Economics of the Pearl Millet Subsector in Northern Namibia

A Summary of Baseline Data

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ICRISAT Southern and Eastern Africa Region

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International Crops Research Institute for the Semi-Arid Tropics

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Acknowledgments

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Acronyms and Abbreviations

MAWRD	Namibian Ministry of Agriculture, Water and Rural Development
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
GTZ	German Agency for Technical Cooperation
CIDA	Canadian International Development Agency
UNDP/FAO	United Nations Development Program/Food and Agricultural Organization
FNDC	First National Development Corporation
NGOs	Non-governmental Organizations
UNICEF/NISER	United Nations Children's Fund/Nambian Institute for Social and Economic Research
NEWFIS	Namibia Early Warning & Food Information System

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Preface and Acknowledgements

This paper offers a summary of baseline data collected under the Namibian Millet Subsector Project[1]. This project aims to assess the commercialization prospects for pearl millet, the competitive market position of pearl millet in relation to maize, and the options for market policy designed to facilitate grain marketing in the main smallholder farming areas of Northern Namibia. Additional reports are being prepared which treat these issues in greater depth..

Pearl millet is the main staple grain and the principle source of livelihood for the majority of Namibia's smallholder population. The Namibian government seeks to encourage the expansion of pearl millet production and trade in order to strengthen the country's agricultural economy and to reduce dependency on maize imports. Yet little is known about current production practices and trade patterns. Most studies of the pearl millet economy to date have been limited in sample size and duration. This study provides the first extensive dataset on the production and marketing of pearl millet in two of Namibia's main smallholder farming regions, the North central region (historically known as Ovamboland[2] and Kavango. These account for over 90% of pearl millet production in the country. The dataset incorporates the results of three major farm household surveys as well as interviews with grain traders and a price monitoring exercise. This data was collected between December 1992 and November 1993.

The baseline data described in this report should be viewed as preliminary. The report has been principally offered as a means of broadening access to its data and the associated early project findings. Nonetheless this data offers a useful means to track progress in the development of pearl millet production and trade. In addition it offers a valuable source of comparative data for future research on a wide range of aspects of Namibia's smallholder economy.

Stefan Keyler collected this data during the course of his Ph.D. research in the field of agricultural economics. He worked under the supervision of Dr David Rorhbach, Director of the Socioeconomics and Policy Division of the International Crop Research Institute for the Semi-Arid Tropics and received additional advisory support from Dr Thomas Reardon of Michigan State University. In Namibia Mr Keyler worked under the leadership of Mr Bernd Rothkegel, Director of the Directorate of Planning, Pricing, Marketing and Cooperatives in the Ministry of Agriculture, Water and Rural Development. Mr Keyler received extensive support from a research assistant, Mr Paul Nashitati, who was provided by the Namibian Institute for Social and Economic Research. However the views expressed in this paper are those of the author and do not necessarily reflect those of other individuals and institutions.

Mrs Myfanwy van Hoffen provided tireless editorial assistance and prepared this paper for printing.

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[1] Funded by Bundesministerium fur wirtschaftliche Zussamenarbeit (BMZ) and Deutsche Gesellschaft fur Technische Zussamenarbeit (GTZ) as Project Number 85.2293.0.

[2] The Ovambo Region is now more formally identified as the Northcentral Region. This encompasses all of the area formerly identified as the Ovamboland including Omasati, Oshana, Ohangwena, and Oshikoto.

1. INTRODUCTION

Since Namibia's independence in March 1991, strategies about how to develop communal agriculture have been debated. The debate has stressed the importance of increasing the productivity in dryland crop production regions: Ovambo[2], Kavango, and Caprivi. Besides acknowledging the importance of improved grain production technology, the Namibian Ministry of Agriculture, Water and Rural Development (MAWRD) also recognized that the performance of the rural marketing system is becoming increasingly important as Namibia moves from an agricultural to a more industrial and urban economy[3].

Because pearl millet[4] is the main food grain for the majority of Namibia's population an ODA consultant's report[5] discussed the possibility of using the northern pearl millet sector as an instrument for rural development. (Hay et al, 1991) There are three major reasons for the importance of pearl millet in Namibia: (1) pearl millet is the main food staple of northern small-holder communal households in Ovambo and Kavango (described below as 'study regions') where about 54% of Namibia's total population lives; (2) pearl millet has a high nutritional value[6]; (3) unlike maize, pearl millet is optimally adapted to the drought-prone climate of northern Namibia.

In 1989 a donor sponsored sector study on Namibia's communal agriculture identified the potential for commercial pearl millet production in northern Namibia.[7] The study found that because of the increasing concentration of the population in the towns of the study regions, cheap and processed food staples are needed there. At present the deficit of locally produced food staples in rural communities and towns in Ovambo and Kavango is mainly augmented with relatively cheap maize meal imported from outside the study regions, primarily from South Africa.

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[2] Since Namibia's regional elections in 1993 the former Ovambo region is now sub-divided in four new election regions (Omusati, Oshana, Ohanguena, Oshikoto) with a total estimated population of 671 000. To ease further geographical discussions the former Ovambo region will be called 'Ovambo' and the neighboring Kavango region will be call 'Kavango'. Kavango has an estimated population of 136 000.

[3] Isaac Kaulinge, Permanent Secretary of MAWRD in his opening speech to the workshop "Prospects for the Commercialization of Millet in Northern Namibia", Windhoek, January 27, 1994.

[4] The term millet or 'mahangu' in the North Namibian tongues refers to pearl or bulrush millet (Pennisetum glaucum: syn., P. typhoideum, P. americanum). Other millets are not, so far as is known, grown in Namibia. (Hay et al, 1991)

[5] Roger Hay et al, "Millet in Namibia Engine for Rural Growth ?", ODA report to the Ministry of Agriculture, Water and Rural Development, August 1991.

[6] "Pearl millet has a higher protein content than any other major cereal except oats; in general, its composition resembles that of sorghum. The essential amino acid contents and balance are similar to those of sorghum, but millet contains more lysine, sulfur-containing amino acids, threonine, and tryptophan..." cited from: Matz, Samuel Adam, "Chemistry and technology of cereals as food and feed." 1991 (266 p.).

[7] Uwe Otzen, "Sektorstudie Landwirtschaft, Struktur, Potential und Furderungsmoglichkeiten", Grundlagenstudie Namibia Band 4, Deutsches Institute fur Entwicklungpolitik, Berlin/Munchen October 1989.

Although pearl millet is the main food staple of northern Namibia little is known about (a) the farmers who produce it, and (b) the structure, conduct and performance of the pearl millet marketing system. Because of the lack of basic information on the costs and returns of production and marketing, a survey was proposed on production and marketing aspects of the pearl millet subsector and an analysis of the long term competitiveness of pearl millet as against other major food staples such as locally produced and imported maize.

Policy makers in Windhoek believed that the combination of a better infrastructure, an agricultural credit program, and an improved agricultural marketing system would promote rural development in the communal north. However, the Hay study 'Millet in Namibia, Engine for Rural Growth' recommended investments in improving the efficiency of pearl millet marketing only if it is certain that the current consumer preference for pearl millet and not for imported maize will continue. (Hay et al, 1991)

Report objectives

In response to these concerns the Directorate of Planning from the Namibian Ministry of Agriculture, Water and Rural Development, in collaboration with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), implemented a 'Millet Subsector Research Project' in mid 1992. The collection of data lasted from November 1992 through January 1994. Funding for this research came mainly from the German Agency for Technical Cooperation (GTZ). Additional funding was acquired from the Canadian International Development Agency (CIDA).

The objectives of the pearl millet research project were:
- to describe northern Namibia's pearl millet production and marketing;
- to assess pearl millet competitiveness as against imported and nationally produced maize;
- to identify options for improving and commercializing pearl millet production and marketing.

This report presents research findings on the first research objective and descriptive information on communal pearl millet producers. It assesses the structure and conduct of the current pearl millet marketing system in the two study regions, Ovambo and Kavango.

Layout of the report

Chapter 2 describes briefly the data sources and the characteristics of the two study regions. Chapter 3 presents characteristics of rural households including their staple food consumption patterns. The main part of Chapter 4 describes pearl millet production. Income generating activities other than crop production and households' investment priorities are also given in this chapter. Chapter 5 describes the current pearl millet marketing and trade.

2. DATA AND REGIONS

This section describes the origin of the data on which this report is based and describes the geographical regions in which the data collection took place.

Data sources

The data for this report come from three household surveys together with one field measurement survey and one pearl Pearl millet trader survey in the two major pearl millet production regions of Namibia: Ovambo and Kavango. Data collection was conducted under the auspices of ICRISAT in collaboration with the Directorate of Planning, Pricing, Marketing and Cooperatives of the MAWRD and with some assistance from the Namibian agricultural extension service.

The household sample of this study comprised 320 households. The households were located in 16 rural communities, 10 of which were in Ovambo and six in Kavango. Each household was visited three times. Each of the three visits was carried out during a specific production phase of the 1992/1993 pearl millet growing season. The first survey was launched during the period of field preparation in December 1992. In April 1993 the second survey was conducted during the pearl millet growing period when field management activities (e.g. weeding, insect and bird control) prevailed. The third and last household survey took place after pearl millet harvesting and threshing in August 1993 when the results of the growing season were more evident.

After the severe drought of 1991/92, the total measured rainfall for growing season 1992/93 was slightly below the long-term average in both study regions. However as the rainfall was well distributed over Ovambo, the harvest there was good while Kavango faced a second consecutive poor harvest.

The pearl millet trader survey was conducted after threshing in October/November 1993 when pearl millet trade was expected to be most vigorous. A total of 59 rural and peri-urban pearl millet traders were interviewed in the study regions. According to the traders surveyed their pearl millet selling period in 1993 was comparatively short in Ovambo because many households that were usually in pearl millet deficit within four months after harvest were able to rely on their own pearl millet production until November. In addition the 1993/94 rainy season began in December which allowed households with pearl millet shortages to consume the early pearl millet crop instead of relying heavily on purchased food staples.

Schedule and composition of the Namibia Pearl Millet Subsector Project Surveys, 1992 - 1993

First cropping practice survey: field preparation period
Date: November-December 1992
Sample: 320 households
Information collected: family composition; food prices; input adoption; field preparation practices; plot data; storage practice; crop sales; taste preferences; investment needs.

Price monitoring survey at wholesale and retail level
Date: February 1992-January 1993; every two weeks.
Sample: 59 retail outlets at 19 locations
Information collected: availability of pearl millet and maize; consumer prices;

Second cropping practice survey: pearl millet growing season
Date: March-May 1993
Sample: 320 households
Information collected: non-farm income; consumption pattern; food prices; labor input into crop production; production limitations; crop sales; livestock sales; expectations from government.

Third cropping practice survey: pearl millet harvest and threshing
Date: July-August 1993
Sample: 320 households
Information collected: non-farm income; consumption pattern; food prices; crop production labor information; pearl millet harvest data; production limitation; crop sales; livestock sales; main expenditures; investment priorities.

Price monitoring survey on pearl millet producer prices
Date: July 1992-January 1993; every two weeks.
Sample: 19 locations
Information collected: bag and bucket prices of pearl millet

Field measurement exercise
Date: August-November 1993
Sample: 320 households
Information collected: field size and yield

Pearl millet trader survey: pearl millet marketing season
Date: September-November 1993
Sample: 59 traders
Information collected: business information; pearl millet acquisition and selling information; marketing margins; type of pearl millet sellers; characterization of pearl millet and maize consumers; cost of value-adding activities; maize trade; perceptions about grain market development

Region description

Two major agro-ecological regions were covered: Ovambo and Kavango (Figure 1). Each region has its own ethnic group with its own traditions and language. Because of Namibia's colonial past the regions' logistical infrastructure (transport and telecommunication) as well as its social infrastructure (education and health) are poorly developed. The agricultural sector is dominated by low input levels and low yields[8].

Ovambo Region

The population in northern Namibia is about 671 000 of which 90% live in rural areas. The region has about 44% of Namibia's total population. With an area of 52 000 km^{-2} Ovambo covers about 6.3% of Namibia's total area. The zone's population density of 11.9 persons km^{-2} is the highest in the country[9].

The vegetation of Ovambo is mainly bush savanna, many areas of which are experiencing severe and ongoing desertification. The region has no perennial rivers that would allow for extended crop production under irrigation. With an average annual rainfall of between 360 and 470 mm and 37-53 rainy days a year, the agro-climate of Ovambo is very poor. Pearl millet, and to lesser extent sorghum, are suited to this drought-prone climate.

Kavango Region

Kavango is east of Ovambo. The population is about 136 000, (95% live in rural areas) and this region has about 9% of Namibia's population. Although of a similar size to Ovambo, Kavango's population density is much lower - 2.7 persons km^{-2}. However, Kavango's population is unevenly distributed as about 90% of the population is concentrated in a strip 10-20 km wide along the perennial Kavango river.

Due to its higher annual rainfall, Kavango's vegetation varies from bush to forest. With an average annual rainfall of between 540 and 620 mm and 55-66 rainy days a year, the agro-climate is better than Ovambo's. Nevertheless Kavango's rainy season is so short that pearl millet is still the main grain crop. Usually the accumulated soil moisture dries up too early for the maize to fully ripen. Maize is therefore eaten green before pearl millet harvesting begins.

Subregions

For this study Ovambo and Kavango were sub-divided into three subregions: west, central, east. The bases for the division into smaller subregions were differences in (a) ecological characteristics (b) population density (c) distance to urban centers.

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8 UNDP/FAO, 'Agricultural Mission: Namibia', Base Studies on Financial, Economic and Social Aspects for the Arrangements for Independence in Namibia, September 1989.

9 The average population density of Namibia is about 1.71 persons/km^{-2}.

Figure 1: Total Population Distribution of Namibia

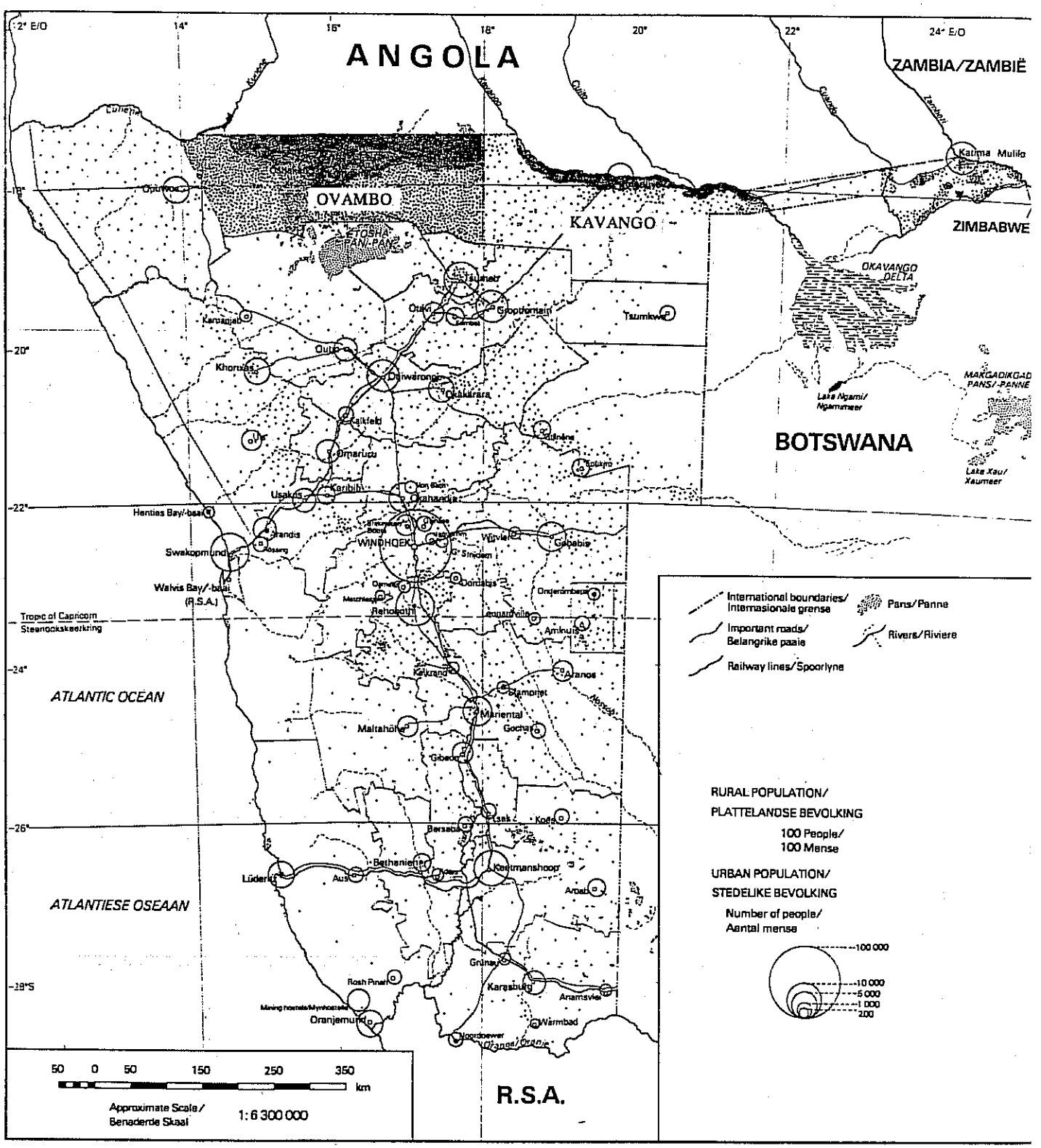
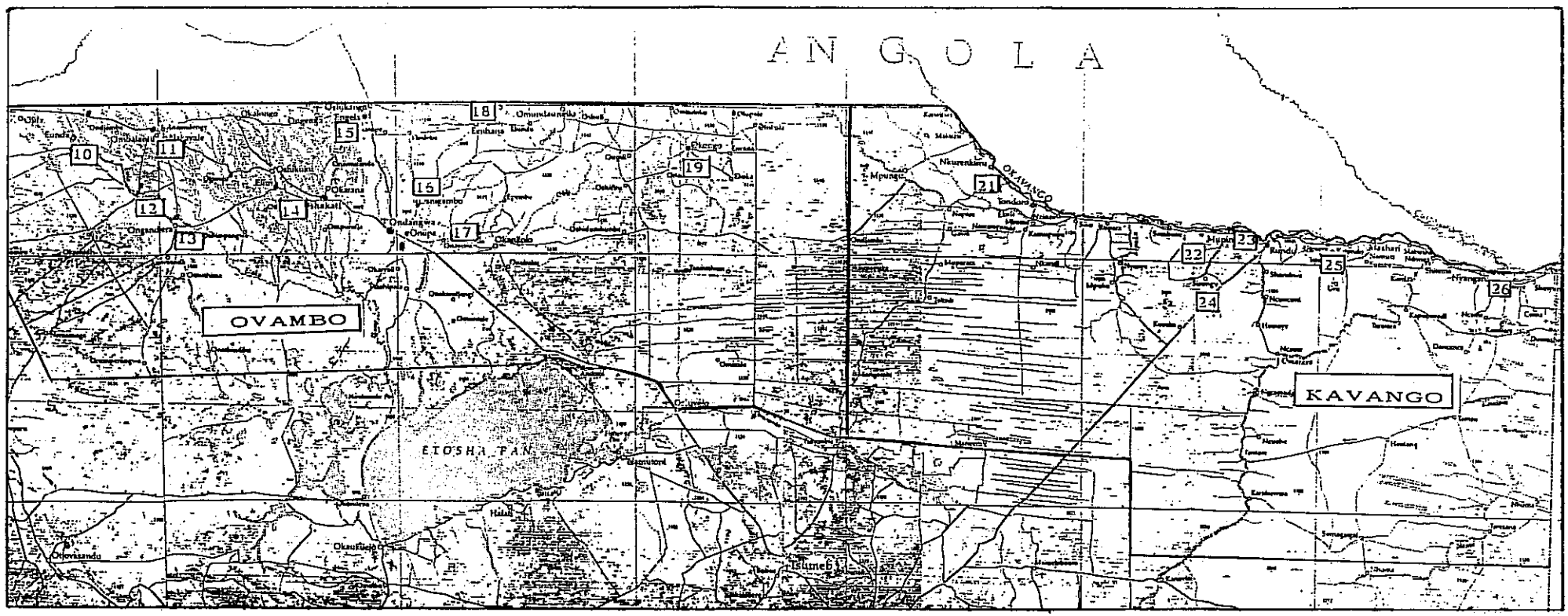


Figure 2: Survey Areas in Ovambo and Kavango



Ovambo West:	Ovambo Central:	Ovambo East:	Kavango West:	Kavango Central:	Kavango East:
10 Onesi	14 Ukwangulu	16 Oshigambo	21 Nkurenkuru	23 Kayengona	25 Sambiyu
11 Outapi	15 Engela	17 Onayena	22 Kapako	24 Myl_30	26 Ndiyona
12 Tsandi		18 Ennhana			
13 Okahao		19 Okongo			

A map of the study regions and the location of survey areas is presented in Figure 2. The characteristics of the individual subregions are described in Table 2.1. The names of the surveyed communities and number of households of the surveyed communities in the different subregions are presented in Table 2.2.

Table 2.1. Characteristics of survey subregions.

Region	Ovambo			Kavango		
Subzone	West	Central	East	West	Central	East
Annual rainfall in mm	360-455	440-470	na	610	540-618	600
Annual rainfall days	37-45	40-53	na	60	43-66	55
Population density	low	high	low	low	high	low
Distance to urban center	far	near	far	far	near	far

Rainfall data from Namibia Weather Bureau
na = not available
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 2.2. Sample communities and their location in subregions, regions, administration and extension areas.

Subregions	Regions and administration areas	Agricultural extension areas	Sample communities	Number of households	Number of households interviewed
Ovambo West	Omusati Region	Onesi	Elondo-West	184	20
		Outapi	Okapanda	40	20
		Tsandi	Uutangatse/Okuvale	53	20
		Okahao	Okanya	57	20
Ovambo Center	Oshana Region	Ukwangula	Ekamba	40	20
		Engela	Engela	228	20
Ovambo East	Ohangwena Region and Northern Parts of Oshikoto Region	Onayena	Ompugulu	92	20
		Oshigambo	Oneputa	66	20
		Enhana	Ennhana	67	20
Kavango West	Along the Okavango at Mpungu, Kahange, and Kapako Area	Nkurenkuru	Nkurenkuru	129	20
		Kapako	Kapako	128	20
Kavango Center	Rundu Area and Kapako Area along the road to Tsumeb	Kayengona	Kayengoma	96	20
		Myl 30	Myl	65	20
Kavango East	Along the Okavango at Mashari and Ndiyona Area	Sambiyu	Mayana	86	20
		Ndiyona	Ndiyona	45	20

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

3. HOUSEHOLD DEMOGRAPHICS AND CONSUMPTION PATTERN

This chapter describes basic demographic data about the study regions' population. It also explains rural households' staple food consumption pattern with emphasis on pearl millet and maize.

3.1. Household demographics

For this study a household unit was defined as a group of people (household members) who live together most of the year (more than six months) and share income and agricultural production between its individual members.

Head of household

During the three phases of the household survey individual households were identified by the name of the head of household. The head of household was defined as the person who has the highest authority about most decisions concerning all individual members within one household.

Gender

Sixty-two percent of rural households in Ovambo and 84% in Kavango had *de jure* a male head of household. Due to seasonal labor migration, some of the male headed households (Ovambo: 6%, Kavango: 3%) stayed less than six months at the homestead, leaving their wives to make most of the agricultural production and household decisions. Taking into account the absence of male household heads, the portion of households that had *de facto* female decision makers for most of the year is 44% in Ovambo and 22% in Kavango (Table 3.1.). The high proportion of households headed by women is consistent with the rural population figures from the 1991 census.

Table 3.1. Gender distribution of de facto heads of household

Region	(Percent of households) Male headed households	Female headed households
Ovambo (n = 200)	56	44
Kavango (n = 120)	78	22

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Age

In Ovambo the majority of female and male heads of household is older than 55 years,

(Table 3.2.). In Kavango the majority of male heads were aged between 31 and 55 years. Female Kavango heads of household were equally distributed between younger and older age groups.

Table 3.2. Age distribution of heads of households by region and by gender.

Age categories	Ovambo Region			Kavango Region		
	Female headed	Male headed	Mean	Female headed	Male headed	Mean
			(Percent of households)			
15 - 30	2.7	0.8	1.5	13.6	8.5	9.4
31 - 55	30.1	37.4	34.6	40.9	62.8	58.8
> 55	67.1	61.8	63.8	45.5	28.7	31.8

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Education levels

In both study regions female heads of household had less access to formal education than males (Table 3.3). In Ovambo 66% of females and 34% of male heads of household received no formal education. In Kavango 50% of females and 32% of male heads received no formal education.

Table 3.3. Level of school education reached by heads of households by region and by gender of head of household.

Educational level reached	Heads of households					
	Ovambo Region			Kavango Region		
	Female headed	Male headed	Mean	Female headed	Male headed	Mean
			(% of household heads)			
No school	65.9	33.6	45.8	50.0	32.0	35.3
Standard 1	0.0	3.2	2.0	0.0	4.1	3.3
Standard 2	2.6	9.6	7.0	13.6	10.3	10.9
Standard 3	1.3	4.0	3.0	4.5	7.2	6.7
Standard 4	5.3	9.6	8.0	4.5	12.4	10.9
Standard 5	10.5	10.4	10.4	13.6	14.4	14.3
Standard 6	5.3	12.8	10.0	4.5	6.2	5.9
Standard 7	3.9	4.0	4.0	9.1	6.2	6.7
Standard 8	2.6	6.4	5.0	0.0	2.1	1.7
Standard 9	0.0	0.8	0.5	0.0	1.0	0.8
Standard 10	2.6	0.8	1.5	0.0	4.1	3.3
Diploma	0.0	4.8	3.0	0.0	0.0	0.0

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In both study regions the number of male heads of household who reached educational levels of between standard four and six was 33%. This was significantly higher than for female heads

of household (23%). Of all heads of household only about 10-15% reached educational levels higher than standard six.

Household size

The number of members in an individual household affected its capacity to cultivate land and to pursue other non-agricultural activities. Data on household size will be used to estimate: (a) the minimum quantity of staple food necessary to ensure food security for a particular household, (b) the per capita cash income, and (c) per capita grain production.

The number of members per household varied from an average of 9.0 people in Ovambo (CV = 0.53) to 7.9 in Kavango (CV = 0.41), (Table 3.4.). The range was between one and 39 household members. The portion of households with 10 and more members was substantially higher in Ovambo (40.0%) than in Kavango (23.7%).

Table 3.4. Average household size by region and by gender of head of household.

Number household members	Ovambo households			Kavango households		
	Female headed	Male headed	Mean	Female headed	Male headed	Mean
			(% of households)			
Avg. HH size	8.1	9.4	9.0	7.5	7.9	7.9
1 to 3	14.9	10.4	13.0	9.1	4.2	6.6
4 to 6	24.3	16.0	20.0	27.3	30.2	28.7
7 to 9	28.4	26.0	27.0	45.5	36.5	41.0
10 to 12	17.6	25.6	22.0	4.5	21.9	13.2
13 and more	14.9	21.6	18.0	13.6	7.3	10.5

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In Ovambo the size of female headed households was, on average, 1.3 persons smaller than male headed households. In Kavango the average size difference between male and female headed households was only 0.4 persons.

Household structure by age and gender

To analyze existing household structures, household members were grouped by age and gender.

In 95% of all households about 27% of the women were between the ages of 15-55 years (Ovambo 27.9%, Kavango 25.4%), and they represented the largest member category (Table 3.5.). The groups of girls and boys under the age of 15 years, and the group of men between 15 and 55 years, represented about 20% of all household members across various household sizes. Men and women older than 55 years represented 11% of household members in Ovambo and 8% in Kavango.

Table 3.5. Average household member structure by region and by gender of head of household.

	Ovambo households			Kavango households		
	Female headed	Male headed	Total	Female headed	Male headed	Total
Girls (0-14yr)	21.1	21.9	21.7	18.7	20.6	20.1
Boys (0-14yr)	21.1	20.0	20.4	26.5	24.0	25.1
Women(15-55yr)	30.0	26.8	27.9	31.3	24.4	25.4
Men (15-55yr)	17.8	20.5	19.5	15.6	23.0	21.5
Old women>55yr	9.6	3.7	5.7	7.8	3.7	4.5
Old men>55yr	0.4	7.0	4.7	0.0	4.4	3.4

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Education levels

The percentage of people who were older than 55 years and who had no formal education is high in Ovambo (females older than 55 years: 59%, males older than 55 years: 48%) (Table 3.6.) and very high in Kavango (females older than 55 years: 85%, males older than 55 years: 61%) (Table 3.6.).

Table 3.6. Ovambo: level of education by age, by region, and by gender of head of household.

Educational level reached	Age categories by gender					
	Female household members aged			Male household members aged		
	15-30 yrs %	31-55 yrs %	>55 yrs %	15-30 yrs %	31-55 yrs %	>55 yrs %
No school	3.3	20.4	58.8	8.3	18.3	48.2
Standard 1	1.8	3.1	1.0	1.2	2.9	1.3
Standard 2	1.2	5.6	4.9	5.8	7.7	10.8
Standard 3	4.2	7.4	4.9	6.6	2.9	3.6
Standard 4	7.2	9.9	3.9	9.1	13.4	4.8
Standard 5	11.4	14.2	11.7	12.5	18.2	6.0
Standard 6	12.7	12.3	10.8	10.4	8.7	15.7
Standard 7	14.0	4.9	1.0	14.1	9.6	1.2
Standard 8	25.0	13.5	0.0	18.7	9.6	2.4
Standard 9	8.4	1.2	0.0	8.4	1.0	0.0
Standard 10	8.4	3.7	1.0	4.1	2.9	0.0
Diploma	1.8	1.9	2.0	0.8	3.8	6.0
Acad. degree	0.6	1.9	0.0	0.0	1.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 3.7. Kavango: level of education by age, by region, and by gender of head of household.

Educational level reached	Age categories by gender					
	Female household members			Male household members		
	15-30 yrs	31-55 yrs	>55 yrs	15-30 yrs	31-55 yrs	>55 yrs
	%	%	%	%	%	%
No school	15.0	50.5	85.4	8.1	26.8	60.5
Standard 1	2.0	4.4	0.0	4.0	2.6	6.1
Standard 2	10.2	7.7	7.3	7.3	14.1	9.1
Standard 3	12.2	8.8	4.9	10.5	11.5	3.0
Standard 4	10.9	9.9	2.4	17.7	16.7	6.1
Standard 5	21.8	7.7	0.0	15.3	7.7	15.2
Standard 6	12.9	3.3	0.0	15.3	7.7	0.0
Standard 7	6.8	4.4	0.0	9.8	9.0	0.0
Standard 8	6.1	1.1	0.0	4.8	1.3	0.0
Standard 9	1.4	2.2	0.0	2.4	1.3	0.0
Standard 10	0.7	0.0	0.0	4.8	1.3	0.0
Diploma	0.0	0.0	0.0	0.0	0.0	0.0
Acad. degree	0.0	0.0	0.0	0.0	0.0	0.0

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

The levels of education reached by people in the 15-30 age group were significantly higher. In this group Ovambo women had almost reached the same level of formal education as men in the same age group. In Kavango, females between the ages 15-30 years had almost reached the same level of education as the males in the same age group in Ovambo. However, 15% of Kavango women between ages 15-30 years had no school education at all.

Ownership of valuable goods

This section describes findings about household ownership of goods such as plowing equipment, transport equipment, and consumer goods.

Ploughs and tractors

In Ovambo and Kavango 56% and 58% of all households respectively owned a plow (wooden or metal) (Table 3.8.). However not all households that owned a plow also had draft animals. In both study regions only about half of all households owned both a plow and draft animals (Ovambo: 48%, Kavango: 49%). In both regions, therefore, more than half of all households either depended on manual field preparation with a hoe or had to hire plowing services from neighbors or from government.

In both study regions fewer female headed households owned plows (Ovambo:36%,Kavango: 48%) than male headed households (Ovambo: 68%, Kavango: 60%). The proportion of households with plows is relatively low for the subregions Ovambo East (44%) and Kavango Central (48%) (Table 3.8.).

Table 3.8. Households ownership of plowing, transport equipment, and consumer goods, by region.

Item	Ovambo households			Kavango households		
	Female headed	Male headed	Total %	Female headed	Male headed	Total %
Plough	36	68	56	48	60	58
Tractor	3	2	3	0	0	0
Donkey cart	6	14	12	0	5	4
Oxen sledge	1	3	3	56	54	53
Canoe	0	0	0	32	26	27
Bicycle	16	41	32	4	11	11
Motorcycle	0	0	0	0	2	2
Motor vehicle[a]	7	21	17	0	17	13
Gas-stove	4	13	10	13	13	13
Refrigerator	4	11	9	9	7	7
Radio	60	73	68	44	66	62
TV set	0	5	3	0	4	4

[a] Motor vehicle = sedan, pick-up truck, van, minibus
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Of a randomly selected sample of 200 Ovambo households and 120 Kavango households, only five households in Ovambo and none in Kavango had privately owned tractors. Four of the five tractors belonged to female headed households. Also four of the five tractors were in the subregion Ovambo West.

Transport equipment

In Ovambo three kinds of transport equipment were owned by larger numbers of households: (1) 32% of all households owned a bicycle (2) 17% owned motor vehicles (including: sedan, pick-up truck, van, mini-bus) (3) 12% owned a donkey cart. Despite the fact that a many of the privately owned motor vehicles were old and not fully functioning, the general scale of motorization was unexpectedly high.

In Kavango four means of transport were owned by large numbers of rural households: (1) About 53% of households owned an ox sledge (2) 27% owned a canoe that could be used on the Kavango River (3) 13% owned a motor vehicle (4) 11% owned a bicycle. As in Ovambo the percentage of Kavango households that owned a motor vehicle was relatively high. In Kavango, unlike in Ovambo, animal and human driven transport were the main means of transport.

In both study regions female headed households owned fewer bicycles and motor vehicles than male headed households. The comparison of the ownership of transport equipment across subregions revealed few discrepancies.

Consumer goods

For most of Namibia's communal population goods like gas-stoves, refrigerators, radios, and television sets were capital intensive consumer goods. Knowledge about the ownership of these goods allows for a better understanding of rural household adaptation to an urban lifestyle. It also indicates whether households had disposable income to invest in consumer goods.

Of the four consumer goods mentioned above radios were owned by the largest number of households in both study regions. In Ovambo 68% and in Kavango 62% of all households owned a radio. Gas-stoves and gas-refrigerators were owned by between 7.1 and 13.3% of the households in both study regions. Television sets were owned by 3.0 to 3.6% of households in Ovambo and Kavango.

With the exception of gas-refrigerators in Kavango, the ownership of all consumer goods was higher in male headed households than in female headed households.

Summary

The number of members per household varied substantially in both study regions. The average household size in Ovambo was higher (9.0 members) than in Kavango (7.9 members).

The percentage of female headed households was relatively high in Ovambo (40%) but was significant in Kavango (20%).

The percentage of heads of household with no formal education was high in both study regions. The number of female heads of household with no formal education was about 66% in Ovambo and 50% in Kavango almost double that of male household heads.

Women aged 15-55 years represented, on average, 28% of household members in Ovambo and 25% in Kavango. Girls and boys under the age of 15 years and men between 15 and 55 years were represented equally at about 20% throughout most households.

In both study regions people from younger age groups reached significantly higher levels of formal education than those from older age groups. The educational levels reached in Ovambo are generally higher than in Kavango. In Ovambo women had nearly reached the same level of education as men.

In Ovambo and Kavango only half of all households owned both a plow and draft animals. Therefore in both regions more than half of all households either depended on manual field preparation with a hoe or had to hire plowing services from neighbors or from government. In Ovambo 17% and in Kavango 13% of households own motor vehicles. Radios were owned by 68% of Ovambo households and 62% in Kavango.

With the exception of tractors in Ovambo and ox sledges and canoes in Kavango, male headed households owned plows, transport vehicles, and consumer goods, significantly more often than female headed households.

3.2. Household consumption pattern

This section portrays rural household food consumption patterns, with emphasis on the main grain staples, pearl millet and maize.

Taste preferences

The following paragraphs describe what types of food staples are currently preferred by households and various household members. Thereafter the determinants of the preference statements are analyzed.

Taste preferences of household member type
Given a choice between pearl millet and maize, a clear majority of the households surveyed opted for pearl millet (Table 3.9.). However, in Ovambo a significant share of the respondents said they had no preference.

Table 3.9. Household preference between pearl millet and maize.

	Percent of households which		
	Prefer p. millet	Equally prefer p. millet and maize	Prefer maize
Ovambo (n = 200)	77	20	3
Kavango (n =1 20)	94	3	3

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Survey respondents were also asked to state the type of staple food that is most preferred by various household members. The choice was between: pearl millet meal, maize meal, a mix of pearl millet and maize meal, bread, rice, and macaroni. Except for children who liked bread best, pure pearl millet meal was most often chosen by all household members (Table 3.10.).

Table 3.10. Staple food preference of various household members.

	Elderly	Women	Men	Migrant worker[a]	Children
	(Percent preferring alternative grains)				
Ovambo (n = 200)					
Pearl millet	66	45	51	61	20
Maize	6	11	12	6	2
Pearl millet/maize Mix	11	22	25	11	13
Bread	4	2	1	0	50
Rice	10	13	8	11	12
Macaroni	3	8	4	11	4
Kavango (n = 120)					
Pearl millet	76	69	72	86	30
Maize	20	18	20	0	10
Pearl millet/maize Mix	0	3	0	14	4
Bread	0	0	0	0	50
Rice	0	3	4	0	1
Macaroni	4	7	5	0	5

[a] Migrant workers leave their households for part of the year to work in Windhoek or one of the southern mining towns.
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In Ovambo almost 52% of adults preferred pure (non-mixed) pearl millet meal to other staple foods. Another 20% preferred a mix of pearl millet meal and maize meal. Rice, macaroni and bread was preferred by 18% and pure maize meal by about 10%.

