitted from technical assistance from FAO/NORAD and Iceland and from medium- and short-term courses overseas. Flexibility provided by the research fund has facilitated training. According to current plans, the research staff is to be increased by four in 1993. Further increases are anticipated as the potential increases in export earnings from fisheries are realized.

In the past, the main fisheries research facilities were situated at Luderitz and Walvis Bay. The latter buildings were lost at independence. The main research groups are now

accommodated in an old hospital in Swakopmund while extensive new facilities are being completed. Freshwater fisheries research has facilities at Hardap reservoir.

## **Wildlife Research**

Namibia provides habitats for many distinctive species of wildlife, as reflected in the increasing significance of tourism to the national economy (about 8% of GDP in 1990). The conservation of wildlife and the national environment is therefore of special importance. This was recognized with the establishment of a separate Ministry of Wildlife, Conservation and Tourism (MWCT) in 1990. Previously wildlife research was located within the former Ministry of Agriculture and Nature Conservation. The main objective of the current wildlife research program is to gain sufficient information and understanding on the behavior of the wildlife population so that it can be successfully and safely maintained, whether in national parks or game farms.

In 1992 the research division of MWCT had 20 well-qualified research staff: eight PhD, seven MSc, and five BSc. Most staff had backgrounds in animal biology or behavior. They were based at Windhoek, Etosha Ecological Research Institute, and the Desert Ecological Research Unit, as well as regionally in game parks.

There are currently four broad research sections: animal behavior and game park management, game on farms and game capture unit, problem animals, and legislation concerning wildlife. More than half of the research staff are concerned with animal survey, biology, and behavior including specific studies on particular birds and animals such as elephant, lion, and giraffe; diseases; and the maintenance of balanced wildlife populations in game parks. The game capture unit plays a general role in studies and in the redistribution of animals, including to private game farms. Some animals cause serious problems to farmers, and the section provides advice and training on how farmers can deal with jackals, lions, and the African hunting dogs. Policy and legislation on wildlife issues are very dependent on quantitative information from the rest of the research service.

There are several areas concerning land use where the research interests of wildlife and agriculture overlap, and joint planning would be desirable.

## **Socioeconomic Research**

The Namibian Economic Policy Research Unit (NEPRU) was established with Norwegian support in early 1990 to conduct applied economic or socioeconomic research and provide the government with strategic information for policy making in these areas. NEPRU is also charged to build up an economic and socioeconomic information base and to train Namibians in appropriate research skills. The governments of Norway and Sweden currently provide core funding to NEPRU. Its research and training projects are funded by a wide range of donors. Although NEPRU has the status of an independent charitable and educational trust, it now has a formal link with the National Planning Commission and anticipates a more assured institutionalized position.

NEPRU has been commissioned to work on a wide range of short-term research projects. It has carried out a series of studies on issues related to land and land tenure, the integration of women into the rural development process, and appraisal of rural development

needs in northern areas (annex 5).

The unit is relatively young, the projects short-lived, and there has been a fairly steady staff turn over. Nevertheless, a core staff of nine researchers has been built up which is supplemented by temporary consultants and attached fellows. It has served to expose the need for policy research in agricultural development as well as in other fields. So far no request to NEPRU for research has arisen from DAI (although there have been requests from other directorates within MAWRD).

The Namibian Institute for Social and Economic Research (NISER) was set up in association with Namibia's former Academy (and now with the University of Namibia). It carries out mainly applied research in areas concerning rural development and poverty, regional development and urbanization, and sustainable agriculture and environment.

NISER relies on funded commissions for its work, having as yet no steady core funding within the university. It has a research staff of about 10, plus consultants and temporary research students. NISER strives to retain a problem-oriented multidisciplinary approach in its research and has worked on a number of socioeconomic projects on problems and issues related to agriculture and natural resources management (annex 5). None of these studies, however, were commissioned by DAI.

## **Forestry Research**

Namibia's harsh climatic conditions limit most woody vegetation to savannah thorn trees and shrubs. Substantial tree resources are found only in the wetter north, where forestry provides a wide range of products, especially firewood. Because these products are mainly used domestically, the real value of forestry resources is not reflected well in the GDP.

In the early colonial period, forestry had already been recognized as an important national resource. In 1900 the first forest research station was established at Brakwater. Its main task was to introduce timber and fruit species. By 1910, ten forest professionals were in place. By 1914 there were 11 forest stations. Subsequently, however, support for forestry declined, at times almost disappearing.

While there were some early activities in natural forest inventory and management in the wetter northern and East Caprivi areas, they did not lead to sustained forestry research efforts. Research picked up in the 1980s with a FNDC project to develop economically viable solutions to the bush encroachment problem. Also in the 1980s the forestry division conducted trials and provenance studies in the Grootfontein area. At independence, however, there was no formal research organization and no full-time forestry research officer.

Forestry research is now carried out within MAWRD in the Directorate of Forestry. In September 1991, the Directorate of Forestry appointed a Deputy Director with responsibility for forestry research. Although there are now only three professional foresters, trial plantings are done in the north for species of firewood, building materials, and for suitable species to improve soil conditions and provide fodder for agroforestry. Permanent observation plots are also established for regrowth and management studies on the important *Pterocarpus angolensis* (kiatt).

### *Current needs assessed*

A thorough survey of research needs in forestry was done with the help of SADC/FINNIDA

and a well-defined plan for the research section drawn up. If fully implemented the plan will lead to a professional research staff of 15 by 2007. External support is to provide experienced expatriate staff initially while Namibian staff are being trained to undergraduate and post-graduate levels. Two new research staff will establish a National Forest Research Center at Okahandja, and, with Swedish support, a strong six-person team is expected to lead a woody biomass survey and inventory.

Following agreed strategic guidelines for reaching national objectives, the plan provides for seven research programs and four supporting programs. Highest priority will be placed on the program for land use and forest inventory, which will provide a basis for all planning and development. The six other programs are as follows: tree improvements silviculture, ecology and management of natural forests, improvement of arid zones and degraded lands, agrosilvo-pastoral systems and forest extension, wood utilization, and nonwood products.

## **Division: Agricultural Investigation (DAI)**

The establishment of DAI can be traced back to an 1894 report on the agricultural value of the country and the tasks of the state. The division's current structure and organization is the result of a number of subsequent changes in government, development policy, and, consequently, research policy and organization. These are described in annex 2 on the history of the agricultural research service (and also covered in the recent paper by J.P. Venter on "Mobilizing and Sustaining Support for Agricultural Research in Namibia: Past Experiences and Plans to the Year 2000").

The division's early emphasis was on the development of livestock farming practices profitable in Namibia's harsh environment. Substantial progress was made which, over the years, was to lay the foundation for the development of economically sound farming in the commercial sector. Outstanding achievements were the development of the shallow curl and water silk Karakul pelts out of the original pipe-curl type, the long-term comparison of 10 beef cattle breeds, and pasture management guidelines for safe stocking rates in different parts of the country. Very little research was done relating to communal farming systems however.

Political attitudes before independence had a profound impact on the current structure and organization of DAI after independence. Under the pre-1978 South African administration, the region was administered as one research area with a selection of representative research stations: three initially, followed by three more in 1958-62. There were no facilities for research on problems relating to communal mixed farming areas until 1972, however, when stations were set up at Mahanene and Katima Mulilo. (In any case, the research conclusions, on irrigated crops, were not widely applicable to the communal farmers' situation.)

Agricultural services, including research, were divided among the Central Authority and 10 representative authorities. Many authorities felt the need for their own experimental or demonstration farms. When the Karakul market suffered a slump, the Agricultural Division of the Administration for Whites bought four extra farms for studying possibilities of diversification, and established a center for Karakul progeny testing.

With the coming of independence and the change to centralized government, the new

DAI in the Directorate of Agriculture inherited 14 farms for research, demonstration, and production and various responsibilities from the agricultural administrations of the Second Tier Authorities, in addition to the central research stations. In 1992, after subsequent adjustments, 19 farms and stations were left under the management of DAI. The resulting structure was not necessarily an efficient one for carrying out a unified national agricultural research program. In light of the role that research is now expected to play and within the limits of its resources, it has become necessary to reappraise the need for all of these stations. Steps have already been taken to reduce the number of demonstration farms under the control of the division.

Meanwhile, the number of researchers in the central government has increased from two in 1984 to 21 in 1992:

1984-85	2 researchers
1988	12 researchers
1990	14 researchers
1992	21 researchers <sup>3</sup>

The division is organized under a Deputy Director with five sections:

* Large stock (beef, game, dairy)	5 researchers
* Small stock (sheep, goats, poultry, pigs)	3 researchers
* Pasture science (natural and cultivated pasture)	3 researchers
* Agronomy and horticulture (dryland/irrigated crops)	4 researchers
* Analytical services and herbarium (meat, plant, & soil)	5 researchers

A technical support services group provides the research stations with well-qualified technicians.

While most senior research staff are based at headquarters in Windhoek, the chief agronomist is based at Mahenene research station. The nominal establishment of the division at 51 research officers is appreciably bigger than the current number of filled posts. A modified structure to include two Deputy Directors, one for animal production and one for crop production, 46 Research Officers, and 17 research stations, envisages three subdivisions: livestock, plant production, and research stations. This proposal is under consideration but not yet accepted.

The new government has placed high priority on agriculture, especially on improvement of services to the farmers in the communal areas of the north. Improved national support for agricultural research was demonstrated not only in the 1991-92 budget, but also in the division's capital budget (R 13,574 million). This budget is earmarked mainly for upgrading of research stations, with R 4 million reserved for "The Sustainable Agricultural Development Program for Northern Namibia". (The latter was followed up with a further R 2 million for 1992-93.)

DAI has reconsidered its research priorities in light of the new, broad national policy directives and has reached the following decisions:

- \* The consequences of present research must be reappraised.

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<sup>3</sup> 1993 25 researchers

- \* All farms and stations should be reevaluated.
- \* Operating research units must be established in those areas which have lacked these facilities in the past.
- \* Agronomic and horticulture projects must be initiated in the northern parts of the country.

A thorough review of food crops research requirements in the northern areas was carried out by ICRISAT/SADC in 1990. A plan was then proposed for the development of a multidisciplinary food-crops research team made up of 25 research officers over a 10 year period. This included an intensive training program and an interim expatriate research team of eight experts during the period of staff development. The project proposal has been accepted in principle by the ministry and R 6 million has been allocated to implement the early phases of faculty development. The size and scope are not yet determined in detail. Meanwhile, a careful analysis of the breeding and testing research programs for major food crops has been prepared by the senior millet breeder at ICRISAT following several months' experience at Mahenene.<sup>4</sup>

A major livestock research project for communal areas, the "Sustainable Animal and Range Development Program" (SARDEP) supported by the government of Germany through GTZ was launched by DAI in October 1991. It is being implemented in former Hereroland and Namaland. A possible extension into the Ovambo region is now under discussion. The program's research components may also be involved in a proposed Northern Livestock Improvement Project under consideration by IFAD. This project may be expanded to include crops.

### *The division's research program*

DAI's research program is expressed in projects of varying size. The largest is long-term and involves yearly 0.2 researchers, 19 research technicians, and support staff on the 8,300 ha Sandveld research station. On the smaller side, exploratory research projects on, for example, cowpeas involve yearly only 0.01 researcher (as supervisor). Details of the research programs in livestock and crop production and discussion are in annexes 3 and 4. Annex 5 contains a discussion of the need for research on the socioeconomic aspects of farming systems.

### *Livestock research*

The main objective of research on livestock and range and pasture lands is to generate technologies to increase livestock productivity within the limits of natural resources. This is being pursued with a two-pronged strategy:

- a) to maintain research support to the large-scale commercial livestock farms which are

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<sup>4</sup> Bidinger, F.R., *Research on Small Farmer Crops in Northern Namibia*, ICRISAT, 1992

crucial to the country's export economy,

- b) to increase research services to the communal farming enterprises (including the mixed farming systems in the north) to improve the well-being of farmers and food self-sufficiency in the country (The SARDEP project is focused on the latter).

In addition to important large stock work on comparison of breeds, beef cattle studs have been kept at research stations to improve the quality of both commercial and communal herds. Currently only Sanga and Afrikander breed studs are maintained for genetic conservation and improvement. The private sector has taken over most of the stud activities, with DAI responsible for supervising the National Beef Performance and Progeny Testing Scheme previously operated from RSA. Earlier crossbreeding studies at Neudamm have provided the basis for the current breeding program to increase the frame size of the Sanga cattle to match EC market preferences.

Extensive work on farm management, nutrition, and supplements to grazing have laid down guidelines for production practices. Current studies include assessment of available supplements, and a large-scale evaluation of four stocking rates with two frame sizes of cattle (in close association with the pasture research section).

Until 1985, small stock research for dry areas focused almost exclusively on the Karakul pelt export industry. Great strides were made in production management and quality of the product. Since the dip in prices, however, more attention has been given to both sheep and goat meat production and diversified products such as wool, mohair, and game.

Currently, more than half of the research work is dedicated to the improvement of Karakul pelts and progeny testing of Karakul rams. A large-scale comparison of the potential productivity for mutton of Karakul and Dorper breeds is underway, together with a large study of the benefits of spreading the mating seasons of the Dorper to match market demand.

For communal areas, the prospects for improving production and marketing of ostrich and gemsbuck are being evaluated. Finally, studies are planned for the production and reproduction potential of indigenous Sanga goats and Damara sheep.

In both communal and commercial areas more than 80% of agricultural activity is dependent on natural rangeland. Pasture and rangeland research were initiated early and continued. In the past, rangeland research was aimed at land rehabilitation with emphasis on the bush-encroachment problem. Norms for realistic grazing capacities for safe management were developed for different parts of the commercial farming systems. Studies of the effects on the pasture of various stock management practices continue at Sandveld and Omatjenne in association with the large stock section.

A major new initiative in the communal areas is closely linked with the SARDEP project. Following initial survey work, subsequent studies will aim at reducing man-induced degradation and desertification. Supplementary studies are also underway on the diets of Boer goat and Damara sheep.

Most of the analytical services on meat, plant, and soil are in support of livestock research, although some soil and water analysis have been done for crop studies. The recently established tissue culture unit focuses on propagation of date palms. A herbarium carries out studies on the taxonomy and identification of rangeland species and classification of ecocommunities, in addition to collecting for preservation of plant genetic resources. The laboratories and pasture section are currently closely associated with a remote-sensing facility established in the weather bureau for documenting rainfall and vegetation changes, and providing early warning of potentially damaging droughts.

## *Crops research*

The limited crops research done has focused on two main areas:

- \* *irrigated crops*—testing for suitable varieties and cultivation practices of crops, fruit, and vegetables for irrigated agriculture (in a 1,900 ha area watered from the Hardap dam and for commercial farmers near Grootfontein with water pumped from limited groundwater supplies);
- \* *rain-fed crops*—testing for crops suitable for rain-fed conditions (in the Tsumeb, Grootfontein, Otavi triangle).

An extensive range of crops have been tested on the 106 ha Hardap Research Station. Current observations and trials include lucerne and millet for fodder, wheat, maize, sorghum, grapes, and a range of vegetables. Several of these are network trials coordinated from RSA centers, which also supply new cultivars.

The single agronomist in charge of research design at Hardap has been recruited very recently. He hopes to begin work on more efficient irrigation methods. On the recently acquired Mannheim station near Tsumeb, evaluations of other crops under irrigation include varieties of tree crops and several maize trials. However, despite the wide range of crops maintained by research technicians, the research program on irrigated crops has been severely curtailed by lack of supervisory research staff. No researcher time was allocated to these crops in 1991.

The most intensive research work on rain-fed crops has been on maize at Uitkomst and nearby stations. Recently, with the leadership of the “Sustainable Agricultural Development Program for Northern Namibia” more emphasis has fallen on millet. A millet breeding program has been started, based at Mahenene, and millet variety and fertilizer trials are being carried out at Ogongo, Mashari, and other stations in the communal farming areas of Ovambo and Okavango. Research on millet received 1.3 researcher years in 1991. Maize, sunflower, cotton, and groundnut trials were carried out mainly at Uitkomst and were allocated about 0.15 researcher years each. Only token amounts of supervisory time were allocated to a range of trials on sorghum, cowpea, pigeon pea, and cassava, however. In addition to the problem of too few research staff available for crops research, spread over too many stations, the uncertain rainfall makes rain-fed crops research especially difficult to manage. A concentrated group of researchers at one main center would reinforce each other and, almost certainly, be more effective than the sum of the scattered parts.

## Chapter 4

### Management of Resources: Human, Physical, and Financial

The general purpose of a national agricultural research system (NARS) is to generate and deliver information that offers new potential for encouraging national development. This is usually done through identifying and demonstrating new opportunities for increasing productivity or maintaining productivity in the face of mounting constraints. The kind of information produced and the balance of clients are both policy issues decided at a high governmental level.

The research process itself is fairly standard. Within its likely resources, a research unit must first decide what it is going to do to generate the required information. Second it must implement the program. Finally, it must communicate the conclusions to the clients who can use the information. Each of these steps involves substantial expenditures of time and money.

No country, however large, can hope to carry out all of the research needed to solve all the problems of producers and processors in a reasonable time frame. Some problems are of greater urgency than others, and in general only a few can be attacked at one time. The decision as to what research should be implemented is therefore crucial for the **efficiency** of the whole research process. Hard choices as to priorities often have to be made.

To implement a research program it is necessary to develop and maintain an appropriate **capacity** of well-trained researchers with adequate support staff, facilities, equipment, and operating funds. The size of this capacity will to a large extent determine the scope of the research system. In this sense, scope covers both the range of topics covered and the kind and depth of research that is feasible and realistic.

The **effectiveness** of the research system depends on the communication of research results to clients. This is part of a broader network of linkages that must be maintained, both to bring information into the system (to help reach programming decisions) and to transmit new information to clients. Because all linkages cost time and money, not all desirable linkage mechanisms can be adopted. Again, hard choices among priorities must be made. This chapter examines how resources for research are being applied to develop and maintain a research capability.

#### Human Resources

The prime requirement for carrying out agricultural research is a cadre of well-trained research scientists. Results from completed survey questionnaires showed that the main researcher strength lay in DAI (table 4.1).

Table 4.1. Time allotted to agricultural research in various institutions, 1991

Institution	Number of research grade staff	Person years of research effort in 1991
Division: Agricultural Investigation (DAI)	21	7.2
Directorate of Forestry	3	0.35
Directorate of Agricultural Training	7 (responses)	0.40
NISER/NEPRU	19	3.3

Other directorates and divisions in MAWRD responded that none of their staff was involved in agricultural research as defined in the questionnaire. The research divisions of wildlife and fisheries did not consider their research "agricultural". Very small amounts of agricultural research time were reported from the State Museum and the Meteorological Service.

#### *Researcher qualification profile*

A four-year honors degree is the minimum requirement for a researcher position at DAI. This is a continuation from RSA administration requirements. Further post-graduate training is desirable but not essential for promotion to higher grades. The current distribution of formal academic qualifications in research staff in the division and compared with other research divisions is presented in table 4.2.

Table 4.2. Distribution of academic qualifications in research divisions, 1992

Division, ministry	Honors BSc (equiv.)	MSc (equiv.)	PhD (equiv.)	Total
Division: Agricultural Investigation (DAI), MAWRD	11	10	0	21
Division: Research, MWRC	8	7	5	20
Division: Research and Stock Assessment, MFMR	11	6	4	21

The formal qualification profile of DAI is modest compared with many African countries, its responsibilities, and record of success. It is, however, consistent with the stated policy of concentrating on adaptive and testing research. It is also consistent with a system where research experience was built up on an apprentice system, rather than by formal university

training in research methodologies.<sup>5</sup> This is a logical arrangement for a small research system that has traditionally worked in close collaboration with a larger system with about 1,000 researchers (that of the Republic of South Africa).

With the changed circumstances and policies that followed independence, there may be a need to modify the qualification profile. While the main emphasis might remain on adaptive research, more training to PhD level should be encouraged to give scientific leadership in a few disciplinary areas. Adaptive research requires a thorough grasp of research methodology. It often requires a considerable depth of appreciation for technical issues, even if the experiments themselves are less sophisticated. Post-graduate training (MSc-equivalent level) in research methodology is essential for all research officers. For new recruits, this is usually better accomplished rapidly, in a university setting, rather than through the slower in-house apprentice process. Future staff development plans should include such post-graduate training as a standard requirement.

Most BSc or MSc degrees were obtained in universities in RSA, mainly the University of Orange Free State (8) for pasture and small stock; University of Stellenbosch (7) for laboratory and analytical services; and University of Pretoria (4) for large stock.

The research technician cadre is strong in Namibia compared with research systems in most African countries. The main entry qualification is a two-year diploma from a recognized college. A good proportion of DAI's 52 research technicians have a three-year qualification from a technicon and at least five have a three-year BSc degree. (In one case, a technician has an MSc degree from a Russian university.) Many research technicians carry heavy responsibilities. Some would be considered research officers in other African countries. However, they do not have responsibility for the design of projects or interpretation of conclusions, nor for keeping abreast of state-of-the-art research methodology. They are very valuable, but should not be deemed research officers without further education and demonstrated analytical capability.

Length of service of research staff is shown in table 4.3. While there are few researchers with very long service, almost 75% have more than five years' experience. This offers good opportunities to new recruits for guidance in several fields of research. The disciplinary specialization of the highest degree of research staff in DAI is shown in table 4.4.

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<sup>5</sup> Both past and current research work displays a depth of understanding of local conditions and circumstances equal to that required for PhD research work.

