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## FARMER CHARACTERISTICS AND AGRICULTURAL PRODUCTION IN OWAMBO, NAMIBIA : IMPLICATIONS FOR EXTENSION

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### ABSTRACT

Owambo agricultural producers had high levels of illiteracy (44%) and 30% were over 60 years of age. Average extended family size was about 10 persons and approximately two-thirds had incomes below the minimum subsistence level, and many lacked resources for agricultural production. Communal grazing areas were overstocked and lacking in management. There was a low rate of adoption of accepted farming practices, leading to low yields and production levels. Suggestions are put forward for improving agricultural knowledge systems, including strengthening extension services and local institutions.

### 1. INTRODUCTION

The requirements to support increases in rural output and the social and economic advance of rural people include sound policies and planning, land-use planning, suitable technology, extension services, external inputs and monitoring of systems. A knowledge of the cultural and socio-economic characteristics of rural households, agricultural production and production systems, local power structures, and perceived household and community needs, are fundamental pre-requisites for developing demand led research and extension systems adapted to the human and natural environment.

In this paper an overview is given of the results of a pilot study of the personal and socio-economic characteristics of rural households, land-use, farming practices, and agricultural production as a basis for future strategies to strengthen agricultural and rural development knowledge systems aimed at improving the welfare of rural communities in Namibia. Only by identifying relevant constraints and the most important variables can policies be designed and reasonably formulated for the uptake of new technology and so increase farming output (Bennett, 1984 : 13).

### 2. METHODOLOGY

The sample frame comprised landholders in the villages of Otshinyadhils, Onelago, Etolato and Onammulunga in the Owambo area of Namibia, which is also the most densely populated rural area in the country. A stratified random sample of 25% (50 respondents) according to village was drawn for the study.

Data were obtained from questionnaire interviews and

field observations. Scales were constructed to measure adoption of crop and livestock production practices (Tshikesho, 1991). Correlation analysis was used to test the inter-relationship of selected variables.

### 3. CHARACTERISTICS OF PRODUCERS

Research has shown that farmer characteristics such as marital status, age and education, and various socio-economic factors have an effect on agricultural production and general development trends (Bembridge, 1984; Bembridge, 1987).

#### 3.1 PERSONAL CHARACTERISTICS

The majority of heads of households were males (78%) and married (74%) (Table 1). The average family comprised 9,86 persons, which included the extended family. Average population growth in the study area was estimated at 4%, which is higher than for Namibia as a whole (UNICEF, 1990). Because of the high proportion of persons currently in or still to enter the reproductive age groups, population growth is likely to continue at a high rate.

The majority of heads of households (64%) were between 40 and 60 years of age, while 30% were over 60 years of age (Table 1). Some of the latter category may not have the necessary physical ability to carry out heavy agricultural and household tasks. Two in five (44%) heads of households and about one in five of their spouses (22%) had less than 5 years of education (Table 1), and were unlikely to be literate or responsive to written communication (Koshy, 1977). In this study level of education correlated positively with household

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income ( $P < 0.001$ ), household expenditure ( $P < 0.001$ ), housing standard ( $P < 0.05$ ), crop yield per ha ( $P < 0.05$ ) and cattle herd size ( $P < 0.05$ ). This confirms that better educated household heads had higher earning capacity and were able to make greater investments in farming.

TABLE 1 PERSONAL CHARACTERISTICS OF RESPONDENTS IN OWAMBO, 1990 (N = 50)

Characteristics	No.	%
Male head	39	78
Married head	37	74
Head > 60 years of age	15	30
<u>Education</u>		
Head < 5 years	22	44
Wives < 5 years	11	22

### 3.2 SOCIO-ECONOMIC CHARACTERISTICS

Of the two-thirds (66%) of heads of households in employment, (Table 2) 45% were working outside the area, which inevitably had a disruptive effect on the social life of the households concerned. The most common types of employment were in public services and mining. Almost two in five (16%) of heads of households were either headmen, sub-headmen or tribal elders. Practically all heads of households belonged to a world religion, mainly Lutheran (60%) and Roman Catholic (32%) and were regular church goers (70%). Other than churches, there was a low level of membership of local organisations (34%) and no local farmers' organisations had been formed in the area. Those who participated in local organisations were better educated ( $P < 0.01$ ) and had a greater knowledge of crop pests and diseases ( $P < 0.01$ ).