In Kavango 70% of adults favored pure pearl millet meal best. Maize meal was preferred by 19% and rice, macaroni and bread by 9%. Only 2% percent of the adults liked a mix of pearl millet meal and maize meal.

Generally staple food preferences seemed to be related to age. While a clear majority of older people preferred pearl millet to the different food staples, younger people were less likely to prefer porridge made solely from pearl millet. In Ovambo a significant number of adult women and men preferred either a pearl millet-maize mix or pure maize meal. Children's high preference for bread can be explained by their exposure to it. Parents explained that they often gave their young children bread because it is convenient and because children like its sweet taste.

Preference determinants

Households were asked to explain why they preferred one food staple to others. The reasons most often mentioned for pearl millet or maize preference are:

- tradition or familiarity;

- exclusive availability i.e. no other staple food available to the household;
- low price and accessibility i.e. easier to buy;
- nutritional value i.e. food item gives more energy, is healthy, etc;
- taste.

In Ovambo the preference for pearl millet or pearl millet-maize mix was mainly determined by tradition and exclusive availability (Table 3.11.). For those who preferred either rice, macaroni, or bread the main reasons were taste and high nutritional value. Reasons for pure maize preference were chiefly exclusive availability and then low price and accessibility.

Table 3.11. Explanation given for staple food preferences.

	Percent of households citing alternative reasons for taste preferences				
	Tradition & used to it	Exclusive availability	Low price & accessibility	Nutritional value	Good taste
Ovambo (n = 200)					
Pearl millet	44	27	7	15	7
Maize	44	23	8	10	15
Pearl millet/maizemix	11	64	14	7	4
Bread,rice and macaroni	3	2	19[a]	33	43
Kavango (n = 120)					
Pearl millet	17	12	0	58	1
Maize	0	0	0	100	0
Pearl millet/maize mix	7	29	10	43	12
Bread,rice and macaroni	0	5	5[a]	55	35

[a] Includes convenience and modern lifestyle
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In Kavango pearl millet preference was mainly attributed to its nutritional value and tradition. The major reasons for pure maize preference were also its nutritional value and its exclusive availability. For those who preferred either rice, macaroni, or bread the reasons were mainly their high nutritional value and taste.

Food staple consumption

The following section describes the type of food staples that households actually consume.

Consumption of pearl millet and maize

To evaluate what households actually eat, participants were asked about their daily diet in April 1993 (eight months after the last grain harvest) and in August 1993 (when threshing of the current harvest was finished). The changes in household diets that occurred within the four month period was profound. Especially significant was the consumption switch from porridge made from pure maize meal or porridge made from a maize/pearl millet mixture to porridge made solely from pearl millet (Table 3.12.).

Table 3.12. Seasonality of households' pearl millet and maize consumption.

	Percent of households consuming alternative grains			
	Ovambo		Kavango	
	April	August	April	August
Pearl millet	29	63	8	69
Pearl millet/maize mix	20	34	14	13
Maize	51	4	78	18

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In Ovambo the percentage of households that ate pure pearl millet porridge increased from 29% in April 1993 to 63% in August 1993. The percentage of households that ate pure maize porridge or a porridge made from a maize-pearl millet mixture declined from 71% in April 1993 to 38% in August 1993.

The switch from maize to pearl millet was even more significant in Kavango. The percentage of households that ate pure pearl millet porridge increased from 8% in April 1993 to 69% in August 1993. The percentage of households that ate pure maize porridge or a porridge made from a maize-pearl millet mixture declined from a total of 92% in April 1993 to 31% in August 1993.

The significant dietary move away from maize porridge when pearl millet is available confirms the household preference statements given above. It also indicates that for the majority of communal households, staple food consumption is mainly supply driven - i.e. as long as pearl millet from their own production is available it is the preferred food staple. Only when pearl millet stocks have significantly dropped do households start stretching pearl millet porridge with maize meal. Many households eventually have to rely entirely on purchased maize until the next harvest.

Questioned about the reason for their choice between pearl millet and maize, household replies confirmed that staple food consumption is mainly supply driven. Of those Ovambo households that ate pure pearl millet in April 1993 the majority (46%) gave their decision as being dictated by pearl millets' exclusive availability, (Table 3.13.). The other major determinant for pearl millet consumption given in Ovambo was tradition (43%). In Kavango the determinants for pearl millet consumption were similar weighted. Forty percent of Kavango households claimed that pearl millet's exclusive availability is the main decision factor. Thirty percent of households stated tradition and 21% gave pearl millet's nutritional value as their reason for choosing it.

Table 3.13. Determinants of consumption decision by region.

	Tradition & familiarity	Exclusive availability	Low price & accessibility	Nutritional value	Good taste
	(Percent of households citing alternative justifications for consumption decisions)				
Ovambo					
Pearl millet	43.4	46.2	5.7	2.8	1.9
Maize	0.0	93.3	6.7	0.0	0.0
Pearl millet/maize mix	0.0	90.9	0.0	9.1	0.0
Bread,rice,macaroni	0.0	50.0	0.0	50.0	0.0
Kavango					
Pearl millet	30.3	39.4	0.0	21.2	9.1
Maize	0.0	69.6	21.5	7.6	1.3
Pearl millet/maize mix	na	na	na	na	na
Bread,rice,macaroni	0.0	0.0	0.0	0.0	100.0

na = not available
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

The majority of those households consuming only maize gave exclusive availability as the main criterion (Ovambo: 93%, Kavango: 70%). The other important factors mentioned were the low price of maize and its accessibility on the market (Ovambo: 7%, Kavango: 22%).

Consumption of other food items

Not only pearl millet and maize consumption changed with production seasons but also the consumption of other food items e.g. the consumption of goat milk was increased in both regions in April compared with August. In Ovambo the consumption of fresh and dried vegetable leaves significantly increased during April, (Table 3.14.).

After the harvest in August 1993, the consumption of beans and of meat increased, together with pearl millet consumption, in both regions. In the same period dairy milk and cabbage were consumed more in Ovambo, while the consumption of fish and pumpkin increased in Kavango.

The consumption of more expensive grain staples was generally stable between April and August. In Ovambo about 30%, and in Kavango 13% of all households included bread in their daily diet, mainly for children. Rice is consumed by about 3% of households in both regions. Five percent of Ovambo households and one percent of Kavango households included macaroni in their diet.

Food staple accessibility

As described above, the majority of rural households who eat maize meal explained their

decision by the unavailability of pearl millet, the low price of maize and its accessibility. The following two sections will try to quantify those statements.

Table 3.14. Seasonality of households food consumption.

Food item	Ovambo		Kavango	
	April	August	April	August
	(Percent of households consuming each food item)			
Pearl millet	30	63	8	69
Pearl millet drink	57	87	12	37
Beans	20	38	22	3
Fish	0	4	0	24
Cabbage	1	18	0	3
Cow milk	4	21	8	3
Meat	54	64	38	51
Pumpkins	4	6	3	18
Bread	28	30	13	13
Poultry	0	1	0	3
Maize drink	2	1	11	3
Tea/coffee	39	36	11	10
Rice	5	1	3	3
Sauce	24	19	2	3
Eggs	6	1	1	1
Macaroni	8	2	2	0
Sorghum drink	19	11	1	3
Maize	20	4	78	18
P.millet/maize mix	51	34	14	12
Goat milk	22	0	15	0
Leaves	89	53	64	64

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Pearl millet scarcity in rural markets

When asked which of the two main food staples, pearl millet or maize, is easier to buy, responses were clearly in favor of maize (Table 3.15.). In Ovambo 57% of all households said maize meal was easier to buy than pearl millet. Twenty-six percent said both pearl millet and maize were equally accessible. In Kavango 91% of all respondents claimed that maize was easier to acquire.

Table 3.15. Comparison of household access to p.millet and maize.

Region	Percent of households who believe		
	P.millet is easier to buy	Both are equally accessible	Maize is easier to buy
Ovambo	17	26	57
Kavango	7	2	91

Source: Namibia Millet Subsector Project Surveys, 1992-93.

In April 1993 only 45% of rural households from both regions said that non-processed pearl millet was available to buy (Table 3.16). Pearl millet meal was only available to a few rural households (Ovambo: 2%, Kavango: 4%).

At the same time almost 100% of the respondents said that maize *meal* was available to buy, but in most subregions raw maize i.e. unprocessed maize, was difficult to obtain. In Ovambo Central only 23% and in Kavango Central only 13% of all households could buy unprocessed maize grain. In most other subregions unprocessed maize grain was available to about 50% of households.

Table 3.16. Rural households with access to various food staples in April 1993 by region and by subregion.

	Percent of households with access to						
	Unprocessed p. millet	P. millet meal	Unprocessed maize	Maize meal	Bread	Rice	Sorghum
Ovambo							
West	58	4	92	99	26	97	97
Central	33	0	23	100	10	95	100
East	44	1	54	99	37	90	99
Total	45	2	56	99	24	94	99
Kavango							
West	63	5	58	100	0	87	100
Central	13	3	13	100	0	63	69
East	58	5	60	100	0	95	93
Total	44	4	43	100	0	82	87

Source: Namibia Pearl Millet Subsector Project Surveys 1992-93.

In April 1992 bread was available to about 86% of all Ovambo households and to about 67% of all Kavango households. In both regions imported rice was available to the vast majority of all households (Ovambo: 94%, Kavango: 82%). But only 24% of Ovambo households were able to purchase sorghum.

Strategies to cope with pearl millet shortage

To find out how rural households reacted to a shortage of pearl millet they were asked to explain what they do when their stocks of pearl millet run out. The following are the overall strategies used by households:

- change their consumption habits;
- ask others for assistance;
- work for food or money to buy pearl millet;
- buy the food that is out of stock.

Household coping strategies in response to pearl millet shortages differ between Ovambo and Kavango households (Table 3.17.). In Ovambo the first reaction to pearl millet shortage was

to stretch the existing pearl millet meal with maize meal. Also less pearl millet was eaten or households changed to other food types. The next step was to ask relatives or neighbors to supply the household with pearl millet. Relatives were also asked to provide money to buy food. Eventually 58% of all Ovambo households bought pearl millet. The sources from which households buy pearl millet are presented in Table 3.18.

When Kavango households ran short of pearl millet they changed their eating habits. Most households reduced pearl millet consumption and switched to other foods. The stretching of pearl millet meal with maize meal was also practised. In comparison with Ovambo, fewer households asked relatives or neighbors for help. On the other hand 24% of all Kavango households said they worked for others to obtain food or money. Eventually only 19% of the Kavango households bought pearl millet from various sources.

Table 3.17. Household reactions to pearl millet and maize shortages.

Reaction to shortage	Response to p.millet shortage (% of households)		Response to maize shortage (% of households)	
	Ovambo	Kavango	Ovambo	Kavango
Mix millet with maize	43	47	2	5
Eat less	17	70	1	26
Eat other food	17	60	5	40
Ask relatives for grain	38	12	8	9
Ask relatives for money	13	6	7	5
Ask neighbor for help	26	8	7	13
Work for food or money	1	24	2	29
Buy the grain in short supply	58	19	92	44

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 3.18. Sources where rural households buy p. millet and maize.

Source	Possible p.millet sources (% of households)		Possible maize sources (% of households)	
	Ovambo	Kavango	Ovambo	Kavango
Neighbors	22	9		
Local shop	13	6	66	32
Local market	5	1	22	2
Urban market	3	0	8	0
Urban supermarket	10	6	54	18
Urban wholesaler	4	4	41	13
Travelling traders	14	0	8	0
Angolan traders	14	3	4	2
From Angola	2	0	2	0

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Coping with maize shortage
Of all rural households only 0.5% in Ovambo and one percent in Kavango said they do not eat maize meal. In Ovambo the main response when maize meal stocks run out was to buy it (92% of all households). The main sources of maize meal are presented above.

In Kavango, households responded to depleted maize meal stocks much as they did to a pearl millet shortage. Many households first reduced their consumption (26%) and switched to other foods (40%). About 30% said that they would work for food. Some households asked relatives and/or neighbors for food (both 13%). Eventually maize meal was bought by about 44% of all Kavango households.

Food expenditures and consumer prices

This section describes the proportion of household cash expenditure that is spent on food. The section thereafter will demonstrate the different price levels at which food staples are available to rural consumers and how these price levels change by season and across geographic areas.

Household food expenditures
After the grain harvest in August 1993 when food was most abundant, rural households were asked to state the three items on which they spent most money within one month. Households were also asked to estimate the approximate amount they spent in these three categories.

In Ovambo about 75% of households spent between N$100 and N$300 a month on their three most costly items. Only 6% of all households claimed that they had no cash income to spend. Of monthly expenditure the average spent on food is about 53% across all Ovambo households.

In Kavango 24% of all households said they had no cash expenditures, but 39% spent on average between N$200-400 a month. Those households that had money, spent, on average, 67% on food.

Seasonal consumer prices for pearl millet and maize
To gain a better understanding about price competitiveness between pearl millet and maize at the consumer level, households were asked three times (in December 1992, March 1993, and August 1993) to quote the local prices for:[10]
- 50 kg bags of maize meal (commercially traded)
- 50 kg bags of unprocessed pearl millet (commercially traded)
- 16.5 kg buckets of unprocessed pearl millet (informally traded).[2]

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10 A more extensive analysis of seasonal pearl millet and maize price data on the retail level collected during the price monitoring survey (Feb 1992 to Jan 1993) will be presented in a separate report about the competitive position of pearl millet produced in communal areas compared with commercially produced and imported maize.

With the exception of Ovambo West the comparison of the consumer prices for staple grain for all subregions yielded a similar result. Throughout most of the 1992/93 production year the kilogram price for commercially traded maize meal was cheaper than for commercially traded pearl millet. (See Figures 3 and 4)

In Ovambo Central and Ovambo East commercially traded pearl millet was on average 15% more expensive than maize meal. In Kavango commercially traded pearl millet was between 26% and 43% more expensive than maize meal. Only in Ovambo West was the consumer price for commercially traded pearl millet cheaper (7%) than the price for maize meal. Seasonal pearl millet and maize prices across various subregions are presented in Table 3.19.

Table 3.19. Seasonal consumer prices of pearl millet and maize by subregion.

	December 1992	March 1993	August 1993	Mean
	(N$ per kilogram)			
Ovambo West				
Commercial maize meal	1.40	1.34	1.20	1.31
Commercial pearl millet	1.35	1.11	1.21	1.23
Informal pearl millet	0.96	1.48	1.18	1.21
Ovambo Central				
Commercial maize meal	1.19	1.12	1.22	1.18
Commercial pearl millet	1.36	1.12	1.67	1.38
Informal pearl millet	0.80	2.01	0.98	1.26
Ovambo East				
Commercial maize meal	1.26	1.17	1.24	1.22
Commercial pearl millet	1.42	1.12	1.48	1.34
Informal pearl millet	0.63	1.04	1.12	0.93
Kavango West				
Commercial maize meal	1.32	1.42	1.40	1.38
Commercial pearl millet	1.73	1.51	1.97	1.74
Informal pearl millet	1.20	1.13	1.16	1.16
Kavango Central				
Commercial maize meal	1.29	1.38	1.39	1.35
Commercial pearl millet	1.90	1.68	1.91	1.83
Informal pearl millet	1.42	1.21	1.21	1.28
Kavango East				
Commercial maize meal	1.34	1.44	1.49	1.42
Commercial pearl millet	2.19	1.96	1.95	2.03
Informal pearl millet	1.64	1.21	1.22	1.36

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Figure 3: Seasonal consumer prices of millet and maize in Ovambo

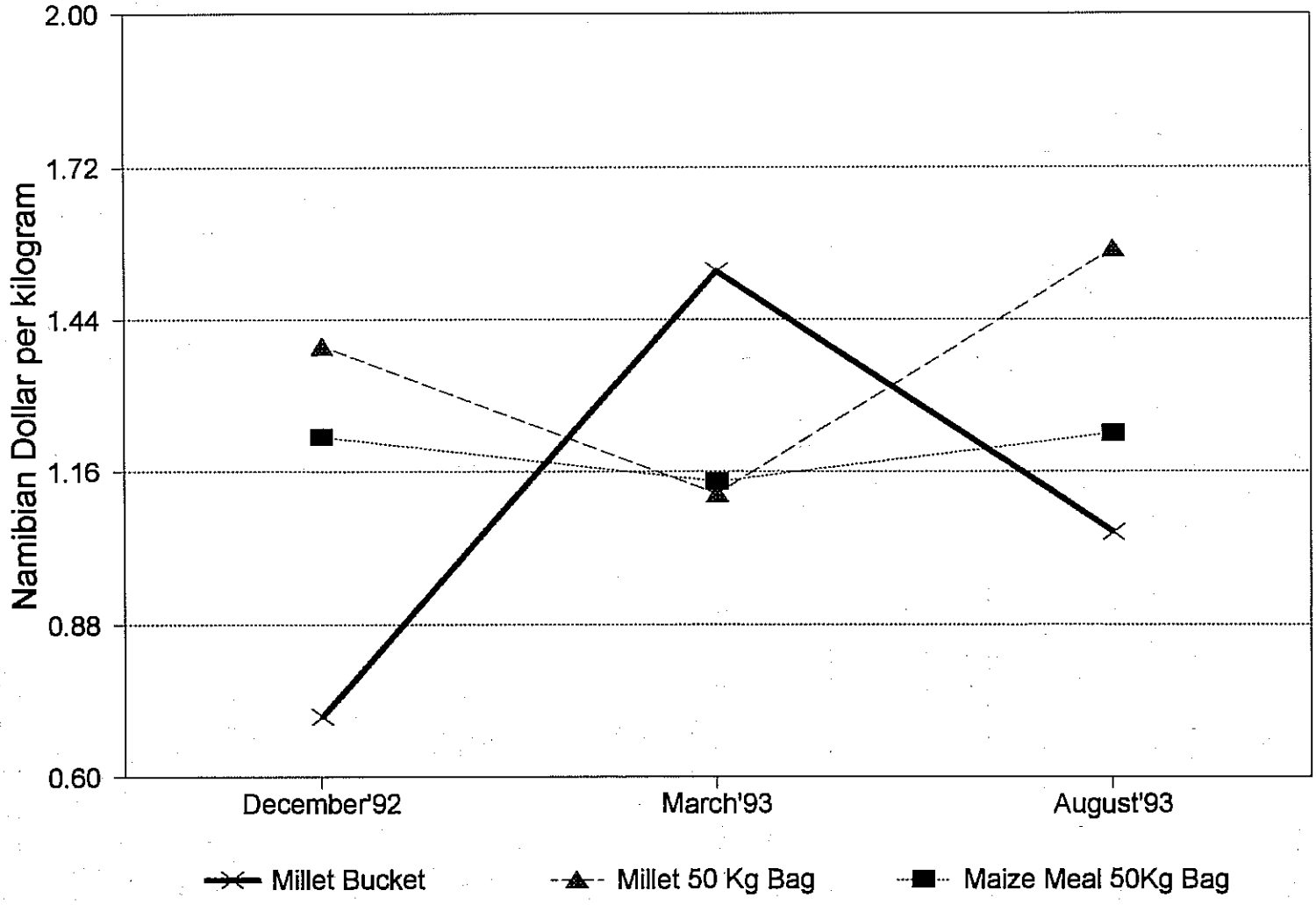


Figure 4: Seasonal consumer prices of millet and maize in Kavango

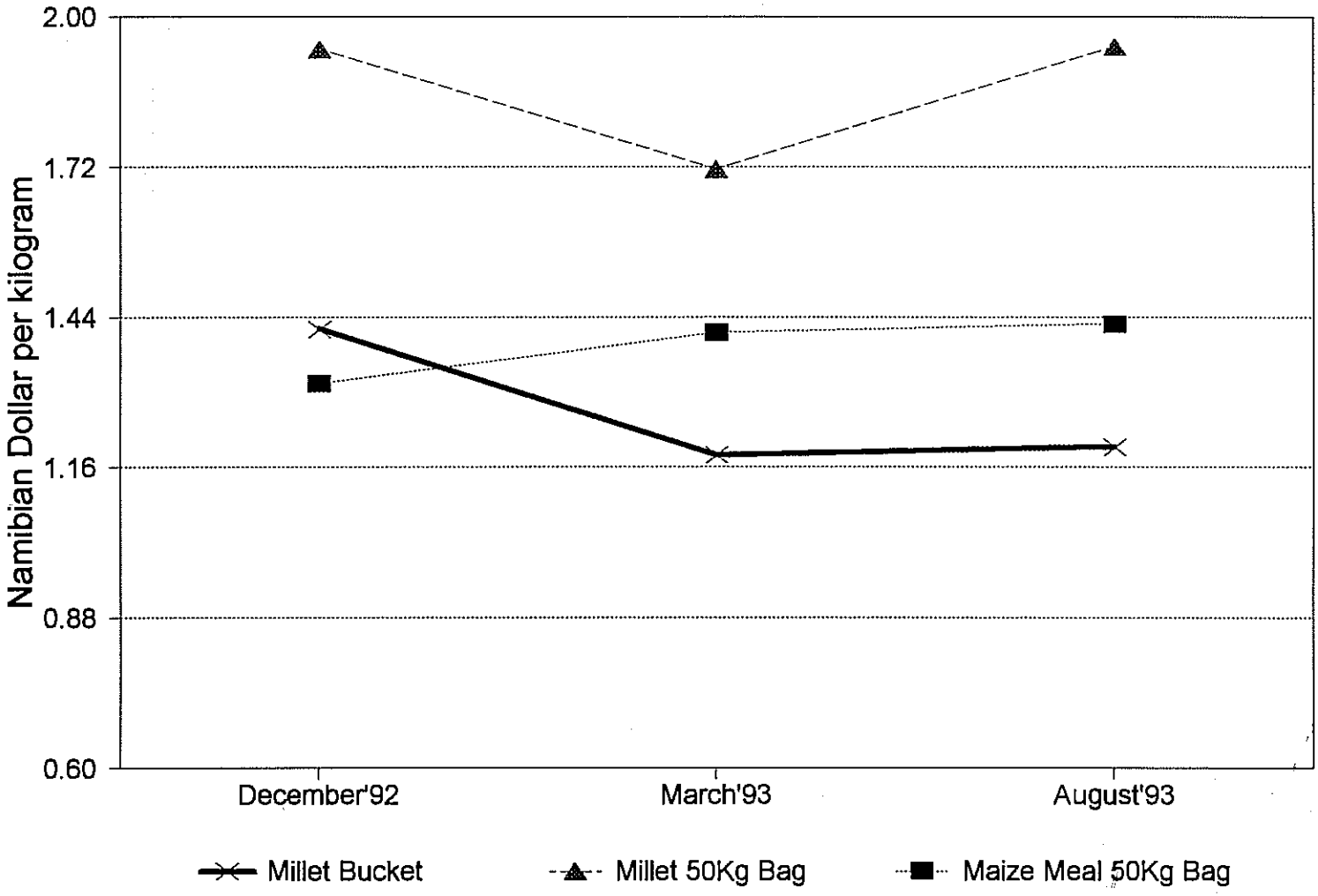
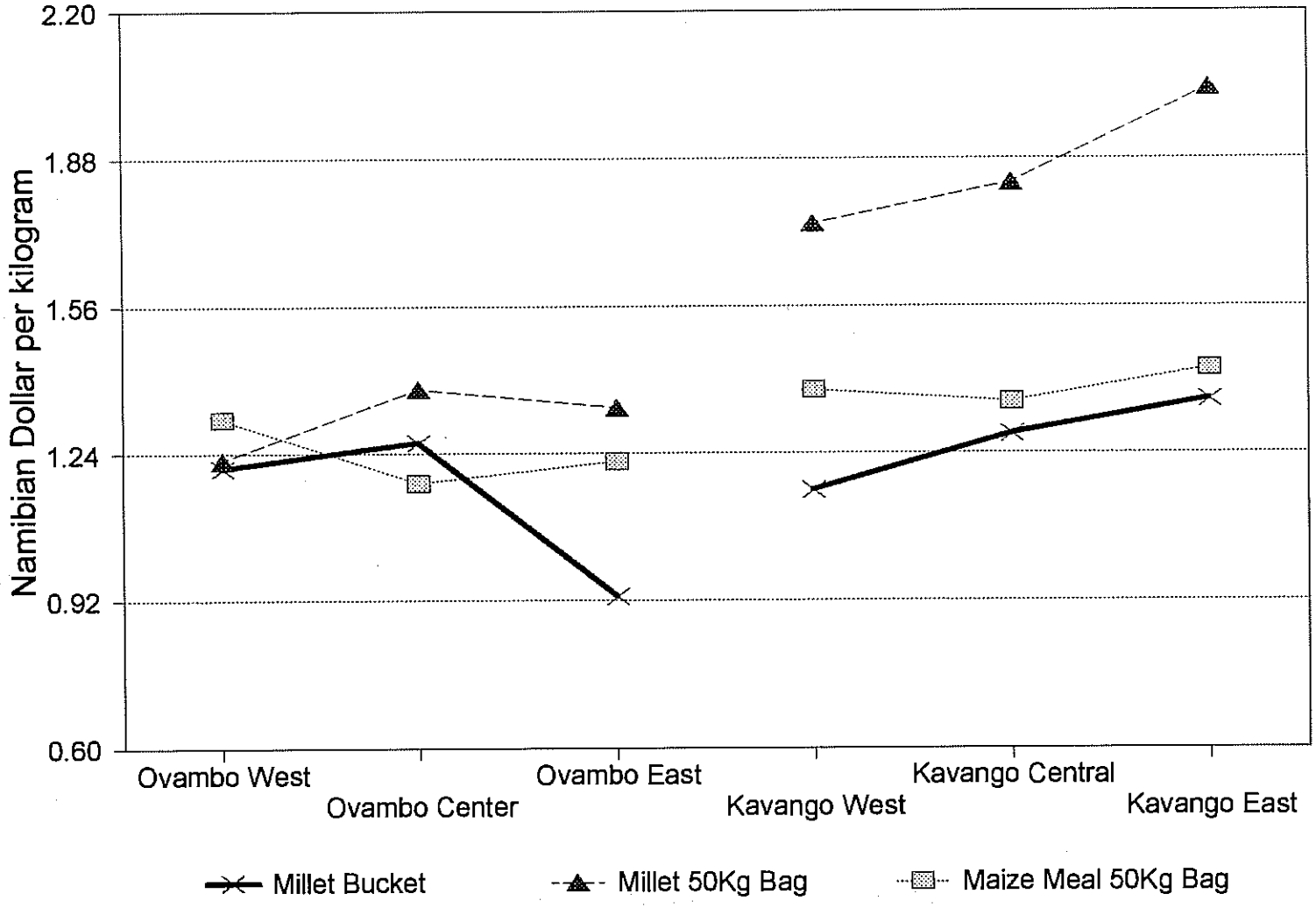


Figure 5 Regional consumer prices of millet and maize in 1992/93



However at the beginning and end of the production year 1992/93 the kilogram price for informally traded pearl millet (bucket price) was cheaper than commercially traded maize and pearl millet. In Ovambo the average price for informally traded pearl millet was between 8% and 24% cheaper than for maize meal. In Kavango the average price difference between the two varied between 5% and 16%.

Consumer price variation across subregions

Due to the concentration of wholesalers in urban centers, maize meal prices in Central Ovambo and Central Kavango are lower than in the peripheral subregions. Figure 5 demonstrates that staple food prices varied even more significantly between Ovambo and Kavango. During the production year 1992/93 maize meal was on average 15% cheaper in Ovambo than in Kavango. Commercially traded pearl millet was 38% cheaper in Ovambo than in Kavango.

There were four reasons for the large price discrepancies of major food staples between Ovambo and Kavango:

(1) Kavango wholesalers' and retailers' prices were significantly higher than for Ovambo wholesalers.
(2) Kavango experienced consecutively poor pearl millet harvests in 1992/93.
(3) Commercial pearl millet trade in Kavango was under the control of only five large wholesale and retail businesses.[11] Although these businesses competed with each other for a share of the food and consumer goods market, it is quite possible that pricing strategies for scarce products t ook advantage of customers' limited alternatives.
(4) Ovambo wholesalers were able to gain direct access to large quantities of relatively cheap supplies from commercial farms in Angola while Kavango wholesalers could only access the same sources via grain traders from Ovambo.

Chapter 4 discusses the determinants of pearl millet production levels in more detail. The structure of the commercial grain market in Kavango and the pearl millet trade between Angola and northern Namibia are described in the Chapter 5.

Comparison of staple food consumer prices from 1992/93

To improve the understanding of the price structure of various food staples, the average consumer prices for the production year 1992/93 were calculated for each important food staple in Ovambo and Kavango (Table 3.20.).

As already discussed, results show that the cheapest food staple was informally traded pearl millet, followed by commercially traded maize meal and pearl millet. It is therefore obvious that alternative food staples like sorghum, bread and rice are not price competitive. In April 1993

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[11] These include the former First National Development Corporation wholesaler operation and the farmers' marketing cooperative 'Katemo' in Rundu.

one kilogram of bread was between 60% and 70% more expensive than one kilogram of maize meal in both regions. At the same time the kilogram price for rice was between 110% and 180% higher than the price of maize meal in both regions. Sorghum, only available in Ovambo, was about 45% more expensive than maize.

Table 3.20. Average consumer prices of food staples during the production year 1992/93, by region.

	Ovambo (N$/kg)	Kavango (N$/kg)
Informally traded raw material	1.10	1.27
Commercially traded maize meal	1.20	1.38
Commercially traded raw pearl millet	1.35	1.87
Sorghum	1.75	na
Bread	2.00	2.24
Rice	3.30	2.97

na = not available
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Summary

Given only one consumption choice between pearl millet and maize the majority of the survey households opted for pearl millet (Ovambo:77%, Kavango:94%).

Asked to choose from the following different food staples: pearl millet, maize, sorghum, bread, rice, and macaroni, the majority of rural adults chose pure pearl millet meal as their favorite (Ovambo: 52%, Kavango: 70%). The overall pattern of staple food preferences indicates that younger people are less likely to prefer porridge made solely from pearl millet. In Ovambo pearl millet preference was mostly attributed to tradition while in Kavango it was attributed to its nutritional value.

During the 1992/93 production year a significant consumption shift occurred away from maize to pearl millet. In Ovambo the percentage of households that ate pure pearl millet porridge increased from 30% in April 1993 to 63% in August 1993. The percentage of households that ate pure maize porridge or a porridge made from a maize/pearl millet mixture declined from 70% in April 1993 to 37% in August 1993.

The shift from maize to pearl millet was even more significant in Kavango. The percentage of households that ate pure pearl millet porridge increased from 8% in April 1993 to 70% in August 1993. The percentage of households that ate pure maize porridge or a porridge made from a maize-pearl millet mixture declined from 92% in April 1993 to 30% in August 1993.

The move away from maize porridge when pearl millet was available confirms the statements by households about their preference for pearl millet. It also indicates that for the majority of communal households, staple food consumption was mainly supply driven, i.e. as long as the pearl millet that is produced on a household's own fields is available it is the preferred food staple. Only when pearl millet stocks were seriously depleted do households start buying maize meal.

When asked which of the two main food staples, pearl millet or maize, was easier to buy locally, responses were clearly in favor of maize. In Ovambo 57%, and in Kavango 91% of the survey respondents said that maize meal is easier to buy than pearl millet. In April 1993 only 45% of rural households from both regions said that pearl millet was available to buy. Almost 100% of the same respondents said that maize meal was available.

The main strategies of Ovambo households for coping with pearl millet shortages were (a) to stretch pearl millet with maize (43%), (b) to ask relatives for help (38%), and (c) to buy pearl millet if available (58%). Kavango households that were short of pearl millet usually altered their consumption habits. Most households reduced pearl millet consumption (70%) or switched to other foods (60%). Twenty-four percent of all Kavango households said that they worked for others to obtain food, or money to buy food. Only 19% of Kavango households buy pearl millet.

The reaction of Ovambo households when maize meal stocks ran out was to buy more (92%). The response by Kavango households was the same as their response to pearl millet shortages. Forty percent of households substituted maize with other food (40%). About 30% said that they would work for food. Maize meal was bought by 44% of Kavango households.

With few exceptions most of the money spent by rural households was on food. Ovambo households spent on average 53% and Kavango households spent about 67%.

With the exception of Ovambo West, comparison of consumer prices of staple grain yielded a similar result. Throughout most of the 1992/93 production year the consumer price for commercially traded maize meal was cheaper than for commercially traded pearl millet. In Ovambo Central and Ovambo East commercially traded pearl millet was on average 15% more expensive than maize meal. In Kavango commercially traded pearl millet was between 26% and 43% more expensive than maize meal. Only in Ovambo West was the average consumer price for commercially traded pearl millet cheaper (7%) than the price for maize meal.

However, at the beginning and end of the production year 1992/93 the price for informally traded pearl millet (bucket price) was cheaper than commercially traded maize and pearl millet. In Ovambo the average price for informally traded pearl millet was between 8% and 24% cheaper than maize meal. In Kavango the average price difference between the two varied between 5% and 16%.

Staple food prices varied significantly between Ovambo and Kavango. During the production year 1992/93 maize meal was on average 15% cheaper in Ovambo than in Kavango. Even commercially traded pearl millet was 38% cheaper in Ovambo than in Kavango.

4. PEARL MILLET PRODUCTION AND ALTERNATIVE INCOME SOURCES

The conclusion from the second half of the last chapter about staple food consumption was that the majority of households preferred pearl millet over other food staples and that pearl millet consumption was mainly supply-driven. Supply-driven means that households eat homegrown pearl millet until their granaries are empty.

The first part of this chapter focuses on the supply side of the pearl millet sector by describing pearl millet production in Ovambo and Kavango. The second part analyzes alternative sources of household income that are not directly related to pearl millet production, but compete with it for household labor. The four major alternative sources of income were (1) livestock herding, (2) on-farm but non-agricultural income-generating activities, (3) off-farm employment (4) government pensions. This section also compares the proportion of income that households acquired through pearl millet production with total annual household income. Finally it analyzes household investment priorities for the future.

4.1. Pearl millet production

The beginning of this section describes the importance of pearl millet for communal farm households as a food and cash crop. Section two presents some relevant pearl millet production issues. Section three discusses the area that households have under grain cultivation and their yields. The fourth section assesses the costs and returns of pearl millet production at a household level.

Importance of pearl millet production

A general consensus exists between communal farmers and agricultural experts about the importance of pearl millet for the communal regions of Ovambo and Kavango (Table 4.1.).

When rural farmers were asked "What is your most important food crop?" the vast majority answered 'mahangu' or pearl millet (Ovambo: 95%, Kavango: 94%). When asked which crop constitutes their most important cash crop, 50% of Ovambo households and 44% of Kavango households answered that they do not produce crops for sale. However the second most frequently given answer was again 'mahangu' (Ovambo: 22%, Kavango: 23%).

Table 4.1. Most important food and cash crops for rural households by subregion.

	Percent of households citing alternative crops as most important							
	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
Food crops								
Pearl millet	96	100	90	95	85	98	100	94
Sorghum	0	0	4	1	0	2	0	1
Green maize	0	0	0	0	15	0	0	5
Beans	3	0	3	2	0	0	0	0
Nuts	1	0	1	1	0	0	0	0
Other	0	0	2	1	0	0	0	0
Cash crops								
No cash crops	50	44	56	50	3	44	85	44
Pearl millet	21	44	1	22	47	10	12	23
Watermelons	8	0	20	9	3	10	0	4
Nuts	13	0	1	5	3	5	3	4
Beans	5	3	6	5	5	15	0	6
Cabbage	3	3	1	2	0	0	0	0
Sorghum	0	0	3	1	0	3	0	1
Green maize	0	3	0	1	34	0	0	11
Other	0	0	9	3	0	0	0	0

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Sorghum and maize[12] were also produced by a high percentage of rural households. However the aggregated share of sorghum and maize of total grain production was not more than 8% in Ovambo and 16% in Kavango (Table 4.2.).

Table 4.2. Share of pearl millet, sorghum and maize of total grain production.

	Ovambo	Kavango
	Percent share of total grain production	
Pearl millet	92	84
Sorghum	9	6
Maize	0	10

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Most households also grew beans (Ovambo 95%, Kavango 96%), bambara nuts (Ovambo 82%, Kavango 67%), watermelons (Ovambo 86%, Kavango 78%), and pumpkins (Ovambo 76%, Kavango 76%) (Table 4.3.).

[12] Due to the short rainy season maize often does not ripen and is eaten in a green state before the millet harvest starts.

Table 4.3. Crops grown by rural households by region and by subregion.

	Percent of households growing alternative crops					
	Ovambo households			Kavango households		
	West	Central	East	West	Central	East
Grain type						
Pearl millet	100	100	99	100	100	100
Sorghum	100	100	86	88	80	70
Maize	85	93	50	100	100	98
Vegetable type						
Beans	93	100	93	100	88	100
Groundnut	94	73	79	60	45	95
Pumpkin	51	95	81	78	50	100
Tomato	6	0	14	0	3	5
Onions	6	0	1	0	3	5
Cabbage	1	98	78	0	0	45
Fruit type						
Watermelon	95	95	69	75	60	98
Citrus	1	0	3	0	0	0
Banana	1	0	3	0	0	3

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In Ovambo sorghum was the second most important grain after pearl millet, while in Kavango maize was second. Only 13% of Ovambo households grew all four major food crops: pearl millet, sorghum, beans and maize. The majority of Ovambo households (59%) produced the three major crops: pearl millet, sorghum, and beans. About 18% of Kavango households grew all four major food crops, but the largest household group in Kavango (30%) produced the three major crops: pearl millet, maize, and beans. The main crop combinations grown by households of various subregions are presented in Table 4.4.