Table 4.3. Length of service in DAI, 1992

Length of service	Degree holders
More than 25 years	3
20-25 years	1
15-20 years	0
10-15 years	2
5-10 years	9
Less than 5 years	6
Total	21

Table 4.4. Distribution of specialization among disciplines in DAI, 1992

Discipline of final degree	Number of researchers	Total
Animal husbandry		
Animal breeding	4	
Animal nutrition	2	
Animal physiology	3	9
Pasture science	3	3
Agronomy		
Agronomy	3	
Agricultural Economics	1	4
Chemistry	1	
Botany/ecology	4	5
Total		21

Note: Of the five training officers involved in research at Neudamm, four are specialized in animal breeding and one pasture science. Disciplines represented at NISER and NEPRU fluctuate and include economics, economic history, sociology, anthropology, development studies, environmental management, and regional planning (pertaining to agricultural research).

The distribution shows the emphasis on animal and pasture research, including some spread of specialization within animal husbandry. It also shows the extreme shortage of crops research scientists and no specialized training in component technical disciplines such as entomology, pathology, soil science, physical environmental sciences, agricultural engineering, and food science and very little in the social sciences. Building up a cadre of national scientists in crops research is an urgent task, but likely to be prolonged.

Four of the research staff were women and 17 men in 1992. An appreciation of the role of women in agricultural production in the communal farming areas will be important

in the future and will require women researchers and extensionists.

Except one, all of the livestock pasture and laboratory herbarium researchers are Namibian. However, only two of the four in agronomy are Namibian. The other two were initially recruited to the Owambo Authority services. (In contrast, only about half of the social sciences researchers at NISER and NEPRU are Namibian).

If the crops research strength is to be increased rapidly and advertisements fail to raise qualified Namibians, it will probably be necessary to seek temporary expatriate researchers (as is being done in the Directorate of Forestry).

### *Strategic human resource planning*

The urgency of the merging of the authorities into a central government left little opportunity for the development of a strategic plan for agricultural research. Such a research plan would support the broader national development plan for the agricultural sector. Strictly speaking, the latter plan should precede and be the basis for the former, which is then the basis for a human resource plan. At this time, then, it is difficult to proceed with a definitive plan for human resource development.

Some points for planning are reasonably clear, however. As already discussed, policy guidelines suggest that research is necessary on three farming systems: large-scale commercial livestock farming; medium-scale commercial mixed farming (converted from underutilized communal areas); and small-scale communal mixed farming. Almost regardless of what policy decisions are made on the relative priority of research on each, it is clear from the current disciplinary distribution of staff that a strategic build up of crop scientists and associated agro-socioeconomists will become necessary. Also, a broader representation of the ethnic groups in the research cadre will almost certainly be needed. As that is likely to be a drawn-out process with a possible adjustment in the gender balance, policy decisions should be made urgently to guide long-term development.

The Sustainable Agricultural Development Program for Northern Namibia is a good illustration of a strategic human resource development plan premised on policies that would require a target of 25 national research staff working on cereals and grain legumes in northern communal areas by the year 2002. Further, the plan calls for an additional group of eight expatriate specialists assisting research work and training in the meantime. The parameters of the program are realistic if the target of 25 cereal and legume researchers trained by 2002 is compatible with future plans for the size of the overall agricultural research service. To make this reality, recruitment rates for researchers would have to reach 20 per year in the early years and intensive training fellowships for BSc or postgraduate degrees would have to average more than 20 each year.

Even with a smaller total figure it is evident that there is an urgent need for a vigorous training and recruitment program. The MAWRD should prepare strategic plans for different policy options as soon as possible. There are a number of policy decisions needed:

- \* the relative priority of different sectors' development,
- \* agriculture's share of research resources (size of system),
- \* the balance of research effort among farming systems,
- \* the criteria for ranking commodities and production factors for research,

- \* whether first degree training can be included in the plan,
- \* whether experienced expatriate researchers should be recruited to fill gaps.

As the physical resources available on research stations are very generous, the most critical long-term strategic decisions concern human resources rather than capital development.

## Financial Resources

Most of the funds supporting agricultural research are provided by the Government of Namibia in the form of subventions through MAWRD. To date, only small amounts of additional funding are contributed by donors. However, no contributions are made by the livestock industry. Wildlife research is in a similar position. For fisheries research, while salaries are provided by the ministry, almost all operating funds come from the Sea Fisheries Research Fund maintained from the cess on all landed fish.

Neither DAI's research nor technical support staff complained seriously about shortage of operating funds or bureaucratic delays in releasing funds for activities. In stark contrast to many African countries, they considered the financial management satisfactory and not a serious constraint to research.

### *Level of support*

The level of support for national agricultural research is often quoted in relation to the contribution of agriculture to the gross domestic product (AgGDP). The gross budget for DAI in 1990-91 was R 7.037 million; AgGDP was R 494 million. The apparent level of support is therefore about 1.4% AgGDP. However, DAI repaid R 1.389 million to the national treasury from sales of produce and services, leaving a net level of support of 1.1% of AgGDP. An equivalent figure for 1991-92 is estimated at 1.4%. This is above the average for sub-Saharan Africa during 1981-85 (0.49%).<sup>6</sup> Although it is about in line with the average for the SADC countries (1.02%), it is still well below the levels recommended by the World Bank in 1981.<sup>7</sup>

The World Bank standard, however, is difficult to reach for countries with economies heavily dependent on agriculture. Developed industrial countries support high levels of agricultural research with taxes on industry. Similarly, Botswana supports agricultural research at a high level (4.7% AgGDP in 1990) using its mining income. In this respect, Namibia is in a position similar to Botswana and a level of 2% AgGDP or more might be considered attainable.

Small countries also generally maintain support to agricultural research at a higher level than do large countries (1.8% AgGDP in Gambia compared with 0.3% AgGDP in India). But India has many thousands of researchers compared with about 25 in The Gambia.

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<sup>6</sup> Pardey P.G., J. Roseboom, J.R. Anderson, *Agricultural Research Policy: International Quantitative Perspectives (1991)*. ISNAR, Cambridge University Press, p.36.

<sup>7</sup> The World Bank, observing that developed countries were investing more than three percent of AgGDP in agricultural research, proposed that developing countries should raise their rates of investment to one percent AgGDP immediately, and increase them steadily to two percent over a subsequent 10-year period.

As a final factor in level of support, special social urgency may predicate short-term high rates of support to research.

### *Funding per researcher*

The total allocation to DAI in 1991-92 was R 9.096 million (US \$3.369 million at R 2.7 = \$1) for 20 research officers. This is equivalent to R 454,800 per researcher allocated in three components:

- \* R 190,800 for salaries (researcher plus share of total support staff),
- \* R 55,000 for per-researcher share of capital investments,
- \* R 209,000 for operations (or "activities").

The latter "activities" component, at US \$77,400 per researcher is surprisingly high. Equivalent figures for other national agricultural research services in Africa range from about US \$5,000, which is inadequate, to about \$30,000 for efficient operations. (The average equivalent figure for the United States agricultural research in 1984 was some \$28,000.) Some World Bank projects in Africa are using a planning figure of about \$28,000 per researcher for activities.

A comparison within Namibia can be made with fisheries and wildlife research, although there are significant differences in style of research. For fisheries, operating expenses per researcher was \$42,534 in 1991-92, including heavy expenses for vessels. For wildlife research it was \$16,235. The \$77,400 figure for agricultural research is then remarkably high and merits further examination:

*Earnings:* DAI's net earnings repaid to the treasury were estimated at R 1.47 million in 1991-92. However, even deducting this amount from the treasury's gross allocation, the net allocation per researcher remains a high \$51,500.

*Subsidies:* The research division provides some subsidized services to livestock owners. Fees charged for ram and bull performance and progeny testing, for example, do not cover the real costs. While it is perfectly reasonable for subsidized services to be provided to farmers, it is unusual to pay them through the agricultural research budget. If fees paid only 30% of the real cost (R 47,000 in 1991-92), this represents a subsidy of about R 110,000, equivalent to US \$2,040 per researcher, not a large part of the discrepancy.

*Transport:* Transport costs are undoubtedly higher than might be expected because research at distant stations is done by headquarters-based researchers rather than by resident research officers.

*Style of research:* The extensive livestock work now done is more expensive than most crops and other livestock research (but does earn more by sales). However, most expenses for both crops and livestock research are incurred from maintenance of research station facilities (buildings, roads, utilities, etc), not from the actual

conduct of experiments.

*Number of research stations:* DAI maintains a large number of research stations and production farms in comparison to the number of research officers available: 19 farms and stations for a total of 21 research officers. Experience elsewhere indicates that a favorable benefit/cost performance would be extremely difficult to achieve with such a low input of researcher person weeks per station.

Some of the farms cannot be producing research results in proportion to the cost of their upkeep and operation. Indeed, two are operating for demonstration or production purposes, not for research; their operation should not be charged to the research budget.

It appears that the main reason for the anomalously high allocation of operating funds per researcher is the large number of farms and stations maintained (for the small number of researchers). Also, because the farms are under the direction of DAI, a substantial amount of researcher time is lost to nonresearch farm-related activities. According to the questionnaires, researchers spent an average of only 38% of their time on research in 1991 (table 4.5).

Table 4.5. Distribution of researcher time for 19 researchers in DAI, 1991

Agricultural research	Other research	Administration	Teaching	Extension	Production	Leave
37.8%	0.2%	26.5%	10.1%	8.4%	10.2	6.8

Some researchers protested that the situation presented by the distribution of researcher time in 1991 gives a wrong impression of the intensity of researcher activity in previous years. They explained that since independence they have been heavily involved with extension and training courses in the communal areas, servicing visitors, and traveling with missions to identify development opportunities. Moreover, general administration was substantial because of vacancies in chief controller positions.

## Physical Resources

Those experiment farms visited by the ISNAR group appeared, in general, well equipped for carrying out field research, although laboratory facilities for crops research in northern areas were limited. Substantial improvements were recently made to physical facilities in the northern stations at Mahenene, Ogongo, and Mashari as part of the Sustainable Development Program for Northern Namibia.

Unfortunately, with the present staff (plus any likely expansion), it is unlikely that the research capabilities of these farms will be exploited efficiently. DAI inherited a large number of experiment and demonstration farms as an accident of history. This situation should be rectified as soon as possible. The farms are not only unlikely to be operated

efficiently (from a research point of view) but also the widespread and scattered responsibilities of the researchers reduces individual research efficiency.

A dramatic reduction in number of farms is possible while still leaving adequate field facilities for the likely number of researchers. In the long term, five or six farms for livestock research and two or three for crops (some combined) would be sufficient, even if this is not possible immediately. Extensive livestock trials might be better conducted in collaboration with farmers on their own farms. Many rangeland management and studies on the control of bush encroachment have indeed been carried out on farms. For crops research in the northern communal areas, on-farm trials will be essential and all on-station conclusions would need to be evaluated under real farming conditions.

At headquarters, the main supporting Laboratory and Herbarium Services for analysis of meat, plants, and soils were reasonably well equipped but inadequately housed for the demands made upon them. The section should be allocated more space.

The Library and Information Service is one general facility common to all research activities and programs. One of the major tasks of the research service is to provide well-digested information to its clients. If trained manpower for experimental work is in short supply, often the only information that can be provided is global knowledge carefully interpreted to match the local situation. Access to up-to-date world information is indeed important in almost all of the tasks of agricultural research at all levels: drawing up policies, deciding priorities, planning research, training research scientists for higher degrees in universities, designing and executing appropriate research programs in research institutes, and communicating results to extension workers and farmers.

With all the research staff and most of the other senior agricultural staff based at headquarters in Windhoek, the central library and information service could readily provide a service to all. However, increased emphasis is now being placed on agricultural services for the northern communal areas. This will require a substantial concentration of staff far from Windhoek. The library and information services in the north should therefore be improved to accommodate the growing need. A small library already exists in Ogongo College. This should be expanded to provide a core facility focused on the needs of agricultural research, training, extension, and other services to the northern communal areas.

## Conclusions

An efficient research service needs a reasonable balance among the resources of researchers, funds, and physical facilities. To establish and maintain this balance is an important task for management.

At present (1992), there is an disproportion in the number of researchers to the number of research stations (21 researchers to 19 stations). A further imbalance exists in the number of research projects for each researcher (4 to 5 projects per researcher). Some of the stations are devoted to demonstration, service, and production, not research. This diverts scientists' time from research activities. (However, other important calls on researchers' time for extension and training activities also contributed to the result that only 7.2 person years from 20 research staff was applied to research in 1991.)

One of the consequences of the present situation is that per-researcher funding for operations is exceptionally high. This is because part of the amount is spent on demonstration and services, not research, and costs for maintaining farm facilities are substantial. The

present overall level of funding for agricultural research is not unreasonable, however, if it were used for research only. The figure of 1.4% to 1.7% of AgGDP could be considered appropriate or, indeed, low.

There is a need to balance facilities and staff to research resources and activities. This can be done both by reducing the number of stations and increasing the number and disciplinary range of research staff.

The need to increase human capacity and specialized training for research on crops in the mixed farming communal areas is perhaps the most urgent and pressing issue of all.

## Chapter 5

# Management of the Research Program

### Research Program Formulation

Any **national** agricultural research program should be aimed ultimately at helping to achieve national objectives for agricultural development and science and technology. Objectives may concern economic efficiency, social equity, food security, and scientific status.

The efficiency of a national agricultural research system is critically dependent on the research program that is chosen to be carried out. The **cost** of the research system is more or less determined by the government's decision as to level of research capability to maintain—regardless of the results produced. The **benefit** derived by the country from the research system is extremely sensitive to the research program, that is, the detailed choice of experiments and studies carried out each year; the benefit is dependent on the research results' potential to reduce constraints to agricultural productivity. Only a very small percentage of the studies likely to be beneficial can be carried out each year. It is therefore essential that these few studies and experiments (component elements of the national agricultural research program) be chosen carefully.

The process of formulating a national agricultural research program is complex. It is based on choices and decision making at several stages, each involving different personnel and **criteria** for priority. Because of its complexity, the process requires careful management and organization.

In general, the **quality** of the research program depends on the training and experience of the researchers putting forward proposals and their immediate supervisors. This is part of the management of the means on carrying out research. But the **relevance** of the program depends on the management of the research planning process. This process extends from the national agricultural development policy level to the level of the station researcher.

Large and wealthy countries can afford to take risks on basic exploratory research with a low probability of success. They are able to let some scientists follow hunches in the hope of one or two achieving breakthroughs that will pay for all the failures. In smaller countries, however, the planning process must be done more carefully. It must be systematic, within a consistent framework, in order to focus national research on very high priority problems with a reasonable chance of success.

The next section sets out such a framework against which the current program formulation process can be discussed and possible modifications can be suggested.

Research program formulation is a process of planning followed by review.

## *Program planning*

Program planning essentially involves choices at three stages.

- \* First, choices must be made as to which commodities, factors of production, or farming systems researchers should work on to effectively pursue the national objectives. These choices should lead to allocation of resources (best expressed in terms of researcher time).
- \* Second, for each commodity, factor of production, or farming system (identified above), choices must be made as to which productivity constraints could best be addressed by research. (Again, these are best expressed in terms of researcher time allocations.)
- \* Finally, within each constraint, particular experiments or studies must be chosen which will best contribute towards reducing that constraint to productivity. (These are expressed as requests for specific resources to carry out experiments).

The end product of this planning process is proposals for experiments and studies from researchers at research station level. For example, the sequence of choices might be:

Commodity:	cattle (4 researcher years)	
Constraint:	nutrition (0.5 researcher years)	carcass to match market, etc... (1.5 researcher years)
Study:	comparison of 4 salt licks, etc... (0.1 researcher years + support)	comparison of 3 crosses (0.6 researcher years + support)

The planning process involves hard choices at each stage between many alternatives. In the simplest procedure, all of the stages take place in one researcher's head. There is no consultation and decisions are made on the basis of the individual researcher's perceptions of the national objectives. This clearly relies too much on the individual researcher's strategic knowledge, integrity, and competence.

At the other extreme, elaborate quantitative priority setting methods needing lots of information can be used to rank commodities, factors or systems in the considered opinion of an authoritative committee; (and with equivalent committees for constraints, etc). This, equally clearly, can quickly become too burdensome to be practicable or worthwhile for a small system. The essence of effective management of the program planning process is to arrange for "appropriate" groups at each stage to reach decisions on moderate supplies of information

Most countries err on the side of leaving too much weight and authority to the researcher, and give the research insufficient guidance for making research proposals. However, it is important to note that the planning committees can only give focusing guidance to the researcher. In the last analysis, it is the imagination and creativity of the researcher that gives rise to the detailed proposals for the design of experiments. Further, it is the aggregation of such experiments or studies that constitute the national agricultural research program for the coming year.

### *The Review Process*

The formulation of proposals by researchers is the end point of the planning process. It is also the beginning of **review**. A review is a comparison of the research proposals against some plan or norm. In this case, ideally, each research proposal is presented to the third level planning committee (that gave the guidelines to the researchers). The proposal is reviewed for **relevance** according to these guidelines. It is also reviewed for **quality** of design, scientific efficiency, and validity by peers. It must also be assessed for cost against resources likely to be available. It is at this primary review stage that the critical appraisal for relevance and quality is made. There is usually not sufficient time for such detailed appraisal at later stages of review.

Approved proposals are passed on for review by the groups at “constraint” and “commodity” stages. There they are evaluated as to whether or not they fit with the planned allocation of resources, and that resources are indeed available for implementation.

### **Organizing Program Formulation**

The following are included among the principles desirable for organizing research program formulation:

- \* The authoritative groups at national level should include a majority of policymakers and users of research results rather than technical research practitioners. The information used in decision making should focus on national-level parameters of efficiency of production, marketing, etc., and on relevance to equity objectives. Technical guidance should focus on realistic opportunities and practical difficulties related to improvements in commodities, factors, or systems.
- \* Users of research results should be prominent in the composition of the constraint-level groups. However, technicians should also be involved, as the information required to assess criteria for research priorities is likely to be increasingly technical, about opportunities for improving productivity and marketing.
- \* The groups at the third stage should be multidisciplinary in composition, including extensionists and farmers (or proxies for them in socioeconomists, agronomists, or animal husbandry specialists). For each of the different clients, the groups must assess the likely practical relevance of any recommendations or technologies that might emerge from the proposed research program. The assessment should be much broader than the value system of one discipline. The flow of information at this level should include details of the micro socioeconomic and physical environmental conditions of the targeted producers.

In a small research organization it is not possible to spare enough researcher time to arrange for the collection of the information needed to support a complex and sophisticated methodology for priority setting in program formulation. It is also possible that two stages of the process might be combined, or handled by the same group. However, the process of program formulation is so critical to the efficiency of the research system, that it is worth

investing a substantial amount of time in the program planning phase, before spending much larger amounts of time and resources on research program implementation.

## **Current Situation**

The current research program formulation process in DAI does not have such a formal framework. It is essentially informal. The only formal body is the Program Committee which is called by the Deputy Director, Research on an ad hoc basis to review project proposals put forward by researchers and heads of subdivisions. The Program Committee is composed of the Deputy Director, Research, the two Deputy Directors of Extension Services, and the four chief research officers. Some representation of interests outside those of technical researchers is therefore included.

After endorsement from the Program Committee, project proposals are forwarded to the Permanent Secretary for approval, in particular for financial implications. Meanwhile, a project document is often sent on a researcher's initiative to a few external advisers to check for scientific soundness and to get advice on the experiment protocols.

A fair amount of informal planning takes place before research proposals are made by individual researchers. Researchers consult with extension staff and contact commercial farmers directly to highlight important problems of production. This also provides important information on the micro conditions of the farming system. However, with the exception of the "farmers' days" during which researchers, extension service staff, and farmers meet and, possibly, the annual meeting of the Agricultural Scientific Society of Namibia (AGRISSON), there are no formal fora and no official mechanisms to discuss the key problems researchers should tackle. There is little opportunity for researchers to interact with the farmers of the mixed communal farming systems of the north and there appears to be only sporadic contacts with staff of the Directorate of Planning, Pricing, Marketing and Cooperatives on the macro conditions for agriculture in the country.

Outstandingly, there is no formal body at the national level to give guidelines on major resource allocations for agricultural research on commodities, factors, or production systems in accordance with national development objectives. This leaves the next echelon of decision makers (the Program Committee) with no alternative but to construct guidelines as best they can from the general development policy statements available. However, as presently operated the Program Committee spends little time on planning and giving guidelines to researchers. It focuses mainly on review. The committee should devote some time to planning as well as review.

### *Allocation of researcher time*

It is not the objective of this chapter to describe and comment on the actual program of research in hand, although some description is given in annexes 3 and 4. It is rather to consider the process of research program determination, as above, and the general scope of the program.

Information on the scope of the 1991 research program expressed in terms of researcher time allocated to commodities, production systems, or factors of production was made available from questionnaires returned by researchers. The returns were comprehensive for DAI, Directorate of Forestry, and for NEPRU. Summarized information was available

for NISER. Returns were also sent in by agricultural training officers who were involved in research to some extent. Finally, some returns and information were available from FNDC.

The results for the categories as described by the respondents (except for groupings of national and farm socioeconomic research) are shown in Table 5.1. Together the information covered 40 research officers or equivalent, averaging about 30% of their time on research. They do not include the time of about 50 research technicians as they were operating as support staff and were not responsible for initiating or designing experiments. The technicians were exceedingly important in carrying out research, however; the scope of the program would be impossible without their support.

Some commodities and factors show zero time. These reflect crops on which research technicians were conducting experiments designed either by researchers outside Namibia or by researchers who had left the division. No current researcher claimed responsibility.

Research was spread over a very wide range of commodities in 1991, with no commodity receiving a concentration of as much as two person years. For many crops only observational trials were possible to test new varieties. The concentration on millet reflects recent work at Mahenene, Ogongo, Mashari, Uitkomst and FNDC.

The relatively small amount of researcher time available for livestock research shows that significant extensive livestock trials can be done by good research technicians with light supervision by researchers following careful design. Farm game received about as much researcher time as sheep.

More NEPRU and NISER researcher time was spent on agriculture-related socioeconomic research than on research on cattle and sheep combined. But this work was not commissioned by DAI. Closer coordination and collaboration is perhaps needed. While more than half of the total researcher time came from DAI, a still significant amount was contributed by other institutions.