The level of poverty is to some extent manifested in the extent to which households acquired the basic amenities of rural life. Sixty per cent of households were living in either modern (38%) or semi-modern housing (22%). The majority of households (96%) possessed a radio and therefore had some contact with the outside world. However, very few possessed any form of transport or mechanical tillage implements and only half the households possessed a plough (Table 2).

In most households (88%) cooking was done on wood-fires with fuel wood gathered locally, while lighting was invariably provided by paraffin lamps. Two in five respondents (44%) had to walk more than 500 m to fetch water for the household.

TABLE 2 SOME SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS IN OWAMBO, 1990 (N = 50)

Characteristics	No.	%
Unemployed head	17	34
Tribal leaders	8	16
Organisation membership	18	36
Modern housing	19	38
Semi-modern housing	11	22
Ownership of radio	48	96
Ownership of TV	2	4
Motorised transport	3	6
Cycle transport	6	12
Ownership of tractor	2	4
Ownership of plough	25	50

TABLE 3 ESTIMATED ANNUAL HOUSEHOLD INCOME, EXPENDITURE AND EXPENDITURE ON FOOD IN OWAMBO (N = 53)

Variable	Mean R	S/D R
<u>INCOME</u>		
Wages	6 250,80	5 241,64
Value crops*	1 069,60	1 013,30
Livestock sales	247,90	467,31
	7 568,30	-
<u>EXPENDITURE</u>		
All items	3 021,60	2 281,56
Food	1 726,56	1 431,16

\* Calculated at value of purchased grain for food

On a per capita basis, average estimated household incomes of R7 568 for a family of 9,86 persons (Table 3) was below the minimum subsistence level of R6 776 estimated by Potgieter (1991) to be required for 6 persons in South Africa. An analysis of the household income distribution pattern revealed that at least half of

the households were probably living somewhat below the minimum subsistence level. However, because of lack of records, income and expenditure data in Table 3 should be interpreted with some caution. No account was taken of the value of livestock products consumed or utilised by the family, nor was the value of crops inter-planted with millet taken into consideration. Although household expenditure on food as a percentage of total expenditure (57%) was in line with other recent findings in South Africa (Bembridge and Williams, 1990 : 54; Bembridge, 1992 : 65), expressed as a percentage of total income, it was only 23%, which is more in line with more prosperous societies. Even allowing for such discrepancies, it is a reasonable hypothesis that the majority of households were living in varying degrees of poverty. It is clear that at present agriculture plays a fairly minor role in the household economy.

It was found that income from employment correlated significantly with household expenditure ( $P < 0,001$ ), expenditure on food ( $P < 0,001$ ), housing standard ( $P < 0,001$ ), number of cattle ( $P < 0,001$ ) adoption of cattle practices ( $P < 0,001$ ) and level of education ( $P < 0,001$ ). Thus the better off and better educated heads of households were able to enjoy higher living standards, and invest more in improving housing standards, as well as in cattle.

### 3.3 PERCEIVED NEEDS

Respondents were asked to state their needs to improve the quality of life, as well as farming and community needs. The finding that the major needs were for food (32%) and additional income (22%) confirms the poverty situation mentioned above. Additional perceived needs were for potable water (21%), household energy (13%), improved houses, medical care and education.

The most important perceived needs for agriculture were for the provision of inputs (43%), veterinary services (19%), animal feed (13%), draught power (11%) and extension services (5%). Community needs cited by respondents were for social and community services and infra-structural development, including clinics, schools, veterinary services, input supply centres, water supplies, roads and telephones, as well as for employment opportunities. All these factors are general constraints to rural development in the area.

## 4. AGRICULTURAL PRODUCTION

Owambo is situated in a sub-humid, semi-arid area, with the mean annual summer rainfall varying from 350 mm in the south to 550 mm in the north. Soils are mainly Kalahari sands, and the vegetation *Baikiaea plurijuga* and Mopane tree and tree-bush savanna. The area is basically suited to semi-extensive livestock production supported by drought resistant food and fodder crops.

### 4.1 LAND-USE

The majority of respondents (70%) owned cattle and goats and cultivated crops, while 30% only had access to arable land and did not own any livestock except for a few goats in some cases. In most cases arable land allotments were allocated by local chiefs on payment of a fixed sum (74% of cases) or inherited (22% of cases).