Production practices

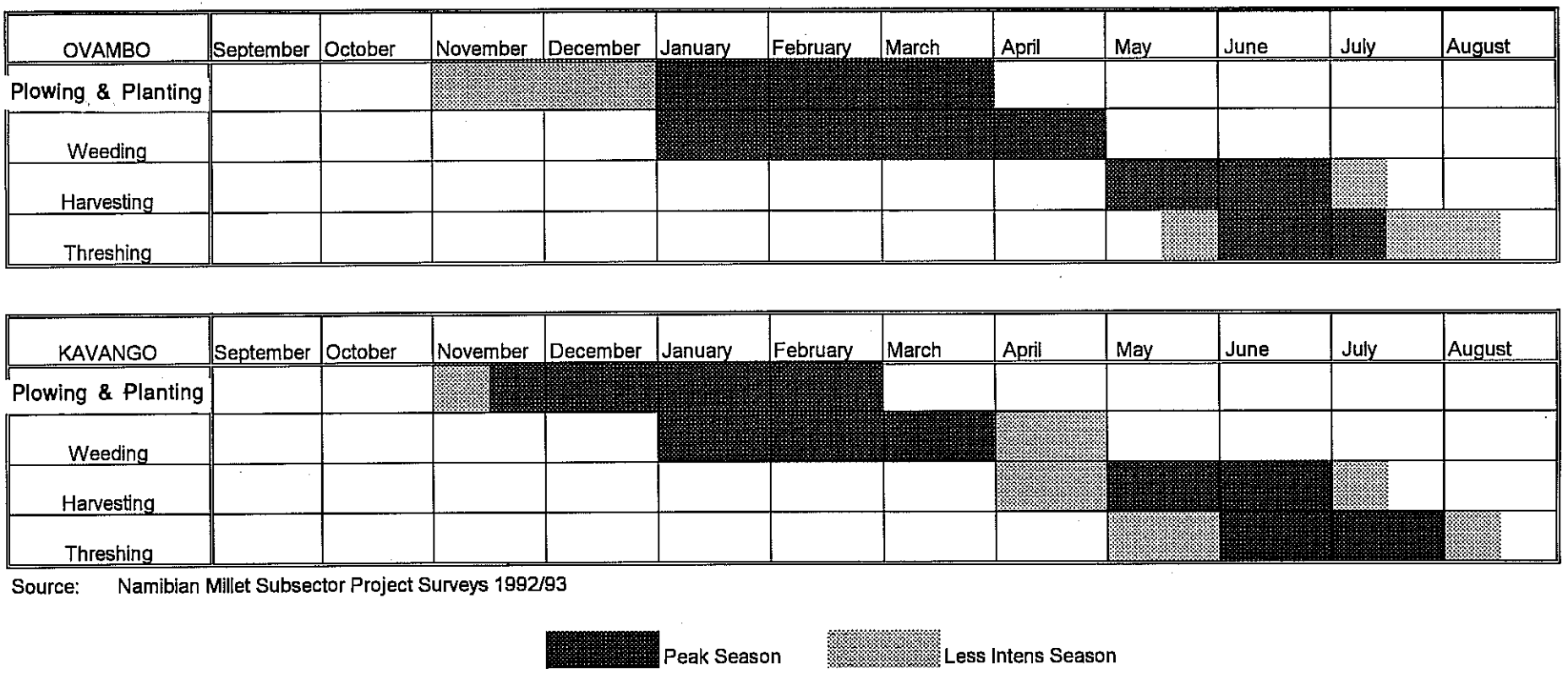
Because pearl millet constitutes the main staple produced by rural people in Ovambo and Kavango, most agricultural activities are arranged around pearl millet production. The following paragraphs describe how pearl millet is currently produced.

Pearl millet production calendar

Cropping calendars were generated for Ovambo and Kavango from data from households surveyed about the usual main pearl millet production phases. The cropping calendars in Figure 6 indicate starting dates and duration of the four major pearl millet production phases:

(1) plowing and planting;
(2) weeding, insect and bird control;
(3) harvesting;
(4) threshing.

Figure 6 Millet Cropping Calendar



Source: Namibian Millet Subsector Project Surveys 1992/93

Figure 7 Monthly rainfall in Ovambo and Kavango
(in millimeter per month)

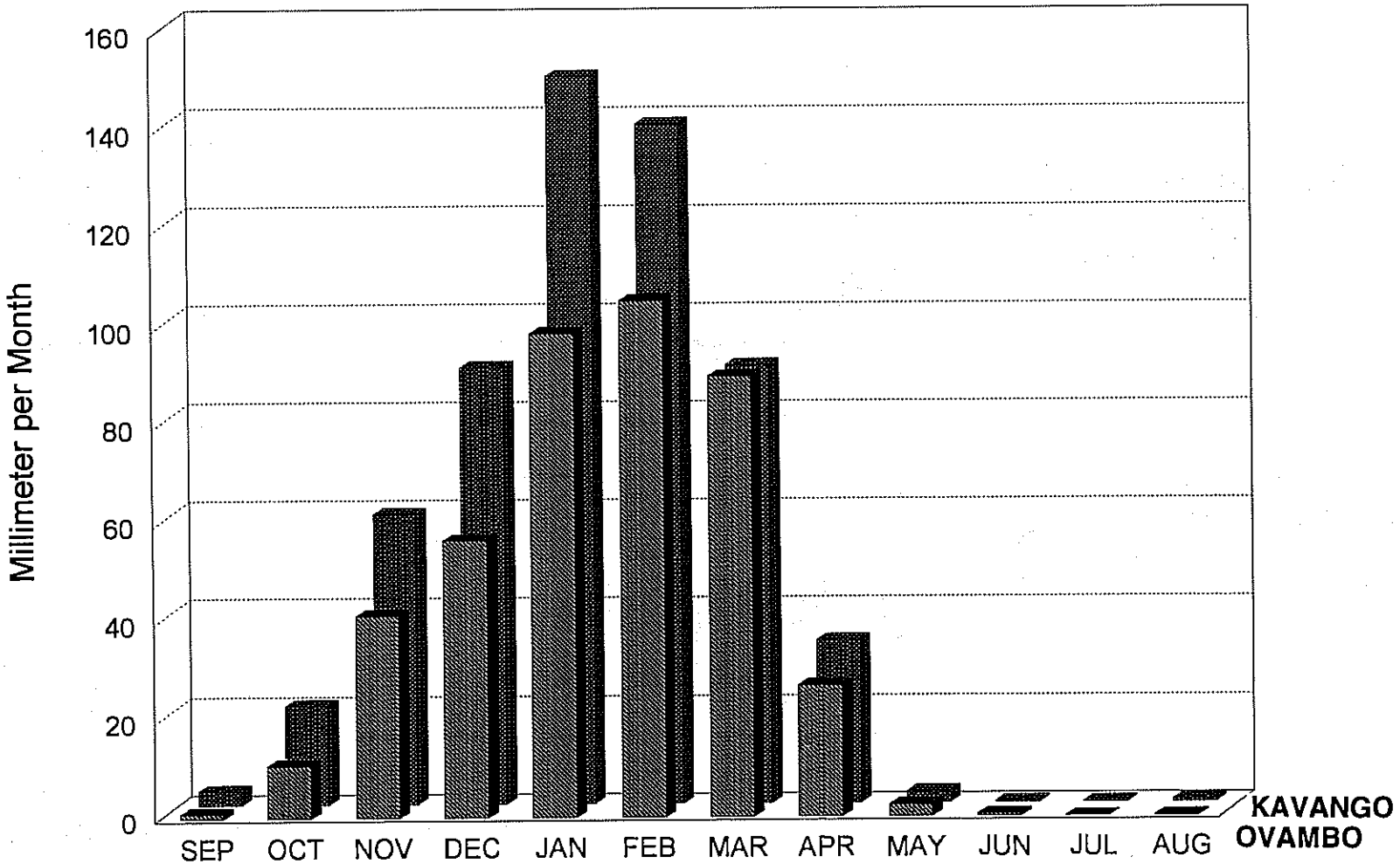


Table 4.4. Crop combinations grown by rural households by region and by subregion.

Ovambo households							
Crop combinations							
P.millet	Sorghum	Beans	Maize	West	Central	East	Total
				(Percent of households)			
yes	yes	yes	yes	8	0	30	13
yes	yes	yes	no	78	50	49	59
yes	yes	no	no	4	25	3	10
yes	no	yes	no	8	3	10	7
yes	no	no	no	4	20	2	9
no	no	no	no	0	3	6	3

Kavango households							
Crop combinations							
P.millet	Sorghum	Beans	Maize	West	Central	East	Total
				(Percent of households)			
yes	yes	yes	yes	15	23	18	18
yes	yes	yes	no	3	3	0	2
yes	no	yes	yes	33	15	43	30
yes	no	no	yes	20	20	13	18
yes	no	yes	no	3	10	10	8
yes	no	no	no	23	13	8	14
	Other combinations			3	8	0	3
no	no	no	no	3	10	10	8

Source: Namibia Pearl Millet Subsector Project Surveys 1992-93.

Once the rainy season has started and enough soil moisture has accumulated, rural households start field preparation. Long-term rainfall data shows that in Kavango the rain usually begins earlier and is heavier than in Ovambo (Figure 7). Accordingly, Kavango's total pearl millet production period is longer and the production potential higher than in Ovambo. Kavango households normally plow and plant between the second half of November and the end of February. In Ovambo the majority of households prepare their fields between the beginning of January and the end of March. In both regions harvesting takes place between the beginning of May and end of June.

Field numbers and distances

During the production year 1992/93 the majority of Ovambo households (94%) grew pearl millet and all their other crops in one field. Sorghum is usually inter-cropped with pearl millet while vegetables are mostly concentrated in pockets of land with higher soil moisture. In Kavango only 56% of all households produced all crops in one field while 31% planted their crops on two fields, and 12% on more than two fields.

The figures above indicate that many Kavango households spread their production over more than one field during 1992/93 season. However these figures understate the number of fields

that are usually cultivated by Kavango households because in 1992/93 the rainy season started relatively late in Kavango. As a result most households did not have the usual number of fields. Table 4.5. compares the intentions of households to cultivate a certain number of fields (stated before the actual field preparation started), with the number of fields households actually cultivated. While in Ovambo the figures for intended and actually cultivated fields are about the same, in Kavango actual numbers were much lower than intended. According to Kavango households, their initial intention was that 70% of all households would produce their crops on more than one field.

Table 4.5. Number of fields intended and actually cultivated by households during 1992/93.

	Ovambo		Kavango	
	Cropping intention	Eventually cultivated	Cropping intention	Eventually cultivated
	(Percent of households)			
One field	94	94	30	56
Two fields	6	5	47	31
Three fields	0	1	15	6
More than three fields	0	0	8	6
Total	100	100	100	100

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

The households surveyed were asked to state the walking distance between their homestead and their largest field, second largest field, etc. The results vary significantly between Ovambo and Kavango, and across their respective subregions (Table 4.6.).

Table 4.6. Average distance of fields from household homesteads by relative size of field, region and subregion.

Relative field size	Ovambo (n = 192)			Kavango (n =79)		
	West (km)	Central (km)	East (km)	West (km)	Central (km)	East (km)
Large	<1	<1	1	9	5	35
Middle	3	na	25	10	4	1
Small	5	na	na	16	9	1

na = not available
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In Ovambo the average distance from household homesteads to their largest fields was about seven minutes walk or roughly 0.4 km. Those Ovambo households that cultivated a second field travelled an average distance of 14 km to the field. Smaller fields were on average five kilometers away. In Ovambo East 11% of rural households had a second field that was on average 25 km away from their homesteads.

In Kavango most fields were between five and seven kilometers away from homesteads. However field distances in Kavango West were much further than in Kavango Central and Kavango East.

Land clearing

The variation in the distance of fields was caused mainly by availability of cultivable land. In Ovambo almost all cultivable land was cleared and households had settled close by. On average only 8% of all Ovambo households said that they had cleared new land within the last five years (Table 4.7.). In Kavango clearing of new land was still common. Forty-eight percent of all Kavango households had cleared new land during the last five years.

Table 4.7. Households that cleared new land and gave up old fields, in relation to obstacles to land clearing by region and subregion.

	Ovambo households				Kavango households			
	West (%)	Central (%)	East (%)	Mean (%)	West (%)	Central (%)	East (%)	Mean (%)
Cleared new and gave up old fields:								
Cleared new land during last five years	4	7	13	8	58	55	30	48
Gave np fields during last five years	4	5	3	4	55	20	25	33
Lack of land as obstacle to land clearing:								
No land close to homestead	81	75	39	65	13	33	40	29
Free land far away	36	70	41	49	33	28	23	28
Other limitations to land clearing:								
Lack of equipment	48	70	46	55	35	50	63	49
Lack of money to hire people	43	65	44	51	38	95	63	65
Lack of family labor	45	58	38	47	33	75	60	56
No drinking water at fertile land	21	38	14	24	35	63	18	39

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

This practice of shifting cultivation had almost ceased in Ovambo but still existed in Kavango. Over the last five years only 4% of all Ovambo households gave up one or more fields. But in Kavango the respective percentage of households abandoning fields was 20% in Kavango Central, 25% in Kavango East and 55% in Kavango West.

When asked why clearing new land was difficult, 65% of Ovambo households agreed with the statement: 'No land is available near the homestead'. Also 49% of Ovambo households agreed that: 'Free land for cultivation is too far away'. By comparison only 28% and 29% of Kavango households confirmed those respective statements.

Households from Ovambo Central also chose 'lack of equipment' (70%), 'lack of money to hire people' (65%), 'and lack of family labor' (58%) as the main obstacles to land clearing. In Kavango Central most households gave 'lack of money to hire people' (95%) and 'lack of family labor' (75%) as the main obstacles.

Soil fertility and fertilizer use

The United Nations map 'Land Use Potential' in Namibia categorizes most areas of Ovambo and Kavango half-way between 'high' and 'low' agricultural potential. However rural households' judgment about the soil fertility of their fields varied considerably across regions and subregions. Table 4.8. demonstrates that the majority of Ovambo households judged the fertility of their soil to be poor (51%) while in Kavango most households judged the soil fertility of their fields as good (61%).

Table 4.8 Perceptions of the current level of soil fertility and households' use of manure and chemical fertilizer, by region and by subregion.

	Ovambo				Kavango			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households citing:)							
Soil fertility								
Good	25	2	14	14	49	64	70	61
Moderate	36	14	54	35	30	29	22	27
Poor	39	83	32	51	22	8	8	12
	(Percent of households citing:)							
Manure & fertilizer use								
Manure	79	83	82	81	53	8	5	22
Chemical fertilizer	3	8	18	9	10	0	0	3
None	21	18	16	18	48	93	95	78

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

The judgement by a majority of households that soil fertility was good was unanimous across all three Kavango subregions. However the results of the Ovambo subregions vary. In Ovambo West the ranking was equally distributed between poor, moderate, and good soil fertility. In Ovambo Central the vast majority of households classified the soil fertility of their fields as poor (83%). In Ovambo East more than half (54%) of all households ranked soil fertility as moderate.

Farmers were also asked to state whether the soil fertility of their fields had declined over the last five years. In Ovambo the ratio between households that confirmed a fertility decline and those who did not ,was 1.8 to 1. In Kavango the respective ratio was 1.3 to 1. The majority of households (63-75%) from the four subregions Ovambo West and East, and Kavango Central and East, claimed that soil fertility had declined over the last few years. Only in Kavango Central did 73% of households state that there was no decline in soil fertility. In Ovambo East the respondents were non-committal.

With the knowledge that shifting cultivation has stopped in Ovambo, it is not surprising that soil fertility in this region is declining. In Kavango households still have the option of abandoning infertile land and clearing new land. Because of reduced opportunities, the majority of Ovambo households used either manure and/or chemical fertilizer (82%) to keep their soil fertility in balance. With the exception of Kavango West households, only about 5%

to 7% of all Kavango households used manure and/or chemical fertilizer on their fields.However as was shown above, 48% of all Kavango households cleared new land during the last five years.

Household representatives were also asked why they did not use manure or chemical fertilizer. In Ovambo about 98% gave lack of livestock as the main obstacle to using manure (Table 4.9.). In Kavango East the majority of answers (75%) gave lack of transport to distant fields as the main obstacle to using more manure, i.e. fields were too far away from the places where livestock was kept and manure was available. These answers accord with the disproportionately far distances between homesteads and their second largest fields see above. High chemical fertilizer costs were given as the obstacle to fertilization in Kavango West (73%) and Kavango Central (100%). Lack of labor to apply manure to their fields was given by about 11% of all Kavango households

Table 4.9. Obstacles to the use of manure or chemical fertilizer.

	Ovambo				Kavango			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of responses)							
No or not enough manure	100	100	93	98	0	0	0	0
No transport	0	0	0	0	0	0	75	25
Chemical fertilizer too costly	0	0	0	0	73	100	19	64
Lack of labor	0	0	7	2	27	0	6	11

Source: Namibia Millet Subsector Project Surveys, 1992-93.

Use of local and improved seed

Seed is an important input for pearl millet production. Traditionally communal farmers mostly select their seed from their own fields. With the exception of one Kavango farmer who tries to improve local seed through breeding, no particular pearl millet varieties were developed locally in Ovambo and Kavango.

The following section will discuss the need for, and the effects of, pearl millet seed distribution through non-governmental organizations (NGOs) and the agricultural extension service during the 1992/93 production season.

After the severe drought of 1991/92, Namibian government officials and NGOs feared that communal farmers would not have enough seed from their own production to grow their main staple in the 1992/93 production year. Before planting in December 1992 a high proportion of the households surveyed (Ovambo: 60%, Kavango: 37%) stated that they did not have enough seed for planting (Table 4.10.).

However data gathered during follow-up surveys in 1993 indicates that at least some households (especially from Ovambo) overstated their lack of seed. Four months after the December 1992 survey the same households were interviewed again. As already discussed in Chapter 3, in April 1993, 49% of Ovambo households were still eating either pure pearl millet

porridge or a porridge made from a mixture of pearl millet and maize meal. This shows that seed shortage in Ovambo could not have been as severe as farmers had claimed in December. At the same time the percentage of Kavango households that included pearl millet in their daily diet was reduced to 22% see above.

Table 4.10. Households with shortage of pearl millet seed during 1992/93 and their main sources of pearl millet seed.

	Ovambo				Kavango			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
Identified seed shortage in:								
December 1992	58	67	56	60	27	20	63	37
August 1993	27	50	27	35	23	84	38	48
Main source of p.millet seed:								
Own production	91	84	90	88	87	90	83	87
Neighbors	8	3	9	7	5	0	14	6
Government	1	5	1	2	0	10	0	3
Rural shops and markets	0	8	0	3	8	0	3	4

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Knowing that most households need only about two to three kilograms of pearl millet seed to plant one hectare, and knowing that communal households have a long tradition of keeping pearl millet reserves against drought, the answer from the majority of Ovambo households about their lack of seed in December 1992 was all the more questionable.

During the survey in August 1993 after a relatively good pearl millet harvest in Ovambo, only 35% of all households claimed that they did not have enough seed for planting at the beginning of the production season. When Kavango households were asked, retrospectively, in August, about their seed availability, many seemed to have suffered a second poor harvest following the 1991/92 drought year. Almost half of all Kavango households (48%) said they did not have enough seed at the beginning of the 1992/93 production season.

To probe whether the claimed shortage of seed and subsequent reduction from 60% at the beginning of the season to 35% at the end of it, was as a result of seed distribution efforts of the Namibian government and NGOs, households were also asked in August 1993 about the main source of their pearl millet seed for the just finished 1992/93 season. This time the vast majority of households (Ovambo: 88%, Kavango 87%) stated that most of their seed came from their own granaries see above. Only 2% of households in Ovambo and 3% in Kavango named seed distribution from government as their main source of seed.

Nevertheless at the beginning of the production year 1992/93 the agricultural extension service of Ovambo and Kavango had distributed to farm households mainly pearl millet seed of the

improved pearl millet variety Okashana 1[13]. This variety matures in about three months compared with about five months for the locally grown pearl millet. Also Okashana 1 variety is supposed to have other good attributes such as a positive response to chemical fertilizer and a softer and more uniform kernel which eases manual and mechanical processing. The ability to ripen early, therefore reducing the risk of total loss of the pearl millet harvest because of long dry spells during the growing season, is the best characteristic of Okashana 1.

Although it is likely that not all of the Okashana 1 seed was used by farmers as they had intended, its distribution had the effect of more farmers being exposed to the positive characteristics of a drought-resistant short-season variety. The percentage of Ovambo farmers that were exposed to the Okashana 1 variety for the first time increased by 14%. About 20% of Kavango households were exposed to Okashana 1 seed for the first time during the 1992/93 season. Table 4.11. compares the percentage of rural households that had gained experience with Okashana 1 seed before 1992/93 and those that were familiar with Okashana 1 after 1992/93 season.

Table 4.11. Households that had experience with the pearl millet variety Okashana 1 before and after the 1992/93 production year.

	Ovambo (n = 200)				Kavango (n = 120)			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
Before 1992/93	59	33	20	37	8	25	10	14
After 1992/93	65	48	40	51	28	46	46	34

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

From the discussion above three main conclusions can be drawn concerning household shortages of pearl millet seed during drought situations:

(1) Between 10 and 15% of rural households in Ovambo and Kavango experienced a severe seed shortage after the major drought of 1991/92. A comparison of households from different subregions indicates that proportionately fewer households from Ovambo Central and Kavango East were able to retain enough seed for the 1992/93 production year, than households from other subregions.

(2) Neighbors, rural shops, and rural markets were a more likely source of seed than government for those households that could not retain enough pearl millet seed. Although seed distribution from the Namibian government and from NGOs reached a large percentage of households at the beginning of 1992/93, the analysis of the data suggests that only a small proportion of the pearl millet received was used for seed while most of it

[13] According to the Chief Agricultural Research Officer of Mahanene Research Station, W.R. Lechner, the Namibian Ministry of Agriculture planned to distribute up to 35 t of the pearl millet variety Okashana 1 (Ovambo 25 t, Kavanga 7.5 t) during 1992/93 season. Thius does not include Okashana 1 seed distributed from Non-governmental Organizations such as Roessing.

was probably consumed. From this experience it can be assumed that seed distribution at no cost to the farmers or at a cost below that of food prices will neither encourage farmers to use improved seed - as was intended - nor rural traders to sell seed.

(3) Despite the fact that aid institutions over-estimated the proportion of households that were really in need of pearl millet seed, the distribution of the variety Okashana 1 through the government extension service increased the number of farmers who gained experience with the characteristics of an early-maturing pearl millet variety.

Ploughing equipment and service costs

The use of plowing equipment other than the hoe is one of the main determinants of whether rural households are close to pearl millet self-sufficiency or not. In Ovambo 20% of all rural households only use the hoe for field preparation. For Kavango the percentage is only 4% (Table 4.12.).

Table 4.12. Combinations of plowing equipment used by rural households during 1992/93, by region.

Hoe	Animal traction	Tractor	Ovambo households	Kavango households
			(Percent of households)	
yes	yes	yes	8[a]	0[d]
yes	yes	no	32[b]	17[d]
no	yes	no	13[c]	69[d]
yes	no	no	20	4
yes	no	yes	13	4
no	no	yes	9	0
Other combinations			4	5

[a] All draft animals were donkeys.
[b] 65% were donkeys.
[c] 32% were donkeys.
[d] All draft animals were oxen.
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Animal traction was the main source for draft in both study regions. Fifty -three percent of all Ovambo households and 86% of all Kavango households used animal traction for field preparation. In Ovambo most of the draft animals were donkeys while in Kavango only oxen were used for plowing. Hired mechanical plowing was used by a relatively high proportion of Ovambo households (30%) while in Kavango only 4% of all rural households hired tractor services.

In Ovambo the largest group of households used the hoe in combination with draft animals to prepare their fields (32%). The largest household group in Kavango only used an oxen span to plow (69%).

The hiring of draft animals for field preparation was very common. In Ovambo 42% of all households hired plowing services with Ovambo Central taking the lead, with 60%. In Kavango 39% of all households hired plowing services and Kavango Central ranked first among the Kavango subregions with 50% (Table 4.13.).

Table 4.13. Households that hired plowing service and the average price paid during 1992/93 by region and by subregion.

	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
Proportion of households that hired plowing services (%)	41	60	25	42	35	50	33	39
Average amount paid (N$)	127[a]	186	98[b]	104	90	135	103	109
Coefficient of variation on amount paid	(0.99)	(0.45)	(0.89)	-	(0.58)	(0.83)	(0.85)	-

[a] All households paid at least some money for plowing services. In addition, 18% of the Ovambo households paid in kind.

[b] One case with payments for plowing of aboul N$1240 was excluded from the calculation.

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In the survey of 200 Ovambo and 120 Kavango households only five households that owned a tractor could be identified. Four of the five tractors were in Ovambo West. Therefore most of those who wanted to use mechanical plowing during the 1992/93 season had to hire tractors.[14]

Households that hired plowing services (animal traction or tractors) spent on average N$137 in Ovambo and N$109 in Kavango. Households from Ovambo Central and from Kavango Central spent N$186 (CV 0.45) and N$135 (CV 0.83) respectively - considerably more on plowing services than households from other subregions.

To hire one 'tractor hour' (capable of plowing 0.5-1.2 ha with a disk plow or a disk harrow) Ovambo farmers had to pay on average N$73 and Kavango farmers on average N$66 (Table 4.1.2.10. In comparison, the hiring of an oxen span for about five to seven hours a day averaged N$19 in Ovambo and N$30 in Kavango. The daily rate for a span of donkeys was on average N$15 cheaper in Ovambo but at N$29 in Kavango, almost the same as for a span of oxen.

In order to compare the relative costs to households for renting draft animals as against a tractor, survey respondents were asked to estimate how many days of plowing with an oxen or

[14] The government provided the subsidized ploughing service which reached less than two percent of northern Namibian communal farmers.

donkey span were needed to plow as much land as could be plowed during one tractor hour. The respondents' answers varied significantly. The majority estimated that between eight and 16 days of animal traction were needed to plow as much as mechanical plowing for one tractor hour. The conversion into cost per hectare shows (Table 4.14.)[15].

Table 4.14. Ploughing service cost, by region.

Type of plowing service	Ovambo Region	Kavango Region
Tractor (N$ per tractor hour)	73	66
	(0.32)[a]	(0.62)
Number of cases	106	20
Oxen span (N$/day)	19	30
	(0.37)	(0.17)
Number of cases	87	106
Donkey span (N$/day)	15	29
	(0.40)	(0.07)
Number of cases	48	23

[a] Coefficient of variation in parenthesis
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 4.15. Cost comparison for hired plowing service.

	Ovambo	Kavango
Tractor	86 N$/ha^{-1}	78 N$/ha^{-1}
Draft animals	240 N$/ha^{-1}	416 N$/ha^{-1}
Cost ratio	1/2.8	1/5.3

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Considering the difference in the costs of hiring mechanical plowing and animal traction it is not surprising that leaders from the communal north often requested government to extend its mechanical plowing services and/or to at least encourage private entrepreneurs to rent out their tractors by increasing subsidies.

[15] Assumptions: One tractor hour equals 0.85 ha. A span of oxen or donkeys needs about 12 days or about 60-84 hours to plough 0.85 ha. The average cost of hiring animal traction was N$17/day in Ovambo and N$29.5/day in Kavango.

Storage practices and losses

In his speech about national grain storage[16] Namibia's President Sam Nujoma said that because of his country's erratic rainfall patterns, it was vital to store surplus production efficiently to ensure food security for the following years. The President said that the most efficient way to do this is at the household and village level, as this would reduce the transport and administration costs connected with more centralized storage.

For a better understanding of the current practice of grain storage in rural areas, households were asked what type of container they use for pearl millet storage, how long they can store pearl millet without losses, and how much their eventual storage losses are.

The types of storage containers used by rural households varied widely between Ovambo and Kavango households. In Ovambo the majority of households (90%) used large baskets, 'omahandas', that are made from branches of mopane tree and are sealed with dried clay. These storage containers can hold between one half and two metric tons of grain (Table 4.16.).

Table 4.16. Combinations of p. millet storage types used by rural households.

Storage types					Ovambo	Kavango
Basket	Drums	Stem[a]	Bulk[b]	Bags	households	households
		(Percent of households)				
yes					81	0
yes	yes				9	0
	yes				6	11
	yes	yes			0	6
	yes			yes	1	4
		yes			1	12
			yes		0	19
			yes	yes	0	6
				yes	1	29
	Other combinations				1	13

[a] Stem = the head is left on the plant's stem. A bundle of stems is stored either outside or inside the house.

[b] Bulk = the traditional grain storage in Kavango is a hut covered inside with dried clay where p.millet is stored openly.

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In Kavango households used various types of storage containers and combinations of these for storing pearl millet. The largest group of Kavango households (39%) used 50-70 kg bags for storing pearl millet in their houses. These bags are either made from sisal or from woven polyethylene. Twenty-five percent of Kavango households used traditional storage houses, 'shiietes', in which they stored pearl millet in bulk. Like the omahandas in Ovambo, these

[16] Opening address at the official opening of silos of Agra Cooperatives Limited at Otavi, September 3, 1993.

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yes	yes				9	0
	yes				6	11
	yes	yes			0	6
	yes			yes	1	4
		yes			1	12
			yes		0	19
			yes	yes	0	6
				yes	1	29
	Other combinations				1	13

[a] Stem = the head is left on the plant's stem. A bundle of stems is stored either outside or inside the house.

[b] Bulk = the traditional grain storage in Kavango is a hut covered inside with dried clay where p.millet is stored openly.

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[16] Opening address at the official opening of silos of Agra Cooperatives Limited at Otavi, September 3, 1993.

storage houses are fully lined and sealed with dried clay. Another 21% of households used sealed 200 liter drums for grain storage and 18% leave the pearl millet head on the stem and stored a bundle of stems inside or outside the house.

In both study regions households tried not to mix pearl millet from previous harvests with pearl millet from the current harvest. In order to achieve this they put new grain in empty and clean storage containers and first ate the older pearl millet from previous harvests. This so-called FIFO method (first in, first out) ensures that older pearl millet that might already be infested with insects is consumed first.

When households were asked how many years pearl millet can be stored without being spoiled their answers ranged between one and eight years. However the average number of years for storage in omahandas and drums was closer to three years, while the average for bags, shiietes, and storage on the plant stem was closer to two years (Table 4.17.).

Table 4.17. Number of years p. millet can be stored using various storage methods.

Storage method	Mean of years	Standard deviation	Minimum years	Maximum years	Number of observations
Drum	3.1	2.8	1	8	23
Basket (omahanda)	2.7	2.2	1	8	154
Bulk (shiiete)	2.2	2.1	1	8	23
On the plant stem	1.9	0.7	1	3	15
Bag	1.8	1.7	1	8	35

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

To quantify the grain losses that occurred during storage through spoilage and insects households were asked to categorize their pearl millet losses into: (1) no loss, (2) little loss (up to 25%) (3) much loss (more than 25%). Without distinguishing between the different types of storage, households judged their storage losses as shown in Table 4.18.

Table 4.18. Pearl millet storage losses by region

	Ovambo households	Kavango households
	(Percent of households)	
No loss	19	42
Little loss (less 25%)	65	51
Much loss (more 25%)	16	7

Source: Namibia Pearl Millet Subsector Project Surveys 1992-93.

In Ovambo the majority of households (65%) gave 'little loss' as their answer, while 16% of all Ovambo households claimed to have 'much loss'. In Kavango, at 42%, the proportion of

households with no storage losses was quite high. Fifty-one percent of Kavango households chose 'little loss' as their answer.

In order to compare the quality of various storage methods, households were asked to categorize their pearl millet loss for each of the storage types they used. Omahandas, the storage baskets which are only used in Ovambo, compared unfavorably with other methods. About 18% of all households that used omahandas said they have 'high loss' but 66% claimed they have 'little loss' (Table 4.19.). Storage bags, most often used in Kavango, ranked best among the different methods used. Of those households that used storage bags up to 65% said that they have 'no loss' and only 2% claimed 'high losses'.

Table 4.19. Storage losses of pearl millet across various storage methods used by rural households, by region.

	Ovambo households				Kavango households			
	No loss	Little loss	Much loss	Total	No loss	Little loss	Much loss	Total
	(Percent of households)							
Basket (omahanda)	16	66	18	100	0	0	0	0
Bag	0	0	0	0	65	33	2	100
Drum	33	61	6	100	63	26	11	100
Bulk (shiiete)	0	0	0	0	14	74	12	100
On the stem	0	0	0	0	13	83	4	100

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Because of their low storage losses only a third of all Kavango households took measures to prevent insects from infesting their pearl millet. In Kavango 16% of all households used traditional methods like ash or leaves against insects. Another 13% used chemicals to avert storage losses. Eighty-two percent of the Ovambo households surveyed took measures to prevent storage losses caused by insects. Of these 70% used only traditional methods against insects while 12% also used chemicals.

Labor input and seasonal migration pattern

At the prevailing level of agricultural production technology, human labor is the most important input for pearl millet production in Ovambo and Kavango. During the four main phases of pearl millet production households were asked which of their members were engaged in pearl millet production, how much time those members spent on a particular production activity, and whether they hired labor from neighbors or provided labor for them.

The average number of persons involved in the four main production phases are presented in Table 4.20. During all production phases an average of 51% of the members of an average sized Ovambo household were engaged in pearl millet production. The respective percentage in Kavango was about 43%. The number of household members employed in pearl millet production varied across subregions. Ovambo East, with an average of 5.2, had highest

number of household members. With an average of only 2.6 household members engaged in pearl millet production Kavango Central ranks lowest.

Table 4.20. Average number of households members engaged in various pearl millet production phases by region and subregion.

P.millet production phase	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
	(Number of persons)							
Field preparation	4.5	4.7	3.8	4.3	4.2	2.3	2.7	3.1
Weeding, insect & bird control	4.8	4.3	6.4	5.1	4.7	3.0	3.8	3.8
Harvesting	4.8	4.2	5.7	4.9	4.3	2.6	3.4	3.5
Threshing	3.9	3.8	5.0	4.2	3.4	2.6	3.5	3.2
Total mean	4.5	4.3	5.2	4.6	4.6	2.6	3.4	3.4

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In both study regions women aged between 15 and 55 years old represented the largest group of household members engaged in pearl millet production (Ovambo: 42%, Kavango: 40%) (Table 4.21.). The comparison between all male adults (elderly included) and all female adults yielded a ratio of 29% to 50% in Ovambo and a ratio of 30% to 49% in Kavango. In both regions children were an important number (21%) that produce pearl millet.

Table 4.21. Average number of households members that are engaged in p. millet production, by household member type and by region.

P. millet production phases	Ovambo households						Kavango households					
	Old women	Old men	Women	Men	Children	Total	Old women	Old men	Women	Men	Children	Total
	(Number of persons)											
Field preparation	0.3	0.3	1.5	1.2	1.0	4.3	0.1	0.1	1.2	1.0	0.7	3.1
Weeding,insect & bird control	0.4	0.2	2.1	1.3	1.1	5.1	0.4	0.2	1.5	0.9	0.8	3.8
Harvesting	0.4	0.2	2.1	1.2	0.9	4.8	0.4	0.2	1.4	0.8	0.7	3.5
Threshing	0.3	0.1	2.0	0.9	0.9	4.2	0.3	0.1	1.4	0.8	0.6	3.2
Mean	0.4	0.2	1.9	1.2	1.0	4.6	0.3	0.2	1.4	0.9	0.7	3.4
Percent	8%	4%	42%	25%	21%	100%	9%	4%	40%	26%	21%	100%

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 4.22. demonstrates how many mandays[17] an average household spends on each production phase and on total pearl millet production. In Ovambo households worked an average of 127 mandays on pearl millet production (including harvesting and threshing). The respective number of mandays in Kavango was 76 - much less than in Ovambo. The number of man-days spent on pearl millet production varied greatly between subregions. Households from Ovambo East, with an average of 150 mandays, spent most time on pearl millet production while households from Kavango Central ranked least with an average of only 64.

Table 4.22. Average number of mandays that household members work on p. millet production, by region and by subregion.

	Ovambo (n = 200)				Kavango (n = 120)			
	West	Central	East	Mean	West	Central	East	Mean
Field preparation	13	16	35	21	14	7	13	11
Weeding, insect & bird control	87	64	70	74	39	41	46	42
Harvesting	14	10	12	12	7	6	8	7
Threshing	36	13	11	20	12	11	23	15
Total	150	103	128	127	72	65	90	75

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Female labor contributed most to household pearl millet production. In Ovambo women contributed on average, 61 % (Kavango: 62 %) of all man-days. With 32 % of all man-days (Kavango: 33 %) men contributed only half as much as their female counterparts. Children under 15 years contributed 6 % of all man-days in Ovambo (Kavango: 4 %) (Table 4.23.).

Table 4.23. Average number of man-days household members work on p. millet production by household member type and by region.

Pearl millet production phases	Ovambo households						Kavango households					
	Old women	Old men	Women	Men	Children	Total	Old women	Old men	Women	Men	Children	Total
	(Number of mandays)											
Field preparation	1	2	11	6	2	22 17.2	0	0	5	5	1	11 14.7
Weeding, insect & bird control	6	3	39	21	4	74 57.8	4	2	22	12	1	42 56
Harvesting	1	1	7	3	1	12 9.4	1	0	4	2	0	7 9.3
Threshing	1	0	12	6	1	20 15.6	2	1	9	4	1	15 20
Total man-days	9	5	69	36	8	128	7	3	40	23	3	76
Percent of total	7%	4%	54%	28%	6%	100%	9%	3%	53%	30%	4%	100

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

[17] Mandays: For this study workdays of various types of household members were weighted differently and standardized as 'mandays'. Eight hours work by female and male adults aged 15 to 55 yr were considered a1.0 manday. Eight hours work by people older than 55 yr were weighted as 0.75 mandays. Eight hours work by female and male children under 15 yr were weighted as 0.5 mandays.