Future plans for research activities, none as yet confirmed or fully funded, call for substantial increases in researcher strength. These include more than 20 researchers for crops research after 10 years in SADPNN, about 20 research staff for forestry, and undefined numbers for research support for SARDEP and for IFAD/ADB projects for rural development in the north. The current spread of research activities suggests a central, interministerial coordinating body of some kind would be valuable: for future planning of research among competing claims for resources, it would appear to be essential.

Table 5.1. Research time by commodity and factor of production, 1991\*

Commodity/factor	Person weeks	Person Years
<b>Livestock</b>		
Cattle	68.1	1.31
Karakul	14.7	.28
Other sheep	42.3	.81
Goats	3.1	.06
Pigs	7.4	.14
Poultry	6.0	.12
Farm game	45.0	.87
Pasture	42.9	.83
Nutrition	12.1	.23
		----
Subtotal	241.6	4.65
<b>Crop</b>		
Millet	67.7	1.3
Sorghum	1.0	.02
Cowpea	.5	.01
Pigeon pea	.5	.01
Groundnuts	10.9	.21
Wheat	0.0	0
Barley	0.0	0
Maize	7.8	.15
Cotton	6.5	.13
Sunflower	3.9	.08
Forage	0.0	0
Dates	0.0	0
Horticulture	0.0	0
		----
Subtotal	98.8	1.91
<b>Forestry</b>		
Agroforestry	2.3	.04
Silviculture	7.3	.14
Forest inventory	6.4	.13
		----
Subtotal	16.0	.31
<b>Production factors and Socioeconomic analysis</b>		
Soil analysis	5.2	.10
Food analysis	6.0	.12
National socioeconomic analysis	78.6	1.51
Household-level socioeconomic analysis	95.0	1.83
Crop protection	0.0	0
Soil fertility	0.0	0
Bio survey	38.8	.74
Agricultural mechanization	30.0	.58
Farm systems research	10.0	.19
		----
Subtotal	263.6	5.07
		----
Total time	620.0	11.94

\* From 40 agricultural research officers (and equivalent) with the support of about 50 research technicians.

## Possible Improvements

In the past, research program formulation has proceeded reasonably well on an informal basis. This is mainly due to the close link between research staff and client commercial farmers and extension, and because of researchers' good understanding of the target farming system.

However, new development policies and strategies require that the future research system serve a wider clientele and different, less well known, farming systems. The research program formulation process will need to become more formalized with some systematic and transparent procedures laid down that will demonstrate that scarce resources are being devoted to priority programs developed in line with national objectives.

From the previous discussion on the basic framework for program formulation and organizational principles involved, some general characteristics of a new organization might be suggested.

### *National level*

Whether or not agricultural research continues to be carried out within several institutions, there is a clear need for some national coordinating body. It could be as formal as an independent National Agricultural Research Council. Other alternatives include an advisory committee to the relevant ministries (including finance), a board of trustees for an autonomous agricultural research institute, or a coordinating committee ensuring everyone knows what others are doing. The coordinating body would apply a clear, systematic priority-setting procedure using criteria based on balanced national objectives. It would make recommendations for research allocations to major commodities and factors of production.<sup>8</sup>

The coordinating body would require a national-level technical secretariat to assemble information, assess the criteria, and present conclusions of analysis to help its decision making. The secretariat need not be large nor permanent, and the coordinating body probably would need to meet no more than twice a year.

The membership of the national coordinating body would reflect its status. However, to be given the authority to make significant decisions in line with policy objectives, it would have to include sufficiently senior officials, producers, consumers, and distinguished scientists. Without such a body interpreting national policies and objectives, it is difficult for researchers to develop their programs. Rarely are scientists themselves able to reflect, in their priorities, the balanced views of all stakeholders in the work of the research service.

### *Research institution level*

The essential planning decisions at the senior level in a research institution concern long-term program thrusts to reduce major constraints to productivity. These decisions are crucial for long-term human resource development (recruitment and training plans with respect to necessary disciplines).

Depending on future structural arrangements, within MAWRD responsible research

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<sup>8</sup> The procedure is not easy but guidelines have been developed at ISNAR based on experience in a number of countries. A full account of methods is given in *Science under Scarcity: Theory and Practice for Agricultural Research Evaluation and Priority Setting* by G.W. Norton, P.G. Pardey, and J.M. Alston. Cornell University Press. (forthcoming, 1993). A broad framework for program formulation is given in *Research Program Formulation* by M. Dagg. ISNAR, 1992.

committees may be required in several directorates. One body with authority for broad research program objectives for a number of directorates may be appropriate; or simply one body for one directorate covering all agricultural research in the ministry.

Essentially, the body (possibly an enlarged Program Committee) advisory to the Permanent Secretary, would consider priorities for main research thrusts. Again, at this level, a supply of appropriate information is needed for the body to systematically assess priorities based on criteria related to national development objectives. However, the criteria and information required will be different from those at the national level. The body would not need to meet frequently for program planning purposes (and would have nothing to do with the management of resources in carrying out the program).

Membership should include relevant senior officials in MAWRD and some outside representatives of research clients and users in addition to research leaders. This same group could also serve as the second-level review group for proposals emerging in response to the guidelines agreed. Alternatively, once the program planning guidelines had been decided by full committee, a subcommittee internal to MAWRD would suffice for the review stage.

### *Research groups within the institution*

A research group within the institution should be given the authority to agree on a checklist of guidelines for researchers for preparing research proposals. Guidelines should continue to reflect national development objectives. They must be laid out before the researcher applies his imagination and creativity to produce research proposals. Researchers should also be made aware of the kinds of questions that will be addressed concerning any proposal when it comes up for review by the same group.

The membership of the group should be multidisciplinary and include social scientists, farmers, and extensionists, or proxies. At this level too the priority-setting procedure (possibly checklist) needs a flow of information. However, such groups cannot afford a servicing secretariat. The information has to come from the group's representatives of the various disciplines.

## **Linkages**

Small research units with restricted fields of activity usually do not require elaborate linkage mechanisms. However, as the size and scope of research increases, the case for coordination grows stronger. In particular, as research intensifies on the mixed farming systems of the northern communal areas, the need for integrated socioeconomic, crop, and livestock studies will increase. There is an especially strong case for developing linkages between DAI and the three main socioeconomic research organizations: MAWRD's Directorate of Planning, Pricing, Marketing, and Cooperatives, NEPRU, and NISER.

Although there are many linkages that a Namibia's national research system could maintain to help it operate efficiently and effectively, unfortunately, linkages cost time and money. Within finite resources it is impossible to maintain all the linkages considered desirable (just as it is impossible to carry out all the research that is desirable). It is therefore necessary to examine the range of linkages involved and to choose the most important based on priorities, objectives, and resources available.

Linkages are required at each stage of the research process: in deciding what research

to do, implementing the program, and communicating results to clients. A flow of information in the national research system is important, both internally, within each research institute, and among institutes. In addition, effective two-way linkages between the research service and external bodies are desirable:

- \* For planning, priority setting and programming, linkages are needed with policymakers, national economic analysts, scientific community, extension agencies, micro-economic analysts, producers, consumers, and processors.
- \* For implementation of the research program, linkages are needed with extension, producers, universities, and the private sector.
- \* After research program implementation, for feedback to the research system linkages are needed with producers and extension.
- \* For research to communicate results to clients, linkages are needed with extension, producers, policy makers, universities, and the scientific community.

#### *Current linkages situation*

Linkages within DAI are generally good considering the distances between research farms and stations. Linkages with commercial farmers and extension concerning extensive livestock farming systems are also good. However, linkages with communal mixed farmers and their extension services are weaker, and linkages with other directorates in MAWRD and with other research institutions should also be strengthened. Improvement in the latter linkages will be urgently needed if research work with the communal farming community is to be intensified.

**Within the research system:** Most of the research staff in DAI are reasonably well aware of what is happening in the division, and in the Directorate of Training. Research projects are clearly specified, even if the documentation is not drawn up in a detailed program budgeting manner. Division staff are not so familiar with activities in the DPPMC that may have a considerable bearing on research priority setting.

Linkages between DAI and NISER and NEPRU appear to be very weak, despite dealings and contracts between these institutions and other directorates in MAWRD mainly about conditions in communal farming situations in the north. Contacts with FNDC on the development of commercial farming enterprises in communal areas appear to be reasonably good. The University is very new, but linkages between DAI and its predecessor, the Academy, were slight. As the University develops, it will be essential for DAI to develop close linkages with the proposed Faculty of Agriculture and Natural Resources.

**External linkages:** For the purpose of programming and planning, linkages between DAI researchers and large-scale commercial livestock farmers are exceptionally good. Feedback from these producers is strong and contributes to research program formulation.

This is not the case with respect to the communal farmers, however, and with the change in policy emphasis a significant amount of effort will have to be devoted to improving researchers' linkages with farmers, extension, and consumers in communal areas. Feedback about the nature and economy of the communal farming systems will be essential if the

research program is to serve these areas. (See discussion in annexes 5 and 6.)

Good linkages with policymakers and national planners are important in both directions: for the research system to receive target guidelines and for research findings and information to help planners and policymakers develop better and more realistic guidelines for development. Currently, while NEPRU, as a component of the National Planning Commission, clearly has close linkages with senior planners, DAI does not. A national body (NARC) representing all agricultural research would have a stronger, more balanced voice in influencing planning and policy making.

Researchers are reasonably well served by the Library and Information Service, which maintains linkages with world knowledge. Also, independently researchers make contact with fellow scientists elsewhere, especially in RSA. However, library services will need to be strengthened when a strong resident researcher group is established in the northern area, perhaps at Ogongo College.

Linkages for the implementation of research programs have not been a serious issue in DAI, as almost all research has been conducted on-station. There would be some merit in conducting on-farm trials in collaboration with large-scale commercial farmers under potential economic conditions. This may become necessary if the number of research farms is reduced.

On mixed communal farms on-farm trials will be an essential element of research for testing proposed technologies under realistic conditions. Effective linkages will therefore be vital between researchers, extensionists, and farmers. Methodologies and techniques for this kind of collaborative on-farm work are quite different from the traditional controlled experiments currently done in DAI. Special training for some research and extension staff will almost certainly be necessary. (See discussion in annex 5.)

National agricultural research is not effective unless research conclusions are communicated to target clients. While farmers are the main ultimate clients, they are by no means the research service's only clients. Researchers should pay careful attention to ensuring that well-interpreted research results are transmitted to

- \* policymakers in terms that they will readily recognize as bearing on their interests,
- \* fellow research institutions in the country,
- \* extensionists with results incorporated into advice that can readily be passed on to large numbers of farmers,
- \* university faculty for possible inclusion in teaching course material,
- \* the world scientific community, if appropriate.

While researchers can transmit findings directly to the fewer large-scale commercial livestock farmers, this would be a much more difficult task with the many small-scale communal farmers.

**With extension:** Close collaboration among researchers, extensionists, and farmers will be required if research is to help improve farming practices in the communal farming areas. Any successful strengthening of the research capability in mixed farming systems in northern areas will have to be accompanied by a parallel strengthening of the extension service in the

regions.

Experience in other countries (e.g., Zimbabwe) has shown that even when there are reasonably strong research and extension systems, with reasonable good relations with each other, it is necessary to organize a formal linkage framework to achieve good collaboration (see annex 6). In general, this collaboration needs formal agreement at the heads of division level; and significant resources for time and travel can and should be allocated within each division. Meetings at regional or district level of senior researchers and senior extensionists can endorse this agreement and give guidelines to their staff for holding field-level meetings at which the detailed linkage arrangements can be worked out.

While the final procedure can be relatively informal, it does require a formal high-level institutionalized drive. A documented account of meetings should be kept and communicated to higher levels so that management can monitor the progress of planned activities. Reliance on casual contact for effective research-extension linkage at the field level is rarely successful or enduring.

## **Socioeconomic Research**

Programming input from socioeconomists may not have been considered necessary when DAI was concerned only with large-scale commercial farmers whose values and farming system were well understood. However, for research benefiting the smaller, communal farmers, they are essential. Social science input can be an invaluable representation of the values of the farmer for the research programming process.

While DAI's current links with socioeconomic research services are poor, socioeconomic research and analysis could serve two main functions:

- \* Socioeconomic research within the farming systems context can help to define and prioritize the problems for research. It can improve information flow between farm communities and researchers. Finally, through monitoring and evaluation of research impact and development strategies, it can enhance the effectiveness of research and problem solving.
- \* Applied social and economic research can provide a basis for policy formulation and advise policy decision makers.

These two functions have in common their concern with profitability and market opportunity, social equity, gender impact, sustainability, and the longer-term consequences of research policy and technical change. Concern for the individual farmers' well-being is more focused in the farming system's context.

Resources available for socioeconomic research in agriculture in Namibia are outlined in annex 5. Agricultural policymakers' needs for social science research are served, to a limited extent, by groups in PPMC and FNDC and by NEPRU and NISER under contract to various bodies, including MAWRD. Much more primary information about socioeconomic (and physical) conditions in the communal areas, especially in northern areas, is necessary for more reliable policy formulation. Information from DAI on production potential in such areas would also be valuable.

Apart from specific surveys done by NISER, little has been done on applied social

and economic research within mixed farming systems. Joining research program formulation in DAI, social and economic scientists could have a lot to offer in these areas: following field research activities and identifying local practices, problems, and perceptions of farmers and consumers. In DAI research groups, they can serve as well-informed proxies for farmers.

It may be possible for DAI to reap all the benefits for such a social science input by establishing close ongoing relationships with NISER and other agencies. However, the requirement for such long-standing research and information flow will best be served by social scientists integrated into the multidisciplinary research teams in DAI. Meanwhile, close links between DAI and PPMC, NISER, NEPRU, and other social science research agencies should be urgently established.

## **Chapter 6**

### **Developing the Research Capacity to Support Communal Farmers**

Maintaining a research system capable of supporting large-scale commercial livestock farmers is crucial to the efficiency of the export economy of the country. However, another element of government economic policy is to move towards food self-sufficiency and reduce imports, with the additional social objective to help improve the well-being of communal farmers.

Most of Namibia's food production is done in the north where there is potential for short-season, drought tolerant rain-fed crops and hardy trees. Some scope for irrigation from the Kavango and boreholes also exists. Northern conditions vary considerably both in climate and soils. Soil erosion and salinization are growing problems. Reasonably close matching of crops and management to physical environment is therefore needed.

MAWRD proposes two strategies to improve food production in the communal farming areas of the north: the transformation of communal farming into commercial farming in underutilized areas and the improvement of productivity under existing farming systems in more intensively occupied communal areas. For the latter there will also need to be reasonably close matching of crops and management to the social and economic environment, which is currently not well-defined and understood.

For promotion of commercial farming in communal areas, crop research could be carried out under the direction of DAI research officers headquartered at a distance from the site of research operations. However, a small research team nearby with its own station site is probably essential, together with reliable research technicians on a larger, operational farm. An alternative might be to assign the main research task to FNDC, with monitoring and supervision from DAI.

For promotion of improved small-scale communal farming, close collaboration with many farmers via extension will be required with an additional research dimension to provide information about the mixed farming system. Guiding both researchers' program and extensionists' advisory and support services, this dimension will certainly require a multidisciplinary group of researchers located in the northern area for close and frequent contact with the farmers and extensionists.

The technical needs of the crops research program have been well set out in the "Sustainable Agricultural Development Program for the Northern Areas", supplemented by the report on "Research on Small Farmer Groups in Northern Namibia" and elaborated in annex 4. The "Sustainable Program's" 10-year target of a core staff of 25 researchers for research on cereals and legumes has been considered too high by some. Others have questioned the need for eight full-time expatriate researchers for most of the period. Reviewing the requirements for a modest multidisciplinary research team, this review team

recognized the need for an immediate basic team of nine researchers as **minimal** to make a significant contribution, with only one representative from each main discipline.

## **Scope of the Research Task**

The immediate task of research would be to work towards supplying advice on how to improve the productivity of crops and livestock and the well-being of farmers in the mixed farming system while conserving soil and water resources as far as possible.

Both extensionists and DAI research staff acknowledged that much work was necessary to learn more about the farming practices and values of the communal farming systems in the north, especially the cropping systems. Such studies must constitute an early part of a joint endeavor. Typically, they would need input from cropping and animal husbandry specialists, sociologists, farm economists, and extensionists. Conclusions would set the parameters for development of improved cropping and animal husbandry practices that could be pursued on-station and on-farm. The critical need to establish criteria for good farming practice, to conserve soil and make the very best use of water and trees would also be important.

There is an urgent need for research to develop reliable advice. Researchers should make themselves familiar with elements of improved technology developed elsewhere in the world (especially that developed for similar physical conditions which might suit local socioeconomic conditions). For this, an efficient library and information service will be of paramount importance.

## **The Research Team**

The size of the core research team will inevitably be limited by resources made available. However, a **minimal** team with a range of the most important disciplines should be feasible if economies made elsewhere in DAI budget could be applied to research staff for mixed communal farming in the north.

The team should include at least one each of the following: crop agronomist, animal husbandry specialist, crop protectionist, pasture agronomist, plant breeder, farm micro-economist, sociologist, soil scientist, and forester. However, for early on-farm reconnaissance surveys and problem identification work, two of each of the social scientists, agronomists, livestock specialists, and foresters would be invaluable.

### *Organization*

In beginning research on a new farming system, the value of an interacting interdisciplinary team is very much greater than that of its parts. It would be important to locate the whole team in a research center in the region of communal farming and in close contact with extension.

It was unanimously agreed that the Ogongo College and Research Station was by far the most appropriate site for a multidisciplinary team. It is strategically placed. There are already 13 graduate scientists at the college with similar interests and qualifications to research officers (if different immediate objectives). Also, the facilities have recently been

improved through various projects. If further resources were available, a second, smaller, team at Mashari could be considered.

### *Staff recruitment and training*

Assuming adequate operating funds were made available, there remains the major problem of recruiting a suitable research staff. Technical support staff for crops research might also prove difficult. The current group of crops research staff posted in the north consists of three research officers (two expatriate) and six research technicians scattered from Mahenene to Uitkomst and Mashari.

While Namibian research officers in animal husbandry and pasture agronomy may be readily recruited or transferred, Namibian graduates in crop sciences may be very difficult to find and attract. Urgent sponsorship (by donor if necessary) of promising candidates for undergraduate training may be necessary. Research officers with socioeconomic qualifications will also be necessary to help develop an understanding of the complex socioeconomic constraints to productivity in the farming systems. Again, they may be difficult to find already trained. Moreover, special postgraduate training in techniques and methods appropriate for on-farm investigations will be necessary. The process of recruitment and training will not be quick, and build-up of such a broad team will take several years.

In the short run, expatriates with good research experience in semi-arid crop and livestock situations could be sought to help generate the advice so urgently needed. In this respect, African regional organizations such as SACCAR and the Institut du Sahel (INSAH) as well as international agencies, may be valuable sources of advice and assistance.



## **Chapter 7**

### **Issues**

Namibia's national agricultural research service can be pictured as a nucleus of technical research staff in DAI at Windhoek supervising livestock research done on dispersed research farms. A few researchers are posted in the north where rain-fed crops are possible. While there are groups in other directorates and social sciences institutes that contribute to agricultural research, their linkages with DAI are weak.

National government policy suggests an increase in rural development, extension, and agricultural research services for the large population of communal farmers in the north, in addition to improving the export potential of the commercial farming areas. Meeting these objectives will require strategic changes in the research services. However, before a strategic plan for research can be developed, some policy decisions are desirable on some issues.

### **National Policy for Agricultural Research**

The starting point for program planning for national agricultural research is national policy and objectives for agricultural development and for science and technology. The government has long recognized agricultural development as a key factor in the improvement of national welfare, and has most recently demonstrated confidence in the role that science and technology can play in national development by establishing the University of Namibia. However, there is not yet a statement on national science and technology policy. Such a statement would be a valuable guide as to the status and function of the research service. It could provide distinctive Namibian values and criteria for assessing research performance. Such guidelines are invaluable for research scientists at the research station level.

Policy positions may change as a result of the current reappraisal of government development plans. However, the major draft statement from the MAWRD on agriculture, forestry and rural development policy and strategies indicates that research is expected to help

- \* continue to improve the existing domestic supply and export capacity of agriculture;
- \* increase food production through development of commercial farming in communal areas;
- \* improve the productivity of small-scale farmers and livestock owners within the communal areas, through improved extension services with reliable messages.

Such an expansion beyond the present scope of research will require a significant increase in numbers of trained researchers in crop and livestock production, land conservation, and social sciences, as well as the government's commitment to long-term improvements in the level of support for agricultural research. This is a vital starting point for any national strategic plan for agricultural research.

It is argued earlier (pages 26-28) that the apparent level of support for research in DAI at 1.1% of AgGDP in 1990-91 is misleading in that some of DAI's development activities should not be charged to the research budget. In total, only about seven researcher years were available for research in 1991 out of a research staff of 20. Compared with other countries of similar size, Namibia deserves a larger research service.

Just how much larger, is an important policy and planning decision, as it sets a ceiling for a realistic total number of research staff. In the country's present position, an immediate target for recurrent expenditure on agricultural research should be at least 2% AgGDP. This amount might support 35-40 research staff (with adjustments in the number of research farms). However, the very urgent need for fresh information on how to improve the well-being of communal farmers in mixed cropping areas calls for a short-term intensity of research in those areas that exceeds the long-term steady state.

Planning, therefore, might call for 35-50 research staff depending on policy decisions on the overall level of support for agricultural research. The rate of growth of trained research staff towards these levels would also depend heavily on policy decisions about recruitment and training (as discussed later).

Targets for research in the draft strategies for MAWRD imply work on three farming systems, each with different research programs and requiring different distributions of research staff disciplines. Early decisions on the relative importance that government assigns to these research targets are crucial for guiding recruitment and training within the anticipated ceiling for research staff numbers. It will take time to build up to the required balance of staff numbers, but the targeted numbers should be established as soon as possible.