Pearl millet (*Pennisetum typhoides*) known locally as "Mahango" is the staple food crop, with sorghum as a secondary crop, mainly for beer making. The majority of respondents (98%) practised some or other form of mixed or inter-cropping of millet with beans, pumpkins and melons.

The average arable holding was 6,52 ha (S.D. 2,44) with the majority (82%) having more than the 4 ha estimated to be required for subsistence production. Vegetables were grown by only a small proportion of householders (14%) who had water near their homesteads.

Cattle and goats are run on free-range communal grazing areas. After harvesting animals have access to the grazing of crop residues. One in three (34%) of respondents stored millet and sorghum stubble for winter fodder, while 20% purchased lucerne or hay for winter feeding. Due to increased population and livestock pressure, there was evidence of considerable deterioration in the condition of grazing areas, together with soil erosion and denudation of woody vegetation due to exploitation for woodfuel.

### 4.2 CROP PRODUCTION

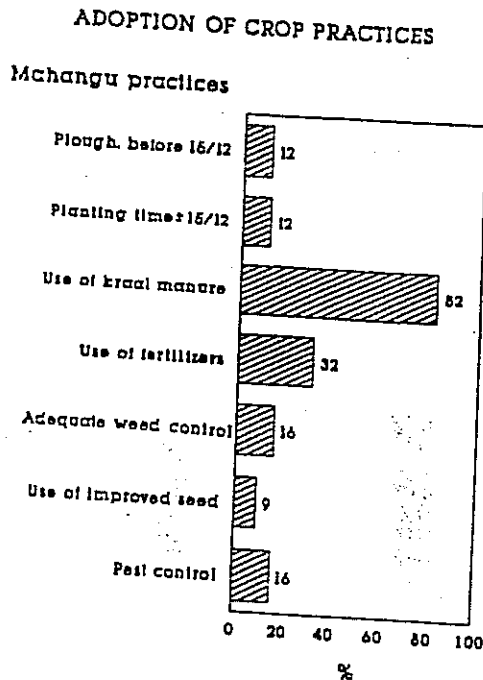
As shown in Table 2, only half the respondents owned a plough and only 4% owned a tractor. Cattle and donkeys were the main source of draught power.

#### 4.2.1 Adoption of crop production practices

It is only very recently that adaptive research on pearl millet production has been undertaken in Namibia. Based on current recommended practices (Lechner, 1990) Fig. 1 shows the adoption rate of important pearl millet cultural practices.

Only 12% ploughed and planted at the recommended time prior to 15 December. Because of draught animals being in poor condition, and in some cases, lack of draught animals, 50 per cent of farmers hired tractors for ploughing, 26 per cent used donkeys and 14% used hand hoes for land preparation. Planting was mainly carried out by hand with no standard row widths, making mechanical weed control difficult.

Although no plant population counts were made, yield, observation showed plant populations to be considerably below the optimum of 30 000 plants per ha.



**FIG. 1 PER CENT FARMERS ADOPTING PEARL MILLET (MAHANGU) GROWING PRACTICES (N = 50)**

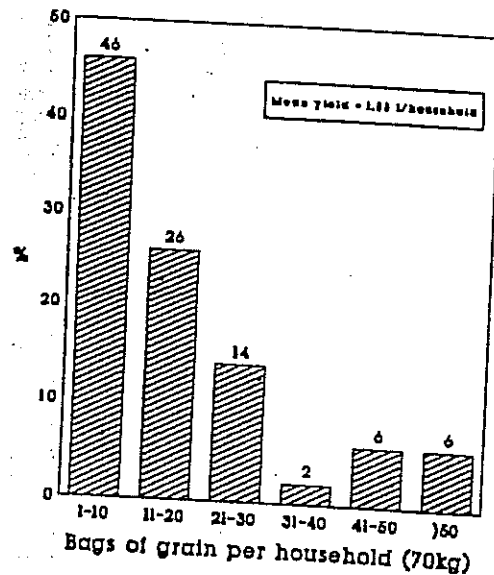
The majority of respondents (82%) used dry kraal manure, which was traditionally spread on the lands in September-October, and usually, subject to prevailing winds, blowing away a large proportion of the dry manure particles during October-November. Although one-third (32%) of farmers used artificial fertilizer, usually mixed with seed, application rates were less than 25 kg/ha, and therefore had no significant impact on yields. Furthermore, the type of fertilizer used was not recommended for pearl millet. In short, soil fertility was found to be a major cause of low crop yields. The majority of respondents (81%) used their own seed, with only 9% using improved hybrids (Fig. 1). In the absence of other cultural practices and low soil fertility, improved cultivars on their own are unlikely to increase yields. Because of indiscriminate scattered planting methods, weeding was invariably carried out by hand. Field observations showed that only 16% of respondents controlled weeds adequately (Fig. 1).