Hiring and renting out labor was very common among rural households in Ovambo and Kavango. To quantify the amount of labor provided for, or received from, neighbors, the households surveyed were asked to state:

- which household members worked for neighbors;
- which categories of neighbors were employed to work on household fields;
- The length of time worked;
- the remuneration given or received.

Generally, labor exchange is practised more in Kavango than in Ovambo (Table 4.24.). On average 22% of Kavango households and 9% of Ovambo households rented out labor to neighbors for pearl millet production during the production year 1992/93. Another 29% of Kavango households hired labor for pearl millet production compared with only 14% of Ovambo households. Labor exchange in Ovambo was high during field preparation but especially high during threshing. In Kavango labor exchange was also high during field preparation but very high during weeding time.

Table 4.24. Percent of households that rent out or hire labor for p. millet production, by region.

	Ovambo (n = 200)			Kavango (n = 120)		
	Rent out labor	Does not rent/hire labor	Hire labor	Rent out labor	Do not rent/hire labor	Hire labor
	(Percent of households)					
Field preparation	20	54	26	18	48	34
Weeding, insect & bird control	5	85	10	30	38	32
Harvesting	4	90	6	23	54	23
Threshing	7	78	15	16	56	28
Mean	9	77	14	22	49	29

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Not all households remunerated labor exchange with money or in kind. It was very common among neighbors to help each other without payment. The social relationships and dependencies among households that allow for this type of unpaid labor exchange are difficult to explore. Table 4.25. presents the percentage of households that exchanged labor without direct payment. On average between 40% and 70% of labor exchange in Ovambo took place on the basis of neighborhood help without direct remuneration. In Kavango payment-free labor exchange was between 10 and 15% - on average much less frequent than in Ovambo.

Table 4.25. Households that rent out or hire labor without remuneration, by region.

	Ovambo		Kavango	
	Rent out labor	Hire labor	Rent out labor	Hire labor
	(Percent of households)			
Field preparation	70	50	17	4
Weeding, insect & bird control	29	20	9	9
Harvesting	100	50	13	17
Threshing	71	47	19	11
Mean	68	42	15	10

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

The wage rates (cash or kind) for agricultural laborers varied greatly. After converting payments in kind (mainly pearl millet and pearl millet beer) into their cash equivalent, wage rates varied from N$1.50 to N$16.00/day. The average wage rates were about N$5.00/day:

Ovambo women: N$/day 4.53 (CV = 0.62, n = 57)
Ovambo men: N$/day 5.04 (CV = 0.64, n = 30)
Kavango women: N$/day 5.04 (CV = 0.42, n = 161)
Kavango men: N$/day 4.93 (CV = 0.36, n = 108)

Those Ovambo households whose members worked for neighbors worked an average of 89% of their time on their own pearl millet production and about 11% for their neighbors. In Kavango the respective ratio is 79% to 21%. Similarly those Ovambo households that hired laborers did 83% of their field work themselves and hired people did 13% of the work related to pearl millet production. In Kavango the respective percentage, an average of 39% is comparatively high.

Although it is known that in both Ovambo and Kavango, women are more engaged in household work (food preparation, water carrying, firewood gathering), child rearing, and crop production than men[18] are, it has not necessarily been understood that women also provide more hired labor than their men. Of the labor hired for pearl millet production roughly 62 to 74% was provided by women in Ovambo and about 57 to 65% by women in Kavango. Because few children work for their neighbors the rest of hired labor is mainly contributed by male laborers (Table 4.26. and Table 4.27.).

[18] United Nations Children's Fund/Namibian Institute for Social and Economic Research "A Situation Analysis of Children and Women in Namibia", Windhoek, March 1991.

Table 4.26. Average number of mandays household members work for neighbors in p.millet production, by household member and type and by region.

P.millet production phases	Ovambo households						Kavango households					
	Old women	Old men	Women	Men	Children	Total	Old women	Old men	Women	Men	Children	Total
	(Number of mandays)											
Field preparation	0.0	0.0	0.2	1.3	0.1	1.6	0.0	0.0	1.4	3.4	0.0	4.8
Weeding, insect & bird control	0.0	0.0	2.0	0.7	0.1	2.8	0.3	0.0	3.1	1.6	0.1	5.1
Harvesting	0.1	0.1	5.1	0.3	0.0	5.6	0.2	0.1	3.5	0.9	0.0	4.7
Threshing	0.0	0.0	3.7	1.3	0.0	5.0	0.1	0.0	4.4	0.8	0.0	5.3
Total mandays	0.1	0.1	11.0	3.6	0.2	15.0	0.6	0.1	12.4	6.7	0.1	19.9
Percent of total	1%	1%	73%	24%	1%	100%	3%	1%	62%	34%	1%	100%

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 4.27. Average number of mandays that households hire labor from neighbors for p.millet production, by household member type and by region.

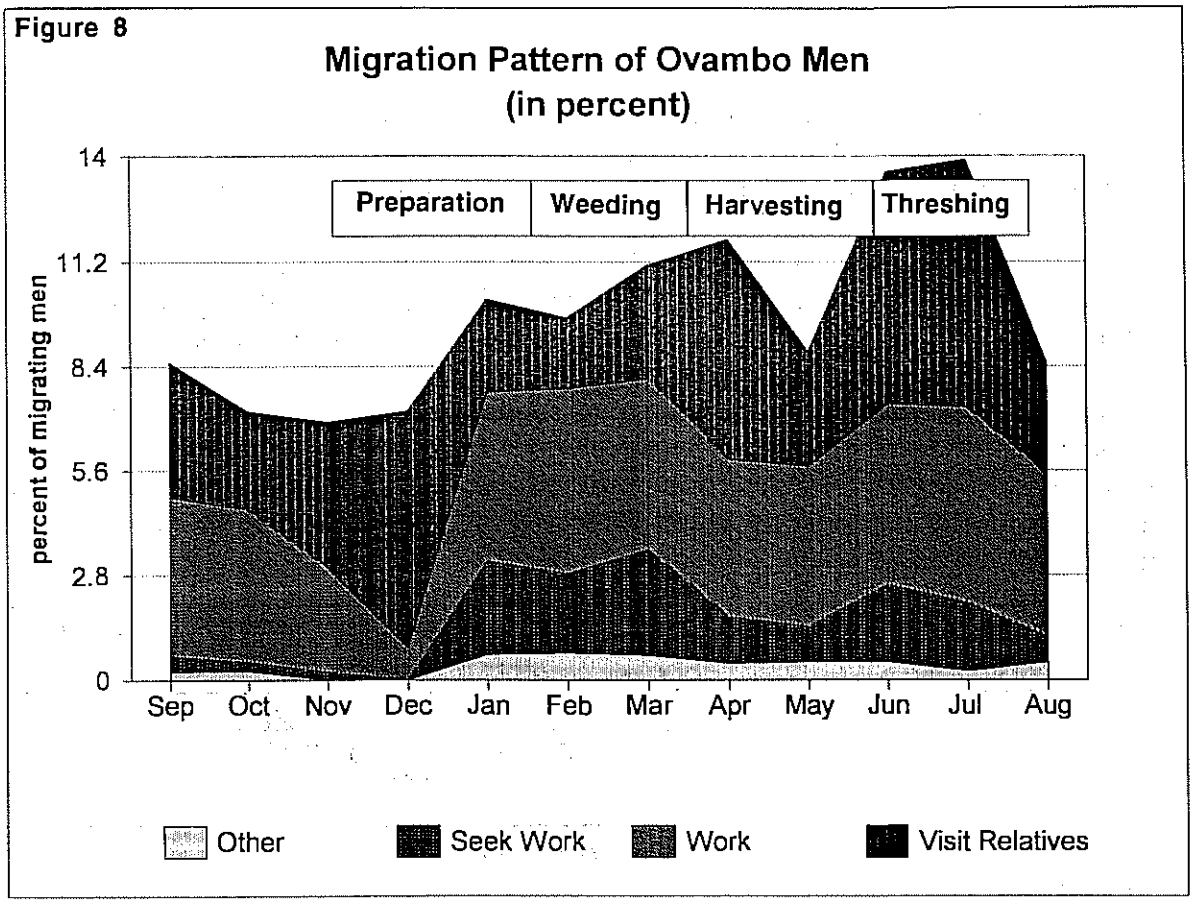
P.millet production phases	Ovambo households						Kavango households					
	Old women	Old men	Women	Men	Children	Total	Old women	Old men	Women	Men	Children	Total
	(Number of mandays)											
Field preparation	0.0	0.1	0.4	1.4	0.0	1.9	0.0	0.0	2.1	3.3	0.0	5.4
Weeding, insect & bird control	0.0	0.5	4.1	1.7	0.6	6.9	0.2	0.1	15.5	9.1	0.1	25.0
Harvesting	0.0	0.0	6.0	1.5	0.7	8.2	0.7	0.2	4.0	4.8	0.1	9.8
Threshing	0.0	0.0	1.1	0.4	0.1	1.6	0.4	0.0	4.8	3.2	0.0	8.4
Total man-days	0.0	0.6	11.6	5.0	1.4	18.6	1.3	0.3	26.4	20.4	0.2	48.6
Percent of total	0%	3%	62%	27%	8%	100%	3%	1%	54%	42%	0%	100%

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

To see whether labor migration was an important factor keeping men from pearl millet production, male and female adults were asked about their absences from home that lasted longer than one week. For adults three reasons were most often given for absenteeism: off-farm employment, search for work, and visits to relatives. Figures 8 and 9 display the percentage of men and women in rural Ovambo and Kavango that were absent during various months of a production season.

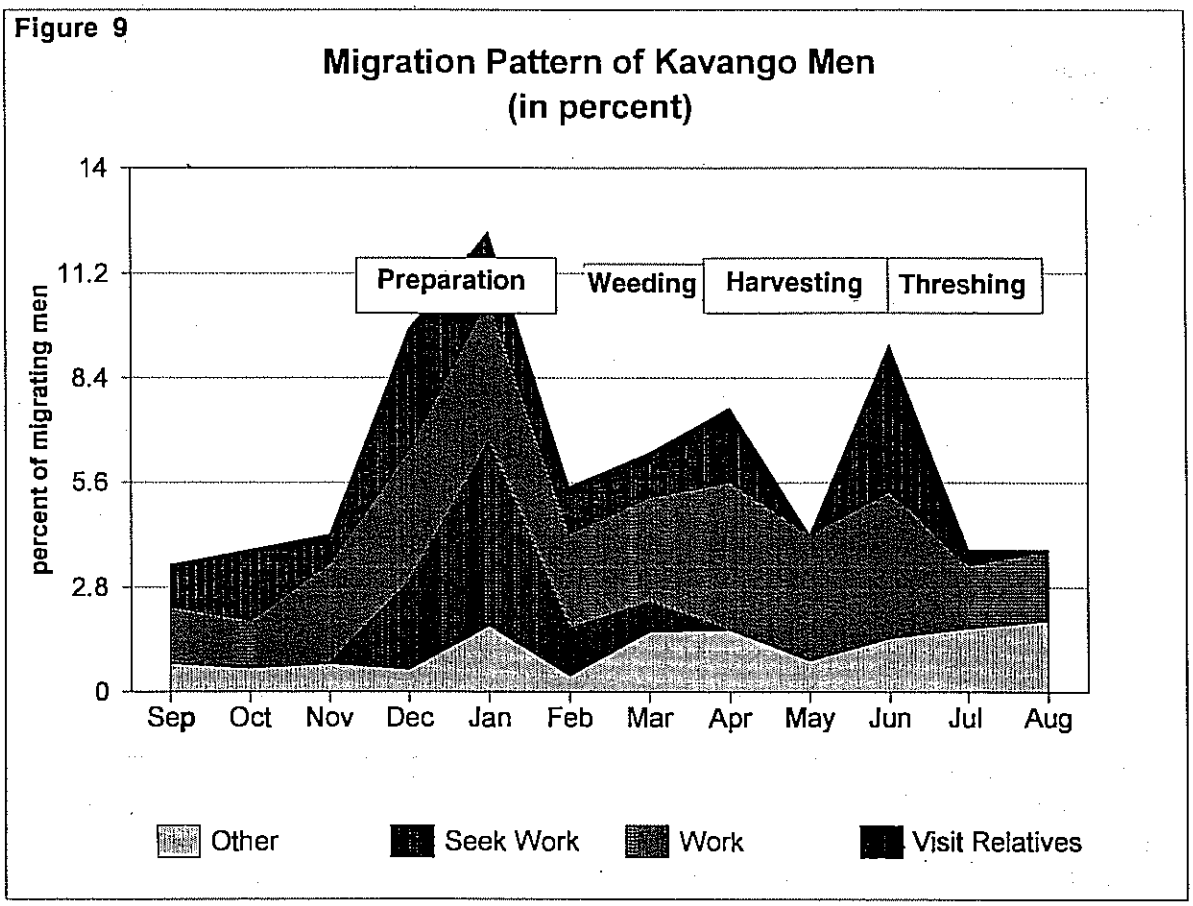
It is obvious that in both study regions women from rural households were less often absent from their homesteads than men. In Ovambo an average of 5% of all rural women were absent for at least one week during one month. This compares with an average of 10% for the same

Figure 8



143.5
161.6

Figure 9



period for men. In Kavango absenteeism from home was generally less frequent than in Ovambo. On average 2% of all rural Kavango women were absent for more than one week during any particular month. The respective average for Kavango men was 6%.

During the course of a crop production year (September to August) there was considerable variation of absenteeism across months. In general a higher percentage of male and female adults were absent from home during the time of pearl millet production between January and August compared with the dry season months from September to December. During the period of pearl millet production the percentage of adults that were absent from home increased significantly in Ovambo (women: from 3.6% to 5.1%, men: from 7.5% to 11.0%), and in Kavango only slightly (women: from 1.4% to 2.6%, men: from 5.3% to 6.6%) (Table 4.28.). Increased migration to go and work or to look for work was the major reason for increased absenteeism.

Table 4.28. Seasonal migration of rural adults in Ovambo and Kavango, by gender and by region.

	Female adults					Male adults				
	Visiting relatives	Work	Seek work	Other	Total	Visiting relatives	Work	Seek work	Other	Total
	(Percent of adults)									
Ovambo										
Dry season (Sept - Dec)	2.3	0.8	0.3	0.2	3.6	4.1	3.0	0.2	0.1	7.5
Rainy season (Jan - Aug)	2.1	1.3	0.9	0.9	5.1	4.0	4.6	1.8	0.5	11.0
Annual average	2.2	1.1	0.6	0.6	4.6	4.2	4.0	1.2	0.4	9.8
Kavango										
Dry season (Sept - Dec)	0.9	0.1	0.0	0.2	1.4	1.8	2.2	0.6	0.7	5.3
Rain season (Jan - Aug)	1.4	0.1	0.2	0.7	2.6	1.3	3.0	0.9	1.4	6.6
Annual average	1.3	0.1	0.2	0.5	2.2	1.5	2.7	0.8	1.1	6.2

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In general men tended to be absent more often from their homesteads than women, but especially during the pearl millet production period. However since the number of the labor force that was absent rarely exceeded 10% of all adult males, labor migration, including job seeking and visits to relatives were not the only factors that explain women's greater contribution to crop production.

Hectares under cultivation and crop yields

Harvest results of 1992/93

The number of hectares cultivated by a particular household indicates whether the household has the potential for producing enough pearl millet to cover the nutritional needs of its household members for the period of one year. The grain yields per hectare demonstrate a household's productivity level at the given level of production technology. The following paragraphs give the research findings on the hectares cultivated and crop yields by farm households, and per capita, in Ovambo and Kavango from the 1992/93 pearl millet harvest. With the assistance of the agricultural extension service the size of fields of almost all 320

households that participated in the household surveys have been measured. Only those fields that were actually cultivated during the 1992/93 production season were measured.

The hectare figures discussed are the total hectares under cultivation per household. Among the various crops produced, pearl millet was the crop that occupied most of the cultivated land. Those households that also produced sorghum and/or maize mostly intercropped these grains with pearl millet. Because other crops, like beans, took relatively little space no additional measurements were conducted.

For the cropping season 1992/93 Ovambo households cultivated on average 2.9 ha of grain (median 2.5 ha). Kavango households cultivated on average 3.0 ha (median 2.0 ha) (Table 4.29.). As shown above, because of unfavorable rainfall distribution many Kavango households could not cultivate as much land as they initially intended for the 1992/93 production season. It can be assumed that in a year with a longer period of productive rainfall Kavango households cultivated more land than they did in 1992/93. The average number of hectares per household varied significantly by subregion and within the subregions.

Table 4.29. Average p. millet hectares and yields per household in 1992/93 production year/capita/ha/variety/region and by subregion

		Ovambo				Kavango			
		West	Central	East	Total	West	Central	East	Total
Average household size (Persons)		8.1	9.5	9.8	9.1	8.2	6.9	8.6	7.9
Hectare of pearl millet planted									
Per household	(ha)	3.6	1.9	3.I	2.9	2.2	3.9	2.9	3.0
Per capita	(ha)	0.4	0.2	0.3	0.3	0.3	0.6	0.3	0.4
Production of millet									
per household	(kg)	2130	450	230	937	180	340	320	380
per capita	(kg)	263	47	23	103	22	49	37	35
Yield per hectare									
Of local varieties	(kg/ha)	644	259	70	324	68	78	96	81
Of Okashana 1	(kg/ha)	234	106	127	156	235	148	na	128
Weighted average	(kg/ha)	592	237	72	310	73	84	96	84
Extrapolation to total region area									
Local varieties	(000ha)				326.7				93.3
Okashana 1	(000ha)				205.4				41.1
Total	(000ha)				219.3[b]				44.6[b]
Extrapolation to total region production[a]									
Local varieties	(000mt)				66.6				3.3
Okashana 1	(000mt)				2.2				0.4
Total	(000mt)				68.8[b]				3.7[b]

[a] The extrapolation is based on an estimate of 81 240 Ovambo households and 14 860 Kavango households.

[b] The figures differ significantly from estimates of the Namibia Early Warning & Food Information System. According to the 'Crop and Food Security Bulletin No: 4.94 p. millet was planted in 1992/93 production year on 143 000 ha in Ovambo and 17 000 ha in Kavango.The production estimates for 1992/93 were 24 000 t in Ovambo and 4.4 00 t in Kavango.

Source: Namibia Pearl Millet Subsector Project Surveys, 1992/93.

In Ovambo roughly a third of all households and in Kavango up to half of all rural households produced their crops on less than two hectares. The proportion of households that produced on more than five hectares is 14% in Ovambo and 10% in Kavango. The portion of households that produced on more than 10 hectares is 6% in Ovambo and 2% in Kavango. A more detailed household distribution according to the area of land cultivated for crops is presented in Table 4.30.

Table 4.30. Household distribution according to hectares of cultivated coarse grain[a] 1992/93 production year, by gender of head of household and by region.

Hectarage categories	Ovambo households				Kavango households			
	Female headed	Male headed	Total	Cumulative total	Female headed	Male headed	Total	Cumulative total
	(Percent of households)							
0.0 to 0.5	0.0	3.3	1.6	1.6	0.0	8.3	4.3	4.3
0.5 to 1.0	8.1	12.1	10.0	11.5	22.2	15.5	18.8	23.0
1.0 to 1.5	11.3	11.0	11.1	22.7	16.7	14.3	15.4	38.5
1.5 to 2.0	8.1	9.9	8.9	31.6	16.7	8.3	12.4	50.9
2.0 to 2.5	14.5	15.4	14.9	46.5	5.6	9.5	7.6	58.5
2.5 to 3.0	14.5	18.7	16.5	63.0	5.6	9.5	7.6	66.1
3.0 to 3.5	14.5	13.2	13.9	76.9	11.1	4.8	7.9	73.9
3.5 to 4.0	4.8	2.2	3.6	80.5	11.1	15.5	13.3	87.3
4.0 to 4.5	3.2	5.5	4.3	84.8	0.0	2.4	1.2	88.5
4.5 to 5.0	3.2	0.0	1.7	86.5	0.0	3.6	1.8	90.3
5.0 to 10.0	9.7	5.5	7.7	94.2	11.1	3.6	7.3	97.6
10.0 to 15.0	8.1	2.2	5.3	99.5	0.0	1.2	0.6	98.2
15.0 to 20.0	0.0	1.1	0.5	100.0	0.0	1.2	0.6	98.8
> 20.0	0.0	0.0	0.0	100.0	0.0	2.4	1.2	100.0

[a] Hectare values for pearl millet, sorghum, and maize (if planted) have been aggregated for each individual household.
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

For 1992/93 the average number of hectares cultivated per capita in Ovambo was 0.3 ha/capita and in Kavango 0.4 ha/capita. These numbers varied significantly by subregion and within the subregions.

Ovambo households produced on average 937 kg (CV 1.49) of pearl millet in 1992/93. Due to the poor production conditions in Kavango, households produced on average only about 280 kg (CV 1.21) of pearl millet. The average production figure per Ovambo household was 113 kg/capita/year. For Kavango the respective figure was only 35 kg/capita/year.

From the production data on the subregion level it is obvious that production conditions in Ovambo West were very good in the 1992/93 production season (average of 0.26 t/capita). On the other hand, production in the subregions Ovambo East and Kavango West was very poor with an average of only 23 and 22 kg/capita/year respectively.

The Namibia Early Warning & Food Information System (NEWFIS) estimates the annual cereal consumption requirement at 132 kg per capita[19]. According to these estimates Ovambo produced an quantity of pearl millet equal to 85% of Ovambo's cereal food requirements for the period between the 1992/93 harvest and the following 1993/94 harvest. However Kavango achieved only 26% of its annual pearl millet food requirement. Taking the production of sorghum and maize into account, the total cereal self-sufficiency levels was 93% for Ovambo and 31% for Kavango. Again the average cereal self-sufficiency levels differed strongly across the various subregions (Table 4.31.).

Table 4.31. Estimated cereal self-sufficiency levels for the 1992/93 production year, by region and by subregion.

Ovambo				Kavango			
West	Central	East	Total	West	Central	East	Total
(Percent of self-sufficiency)							
216	39	19	93	20	44	33	31

Source: Namibia Pearl Millet Subsector Project Surveys 1992 - 93.

Table 4.31. shows that zoneal disparity between Ovambo subregions is quite large. No definite conclusion can be drawn as to why Ovambo West's production was 10 times more than that of Ovambo East. Possible explanations include zoneal rainfall distribution, availability of draft animals, more fertile soils, and lower population density. The per capita production distribution for all Ovambo and Kavango suggests that only 42% of Ovambo households produced more than 120 kg/capita. The per capita production figures for Kavango were much lower than 120 kg. Only 95 of Kavango households produced more than
120 kg/capita (Table 4.32.).

To ascertain the percentage of pearl millet production that stemmed from the newly introduced pearl millet variety Okashana 1 the data from the survey households was extrapolated to study region level. The estimated total number of hectares of Okashana 1 cultivated and the total quantity of pearl millet produced from Okashana 1 during 1992/93 production year is shown above. Okashana 1 had a share of 6% of Ovambo's total area under pearl millet cultivation and of 8% in Kavango. In Ovambo, Okashana 1 yielded on average less per hectare than local varieties. Its estimated total share of pearl millet production was 3%. Due to Okashana 1's relatively better yield performance under dry conditions about 12% of Kavango's total pearl millet yield was derived from this drought-resistant variety.

[19] Crop and Food Security Bulletin No: 4/94, p.4

Table 4.32. Distribution of per capita p.millet production from 1992/93 production season by region and subregion.

Kilogram per capita	Ovambo					Kavango				
	West	Central	East	Total	Cumulative total	West	Central	East	Total	Cumulative total
	(Percent of households)									
0 to 10	2	3	5	3	3	5	13	10	10	10
10 to 60	4	70	69	47	51	78	70	70	73	83
60 to 120	11	8	4	7	58	5	8	13	8	91
120 to 240	21	10	22	18	76	10	10	3	8	98
240 to 350	21	8		10	85			3	1	99
350 to 470	11	3		4	89			3	1	100
470 to 590	7			2	92					
590 to 710	11			4	95					
710 to 820	7			2	98					
820 to 940	5			2	99					
more than 940	2			1	100					

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

As seen from the 1992/93 harvest, Okashana 1's advantage lies in its potential to produce more pearl millet per unit than local varieties, under very dry conditions. The precondition for Okashana 1's performance is that soil fertility is adequate as is the case in Ovambo East and most of Kavango.

Under more favorable rainfall conditions and lower soil fertility, as was the case in Ovambo West and Ovambo Central, local pearl millet varieties clearly performed better than Okashana 1. This does not mean that Okashana 1's general yield potential is lower than of traditional pearl millet varieties. Okashana 1 exhibited very high hectare yields at the Mahanene crop research station in Ovambo West where soil fertility is kept at a comparatively high level through continuous use of chemical fertilizer.

Determinants of pearl millet production

Throughout the household surveys farmers were asked about the problems they experienced during various pearl millet production phases. At field preparation time during December 1992 many households feared the continuation of the serious drought that began in the 1991/92 production year. When asked whether they foresaw any other major problems besides late rains, for the up-coming plowing and planting period, 56% of Ovambo households and 69% of Kavango households cited various problems (Table 4.33.). Two main problems were given. In both areas 78-80% cited lack of draft power for plowing as a problem. The second most important problem for field preparation was lack of labor.

Table 4.33. Percent of households that expected problems at p. millet planting time and the problems the households expected, by region and by subregion.

	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
Expected problems: =>	52	58	58	56	90	33	83	69
Problems expected:								
Weak animals for plowing	7	45	10	21	0	0	0	0
No animals to plow	46	23	33	34	24	25	50	33
Lack of plowing equipment	32	0	3	12	35	0	33	23
Lack of seed	7	0	0	2	0	0	0	0
Lack of labor	0	27	18	15	35	25	0	20
Lack of money to hire tractor	0	0	33	11	6	50	17	24
Health problems	7	5	3	5	0	0	0	0

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

After the field preparation period households were asked whether they were able to cultivate as much land for pearl millet and other crops as they had intended. In Ovambo 33% and in Kavango 10% of all households claimed they cultivated as much land as they had initially intended (Table 4.34.). The rest of households said they were not able to cultivate enough land.

Table 4.34. Percent of households that were unable to cultivate as much p. millet as they intended and tbe reasons tbat prevented them from doing so, by region and by subregion.

	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
That did not cultivate enough pearl millet =>	83	32	86	67	87	100	84	90
Reasons stated:								
Lack of land	21	64	4	29	7	16	8	10
Lack of fertile land	13	9	15	12	9	5	5	6
Lack of family labor	16	18	11	15	5	27	17	17
Lack of labor to hire	9	0	2	4	5	3	7	5
Hiring of labor too costly	5	0	12	6	5	24	6	12
Lack of draft animals	4	0	3	2	11	4	19	11
Hiring of draft power too costly	3	0	10	4	7	7	7	7
Tractor service too costly	3	0	7	3	2	5	3	4
Lack of seed	13	0	27	14	39	4	19	20
Rain period too short	8	9	6	8	4	1	3	3
Other	5	0	3	3	7	3	6	5
Total	100	100	100	100	100	100	100	100

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

To determine if any other factor besides climatic conditions, land, labor, draft power, and seed are really the main determinants of pearl millet production households were asked to recall the time when they had an exceptionally good pearl millet harvest. Then households were asked to state the circumstances which led to such good results (Table 4.35.). The rank orders of the factors that contributed most to pearl millet production were the same for both study regions:

Table 4.35. Non-weather factors that contributed to good harvest results in the past, by region and by subregion.

	Ovambo Region				Kavango Region			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of responses)							
Much family labor	45	52	36	44	17	43	32	31
Planted early	35	22	30	29	31	20	13	21
Use of own tractor	12	19	10	14	26	4	27	19
Use of many draft animals	6	4	2	4	4	12	18	11
More fertile land	2	4	8	5	21	22	10	17
Hired tractor	0	0	3	4	0	0	0	0
Other	0	0	1	0	1	0	0	0

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

To determine the importance of weeding for pearl millet production household representatives were asked what type of problems they had experienced or expected to experience between planting and harvesting. Ninety-three percent of all Ovambo households envisaged problems and 70% of all Kavango households.

In Ovambo most answers were concerned with production damage from insects and birds or free-roaming livestock (90%) (Table 4.36.). Another 5% of the answers gave labor shortage as a problem. In Kavango crop damage from birds, insects and livestock were also the most important problems expected (33% of answers). 'Hunger until harvest' represented 16% of all stated problems. Other problems were 'lack of grain storage facilities' (12%), 'no means of transport to far away fields' (11%), 'labor shortage' (10%).

Table 4.36. Percent of households that expected problems for the period between planting and the problems expected, by region and by subregion.

	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
Expected problems	=>96	88	96	93	80	60	71	70
Problem expected:								
Insects and birds	85	100	69	84	18	15	48	27
Hunger until harvest	0	0	0	0	3	46	0	16
No transport and distant fields	0	0	0	0	0	8	24	11
Not enough storage for harvest	0	0	3	1	27	8	0	12
Shortage of labor	2	0	14	5	18	0	12	10
Low yields	2	0	6	3	9	15	0	8
No fences to protect crop	12	0	6	6	18	0	0	6
Theft of harvest	0	0	0	0	0	0	12	4
Lack of money	0	0	3	1	3	8	0	4
Not enough seed	0	0	0	0	3	0	4	2

Source: Namibia Millet Subsector Project Surveys, 1992-93.

Pearl millet production in long-term perspective

This section attempts to estimate the average aggregate pearl millet production for Ovambo and Kavango over the last 23 years. For this estimation long-term rainfall data was analyzed and combined with the production results of the 1992/93 production year.

In the past ,crop production data was not collected systematically from communal farmers in northern Namibia. The production and yield data from the pearl millet subsector research project presents the first data collected from a large household sample. However because the production results discussed above represent data from only one production year across the different subregions of Ovambo and Kavango, it is necessary to determine how the 1992/93 production season compares with previous harvest results.

To calibrate the 1992/93 production year within the long-term perspective the households surveyed were asked two questions. First, households were asked (a) to state the largest quantity of pearl millet they have harvested in the past and (b) how much pearl millet they produced during the serious drought of 1991/92. The second question was to rank the current 1992/93 pearl millet harvest as good, middle or poor in comparison with yields from previous years.

Although individual households chose maximum yields from different past years, one can assume that the aggregation of those answers represents a production result after (1) a good rainfall season and (2) the availability of enough resources like: labor, draft power, and fertile land at household level. Household representatives were also asked to state their pearl millet production level for the 1991/92 drought year. That year is commonly considered the worst crop production season, not only in Namibia, but also in most other countries of southern Africa.

The answers about household pearl millet production in good and bad years represents the range between minimum and maximum harvest for past production. Table 4.37. presents cereal production levels per capita from the 1992/93 harvest in comparison with three scenarios derived from household minimum and maximum long-term production.

Table 4.37. Cereal production per capita for production year 1992/93 in comparison with cereal production scenarios derived from household long-term minimum and maximum production levels, by region and by subregion.

	Ovambo				Kavango			
	West	Central	East	Mean	West	Central	East	Mean
	(Kg per household)							
1992/93	263	47	23	103	22	49	37	35
Scenarios								
Good	285	254	348	296	193	300	193	229
Middle	174	137	183	165	116	173	180	156
Poor	144	109	150	134	106	170	134	136

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Only the Ovambo West and Ovambo Central 1992/93 pearl millet production year lies between the minimum and maximum production results stated by the household sample. The 1992/93 production results for Ovambo East and the whole of Kavango are very close to, and in some areas even worse, than the results after the 1991/92 drought. In these areas the cumulative effect of poor rainfall distribution and the aftermath of the serious drought on the availability of labor, seed, and draft power caused the poor 1992/93 harvest results.

Household own evaluations of the 1992/93 production season compared with previous years accords with the minimum/maximum comparison above (Table 4.38.). The vast majority of farm households from Ovambo West (83%) ranked their harvest result as good. In Ovambo

Central the majority of households (53%) described their production results as middle while most of the rest classified their harvest results as poor (45%). From Ovambo East and throughout all Kavango the pearl millet harvest of 1992/93 was classified as poor in comparison with previous years (between 64% and 76% of all households).

Table 4.38. Household judgements about their p.millet production of 1992/93 in comparison of harvest results from previous years.

Judgement of harvest	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
Good	81	3	5	30	8	6	6	7
Middle	13	53	19	28	28	21	20	23
Poor	6	45	76	42	64	73	74	70

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Instead of using minimum and maximum production levels from the past to estimate good, middle and poor long-term production scenarios, households' evaluation of their 1992/93 pearl millet harvest can be used to estimate the same pearl millet production scenarios. For this method households' production results for 1992/93 production season are grouped according to the households' evaluation on long-term comparison (good, middle, or poor) and the average production level is calculated for each group and subregion. Table 4.39. shows the results of this method.

Table 4.39. Cereal production per capita for production year 1992/93 in comparison with production scenarios derived from farmers' judgements about their harvest results in long-term perspective, by region and by subregion.

	Ovambo				Kavango			
	West	Central	East	Mean	West	Central	East	Mean
	(Kg per household)							
1992/93	263	47	23	103	22	49	37	35
Scenarios:								
Good	422	366	247	345	179	104	292	192
Middle	300	136	101	179	78	119	192	130
Poor	36	17	23	26	36	20	32	29

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Having determined how the 1992/93 harvest compared with other previous harvests it is important to know how often good, middle and poor harvests occur in each subregion in the long-term. For this purpose rainfall data from 18 different rainfall stations from Ovambo and Kavango have been analyzed for the last 23 production seasons (1969/70 to 1992/93). Instead of judging rainfall conditions on an annual basis, data from each rainfall station was analyzed on a monthly, and if necessary, a weekly basis.

The goal of this qualitative analysis was to classify past crop production seasons into different levels of pearl millet production. Long dry-spells or brief heavy rains that could jeopardize the outcome of a production season have been taken into account as well as the total length of the season and the deviation from average monthly rainfall patterns. Although the retrospective classification of the productivity of the rainfall solely on the basis of rainfall data is relatively narrow it is currently the only way to make any inferences about pearl millet production in the past.

The results of this analysis are the classification of production seasons from the past into nine different productivity levels of seasonal rainfall (Appendix 2a) and the probability of their occurrence. To make the results consistent with the production scenarios from above, nine productivity levels were reduced to the three seasonal rainfall scenarios: good, middle, and poor. The probability of the occurrence of the different rainfall scenarios over the last 23 production seasons between 1969 and 1993 are provided in Table 4.40.

Table 4.40. Long-term probability distribution of rainfall scenarios for grain production in Ovambo and Kavango and their respective subregions.

Rainfall scenarios	Ovambo				Kavango			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of seasons)							
Good	19	18	29	22	29	33	21	28
Middle	33	39	21	31	27	30	40	32
Poor	48	43	50	47	44	37	39	40

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

The results from the combination of probability of rainfall scenarios with cereal production estimates for each scenario and subregion are presented. Because the cereal production scenarios can be derived from either (a) farmers' own judgement about their 1992/93 harvest results, or (b) the use of long-term minimum and maximum production results. Table 4.41. presents the estimates from either method. The calculation of the results from each method are presented in more detail in Table 4.42. and 4.43.