## **Structure and Organization**

A research system and component institutions should have two formal structures and organization: one to facilitate research program formulation and management, and the other to facilitate operations, the control and allocation of resources, and general administration. The latter should not seriously inhibit the efficient management of the research program.

It was noted in chapter 3 that national agricultural research is carried out under several ministries and directorates. Further, chapter 5 discussed the need to establish a National Agricultural Research Council (NARC) or Advisory Committee to give an authoritative planning lead in the formulation of a well-constructed national agricultural research program. Membership of the NARC should include a majority of research users and policymakers, in addition to research scientists. A firm policy decision will be needed to establish such an interministerial committee.

Fisheries research already has such a board with a membership including policymakers and research users from industry. The fisheries committee has the additional responsibility of approving the release of operating funds from the Sea Fisheries Research Fund that supports fisheries research. The board can hold the research organization accountable for the use of the funds. While a National Agricultural Research Committee may

not have such a source of funds as secure as the cess on landed fish, in principle, it should review the use of agricultural research funds. It should also give leads on research program planning. In parallel with the fisheries industry, commercial livestock farmers could be requested to contribute a small percentage of livestock export earnings to a Livestock Research Fund. Representatives on NARC could monitor the application of the fund.

If the current commission considering the role of science and technology in Namibia led to the establishment of a broad National Council for Science and Technology, or equivalent, a NARC could logically be a council committee for the agricultural sector, or, even a subcommittee of a wider committee for natural resources management research. (See discussion in chapter 2.)

A more far-reaching proposal for an autonomous or semi-autonomous institute to incorporate all agricultural research activities is more concerned with the management of resources. The discussion in chapter 3 concluded that the case for such an institute was not as strong in Namibia as in some other African countries, although it would indeed ensure close coordination of research through its board.

Research institutions should each have a program committee with appropriate membership to follow up on the planning guidance from the NARC. Most institutions have such a committee, but may need clear planning mandates and revised constitutions and membership, to be more effective in guiding research rather than only reviewing research proposals.

## **Balance of Resources for Research**

It is important for good research management to maintain an effective balance among human, physical, and financial resources. Due to a variety of largely historical factors, within DAI the physical resources for research at research stations and farms have slipped far out of balance with respect to research staff available. There are almost as many research farms as researchers (chapter 4). Adequate funding has been allocated for the maintenance and operation of the farms, but a great deal of the farm operations are not research activities. The distorted balance shows up in excessively high operating funds per researcher. The supervision of the farms digs deep into the time of researchers who are only able to spend an average 37% of their time on research.

This imbalance should be addressed. However, just how it should be done has policy implications both within MAWRD and in relation to the national plan for the agricultural research services. On the one hand, the small team of research officers could be concentrated on seven or eight research farms. The rest could be sold or transferred to be operated by nonresearch staff, and the research operating funds scaled down accordingly. On the other hand, while research work was still focused on fewer research stations, the funding for DAI, could be maintained (or increased to 2% AgGDP with or without private sector participation, as proposed above). The funding surplus could be dedicated to a substantial increase in the number of trained research staff. These researchers could focus on additional research topics of high priority, as assessed by NARC and the Program Committee. In the latter case, the MAWRD would have to make decisions on how best to deal with the experiment farms surplus to the research service's immediate needs.

## Support for Research on Communal Mixed Farming Systems

The major issue facing the national agricultural research service is how to provide research services to improve the productivity of the communal mixed farming systems in the northern areas, as well as in communal areas in the rest of the country. Even if the government (or NARC) does not award this topic high priority for research resources, it must still command significant and urgent attention, as it is the farming system of the largest part of the population.

The discussion in chapter 6 shows that a significant research effort on the problem will require a multidisciplinary team located at one place within the main production area in the north. In addition to crops and livestock research specialists, the team will require social scientists to work closely on the micro-economics of farming and value systems of the farmers. Soils and ecology researchers will be required to work on the effects of development policy and farming practices on environmental stability. The team members will need to collaborate closely with extensionists in the region. Because the buildup of such a team of indigenous Namibians will take several years it is imperative that policy decisions be taken as quickly as possible to move vigorously ahead with the development of a team, and with staff planning, recruitment and training. Parallel planning for the strengthening of the extension service and for strong formal linkages between research and extension is also necessary. Other arising (sub)issues are size, recruitment policy, and location.

The target size of the team(s) will depend on the long-term commitment for recurrent funding (a share of the total agricultural research strength envisaged).<sup>9</sup> This review considered nine researchers an absolute minimum for an initial team, with the possibility of a second team. Earlier reviews planned for 25 researchers in the long run.

If qualified Namibian crops research scientists are not readily available, it may be necessary to relax recruitment standards for research officers. Support for both undergraduate and postgraduate training may be necessary for selected candidates. A strong research input from social sciences is also required. An early decision is needed by DAI to either recruit social scientists as full-time members of the multidisciplinary team, or rely on contracting services from other institutions. To fill immediate gaps and provide early guidance, it may be necessary to recruit qualified and experienced expatriate research staff on a temporary basis. A decision to establish a substantial subcenter of research staff in addition to the main group at Windhoek should be followed by agreement on location. Ogongo has been suggested. Some additional facilities would be required, however, and clear administrative arrangements should be agreed upon for the composite site for Ogongo College and Research Station.

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<sup>9</sup> This would not include short-term or temporary staff supported by separate projects.

## Chapter 8

# Conclusions and Recommendations

Agriculture plays a large part in the economy of Namibia. It is second only to mining in contribution to exports and GDP and is by far the greatest source of employment and livelihood for the majority of the people. The Namibian government has chosen to support a national research service to help increase the rate of development of agriculture towards its various objectives.

In the past agricultural research policy has aimed at improving the productivity of the commercial sector. However, recent changes in welfare and development policy put more emphasis on the large population of the communal farming areas. This new emphasis implies a change in national agricultural research policy and planning with respect to both commercial and communal farming. Although the magnitude of that change is not yet clearly set out in agricultural development or research policy statements, it is the premise of this discussion that some quantitative changes in the research service will be required, following the reappraisal of national development objectives currently underway. Any future strategic plan for national agricultural research will need to incorporate such changes.

The following discussion will move from the national policy and scientific coordinating level to the level of the MAWRD which carries most of the responsibility for agricultural research, and finally, to DAI, which is the main vehicle for carrying out the research program.

### 1. National level

#### *1.1. Support for research*

It is anticipated that the government will continue to affirm its faith that science and technology can make important contributions to Namibia's development objectives, and will continue to support agricultural research in MAWRD.

It is **strongly recommended** that the target recurrent level of funding for DAI be at least equivalent to 2% of AgGDP. This level of funding should support a research officer staff of 35-40 given some rationalization of research station arrangements. It is highly desirable to have a long-term commitment to a stable level of funding to give a basis for the development of a national strategic research plan over 10-15 years.

#### *1.2. NARC*

The national agricultural research program must be focused on helping attain national objectives. It is **recommended** that an interministerial National Agricultural Research

Council (NARC) or Advisory Committee be established to give guidance on the interpretation of national objectives and priorities for major research directions.

NARC would be the starting point for the planning of the research program and the end point for reviewing progress in agricultural research in the institutions involved including MAWRD, the university, NISER, NEPRU, and FNDC.

## **2. MAWRD**

### *2.1. Program Committee*

Several directorates and divisions of MAWRD are involved in agricultural research, but the main vehicle is DAI. It is **recommended** that the existing Program Committee in DAI be strengthened and upgraded to serve as the main planning and coordinating body for agricultural research in the ministry. It should also serve as the formal body for maintaining close liaison with relevant national research institutions outside the ministry and with international and regional research organizations.

### *2.2. Research strategy*

MAWRD is currently reappraising its development policies and strategies. It is **urged** that clear strategic guidance be given to DAI as soon as possible on the relative priorities of research for the main farming systems: existing large-scale commercial farming; new large-to medium-scale commercial farming in underutilized communal land; and small-scale local market-oriented communal farming. Such clarification of priorities would guide DAI in the development of strategic plans for long-term research and staff development.

## **3. DAI**

### *3.1. Programming groups*

To complete the formal organization for research program planning it is **recommended** that DAI establish multidisciplinary programming groups (e.g., livestock, crops, and communal farming system groups) to transmit guidelines to researchers as to high-priority topics in line with national objectives. Such groups would also be charged to review research project proposals against those guidelines before passing approved projects to the Program Committee.

### *3.2. Resource balance*

For the efficiency of research operations a judicious balance must be maintained among the financial, human, and physical resources for research. It is **recommended** that MAWRD and DAI review the imbalance in resources that has developed in DAI and plan to correct it urgently. Over the long term, it should be possible to reduce the number of research stations and experimental farms to seven or eight with experiments increasingly carried out with farmers on their fields. However, in the short term more stations would have to be retained.

It is **recommended** that the number of stations under DAI be reduced to 12 or 13

(i.e., five in the northern areas of Owambo, Kavango, and Caprivi and seven to eight in the rest of the country). With the resulting savings, it is **recommended** that a much stronger capability be built up for research on crops and the mixed farming system in northern communal areas.

### *3.3. Multidisciplinary research centers*

Effective research for improvement of the mixed farming system in northern communal areas will require a multidisciplinary research team working intensively with both extension and farmers both on station and on-farm. It is **strongly recommended** that a multidisciplinary research center be established at Ogongo as soon as possible, with an initial team of at least nine to 13 research officers in a range of appropriate disciplines in crop sciences, animal husbandry, social science, and land conservation. (When resources are available, a smaller team should be established at Mashari.)

Because of farmers' urgent need for appropriate advice and the likely difficulty of recruiting appropriately qualified Namibians, it is **recommended** that experienced expatriate researchers be recruited for the short term while Namibian scientists are educated and trained in an accelerated program. Intensive effort should be made to obtain special funding through which candidates can be identified for education at BSc and MSc levels.

### *3.4. Socioeconomic research*

To date, almost all socioeconomic agricultural research has been done outside the auspices of DAI. However, research to improve the mixed farming system in communal areas and to accommodate important gender concerns will require a great deal of farm economic and sociological research carried out in close association with technical scientists and extensionists. While appropriate research studies should be carried out by NISER under contract for DAI it is **strongly recommended** that economists and sociologists be recruited into DAI to be integral members of the multidisciplinary research team at the new northern center and to serve as valuable linkage agents to more effectively harness the larger resource of skilled personnel in NISER.

As special expertise in rapid rural appraisal, farming systems research and on-farm trial techniques will be required for new social scientists, technical researchers and extensionists, it is **recommended** that intensive short-term training be sought from an experienced outside group.

Applied social and economic research is also necessary to provide a basis for agricultural policy formation and to advise policy decision makers. It is **recommended** that the research capability on these aspects be strengthened in the Directorate of Planning, Pricing, Marketing and Cooperatives and in NEPRU while close liaison is developed and maintained with DAI.

### *3.5. Research-extension linkages*

Good research-extension linkages are essential for maintaining the flow of information between the research service and its farmer clients. For research, the return flow provides critical input for the process of research program planning. In the northern communal areas, extension will also be essential in implementing on-farm trials. It is therefore **strongly recommended** that formal coordinating and collaborative committees be established: at the

national, heads of division level to authorize linked programs at other levels; at the regional level to arrange local liaison; and at field level to facilitate collaborative research and planning.

#### **4. Strategic Plan for Agricultural Research**

Several strategic decisions are called for concerning agricultural development guidelines, the anticipated role of research, the target size of the research system, and the establishment of decision-making bodies for national agricultural research policy and research program formulation.

When guiding decisions have been made, it is **recommended** that steps be taken towards preparing a national agricultural research strategy and plan including the following:

- \* developing a national agricultural research policy,
- \* adopting a priority-setting methodology and procedure to assist the national decision-making body designate and allocate resource shares to major research topics and long-term research programs,
- \* consider structural and organization arrangements to pursue long-term research programs efficiently and effectively,
- \* prepare a human resource development plan to serve the long-term programs,
- \* prepare a financial and physical resource plan to facilitate the implementation of the personnel development plan and the research programs.

# **Part 2**

## **Annexes**

# **Annex 1**

## **Terms of Reference, Team Members, Itinerary**

In an exploratory mission to Namibia in October 1991, a team from the Overseas Development Administration (ODA) identified the need for a reorganization of agricultural research. Towards this objective, the Permanent Secretary of MAWRD, Mr. V. Nghipondoka, in his letter of February 20, 1992, (copy attached) invited ISNAR to initiate steps towards a review of the agricultural research system in the ministry. Following a response from ISNAR offering to work with a local team in a joint review, MAWRD, through the National Planning Commission, approached ODA with a request to support a project to carry out the review. The terms of reference for the review are incorporated in the proposal and work plan of the project document, as given in the following extract.

### **Project to Review the National Agricultural Research System in Namibia**

#### **1. Background and justification**

- 1.1. The Government of Namibia, following independence has expressed its intent to redirect agricultural research effort from large-scale farming towards smallholders. This will require a major change of policy and operation of the national agricultural research service. Dr. Grimwood and Miss Gent of ODA identified the need for agricultural research reform as a priority activity for ODA support during a visit to Namibia. The Namibian Permanent Secretary for agriculture has since requested that the International Service for National Agricultural Research (ISNAR) assist in the review of agricultural research and in planning improved research strategies and management. The request is related to overall SADC efforts to integrate Namibia's research system into a regional strategy.
- 1.2. The support of smallholders is a vital element of Namibia's current democratic reforms. There is an urgent requirement to align research activities with the needs of these farmers. ISNAR is the CGIAR Center mandated to assist countries in the strengthening of agricultural research management and is uniquely qualified to carry out the requested task.

#### **2. The proposal and work plan**

- 2.1. It is proposed that ODA funds ISNAR to assist the Government of Namibia carry out a review of its national agricultural research system as a first step towards its rational restructuring and reform. ODA funds will provide ISNAR staff, travel, local field experience, and publication costs. The Division: Agricultural Investigation will provide personnel to carry out the review, local staff support, and transport.

## 2.2 Work plan (including preparatory work)

- (i) The MAWRD appoint a team of senior researchers and administrators to work with ISNAR to carry out the review.
- (ii) In a preparatory visit, two ISNAR staff will work with the team to agree on the kind of information desirable and feasible to collect from existing records, by questionnaires, and by interview to carry out the review of the activities of the total agricultural research system.

An agreed list of all concerned institutions, public and private will be drawn up.

Suitable questionnaires will be devised for administering to individuals and to organizations.

The information will cover aspects of government policy with respect to research; history of allocation of financial and human resources; organization and structure of research institutions; current facilities; current budgets for salaries and operations, national and donor; procedures for analysis of research needs for research planning and program formulation; details of current programs; aggregate research manpower and technical and administrative support; details of individual researchers' qualifications, length of service, division, time spent on current activities, etc.; schemes of service, appraisal and promotion procedures, etc.; linkage mechanisms to world knowledge, local producer and consumer needs; linkage mechanisms to extension services, planners, policy makers; internal information flow to managers, etc.

- (iii) The local team will gather the information by questionnaire followed by visits.
- (iv) A second visit by ISNAR staff may be desirable to review progress on the data collection and analysis.
- (v) After an appropriate period, and ISNAR team will return to join the national team in the analysis of the information and discussions on the conclusions with senior researchers, planners, and policymakers.
- (vi) A draft report of the main conclusions and recommendations will be presented before the ISNAR team leaves. The final report will be completed at ISNAR (possibly with participation of the local team leader) and after review and discussion within the national team.



REPUBLIC OF NAMIBIA

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**MINISTRY OF AGRICULTURE, WATER AND RURAL DEVELOPMENT**

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Enquiries: .....

Our Ref.: ..... Your Ref.: .....

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Private Bag 13184, WINDHOEK 9000

20 February 1992

The Director-General  
**INTERNATIONAL SERVICE FOR NATIONAL AGRICULTURAL RESEARCH**  
**ISNAR**  
P O Box 93375  
2509 AJ, THE HAGUE  
NETHERLANDS

Dear Dr Bonte-Friedheim

**RE: NAMIBIA AGRICULTURAL RESEARCH REVIEW AND PLANNING**

Following visits to Namibia by senior officers of ISNAR in 1991 and 1992 and especially the experience we had with ISNAR during the policymakers' workshop hosted by our Ministry in November 1991, we are convinced a partnership with ISNAR for long-term system building initially involving review and planning of our research would be very beneficial to us.

As you are aware Namibia achieved independence in 1990 and our Government is now faced with the challenge to provide support to our communal farming community and its demands for technology in the production systems and natural resources management. Our intention is to re-structure and build the research system to target the small holder farmers.

We recognize the efforts being undertaken through SADCC to integrate Namibia's agricultural research system into the regional strategy. The joint SACCAR/ISNAR proposed strategy for systems building is welcome as an input into our NARS. However we are aware negotiations for funding of such activity is likely to take a long time.

All official correspondence must be addressed to the Permanent Secretary.

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In meantime we would like to invite ISNAR to initiate a step towards review of our system pending approval for funding of masterplanning for the system.

As for the time horizon for the diagnosis, we would like ISNAR assistance beginning 1992. We have limited local funds to provide logistics for an ISNAR mission with our local task force which we hope to constitute as soon as you agree, in principle, to collaborate with us. May we also point out that it may be possible to negotiate supplementary funding with our bilateral donors for the diagnosis process.

If you accept, we shall send you terms of reference for such review and subsequent planning of the research system. We look forward to your early reply.

Yours sincerely

REPUBLIC OF NAMIBIA  
MINISTRY OF AGRICULTURE,  
WATER AND RURAL DEVELOPMENT  
.....  
VILHO NGHIPONDOKA  
PERMANENT SECRETARY  
1992-92-20  
PERMANENT SECRETARY  
AGRICULTURE AND  
RURAL DEVELOPMENT

## **Membership of the Joint Review Team**

### *Namibian team members*

Leader: Mr. J.P. Venter, Deputy Director, DAI  
Mr. F.V. Bester, Chief Agricultural Research Officer, DAI  
Mr. J.M. Lepen, Chief Agricultural Research Officer, DAI  
Mr. P.J. Strydom, Principal Agricultural Research Officer, DAI  
Mr. W.H. Visser, Chief Agricultural Research Officer, DAI

### *International team members*

Leader: Dr. M. Dagg, ISNAR  
Dr. C. Hoste, ISNAR  
Ms. A. Martin, Economic, Social & Statistics Dept., NRI, UK  
Mr. C.M. Matanyaire, ICRISAT

## **Itinerary**

### **September:**

- 27 ISNAR team arrives.
- 28 Team planning meeting with Deputy Permanent Secretary MAWRD.
- 29 DAI; Neudamm College and Research Station; Deputy Director, Extension; Ministry Labour and Manpower Development.
- 30 DPPMC; Livestock Research Group; Veterinary Services; University of Namibia; MWCT; NEPRU; Deputy Minister, MAWRD.

### **October:**

- 1 Hardap Karakul Centre; Hardap Research Station; Kalahari Experiment Farm.
- 2 Personnel Office, MAWRD; FNDC; Sandveld Research Station; Deputy Representative, FAO; Directorate of Training.
- 5 Omatjenne Experiment Farm; Tsumeb.
- 6 Ogongo College and Research Station; Mahenene Research Station; Rossing Foundation, Oshakana Centre.
- 7 Mannheim Experiment Farm; Shitema Farm, FNDC; Shankara Farm, Rossing Foundation; Mashari College and Research Station.
- 8 Musese Farm, FNDC; Chief Extension Officer, Okavango.
- 9 Uitkomst Experiment Farm.
- 10-11 At Windhoek; Representative, ODA.
- 12 DAI; Research Division, MWCT; Analytic Laboratories and Herbarium, DAI; National Agricultural Information Centre; NISER; Accounts, MAWRD; British High Commission; Directorate Veterinary Services; FNDC; Deputy Director, Forestry.
- 13 Ministry of Education and Culture; Embassy of France.
- 14 Team meeting.
- 15 Team wrap-up with Permanent Secretary and Heads of Directorates, MAWRD; Deputy Minister; Laboratories; Director of Agriculture.
- 16 Division Research and Stock Assessment, MFMR; University of Namibia.
- 17 ISNAR team departs.

## **Annex 2**

# **History of the Development of the Agricultural Research System**

*By P.J. Strydom, Agriculture Laboratory and  
A.J. Coetzee, National Agricultural Information Center*

“Upon our natural resource foundation rests the artificial structure of agriculture. If the stability of the foundation is disturbed by damage to any of its component parts, the stability of the agricultural structure erected upon it is undermined and the structure must and does collapse sooner or later depending on the nature and degree of the damage. The erection and maintenance of the structure is the science of agriculture (pure and applied), and it is seen that upon the soundness of that science, on the one side, and upon the manner in which its findings are applied, on the other side, depend on the stability of the natural foundation and the success of agriculture in the long run—the life of the nation—the very existence of man and his civilization.”

J.D.M. Keet (1948)

### **Introduction**

A proper consideration of a review of the agricultural research system in Namibia necessitates a reasonably clear understanding of the history of the science of agriculture. Agricultural research is bound by the dualistic structure composed of the capital-intensive commercial sector and the undeveloped, subsistence-based communal sector. Research relating to commercial farming has been underway for many years and has provided valuable information. However research to benefit the communal sector has been severely neglected and needs attention.

Animal husbandry has developed, owing to the low and precarious rainfall of the country, into the mainstay of the agricultural industry. Thus most research activities (breeding, disease, adaptability and marketing) centered on large and small stock production and pasture management. The cultivation of crops, especially in the communal areas, played a lesser role. Crop research relevant to dryland cultivation of grains in Ovambo and other communal areas, as well as the flood irrigation potential of Eastern Caprivi and Kavango, had to wait until independence before peasant farmer research focused in all seriousness on crop production.