The major diseases and pests were crickets, eelworm, smut and bird damage. Only 16% carried out any form of pest or disease control (Fig. 1). Probably because of overall low adoption rates, there was no significant correlation between soil fertility and pest and weed control practices. Those farmers who adopted most recommended cropping practices also adopted significantly more livestock practices ( $P < 0,001$ ). They also had significantly higher levels of education ( $P < 0,05$ ) and household expenditure ( $P < 0,05$ ). It can be concluded therefore, that there are a number of reasonably pro-

gressive farmers in the area.

#### 4.2.2 Crop yields

With an average family size of 9,86 persons, each family would require approximately 1,5 tons of grain for subsistence purposes (Tapson, 1985 : 236). According to Fig. 2, on average, only 28% of households produced their subsistence requirements. On average 1,33 tons were produced per household. This was substantiated by questioning heads of households, where 74% claimed not to have produced adequate grain for household consumption. The average yield per ha was 274 kg (S.D. 221), with the highest yields being 1,6 tons per ha. The latter figure gives an indication of the gap between present and potential yields. The total crop produced correlated significantly with size of arable land ( $P < 0,001$ ). On average each household purchased 231 kg (S.D. 126) of grain per annum.



**FIG. 2 DISTRIBUTION OF HEADS OF HOUSEHOLDS ACCORDING TO BAGS OF PEARL MILLET (MAHANGU) GRAIN PER HOUSEHOLD 1990 (N = 50)**

#### 4.3 LIVESTOCK PRODUCTION

As with Namibia as a whole, cattle production is the mainstay of the rural economy of Owambo. In Owambo goats are second in importance to cattle. Donkeys are used exclusively for draught power, while sheep and pigs are small in number.

##### 4.3.1 Cattle production

Cattle are fundamental to the wealth of rural households, where quantity is of greater importance than quality.

Owambo small-scale farmers generally own more animals than those landholders in the developing areas of South Africa (Bembridge, 1987 : 76). The majority of householders (60%) owned more than 10 head of cattle, which is considered the minimum for household subsistence and socio-cultural requirements (Table 4). The average herd size was 16,96 head.

TABLE 4 DISTRIBUTION OF HEADS OF HOUSEHOLDS ACCORDING TO CATTLE HERD SIZE IN OWAMBO, 1990 (N = 50)

Herd size category	No.	%
Nil	14	28
1 - 5	1	2
6 - 10	5	10
11 - 15	6	12
16 - 20	10	20
21 - 25	7	14
26 - 30	1	2
> 30	6	12
Total	50	100

An analysis of herd composition showed reasonably well balanced herds, and an average weaning percentage of 59% expressed as the number of calves weaned to number of cows mated. Herd mortality was, however, relatively high at 9,9%. Average milk yield per cow milked was approximately 3,0 litres per day. This was sufficient to provide only 56% of householders with sufficient milk. Off take, in terms of average value of animals sold was low at R128,00 per annum. However, it is now well known that in traditional societies cattle play a different socio-economic and cultural role than is the case in purely commercial herds. In this study it was found that in order of importance cattle played important roles as a source of security, traditional ceremonies and customs, supply of milk, manure, meat for the household, cash sales and draught power (Tshikesho, 1991).

#### 4.3.2 Cattle management practices

The general level of adoption of modern cattle management practices was extremely low. Livestock were managed with the minimum of infrastructure, with the only fixed facilities being the "cattle kraal". Cattle and goats are usually herded during the day and kraaled at night. The main reasons for herding given by respondents were to keep cattle out of the crops, security reasons, and to accumulate manure. Usually children and other relatives were responsible for herding. About

one third (32%) of cattle owners moved their cattle in summer to outlying cattle posts, where grazing was relatively under-utilized.

It was found that a minority of producers practised basic management practices such as castrating at the correct time (39%) and inoculating animals against epizootic diseases (36%). There was no control of external parasites by dipping, neither was there any form of internal parasite control. Besides lack of knowledge, the prolonged war in the area also affected low rates of basic management and disease control practices, which was undoubtedly the major reason for the high herd mortality rates referred to above.