Figure 10 **Rainfall Trends from Ondangwa and Rundu between 1903 and 1993**

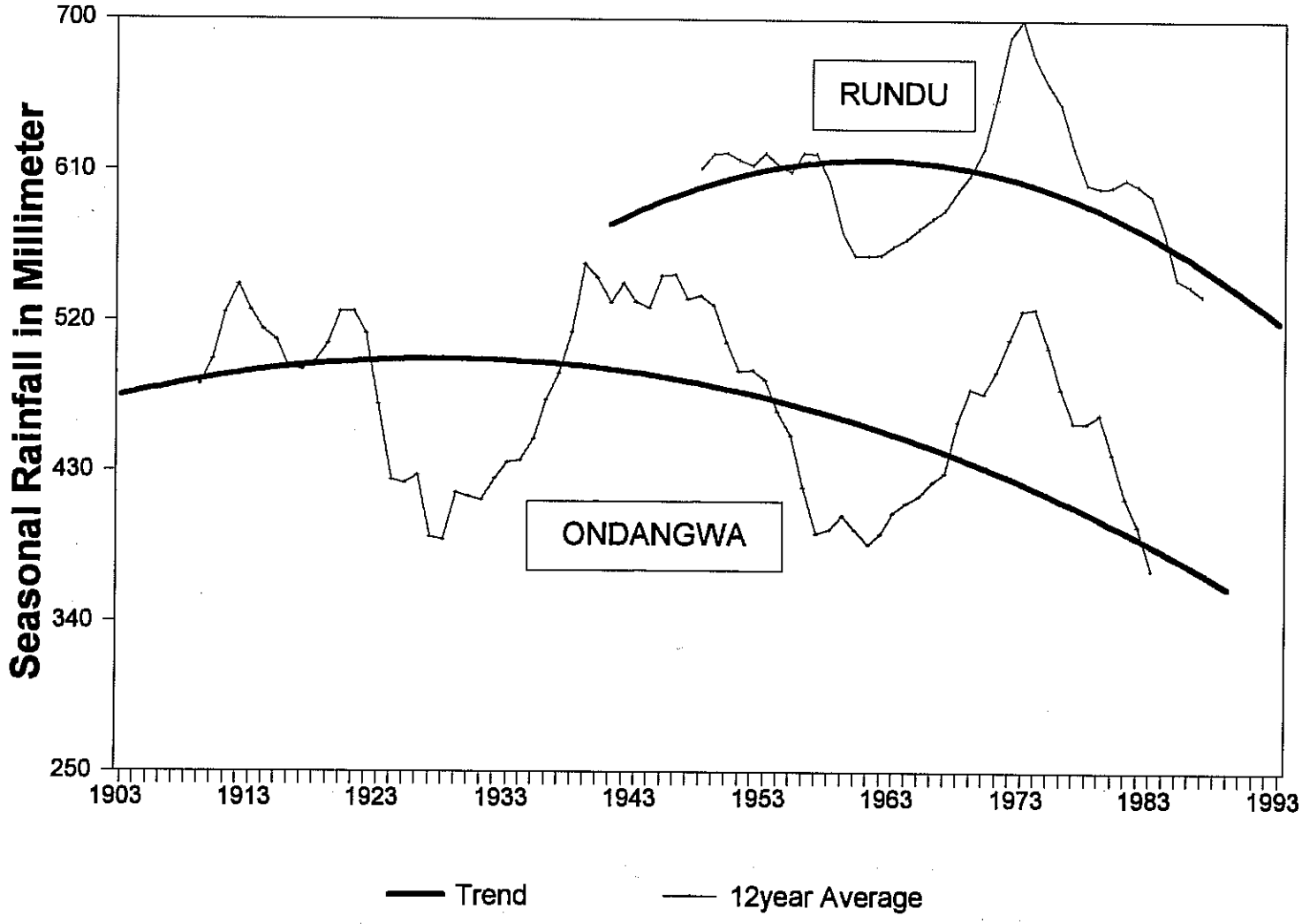


Figure 11 **Rainfall Trends in Ovambo and Kavango by Subzone, between 1969 and 1993**

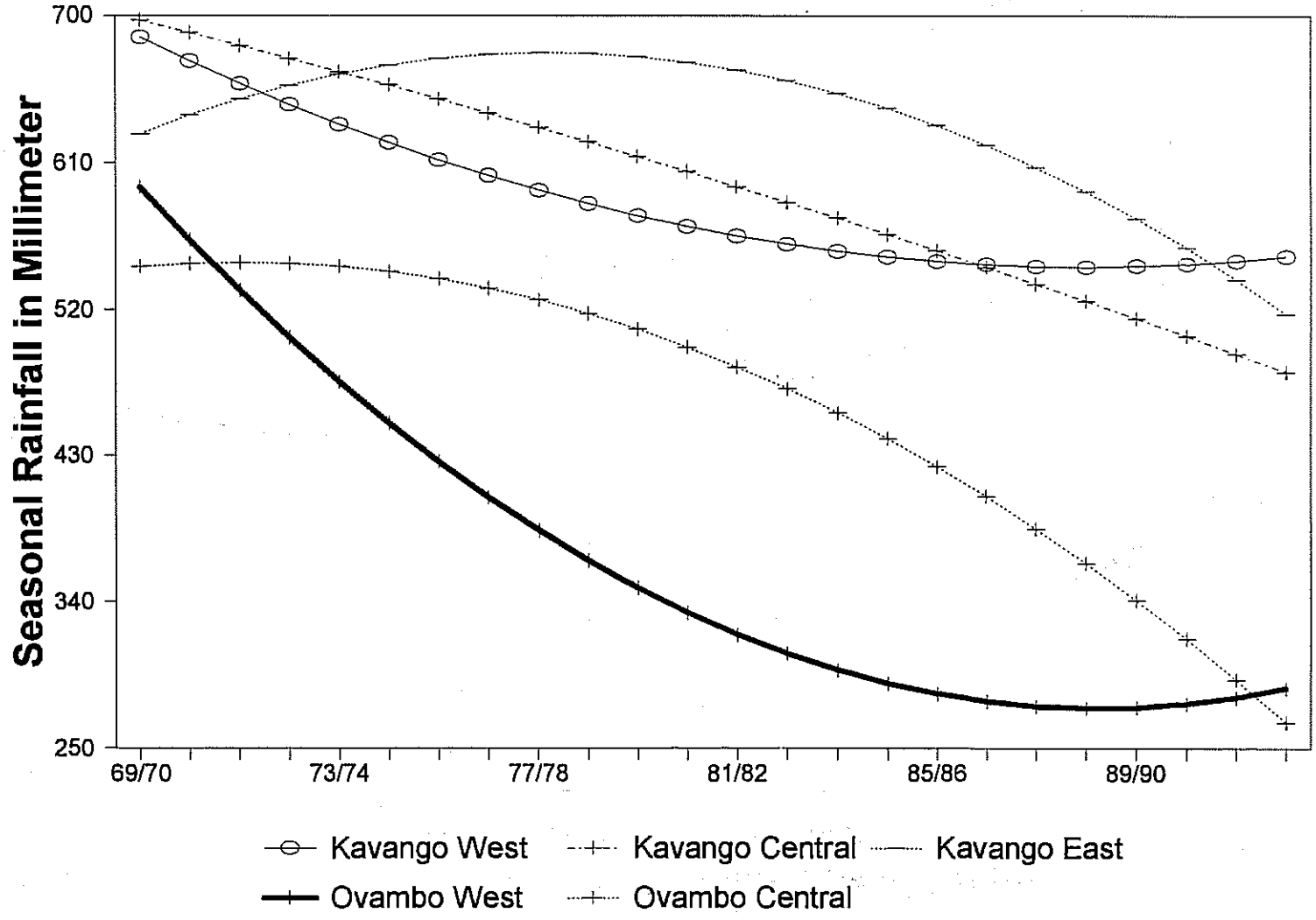


Table 4.41. Long-term per capita[a] annual cereal production and respective self-sufficiency levels[b]

Method	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
(a) Derived from 1992/93 harvest judgements:								
Kg per capita	202	129	108	146	94	80	155	109
Self-sufficiency level (%)	153	98	82	111	71	60	117	83
(b) Derived from long-term harvest results:								
Kg per capita	132	100	137	123	88	141	132	121
Self-sufficiency level (%)	100	76	104	93	67	107	100	91

a The reference period is 23 years from 1969/70 to 1992/93.

b The Namibia Early Warning & Food Information System estimates annual cereal consumption requirements per capita at 132 kg (Bulletin No. 4/94).

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 4.42. Cereal production scenarios[a] derived from 1992/93 production season and the respective probability distribution[b] over years, by region and subregion.

Rainfall scenarios	Ovambo				Kavango			
	West	Central	East	Mean	West	Central	East	Mean
Good rainfall conditions								
Production per capita (kg)	422	366	247	345	179	104	292	192
Number of cases	62	1	3		3	2	2	
Probability of occurrence(%)	0.19	0.18	0.29	0.22	0.29	0.33	0.21	0.28
Percent of self-sufficiency[c]	320	277	187	261	136	79	221	028
Middle rainfall conditions								
Production per capita (kg)	300	136	101	179	78	119	192	130
Number of cases	(8)	(20)	(14)		(10)	(7)	(7)	
Probability of occurrence(%)	0.33	0.39	0.2	0.31	0.27	0.30	0.40	0.32
Percent of self-sufficiency[c]	227	103	77	136	59	90	145	98
Poor rainfall conditions								
Production per capita (kg)	48	23	30	34	48	26	42	39
Number of cases	(5)	(16)	(56)		(23)	(24)	(26)	
Probability of occurrence(%)	0.48	0.43	0.50	0.47	0.44	0.37	0.39	0.40
Percent of self-sufficiency[c]	36	17	23	26	36	20	32	29
Average long-term production								
Production per capita (kg)	202	129	108	146	94	80	155	109
Probability of occurrence(%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent of self-sufficiency[c]	153	98	82	111	71	60	117	83

a Grain production data per capita are averages of those farmers who ranked their 1992-93 harvest results either as good, middle, or poor.

b The probabilities were based on monthly productive rainfall data from production seasons of 1969/70 to 1992/93.

c The Namibia Early Warning & Food Information System estimates annual cereal consumption requirements per capita at 132 kg. Bulletin No: 4/94.

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 4.43. Cereal production scenarios[a] derived from long-term minimum and maximum production and the respective probability distribution[b] over year, by region and by subregion.

Rainfall scenarios	Ovambo				Kavango			
	West	Central	East	Mean	West	Central	East	Mean
Good rainfall conditions								
Production per capita (kg)	285	254	348	296	293	300	193	229
Probability of occurrence (%)	0.19	0.18	0.29	0.22	0.29	0.33	0.21	0.28
Percent of self-sufficiency[c]	216	193	263	224	146	228	146	174
Middle rainfall conditions								
Production per capita (kg)	174	137	183	165	116	173	180	156
Probability of occurrence (%)	0.33	0.39	0.21	0.31	0.27	0.30	0.40	0.32
Percent of self-sufficiency[c]	132	104	139	125	88	131	136	118
Poor rainfall conditions								
Production per capita (kg)	66	23	22	37	43	51	54	49
Probability of occurrence (%)	0.48	0.43	0.50	0.47	0.44	0.37	0.39	0.40
Percent of self-sufficiency[c]	50	17	17	28	32	38	41	37
Average long term production								
Production per capita (kg)	144	109	150	134	106	170	134	136
Probability of occurrence (%)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent of self-sufficiency[c]	109	83	114	102	80	128	101	103

a Production data per capita are estimates from farmers' statements about their maximum and minimum grain production in the past.

b The probabilities are based on monthly productive rainfall data from production seasons of 1969/70 to 1992/93.

c The Namibia Early Warning & Information System estimates annual cereal consumption requirements per capita at 132 kg. Bulletin No: 4/94.

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

The results of both methods indicate that in the long run both Ovambo and Kavango are close to cereal self-sufficiency. In Ovambo the long-term average pearl millet production was about 140 kg/capita or about 105% of the required cereal intake per capita. For Kavango the average grain production per capita was about 115 kg/year or equal to 87% of cereal self-sufficiency.

The results just stated are surprising and encouraging. They are surprising because over the last few years a large gap between zoneal grain production and the aggregate demand for staple food seemed to exist. The explanation for this production gap lies in the continuous decline of total annual rainfall from 1973 on. After the beginning of the 1980's, annual rainfall averaged about 550 mm in Ovambo and 650 mm in Kavango. The current rainfall levels have dropped to about 300 mm in Ovambo and 550 mm in Kavango.

The closeness to long-term cereal self-sufficiency is encouraging because it implies that geographic and annual production variations can probably be balanced by a moderate increase in pearl millet production in the future, in combination with an improved system of grain storage, marketing and trade. In addition the shape of the 12 year average rainfall curve

suggests that Namibia is currently reaching the end of a 20-30 year annual rainfall cycle. It is to be hoped that in the future annual rainfall in northern Namibia will increase according to the long-term rainfall pattern.

Cost and returns of pearl millet production

Knowledge about pearl millet production costs are necessary to see whether locally produced pearl millet can compete with other commercially traded food staples. The returns to land and to labor can be used to compare the profitability of pearl millet production with the profitability of other agricultural or non-agricultural income-generating alternatives.

Household surveys and field size measurements of the 1992/93 production season yielded the following information which is necessary for estimating cost and returns of pearl millet production at the household level:

- hectares under cultivation;
- pearl millet, sorghum, and maize quantities harvested;
- man-days worked by family members;
- man-days worked by hired labor;
- cost of hired labor;
- cost of plowing services received (animal or tractor traction)
- amount of seed needed per hectare;
- average producer price for pearl millet.

Information about the following cost factors was not collected:

- cost of acquiring land from tribal chief for cultivation;
- draft power used from household's own sources;
- cost of fertilizing with manure or chemical fertilizer
- transport costs;
- storage costs.

Since rural households usually differed in both (a) the number of production factors they employed (land, labor, capital) and (b) the effectiveness with which they used those factors, households were grouped for the following cost and return calculation in different categories.

As labor is a major pearl millet production input, households were first categorized into those households that hired labor in addition to their own family labor for grain production and those households that did not. The rationale for this categorization is that those households that could hire additional labor had more resources to employ in pearl millet production than those who did not.

The second categorization was made in relation to the pearl millet self-sufficiency level of households. Those households that produced more than 132 kg/capita (annual grain

consumption need per person) were grouped separately from those who produced less than 100% of their annual grain consumption needs.

Production cost

Family labor was valued at the average wage rate of N$5 per day for agricultural labor (see section about labor input and seasonal migration). The production cost for the different household categories as described above is given in Table 4.44. The figures necessary for the cost calculation are presented in Tables 4.45 and 4.46.

Table 4.44. Average p.millet production cost, by household use of hired labor, by household grain self-sufficiency level, and by region.

Household categories	Ovambo households	Kavango households
	(N$/t)	
Hire labor	995	1432
Do not hire labor	1142	2636
Grain self-sufficient	580	1011
Not grain self-sufficient	1142	2088

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 4.44 demonstrates that in both study regions those households that were self-sufficient in grain production had the lowest production cost in comparison with other household categories. Households with surplus had average costs of production per kilogram pearl millet of N$0.58 in Ovambo and N$1.01 in Kavango. By comparison during the 1992/93 production season the average commercial *consumer* price for maize meal in Ovambo was N$1.36/kg and in Kavango N$1.87/kg.

Under conditions described above farmers with surplus or traders that wanted to offer pearl millet *meal* commercially at the same price at which consumers could buy maize meal, were looking, in Ovambo, at a margin of N$0.78/kg (= N$ 1.36 - N$ 0.58) and in Kavango of N$0.86 (= N$ 1.87 - N$ 1.01) to cover all their storage, processing, and marketing costs and also to provide some return for their entrepreneurial ventures and risks. The task for future research will be to identify storage arrangements, processing technologies, and a marketing system that are suitable to communal farming systems and that stay within the cost margins as presented above.

Table 4.45. Average returns for millet production, by region by households with and without grain self-sufficiency, hy household level, by hectare during 1992/93 production season.

	Ovambo			Kavango		
	Grain self-sufficient	Not grain self-sufficient	Weighted average	Grain self-sufficient	Not grain self-sufficient	Weighted average
Percent of households (%)	33	67	100	13	87	100
Grain produced per capita (kg)	307	46	132	140	34	48
Household level						
Land cultivated (ha)	2.5	2.6	2.6	3.8	5.3	5.1
Grain produced (kg)	1987	804	1194	1473	310	461
Producer price per kg (N$)	1.10	1.10	1.10	1.27	1.27	1.27
Gross income (N$)	2186	884	1314	1871	394	586
Resource use						
Family labor (mandays)	195	157	170	205	93	108
Hired labor (mandays)	3	0	1	12	12	13
Seed (kg)	6	7	6	10	13	13
Variable cost						
Ploughing (N$)	161	126	138	300	79	108
Hired labor (N$)	9	0	3	153	85	94
Seed (estimated value) (N$)	7	7	7	12	17	16
Hectare level						
Grain production (kg/ha^{-1})	804	309	473	388	58	101
Producer price per kg (N$)	1.10	1.10	1.10	1.27	1.27	1.27
Gross income (N$/ha^{-1})	885	340	520	492	74	129
Resource use						
Family labor (mandays/ha^{-1})	79	60	67	54	18	22
Hired labor (mandays/ha^{-1})	1	0	0	3	2	2
Seed (kg/ha^{-1})	2.5	2.5	2.5	2.5	2.5	2.5
Variable cost						
Ploughing (N$/ha^{-1})	65	48	54	79	15	23
Hired labor (N$/ha^{-1})	4	0	1	40	16	19
Seed (estimated value) (N$/ha^{-1})	3	3	3	3	3	3
Net returns						
N$/ha^{-1}	813	289	462	370	40	83
N$/manday	10.30	4.79	6.61	6.86	2.29	2.88

Source: Namibia Millet Subsector Project Surveys, 1992-93

Table 4.46. Average returns for p.millet production, by region by households with and without hired, by household level, by hectare during 1992/93 production season.

	Ovambo			Kavango		
	Hired labor	No hired labor	Weighted average	Hired labor	No hired labor	Weighted average
Percent of households (%)	41	59	100	57	43	100
Grain self-sufficient households (%)	14	17	16	7	3	5
Grain produced/capita (kg)	142	111	124	54	37	46
Household level						
Land cultivated (ba)	4.1	2.6	3.2	7.0	2.8	5.2
Grain produced (kg)	972	804	873	630	201	446
Producer price/kg (N$)	1.10	1.10	1.10	1.27	1.27	1.27
Gross income (N$)	1069	884	960	800	255	566
Resource use						
Family labor (mandays)	160	157	158	124	81	106
Hired labor (mandays)	6	0	2	22	0	13
Seed (kg)	10	7	8	18	7	13
Variable cost						
Ploughing (N$)	149	126	135	94	116	103
Hired labor (N$	7	0	3	166	0	95
Seed (estimated value) (N$)	11.2	7.2	8.8	22.3	8.9	16.5
Hectare level						
Grain production (kg/ha^{-1})	238	309	280	90	72	82
Producer price/kg (N$)	1.10	1.10	1.10	1.27	1.27	1.27
Gross income (N$/ha^{-1})	262	340	308	114	91	104
Resource use						
Family labor(mandays/ha^{-1})	39	60	52	18	29	23
Hired labor (mandays/ha^{-1})	1	0	1	3	0	2
Seed (kg/ha^{-1})	2.5	2.5	2.5	2.5	2.5	2.5
Variable cost						
Plougbing (N$/ha^{-1})	37	48	44	13	41	25
Hired labor (N$/ha^{-1})	2	0	1	24	0	13
Seed (est.value)(N$/ha^{-1})	3	3	3	3	3	3
Net returns						
N$/ha^{-1}	221	289	261	74	47	62
N$/manday	5.64	4.79	5.13	4.18	1.61	3.07

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Returns to land and labor

Having demonstrated that households with a surplus which accepted returns on family labor at the current wage rate of N$5/day were relatively cost-efficient in pearl millet production, now the actual returns on their land and labor must now be determined. Using the same household

categories as above Table 4.47. presents the returns for one hectare of land while Table 4.48. shows the returns for one man-day[20] of family labor

Table 4.47. Average return for one hectare of p. millet production, by use of hired labor, by grain self-sufficiency level, and by region.

Household categories	Ovambo households	Kavango households
	(N$/ha^{-1})	
Hire labor	211	74
Do not hire labor	289	47
Grain self-sufficient	813	370
Not grain self-sufficient	289	40

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 4.48. Average return for one manday of p. millet production, by use of hired labor, by household grain self-sufficiency level, and by region.

Household categories	Ovambo households	Kavango households
	(N$/manday)	
Hire labor	5.64	4.18
Do not hire labor	4.79	1.61
Grain self-sufficient	10.30	6.86
Not grain self-sufficient	4.79	2.29

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In the 1992/93 production year the return per hectare and per man-day were highest for those households that were grain self-sufficient. In Ovambo grain self-sufficient households had on average a return of N$ 813 ha^{-1}. An adult aged between 15 and 55 years had a return of N$ 10.30 for one day of work (eight hours). This is about the double amount of N$ 5 t hat hired laborers earn in rural areas. Due to poor rainfall conditions in 1992/93 and the effects of the aftermath of the 1991/92 drought, grain self-sufficient households in Kavango had on average less return for land and labor than their Ovambo counterparts. Grain self-sufficient Kavango households produced pearl millet at a net value of N$ 370 ha^{-1} and a return of about N$ 6.90 for a man-day's work.

The main findings of this cost and return section are twofold:

(1) Those households that had a grain surplus produced pearl millet at a low enough cost

[20] The term 'manday' is defined in section on 'Labour input and seasonal migration pattern' above.

per kilogram so that further costs for storage, transport, and processing could be added before the price reached the maize meal price. For this cost calculation the return on family labor was assumed to be the same as the current wage rate for hired agricultural labor.

(2) The net value of pearl millet production of grain self-sufficient households gave a return for family labor that was double the ongoing wage rate for hired agricultural labor. For this return calculation the value of the pearl millet crop was based on the producer prices in the informal sector.

Summary

When asked: "What is your most important food crop?" the vast majority of rural households answered "mahangu" - pearl millet (Ovambo: 95%, Kavango: 94%). When asked what crop constitutes their most important cash crop the most often given answer was again "mahangu" (Ovambo: 22 %, Kavango: 23%).

Pearl millet production practices

In Ovambo, almost all cultivable land was cleared and households had settled close by. The practice of shifting cultivation had therefore almost ceased. In Kavango, households still had the option of abandoning infertile land and clearing new land. As a result the majority of Ovambo households used either manure and/or chemical fertilizer (82%) to keep up soil fertility. With the exception of households from Kavango West, only about 5-7 % of all Kavango households used manure and/or chemical fertilizer on their fields. However, 48% of all Kavango households cleared new land during the last five years.

In Ovambo about 98% of all answers about fertilization limitations stated that the household did not have any, or enough, livestock to obtain as much manure as was needed. In Kavango East the majority of answers (75%) centered around the lack of transport to take manure from their herds to their distant fields. High chemical fertilizer costs were given as an obstacle to fertilizing in Kavango West (73%) and Kavango Central (100%). Lack of labor to distribute manure over their fields was mentioned by 11% of all Kavango households.

The vast majority of households (Ovambo: 88%, Kavango 87%) stated that for the 1992/93 production season most of their seed came from their own granaries. Only 2% of households in Ovambo and 3% in Kavango named seed distribution from government as their main seed source.

Only about 10-15% of rural households in Ovambo and Kavango experienced severe seed shortage after the major drought of 1991/92. For those households that could not retain enough pearl millet seed for planting, neighbors, rural shops, and rural markets were the more likely main source of seed than government.

Although seed distribution from Namibian government and from NGOs reached a large percentage of households at the beginning of 1992/93, probably only a small proportion of the distributed pearl millet was used as seed while most of it was consumed. Despite the fact that aid institutions over-estimated the number of households that were really in need of pearl millet seed at the begin of 1992/93 production year the distribution of the variety Okashana 1 through the government extension service increased the number of farmers who gained experience with an early-maturing pearl millet type.

In Ovambo 20% of all rural households only used the hoe for field preparation. In Kavango the respective percentage is only 4%. Animal traction was the main source of draft force in both study regions. Fifty-three percent of all Ovambo households and 86% of all Kavango households used animal traction for field preparation. In Ovambo donkeys represented the mass of draft animals while in Kavango only oxen were used for plowing. Hired mechanical plowing was used by a relatively high proportion of Ovambo households (30%) while in Kavango only 4% of all rural households used a hired tractor.

Because not all rural households possessed oxen or donkeys, the hiring of draft animals for field preparation was very common. In both study regions 40% of all households hired plowing services. Within the survey sample of 200 Ovambo and 120 Kavango households only five privately owned tractors (2.5%) could be located. Four of the five tractors were in Ovambo West. Accordingly most of those who wanted to use mechanical plowing during the 1992/93 season had to hire tractors.

In 1992/3 those households that hired plowing services (animal traction or tractors) spent an average of N$ 137 in Ovambo, and N$ 109 in Kavango. The costs for plowing a unit of land with animal traction was currently three to five times more expensive than those for mechanical plowing. Therefore it is not surprising that the demand for mechanical plowing service was high.

In Ovambo the majority of households (90%) used large woven baskets that are sealed with dried clay for pearl millet storage. These can hold between a half and two tons of grain. In Kavango households used various types of storage containers and combinations of them for pearl millet storage. The largest group of Kavango households (39%) used 50-70 kg bags to store pearl millet in their houses. Twenty-five percent of Kavango households used traditional storage houses in which they stored pearl millet in bulk. Another 21% of households use sealed drums for grain storage and 18% of households leave the pearl millet head on the stem and stored a bundle of stems inside or outside the house.

In Ovambo pearl millet could be stored in baskets or drums for about three years without incurring major losses. In Kavango the average storage without loss in bags, storage houses, and storage on the plant stem was closer to two years.

While the majority of Ovambo households (65%) said that they had to bear losses of up to 25% during storage time, 42% of Kavango households said they incurred no storage losses at all. Fifty-one percent of Kavango households gave 'little loss' as their answer.
Omahandas, the storage baskets used only in Ovambo, compared unfavorably with other storage methods. About 18% of all households that used omahandas said they had high losses but still 66% claimed they had little loss. Storage bags, most often used in Kavango, ranked best among the different methods used. Of those households that used storage bags, up to 65% said they had no losses and only 2% claimed high loss.

At the prevailing level of agricultural production technology human labor was the most important input for pearl millet production in Ovambo and Kavango. During all production phases an average of 4.6 members per household were engaged in pearl millet production in Ovambo. This represents about 51% of the members of an average sized Ovambo household. In Kavango 3.4 household members (or about 43% of an average sized Kavango household) were occupied with pearl millet production.

In Ovambo households worked an average of 127 man-days on pearl millet production (including harvesting and threshing). The respective number of 76 man-days in Kavango was much less than in Ovambo. Ovambo women contributed an average 61% (Kavango: 62%) of all man-days spent on pearl millet production. Men contributed only half the man-days that women did (32% of all man-days Kavango: 33% Ovambo). Children under 15 years contributed 6% of all man-days in Ovambo (Kavango: 4%).

Hiring and renting out labor was very common among rural households in Ovambo and Kavango. On average 22% of Kavango households and 9% of Ovambo households rented out labor to neighbors for pearl millet production during the production year 1992/93. Another 29% of Kavango households hired labor for pearl millet production compared with only 14% of Ovambo households.

Not all households remunerated labor with money or in kind. It was very common among neighbors to help each other without payment. The social relationships and dependencies among households that allow for this kind of unpaid labor exchange are complex. Between 40% and 70% of labor exchange in Ovambo took place on the basis of neighborhood help without direct remuneration. In Kavango payment-free labor exchange was on average 10-15% less frequent than in Ovambo.

The wage rates (cash or in kind) for agricultural laborers varied greatly. After converting payments in kind (mainly pearl millet and pearl millet beer) into cash equivalent most wage rates varied between N$1.50 and N$16.00/day. The wage rates average around N$5.00/day:

Those Ovambo households whose members work for neighbors worked on average 89% of their time on their own pearl millet production and about 11% for their neighbors. In Kavango the respective ratio was 79% to 21%.

About 62%-74% of the labor hired for pearl millet production was provided by women in Ovambo and about 57-65% by women in Kavango. The rest of hired labor was mainly contributed by men. To see whether labor migration was an important factor keeping men from pearl millet production, male and female adults were asked about any absence from home that lasted longer than one week. It is obvious that in both study regions women from rural households were absent less often from their homesteads than men.

Since the number of absent men rarely exceeded 10% of all adult males, labor migration, including job seeking and visits of relatives, does not explain why women contribute more than men do to crop production.

Harvest results of 1992/93

For the cropping season 1992/93 Ovambo households cultivated on average 2.9 ha of grain (median 2.5 ha). Kavango households cultivated on average 3.0 ha (median 2.0 ha). In Ovambo roughly a third of all households, and in Kavango up to half, produced on less than two hectares.

For 1992/93 the average hectarage cultivated per capita was 0.3 ha in Ovambo and 0.4 ha in Kavango. These numbers varied significantly by subregion and within the subregions.

Ovambo households produced on average 937 kg of pearl millet in 1992/93. Due to the poor production conditions an average Kavango household produced only about 280 kg of pearl millet. These figures convert for Ovambo into an average of 113 kg of pearl millet/ capita/year and for Kavango only 35 kg of pearl millet/capita/ year.

The Namibia Early Warning & Food Information System (NEWFIS) estimates the annual cereal consumption requirement at 132 kg per capita[21]. According to this estimate Ovambo produced enough pearl millet to equal 85% of Ovambo's cereal food requirements for the period between the 1992/93 harvest and the following harvest. However, Kavango achieved only 26% of its annual food requirement on pearl millet production. Taking the production of sorghum and maize into account the total cereal self-sufficiency levels reached 93% for Ovambo and 31% for Kavango. The average cereal self-sufficiency levels differed significantly across the various subregions.

The distribution of pearl millet production per capita demonstrates that after the 1992/93 harvest 58% of the Ovambo population and 91% of the Kavango population had less than 120 kg of pearl millet available from their own production for the coming year.

During production year 1992/93 Okashana 1 was cultivated on 6% of Ovambo's total area under pearl millet cultivation and on 8% in Kavango. Because in Ovambo Okashana 1 yielded

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on average less per hectare than local varieties, its estimated total share of pearl millet production was 3%. Due to Okashana 1's relatively better yield performance under dry conditions about 12% of Kavango's total pearl millet production came from this drought resistant variety.

As seen from the 1992/93 harvest Okashana 1's advantage lies in its potential to produce at least some yield under very dry conditions when local varieties perform poorly. However, one precondition for Okashana 1's performance is that soil fertility must be adequate, as was the case in Ovambo East and most of Kavango.

Determinants of pearl millet production

Households of both Ovambo and Kavango ranked the factors that contribute most to successful pearl millet production in the same order: family labor, early planting, use of tractor, more fertile land, draft animals

Aggregate pearl millet production in long-term perspective

To estimate the average aggregate pearl millet production of Ovambo and Kavango over the period of the last 23 years, long-term rainfall data have been analyzed and combined with the production results of the 1992/93 production year.

The results of this analysis indicate that in the long term Ovambo and Kavango are close to cereal self-sufficiency. In Ovambo the long-term average pearl millet production is roughly 140 kg per capita or about 105% of the required cereal intake per capita. For Kavango the average grain production per capita is roughly 115 kg per capita per year. This is about 87% of cereal self-sufficiency.

The results are surprising because over the last few years there seemed to be a large gap between zoneal grain production and aggregate demand for staple food. The explanation for this production gap lies in the continuous decline of total annual rainfall since about 1973.

The closeness to long-term cereal self-sufficiency is encouraging. It implies that geographic and annual production variations can probably be balanced in the future with a moderate increase in pearl millet production, combined with an improved system of grain storage, marketing and trade. Additionally the shape of the 12 year average rainfall curve suggests that Namibia is currently reaching the end of a 20-30 year long annual rainfall cycle.

Cost and returns of pearl millet production

The average cost of production for households with surpluses for one kg pearl millet was N$ 0.58 in Ovambo and N$ 1.01 in Kavango. In comparison, during the 1992/93 production season, the average commercial *consumer* price for maize meal was in Ovambo N$ 1.36/kg and in Kavango N$ 1.87/kg.

Given the above conditions, farmers with a surplus or traders that want to offer pearl millet *meal* commercially at the same price as consumers can buy maize meal are looking at a margin of N$ 0.78/kg (= N$ 1.36 - N$ 0.58) in Ovambo and N$ 0.86 (= N$ 1.87 - N$ 1.01) in Kavango to cover all their storage, processing, and marketing costs. This must also provide some return for entrepreneurial enterprise and risk. The task for future research is to identify storage arrangements, processing technologies, and a marketing system that is suitable for a communal farming system and that stays within the cost margins presented above.

In the 1992/93 production year the return per hectare and per man-day were highest for those households that were grain self-sufficient. In Ovambo grain self-sufficient households had on average a return of N$ 813 ha^{-1}. An adult household member aged between 15 and 55 years had a return of N$ 10.30 for one day of work (eight hours). This was double the amount of N$ 5 that hired laborers earned in rural areas.

Due to poor rainfall conditions in 1992/93 and the effects of the aftermath of the 1991/92 drought, grain self-sufficient households in Kavango had, on average, less return for land and labor than their Ovambo counterparts. Grain self-sufficient Kavango households produced pearl millet at a net value of N$ 370 ha^{-1} and a return of about N$ 6.90 for a man-day's work.

The main results of this cost and return section are:

(1) households with grain surplus production had such low production costs that further costs for storage, transport, and processing could be added before the consumer price for pearl millet reached the price of maize meal.

(2) The net value of pearl millet production of grain self-sufficient households gave a return to family labor that was double the ongoing wage for hired agricultural labor.

4.2. Household alternative income sources

Having discussed pearl millet production and its return on land and labor the following sections will analyze alternative household activities that provide cash income and that compete for household labor. The first section will describe household livestock ownership and the income earned from livestock marketing. Section two concentrates on other non-agricultural but on-farm income generating activities. The third section discusses how income is generated through non-agricultural off-farm employment and a government pension. The fourth section compares the income that a household generates through pearl millet production with income generated through alternative income sources. The last section investigates the investment priorities of rural households.

Income from livestock herding

The section about income from livestock herding is divided into two parts. The first part describes the extent to which households own livestock. The second part analyzes how much income is generated through livestock marketing.

Livestock ownership
It is commonly assumed that farmers from northern communal areas value livestock ownership higher than crop production because of the social status livestock ownership provides. The following list demonstrates that livestock contributed at least four additional functions to rural households, besides social status:

- food in the form of milk and meat;
- food indirectly through traction power for land cultivation and manure for soil fertility.
- a form of security because livestock could be exchanged with rural neighbors for money, goods, or food;
- traction power for transport.

Despite the important functions and services livestock can provide not all households owned animals. Questions about livestock ownership were repeated in each of the three household surveys. Only if 'no livestock possession' was claimed by any household during each survey was it recorded.

In Ovambo 14% of all households had no animals and 37% of all Ovambo households had no draft animals. In Kavango almost a quarter of all households had no livestock at all and 30% had no draft animals. These figures are unexpectedly high. They indicate that in both regions a large proportion of the population cannot take advantage of the communal tradition that everyone can access communal grazing land with his livestock.

With regard to grain production the ownership of draft animals (bulls, oxen, milk cows, and donkeys) is important. The ready availability of draft animals at the beginning of the rainy season for plowing has a major effect on a households' grain production capability. If field preparation is solely or to a large extent dependent on human labor the cultivated area is unlikely to provide enough food grain to meet a household's food needs for a whole year.

Despite the fact that renting of draft animals was quite common in both study regions the large number of households who did not own draft animals was an important reason large numbers of rural households were in pearl millet deficit every year.

A relationship between the gender of the head of households and 'no' draft animal ownership was quite obvious for both study regions. In Ovambo 60% of female headed households did not have their own draft animals while for male headed households the figure was about 25%. For Kavango the situation was the reverse. Fourteen percent of female headed households had no draft animals compared with 30% of male headed households.

A listing of the various livestock types and their distribution across households is presented for both study regions in Table 4.49 and for each subregion in Tables 4.50 and 4.51.

Table 4.49. Percent of households owning a specified number of livestock, by livestock type, and by region.

	Number of livestock								
	0	1	2-4	5-7	8-10	11-15	16-20	21-30	>31
	(Percent of households)								
Ovambo households:									
Bulls	73	18	9	1					
Oxen	73	2	20	4	1	1			
Milk cows	62	5	20	7	4	2	1		0.3
Cattle	61	5	16	9	4	3	1	1	0.3
Donkeys	78	1	15	4	2		0.3		
Goats	37	2	13	11	10	10	10	7	0.8
Pigs	76	15	8	0.3	1				0.3
Draft animals[a]	37	3	15	13	12	8	6	6	2
Kavango households:									
Bulls	85	12	3						
Oxen	47	3	34	8	5	1	1	0.4	
Milk cows	58	3	18	9	7	4	2	0.4	
Cattle	63	3	23	8	2	2			
Donkeys	96	1	2		0.4				
Goats	80	0.4	4	2	4	3	2	5	0.4
Pigs	80	0.4	4	2	4	3	2	5	0.4
Draft animals[a]	33	1	18	15	15	14	3	1	

[a] Draft animals = sum of all bulls, oxen, milk cows and donkeys owned by a rural household.
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In Ovambo goats were the most often commonly owned type of livestock. Approximately 50% of all Ovambo households owned more than four goats, but in Kavango the figure was only 20%.

In Kavango oxen were the most commonly owned animal. About 50% of Kavango households owned more than one ox. In Ovambo only about 25% of households owned more than one. In Kavango oxen were generally more important. Besides being used for plowing they were also widely used to tow wooden sledges for transport. This ancient method of transport was necessary in Kavango because there were not as many small bush roads as there were in Ovambo.

The second and third most commonly owned animals in Ovambo and Kavango were milk cows and calves. At least one cow and heifer were owned by about 40% of rural households in both regions.

Table 4.50. Percent of Ovambo households owning a specified number of livestock, by livestock type, and by subregion.

	Number of livestock owned								
	0	1	2-4	5-7	8-10	11-15	16-20	21-30	>31
	(Percent of households)								
Ovambo West:									
Bulls	73	18	9	1					
Oxen	73	2	20	4	1	1			
Milk cows	62	5	20	7	4	2	1		
Cattle	61	5	16	9	4	3	1		10.3
Donkeys	78	1	15	4	2		0.3		
Goats	37	2	13	11	10	10	10	7	1
Pigs	76	15	8	0.3	1				0.3
Draft animals[a]	37	3	15	13	12	8	6	6	2
Ovambo Central:									
Bulls	63	21	16						
Oxen	75	4	16	4	1				
Milk cows	54	13	21	9	3		1		
Cattle	66	10	13	5	1	5			
Donkeys	80		15	5					
Goats	36	1	14	11	8	11	10	6	3
Pigs	75	13	10		3				
Draft animals[a]	36	3	21	15	10	8	3	5	
Ovambo Central:									
Bulls	74	22	4						
Oxen	64	3	29	3	2				
Milk cows	61	3	20	7	6	3	1		
Cattle	58	4	21	9	4	1	1	1	
Donkeys	88	1	8	2	1				
Goats	44		8	9	6	9	14	9	0.6
Pigs	83	11	6						
Draft animals[a]	37	4	18	15	9	5	6	5	1

[a] Draft animals = sum of all bulls, oxen, milk cows and donkeys owned by a rural household.
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 4.51. Percent of Kavango households owning a specified number of livestock, by livestock type, and by subregion.

	Number of livestock owned								
	0	1	2-4	5-7	8-10	11-15	16-20	21-30	>31
	(Percent of households)								
Kavango West									
Bulls	81.3	15.0	3.8						
Oxen	45.0		32.5	7.5	10.0	2.5	2.5		
Milk cows	53.8	1.3	17.5	10.0	7.5	6.3	3.8		
Cattle	58.8	3.8	20.0	11.3	3.8	2.5			
Donkeys	95.0		3.8		1.3				
Goats	73.8	1.3	3.8	1.3	3.8	3.8	2.5	5.0	5
Pigs	92.5	2.5	3.8			1.3			
Draft animals[a]	50.0	0.0	20.0	12.5	5.0	12.5			
Kavango Central									
Bulls	87.5	10.0	2.5						
Oxen	85.0	11.3	3.8						
Milk cows	53.8	1.3	17.5	10.0	7.5	6.3	3.8		
Cattle	71.3	2.5	16.3	6.3	1.3	1.3			1.3
Donkeys	97.5		2.5						
Goats	83.8		1.3	1.3	3.8	2.5		5.0	2.5
Pigs	95.0		2.5	1.3					1.3
Draft animals[a]	25.0		17.5	22.5	10.0	17.5	7.5		
Kavango Central									
Bulls	85.0	11.3	3.8						
Oxen	37.5	2.5	47.5	7.5	3.8		1.3		
Milk cows	46.3	3.8	25.0	11.3	10.0	1.3	2.5		
Cattle	56.3	1.3	31.3	7.5	1.3	2.5			
Donkeys	96.3	3.8							
Goats	80.0		1.3	2.5	3.8	2.5	3.8	6.3	
Pigs	95.0		1.3	1.3	1.3				1.3
Draft animals[a]	25.0	2.5	15.0	10.0	30.0	10.0	5.0	2.5	

[a] Draft animals = sum of all bulls, oxen, milk cows and donkeys owned by a rural households.
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Income from livestock trade

During the production year 1992/93 relatively few livestock was traded within the randomly selected sample of 320 households. A total of 115 large ruminants and 80 goats were either sold or bought by rural households. Another 132 large ruminants and about 100 goats had been slaughtered. The average prices paid for various livestock types are presented in Table 4.52.