### **German Colonial Period, 1894-1914**

The basis of formal research started in February 1894 when a graduate in agriculture and political sciences from Halle, Dr Richard Hindorf was commissioned by the British South West Africa Company to inspect its concession lands in Namibia. Hindorf's memorandum

about the agricultural value of German SWA was published as an appendix to the annual report for 1893-94 and accurately outlined the economic tasks of the state. Hindorf referred to general measures relating to highways and the associated watering and grazing rights, the veterinary system, forestry protection, and eventually to the creation of model and experimental farms (Bley, 1971: 106).

The country then, entirely undeveloped, followed the pattern of first settlement, then control of stock diseases followed by the building up of flocks and herds, improvement in the quality of livestock and afterwards the orderly marketing of agricultural products. It was against this background that the German settlers began importing animals from their own country for cross-breeding with the indigenous breeds in order to "improve" the quality of the latter.

### **South African Government, 1928-78**

Agricultural research originated within the agricultural branch of the Administration for South West Africa which at that time was mainly responsible for circumscribing herds and combating stock diseases. To promote animal husbandry veterinarians as well as a few botanists were employed. Professor Dr. H.O. Volk, Professor of Botany at the University of Würzburg in Bavaria held several lectures on Karakul pasturage in Namibia and South Africa. He, his colleague, Prof. H. Walter (1952-53) with 2000 specimens, Prof. Kurt Dinter (1933-34) with 500 specimens, Prof. Hermann Merxmüller from the München University and Namibia's outstanding Botanist, Mr. Willy Giess (1928-present), formed the foundations of botanical and pasture research. Mr. Giess developed, initially on a part-time basis (April 1953), but since July 1957 full-time, the National Herbarium of Namibia.

Although the agricultural sector from this period until 1966 was self-governing it was interwoven in such a way with South Africa that its policy and legislative directives were applied with only minor practical adjustments (Watt 1964).

The Commission of Enquiry into the long-term agricultural policy (Keet 1948) indicated research should be conducted in the form of demonstrations, while fundamental research and aspects of academical value should be shelved. Agricultural research must be structured in such a way that the practical and business aspects of farming from the outset take special prominence, and agricultural education must be so combined with agricultural research that results obtained from the latter can be taken up immediately in the practice and business of farming. This method was the most practical and economical for the government and would present the results in the most accessible and visual manner to the farmer, commercial as well as communal.

The idea was that investigations regarding livestock breeding, field management, and crop production be conducted by the farm demonstration method, although intensive fundamental research was called for in the case of Karakul sheep breeding. The Commission considered the time overdue for placing the Karakul pelt industry on a firm scientific foundation.

Intensive and successful research had been undertaken at various experimental farms for purpose of breeding types of livestock adapted to local conditions. Cattle were maintained on the experimental farms with the object of breeding suitable bulls for farmers and conducting various trials with grade cattle, for example, comparison of cattle breeds (Angus, Africander, Brown Swiss, Hereford, Shorthorn, Pinzgauer, Simmenthaler, South Devon and Sussex) and crosses, while Karakul flocks were maintained with the objective of (1) supplying superior rams to farmers and (2) conducting experiments in the interests of the

industry (Administration of SWA 1952: 4-10). Research work was also extended to indigenous breeds of sheep such as the Damara, Nama, Ronderib and Blinkhaar Afrikander.

Three experimental farms, situated in the northern (Omatjenne), central (Neudamm), and southern regions (Gellapt-Ost) of Namibia, offered full scope for development in conservation, farming systems, grazing management, drought precautionary measures and cultivation of crops appropriate to their respective regions (Keet 1948:37). The economic importance of the agricultural industry was realized, which led to the establishment of three additional experimental stations (Kalahari, 1958; Uitkomst, 1960; and Sonop, 1962).

Although the policy of the Administration of South West Africa was that communal areas set aside for occupation by communal farmers should be developed to their benefit, the commission felt that they should be given the same guidance and facilities as regards production and marketing of farmers in the commercial areas (Keet 1948: 71). Very few attempts however, investigated the problems of the communal farmers before the opening of the Mahanene and the Katima Mulilo Experimental Stations. Mahanene Research Station was established in 1972 and operated by the consultants Loxton and Venn; its research was of no relevance to the peasant farmers in the communal areas (NEPRU 1990:B29). Work was done mainly with irrigation, and with resources and scales of management not available to the smallholder subsistence sector (UNDP 1989:45).

In order to make the fullest possible use of the knowledge and experience, South Africa the Commission of Enquiry into South West Africa Affairs (Odendaal 1966) recommended that the agricultural branch of the Administration of South West Africa should form part of and be organized and administered in the same manner as the Department of Agricultural Technical Services. On July 1, 1966 the Agricultural Technical Services of South Africa took over the functions of the agricultural branch and administered it as the South West Africa Region.

### **Transitional Period, 1978-90**

The implementation of Proclamation Number AG 8 of 1980 resulted in the division of agricultural functions between the Central Authority and the 10 representative (ethnic) authorities. The various second tier authorities were expected to carry out applied research, while the Department of Agriculture and Forestry, was mandated to carry out basic research. Generally, agricultural activities that originated from land issues were under the Central Authority, while agricultural activities concerning the farmer belonged to their representative authority (Mostert 1984:8). The Bushmen people however, decided not to form a representative authority and was thus administered by the Central Authority.

With the exception of the Administration for Whites little research had been carried out by the second tier authorities on the main crops grown by communal farmers, nor on agronomic techniques, maintenance of soil fertility, animal husbandry, nor pasture management. Second tier authorities had experiment stations at their disposal but those were merely used as breeding stations.

The Division: Agricultural Research of the Department of Agriculture and Nature Conservation provided a research service, on request from the representative authorities. The responsibilities of the division comprised the gathering, processing, and publication of research data to support agricultural development (Department of Agriculture and Nature Conservation 1989:7).

The research policy of the agricultural division of the Administration for Whites was problem-directed and had the following goals in mind:

1. To maintain an efficient research program on appropriate experiment and production farms in order to ecologically improve the development of the agricultural potential of those districts and to find a solution to their problems.
2. To conduct research on those aspects of farming questions peculiar to each district—applied research in order to improve the extent and quality of production in each district (Le Roux 1984:6).

Unfortunately for the Karakul industry, the market slumped. Farmers diversified and consequently agricultural research was directed to wool, fibre and mutton production. The division for agriculture of the Administration for Whites bought Pfannenthal production farm for Merino research (1986), Koppieslaagte production farm for Angora research, Kalahari production farm (1958) for Derper research, Estcourt production farm for game research, and the Hardap Karakul Center (1987) for Karakul progeny testing.

In view of the national reclamation strategy it is of cardinal importance that the natural pastures be monitored scientifically. An important event was the purchasing of computer equipment during 1987 to be used for the evaluation of the natural resources by means of remote sensing and digital image processing (R 500 000). The need for an agriculture laboratory was realized in 1983 and formally established in 1986. It is equipped as a nutrition, meat, and soil laboratory and renders service to farmers, researchers, and developers.

### **Post-independence, 1990-present**

#### *Government sector*

The post-independence agricultural research policy aimed at the conservation, utilization, and recovery of natural resources through need-orientated basic and applied research. Two fields of research were executed: advanced research with emphasis on increased efficiency and applied research with emphasis on on-farm experiments, especially in the Ovambo and Kavango regions. Emphasis would be placed on the utilization of existing knowledge and not necessarily on the generation of additional knowledge. Appropriate goals have been identified and are as follows:

- \* An evaluation of existing research, breeding and production farms and research projects;
- \* The establishment of efficient operating research units in those areas that lacked these facilities in the past; and
- \* Initiating projects in agronomy and horticulture in the northern part of the country.

More than ninety research projects are being conducted on 22 research stations covering subjects such as animal feeding, breeding and management, plant production, pasture management, and horticulture. In the medium to long term, research is aimed at animal breeding and feeding by setting up programs in cross-breeding, calving percentage and calf mortality, establishing the most economic and productive weaning period, development of a feeds industry using local resources, the establishment of correct land-carrying capacities

for different breeds according to ecological conditions, and the improvement of pastures through a sound and long-term program of soil conservation.

During 1992 agricultural research established a well developed tissue culture laboratory. This newly acquired facility (R 850,000) will be responsible for the multiplication of cells of the growing points of date suckers by means of nutrient culture and thereby save the country valuable foreign exchange.

*Gellapt-Ost Research Station:* Gellapt-Ost had its origin in the late thirties. It comprises 13,737 ha and is situated 16 km northwest of Keetmanshoop. Two breeding projects for white Karakul are in progress, of which one, the recessive-white project, is ongoing since 1952. The other began in 1978. These two projects are at present being concluded and replaced by a single breeding project for white Karakul. The aim of the first white project was the creation of a recessive white Karakul from the black Karakul by breeding and selection. The other project constituted mating the recessive white Karakul to a dominant white to create a white Karakul with improved fleece qualities.

Gellapt-Ost is also known for its development of grey Karakul ewes with superior pelt traits. The aim is to improve the pattern and quality of the animal's fleece by breeding and selection. Research work on the Karakul includes mineral supplementation, flock management, sex physiology, and comparative growth trials, for example, versus Dorper, Damara, and Boer goat. On the pasture science side Gellapt-Ost evaluated four production systems representative of the Dwarf Shrub savanna.

*Hardap Research Station:* Hardap is 10 km from Mariental in the central part of the Hardap Irrigation Settlement. Plot No 46 was earmarked and in 1966 officially inaugurated as an experiment farm (Maritz 1988:7). The farm was selected for its representation of the soil types found on the scheme and could thereby serve as a model for the farmers of the Hardap Irrigation System. Seventy-five of the available 160 ha are used for applied research on sultana, table grapes, dates, wheat, maize, cotton, vegetables, and lucerne (Van der Westhuizen 1984:9).

*Kalahari Research Station:* The Executive Committee of the SWA Administration was looking for a potential experiment farm in the mixed tree and shrub savanna. Mr. R. Schröder, of the farm Rohrbeck, demonstrated his desire to establish such a farm in the area by selling a portion of his property for R 8 per ha. The farm was renamed with transfer on the January 31, 1958 to the Kalahari Experiment Farm (Agenbag 1987:7).

Kalahari, with an area of 10,215 ha and an average rainfall of about 180 mm per annum, is situated 32 km northeast of Stampriet. It is representative of the mixed tree and shrub savanna with its particular problems, most significantly, the severe internal parasite infestations. Karakul research forms the basis of activities, especially the development of the white Karakul and Karakul meat production (Van der Westhuizen 1984:9) and recently the introduction of Dorper sheep as meat producers as alternative to the Karakul. Considerable attention is being devoted to controlling internal parasites by means of rotational systems of grazing and the maintenance of the correct balance between sheep and cattle.

*Mahanene Research Station:* Mahanene is located 110 km northwest of Oshakati. The station was founded in 1970 and selected due to the similarity in soil types to those found in

Ovambo and Kavango. Research at the station focused principally on small-scale irrigation schemes using the water diverted from the Cunene river. The station also concentrates on the evaluation of new varieties of food crops in the Ovambo district, particularly mahango millet for which the station is the national center for plant genetic improvement research. New varieties are developed by collecting and evaluating traditional varieties grown by Namibian farmers and by testing breeding lines and varieties from various SADC national and regional programs. Other research involves the evaluation of sorghum, groundnut, and pigeonpea varieties.

*Neudamm Research Station:* During 1909 the German governor and his commission investigated the possibility of developing Neudamm into an experiment farm. The large number of marshes tied the knot and the experiment farm of Neudamm was established in 1920. Neudamm with an area of 10187 ha is located in the highland savanna, 35 km east of Windhoek. It has an annual rainfall of about 380 mm. Neudamm is the oldest experiment farm in Namibia and has become world renowned for its development of the shallow-curl and water-silk Karakul from the pipe-curl type Karakul by Mr. A.D. Thompson. On Gellap-Ost Research Station, breeding was also done on the shallow-curl and developed shallow-curl direction. Karakul research on Neudamm dates back to 1907 when the first Karakul sheep were imported. Color hereditary, especially the removal of the lethal gene at the white and grey karakul and spots and patches at the white Karakul was also intensely researched (Hugo 1985:7).

Pasture research evaluated the growth curves of seven climax grasses found in the highland savanna as well as the botanical species selection of Africander cattle.

*Omatjenne Experiment Farm:* Omatjenne was acquired for R 24,000 (R 1.95 per ha) with the objective of constructing the Omatjenne dam on the farm to provide job opportunities for poor whites. The authorities decided in 1938 to establish Omatjenne as an experiment farm, mainly for agronomy, both dry land and irrigated. Omatjenne is situated in the Thornbush savanna, 25 km west of Otjiwarongo. It has an annual rainfall of 450 mm and is the largest research station (17,666 ha) in Namibia (Barnard 1987:10).

Omatjenne is well known for its comparative beef production trials (adaptability, reproduction, calving percentage, and slaughter traits) which started in 1951 with 11 different beef breeds (Aberdeen Angus, Africander, Bonsmara, Brown Swiss, Hereford, Simmenthaler, Shorthorn, Pinzgauer, Red Poll, South Devon and Sussex) (Loubser 1987:5). These ended in 1989 with the evaluation of six breeds: Africander, Hereford, Nguni, Sanga, Santa Gertrude and Simmenthaler. Several breeds were incorporated while less successful breeds were excluded during the length of the trial. However, in 1972 the importance of the Sanga as an indigenous breed was acknowledged and also included.

The first input of the communal farmer into the commercial farming sector started in 1958 with the introduction of the hardened and adaptable Damara from Kaokaland in the Omatjenne improvement breeding trails, mainly as meat-production sheep. Several projects were concluded whereby the grazing habits of Boer goats and Damara sheep and bush utilization are correlated.

*Sandveld Research Station:* Sandveld is 60 km northeast of Gobabis and serves the farmers of the eastern sandy regions of the country. Research conducted there identified the most economic mating season and compared the beef production potential of Charolais cattle versus the Africander. Ongoing research includes the evaluation of dryland cultivated

pastures and the economic-biological evaluation of beef production under four fixed stocking rates with two frame size cattle types.

*Sonop Research Station:* The Sonop station was established in 1961 to find a solution to the poison-leaf problem. With an annual rainfall of 531 mm, Sonop is situated in the tree savanna and woodlands area of Namibia, 120 km north east of Grootfontein and has an area of 5,457 ha. The station renders service to the north and northeastern regions of Namibia especially as regards to the eradication of the magougif (*Dichapetalum cymosum*). Research includes poison-leaf management, the evaluation and effect of poisons, and controlled fire. Research projects currently undertaken are an assessment of the yield potential of an 18-month weaner production system and a comparison of such a system with the traditional 12-month weaner production system, as well as the economical and practical integration of game (Eland) with cattle under controlled extensive farming conditions. The eradication of bush by means of fire burning and dryland cultivated pastures (sorghum) are ongoing (Potgieter and Barnard 1988:3).

*Uitkomst Experiment Farm:* Uitkomst and Klein Uitkomst were acquired as an experiment farm in 1960 due to the inability of the previous owners to turn it into a viable farming enterprise (Van Zyl 1986:6) because it lies in the corner of the maize triangle. The farm was established as a reference center for agronomy and horticulture as well as milk and cream production. Uitkomst, with an area of 6,458 ha, is situated in the mountain savanna and karstveld of Namibia, 20 km south of Grootfontein and has an annual rainfall of about 600 mm. Uitkomst has at its disposal a Simmenthal stud for applied research on extensive beef production and complementary fodder products. A Brown Swiss stud as well as Simmenthal cows are used in a semi-intensive dairy and field dairy off the natural veld. Several horticulture crops (irrigated), dry-land crops (maize, sunflower, and sorghum), as well as bush eradication trials are conducted on a continuous basis (Van der Westhuizen 1984:9).

### **Nongovernmental Organization (NGO) Sector**

The Rössing Foundation is the only private agency in Namibia carrying out scientific research into rain-fed crop production which is of relevance to the needs of farmers in Ovambo and Kavango. This adaptive research was carried out at the Okashana Agricultural Training Center which was established in 1986 (NEPRU, 1990, A7). However, in 1992, the Rössing Foundation decided to cease agronomic research activities.

### **First National Development Corporation (FNDC)**

FNDC has been involved in agriculture since 1978 and played only a supplementary role to that of the central and second tier authorities. Due to the lack of information on climate and the reaction of crops in the communal areas, "energy centers"—Musese, Shitemo, Vungu and Shadikongoro (Kavango) and Katima Farm (Caprivi) were established to provide job opportunities at an advanced stage. A research station however, was established at Musese in September 1985 to do scientific research into specific practical problems. Some agricultural research activities are carried out by the FNDC, for example, the development of commercial date cultivation, commercial rice production, and crop production research, mainly in Kavango, Damaraland, Namaland, and Caprivi.

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## Annex 3

### Livestock Research

#### Livestock in the Agricultural Sector

Namibia is a net exporter of beef, mutton, venison, wool, mohair, hides, skins, and karakul pelts. Beef and mutton production contribute 87% and 11% respectively, to the country's gross agricultural income. Agriculture as a whole contributes a total of 10.2% of the GNP of the country.

According to the veterinary services, in 1990 Namibia produced 75,454,000 tons of beef, 16,750,000 tons of mutton and goat meat, 16,759,000 liters of fresh milk, and 2,920,000 dozen eggs. In the same year, 50,635 game carcasses were harvested for export; 1,878 tons of wool and 113 tons of mohair were produced as well as 5,959,000 kg hides. Small stock skins numbered 425,750 pieces. From the Karakul sheep 430,000 pelts were produced.

Nearly 85% of total land area is used for stock farming of which 33 million ha is for cattle, 10 million for mixed cattle and sheep, and 26 million ha for small-stock farming.

#### *Livestock numbers, breeds and distribution*

In July 1992, the Namibian stock census, compiled by the Directorate of the Veterinary Services, gave the following figures for the main species:

cattle: 2,322,155 head  
sheep: 3,166,197 head  
goats: 1,874,420 head  
horses: 47,189 head  
donkeys: 175,732 head  
pigs: 15,141 head  
poultry: 438,825 head  
camels: 15 head  
ostrich: 11,417 head

The principal breed of cattle is the indigenous Sanga, though 20 different cattle breeds are registered with the Stud Book Association. The communal areas are mainly grazed by Sanga and Sanga crossbreeds. The large commercial farms are stocked with purebred exotic animals (approx. 100,000 head) or with crossbreeds of different exotic breeds (approx. 900,000 head). The most common exotic breeds found in Namibia are the Afrikander, the Brahman, the Simmental, the Bontsmara, and the Santa Gertrudis.

There are two main breeds of sheep in the country: the Karakul (835,697 head) and the Dorper (1,744,614 head). As far as goats are concerned, the Boergoat breed is dominant (1,112,119 head). In the northern areas the indigenous Sanga goat is dominant. Among other breeds, it is worth mentioning the Angora with approximately 20,000 head, which is used for mohair production.

Large stock farming is done in the central and northern parts of higher rainfall, whereas sheep farming is concentrated in the drier southern areas. Goats are evenly scattered

throughout the country.

### *Animal health*

Animal health is not a serious constraint to livestock development in Namibia, the major exception being the risk of FMD (Foot and Mouth Disease) and CBPP (Contagious Bovine Pleuro-pneumonia) in the north. This has a direct impact on exports to RSA and the EC, as this valuable export market is dependent upon the animals being guaranteed free of FMD. A Veterinary Cordon Fence has been established to block the southerly movements of livestock. Neither live animals, nor untreated animal products are allowed to pass from north of the fence to the south.

Other diseases of major economic importance include Anthrax, Blackquarter, Botulism, and Entero-toxaemia. In the commercial and communal farming areas south of the cordon fence, vaccination of cattle against anthrax, heifers against brucellosis, and dogs against rabies is compulsory. Higher rainfall and poor traditional livestock management practices in the northern parts of the country are responsible for high mortality and morbidity rates, with a high incidence of external and internal parasitic diseases.

### *Production systems*

In Namibia, two major livestock production systems exist: a large extensive farming system and a small-scale traditional crop-livestock production system. The first is found mainly in the commercial sector and represents 4,200 farmers farming about 36 million ha of private land. The average holding size is 8,600 ha.

The communal sector comprises about 120,000 farmers (or about 95% of the total) who farm about 23 million ha of land. In the northern communal regions nearly 60% of the total population is concentrated on about 2.3 million ha of farmland. In the communal system, the average size of the herd varies from 30-50 head in Kaokoland to 12-15 head in Ovambo. Nearly 60% of the households said they have no cattle at all. Animal traction was used traditionally, but seems to have decreased over the past 10 years for many reasons. The sizes of the small stock herds are usually less than 20, with a large number of households without any sheep or goats (FAO/IFAD 1992).

## **Livestock Research**

### *Special livestock projects*

One major livestock project has recently been launched and another is currently under discussion. These are the Sustainable Animal and Range Development Programme (SARDEP) and the Northern Livestock Improvement Project.

SARDEP was started in October 1991. The program is to continue 10 years and is supported by the German government through the GTZ. This program is being implemented in three pilot areas in the Omaheke-Otjo-zondjupa (Hereroland) and in the Karas-Hardap (Namaland) regions. The program may possibly be extended to three other pilot areas in a third region, the Ovambo. Extension is now being discussion. The major objectives of SARDEP are the following:

- \* to contribute to sustainable utilization of natural resources;
- \* to reduce man-induced land degradation and desertification;
- \* to improve the welfare of the animal population in the program areas.

The Northern Livestock Improvement Project is located in the Northern Communal Areas and will probably include the regions of Kaokoland, Ovambo, Kavango and Caprivi. Its main aim is to combat poverty. The project will address the problems of animal health, animal productivity, training, infrastructure (water, roads), access to credit, and marketing in these four regions. IFAD and FAO are now preparing a project proposal based on a socioeconomic and production systems study (SEPSS) carried out in 1992.

In addition to these two projects, the EC is undertaking a Livestock Survey in the Northern Areas of Namibia. External assistance is also being provided to the veterinary services to improve animal health, mainly in the north, so that the cordon fence can be removed or relocated.