Improved bulls were used by only 4% of respondents. In any event, before any genetic improvement can be expected, it is first necessary to apply basic cattle and grazing management practices. In treating sick animals only one in four (26%) consulted a stock inspector or state veterinarian. One in three (34%) used traditional remedies, whilst the remainder (40%) did not provide any treatment. The most important epizootic diseases cited by respondents in order of importance were Bovine contagious pleuro-pneumonia, Anaplasmosis, Botulism and Black Quarter.

### 3.3 OTHER LIVESTOCK

Goats were next in order of importance to cattle in Owambo. On average, householders kept 33 goats. While there was some cross-breeding using Boer goat rams, the majority were of the long haired indigenous type. Average kid weaning percentage was calculated at 59% and actual sales were low, averaging R61,70 per producer. The main value of goats to producers was for household consumption for meat, and to a much lesser extent, for milk. Only 28% used goats for milk. As with cattle, management standards were low.

Sheep do not play a significant role in the life of the Owambo people. Only one in ten respondents owned one or two sheep.

While more than half of the respondents owned pigs, only 2% owned more than 4 pigs. Pigs were mainly of the indigenous type and were kept for home slaughter and for sale. On average pigs contributed R26,60 to household income. Management was primitive and piglet mortality high.

Although poultry have been part of the domestic scene in Owambo for some decades only 16% of respondents owned any birds, where small numbers, on average 15 birds per household, mainly indigenous type, were kept for home consumption.

Donkeys were kept by 36% of producers, mainly as a source of draught power.

## 5. CONCLUSIONS AND IMPLICATIONS

A general conclusion was that in Owambo, where 60% of the population is concentrated, there can be little increase in rural output beyond the means of subsistence without diversification and changes in agricultural production systems. In the case of small-scale farming systems, it is also true that rural households can only become prosperous to the extent that non-agricultural development also advances. The latter was beyond the scope of this study.

There is clearly a great need for further investment in human capital formation, particularly in addressing the problems of illiteracy, as well as farming knowledge and skills. The crucial part of human resources development is that it is concerned with social systems.

Present agricultural knowledge systems in Owambo are weak and under-developed. In order to develop the knowledge system there is a need for the supply-push of research and extension to interact with the demand of rural people themselves. Technology needs to be adapted and developed for local conditions by consultation and testing under local conditions.

The role of extension and research is not to recommend "packages of practices" or "new technology" to producers, but rather to produce alternative options to be tested by producers. This can be achieved by research, extension and farmers being involved in co-operative studies of rural life and production, to describe and explain existing systems, to determine the needs of rural householders, what constraints need to be overcome, and to assess the services they need from research, extension and education to help them to achieve their objectives.

There is a need not only to strengthen extension services, but for greater emphasis on a more people-centred, adaptive type of extension that works towards greater participation of rural communities. Extension workers need to act as facilitators by providing alternatives, as well as catalysts in mobilising rural communities to make decisions in solving their own problems. In this study it was found that agricultural organisations were non-existent. There is thus a need to work through existing structures in developing rural organisations and leadership.

Strong organisations are important in creating awareness, leadership development, horizontal communication, group cohesiveness and other group attributes which can enhance the ability of rural communities to solve their own problems. This involves high level political commitment.

In forming groups it is necessary to differentiate between

groups according to the ability to acquire and use technology so that there is no competition between groups with different resources. This will ensure horizontal diffusion of technology.

In Namibia small-scale livestock production is a form of capital accumulation and methods to achieve subsistence and fulfil cultural and social needs. There is a need for a holistic approach to planning and management of communal grazing areas and arable land allotments, ensuring the participation of producers in the whole process.

Regulations and control by local authorities of grazing rights could help in promoting effective use of resources for increased livestock production. A livestock development strategy involving the commitment of producers could explore various options, but it will require substantial investment in infrastructure and services.

The results of this study show that there is a need for a broader definition of the role of extension to include rural development in terms of fulfilling basic needs such as water supplies, food, energy and capital information. Its main task should lie in the identification of useful information, focusing on rural communities, as well as encouraging active participation and developing links with external organisations, including input suppliers, credit and marketing agencies, research, servicing organisations and the private sector.

Besides identifying some of the constraints leading to suggestions for considerations in planning future agricultural and rural development strategies in Owambo, the results of this study also provide a bench-mark for evaluating the future impact of new strategies.

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