Table 4.52. Average prices for livestock in Ovambo and Kavango during the 1992/93 production year.

Livestock type	Bulls	Oxen	Milk cows	Heifers	Donkeys	Goats
Average price (N$)	340	470	660	700	na	80

na = not available.
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Seventy-six percent of Ovambo households and 82% of Kavango households did not sell, slaughter, or buy livestock (Table 4.53). Between 10 and 13% of Ovambo and Kavango households slaughtered their own livestock. Eleven percent of Ovambo households sold livestock and 4% of Kavango households. Only a few households bought livestock from others (Ovambo: 5%; Kavango: 8%).

Table 4.53. Rural households livestock transactions during the production year 1992/93, by region and subregion.

Transaction type	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
Slaughter	4	8	29	13	5	15	10	10
Selling	3	0	11	5	15	3	5	8
Buying	9	5	20	11	5	5	3	4
None	84	88	56	76	80	80	85	82

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Most households that sold or slaughtered livestock did not buy any. The reverse is true for households that bought in livestock. They did not sell or slaughter their own livestock, (Table 4.54.). This means that households that bought livestock did not sell or slaughter their livestock to counter their expenses. Therefore 6% of all Ovambo households and 3% of all Kavango households had annual net expenditures for livestock purchases beyond N$ 500 (Table 4.55.).

Table 4.54. Combinations of livestock transactions carried out by rural households during the production year 1992/93, by region and subregion.

Transaction combinations			Ovambo households				Kavango households			
Sold	Slaughtered	Bought	West	Central	East	Mean	West	Central	East	Mean
			(Percent of households)							
yes	no	no	3	0	6	3	13	3	5	7
no	yes	no	9	5	10	8	5	3	0	3
no	no	yes	5	8	19	10	3	13	8	8
yes	yes	no	0	0	3	1	0	0	0	0
no	yes	yes	0	0	6	2	0	3	3	2
no	no	no	84	88	56	76	80	80	85	82

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 4.55. Household distribution according to the balance of livestock in and outflows[a] during the production year 1992/93, valued in N$.

Household categories based on net transaction value (N$/year)	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
< -2000	0	0	4	1	0	0	3	1
-1500 to -2000	1	0	1	1	0	0	0	0
-1000 to -1500	1	3	1	2	0	0	0	0
-500 to -1000	0	3	3	2	5	0	0	2
0 to -500	6	0	6	4	0	5	0	2
none	84	88	55	75	78	80	85	81
0 to 500	3	5	10	6	3	3	3	3
500 to 1000	0	0	4	1	5	0	0	2
1000 to 1500	3	3	11	5	0	8	10	6
1500 to 2000	1	0	1	1	5	0	0	2
> 2500	1	0	4	2	5	5	0	3

[a] Livestock slaughter and selling are counted as inflow while livestock buying is counted as outflow.

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

The vast majority of households (Ovambo: 75%, Kavango: 81%) neither earned nor spent money on livestock transactions (including consumption). Finally, 9% of Ovambo and 13% of Kavango households received more than N$ 500 in meat or cash from livestock herding. Very few households (Ovambo 2%; Kavango 3%) had a net return from livestock selling and consumption that was more than N$ 2500 per annum.

Non-agriculture On-farm income generating activities

In both study regions many households earn additional income through non-agricultural activities that are carried out at their homestead. These activities are called 'On-farm income generating activities'.

In Kavango a much higher proportion of households (60%) were engaged in at least one On-farm income generating activity during some time of the year than households from Ovambo (34%) (Table 4.56.). The average monthly income earned through On farm income generating activities was N$ 141. This was significantly higher in Kavango than in Ovambo, and gave an average cash return of N$ 67.

Most On-farm income generating activities were practised in rural Ovambo and Kavango are listed in (Table 4.57.). In this table the percentage figure associated with each On-farm income generating activity indicates the share of households that pursued the respective activity at any time between December 1992 and August 1993.

Table 4.56. Percentage of households with On-farm income generating activities and their respective average monthly incomes

	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
Households with On-farm income generating activities (%)	23	23	51	32	73	58	50	60
Average monthly income (N$)	86	138	44	67	117	175	137	141

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 4.57. On-farm income generating activities of rural households by region.

Activity	Ovambo (Percent of all households)	Activity	Kavango (Percent of all households)
Sorghum beer	12.5	Pearl millet beer	27.5
Cuca shop	11.5	Veld fruits	20.8
Spirits	9.5	Wooden implements	20.0
Cooked food	7.0	Spirits	19.3
Wooden implements	7.0	Sorghum beer	17.8
Baskets/mats	6.5	Cuca shop	15.3
Woodcarving	6.0	Milk/meat/skin	15.8
Veld fruits	5.5	Renting oxen	15.0[a]
Pearl millet beer	5.0	Building/thatching	14.2
Pottery	2.5	Woodcarving	11.7
Clothes	2.0	Renting plow	11.7[a]
Pearl millet pounding	2.0	Baskets/mats	10.0
Storage baskets	1.5	Cooked foods	9.3
Milk/meat/skin	1.5	Traditional doctor	7.5
Building/thatching	1.5	Clothes	5.9
Renting oxen	1.1[a]	Fishing nets	5.8
Poles	1.0	Taxi driving	4.2
Fishing nets	1.0	Bricks	3.5
Fish	1.0	Pearl millet pounding	2.5
Renting plows	0.5[a]	Water carrying	2.5
Firewood	0.5[b]	Storage baskets	2.5
Small trade	0.5	Fish	2.5
Water carrying	0.5	Firewood	1.7[b]
Bricks	0.5	Poles	1.7
Traditional doctor	0.5	Renting donkeys	0.8[a]
Herding	0.3[b]	Fences	0.8[b]
Fences	0.3[b]	Herding	0.8[b]
Taxi driving	0.0	Pottery	0.8
Renting donkeys	0.0[a]	Small trade	0.8
Other	2.5	Other	6.7

n.b. Most data was collected in December 1992 and January, August 1993.

[a] Data was only collected in December 1992.

[b] Data was only collected in January and August 1993.

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In Ovambo only two groups of On-farm income generating activities were of any importance:
- selling homemade and industrial brewed alcohol (sorghum beer, cuca shop, spirits, and pearl millet beer);
- selling hand-crafts (wooden implements, basket/mats, woodcarving).

In Kavango the four most important groups of On-farm income generating activities were:
- selling home or industrial brewed alcohol (pearl millet beer, cuca shop, spirits, and sorghum beer);
- selling agricultural products (veld fruits and milk/meat/skin);
- selling woodwork (wooden implements, house building or thatching, wood carving, and baskets/mats);
- renting out draft animals and equipment (renting oxen, donkeys, and plows).

The higher percentage of Kavango households that pursued On-farm-income-generating activities, together with the higher cash earnings from On-farm income generating activities confirms that in Kavango On-farm income generating activities were more important than in Ovambo. However the relatively high average On-farm income generating activities cash income in the subregion Ovambo Central indicates an increased income potential from On-farm income generating activities in areas that have a higher population density and are closer to urban centers.

Income from off-farm employment

In rural Ovambo and Kavango not all adults were occupied in agriculture. Since independence the proportion of communal children, adolescents, and young adults that attend public schools has increased dramatically. Labor migration to the south of Namibia and the increasing availability of formal employment opportunities for the communal population in their own regions as well as in Windhoek also drew on the labor force of rural households .

Only 38% of all adults older than 14 years in Ovambo and 65% in Kavango gave farm work (including herding) as their sole main activity (Table 4.55). The low percentage in Ovambo was due to the high numbers of young adults (15-30 years) who have attended school since independence (Ovambo: 62%; Kavango: 40%).

Table 4.58. Occupational distribution of the adult labor force in Ovambo and Kavango, by gender and region.

Occupation	Ovambo			Kavango		
	Female	Male	Mean	Female	Male	Mean
	(Percent of adult labor force)					
Farmer	45	29	38	75	52	65
Pupil	35	35	35	17	26	21
Off-farm employee	13	24	18	6	19	12
Unemployed/retired	7	12	9	2	3	2

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In Ovambo 18% and in Kavango 12% of all adults were employed outside agriculture and away from home. The number of unemployed adults (i.e. household members who did not work on the farm and who gave only 'job-seeking' as their main activity) was low in both regions (Ovambo: 5.5%; Kavango: 0.6%). Also the number of retired elderly was low in both regions (Ovambo: 3.6%; Kavango 1.8%).

In both study regions the distribution of occupations held by women differed substantially from the respective distribution of occupations held by men. The proportion of women who worked full-time on the farm was significantly higher (Ovambo women: 45%; Kavango women 76%) than the respective percentage for men (Ovambo men 29%; Kavango men 52%). The reverse was true with regard to off-farm employment. Proportionately fewer women were off-farm employed (Ovambo women 13%; Kavango women 6%) compared with men (Ovambo men 24%; Kavango men 19%).

In Ovambo the five major off-farm employment categories were:

- laborer working mainly for the government (3.3 % of all adults in Ovambo);
- qualified worker such as a mechanic or carpenter (3.2%);
- teacher (2.9%);
- nurse and other health sector employee (1.7%);
- member of the armed forces (1.2%).

In Kavango the five main off-farm occupations were:

- laborer working mainly for the government (3.0% of all adults in Kavango);
- teacher (2.8%);
- miner (1.4%);
- police and security guard (1.2%);
- clerk (0.8%).

In Ovambo 54% and in Kavango 63% of households had no member who was employed off-farm (Table 4.59.). About a third of all rural households (Ovambo 32% ; Kavango: 35%) had only one person with off-farm employment. Households with two off-farm wage earners represented 14.6% in Ovambo and 4.2% in Kavango.

Table 4.59. Household distribution according to the number of off-farm employed household members, by region and subregion.

Off-farm employed per household	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
Zero	43	67	51	54	63	65	59	62
One	38	21	26	28	28	33	35	32
Two	11	10	17	13	8	3	4	5
Three	5	3	4	4	3	0	2	1
Four and more	3	0	3	2	0	0	0	0

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

The average monthly off-farm income of those households who had at least one household member with off-farm employment was relatively high: N$ 1034 (CV = 1.0) in Ovambo and N$ 782 (CV = 0.74) in Kavango[22] (Table 4.60.). However, the high values of the coefficients of variation of the average income figures reflect a large variation in the off-farm income among individual households.

Table 4.60. Rural households with income from off-farm employment and their respective average monthly income.

	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
Households with OFF- EMP (%)	57	33	49	46	37	35	41	38
Average monthly income (N$)	830	1020	129	1047	795	738	806	780

Source: Namibia Millet Subsector Project Surveys, 1992-93.

The differences in numbers of household members with off-farm employment is one explanation for the large variation in off-farm incomes among households. Another explanation is the considerable variation in wages across different occupations. Table 4.61 shows the average monthly wages of men and women employed off-farm in selected occupations. While the maximum monthly occupational income of one individual was N$ 2500, average monthly wages were considerably lower in both regions. Six hundred and fifty-six N$/month (CV = 0.67) was the average wage for Ovambo's off-farm employed-N$ 100, less than the respective wage of N$ 756/month (CV = 0.59) in Kavango.

A comparison of average wage rates shows that male and female monthly earnings hardly differ. In Ovambo however, the wage rates for administrators and laborers are clearly higher for males than for females.

[22] Throughout 1992/93 the exchange rates for the N$ were N$ 3.0 per US-$ and N$ 2.0 per DM.

Table 4.61. Monthly wage rates for occupations held by rural off-farm employed by region and by gender.

Off-farm employment	Ovambo			Kavango		
	Female	Male	Mean	Female	Male	Mean
Administrator (N$/month)	897	1260	1098	na	na	na
Coeff. of variation	(0.78)	(0.62)	(0.66)	na	na	na
Number of cases	4	5	9	0	0	0
Teacher (N$/month)	956	912	946	1125	1027	1069
Coeff. of variation	(0.51)	(0.49)	(0.50)	(0.44)	(0.36)	(0.38)
Number of cases	17	5	22	6	8	14
Army employee (N$/month)	na	788	788	na	2000	2000
Coeff. of variation	na	(0.61)	(0.61)	na	na	na
Number of cases	0	9	9	0	1	1
Miner (N$/month)	na	675	675	na	1042	1042
Coeff. of variation	na	(0.68)	(0.68)	na	(0.31)	(0.31)
Number of cases	0	4	4	0	5	5
Nurse/health (N$/month)	676	400	658	600	815	772
Coeff. of variation	(0.67)	na	(0.67)	na	(0.40)	(0.38)
Number of cases	14	1	15	1	4	5
Private business person (N$/mth)	160	1112	636	na	na	na
Coeff. of variation	na	na	(1.60)	na	na	na
Number of cases	1	1	2	0	0	0
Police/security (N$/month)	500	642	622	na	486	486
Coeff. of variation	na	(0.23)	(0.23)	na	(0.60)	(0.60)
Number of cases	1	6	7	0	6	6
Skilled worker[a] (N$/month)	599	607	606	na	833	833
Coeff. of variation	(0.49)	(0.66)	(0.62)	na	(0.25)	(0.25)
Number of cases	5	21	26	0	3	3
Clerk (N$/month)	557	400	535	na	na	na
Coeff. of variation	(0.48)	na	(0.47)	na	na	na
Number of cases	6	1	7	0	0	0
Laborer[a] (N$/month)	200	564	505	na	465	465
Coeff. of variation	(0.71)	(0.42)	(0.52)	na	(0.42)	(0.42)
Number of cases	5	25	30	0	13	13
Food processor[a] (N$/month)	700	360	414	400	na	400
Coeff. of variation	(0.20)	(0.59)	(0.64)	0.00	na	0.00
Number of cases	2	5	7	1	0	1
Sales person (N$/month)	203	450	238	75	500	216
Coeff. of variation	(0.37)	na	(0.49)	(1.00)	na	(1.14)
Number of cases	6	1	7	2	1	3
Total average (N$/month)	655	658	656	790	747	756
Coeff. of variation	(0.72)	(0.63)	(0.66)	(0.74)	(0.55)	(0.59)
Number of cases	61	84	145	10	41	51

a. Occupied in the formal and informal sector.

na = not available.

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Most of those who have off-farm employment worked further away from their rural homes (Table 4.62.). Only 8% of Ovambo's and 33% of Kavango's off-farm employed people worked within their own locality. The higher percentage in Kavango might indicate reduced work mobility in this region. In both regions the majority of off-farm employed (Ovambo 62%; Kavango 52%) found jobs within their own region but not within the vicinity of their own households. A smaller number of those were concentrated in the urban centers of Oshakati and Ondangwa in Ovambo and Rundu in Kavango. About 14% of Ovambo's and 4% of Kavango's off-farm labor force worked in one of the southern mining towns (Oranjemund, Walvis Bay or Sakopmund). Another 12% of off-farm employed from Ovambo and 2% from Kavango migrated to work to Windhoek.

Table 4.62. Geographic distribution of off-farm employment, by region and gender.

Location of off-farm employment	Ovambo			Kavango		
	Female	Male	Mean	Female	Male	Mean
	(Percent of people employed)					
Area close to household	7	9	8	33	33	33
Urban center of own region	18	9	14	22	23	23
Other areas of own region	67	36	48	44	26	29
Windhoek	3	20	12	0	3	2
Industries in south Namibia	4	21	14	0	5	4
Other communal regions	0	1	2	0	8	6
Commercial farm area	0	1	1	0	0	0
Other	0	1	1	0	3	2

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Looking at the different sectors that provided off-farm workers with jobs is is obvious that government was by far the biggest employer within the study regions (Table 4.63.). Of all off-farm employed adults 80% in Ovambo and 66% in Kavango worked for government. In Ovambo the two next most important sectors were the manufacturing industry and self-employment, both with 5.3%. In Kavango the next most important job sectors were construction and commerce, each with 5.4%.

Table 4.63. Off-farm employment distribution across sectors, by region and gender.

Employment sectors	Ovambo			Kavango		
	Female	Male	Mean	Female	Male	Mean
	(Percent of people employed)					
Government	82	79	80	82	62	66
Manufacturing	6	5	5	0	0	0
Self-employment	4	6	5	0	4	4
Mining industry	0	4	2	0	16	13
Construction industry	0	2	1	0	7	5
Trade & commerce	3	0	1	18	2	5
Transport industry	1	1	1	0	4	4
Services	1	1	1	0	0	0
Commercial agriculture	1	0	1	0	2	2
Other	1	1	1	0	2	2

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Income from government pensions

For many rural households, government pension payments were an important source of cash income (Table 4.64.). In Ovambo half of all households (50%) had at least one older household member who received a pension from the government of N$ 120/month. Only 24% of Kavango households had a pension income, considerably less than in Ovambo. One possible explanation for the discrepancy between the two regions lies in the difference in size and member structure of Kavango and Ovambo households. As already demonstrated, Kavango households are on average smaller and have a slightly reduced number of older people compared with Ovambo.

Table 4.64. Household distribution according to number of pension recipients, by region and subregion.

Pension recipients per household	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
Zero	52	44	53	50	70	90	70	77
One	36	36	33	35	20	5	18	14
Two	10	18	14	14	8	5	13	8
Three	3	3	0	2	3	0	0	1

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Proportion of pearl millet production of total household income

This section compares the contribution of pearl millet production with total annual income between grain self-sufficient households and households that are in grain deficit. Factors that might have determined household income compositions are also examined.

Table 4.65. Comparison between households that reached and that have not reached grain self-sufficiency during the 1992/93 production year.

		Average Ovambo household			Average Kavango household		
		Grain self-sufficient		Weighted	Grain self-sufficient		Weighted
		Yes	No	average	Yes	No	average
Percent of all households	%	33	67	100	13	87	100
Household characteristics							
Number of household members		7.1	9.1	8.4	5.9	9.5	9.0
Percent of female beaded households	%	25	44	38	15	18	18
Grain production							
Hectare scultivated per household	ha	2.5	2.6	2.6	3.8	5.3	5.1
Hectares cultivated per capita	ha	0.35	0.29	0.31	0.64	0.56	0.57
Labor for crop production	mandays	174	131	145	162	97	105
Labor for crop production per capita	mandays	25	14	145	27	10	105
Millet yield per ha	kg	716	136	327	169	131	136
Total grain production	kg	3,104	288	1,217	1,445	326	471
Grain production per capita	kg	448	36	172	246	38	65
Ownership of equipment and livestock							
Households owning a plow	%	76	45	55	86	52	56
Households owning motor transport	%	25	12	16	29	9	12
Households owning small ruminants	%	70	71	71	50	63	61
Households owning large ruminants	%	75	56	62	93	69	72
Households owning draft animals	%	56	54	55	50	68	66
Households that earn income from							
Crop production	%	100	100	100	100	100	100
Livestock herding	%	14	18	17	14	17	16
On-farm non-agric. activities	%	30	37	35	71	63	64
Off-farm employment	%	64	40	48	50	43	44
Government pension payments	%	51	48	49	29	25	26
Average annual income							
Total annual income	N$	8,248	4,201	5,537	6,375	3,381	3,770
Total annual income per capita	N$	1,170	463	696	1,075	357	450
Percent of total income							
Crop production	%	24	18	21	22	6	10
Livestock herding	%	7	6	6	9	7	8
On-farm non-agric. activities	%	2	2	2	16	20	19
Off-farm employment	%	54	53	54	42	52	50
Government	%	12	21	17	11	15	14

Source: Namibia Millet Subsector Project Surveys, 1992-93.

Since household pearl millet production varied quite significantly during the production year 1992/93, households were grouped into two categories:

- households that reached self-sufficiency in grain production during the production year 1992/93 (i.e. households that produced at least 132 kg grain/capita).
- Households with grain deficit (i.e. households that produced less than 132 kg grain/capita during the production year 1992/93).

The information about the different composition of incomes in the two household categories are combined with information about the factors that probably contributed to this difference. The numerical results of this analysis are presented in Table 4.62 and are summarized in the following:

- the majority rural Ovambo and Kavango households had a grain production deficit in 1992/93 (Ovambo: 67%; Kavango: 87%).

- The number of household members and the probability of a female head of household was lower for grain self-sufficient households than for grain deficit households.

- Labor investment in grain production, average yields, and the harvested quantity of grain per household and per capita were significantly higher for grain self-sufficient bouseholds than for grain deficit households.

- Ownership of plows, motorized vehicles, and large ruminants was more common among grain self-sufficient households than among grain deficit households.

- Income from off-farm employment or from government pension was more often received by grain self-sufficient households than by grain deficit households.

- The total annual income of grain self-sufficient households was, on average, double (per capita triple) the income of grain deficit households.

- The annual per capita income of Kavango households was significantly less than Ovambo households (grain self-sufficient households: - 8%, grain deficit households: - 23%).

- Income share from crop production of total annual income was higher among grain self-sufficient households (Ovambo 20%, Kavango 25%) compared with grain deficit households (Ovambo 18%, Kavango 6%).

- Income from off-farm employment contributed 50% to total annual income for both household categories in Ovambo and Kavango.

- Income from livestock herding and non-agricultural on-farm income generating activities contributed the same share to total annual household income for both household categories (Ovambo: 8%, Kavango: 27%).

- Government pension payments contributed relatively less to total annual household income of grain self-sufficient households (11-12%) than households with grain deficits (15-21%).

There are two overall results regarding the contribution that pearl millet production makes to household total income:

(1) For grain self-sufficient households pearl millet production is the second most important income source after off-farm employment. If no further off-farm employment alternatives are available to households in this category, investments to increase the productivity of pearl millet production for selling might be an attractive alternative.

(2) The factors that determine rural households' production are multi-dimensional. This makes it difficult to increase households' productivity in crop production with single measures. The relatively small contribution of pearl millet production to total income of grain deficit households probably limits their willingness to invest more time and money in pearl millet production.

Investment priorities of rural households

This section of chapter four analyses household investment priorities among the previously discussed income generating activities.

In the third survey household representatives were asked to rank four activities according to their own willingness to invest money with the goal of eventually improving the well being of all household members. Once a certain activity type was ranked the respondents were also asked to specify what they would like to achieve with the investment. The activities ranked were: business; school education; pearl millet production; livestock herding.

The ranking results did not significantly change by gender of the respondent or grain self-sufficiency status and income of the households interviewed. However, the order of the investment ranking differed clearly between Ovambo and Kavango households (Figure 12).

Ovambo

- In Ovambo most households placed highest priority on investing in school education. When asked what they expected to achieve with more education the majority said wealth through employment. Only one percent of all households expected that education would help them to improve their crop production.

- The activity ranked second but very close to school education was pearl millet production. Here the predominant investment goal was to produce more food and income for the household.

- Livestock herding was most often ranked third by Ovambo households, but quite far down the scale from pearl millet production. The expectation from this investment was mainly the benefit from the multiple use of large ruminants; plowing, food, and income. Ploughing (i.e, crop production) was mentioned by 5% of the respondents as the only purpose for livestock investment.

- Investment into business was most often ranked last. About 84% of the respondents connected business with the ownership of a cuca shop (small retail shop that sells mainly alcohol and basic foods like maize meal). Selling homemade beer made from pearl millet was considered by 13% of the respondents.

Kavango

- In Kavango most households ranked investment into livestock first. However 41% of the Kavango respondents wanted to use livestock chiefly for plowing i.e.for crop production and about 48% saw the benefits of livestock investment as a potential for multiple use, including plowing.

- The activity ranked second but some way down the scale from livestock was pearl millet production. As in Ovambo the main goal for this investment was to produce more food and income for the household.

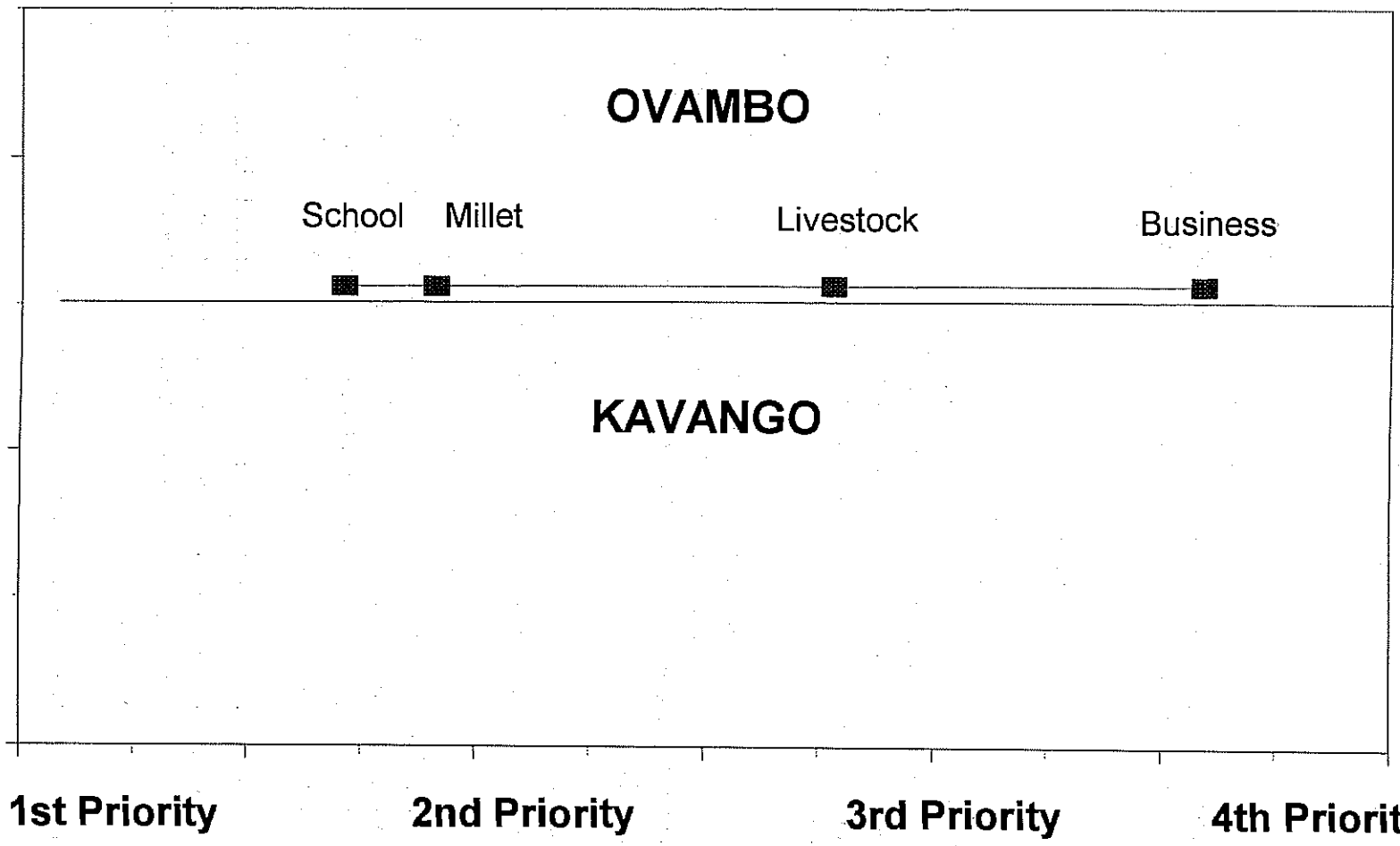
- Investment in school education mostly ranked third among Kavango households. About 2% of the respondents expected that at school they would learn how to improve their crop production.

- Investment in business was often considered less attractive and therefore ranked between three and four.

The overall result from the analysis of household investment priorities is contingent with the findings about the contribution of various income generating activities to total household income. As discussed in previous sections, wages from non-agricultural off-farm employment were relatively high and contributed, on average, about 50% towards households' total annual income. Because in Ovambo higher percentages of rural households, and of the adult population in general, earned income from off-farm employment and as this income was on average significantly higher than in Kavango (see above), the investment in school education to acquire such employment was also more attractive to Ovambo households.

In Kavango most of the adult population was occupied with agricultural production. The tendency of Kavango households to invest first in livestock is understood better once their statements about the use of livestock for plowing, lack of labor, and need for animal traction are taken into consideration.

Figure 12 Likert Scale: Investment Ranking of Rural Households in 1993



Source: Namibian Millet Subsector Project Surveys, 1992-93

Once Ovambo households have paid school fees, pearl millet production had the highest investment priority for the majority of rural households in both regions. For Namibian policy makers and NGOs this is an indication that support programs that focus on increasing pearl millet production is in line with the priorities of farmers.

Summary

The second part of chapter four described alternative household activities that provided cash income and competed for household labor. The contribution of pearl millet production to total annual household income, and household investment priorities were discussed at the end of part two.

Income from livestock herding

In Ovambo 14% of all households had no animals at all and 37% of all Ovambo households had no draft animals. In Kavango, almost a quarter (24%) of all households had no livestock and 30% had no draft animals. Despite the fact that renting out draft animals was quite common in both study regions, lack of private ownership of draft animals by such high numbers was probably an important reason that large numbers of rural households are in pearl millet deficit every year.

In Ovambo 60% of female headed households did not own draft animals while the respective average of 25% for male headed households was significantly lower. In Kavango only 14% of female headed households had no draft animals while the respective percentage of male headed households was 30%.

In both Ovambo and Kavango, milk cows and their calves were the second and third most often owned animals, after goats and oxen, in the two respective regions.

During the production year 1992/93 relatively few livestock were traded by rural households. In Ovambo 76% and in Kavango 82% did not sell, slaughter, or buy livestock. Between 10% and 13% of Ovambo and Kavango households slaughtered their own livestock. Eleven percent of Ovambo households and 4% of all Kavango households sold livestock. Only a few households bought livestock from others (Ovambo: 5%; Kavango: 8%).

Only 9% of Ovambo households and 13% of Kavango households received more than N$ 500 in meat or cash from livestock during 1992/93 production year. Very few households (Ovambo: 2%; Kavango: 3%) had a net return from livestock selling and consumption that was more than N$ 2500/annum.

Income from On-farm income generating activities

In both study regions many households earned additional income through non-agricultural activities that were carried out at their homesteads. In Kavango a much higher proportion of

households (60%) was engaged in at least one On-farm income generating activities during some time of the year than households in Ovambo (34%). The average monthly income earned through On-farm income generating activities of N$ 141 was significantly higher in Kavango than in Ovambo which had an average cash return of N$ 67.

In Ovambo only two types of On-farm-income-generating activities were of any importance - selling homemade and industrial brewed alcohol and selling handcraft. In Kavango the four most important On-farm-income-generatings were: selling home or industrial brewed alcohol, selling agricultural products, selling wood work, and renting out draft animals and plowing equipment.

Income from off-farm employment and government pension payments

In rural Ovambo and Kavango not all adults were occupied in agriculture. Since independence not only has the proportion of communal children and adolescents attending public schools increased dramatically but also that of young adults (Ovambo: 62%; Kavango: 40%). Labor migration to the south of Namibia and the increasing availability of formal employment opportunities for the communal population in their own regions, as well as in Windhoek, also drew from the rural household labor force.

Of adults older than 14 years, only 38% in Ovambo and 65% in Kavango, gave farm work (including herding) as their sole main activity. In Ovambo 18% and Kavango 12% of adults were employed outside agriculture and away from home. The number of unemployed adults, (i.e. household members who did not work on the farm and who gave only 'job-seeking' as their main activity), was low in both regions (Ovambo: 5.5%; Kavango: 0.6%). Also the share of retired elderly was low in both regions (Ovambo: 3.6%; Kavango 1.8%).

In both study regions the distribution of occupations held by women differed substantially from the respective distribution for men. The proportion of women who worked full-time on the farm was significantly higher than men. The reverse is true with regard to off-farm employment.

In Ovambo 54% and in Kavango 63% of all households had no members who were employed off-farm. The average monthly off-farm income of those households which had at least one household member with off-farm employment was, at N$ 1034 (CV = 1.0) in Ovambo and N$ 782 (CV = 0.74) in Kavango, relatively high. However the high values of the coefficients of variation of the average income figures indicate a large variation of the off-farm income between individual households.

Government was by far the largest employer for both study regions. Of all off-farm employed adults 80% in Ovambo and 66% in Kavango worked for the government.

For many rural households government pensions were an important source of cash income. In Ovambo half of all households (50%) had at least one older household member who received a

pension of N$ 120 per month from the government. The percentage in Kavango (24%) was considerably lower than in Ovambo.

The contribution of pearl millet to total household income

Most rural Ovambo and Kavango households had a grain production deficit in 1992/93 (Ovambo: 67%; Kavango: 87%). The contribution of pearl millet production to total annual income differed between grain self-sufficient households and households that were in grain deficit. The proportion of income derived from crop production in total annual household income was higher among grain self-sufficient households (Ovambo: 20%, Kavango: 25%) than grain deficit households (Ovambo 18%, Kavango: 6%).

Factors determining the difference and that might have influenced the household grain self-sufficiency status were:

- number of household members;
- gender of head of household;
- income from off-farm employment and/or from government pension;
- total annual household income;
- labor investment in grain production;
- yields;
- ownership of plows, motorized vehicles, and large ruminants.

Two overall findings as to the contribution of pearl millet production to household total income are: (1) for grain self-sufficient households pearl millet production is the second most important income source after off-farm employment. If no further off-farm employment alternatives are available to households in this category, investments to increase the productivity of pearl millet production for selling might be an attractive alternative. (2) The relatively small contribution of pearl millet production to total income of grain deficit households probably limits their willingness to invest more time and money in pearl millet production.

Investment priorities

In Ovambo most households placed highest priority on investing in education. Second, but ranked very close to school education was pearl millet production. Here the predominant investment goal was to produce more food and income for the household. Livestock herding was most often ranked third by Ovambo households but quite far down the scale from pearl millet production. The expectations from such an investment were mainly the benefits from the multiple use of large ruminants: plowing, food, and income. Investment in business was most often ranked last.

In Kavango most households ranked investment in livestock first. However 41% of the Kavango respondents wanted to use livestock predominantly for plowing i.e. for crop production. About 48% of the respondents saw the benefits of livestock investment in its potential for multiple use including plowing. The activity ranked second but some way down

the scale from livestock was pearl millet production. Investment in school education mostly ranked third among Kavango households. For most Kavango households investment into business was considered least attractive.

The overall result from the analysis of household investment priorities is consistent with findings about the contribution of various income generating activities to total household income. Because in Ovambo higher percentages of rural households and of the adult population in general earn income from off-farm employment, and because this income is on average significantly higher than in Kavango, the investment in schooling to acquire employment was also more attractive to Ovambo households.

In Kavango the majority of the adult population was occupied in agricultural production. Kavango household tendencies to invest in livestock first is better understood once their statements about the use of livestock for plowing, lack of labor and need for animal traction is taken into consideration.

It can be concluded that once Ovambo households have paid school fees, pearl millet production has highest investment priority for the majority of rural households in both regions. For the Namibian policy makers and NGOs this is an indication that support programs that focus on increasing pearl millet production was in line with the priorities of most farmers.

5. INFORMAL AND COMMERCIAL PEARL MILLET MARKETING

Although most pearl millet production in Ovambo and Kavango is on a subsistence basis, the performance of the rural and urban grain marketing system becomes increasingly important as northern Namibia moves from an agricultural to a more urbanized and industrialized economy. Chapter 5 describes the existing informal and commercial pearl millet trade. It represents the logical link between information already presented about the staple food consumption and pearl millet production of households.

The first section of Chapter 5 repeats the main findings about pearl millet consumption and production that relate to the current pearl millet marketing system. Section two describes pearl millet marketing on the level of rural households. The third section presents the results from the pearl millet trader survey about the existing commercial pearl millet market in rural and urban areas.

5.1. Pearl millet consumption and production as preconditions for marketing

To understand the preconditions for informal and commercial pearl millet trade in Ovambo and Kavango four major findings from Chapters 3 and 4 must be remembered.

First, the basis for pearl millet trade is that potential pearl millet buyers must have a preference for pearl millet consumption as a main staple. The section about 'taste preferences' in Chapter 3 demonstrated that 77% of rural Ovambo households and 95% of Kavango households prefer pearl millet to maize meal, which is the closest substitute.

Second, decisions by households to buy pearl millet are not solely determined by their taste preference but also by the relative prices of pearl millet to the closest substitutes. The section about 'Household' food expenditures and consumer prices' in Chapter 3 demonstrated that throughout most of the production year 1992/93 informally traded pearl millet was on average 8% cheaper than maize meal. However commercially traded pearl millet was significantly more expensive (Ovambo: 13%, Kavango: 36%) than commercially traded maize meal see (Figures 3 and 4.

Third, if the majority of rural people prefer pearl millet as food staple and if the price of pearl millet is competitive with maize and other food staples, availability of pearl millet on the food market could be the only limitation that would prevent potential consumers from purchasing pearl millet. The section about 'scarcity of pearl millet in rural markets' in Chapter 3 revealed that in the middle of the 1992/93 production year only 45% of rural households in Ovambo and 46% of rural Kavango households had access to pearl millet while at the same time maize meal was accessible to all households. The majority of households (Ovambo: 57%, Kavango: 91%) also stated that maize meal is generally easier to buy than pearl millet.