The SARDEP project is more research-oriented than the others and is, in fact, executed by DAI. However, all these projects offer excellent opportunities for applied and adaptive livestock research. This, however, requires personnel, both at the researcher and the technician levels. The question that remains is if there is currently enough staff available to carry out all research that is needed.

#### *Livestock research personnel*

Because of the importance of the livestock sector, both for the subsistence of the population and for the revenues gained from export, livestock research has received high priority within MAWRD. In 1992, researchers directly involved in livestock research (Director and Deputy Director not included) represent approximately 45% (nine out of a total of 20) of the scientific staff of DAI. When technical staff are included, this percentage comes to 60% (45 out of a total of 75). Indirect support for livestock comes from three researchers in the Pasture subdivision and from three researchers in the research laboratories. The total number of researchers, however, is quite small.

#### **Livestock Research Agenda**

Before listing the ongoing research projects, it is important to discuss how the research agenda is set and what mechanisms are currently in place to guarantee that the research priorities take national objectives into account.

#### *Research planning*

Program and project identification are done by individual researchers based on consultations with extension services staff or directly with farmers. Except for farmers' days, during which researchers, extension services staff, and farmers meet, and possibly the annual meetings of the Agricultural Scientific Society of Namibia (AGRISSON), there are no formal fora and no official mechanisms to discuss the key problems research should tackle.

The researcher, however, is responsible for writing a detailed project proposal which is discussed within the subdivisions and with the Deputy Director. When approved, a

Programme Committee meeting is called, on an “ad hoc” basis, to endorse the project. The Programme Committee is composed of the Deputy Director of research, the two Deputy Directors of Extension Services and the four chief research officers. This is a mechanism providing the extension services an opportunity to be informed and to comment on the relevance of the research proposal.

The project document is sent, on the initiative of the researcher, to a few external advisers to check its scientific soundness and to get advice on the experimental protocols.

The Permanent Secretary of the ministry finally receives the project document for approval, in particular for its financial implications.

### **Ongoing research projects**

Tables 3.1 to 3.4 give an overview of the ongoing livestock research projects together with time allocation (in person/months) for both the researchers (R) and the technicians (T), where available. Without judging the relevance or scientific quality of these research projects, it can be seen that the number of projects is quite high compared with the human resources available. As a consequence, the research time allocation for each project is low and very few projects involve more than one researcher. Joint projects are the exception, with only two projects executed by staff of two subdivisions.

Another major characteristic of these research projects is that they are almost exclusively carried out in research stations. On-farm research in the commercial farms is exceptional and has not yet been initiated for livestock research in the communal areas.

### **Livestock Research Facilities**

MAWRD owns and runs 29 research stations and production farms (see map 3 for their locations). DAI owns and runs 19 of these field centers: 12 research stations, two production farms, one Karakul testing center, and four research units at agricultural colleges. These farms are usually large (5-10,000 ha) and significant numbers of livestock can be found at almost all these units.

MAWRD is presently reviewing the situation of all research stations and production farms to decide if it wishes to keep them for research or if they should be turned over probably to the private sector. At present, seven of the stations are used for livestock research, as well as the production farms, three of the college sites, and the Karakul testing center. Pasture research is also carried out at these units. The following list gives the name of the unit with the species and breeds involved in research:

Gellap-Ost Experiment Farm:	Karakul sheep and Boer Goats;
Hardap Karakul Test Centre:	Karakul sheep;
Kalahari Experiment Farm:	Karakul and Dorper sheep;
Neudamm Experimental Farm:	Cattle performance testing centre (six breeds); Karakul sheep; Afrikaner and Boer goats;
Omatjenne Research Station:	Afrikaner, Sanga/Nguni, Bonsmara, Simbra, Simmentaler cattle; Damara sheep; and Boer goats;
Sonop Research Station:	Afrikaner, Santa Gerdrudis, Sanga, Nguni cattle;
Sandveld Research Station:	Sanga, Simmentaler x Afrikaner cattle;

In addition to these units, some others are worth mentioning, in spite of the fact that they do

not have specific research programs. They monitor the performance of different breeds in their specific environment:

Koppieslaagte Production Farm: Angora goats;  
 Pfannental Production Farm: Merino and Dohne-merino sheep;  
 Uitkomst: Simmentaler and Brown Swiss cattle, Boer goats;

Finally, the Hardap Experiment Farm has a small-scale research project on ostriches. The Escourt Production Farm monitors different game species: Oryx, Springbuck, Ostriches.

Table 3.1. Agricultural laboratory and meat science subsection projects

Research Project	Time Allocation (person/months) per year	
	Researcher	Technician
The estimation of herbage intake and nutrient selection of cattle grazing the Cametehorn Savanna of Namibia.	0.3	3.7
The effect of tannins on the digestibility of indigenous vegetation in Namibia.	1.8*	0.0
Chemical composition of indigenous browse and grass species.	0.9	0.0
Maximizing of P/E ratio in the nutrients absorbed by ruminants fed low-quality forage-based diets.	4.2	0.0
The effect of docking on carcass traits and meat quality characteristics of three sheep breeds of Southern Namibia.	3.7**	1.4
Comparative carcass traits and meat quality characteristics of six breeds of cattle, weaned and slaughtered at two different ages under extensive range conditions in Namibia.	1.6***	0.5

\* plus one expatriate.

\*\* plus 2.4 persons/month technical assistance.

\*\*\* plus 3.9 persons/month technical assistance.

Note: Only the projects related to livestock research are mentioned. In other words, the projects carried out by the soil subsection are not mentioned. In the rangeland nutrition subsection, four research projects are ongoing, while in the meat science subsection two research projects are in progress.

Table 3.2. Large stock research projects

Research Project	Time Allocation (person/months) per year	
	Researcher	Technician
A biological & economic evaluation of beef production under four stocking rates and with two frame-size types of cattle for the eastern parts of Namibia.	1.2	19.2
Evaluation of the productivity of six cattle breeds in Namibia.	0.7	0.1
Evaluation of breeding strategies with the primary objective of optimizing efficient extensive beef production in Namibia.	1.0	0.0
Genetic conservation of indigenous Sanga cattle.	2.4	0.0
Genetic improvement of the national beef cattle population.	0.8	3.6
Evaluation of various weaning strategies.	0.6	0.0
Evaluation of the productivity and efficiency of production of small- and large-frame size animals within breeds.	1.4	2.4
Evaluation of production systems: a fenced rotational grazing production unit with optimum management versus an unfenced rotational grazing production unit with minimum management inputs.	1.4	2.4
Evaluation of udder development in heifers as a selection parameter for productivity.	1.4	2.4
Evaluation of fattening systems of oxen on natural grazing.	1.4	1.2
Evaluation of pearl millet as animal feed in all farming areas.	1.4	1.2
Evaluation of electronic feeders.	1.4	1.2
An investigation into the utilization of draught power in communal areas.	1.2	0.0
Production unit: semi-intensive milk production in the northern areas of Namibia.	1.2	0.0
An investigation into the tick resistance of purebred and crossbred cattle.	1.2	1.2
Evaluation of the production potential of the Eland in the northern farming areas of Namibia.	1.2	1.2

Note: These 16 research projects add up to 19.9 persons/month of researchers and 36.1 persons/month of technicians of the large stock subdivision, with only one project receiving more than two persons/month of researcher time and one project receiving 53% of the total technician time.

Table 3.3. Small stock research projects and game projects

Research Project	Time Allocation (person/months) per year	
	Researcher	Technician
The breeding of a spotless lethal free white Karakul.	0.4	9.6
Production unit with Merino and Dohne Merino sheep.	0.4	9.6
Economic viability of the Angora goat in Southern Namibia.	0.4	18.0
Breeding vital white Karakul sheep from "du Preez" sheep.	0.4	1.2
The breeding and improvement of a recessive white Karakul.	0.6	11.0
Centralized performance testing of mutton rams.	1.0	7.0
Progeny testing of Karakul rams.	1.2	21.6
Comparative study of Karakul and Dorper for meat production.	1.0	2.4
Evaluation of five mating seasons per year for Dorpers.	1.4	3.6
Comparative study between the Dorper and Karakul in the feedlot.	1.2	2.4
The management and marketing of Gemsbuck.	0.6*	2.4
Evaluation of partially extensive ostrich farming.	1.2	3.6
Evaluation of different aspects of intensive ostrich farming.	1.2	3.6
The comparison of millet with yellow maize as ingredient in ostrich growth ratios.	0.6	0.6

\* Extension officer.

Note: These 14 ongoing research projects carried out by the small stock subdivision add up to 11.0 persons/month of researcher time and 96.6 persons/month for technicians. If the researcher time is more or less equally distributed, five projects required nine persons/month or more of technicians each.

Table 3.4. Pasture projects

Research Project	Time Allocation (person/months) per year	
	Researcher	Technician
Control of reeds in the fish water at Hardap irrigation scheme.	1.2	4.8
The influence of goat browsing on the botanical composition of natural vegetation and the diet of the Boer goat.	2.4	3.6
Evaluation of breeding strategies with the primary objective of optimizing efficient extensive beef production in Namibia (jointly with the large stock subdivision).	1.2	4.8
A biological and economic evaluation of beef production under four stocking rates and with two frame-size types of cattle for the eastern part of Namibia (jointly with the large stock subdivision).	3.6	0.0
Determination of the dietary composition and utilization pattern of the Boer goat and Damara sheep.	2.4	0.0
Chemical control of Prosopis.	0.6	0.6
An examination towards the connection of plant pathogenic organisms and the natural dying back of Black Thorn in northern Namibia.	0.6	0.0
Pasture evaluation with the aid of remote sensing.	2.4	0.0
The introduction of various species of grass and browse as dryland pastures in Namibia.	0.5	0.0

Note: These nine projects executed by the pastures subdivision represent a total of 14.9 persons/month of researcher time and 13.8 persons/month for technicians.

### Future Priorities

One overall policy objective of the government is “the optimal management of the natural resources of the country in an effort to improve quality of life among the poor rural community dependent on agriculture.”

This objective implies a significant shift in research from the large commercial livestock farm sector towards the communal lands of the northern regions. However, as the most common production system found in the north is the mixed farming system, livestock research will still have a key role to play. However, it will have to be done in closer cooperation with crop research.

There will be major consequences of this policy objective for livestock research:

- \* It will have to contribute to socioeconomic surveys in the north to help increase

understanding of the mixed farming system and the exact contribution of the different livestock species.

- \* It will need to launch specific livestock surveys to estimate the different production parameters and identify major constraints to livestock productivity.
- \* Intensive on-farm research in the communal areas will need to dominate over on-station research.
- \* An animal traction research program will have to be initiated.
- \* Some livestock researchers will have to be relocated to the north to take part in the multidisciplinary teams.

Some of these new priorities have already been taken into consideration in the planning of research activities for 1993 and onwards, especially by the large stock subdivision which is the most directly concerned. However, a clear reallocation of resources is needed and should be worked out rapidly.

## **Conclusions and Recommendations**

Livestock research in Namibia has traditionally focused on ruminant species (cattle, sheep, and goats) bred throughout the country. To be able to meet that demand, facilities were built all over the country. Facilities in the communal areas, when still under the jurisdiction of the Second Tier Authorities, were mainly used as demonstration centers.

On three of the stations (initially only one), official testing of purebred bulls from any farmer in the country is carried out. This is done as part of the performance testing scheme.

Since independence, research priorities have changed. New projects have to be designed and launched to serve national development objectives in all the communal areas. As all resources, in particular, human resources, are limited, DAI of the MAWRD will have to carefully revise its strategy and activities.

The main recommendations that can be formulated at this stage are summarized as follows:

- \* Planning and priority setting of research projects should be improved, and done in closer cooperation with the research service's potential clients (extension services and farmers). This implies the establishment of some formal links between the different actors.
- \* The number of research projects should be limited to a minimum so that a significant mass of researchers per project can be reached and the participation of researchers from different subdivisions in the execution of projects should be promoted.
- \* The number of research stations and production farms should be reduced in order to free financial resources to increase the numbers of research staff, rehabilitate those stations which are essential, and promote on-farm research.

- \* Livestock researchers should be trained in livestock and socioeconomic survey techniques so that they can initiate their own research in the communal areas.
- \* Some livestock researchers should be relocated to the communal areas to be part of multidisciplinary teams and to work in the field in closer connection with the farmers.

## Annex 4

### Crops Research

The crops research program in Namibia is in its formative stages and is responding to the call from the post-independence government of Namibia to contribute to national development objectives:

- \* Improve food security (paragraph 36 of chapter 7 of the Draft Transitional National Development Plan (TNDP));
- \* Transform communal farming into commercial farming (paragraph 37 of chapter 7 of the TNDP);
- \* Increase and sustain agricultural production and productivity and diversify agricultural production through research, training, etc. (paragraph 39 of chapter 7 of the TNDP).

Emphasis is on the northern region communal areas where 60% of the country's population lives and which is mainly dependent on subsistence agriculture. The government recognizes the need for better technical services in both livestock and arable farming to enable the communal farmers to (a) increase their productivity under existing production systems and (b) get the confidence to invest in more profitable crops (paragraph 40 of chapter 7 of the TNDP).

The preparation, acceptance, and funding by the government of the Sustainable Agricultural Development Program for Northern Namibia, whose main focus is to set up a sustainable research base to serve the communal areas in the northern region, is a testimony to the government's commitment to improving production and productivity in those areas.

ICRISAT and SADC played major roles in preparing for and getting the crop research program established in the northern region and continues to give professional and technical support to the program. In the absence of formally structured research programs the following gives an overview of the crop research activities of the Namibian NARS.

#### **Trials**

##### *Pearl millet research, 1.3 researcher years*

This is the only crop for which a full-scale national breeding program is being developed. Pearl millet is the dominant cereal in the north and contributes 24% of the total calorie intake of the country compared with 23% for maize (SADCC Food Security Quarterly Bulletin, June 30, 1991).

The existing local varieties are generally tall, late maturing, and low yielding. The program is breeding for yield, stability, and quality traits. Program activities include the following:

- evaluation of Namibian germplasm SI progenies,
- evaluation of F1, F2 progeny sets,
- evaluation of introductions,

- crossing of land races and superior introductions and evaluation of the progenies,
- random mating of Namibian gene pools and composites,
- advanced and late maturing variety trials,
- Namibian national variety trials—both on-station and on-farm.

Breeding activities are centered at Mahanene. Mashari is the main support location for the breeding nurseries and trials. Limited pearl millet breeding is done at Ogongo.

*Maize research (dryland), 0.15 researcher years*

The objective has been the evaluation of cultivars for yield at various locations and trials based on introductions from the region:

- SARMEIT yield trials for the SARCUS region,
- S.A. national maize trial,
- Namibian national cultivar trial—both on-station and on-farm (large scale commercial),
- CIMMYT regional early and medium maturing variety trials.

The first two trials have been going on for several years and are more of regional than local interest. The trials are conducted at Uitkomst and on FNDC's Kavango farms. Limited maize agronomy research is done on fertilizers and on plant population studies.

*Sorghum research, 0.02 researcher years*

The objective is to evaluate cultivars for yield and grain type. Trials based on introductions include the following:

- the regional advanced white sorghum variety trial;
- the regional advanced red sorghum variety trial;
- the Namibian national variety trial—both on-station and on-farm from 1992; advanced, late, and early variety trials;
- evaluation of RSA sorghum cultivars;

The majority of the trials originate from SADC and ICRISAT SMIP and locations include Mahanene, Ogongo, Uitkomst, Mashari, and Musese (FNDC). Agronomy research is limited to plant population and N-P-K studies at Uitkomst and Musese, but very little is being done.

*Legumes research, 0.23 researcher years*

The objective is to evaluate promising germplasm selections, advanced breeding lines, and cultivars for yield and adaption to the Namibian environment. All trials are based on introductions and include the following.

- Beans:**
- The International Bean Yield and Adaption Nurseries (IBYAN) for bush and climbing types consisting of six nurseries and 92 cultivars in total,

- The Southern African Zonal Bean Yield trial.
- Groundnuts:** - The SADC regional groundnut variety trial—Spanish  
4th international early maturing groundnut variety trial,  
- The national groundnut variety trial.
- Cowpea:** - IITA regional cowpea trial,  
- National cowpea yield trial.

All trials come from outside sources, notably CIAT, IITA, and ICRISAT. No legumes agronomy research is being carried out at the moment.

*Oil seeds research, 0.21 researcher years*

As for legumes, the objective is to evaluate promising germplasm selections, advanced breeding lines, and cultivars for yield and adaption to the Namibian environment. Trials have included the following.

- Cotton:** - National cotton cultivar trial 1991 from RSA,  
- Work on water-harvesting from cotton initiated at Uitkomst during the 1991-92 season.
- Sunflower:** - National sunflower cultivar trial 1991-92 from RSA.
- Bambara nuts:** - Introductory variety trial at Mashari, Ogongo, and Mahanene.

**Irrigated Crops**

During 1991, there was no research officer directly responsible for research work on irrigated crops due to the transfer of one officer to another ministry. A replacement was appointed in 1992. Many trials, however, were maintained by experienced research technicians at Hardap Research Station. Some trials are regional trials supervised from RSA. These included variety trials on wheat, maize, cotton, various vegetables, and several variety and agronomic trials on lucerne. Observational trials are conducted at Hardap on grapes, dates, and other fruit trees. The Mannheim Experiment Farm is mainly concerned with demonstrations of irrigated fruit trees and fodder production with some trials on irrigated cotton.

**Crops Research Staff**

The agronomy researchers within DAI available to handle the listed trials are one chief researcher and three research officers (two are new in the agronomy section, one a new recruit and the other recently transferred to agronomy research).

The chief researcher, who has overall responsibility for running the agronomy section, has very little time for research. Until 1991 there was less than one person year of researcher time from DAI going into crop research. This very limited research time was thinly spread over a long list of commodities. It was thus unlikely to lead to any noticeable impact on the

crop commodities under research.

The contribution of trained technicians into the crop research effort has been substantial. ICRISAT has provided on-the-job training to one senior research technician (now in charge of the breeding program at Mahenene), and two research technicians who attended the six-month course at ICRISAT. These now manage the trials and breeding nurseries at Mashari. The dryland crop research effort in the division has depended heavily on these inputs to the program. The work on irrigated crops is similarly dependant on well trained research technicians. Table 4.1 gives a brief overview of the research stations where crop research is being carried out or is planned for the near future.

The crop research program has a large number of research stations that are fairly well developed and equipped. By contrast there is a dearth of crop researchers in the system, and the few who are available have very little time for research on the large number of commodities.

### **Observations on the Crop Research Program and Organization**

The review team noticed the following with respect to crop research in DAI:

- \* Most of the research nurseries as well as the majority of trials are of a regional nature or origin. The regional bodies and international agricultural research centers in the region play a dominant role in directing the activities undertaken by the crop research program, resulting in minimum of departmentally driven crop research program formulation or experiment design. The input from ICRISAT in strengthening local staff has however helped in the construction of national trials relevant to local conditions and requirements, especially for millet.
- \* The division does not take a leading role in program planning, formulation, or experiment design. Furthermore it takes a secondary role in the evaluation of research programs. There is a minimum in formal departmental evaluation and monitoring of crop research activities.
- \* DAI fully recognizes the inadequacy of its researcher numbers in crop agronomy. There is also an apparent dearth of qualified Namibian agronomists. Plans have been made to seek financial resources to recruit experienced expatriate researchers while at the same time educating and training Namibians.
- \* Linkages and interactions with extension have been initiated though at present they remain weak, informal, and unstructured. There is still no formal input by extension agents or small-scale communal farmers into the crop production.
- \* Pearl millet receives the bulk of the current research resources (1.3 person years researcher time in 1991). It is the dominant cereal in northern Namibia. Maize, groundnuts, and cotton take a modest share (0.15, 0.21, and 0.13 person years, respectively). Other crops receive only token attention.
- \* Little attention is given to formal program formulation and priority setting to help division staff make choices that would ensure effective use of limited resources.

Table 4.1. Research station overview

Name of station	Area (ha)	Staffing	Comments on research activities and research support facilities
Mahanene	120	1 chief researcher 1 senior technician 1 technician 10 general hands	The main crop research center. Base of pearl millet breeding program. Facilities adequate, while some improvement is desirable. Lack of office is a major deficiency. Former office now turned into health clinic.
Ogongo	4,150	1 farm manager (acting) 2 technicians 45 general hands	An agricultural college with 13 qualified staff. Main pearl millet seed production center. Test site for most trials. Facilities generally adequate and housing expansion in progress. Upgrading of some components needed, in particular, laboratory, library, and crop processing facilities. Facilities for livestock research available.
Uitkomst	6,400	1 farm manager 1 technician 22 general hands	The main center for maize and cotton research. Facilities in good shape and fairly adequate including potential to support livestock research.
Mannheim and Scott	50 and 4,900	1 farm manager 1 technician 45 general hands	Main center for horticulture trial demonstrations. Cotton research since 1991. Little crop research done. Feed and fodder production under irrigation is a major activity. Previously a rehabilitation farm. Facilities for livestock research available.
Maslari	4,300	1 farm manager 3 technicians 2 technical assistants 29 general hands	A former agricultural college. The main substation for pearl millet research. Facilities generally good and adequate though some upgrading is desirable. Facilities for livestock research available but needs rehabilitation.
Ragani	16	1 farm manager 11 general hands	A recently acquired location. Previously a police vegetable garden. Facilities upgraded by the newly built ADC. Land improvement urgently needed. No crop processing area available.
Katima	30	1 caretaker (manager) from extension	Previously managed by extension and recently transferred to research. A sewerage irrigation farm with about 50% under a center-pivot irrigation. The land and irrigation system need rehabilitation, no fencing, no buildings, etc. A location from which collaboration with Zambian NARS could be developed.
Hardap	160		Available for agricultural research for the Hardap irrigation scheme from the Hardap Dam. Wide range of crop introductions and trials: maize, wheat, barley, vegetables, fodder, dates, grapes, etc. Research on intensive ostrich production.
Others			These include the FNDC farms in Kavango (3), and the Rössing Foundation Shankara Scheme which do some limited research principally evaluation of cultivars for own use and limited fertilizer use experiments. All the locations are well equipped and staffed for commercial production with irrigation except Musese FNDC farm where there is limited irrigation.

- \* There is little information available on crop production and associated farming systems in the communal areas in northern Namibia. Small farmers' perceptions of their agricultural problems and constraints, mechanisms to set priorities for investments and value judgements, as well as their approach in evaluating technical innovations are little understood. Studies which are being done on agricultural socioeconomic factors are uncoordinated and donor-project driven.
- \* The crop farmers in the communal areas of the north operate a farming system in which crop-livestock interactions are intricate and complex. This emphasizes the importance of research to focus more on the system rather than on individual components in isolation. The current agronomy research program has a minimum of operational linkages and interactions with other research sections in the division. The deployment of the chief agronomist at Mahanene while other chief researchers remain in Windhoek appears to be less important in this lack of interaction than the inadequacy of a formal program formulation mechanism involving all research chiefs.
- \* For the past two seasons DAI has been involved in pearl millet seed production to facilitate the introduction of the newly released *Okashana 1* variety. However, there has been no formal cultivar release. There are neither seed certification procedures nor regulations. In their absence, it is not easy to promote private seed production while ensuring that farmers continue to get quality seed.
- \* Prior to independence the research centers in the communal areas, run by the Ovambo, Kavango and Caprivi administrations, were not involved in research. They were geared to training and extension. This is reflected in their staffing. The "technicians" on these stations from the previous administration are now "agricultural officers", with the minimum qualification requirement of a post-standard 8 diploma issued by the post-independence local administration. These staff need to be regraded, reoriented, and retrained to be brought up to the level of their counterparts who hold postmatric diplomas, and also to provide efficient and effective research support.
- \* The flow of crop research information to DAI, within the division itself, and from the division to its clients is not formally structured. To date the crop research program has not contributed much to the division's publications Agri-Info and Agricola.
- \* The crop research program has done on-farm trials only in the large-scale commercial areas, not in the small-scale communal areas. In 1991 on-farm trials were initiated in the communal areas with participation by extension and FNDC. Training of extension officers to improve the effectiveness of their participation is in progress.

## Recommendations

In order to strengthen the organization and ensure more attention is given to the policy objective of uplifting agricultural production and productivity in the communal areas, the review team has made the following recommendations:

### *1. Multidisciplinary research center in the north.*

A multidisciplinary research team is needed to effectively address the agricultural production constraints of the communal area farming system. The team would consist of members with disciplinary competencies in crop breeding and agronomy, pasture management, animal husbandry, farm management economics, sociology, and land conservation. The team would best be located at one of the main research centers to maximize the benefits of interaction on a regular basis.

For the optimum effectiveness the research center would be best located in the communal areas of the north. The team recommends that the multidisciplinary research center be based at Ogongo for the following reasons:

- \* Ogongo has the advantage of being in the center of an area where over 40% of the population, and more than 70% of the communal area farmers dependant on crop-livestock farming systems reside.
- \* The Ogongo area environment is harsher than Okavango, making adaptation of successful technologies to less harsh environments in the east an easier task.
- \* There is already a nucleus of scientific staff of 13 college lecturers with potential to contribute to the multidisciplinary team's research. They can provide supplementary and complementary specializations and input that may help to focus research through formal and informal interactions.
- \* Ogongo is only 60 km from the town where the regional extension staff live in the heart of the communal area. This physical proximity would make it easier and cheaper to establish and maintain effective, formal research-extension-farmer linkages and interactions.

The envisaged minimum size of the multidisciplinary team is nine researchers. Subsequently a smaller team, about half this size, could be based at Mashari.

An integrated research approach, with a multidisciplinary team under one team leader will go a long way to facilitating and improving interdisciplinary collaboration and interaction.

### *2. Recruitment and staff development*

Recruitment and special training of staff with the required disciplines might need special measures if no suitably qualified candidates respond to advertisements. There is already a recognized shortage of qualified crop scientists in the country. The team endorses the strategy developed by the Directorate of Forestry to recruit expatriates in the short term while educating and training Namibians. Efforts must be intensified to obtain special funding through which candidates can be identified for education to BSc and MSc levels.

### *3. Program formulation and priority setting*

It is essential to ensure that research is maintained efficiently focused on national needs and

policy objectives. Program formulation with clearly set out, widely understood, and transparent priority-setting mechanisms will facilitate this. There is little formal program formulation within DAI and in the crop research program. This makes monitoring progress and evaluation difficult. Priorities are equally unclear to agronomy researchers with respect to the multiplicity of commodities claiming attention.

The review team recommends that a formal program formulation and priority setting mechanism be instituted. It should include clear and transparent priority-setting mechanisms together with a formal program review, evaluation, and monitoring system to ensure that proper guidance is given to crop agronomy researchers.

#### *4. Provisional priority research areas*

Within the communal areas of the north pearl millet is undoubtedly the dominant cereal. Nationally its contribution is equal to that of maize. Research is giving priority to increasing the productivity of pearl millet in the communal areas and should also investigate the processing and utilization of mahngu. In the short term it is recommended that the multi-disciplinary team focus on pearl millet improvement and the associated cropping systems in conjunction with the pasture, feed, and fodder perspectives of the crop-livestock farming system of the north.

The pearl millet breeding program focuses on the production of open pollinated varieties from both the Namibian pearl millet germplasm collection and introductions from similar environments. Efficient use of water and maintaining soil fertility are areas of crop agronomy research with high potential impact on crop productivity in the short term. Results of diagnostic studies to identify and quantify social, economic, and technological constraints to crop productivity and production should help to define the research focus of the multidisciplinary team. The team should focus primarily on adaptive and applied research.

The introduction and evaluation of potential cash crop options to enable research to provide technologies that can finance purchased inputs in the medium term should be continued on a selective, closely monitored, cost-effective single or dual test-location basis.

#### *5. Collaboration with regional bodies, regional NARS, and international agricultural research centers operating in the region*

Namibia's government does not have resources to establish multidisciplinary research teams capable of conducting integrated research on all crops grown in the country and the introduction of potential cash crops. As a member of SADC and SARCUS, however, Namibia has access to products of research from other NARS, regional research institutions, and international agricultural research centers operating in southern Africa. To facilitate maximum exploitation of these technology sources, DAI must have the capability to introduce and test, on a regular basis, available crop cultivars and agronomic technologies for their adaptation to local conditions. The multidisciplinary team to be based at Ogongo should manage these introductory trials. Their effective implementation would require the following:

- thorough understanding by the team of the new crops' requirements based on the agroclimatic and socioeconomic environments in Namibia,
- team capability to identify from regional sources potentially adaptable technologies,

- establishment of a regular program of trials based on introduced technologies.

The Division must maintain effective operational linkages with all possible sources of technology in the region. Collaborative research activities with regional institutions and international agricultural research centers in the region must be maintained and, where necessary, strengthened.

#### *6. Rationalization of research sites*

With the need to concentrate staff in one or two centers for maximum interaction (see details above) the team recommends that Ogongo be set up as the multidisciplinary research center and subsequently Mashari as a smaller substation. No resident crops research officers should be posted elsewhere in the north. The role of the other research stations (listed in table 4.1) should be reviewed carefully in relation to the involvement of extension in on-farm research and on test sites at the agricultural development centers (ADC).

#### *7. Information management*

There is no formal system for managing information on crops in DAI. The situation is ad-hoc for incoming, internal, and outgoing information. For the division to benefit from regional sources of technology, international information sources, and individual internal project information, there is a strong need for a systematic approach to information management within the division.

A good librarian/information officer would be an asset for both the college and the proposed multidisciplinary research center at Ogongo. A periodic reporting system, if instituted, may help internally to keep officers and policymakers informed. As technologies become available to farmers, publications should be formally prepared for use by extension and farmers. In this regard the information officer could play a leading role.

#### *8. Variety release procedures and seed production*

Many countries in the region have their own cultivar release and seed certification regulations and procedures. At present no such regulations and procedures exist in Namibia. It will be necessary to institute legal regulations governing the release of crop cultivars and the production of certified seed to support the crop breeding program and ensure that the farmer receives quality, certified seed, true to type. Government policy guidelines in a number of areas should be drafted and considered:

- to regulate the procedures for testing products of the breeding programs;
- to make decisions regarding recommendations for the release of new cultivars to farmers;
- to produce and certify seed of recommended cultivars for use by farmers.

DAI should take the lead in this.

## *9. Research farm-support services*

Good farm support services are essential for quality research. When researchers are off the station, data quality is totally dependent on the inputs from the farm management and technical staff on the farm. Good support staff is critical. Support staff must be able to use the physical facilities properly and fully appreciate the precise nature of research. There are neither fully fledged farm managers nor technicians on the following crop research farms: Ogongo, Mahanene, Mashari, and Katima. Bagani and Mannheim are managed by senior agricultural research technicians and on the whole are better managed than the others, except for Mahanene where the chief agronomist doubles as farm manager.

If a multidisciplinary research center is established at Ogongo is initiated and Mashari becomes a substation, the need to upgrade the management of both locations must not be overlooked if the benefits of a concentration of researchers is to be realized. For Ogongo it is recommended that the farm manager post be upgraded to control technician level in order to attract the best person for the job. It will be necessary that the farm manager be of adequate status and knowledge to liaise and interact as an equal with the research and college staff. The farm manager must be able to fully understand the objectives of all experiments on the farm and their implications with respect to management considerations in the short, medium, and long terms.

## *10. On-farm research*

DAI does not have the capacity to handle even on-station crops research, much less on-farm crops research. The involvement of extension in on-farm research would enable this essential activity to be undertaken with the human resources already on board in MAWRD. This activity has already been initiated and now requires formalization. It is imperative that extension and farmer participation is obtained in the process of diagnosis of production constraints, technology generation, and evaluation. The potential benefit of new technology with respect to raising production and productivity, economic viability, or social acceptability, as well as reducing production costs is best judged by the farmer. Extension is best placed for doing technology evaluation with the farmer.

The team strongly recommends that the participation of extension in technology generation and evaluation be formalized and the key role extension should play during technology on-farm evaluation be under written into the division's operational strategies. Resources should be made available to adequately support the participation of extension in this activity.

## **Annex 5**

### **Socioeconomic Research**

This section considers the role of socioeconomic study and analysis in agricultural research. Two main functions of socioeconomic analysis can be distinguished:

- \* Within the farming systems context, socioeconomic research can help to define and prioritize the problems for research, improve the flow of information between farm communities and researchers, and, through monitoring and evaluation of research impact, help develop strategies to enhance the effectiveness of research and problem solving.
- \* Applied social and economic research can provide a basis for policy formulation and help advise policy decision makers.

The two approaches have in common their concern with sustainability, social equity, profitability and market opportunity, gender impact, and the long-term consequences of research policy and technical change.

#### **Institutional Location of Socioeconomic Research**

The main institutions involved in socioeconomic research in Namibia are the Namibian Economic Policy Research Unit (NEPRU), the Namibian Institute for Social and Economic Research (NISER), and the Directorate of Planning, Pricing, Marketing and Cooperatives (PPMC) within MAWRD.

All three of these institutions do socioeconomic research with a direct bearing on policy. Other aspects of their research cover issues of immediate relevance to practical project implementation.

With the exception of one agricultural economist in the agronomy section, DAI of the Directorate of Agriculture and Development does not employ social scientists within its research programs.

Other sources of expertise in economics and sociology are present within the Extension Division of the Directorate of Agriculture and Development, the Directorates of Rural Development, Training and Veterinary Services, and within the First National Development Corporation (FNDC). However, in response to the questionnaire on research, none of these groups reported that they were involved in research (although the veterinary services have conducted socioveterinary surveys in Kaokoland with advice from NISER). Some social research is also conducted by NGOs such as ELCIN,<sup>10</sup> Rössing Foundation, and the Private Foundation.

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<sup>10</sup> Evangelical Lutheran Churches in Namibia.

### *Directorate of Planning, Pricing, Marketing and Cooperatives*

Social scientists within MAWRD are located in the DPPMC. Before independence, agricultural economists were more concerned with administration of financial schemes and loans. Subsequently their role broadened to include planning and marketing.

In response to the questionnaire circulated by DAI, PPMC did not indicate any research activities in 1991. However, in subsequent discussions, this proved to have been a narrow interpretation of "research". PPMC research activities include a millet marketing survey in the northern communal areas, intended to guide policy on millet production and pricing; a study of the conditions of small farmer credit; and a study of fruit and vegetable marketing. Farm management data from 200 farmers is collected monthly through the extension offices in order to monitor the regional agricultural situation. Individual data can be used to determine the viability of loans. Agricultural unions also use the information. The northern communal area is not included in this study, however.

Both PPMC and NISER are involved in the Drought Warning and Food Information study. This is a joint effort with extensionists and enumerators from the central statistics office as the PPMC has limited staff and no enumerators. The main task of both is to monitor food distribution.

PPMC provides agricultural economics teaching at Neudamm Agricultural College. The proposed restructuring of PPMC includes an increased capacity in agricultural economics, statistics and data collection, and the recruitment of a sociologist for the planning, monitoring and evaluation department. Because the post of sociologist within the government service did not exist it required creation.

### *First National Development Corporation (FNDC)*

The five economists in FNDC analyze the production economics and crop budgets for the production farms and farmer support programs, while the sociologists consider the social organizational aspects of the process of commercialization within communal areas. Although there is no formal cooperation between FNDC, NISER, and NEPRU there is contact through training courses run by NISER and good dissemination of information. While there is no formal flow of information between MAWRD and FNDC, informal personal contact at middle management level is made.

### *Namibian Institute for Social and Economic Research (NISER)*

NISER primarily carries out applied research in the following areas:

- \* rural development and poverty, drought related concerns with household economies;
- \* regional development and urbanization;
- \* sustainable agriculture and environment, particularly community-based natural resource management.

NISER relies on funded commissions for its work, having no core funding, although it is associated with the University. Funding sources are the UN agencies, especially UNICEF,

bilaterals (DANIDA, SIDA, FINNIDA, NORAD, ODA, GTZ), the EC, NGOs, and government departments. NISER also does social impact analysis for the private sector. About 10 researchers are employed on specific research projects in addition to consultants and temporary student researchers. NISER adopts problem-oriented multidisciplinary approaches, and wishes to retain this strength rather than become overly specialized in socioeconomic research. It is seeking to develop expertise in qualitative as well as quantitative research, and for the proper integration of gender issues into research. The Director is conscious of the trade off between excellence in a narrow field and a broader coverage to an acceptable standard.

An increasing proportion of NISER's work is related to agriculture because of drought activities. Current projects with rural agricultural relevance include the following:

- \* Research and monitoring work with the drought early warning system.
- \* Study of Kavango determinants of productivity (for Oxfam, Canada).
- \* Coping strategies and household food security (for DANIDA).
- \* Household survey and study in Namaland (with Rural Development, MAWRD).
- \* Community-based natural resource management (with Wildlife and Tourism).
- \* Proposed study in the south of household economies and poverty (for SAREC<sup>11</sup>).
- \* GTZ sustainable agricultural production in Namaland and Hereroland: assistance in rapid rural appraisal for selection of pilot sites and advice on communal management.

The following are the subjects of other studies done:

- \* Social economy of Oshakati and Ondangwa (1990),
- \* The land issue in Namibia,
- \* Rapid rural appraisal (investigating the social economic and environmental impacts of the proposed Ogongo-Oshakati canal upgrading scheme, Owamboland).
- \* Social economy of livestock farming in Owambo and Kavango region (GTZ, 1990),
- \* Social organization of major population groups Kaokoland, Owambo, Caprivi, Namaland (UNFPA-FAO, 1990).
- \* Environmental profile of Namibia (SIDA, 1991).
- \* Situational analysis of Children and Women in Namibia, (UNICEF-NISER, 1991).

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<sup>11</sup> Swedish Agency for Research Cooperation with Developing Countries.

No work has been commissioned from NISER by DAI.

NISER runs in-house training for its own staff and attached students, not for outside agencies. Its future commitment to training is uncertain in view of the proposals for organization of research within the new university structure.

#### *Namibian Economic Policy Research Unit (NEPRU)*

NEPRU assists the government through applied research, informing policymakers in strategic economic and socioeconomic areas. Research is commissioned or endorsed by government. NEPRU has the status of an independent charitable trust. However, it has a formal link with the Planning Commission and is concerned with providing information to allow more effective planning by this body.

The unit was established in 1990 as a transitional facility with two to three years' funding. Since 1991 it has received core funding from Norway and Sweden. Other funders are ODA, Germany, SIDA, ILO, UNIDO, OECD, Oxfam-UK, and the Friedrich Ebert Foundation. Nine research staff and additional consultants are employed. There are two attached research fellows. Research is project funded, with the result that staff have been mostly short-term. Long-term external assistance has been difficult to secure, and research has been fragmented and irregular.

In 1991 NEPRU carried out and coordinated the background research for the national conference on land reform and the land question. It also conducted the initial background studies on the creation of a national university. It has conducted major research projects in fisheries, agriculture, and the industrial sector. It also houses an information resource base on Namibian affairs, the Namibia Socioeconomic data base and the Namlit data base, a Namibian national bibliography. Research has also included the following:

- \* Seventeen separate studies on land issues in 1991 as preparation for the conference on land tenure, including attitudes towards privatization of communal areas, gender, and land tenure. Results question the extent to which capital intensive approaches to agricultural development are replicable and highlights the risk of promoting subsidized services for the richer minority while the majority find they are excluded from their traditional access to land for cropping and grazing.
- \* Namibian agriculture: policies and prospects 1992. (OECD) through MAWRD.
- \* Review of First National Development Corporation projects in Caprivi 1990.
- \* Research on Fisheries policy.
- \* Integration of women into the rural development process.
- \* Collaboration with the Directorate of Rural Development on appraisal of rural development needs in the north.

Like NISER and PPMC, NEPRU has not received any requests for research from DAI, although there is collaboration with other ministry directorates. NISER advised on a questionnaire for a socioveterinary study and PPMC collaborated with extension on studies on credit for small farmers. A further similarity between NEPRU and NISER is their

uncertainty over their future position vis a vis the proposed multidisciplinary research institute of the university.

A major problem highlighted by NEPRU, but recognized by the other institutions, is the increasing number of consultancy reports which are not effectively used by the commissioning ministries and departments. Few reports build in the terms for implementation of their recommendations and departments have some difficulties in making effective use of policy-related research such as that generated by NEPRU. NEPRU has identified the need to develop more practical approaches for government for the design of a strategy for informing policymakers of study results.

The University of Namibia has three to four people teaching sociology and four economists, two of which are funded by the EC. Agricultural economics is not taught, and both economics and sociology are broad undergraduate courses aimed at providing a theoretical foundation rather than practical professional skills.

### The Need for Socioeconomic Research

A paper by the Director of NISER, argues that the need for applied socioeconomic research is paramount.<sup>12</sup> This implies the need for more skilled researchers with applied research experience. In writing about northern communal areas the Director points out the serious deficiency of both quantitative and qualitative data on the social economies, particularly studies dealing with recent changes in social organization. He notes that this omission can lead to erroneous assumptions about rural life as basis for policy, for example, the assumption of community-based democracy, when for a number of reasons, there is not a strong tradition of community participation in many rural areas.

Table 5.1. Social scientists by institution, gender, qualification, and research time on issues related to agriculture, 1991-92

Institute	M	F	BSc/BA	MSc	PhD	weeks	Yrs
NISER	8	2	1	7	2	173.2*	2.60
NEPRU	7	2	?	?	?	38.4	.74
PPMC	9	2	?	?	0	N/A	
DAI	1	0	0	1	0	10**	.2
Training	1	0	0	1	0	N/A	
FNDC	6	1	3	4	0	N/A	

\* Estimate, does not include consultants or part-time contributions.

\*\* Farming systems research.

The major constraints facing the research institutes and departments are shortages of personnel rather than constraints on funding. Table 5.1 provides an indication from the questionnaires as to how much research time was spent on issues related to agriculture in 1991-92. From the returns the total was about 3.5 person years.

Recruitment of agricultural economists has not been easy as local competence in

<sup>12</sup> C. Tapscott 1992.

socioeconomics is scarce and qualified people are attracted to the private sector. Social sciences were not a popular option under the external scholarships program. If economics was studied at all, it was generally as part of a development studies degree, and did not impart skills, methodologies, or particular specialties.

### *Social science research needs for agricultural policy*

Social science research has a dynamic relationship with agricultural policy. On the one hand, the activities of researchers, at least those within the government structures, operate within the policy guidelines on agricultural development. At the same time, their research findings feed into and influence policy debates.

Within the draft agricultural development plan, the priorities emerging have clear implications for the type of research required:

- \* issues in connection with commercialization of farming within communal areas,
- \* establishment of a research and extension process which serves the needs of small-scale farmers in the communal areas,
- \* the provision of information which can be readily used by policymakers,
- \* the long-term sustainability of natural resources, the use and management of resources and environmental impact,
- \* multidisciplinary and farming systems approach.

Issues connected with commercialization are currently undertaken by the group within PPMC and by FNDC economists and sociologists who also have a major role in gathering information for planning. Within the current research system, however, continual research benefiting the small farmers of the communal areas has been lacking.

### *Applied social research within farming systems*

With the exception of a number of specific surveys social research has been largely neglected. There has been some progress in collection of quantitative data but little which analyzes processes: the changing social structure of rural households, the function of the extended family, sources of rural income<sup>13</sup> and survival strategies, migration, importance of remittances and pensions, and farming systems research.

It is important to distinguish between the variety of methods available for community-level applied research. Although questionnaire surveys are a useful tool for providing baseline information, they do not meet the requirement for detailed understanding of social processes and structures. They provide an individualistic view of farm decision making which should be supplemented by methods which analyze farming within a social context and value system.