Fourth, two main factors could cause the poor accessibility of pearl millet in rural areas. (1) If there is not enough pearl millet surplus produced by grain-self-sufficient households there will

not be enough to satisfy the demand for households with grain deficit. (2) If enough pearl millet is produced but rural grain markets are insufficiently developed, potential buyers cannot reach sellers, or only at a prohibitively high cost. The section about 'harvest results in 1992/93' in Chapter 4 demonstrated that at an aggregate level only the subregion Ovambo West reached grain self-sufficiency in that year. None of the other subregions reached aggregate grain self-sufficiency levels greater than 44%. In addition, although the estimated aggregate self-sufficiency level of grain over the last 23 years was close to 100%, the annual aggregate production varied widely with climatic conditions. About *five out of ten* production seasons in Ovambo and *four out of ten* in Kavango had to be classified as poor harvest years due to low rainfall or bad rainfall distribution.

From the above it can be concluded that the aggregate grain deficit in various subregions in combination with large production variation over time represents one reason for the limited access to pearl millet by rural households. The question of whether the current pearl millet market in Ovambo and Kavango is efficient enough to balance out part of these large variations of supply is covered in the following sections.

5.2. Informal pearl millet trade on the household level

The following sections about pearl millet marketing at the household level cover two major aspects, (1) the frequency and extent at which pearl millet trade occurs at household level, and (2) the factors that limit rural households from engaging in pearl millet selling and buying.

Frequency and extent of pearl millet trade

To investigate the extent and importance of pearl millet trade at the rural household level household representatives were asked how often they sell pearl millet. The results on the selling frequency indicate that pearl millet is generally more often sold by Kavango households than by Ovambo households (Table 5.1.). Eighty-two percent of Kavango households sold pearl millet every year or at least every other year. Of the 200 Ovambo households surveyed only about 30% of Ovambo households sold in some years and none sell pearl millet every year.

Table 5.1. Percent of rural households selling pearl millet, by region and subregion.

Selling frequency	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
Never	76	55	80	70	34	18	32	28
Some years	24	45	20	30	42	80	40	54
Every year	0	0	0	0	24	2	28	18

Source: Namibia Pearl Millet Subsector Project Surveys 1992-93.

Those households that sold pearl millet were asked to point out the circumstances under which they usually sold it. In both study regions the importance of conditions under which pearl

millet is sold are the same. The majority of pearl millet sellers gave the urgent need for money or goods as the primary reason (Ovambo 88%, Kavango 73%). Large numbers of households sold only after good harvest years (Ovambo: 35%, Kavango: 59%). Other conditions often selected were: 'the amount of pearl millet in storage must cover at least the household consumption needs until the next harvest' and 'a buyer would approach the household'.

In Ovambo 85% of pearl millet selling households sold a 20 liter bucketful (approx. 16.5 kg) or less to individual buyers. Eleven percent sold pearl millet mostly in 50 kg bags. In Kavango the situation is reversed. Only 25% of pearl millet selling households sell a 20 liter bucketful to individual buyers and 61 % sold pearl millet mostly in 50 kg bags.

Of those households that sold pearl millet only a few planned to sell pearl millet at the time of planting (Ovambo: 9%, Kavango: 38%). Among the Ovambo households that planned to sell pearl millet after harvest, hiring of labor and the use of a plow was the most often chosen means of producing surplus pearl millet. Enlarging the number of fields was the method used by Kavango households to produce more pearl millet than needed for household members.

Only a small minority of pearl millet surplus producers actively searched for pearl millet buyers (Ovambo: 19%, Kavango: 40%). In Ovambo the active sellers mainly travelled around their community in search of potential buyers. In Kavango the majority of active pearl millet sellers asked their neighbors and sent messages to other communities. Some also advertised their willingness to sell through the public radio.

To search for potential pearl millet buyers or to transport pearl millet to the homesteads of rural buyers, most sellers walked (Ovambo 58%, Kavango 38%). Those who did not walk used a variety of other means. In Ovambo bicycles (19%), private motor vehicles (6%), and donkey carts (8%) were used. In Kavango the ox sledge was widely used by sellers (40%). Taxis were used by about 29% of the sellers and private motor vehicles by 9%.

Table 5.2. Percent of pearl millet selling households that sell p.millet at particular locations or to individuals or institutions, by region.

Buyers of p.millet	Ovambo (n=53)	Kavango (n=85)
	(Percent of households selling through each outlet)[a]	
Neighbors	100	89
Travelling traders	22	42
Local, open markets	17	11
Cuca shops	4	36
Open markets/retailers in centers	6	24
Katemo Cooperative in Rundu	0	25
FNDC in Oshakati and Rundu	0	12
Traders from Windhoek	0	5

[a] Percentages do not add up to 100 because p.millet selling households sold to different buyers.

Source: Nambia Pearl Millet Subsector Project Surveys, 1992-93.

An overwhelming number of pearl millet producers mentioned neighbors when they were asked to whom they sold their surplus pearl millet (Ovambo: 100%, Kavango: 89%) (Table 5.2.). Travelling traders were the second most often mentioned category of pearl millet buyers (Ovambo: 22%, Kavango 42%).

The investigation into individual pearl millet selling activities revealed that pearl millet is most often exchanged for meat with those neighbors who had just slaughtered beasts. This type of transaction usually occurred in the period after the grain harvest and generally involved quantities of pearl millet that were less than one kilogram. Pearl millet selling to travelling traders was mainly in exchange for money or consumer goods. These transactions also took place shortly after harvest. However the quantities sold varied from a single 20 liter bucket to several bags of pearl millet.

Limiting factors to pearl millet trade

It is often assumed that communal households do not have enough incentive to produce surplus grain because market prices are not high enough. However it has been demonstrated that returns for labor are greater than the average wage paid to field workers.

Pearl millet production

In the light of the dearth of pearl millet sellers, household representatives were asked to indicate the reasons that limited their pearl millet sales. For those households that never sold pearl millet, the lack of surplus (Ovambo: 83%, Kavango: 94%) and the fear of drought (Ovambo: 79%, Kavango: 94%) were the main reasons for not selling pearl millet (Table 5.3.).

Table 5.3. Factors that limit household from p.millet selling, by households selling frequency and by region.

Limiting factors to p.millet selling	Ovambo households (n=20)				Kavango households (n=120)			
	Never	Some years	Every year	Weighted average	Never	Some years	Every year	Weighted average
	(Percent of households)							
Not enough pearl millet	83	68	0	79	94	98	84	95
Fear of drought	79	86	0	81	94	97	88	95
Expensive transport	22	56	0	31	20	67	77	56
No own transport	6	29	0	20	10	33	53	31
Long distances	7	33	0	14	0	34	65	30
No local markets	18	11	0	16	3	23	53	22
Tradition not to sell	15	16	0	15	32	8	33	12
Search for buyers	12	9	0	15	0	26	25	19
Low pearl millet price	7	11	0	8	0	94	29	13

Source: Namibia Pearl Millet Subsector Project Surveys, 1992/93.

The majority of households that sell pearl millet in some years or every year also indicated that their pearl millet trade was limited mainly by grain production and the fear of drought. However marketing constraints were also mentioned by those households. Large proportions of pearl millet selling households of both study regions mentioned long distances to traders and

the lack or prohibitive cost of transport as limiting factors. In Kavango the lack of local markets was also an important constraint for those households that sold pearl millet every year.

Few households indicated that their pearl millet selling activities were limited by (a) the tradition of producing only enough for their own household consumption (b) difficulties in finding pearl millet buyers (c) low pearl millet prices. Only in Kavango Central did a large majority of the farmers that sell pearl millet in some years (94%) give low pearl millet prices as an obstacle to selling. It is possible that most of these farmers tried to sell pearl millet after good harvest years when pearl millet was generally in good supply and prices were depressed.

Household representatives also indicated those factors that made buying of pearl millet difficult. In Ovambo three types of limiting factors were frequently given: (1) 'lack of money' was indicated most often by households (86%), (2) 'long distances and prohibitively high transport costs' by about 50%. (3) In additon 'high consumer prices for pearl millet' were given by 52% of Ovambo households.

In Kavango four limiting factors to pearl millet buying were indicated by more than 90% of all households: (a) high pearl millet prices, (b) easier access to maize meal, (c) relatively lower prices for maize meal, (d) households' lack of money. Expensive transport was cited by 68% of Kavango households.

Fewer households said that their pearl millet buying is limited by (a) difficulties in finding sellers (Ovambo 28%, Kavango 35%) (b) the non-existence of local markets (Ovambo 35%, Kavango 36%), and (c) the uncertainty about the pearl millet prices that might be asked by the sellers (Ovambo: 35%, Kavango: 36%).

Fear of drought

To investigate the relationship between fear of drought and the decision by households to sell pearl millet out of storage, household representatives were asked to indicate the quantity they held in store. Answers about grain storage/selling thresholds have been converted into quantity stored per household member, before averages were calculated for different household categories (Table 5.4.). The storage/selling thresholds per capita calculated for Ovambo households were unrealistically high. According to answers given by Ovambo households, an average household would store enough grain to last between four to six and a half years before pearl millet selling would be considered. The high thresholds indicate that most Ovambo households were not accustomed to selling. However these high thresholds also indicate that the majority of rural households perceived the threat of drought as so imminent that they would rather hold a large surplus of pearl millet to increase their food security, than t sell the surplus on the informal or commercial market.

The storage/selling thresholds of Kavango households were more realistic. On average Kavango households preferred to have between 220 and 260 kg pearl millet per household member, to last about two years, before they would consider selling grain. Only those Kavango households that sold pearl millet every year had grain storage/selling thresholds that would last between three and four years per capita. This higher threshold probably results from social obligations after a poor harvest, to give pearl millet to needy neighbors.

One conclusion from this analysis is that after good production years the priority for rural households is to replenish their pearl millet storage i.e. most of the surplus pearl millet in an area with a good harvest is not immediately available to areas in pearl millet deficit via the informal or commercial pearl millet market. The other conclusion is that due to the storage practices of households, the oldest rather than recently harvested pearl millet would be sold once the selling threshold is reached. Both the non-availability of surplus pearl millet on the

Table 5.4. Grain storage threshold of households for selling larger amounts of p. millet, by selling frequency and region.

	Ovambo households			Kavango households		
Selling frequency:	Never (n=13)	Some years (n=41)	Every year (n=)	Never (n=30)	Some years (n=38)	Every year (n=12)
Storage threshold (kg/capita)	543	877	0	259	217	456
No. of years p. millet would last in storage	4	6.5	0	2	2	3.5

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

market and the practice of selling older, lower quality pearl millet will make it more difficult in the future to balance deficit production in one area with pearl millet shipments from areas with temporary pearl millet surplus.

It is important to accept that for household food security the described storage and selling practices are absolutely rational. Households chose to store surplus pearl millet rather than run the risk of being forced to buy less prefered maize meal after poor grain harvests. Rural households with little or no cash income had to be especially careful with their pearl millet resources because under pearl millet deficit conditions they could not take advantage of the availability of maize meal in rural food markets.

Transport limitations

In order to understand better the limitations that transport costs imposed on pearl millet marketing, household representatives were asked to indicate (a) the locations where they would buy and sell a 50 kg bag of pearl millet (b) whether they needed transport to reach these locations (c) how much it would cost them to go to those places with and without a bag. Table 5.5 shows at which locations rural households bought or sold a 50 kg bag of pearl millet.

In Ovambo 35% of all households bought or sold large amounts of pearl millet from or to their neighbors. Other important marketing locations for Ovambo households were local markets and distant market towns in the center. Similarly the largest group of Kavango households sold or bought large amounts of pearl millet to or from their neighbors. Other preferred locations for pearl millet buying were rural shops and the Farmer Cooperative Katemo at Rundu. Preferred locations for pearl millet selling were buying points of the former FNDC (First National Development Corporation) and the open market in Rundu.

Table 5.5. Locations where households bought or sold a 50 kg bag of p.millet, by region and subregion.

	Ovambo households		Kavango households	
	P. millet buying	P.millet selling	P. millet buying	P. millet selling
	(Percent of households)			
Neighbors	35	35	32	32
Local market	38	30	1	1
Local shop	0	8	27	8
Distant market	24	23	5	27
Farmers' Cooperative	0	0	17	5
FNDC	0	0	6	17
Other	1	2	4	4

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 5.6 presents the proportion of households that (a) did not need transport to trade a bag of pearl millet (b) used their own transport, or (c) had to hire transport services. Due to the low population density in the subregion Ovambo East and the adjacent subregion Kavango West, distances from households to pearl millet buying and selling points were great. Therefore in these two regions 80-100% of all households needed transport for pearl millet trade. In the other four subregions (Ovambo West, Ovambo and Kavango Central, and Kavango East) 30-60% of households needed transport to buy or sell pearl millet. On average 40-50% of households from Ovambo or Kavango had to hire transport to reach a location where they could buy or sell a bag of pearl millet.

Table 5.6. Rural household transport needs for p. millet buying and selling, by region and subregion.

	Ovambo households				Kavango households			
	West	Central	East	Mean	West	Central	East	Mean
	(Percent of households)							
P. millet buying:								
Need no transport	51	41	1	31	23	59	63	48
Use own transport	19	3	50	24	23	3	3	10
Hire transport	30	56	49	45	54	38	34	42
P.millet selling:								
Need no transport	51	54	0	35	8	50	71	43
Use own transport	17	3	64	28	12	0	4	5
Hire transport	32	43	36	37	80	50	25	52

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Table 5.7 presents the average cost for (a) the transport to and from the place of pearl millet trading for one person and (b) the additional cost a person has to pay to carry a full bag of grain one way. The figures confirm household statements that the cost of grain transport was relatively high. If only the cost for the 50 kg bag of grain was counted the average transport cost in Ovambo converted to the equivalent of about 5% of the average commercial and

informal pearl prices. In Kavango, transport costs, on average, 7% of Kavango's average pearl millet consumer prices for the 1992/93 production season.

However if the cost for the person travelling was included, transport costs rose to about 20% of the average pearl millet consumer price in Ovambo and roughly 25% of the average pearl millet consumer price in Kavango.

The above analysis confirms that for 40-50% of rural Ovambo and Kavango households the buying or selling of a large quantity of pearl millet necessitates hiring transport services. Transport costs increase consumer prices and reduce producer prices between 20-25% of pearl

Table 5.7. Average transport cost of p. millet trade for those households that have to hire transport, by region and subregion.

Transport cost	Ovambo				Kavango			
	West	Central	East	Mean	West	Central	East	Mean
P. millet buying:								
Per person return trip (N$)	5.50	9.20	5.50	6.70	12.20	21.20	6.40	13.30
Per 50 kg bag single trip(N$)	1.20	4.20	4.00	3.10	4.60	8.10	2.00	4.90
P. millet selling:								
Per person single trip (N$)	20.00	6.10	9.10	11.70	11.00	10.00	5.70	8.90
Per 50 kg bag single trip (N$)	2.30	2.60	3.10	2.70	4.50	5.00	2.10	3.90

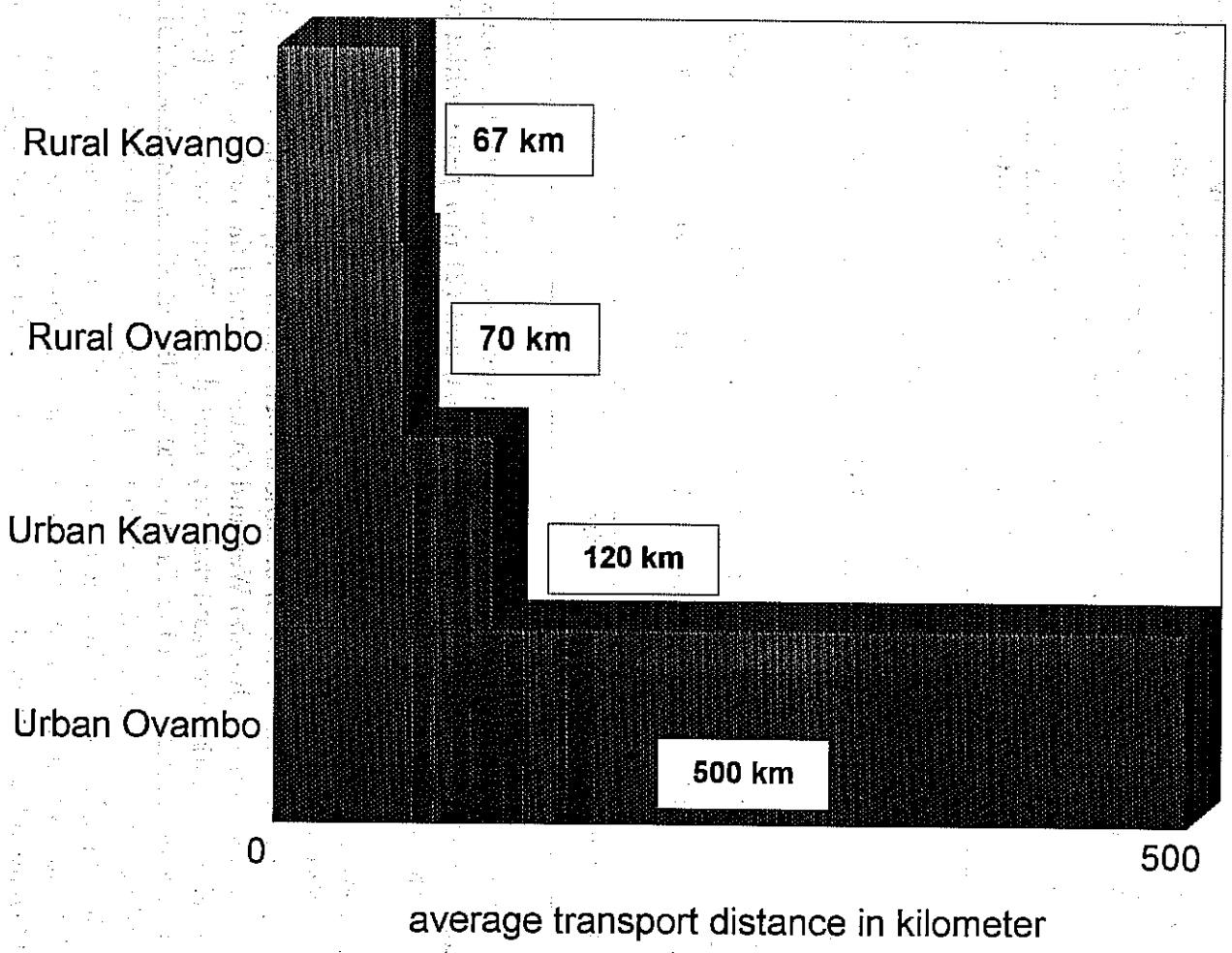
Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

millet market value. Potential results from these price changes are (1) that pearl millet sellers are discouraged from selling their pearl millet surplus, and (2) that pearl millet buyers eventually decide to purchase more accessible maize meal.

Lack of local markets

In Ovambo and Kavango 40-60% of the households surveyed claimed that there was no local market where pearl millet was traded in or close to their community (Table 5.8). With the exception of respondents from Ovambo West and Ovambo Central the vast majority of those who had no local grain market indicated that they needed one. Their expectation from local grain markets were (a) shorter travelling distances (about 50% of all reasons given) (b) easier buying and selling opportunities for those who want to trade grain (about 30%), and (c) a general improvement of living and income conditions within the area (about 10%). Of those who opposed the idea of local grain markets (mainly in Ovambo West and Ovambo Central) 25% claimed that potential pearl millet suppliers would not be able to sell enough and therefore would not make enough profit while another 25% claimed that new local markets would fail because most people did not have enough pearl millet to sell there.

Figure 13 Average distance between millet production areas and the traders, by trader type and zone (km)



Source: Namibian Millet Subsector Project Surveys 1992 - 93

Table 5.8. Households with no access to local grain market and their perception about the need for a local market.

	Ovambo households			Kavango households		
	West	Central	East	West	Central	East
	(Percent of households)					
No access to local markets	48	53	59	49	59	42
Expressed a need for local markets	24	5	54	44	59	42

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

There is validity to the opinions of both household groups - those who express the need for a local market and see the potential benefits and those that are afraid there might not be enough trade volume to justify the effort of establishing a local market infrastructure. With insufficient local markets, households with a pearl millet surplus are more likely to sell their pearl millet at distant market places in the central towns. A direct consequence of this is that households that need pearl millet are deprived of the opportunity of buying pearl millet from the farmers with surpluses and eventually have to buy imported maize meal offered in their vicinity.

5.3. Commercial pearl millet trade in rural and peri-urban areas

The following sections will discuss the findings of the pearl millet marketing survey carried out between October and November 1993. The survey was conducted after the pearl millet threshing period when pearl millet trade was expected to be most active. A total of 58 rural and urban pearl millet traders were identified and interviewed in Ovambo and Kavango. The main purpose of the survey was to gather information about the performance and conduct of the already existing commercial pearl millet market. Information was sought particularly about traders' pearl millet buying and selling activities as well as about their value-adding activities.

The commercial pearl millet trade will be described in five parts. Part one will characterize commercial pearl millet traders. Part two focuses on the pearl millet acquired from Namibian producers and Angola. Commercial pearl millet storage and traders' value-adding are described in part three. Part four assesses traders' selling activities, including the determination of selling prices and the size of traders' profits. In the last part of this section the size of the surveyed pearl millet trade operation is extrapolated to the aggregate level of Ovambo and Kavango.

Characterization of commercial pearl millet traders

Of the pearl millet traders surveyed in Ovambo, 22 operated in rural areas and nine traded in one of the three urban townships, Oshakati, Ondangwa or Ohanwena. In Kavango, 23 rural traders were interviewed as well as four pearl millet traders from Rundu. While it is difficult to estimate the percentage of rural pearl millet traders that were covered by the marketing survey, about 70% of all urban pearl millet traders from Ovambo and Kavango were interviewed. Most of the urban pearl millet traders were wealthy businessmen who owned wholesale operations or

several supermarkets. The vast majority of small, urban food retailers sold maize meal only, and no pearl millet to their customers.

Four different types of pearl millet retail outlets [23] could be identified in the rural areas. Most of the rural outlets were privately owned 'cuca shops' (small retail shops trading basic necessities), or of somewhat larger and better stocked supermarkets. The second type of pearl millet trading place did not differ physically from the cuca shops or small supermarkets, but belonged to a chain of retail outlets owned by a wholesaler, or the owner of a large supermarket from one of the urban areas. In Ovambo two churches were identified that would accept payment of their annual membership fees in the form of pearl millet.

In Ovambo seven of the nine urban pearl millet traders were wholesalers and two were owners of large supermarkets. In Kavango three of the four pearl millet traders interviewed owned supermarkets, the fourth owned the only private wholesale operation in Rundu besides the subsidized wholesale operation of the former FNDC.

Most of the interviewed pearl millet traders were involved in branches of trade other than pearl millet marketing. Table 5.9 presents the average share that pearl millet trade and other business activities had of traders' total turnover. Among the interviewed rural traders, pearl millet marketing is relatively more important than for urban traders. Compared with Kavango traders, rural and urban traders from Ovambo trade relatively more maize meal than pearl millet.

Table 5.9. Average share of business activities of p.millet traders' total volume.

	Rural p.millet traders		Urban p.millet traders	
	Ovambo	Kavango	Ovambo	Kavango
	(Percent of business activity)			
P.millet	19	27	13	13
Maize meal	24	12	31	6
Food & services	25	27	16	68
Goods & services	13	25	24	0
Alcohol	18	7	10	9
Cooked food	1	2	6	4

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

With very few exceptions pearl millet trade does not have a long tradition among the business people in Ovambo and Kavango.[23] Although 84% of all Ovambo traders interviewed had started their businesses before 1982, about 65% had started trading pearl millet after the recent severe drought of 1991/92 when pearl millet prices and profit margins were high. Of the interviewed Kavango business people 52% started their pearl millet trade after the 1991/92 drought although 74% had started their businesses before then. Almost all pearl millet traders confirmed several times during their interviews that pearl millet trade tended to be depressed

[23] Of the business people surveyed, one travelling trader from Oshakati had begun his millet trade in 1959. His trading strategy differed from others in that he mainly sold cloth and shoes to the rural community in exchange for money or pearl millet. The accumulated pearl millet was then advertised by radio and eventually sold to the urban population around Oshakati and Ondangwa.

after good rainfall seasons, including the 1992/93 harvest, while after poor production seasons (like the 1991/92 drought year) pearl millet trade flourishes.

Pearl millet acquisition from Namibian producers and Angola

The following section describes six aspects of pearl millet acquisition by traders: (1) months of acquisition (2) pearl millet suppliers (3) transport practices (4) determinants of the acquisition price (5) supply prices and quantities traded in 1992/93.

Months of acquisition
Most rural and urban traders started to buy pearl millet between June and September when pearl millet was harvested and threshed. However, the end of the pearl millet acquisition period varied according to the type of suppliers that the different traders used and the financial strength of individual traders. By end of December most traders had ceased acquiring pearl millet.

Pearl millet suppliers
In urban areas pearl millet traders were usually approached at their wholesale or retail outlets by producers or long distance traders offering pearl millet. In some cases large producers went to urban pearl millet traders and asked them to buy their pearl millet and also to transport their pearl millet from the production locality to the trader market outlets. In rural areas there are three main places where the pearl millet transactions between producers and traders were agreed. The first is at the rural trader market outlets, the second is where the pearl millet is produced such as at the homestead of the farmer who offers his pearl millet to the trader. The third is where a pearl millet trader is a large farmer and transports his surplus pearl millet to his retail outlet where it is sold.

Most of the people who offered their pearl millet at formal market outlets either approached a trader and inquired if he was interested in buying from them or others had told them that a trader was willing to buy. Pearl millet traders who bought from producers' homesteads were either invited by the producer to come and buy or knew from previous years that the farmer was a potential pearl millet surplus producer and willing to sell.

The quantity of pearl millet acquired by traders from different sources was largely dependent on the location of the traders' market outlet such as whether it is located in rural or urban areas and in Ovambo or in Kavango (Table 5.10.).

Table 5.10. Percent of p.millet that is acquired by commercial traders from different locations.

	Rural p.millet traders		Urban p.millet traders	
	Ovambo	Kavango	Ovambo	Kavango
	(Percent of millet derived from each source)			
Large-scale farmers	18	61	12	87
Middle-scale farmers	15	16	2	13
Marginal farmers	65	20	3	0
Angola	2	3	84	0

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Rural Ovambo traders' pearl millet sources
Rural Ovambo traders said that 65% of the pearl millet they acquired came from marginal farmers who were either in urgent need of money or other goods. In contrast only 18% of their pearl millet is supplied by large and wealthy farmers and 15% by middle-scale farmers. Middle-scale farmers usually try to balance their pearl millet deficit with surplus stocks from previous years and were not inclined to sell their pearl millet. If they were in need of money they usually acquired it through activities that were not related to pearl millet production. Very little pearl millet was acquired from Angolan farmers directly across the border.

Rural Kavango traders' pearl millet sources
Wealthy farmers with relatively large surpluses supplied about 61% of the pearl millet to rural traders. Another 20% came from marginal farm households and only 16% from middle-scale farmers.

Urban Ovambo traders' pearl millet sources
One of the most surprising results of the pearl millet marketing survey was that in 1993 pearl millet traders from urban Ovambo acquired 84% of their pearl millet from Angolan traders. This pearl millet was legally shipped across the Angolan border and customs duties were paid for much of it . Most of the rest of the pearl millet that urban Ovambo traders acquired came from large and wealthy farm households.

Urban Kavango traders' pearl millet sources
Similarly, wealthy farmers in Kavango who had large surpluses supplied about 87% of Kavango rural traders' pearl millet. The remaining 13% was supplied by middle-scale farmers.

Transport practices and costs
Traders arrange transport for pearl millet in at least half of all pearl millet transactions. The average radius for pearl millet acquisition in both study regions is about 70 km (Figure 13). In Kavango about 45% and in Ovambo about 70% of the pearl millet acquired by rural traders is transported by motor vehicles.

In contrast to rural traders, most of the pearl millet acquired by urban traders is transported by the sellers. The average distance between urban traders in Kavango and the origin of pearl millet production in Kavango is 120 km. Because urban pearl millet traders from Ovambo acquired most of their pearl millet from the Angolan province Huila Lubango, the average distance between them and the pearl millet origin is about 500 km. Almost all of the pearl millet transported to urban traders in Ovambo and Kavango comes on trucks or other motor vehicles.

Traders were asked to give their pearl millet transport costs for bringing the pearl millet from where it was produced to their market outlet. The average transport cost was about N$ 90/t in Ovambo and about N$ 60/t in Kavango. The average transport cost per 100 km was between two and three times higher for rural than for urban traders (Table 5.11.). However, the long distance pearl millet trade between Ovambo and Kavango was due to the cost-effectiveness of the 40-ton trucks used.

Table 5.11. Traders' average p.millet transportation cost, by trader location and region

	Rural p.millet traders		Urban p.millet traders	
	Ovambo	Kavango	Ovambo	Kavango
N$/t/100 km	100	250	42	50

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Determinants of the pearl millet acquisition price

Pearl millet traders were asked who eventually determined the pearl millet prices they paid to their pearl millet suppliers. In rural areas about 50% of the traders claimed that payment to their pearl millet suppliers was determined unilaterally. Another 50% of rural traders said that their pearl millet acquisition prices depended on their individual negotiations with the supplier. All urban pearl millet traders stated that they usually had to bargain with their suppliers.

When asked what type of market indicators or reference prices they used either to determine their acquisition price, or to determine their position during their price negotiations, traders gave various answers (Table 5.12.). The largest group of rural traders used the prevailing pearl millet bucket price in their community as their reference price. Other rural traders used retail prices to determine the price to pay to suppliers.[24]

Table 5.12. Indicators used by p.millet traders to determine their own p.millet prices, by trader type and region.

	Rural p.millet traders		Urban p.millet traders	
	Ovambo	Kavango	Ovambo	Kavango
	(Percent of traders citing each indicator)			
Price indicator used:				
Local bucket prices	50	33	0	33
Competitors' prices	12	19	100	0
Own cost	18	30	0	33
Maize meal price	0	0	0	33
Other	15	18	0	0

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

All urban pearl millet traders in Ovambo stated that they determined their pearl millet acquisition prices according to the retail prices charged by their competitors. Of the four pearl millet traders in Rundu only three wanted to disclose their pricing strategies. One of the three claimed that it was essential to know the potential pearl millet retail price at which he could sell to his customers before he could decide about how much he would be willing to pay to his suppliers. It was explained that the demand for pearl millet in Rundu was closely linked to the price of its

[24] It is important to note that it was not only the local supply and demand for p.millet that determined rural bucket prices but that in some rural areas churches strongly influenced local grain prices. For example, in 1993 the churches interviewed accepted one 20 liter bucket of p.millet as the equivalent of their annual membership fee of N$ 15 for women, and two 20 liter buckets or N$ 30, for men.

closest substitute, maize meal. Pearl millet could be sold at a premium that did not exceed 10 to 20 % of the maize meal on offer.

Mode of payment and availability of credit

Roughly two thirds of rural pearl millet traders from Ovambo and about one third from Kavango paid their pearl millet suppliers in cash immediately. The rest of the rural pearl millet traders in Ovambo and Kavango paid their suppliers in cash or kind. Among the urban pearl millet traders from both study regions 50% paid their suppliers in kind and 50% paid in cash.

About 30% of rural pearl millet traders from Ovambo and 15% from Kavango claimed they could get credit for their trade businesses if needed. Only 25% of the urban pearl millet traders in Ovambo and half of pearl millet traders from Rundu claimed they could obtain business credit.

Surprisingly most of those who claimed they had access to credit named the government as their potential source. Only two rural traders from Ovambo indicated commercial banks as a potential credit source and two rural pearl millet traders named the former FNDC as a source of credit.

Pearl pearl millet acquisition and supply prices in 1993

To obtain an indication about the quantity of pearl millet commercially traded and the prices paid to suppliers, the traders from Ovambo and Kavango in rural and urban areas were asked (a) to state the quantity of pearl millet they acquired between June and December 1993, (b) to compare the quantity acquired in 1993 with the amount they usually buy and to explain the reasons for the difference, and (c) to compare the pearl millet acquisition prices of 1992 with 1993. The responses were as follows.

Rural Ovambo

Between June and December 1993 most rural pearl millet traders in Ovambo acquired 1 to 5 t pearl millet for resale. Few purchased 5 to 50 t and only one rural trader stocked more than 150 t for resale.

Rural Kavango

In rural Kavango only a quarter of the traders involved in pearl millet trade acquired less than 5 t of pearl millet. One-half stocked 15 to 50 t and another 25% stored 50 to 200 t.

Urban Ovambo

The few pearl millet traders in urban Ovambo varied significantly in the amounts of pearl millet they acquired during 1993 for resale. The quantity of pearl millet held in stock ranged from 10 t to more than 600 t.

Urban Kavango

The four dominant pearl millet traders in Rundu also differed in the amount of pearl millet acquired for resale. The smallest amount acquired was about 15 t while the largest amount held in stock by the end December was about 250 t.

With the exception of Kavango rural traders, most traders had acquired less pearl millet for resale than in previous years. The three reasons most frequently given were: (1) the harvest in the trading area was good and therefore the demand for pearl millet was expected to be low; (2)

the prices for pearl millet from Angola had increased with the introduction of custom fees; (3) the traders' own pearl millet production was lower than usual, or his/her financial situation did not allow for purchasing as much as usual.

Of those traders who had acquired more pearl millet than usual, the three main explanations were: (1) more people had offered pearl millet to them because of better harvest conditions than after the 1992/93 drought; (2) the traders' stores were better stocked with goods that they could barter for more pearl millet; (3) the traders had acquired relatively cheap pearl millet from Angola for the first time.

A comparison of traders' pearl millet acquisition prices from 1992 and 1993 is presented in Table 5.13.

Table 5.13. Average p. millet acquisition prices of p. millet traders in 1992 and 1993, by trader and region.

Year of acquisition	Urban p.millet traders		Rural p.millet traders	
	Ovambo	Kavango	Ovambo	Kavango
	(N$/t)			
1992	930	na	1020	1860
1993	800	970	1030	1200

na = not available
Source: Namibia Pearl Millet Subsector Project Surveys 1992-93.

There are three salient observations here.

(1) As expected, 1992 pearl millet prices were generally higher than 1993 prices.
(2) On average urban traders expected lower pearl millet acquisition prices than rural pearl millet traders.
(3) Pearl millet traders in Ovambo pay less for pearl millet than traders from Kavango.

New competition from Angolan pearl millet producers
As demonstrated above, during 1993 rural and urban pearl millet traders from Kavango received most of their pearl millet from large-scale Namibian farmers while pearl millet traders from urban Ovambo acquired most of their pearl millet from Angola. Table 5.14 presents a comparison of pearl millet acquisition prices from four traders who bought more than 70% of their pearl millet from Angola with prices from four traders who bought most of their pearl millet from large Namibian farmers. The results from the comparison are that:

(1) In 1993 the Angolan pearl millet supplied to Ovambo traders was significantly cheaper than the pearl millet that was supplied by large producers in Kavango.
(2) Price differences between Angolan and Namibian pearl millet supplies were significantly bigger when large quantities are traded.

Table 5.14. Comparison of trader p. millet supply prices from Namibian producers and from Angola.

Traders with p.millet supply mainly from Angola			Traders with p.millet supply mainly from Namibia		
Trader's location	P.millet acquired	N$ paid per ton	Trader's location	P.millet acquired	N$ paid per ton
Urban Ovambo	600 t	430 N$	Urban Kavango	200 t	1000 N$
Urban Ovambo	150 t	500 N$	Rural Kavango	40 t	800 N$
Urban Ovambo	70 t	900 N$	Rural Kavango	10 t	1150 N$
Urban Ovambo	50 t	700 N$	Rural Kavango	7 t	1200 N$

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Due to the resumption of Angola's civil war in 1993 it was not possible to research the circumstances that enabled Angolan producers to supply pearl millet to northern Namibia in such large quantities and at competitive prices. Namibian traders explained that Angolan pearl millet originates from the province Huila Lubango about 500 km north of Oshakati in Ovambo. It is produced on large-scale commercial farms that are fully mechanized and produce under more favorable climatic conditions than northern Namibia.

Three additional, more temporary, reasons might have contributed to the increased pearl millet export from Angola to Namibia.

(1) It is possible that due to ongoing war the Angolan grain markets, in towns and cities, were not accessible to Angolan pearl millet producers, who therefore searched for alternative outlets.
(2) Due to the poor economic state of Angola, its currency was devalued to such an extent that Angolan agricultural products became price competitive on the northern Namibian staple food market.
(3) Direct imports of western consumer goods from South Africa were reduced because of the war there. Many of the large Namibian firms that bought Angolan pearl millet paid with South African produced consumer goods.

Although it is not clear whether the supply of relatively cheap Angolan pearl millet will continue in years to come, the findings about the pearl millet imports in 1993 add a new and unexpected piece of information regarding the development prospects of the Namibian pearl millet subsector. Up until now only maize coming from South Africa or Namibia's commercial farmers was considered to be the main competitor for Namibian pearl millet on the commercial staple food market as against pearl millet produced in Ovambo and Kavango. Now imported pearl millet from neighboring Angola might add competition for the increasing rural and urban consumer market needing cheap food staples.

Pearl millet storage and value-adding

The following paragraphs will describe how commercial pearl millet traders stored pearl millet acquired for resale and whether they added value to the pearl millet by either cleaning, processing or packaging.

Storage practices and capacity

With the exception of those pearl millet traders who produced pearl millet themselves, most commercial pearl millet traders intended to store pearl millet for less than one year. They buy in pearl millet briefly after grain harvest and then sell it before the next pearl millet harvest began. The price risk from the differing pearl millet suppliers and potential changes in maize meal prices were probably the two main reasons why only larger businesses in urban areas were involved in pearl millet trade. During the period of pearl millet acquisition commercial pearl millet traders faced the risk of under-estimating the harvest yield of one production season and then over-estimating the demand for pearl millet (prices and sales) that might arise from farm households which usually run out of pearl millet before the next harvest. This resulted in traders sometimes carrying over a high proportion of their stocks into a second or even third year until the pearl millet shortage was so desperate that it could be sold. The delay in selling did not cause as much financial loss from storage costs as did the tying down of capital.

The majority of the rural pearl millet traders had a house with a roof of corrugated iron in which to store pearl millet in bags. At least one third of them also stored pearl millet in traditional granaries (Ovambo: 'omahandas', Kavango: 'shiietes'). Most of the urban pearl millet traders owned large storage buildings where they mainly stored maize meal, alcohol and other goods for trading, as well as bags of pearl millet.

A surprising result emerged from the inquiry into the grain storage capacity of commercial pearl millet traders. Among communal businessmen the ownership of large storage facilities seemed to be an important status symbol, similar to rural farm households, but on a smaller scale. Accordingly the average storage capacity of the pearl millet traders surveyed was unexpectedly high. Rural pearl millet traders had an average storage capacity of about 250 t of grain in Ovambo and about 530 t in Kavango. Urban pearl millet traders in Ovambo had an average storage capacity of about 2400 t of grain and about 2 400 t in Kavango. Many of the storage facilities of the surveyed business operations were obviously underutilized.

The lesson to be drawn from these high grain storage capacities in the private sector is that there is probably no need for government to invest in regional storage facilities for grain reserves against drought years or for other schemes. If the government needs to house large grain reserves in Ovambo or Kavango it can rent enough storage space from the local business community.

An inquiry into storage losses from insects demonstrated that about half of the rural traders in Ovambo, but only a sixth in Kavango incurred storage losses from insects. Among the urban pearl millet traders very few gave insects as a problem for grain storage. Most owners of large storage facilities fumigated them at least once a year.

Storage costs for pearl millet are difficult to estimate because most storage buildings were also used for other trading goods. Pearl pearl millet traders themselves did not consider the construction costs of storage facilities as a part of their pearl millet business. However, some traders attributed some pearl millet storage costs to handling costs for unloading and storing pearl millet bags and the cost of security. According to these estimates, labor and security costs were N$15-20/t of pearl millet.

Value-adding
Although all traders were specifically asked whether they added value to pearl millet in any form before they sold it (e.g. cleaning, grading, processing, or packaging) most of them did not. The two exceptions were (1) the former FNDC operation in Musese/Kavango where the technology for pearl millet grading, cleaning, processing and packaging was upgraded for a potential Namibian large-scale pearl millet processing and marketing scheme. (2) The Katemo Farmers' Marketing Cooperative in Rundu/Kavango in 1993 acquired much the same mechanized processing equipment from Zimbabwe as FNDC, but for small- to middle-scale level trade.

Most traders did not add any value to their pearl millet. They merely guaged the quality of the pearl millet when they received it from their suppliers and negotiated their acquisition price accordingly. Some urban traders in Ovambo had experimented with processing pearl millet with either small-scale hammermills or with the roller mills they used to grind maize into maize meal. None of them had an operational system in place at the time the marketing survey was carried out.

Rural pearl millet traders from Kavango who sold part of their own pearl millet production explained that they cleaned and graded their pearl millet at threshing time on the farm, before they shipped it to their market outlets. However they considered these activities more as a normal part of the production process than as part of their pearl millet marketing activities.

Pearl millet selling

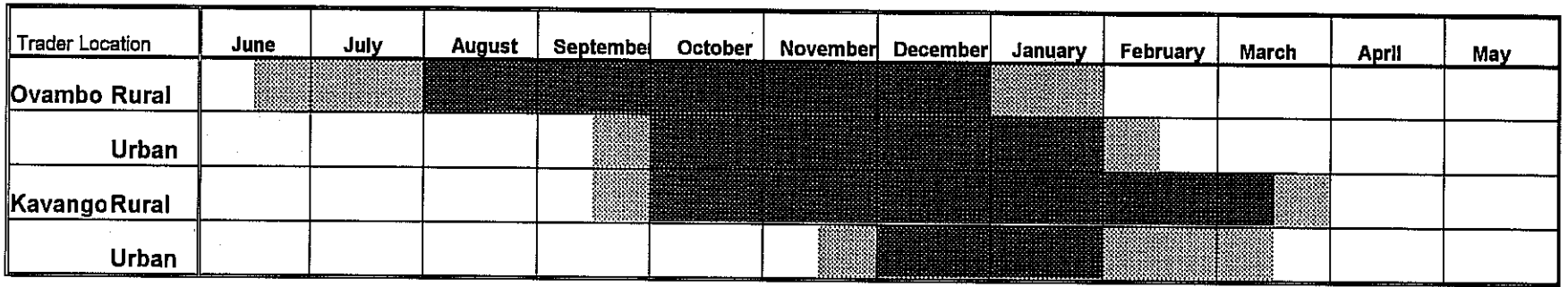
After traders had acquired pearl millet from their suppliers their main concern was to sell it to consumers before the next grain harvest. This section covers the four major aspects of pearl millet traders' selling activities. (1) The period when most pearl millet was sold to consumers, (2) the type of consumers who bought commercially traded pearl millet, (3) how consumer prices for pearl millet were determined, and (4) the traders' gross margins in 1993.

Period of commercial pearl millet sales
In Ovambo most farmers had finished threshing by the middle of July while most Kavango farmers completed threshing two weeks later. In both regions most traders started to acquire pearl millet from producers between June and September. The beginning and the duration of commercial pearl millet sales from traders to consumers varied between Ovambo and Kavango, and according to the trader locations in rural or urban areas.

As Figure 14 demonstrates, the peak period for pearl millet sales started significantly earlier in Ovambo (August) than in Kavango (October) and also earlier in rural than urban areas. By the end of January commercial pearl millet selling activities had ended in most areas.

To understand why the peak selling period for pearl millet started two months earlier in Ovambo than in Kavango, traders were asked to explain why their pearl millet buyers came chiefly during these times. The vast majority of traders responded that the peak selling season was mainly determined by depleting rural household pearl millet stocks. Two other reasons were offered that are related to the beginning ofhousehold field preparation activities:

Figure 14 Pearl millet selling period for commercial traders, by trader location



Source: Namibian Millet Subsector Project Surveys 1992 - 93

Less intense selling Peak selling

Source: Compiled from Map No. 3158, United Nations, Cartographic Unit, New York, November 1985

(a) About half of the rural Kavango traders said that farmers came during this period because they needed seed.
(b) About two-thirds of the urban Ovambo traders claimed that when plowing began people need more food and drink made from pearl millet.

From this information it is concluded that on average rural Ovambo households experienced a larger grain production deficit than rural Kavango households and that this difference manifested itself in a much earlier start to pearl millet buying by commercial traders in Ovambo.

Characterization of pearl millet and maize buyers
To understand commercial pearl millet trade flow it is not only important to know who the pearl millet suppliers were but also who eventually bought pearl millet and in what quantities from the commercial food staple market.

Before commercial pearl millet traders were asked about the characteristics of typical pearl millet or maize meal buyers, they were asked what do people prefer to eat, pearl millet or maize? Although most commercial pearl millet traders eventually sold more or at least as much maize meal as pearl millet, 93% of them said that pearl millet was favored by the majority of the people. Another 5% said that consumers did not have a taste preference for either pearl millet or maize and only 2% said that maize was preferred to pearl millet. These answers confirmed the preference statements made by household representatives during the household surveys.

Trader differentiation between those consumers who preferred to buy pearl millet against those who preferred to buy maize meal is presented in Table 5.15. A large majority of traders claimed that all people in their region preferred pearl millet to maize (83%). Some were more specific and reduced the set to all rural people (10%) or poor people who needed pearl millet to make 'oshikundo' a fermented pearl millet drink, or pearl millet beer (3%).

When specifically asked to characterize those consumers who prefer to buy maize meal, 38% of the pearl millet traders claimed that none of their maize meal buyers really preferred maize to pearl millet. The next largest group of traders (16%) claimed that only consumers who needed food urgently and who did not have enough money to buy pearl millet, purchased maize.

Some traders also associated a second set of people with a preference for maize consumption. These people were mainly characterized as wealthy and urban employed (14%). However town residents in general and migrant workers were also mentioned as typical maize meal consumers (each 8%). Few traders could estimate the size of the population group that is more urban oriented and preferred to buy maize meal. Urban pearl millet traders estimated that 10% to 30% of the population belonged to those who were weaalthy and had urban employment. One rural trader estimated that no more than one percent of the total population belonged to those who preferred, and ate, only maize.

Table 5.15. P. millet traders' characterization of people who preferred p. millet and those who preferred maize.

Consumer characteristics	Prefer p. millet	Prefer maize
	(Percent of population who prefer each grain)	
All people	83	0
Rural people	10	0
Poor people	3	0
Those needing food urgently	0	16
Migrant workers	0	8
Town residents	0	8
Urban employees & the wealthy	0	14
Nobody	0	38
Other	4	13

Source: Namibia Pearl Millet Subsector Project Surveys 1992-93.

The quantity of pearl millet that individual people bought from commercial traders was generally larger than that which was traded informally among rural households. Table 5.16 shows the distribution of traders' answers about the quantities their customers usually bought from them. None of the traders gave quantities of less than a 50 kg bag as most commonly sold. The majority of traders gave quantities of between 50 kg and 250 kg as the typical amount that pearl millet buyers purchased. Relatively high percentages of pearl millet traders from rural Kavango (29%), and from urban Ovambo (25%), claimed that most pearl millet buyers acquired more than 250 kg pearl millet at a time.

The section about consumer prices of food staples (Chapter 3 above) has demonstrated that pearl millet consumer prices during 1992/93 were on average 13% more expensive than maize meal in Ovambo and 36% higher in Kavango. Taking into account he information about the relatively high average quantities that individual pearl millet buyers acquired from traders, the conclusion is clear that only the wealthier Ovambo and Kavango people could afford to purchase millet. Some of the urban pearl millet traders in Ovambo stated that most of their pearl millet buyers were people returning home for Christmas from Windhoek or southern mining towns. These people bought large quantities of millet for their families in rural areas.

Table 5.16. Distribution of trader answers on the average quality of p. millet they sell to individual customers.

Average quality sold to individuals	Urban p.millet traders		Rural p.millet traders	
	Ovambo	Kavango	Ovambo	Kavango
	(Percentage distribution of purchases)			
50 to 100 kg	13	50	50	21
101 to 250	62	50	45	50
> 250 kg	25	0	5	29

Source: Namibia Pearl Millet Subsector Project Surveys 1992-93.

Determination of consumer prices
This section about the millet selling practices of traders deals with three questions. Who determined the commercial selling price for pearl millet and on what basis? Why were the prices for commercially traded pearl millet comparatively high in Ovambo and Kavango?

Of all pearl millet traders interviewed about 90% stated they determined their pearl millet selling prices themselves. Another 7% said that within certain limits their selling prices were determined through negotiations with buyers. A third said they gave discounts to buyers of larger quantities.

In Ovambo pearl millet traders used three main measures for determining their selling prices while Kavango traders also used a fourth. Traders usually determined the price according to how much they paid to suppliers. The remaining three pricing factors were all related to the prevailing selling prices. (1) Traders watched the general price development for pearl millet on the market. (2) In particular they watched their competitiors prices, and (3) in Kavango many rural traders said they also took into account whether grain harvest results were good or poor.

Traders attributed the comparatively high prices for pearl millet in Ovambo and Kavango to three main factors:

- pearl millet's high production cost; (especially for labor, plowing, threshing, and transport);
- consumers' strong preference for pearl millet;
- the general scarcity of pearl millet, together with the small number of farmers with surpluses who were willing to sell.

Retailer profit margins in 1993
Although pearl millet traders blamed factors other than their own pricing practices on high market consumer prices for pearl millet, investigation into the gross margins and major marketing costs (transport and handling) showed otherwise. At least some commercial pearl millet traders took advantage of strong consumer preference for pearl millet and the general scarcity of pearl millet on the commercial food market.

During the pearl millet marketing survey only 15 out of 58 traders were willing to disclose both their pearl millet acquisition costs and selling prices during 1993. The average cost for pearl millet transportation and handling were described in previous sections. They averaged about N$ 100/t. Because for most businesses that were surveyed pearl millet only represents a small proportion of total retail operations the storage costs for pearl millet were negligible.

The cost structure for traders who obtained big quantities of pearl millet (50 to 600 t) from large producers of surpluses in Namibia, or from Angola, during 1993, was compared with the costs for smaller traders who were mainly located in rural areas and who bought less than 50 t from their suppliers. The comparison shows that three factors significantly reduced acquisition prices: (1) the source of pearl millet, (2) the discount for quantity, and (3) the bargaining power of larger traders (Table 5.17.). The weighted average pearl millet acquisition price per ton was about N$ 540 for large traders and N$ 1080 for small traders.

Table 5.17. Comparison of average p. millet acquisition cost, selling prices and profit margins of small and large p. millet retailers in 1993.

Trader category	Traded p. millet quantities (t)	Average acquisition price (N$/t)	Average retail price (N$/t)	Profit margins (N$/t)	Profit margins as a percent of selling prices[a]
Small-scale	1 to 49 t	1075	1890	715	38%
Large-scale	50 to 600 t	545	1025	380	37%

[a] The calculation of the profit margin includes estimated handling and transport costs of N$ 100/t. Storage costs were negligible.

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

The comparison of pearl millet retail prices of small and large-scale pearl millet traders indicates that the cost advantages of large-scale pearl millet traders were passed on to their customers. The average pearl millet retail price charged by large-scale traders was N$ 1.03/kg which is only 54% of the prices charged by small-scale traders.

Trader profit margins per ton were relatively high. Small-scale pearl millet traders' returns from the sale of one ton of pearl millet were on average N$ 715 or 38% of the retail price their customers had to pay. Three points should be considered in relation to the profits of small-scale traders.

(1) Small-scale traders usually had a lower pearl millet turnover.
(2) Pearl millet marketing represented an important part of their total trade and absorbed a high proportion of their available funds that could otherwise have been invested in alternative, profitable enterprises;
(3) The potential for financial loss was high due to the unpredictable price and market risks from unpredictable harvest yields.

The profit margin for large pearl millet traders was, on average, N$ 380/t. This is only about half the profit that small-scale pearl millet traders earned per tonne, but was still 37% of the average retail price. Due to a bigger turnover, the pearl millet trade could be a profitable side business for large retailers or wholesalers in urban areas. The two examples in Table 5.18 will demonstrate this fact:

Table 5.18. Examples of the profitability of p.millet trade for urban traders in 1993.

	Trader location	Quantity traded (t)	Acquisition price (N$/t)	Retail price (N$/t)	Marketing cost (N$/t)	Total profit (N$)
Example 1	Urban Ovambo	150	500	1000	100	60.000
Example 2	Urban Kavango	75	800	1400	100	37.500

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

Aggregate size of the commercial pearl millet market

This section presents the estimated share of the commercial pearl millet market in Ovambo and Kavango held by suppliers. It also compares the total commercial pearl millet trade volume with total pearl millet production in Ovambo and Kavango.

Sources of the commercially traded pearl millet
For the extrapolation of the results from the pearl millet trader survey it was estimated that the following percentages of the commercial pearl millet trade volume in 1993 were covered by the survey.

Rural Ovambo: 8%, Urban Ovambo: 70%.
Rural Kavango: 21%, Urban Kavango: 70%

According to these estimates the total trade volume of the commercial pearl millet market of Ovambo and Kavango in 1993 amounted to roughly 8 900 t (Table 5.19.). Rural pearl millet traders of both study regions represented the major portion of the trade volume (rural Ovambo traders 58%, rural Kavango traders 76%).

In Ovambo most of the traded pearl millet was supplied by marginal farmers (39%) who either sold their pearl millet for money or exchanged it for other food items or consumer goods. The second largest suppliers of commercially traded pearl millet were Angolan traders (36%) who shipped pearl millet from the Angolan Huila province to the central towns of Ovambo.

Table 5.19. Extrapolated quantities of p. millet acquired by commercial traders from various suppliers during 1993, by trader location and region.

Supplier type	Ovambo traders				Kavango traders				Total			
	Rural (t)	Urban (t)	Total (t)	Total (%)	Rural (t)	Urban (t)	Total (t)	Total (%)	Rural (t)	Urban (t)	Total (t)	Total (%)
Large farmers	470	220	690	16	2560	260	2820	63	3030	480	3510	39
Middle farmers	390	30	420	9	670	40	710	16	1060	70	1130	13
Marginal farmers	1660	50	1710	39	840	0	840	19	2500	50	2550	29
Angola	50	1560	1610	36	130	0	130	3	180	1560	1740	19
Total	2570	1860	4430	100	4200	300	4500	100	6770	2160	8930	100

Source: Namibia Pearl Millet Subsector Project Surveys, 1992-93.

In Kavango large and wealthy farmers supplied most of the commercially traded pearl millet (39%). The second most important pearl millet suppliers in Kavango were marginal farmers (29%), and third the Angolan producers from the Huila province whose pearl millet was shipped via Ovambo to Kavango.

It is concluded from this section that in 1993 the pearl millet supply to the commercial pearl millet market was mainly dominated by marginal farmers and Angolan producers in Ovambo. In Kavango commercial pearl millet came mostly from from large and marginal farmers. In

both study regions relatively few middle income farmers sold pearl millet to commercial sellers. If middle income farmers had a temporary pearl millet surplus they would rather store it for possible future drought seasons than sell it to commercial trade agents. If they were in urgent need of money or goods they found the funds through alternative income sources rather than sell to commercial intermediaries.

Commercially traded pearl millet production
According to the different estimates about total pearl millet production in Ovambo and Kavango, estimates of the percentages that went through the commercial pearl millet market varied.

(1) The "Namibian Early Warning & Food Information System" estimated the pearl millet production for Ovambo and Kavango for the 1992/93 production season at 38 700 t.[25] Of this production the commercial pearl millet market covered 7 200 t (the 1 700 t imported from Angola is not included), or 19%.

(2) In Chapter 4 of this report the total pearl millet harvest for the 1992/93 production season in Ovambo and Kavango was estimated at 68 800 t. According to this estimate the commercial pearl millet market represented about 10% of the total production in Ovambo and Kavango.

(3) Using the estimated long-term per capita production figures estimated from rainfall data over the last 23 years the long-term total pearl millet production for Ovambo and Kavango can be estimated at roughly 90 000 t. According to this estimate the commercial pearl millet market covers only about 8% of the total production.

Ten percent of the total production by the commercial pearl millet market seems most reasonable because 20 % of the total production would require more extensive marketing activities. It must be stated that this 10% does not include the informal pearl millet trade between rural producers and consumers, which excludes commercial intermediaries.

The conclusion of this section is that the commercial pearl millet market was too small to redistribute and to balance out the large variation in pearl millet production across the different subregions. Because the informal pearl millet trade was kept mainly within the borders of rural communities it too did not contribute significantly to the redistribution of production between subregions.

5.4. Summary

As northern Namibia moves from an agricultural to a more urbanized and industrialized economy the rural and urhan grain marketing system becomes increasingly important. The main question in Chapter 5 is whether the current pearl millet market in Ovambo and Kavango is efficient enough to balance out, at least partially, the large annual supply variations.

[25] Namibia Early Warning & Food Information System, Crop and Food Security Bulletin No: 4.94

Frequency and extent of informal pearl millet trade

In general, pearl millet was more often sold by Kavango households than by Ovambo households. Eighty-two percent of Kavango households sold pearl millet either every year or at least every other year. Only about 30% of them sold pearl millet some years and nobody, every year. The majority of pearl millet sellers gave the urgent need for money or goods as the primary reason for selling (Ovambo: 88%, Kavango 73%). Large numbers of households only sold pearl millet after good harvest years (Ovambo: 35%, Kavango: 59%). Other conditions often given were that 'the amount of pearl millet in storage must cover at least the household consumption needs to the next harvest' and that 'a buyer would approach the household'.

In Ovambo 85% of pearl millet-selling households sold a 20 liter bucketful (approx. 16.5 kg) or less to individual buyers. In Kavango only 25% of pearl millet selling households sold a 20 liter bucketful to individual buyers and 61% mostly sold millet in a 50 kg bag.

Of those households that sold pearl millet only a few planned to sell it at planting time (Ovambo: 9%, Kavango: 38%). Active searching for pearl millet buyers was undertaken by only a minority of producers with a pearl millet surplus. In Ovambo the active sellers mainly travelled around their community in search of potential buyers. In Kavango most active sellers offered it to their neighbors and sent messages to other communities.

Most sellers walked to look for potential pearl millet buyers and to transport pearl millet to rural buyers (Ovambo: 58%, Kavango: 38%). An overwhelming number of pearl millet producers said 'neighbors' when they were asked to whom they sold their surplus pearl millet (Ovambo: 100%, Kavango 89%). Travelling traders were the second most often mentioned category to whom pearl millet was sold (Ovambo: 22%, Kavango: 42%) Pearl millet was most often exchanged for meat with those neighbors who had just slaughtered animals.

Limiting factors to pearl millet trade

The lack of surplus (Ovambo: 83%, Kavango: 94%) and the fear of drought (Ovambo: 79%, Kavango: 94%) were the main reasons stated by households for not selling pearl millet. However marketing constraints were also given by those households. Long trading distances together with lack of transport or its prohibitive cost were the most limiting factors for pearl millet marketing. In Kavango the lack of local markets was often given as an important constraint for those households that sold pearl millet every year. Only in Kavango Central where a large majority of the farmers sold pearl millet in some years (94%) were low prices given as an obstacle to selling.

In Ovambo three major limiting factors for pearl millet buying existed: (1) 'lack of money', (2) 'long distances and prohibitively high transport cost', (3) 'high consumer prices for pearl millet'. In Kavango four limiting factors for pearl millet buying were given by more than 90% of all households: (1) 'high pearl millet prices', (2) 'easier access to maize meal', (3) 'relatively lower prices for maize meal', and (4) 'households' lack of money'. Expensive transport was given by 68% of Kavango households.

Fear of drought

An average Ovambo household stored enough pearl millet to last between four and six and a half years before considering selling pearl millet. These high thresholds indicated that the majority of rural households perceived the threat of drought as so probable that they preferred holding large amounts of surplus pearl millet to increase their food security than selling it on the informal or commereial market. On average, Kavango households preferred to store enough pearl millet per household member to last about two years before considering selling grain.

After good production years the priority of rural households was to replenish their pearl millet stocks. Therefore most of the surplus pearl millet in an area with a good harvest would not immediately be available to areas with a pearl millet deficit via the informal or commercial pearl millet market. It was normal storage practice for households to sell the oldest rather than recently harvested pearl millet once the selling threshold is reached.

It is important to accept that considering the need for household food security, the described storage and selling practices are absolutely rational. Households chose to store surplus pearl millet rather than run the risk of being forced to buy less preferred maize meal after poor grain harvests. Rural households with little or no cash income had to be especially careful with their pearl millet resources because when there are deficit conditions they do not have the advantage of availability of maize meal on rural food markets.

Transport limitations

In Ovambo 35% of all households trade large quantities of millet with their neighbors. Other important marketing locations for Ovambo households were local markets and distant markets in central towns. Similarly the biggest group of Kavango households also traded large quantities of pearl millet with their neighbors. Other preferred locations for pearl millet buying were rural shops and the Farmer Cooperative Katemo at Rundu. Preferred locations for pearl millet selling were buying points of the former FNDC (First National Development Corporation) and the open market in Rundu.

Due to low population density in the subregion Ovambo East and the adjacent subregion Kavango West the distances from households to pearl millet buying and selling points are great. Therefore in these two regions between 80 to 100% of all households needed transport for pearl millet trade. In the other four subregions (Ovambo West, Ovambo and Kavango Central, and Kavango East), 30 to 60% of households needed transport to buy or sell .

For 40 to 50% of rural Ovambo and Kavango households the trading of large quantities of pearl millet made hiring a transport service necessary. Transport costs increased consumer prices and reduced producer prices to between 20% and 25% of pearl millets' market value. Potential effects of these price changes could be that (1) potential sellers are discouraged from selling their surpluses and (2) potential buyers eventually decided to purchase more accessible maize meal.

Lack of local markets

In Ovambo and Kavango 40 to 60% of the households surveyed claimed that there was no local market where pearl millet was traded in or near to their community. The vast majority of those who had no local grain market indicated that one was needed. They expected that local grain markets would provide: (a) shorter travelling distances, (b) easier buying and selling opportunities for those who want to trade grain and, (c) a general improvement of living and income conditions within the area.

Of those who opposed the idea of local grain markets (mainly in Ovambo West and Ovambo Central) 25% claimed that potential pearl millet suppliers would not be able to sell enough and therefore would not make enough profit, while another 25% claimed that new local markets would fail because most people did not have enough pearl millet to sell. Where there were no local markets, households with pearl millet surpluses were more likely to sell their pearl millet at distant market places in central towns thus denying those farmers without grain the opportunity of buying from people with surpluses, and forcing them buy the maize meal on offer in their vicinity.

Commercial pearl millet trade in rural and peri-urban areas

A total of 58 rural and urban pearl millet traders were identified and interviewed in Ovambo and Kavango. The main purpose of the survey was to gather information about the performance and conduct of the already existing commercial pearl millet market. While it is difficult to estimate the percentage of rural pearl millet traders that were covered by the marketing survey, about 70% of all peri-urban pearl millet traders from Ovambo and Kavango were interviewed. Most of the urban pearl millet traders were wealthy businessmen who owned wholesale operations or several supermarkets. The vast majority of small, urban food retailers only sold maize meal and not pearl millet to their customers.

Most of the interviewed pearl millet traders were involved in trade activities other than pearl millet marketing. Among the rural traders interviewed, pearl millet marketing was relatively more important than among urban traders. In addition rural and urban traders from Ovambo traded relatively more maize meal than pearl millet ,compared with Kavango traders.

With very few exceptions pearl millet trade does not have a long tradition among the business people in Ovambo and Kavango. About 65% of the Ovambo traders and 74% of the Kavango traders interviewed began their pearl millet trade after the severe drought of 1991/92.

Almost all pearl millet traders confirmed several times during their interviews that pearl millet trade tended to drop after good rainy seasons, including the 1992/93 harvest, while after poor production seasons (like the 1991/92 drought year) pearl millet trade flourished.

Pearl millet acquisition from Namibian producers and from Angola

Most rural and urban traders began buying between June and September when pearl millet was harvested and threshed. By end of December most pearl millet traders had ceased acquiring pearl millet.

Most people who offered their pearl millet on the trader market outlets either approached a trader and asked if he was interested in buying from them or they heard from others about a trader's willingness to buy. Those pearl millet traders who bought pearl millet at producers' homesteads were either invited there by the producer or knew from previous years that the farmer was a potential pearl millet surplus producer and willing to sell.

The quantity of pearl millet acquired by traders from different sources was largely dependent on the location of the trader market outlet, that is whether it was located in rural or urban areas and in Ovambo or in Kavango.

In Ovambo most of the traded pearl millet was supplied by marginal farmers (39%) who either sold their pearl millet for money or exchanged it for other food items or consumer goods. The second largest suppliers of commercially traded pearl millet were Angolan traders (36%) who shipped pearl millet from the Angolan Huila province to the central towns of Ovambo.

In Kavango large and wealthy farmers supplied most of the commercially traded pearl millet (39%). The second important pearl millet supplier group in Kavango were marginal farmers (29%) and third Angolan producers from the Huila province, whose pearl millet was shipped via Ovambo to Kavango.

Transport practices and cost

Traders arranged transport for pearl millet in at least half of all pearl millet transactions. The average radius of pearl millet acquisition by rural traders in both study regions was about 70 km. In Kavango about 45% and in Ovambo about 70% of the pearl millet acquired by rural traders was transported by motor vehicles.

In contrast to rural traders, most of the pearl millet acquired by urban traders was transported by the sellers. The average distances between urban traders in Kavango and the source of pearl millet production was 120 km. As urban pearl millet traders from Ovambo acquired most of their pearl millet from the Angolan province Huila Lubango the average distance between them and the pearl millet source was about 500 km. Almost all of the pearl millet transported to urban traders in Ovambo and Kavango came on trucks or other motor vehicles.

The average transport costs were about N$ 90/t pearl millet in Ovambo and about N$ 60/t in Kavango. The average transport cost per 100 km was between two and three times higher for rural than for urban traders. The long distance trade of pearl millet between Ovambo and Kavango was possible because of the cost-effectiveness of the 40-ton trucks used.

Determinants of the pearl millet acquisition price

In rural areas about 50% of the traders claimed that payment to their pearl millet suppliers was determined unilaterally. Another 50% of rural traders said that their pearl millet acquisition prices depended on their individual negotiations with a supplier. All urban pearl millet traders said they usually had to bargain with their pearl millet suppliers.

The largest group of rural traders used the prevailing pearl millet bucket price in their community as their reference price. Other rural traders used retail prices to determine the price they paid to their suppliers.

All urban pearl millet traders in Ovambo said that they determined their pearl millet acquisition prices according to their competitors' retail prices. Of the four pearl millet traders in Rundu only three wanted to disclose their pricing strategies. One of the three claimed that it was essential to know the potential pearl millet retail price at which he could sell to his customers before deciding what he would pay his suppliers. It was explained that the demand for pearl millet in Rundu was closely linked to the price of its closest substitute, maize meal. Pearl millet can only be sold for a premium that does not exceed 10% to 20 % of the price of maize meal.

Mode of payment and availability of credit

Roughly two-thirds of rural pearl millet traders from Ovambo and about one-third from Kavango paid their suppliers in cash immediately. The rest of the rural pearl millet traders in Ovambo and Kavango paid their suppliers in cash or kind. Among the urban pearl millet traders from both study regions 50% paid their suppliers in kind and 50% paid them in cash. About 30% of rural pearl millet traders from Ovambo and 15% from Kavango claimed they could get credit for their business if needed. Only 25% of the urban pearl millet traders in Ovambo and half of pearl millet traders from Rundu said they could obtain business credit.

Pearl millet acquisition and supply prices in 1993

Rural Ovambo
Between June and December 1993 most rural pearl millet traders in Ovambo acquired between one and five tons for resale. Few purchased between five and 50 t and only one rural trader stocked more than 150 t.

Rural Kavango
In rural Kavango only a quarter of the traders that were involved in pearl millet trade acquired less than five tons. One-half stocked 15 to 50 t of pearl millet and another 25% stored 50 to 200 t.

Urban Ovambo
The few pearl millet traders in urban Ovambo varied significantly in the quantities they acquired for resale during 1993. The quantities of pearl millet in stock ranged from 10 to more than 600 t.

Urban Kavango
The four dominant pearl millet traders in Rundu also differed in the amount acquired for resale. The smallest quantity acquired was about 15 t while the largest quantity in stock by the end December was about 250 t.

With the exception of rural Kavango traders most traders had acquired less pearl millet for resale than in previous years. The three most frequently given reasons for this situation were: (1) the harvest in the trading area was good and therefore the demand for pearl millet was

expected to be low. (2) The prices for pearl millet from Angola had increased with the introduction of custom dues. (3) The traders' own pearl millet production was less than usual or his/her financial situation did not allow for buying as much as usual.

New competition from Angolan pearl millet producers

A comparison of pearl millet acquisition prices paid by four traders who bought more than 70% of their pearl millet from Angola, with prices paid by four traders who bought most of their pearl millet from large Namibian farmers shows that:

(1) in 1993 the Angolan pearl millet supplied to Ovambo traders was significantly cheaper than the pearl millet that was supplied by large Namibian producers in Kavango. (2) Price differences between Angolan and Namibian supplied pearl millet were significantly higher when large quantities were traded.

Namibian traders said that Angolan pearl millet originated from Huila Lubango about 500 km north of Oshakati in Ovambo. It was produced on large-scale commercial farms that are fully mechanized and which produce under more favorable climatic conditions than northern Namibia.

In addition three more, temporary, reasons might have contributed to increased pearl millet exports from Angola to Namibia.

(1) It is possible that due to the ongoing war, Angolan grain markets in towns and cities, were not accessible to Angolan pearl millet producers, who therefore searched for alternative outlets.
(2) Due to the poor economic state of Angola its currency was devalued to such an extent that Angolan agricultural products became price-competitive on the northern Namibian staple food market.
(3) Angolan consumers can gain access to consumer goods from South Africa via northern Namibia. Many of the large Namibian firms that bought Angolan pearl millet paid with South African consumer goods.

Until then, only maize coming either from South Africa or from Namibia's own commercial farmers was considered to be the main competitor for Namibian pearl millet on the commercial staple food market, compared with pearl millet produced in Ovambo and Kavango. Now imported pearl millet from neighboring Angola might dictate which product will be bought by the increasing number of rural and urban consumers in need of cheap food staples.

Pearl millet storage and value-adding

Rural pearl millet traders had an average storage capacity of about 250 t of grain in Ovambo and about 530 t in Kavango. Urban pearl millet traders in Ovambo had an average storage capacity of about 2 400 t and in Kavango, about 2 000 t. Many of the storage facilities of the business operations surveyed were underutilized.

The lesson to be drawn from these high grain storage capacities in the private sector is that if the government needs to house large grain reserves in Ovambo or Kavango it can rent enough storage space from the local business community.

Storage costs for pearl millet were difficult to estimate because most storage buildings were also used for other trading goods. Pearl millet traders themselves did not consider the construction cost of storage facilities as a part of their pearl millet business. However some traders did include handling costs for unloading and storing millet bags and the cost of security. According to these estimates, labor and security cost N$ 15 to 20/t millet.

Although all traders were specifically asked whether they added value to millet in any way before they sold it (e.g. cleaning, grading, processing, or packaging) most of them did not. The two exceptions were the former FNDC operation in Musese, which competed with "Katemo Farmers' Marketing Cooperative" in Rundu.

Pearl millet selling

The peak period of pearl millet selling starts significantly earlier in Ovambo (August) than in Kavango (October) and also earlier in rural than urban areas. By the end of January most commercial pearl millet sales had ended in most areas.

The vast majority of traders replied that the peak selling season was mainly determined by depleting rural household pearl millet stocks. Two additional reasons were offered, relating to the beginning of the field preparation activities. (1) About half of the rural Kavango traders said that farmers came during this period because they needed seed. (2) About two-thirds of the urban Ovambo traders claimed that when plowing starts, people needed more food and drink made from pearl millet.

The most important conclusion from this information is that on average rural Ovambo households experienced a larger grain deficit than rural Kavango households and that this difference manifested itself in a significantly earlier start to pearl millet buying by Ovambo commercial traders.

Characterization of pearl millet and maize buyers

A large majority of traders claimed that all people in their region prefered pearl millet to maize (83%). Some were more specific and reduced the set to all rural people (10%) or poor people who needed pearl millet to make 'oshikundo' a fermented pearl millet drink, or pearl millet beer (3%).

When specifically asked to characterize those consumers who prefered to buy maize meal, 38% of the pearl millet traders claimed that none of their maize meal buyers really prefered maize to pearl millet. The next biggest group of traders (16%) claimed that only those who are in urgent need of food and do have not enough money, buy maize.

Some traders associated a second set of people with a real preference for maize consumption. These were characterized as wealthy and urban-employed people (14%). However, town

residents in general and migrant workers were also mentioned as typical maize meal consumers (each 8%).

The quantities of pearl millet that individual people bought from commercial traders was generally larger than that traded informally between rural households. None of the traders indicated quantities of less than a bag of 50 kg as most commonly sold. The majority of traders gave quantities of between 50 kg and 250 kg as the typical amount that buyers acquired. Relatively high percentages of pearl millet traders from rural Kavango (29%) and from urban Ovambo (25%) claimed that most of their pearl millet buyers acquired more than 250 kg at a time.

Some of the urban pearl millet traders in Ovambo stated that most of their pearl millet buyers were people returning home for Christmas from Windhoek or southern mining towns. These people bought large quantities of pearl millet for their families in rural areas.

Determination of consumer prices

About 90% of all millet traders said they determined their pearl millet selling prices themselves. Another 7% claimed that within certain limits their selling prices were determined through negotiations with buyers. A third of the traders said they gave discounts to buyers of large quantities.

In Ovambo pearl millet traders used three main yardsticks to determine their selling prices, while Kavango traders used four. The price determinant most frequently given was costs already accrued, that is the acquisition price traders paid to suppliers. The remaining three pricing factors were all related to the selling prices prevailing on the market. (1) Traders watched the pearl millet price development on the market, (2) they particularly watched the prices of their direct competitors, and (3) in Kavango many rural traders said they also took into account whether the grain harvest results were good or poor.

Traders attributed comparatively high prices for pearl millet in Ovambo and Kavango to three main factors:

- pearl millet's high production cost (especially for labor, plowing, threshing, and transport);
- consumers' strong preference for pearl millet;
- the general scarcity of pearl millet together with the small number of farmers with surplus who are willing to sell.

Retailer profit margins in 1993

Although pearl millet traders blamed factors other than their own pricing practices for high consumer prices for pearl millet, the investigation into the gross margins and major marketing costs (transport and handling) indicated that at least some of the commercial pearl millet traders took advantage of consumers' strong preference for pearl millet, and the general scarcity of pearl millet on the commercial food market.

The weighted average pearl millet acquisition price per tonne was about N$ 540 for large pearl millet traders and N$ 1080 for small traders. The comparison of the pearl millet retail prices charged by small- and large-scale pearl millet traders indicated that the cost advantage of large-scale pearl millet traders were passed on to their customers. The average pearl millet retail price of large-scale traders was N$ 1.03/kg which was 54% of the pearl millet retail prices charged by small-scale traders.

Traders' actual profit margins per tonne were relatively high. Small-scale pearl millet traders' returns from the sale of one tonne of pearl millet were on average N$ 715 or 38% of the retail price their customers paid. The profit margin of large pearl millet traders was on average N$ 380/t. This represented only about half of the profit that small-scale pearl millet traders earned per tonne, but it is still 37% of their average retail price.

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