Much of the recent applied research has been commissioned by donor agencies as a

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<sup>13</sup> UNICEF report 1990.

preliminary to establishment of development projects (e.g., UNICEF, SIDA, GTZ). One consequence of the lack of coordination in research activities is that some areas are under-researched while others are over-studied.

### **Role of Social Science in the Research Process**

There is a strong case for the assignment of social scientists to DAI research activities to support a technology development process involving researchers, extensionists, and farmers. Field-level socioeconomic analysis should not be seen as an isolated independent activity. The expertise of socioeconomics can catalyze and facilitate the investigation of farming systems by scientists and extensionists. Social science methods can also contribute to the interpretation of the experience and information. Their contribution can be summed with the following:

- \* In the research proposal formulation stage, social scientists can help to develop interdisciplinary, problem-oriented projects. This follows from the identification of research needs by researchers, extensionists, and farmers. Through this process local practice is identified, as well as the problems and perceptions of participating groups.
- \* Identification of beneficiaries and participating groups. This arises from an analysis of social differentiation and a recognition of rural diversity.
- \* Economic assessment of technology changes with particular attention to labor and cash requirements. This is relevant to research directed towards communal areas, but also to some ongoing research in commercial areas, especially market-related experiments. An example is research into possibilities for balancing the supply of lambs seasonally.
- \* The relation between new crops and techniques and the structure of farmers' preferences, their perceptions and attitudes to risk, and their consumption preferences, storage and processing criteria.
- \* Feedback from farmers concerning on-farm trials.
- \* Monitoring and identification of the impact of research—on the environment, the implications for social equity, especially on gender relations and the extent of poverty.
- \* Contribution to the conclusions of research and implications for policy.

Social scientists can make a particular contribution in areas where technical issues are well understood in a well known farming system. An example is pasture management in the commercial system. However, because scientists have little knowledge of the way in which communal farming systems work and how decisions are made, social scientists can work along side of technical researchers in improving community resource management. Their contribution is important for analyzing farmers' perceptions, particularly where these differ from those of scientists accustomed to other farming systems.

The social scientist recognizes the status and validity of different perspectives and explores the contribution that can be made by local knowledge. Another area is the process

of commercialization in communal areas. Social scientists should analyze the relationship between the beneficiaries of commercialization opportunities and the losers, as well as assessing the economic viability and sustainability of mechanized agricultural operations and recommended input levels.

### *Approaches, skills, and training*

At present the necessary skills to support a research program oriented to the policy objectives of improved food production and welfare for smallholder farm families are lacking within the research system. There is a need to upgrade social analysis skills in the country as a whole. However, training of social scientists should not lead to exclusion of other disciplines from socioeconomic investigation.

An issue to address is whether the need for social science within the research system should be tackled through gradual recruitment of social scientists who can undertake survey work; or to try to establish rapidly a minimum capacity of research skills among existing research and extension personnel through intensive training in-country and overseas. The skills required are in needs identification and rapid rural appraisal, on-farm research (the realistic limits, different kinds of purposes, designs, and farmer participation), approaches to community resource management, and institutional development. Within DAI there is a requirement for economic analysis and comment on research proposals.

The number of social scientists within research is likely to be small in the short term. This suggests a need for training for researchers and extensionists to investigate research needs within the farming systems. Areas where training and techniques are required and would be available from overseas institutions include the following:

- \* problem identification involving research extension and farmers, rapid rural appraisal, and needs assessment;
- \* approaches to on-farm research and objectives, analysis, design, and farmers' participation in research;
- \* identification of target groups and recommendation domains embracing both agroecological criteria and resource dimensions;
- \* techniques for exploring farmers' perceptions and preferences, for example, selection criteria for breeding bulls, preferred characteristics in major crops.

Several options are available. One is initial short-term training for groups of researchers and extensionists in rapid rural appraisal and farming systems approaches. This would require outside sponsorship. Others include training and support for socioeconomicists within existing Namibian institutions (e.g., NISER) in order to develop their training capacity in country, the long term assignment of an expatriate socioeconomicist to the research division, and on-the-job training for new socioeconomicist recruits.

There are advantages to developing capacity where most of the research work takes place, that is, within the research division. However, the skills and advice would be valuable within other directorates: Extension, Rural Development, Veterinary Services, and Forestry.

Reliance on the proven skills of agencies such as NEPRU and NISER is useful for

specific studies, policy, or research needs identification. However, short-term inputs from outside the research division would not encourage social scientists to become part of the research project team or develop working relationships and approaches. It would not develop accountability or joint responsibility and may risk creating an oppositional relationship between social and biological sciences.

The development of internal capacity would foster interdisciplinarity and help to bring about the change in attitude necessary to undertake research work within the new policy context. A major reorientation of the researchers' perspective is necessary: from the present controlled research station conditions, to direct work with farmers. This is not to negate the role of researcher controlled experiments. It implies rather a wider repertoire of research with different levels of involvement from farmers and extension, different disciplinary combinations, and different target audiences.

The particular balance between on-farm and station-based research would be decided through project planning with a critical assessment of objectives in terms of policy. Involvement of social scientists in research proposal formulation and their representation on the committee for project approval is recommended. An interdisciplinary structure, whereby the basis for reporting is by project rather than by discipline is recommended.

### *Social sciences in the agricultural training colleges*

Social sciences are part of the curriculum within the agricultural training colleges. The first year includes rural sociology, extension, agricultural economics, and farm management. The second continues with agricultural economics, farm management, and extension. Extension will be offered as a specialization in the third year, and there is the possibility that agricultural economics will be added. It is intended that students will have one term to do a practical research project. For this, topics with an economic and social focus should be considered legitimate choices and students should be encouraged to take a broad view of research.

### **Gender Issues in Research**

Two important issues are women's participation in agricultural research and training and the orientation of the research and extension system to the needs of women farmers. Households headed by women are amongst the poorest. While the majority of small farmers are women, they are often poorly represented at meetings with extension and tend to be excluded from agricultural development initiatives. The gender composition of agricultural staff is heavily male biased—current participation of women is around 8% in extension and 16% in research.

In agricultural training there is a good balance of women staff at Ogongo Agricultural College. Six out of 15 are women, although some of them are volunteers on short-term contracts. The gender balance of students is about equal in Ogongo, in contrast to Neudamm where there are few women students.

In developing research capacity for the communal areas the recruitment of more women into the research and extension system could facilitate consultation with and participation of women farmers in the adaptive research process.

## **Annex 6**

### **Research-Extension Linkages**

The objective of agricultural research is to generate relevant, appropriate, and affordable technology for its clients, largely farmers. Within the framework of the Namibian government's agricultural development policies, the small-scale communal area farmers are the priority clients for agricultural research and extension. To ensure that the products of research are relevant, appropriate, acceptable, and affordable there is a need for the farmers and extension to be involved in research development. Farmers, irrespective of size and farming system, are the best judges of the technology that research produces. It is most cost effective if the judgement element is assessed early in the process of developing the technology.

Effective extension has contacts with many farmers. It should therefore be better able to understand the production constraints of farmers and be able to effectively translate and articulate the broader production constraints into technology needs. Together extension and farmers are better able to help research to focus on relevant constraints and develop appropriate, acceptable technologies.

Effective linkages between research, extension, and farmers (REF) are required. Linkages and interactions should be formal, structured in such a manner that they will enable farmers and extension to influence the technology development process. Influence should start with a constraints diagnosis and follow through to farmers' adoption of the research-developed solution. Extension must not be taken only as transmitters of off-the-shelf technologies and farmers must not be viewed as passive technology receivers. Both farmers and extension should be involved in technology development.

DAI has reasonably good linkages and interactions with the large-scale commercial farm sector. Contacts are made through field and information days, as well as through formal and informal contacts with the farmers' union and the breeder associations. The commercial farmers and extension have, to a large degree, influenced the research program, particularly in the livestock and pasture sections. Prior to independence there was very little formal research in the communal areas. There the post-independence research structures, still in formative stages, have yet to establish formal functional linkages and interactions with extension, much less farmers. During the 1991-92 season, collaboration among research, extension, and farmers was initiated through on-farm pearl millet variety trials and production demonstration plots. With fairly good results, the trials and demonstrations were largely managed by farmers with advice from research and extension. This arrangement is planned to continue in the 1992-93 season. These interactions need to be formally structured for future operational efficiency.

While extensionists in the north have begun to contribute to technology development by participating in on-farm trials, their input has been minimal in research program formulation and priority setting to facilitate targeting of the research efforts to problems farmers can articulate. Farmers have not yet been able to directly or indirectly influence on-farm trials, which are based primarily on DAI's perceptions of the production constraints and potential solutions, with sizeable inputs from SADC and ICRISAT.

Even at national level the contribution of extension to the technology generation processes is small. Informally extension may influence the direction of research by commenting on new research proposals prior to their approval for funding. However, there is no formal body by which the Extension Division can help ensure that research thrusts

remain relevant to national policy objectives and that research subprograms are focused on the appropriate priority areas. Input from farmers at the national level is very informal. Otherwise, no farmer contribution is made in the formulation and review of research programs.

Presently, it is recognized that the research capability for the communal mixed farming system is weak. However, there are proposals for strengthening this capacity through the establishment of a multidisciplinary team in the north.

Similarly, the extension advisory service capability in the north is not strong due to a variety of factors. There has been a lack of a clearly defined role or balance of roles for extension personnel. Absence of reliable technical messages inhibits extension's advisory role. More weight is then put on extension's role as administrator of services such as ploughing, credit, and fertilizer sales. A defined share of total extension time should be specifically allocated to extension of information and advice. The capability for research and extension advisory service in the north should be strengthened together, maintaining close linkages and interacting in program formulation for both research and extension activities.

## **Recommendations**

At the moment DAI does not have adequate staff to service even the priority on-station research needs, particularly in crop agronomy. The collaboration and full participation of extension in on-farm research is one strategy for augmenting the research capacity of DAI. Collaboration between research and extension in research is fully endorsed by the review team, as it establishes a much stronger relationship and an operational linkage. This partnership should, however, be formalized by the ministry.

Extension's plans and strategies need to be clearly redefined to embrace their role in on-farm and on-station research. Extension programs must recognize and finance the principal role of extension in on-farm research and their support role in on-station research. Formal collaborative mechanisms are therefore recommended with respect to both resource allocation and programming.

### *Resource allocation*

Extensive linkage and collaboration costs time and money in both the research and extension divisions. These activities and resource allocations must be firmly agreed and endorsed by both heads of division, and their endorsements reflected in directives from regional extension officers and senior research officers to the extensionists, technical and social science researchers, and research technicians at field level. On-farm research methodologies must be recognized as essential components in research on the communal mixed farming system.

### *Programming*

The participation of extension in research program formulation should be promoted. The sequence of decision-making bodies for program formulation has been described in general in Chapter 5 as part of the machinery for management of the research program. Extension staff should be represented at appropriately senior level at the national level, NARC; Program Committee, at long-term program level; and at the research group or experimental

level, as part of the external, users-of-research membership. This is a very important membership on the planning side of programming to ensure relevance of project proposals.

Table 6.1 gives an indication of one particular hierarchy of advisory/decision making bodies that might be established and be appropriate for the situation in the northern communal areas.

Table 6.1. Hierarchy of proposed research programming bodies for northern communal mixed farming areas

Organization	Proposed membership
National Agricultural Research Council (NARC)	Planning Commission Farmers' unions Private-sector agroindustry University of Namibia Directors of Agriculture and Rural Development Deputy Director of Agricultural Research Deputy Director of Extension Director of Forestry
Regional Agricultural Research Program Committee (RARPC)	Research team leader(s) Extension regional chief(s) Coopted nongovernment organizations
On-farm research committees (OFRC)	Research officers(s) Extension officer(s) NGO representatives—coopted

#### *National Agricultural Research Council (NARC)*

The National Agricultural Research Council (NARC) (or Committee, or Advisory Council) could be advisory to the government or the minister of agriculture. This would depend on the details of its establishment. NARC could meet twice a year with functions including the following:

- \* establish or recommend a national agricultural research policy;
- \* decide on research priorities for agricultural commodities, factors of production or farming systems, and recommend indicative resource allocations in line with national policy and objectives;
- \* review the emergent research program for alignment with guidelines, review progress in research programs and examine constraints to the programs;
- \* keep the government (agriculture-related ministries) well informed and advised.

#### *The Regional Agricultural Research Program Committee (RARPC)*

It is proposed to have two Regional Agricultural Research Program Committees (RARPC).

One will handle commercial livestock and pasture research and the other, crop improvement and communal farming systems research. The former could be based at the research and extension nucleus in Windhoek, while the latter could be based at the research nucleus proposed for Ogongo with extension input from all the cropping areas of the north.

These bodies could meet twice a year, once in August/September to review the results of the previous season and plans for the coming season. Then again in mid-season, to assess ongoing projects and interact with researchers in the field. This will be a mid-season research program monitoring activity. The following could be included in the role of the RARPC:

- \* provide broad program guidelines to research committees and ensure compliance with national objectives and identified technology gaps;
- \* review all on-station research projects for relevance and quality and check that they are in line with program guidelines;
- \* review progress of both on-station and on-farm research;
- \* ensure proper coordination of on-farm and on-station research.

#### *On-farm Research Committee (OFRC)*

The On-farm Research Committee is particularly relevant to the communal area farming situation due to its diversity and complexity. A committee is recommended for each region. The role of OFRC could include the following:

- \* review of all on-farm research projects for quality and relevance,
- \* check all on-farm trials for simplicity and quality,
- \* set priorities for on-farm research and ensure critical technology gaps are addressed,
- \* review progress of on-farm research,
- \* monitor implementation of all on-farm research projects.

The OFRC would make mid-season monitoring visits to all on-farm trials in their region as well as to the research stations actively developing technologies targeted for their region.

# Annex 7

## Research Stations and Production Farms

Table 7.1 gives the names, size, and main characteristics of the different research stations and production farms available for research studies in MAWRD. Map 7.1 gives the approximate positions of the stations and farms. (Bagani Gardens has since been added to DAI research stations, and Scott/Mannheim merged.)

Map 7.1.

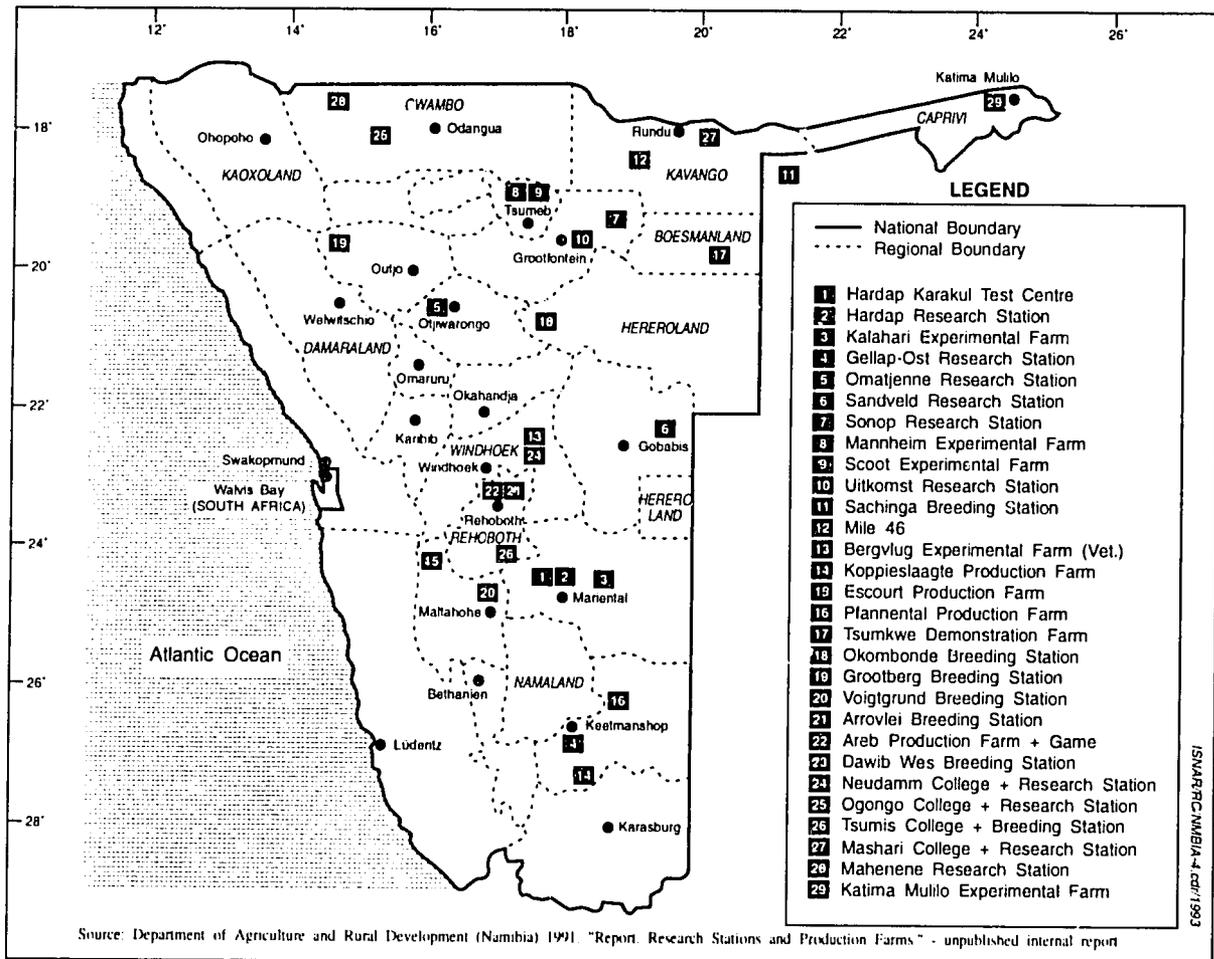


Table 7.1. Research stations and production farms in MAWRD, October 1990

NAME	LOCATION ON MAP	SIZE HA	MAIN OBJECTIVE	LIVESTOCK SPECIES/BREED	NUMBER
<b>DAI</b>					
Hardap Karakul Test Centre	1	11	sheep progeny testing	Karakul sheep	1 500
Hardap Experimental Farm	2	160	irrigated crop and horticulture research; ostrich research		
Kalahari Experimental and Production Farm	3	10 215	sheep research and production	Karakul (white, stud) Dorper sheep Boer goats Crossbred cattle Horses	1473 672 13 25 8
Gellap-Ost Experimental Farm	4	13 737	sheep and goat research and production; pasture research	Karakul sheep Boer goats Damara sheep Dorper sheep Other sheep Cattle	999 182 33 33 321 30
Omatjenne Experimental Farm	5	17 666	cattle, sheep and goat research; stud breeding; cattle testing, pasture research	Cattle Boer goats Damara sheep	265 240 230
Sandveld Research Station	6	8 336	cattle research and production	Sanga Simmental- crosses Brown Swiss Damara sheep Horses	514 355 36 61 6
Sonop Research Station	7	10 994	cattle production; game and pasture research	Afrikander Santa Gertrudis Sanga Ngunis Brown Swiss Eland Giraffe	153 129 151 111 65 225 45
Mannheim Experimental Farm	8	42	crop and fruit production	-	-
Scott Experimental Farm	9	4994	cattle production	Beef cattle	300
Uitkomst Experimental Farm	10	6 558	dairy and beef research and production; goat research; crop and pasture research	Simmentaler stud Brown Swiss Boer goats	258 66 350
Sachinga Breeding Station	11	2 460	cattle production; genetic conservation of indigenous breeds	Sanga cattle Bonsmara cattle	300 100
Mahenene Research Station	28	120	crop research	---	---
Katiina Mulilo Experimental Farm	29	30	crop research; horticulture	---	---
Neudamm Agricultural College and Research Station	24	10 187	training; cattle and small stock research and production; performance testing; pasture research	Cattle Sheep	?

Table 7.1. (cont.) Research stations and production farms in MAWRD, October 1990

NAME	LOCATION ON MAP	SIZE HA	MAIN OBJECTIVE	LIVESTOCK SPECIES/BREED	NUMBER
Ogongo College and Research Station	25	4 150	training; cattle and goat research and production; genetic conservation; pasture and crop research	Cattle Goats	400 400
Tsumis College and Research Station	26	13 147	training; cattle and small stock production	Simmentaler stud cattle Brown Swiss cattle Boer goats	258 66 350
Mashari College and Research Station	27	2 460	training and crop research		
Koppieslaagte Production Farm	14	7 026	goat research and production	Angora goats Karakul sheep Dexter cattle Horses	1374 12 9 3
Pfannental Production Farm	16	10 881	sheep production and wool research	Merino Dohne-Merino Horses Springbuck	780 760 3 30
<b>DIVISION: EXTENSION AND DEVELOPMENT</b>					
Mile 46	12	5 770	cattle production	Sanga cattle	120
Tsumkwe Demonstration Farm	17	?	?	?	
Okombonde Breeding Station	18	9 601	cattle and goat production	Bonsmara cattle Afrikander cattle Boer goats	289 82 307
Grootberg Breeding Station	19	30 057	cattle production	Afrikaner cattle	100
Voigtrund Breeding Station	20	11 380	game production	Simmentalers Springbuck Oryx gazelle	19 1000 300
Arrovlei Breeding Station	21	6 500	cattle and game production	Bonsmara cattle Zebra Giraffe Springbuck Kudu	156
Arch Production Farm + Game	22	7 200	game production	Zebra Kudu	? ?
Dawib Wes Breeding Station	23	6 550	sheep and goat production	Karakul/Damara Sheep Boer goats	? ? 150
<b>DIRECTORATE OF VETERINARY SERVICES</b>					
Bergvlug Experimental Farm	13	?	?	?	?
<b>(TRANSFERRED TO MINISTRY OF CONSERVATION AND WILDLIFE)</b>					
Escourt Production Farm	15	24 751	game production	Ostriches Oryx gazelle Springbuck Dexter cattle Karakul sheep	117 140 160 4 9