

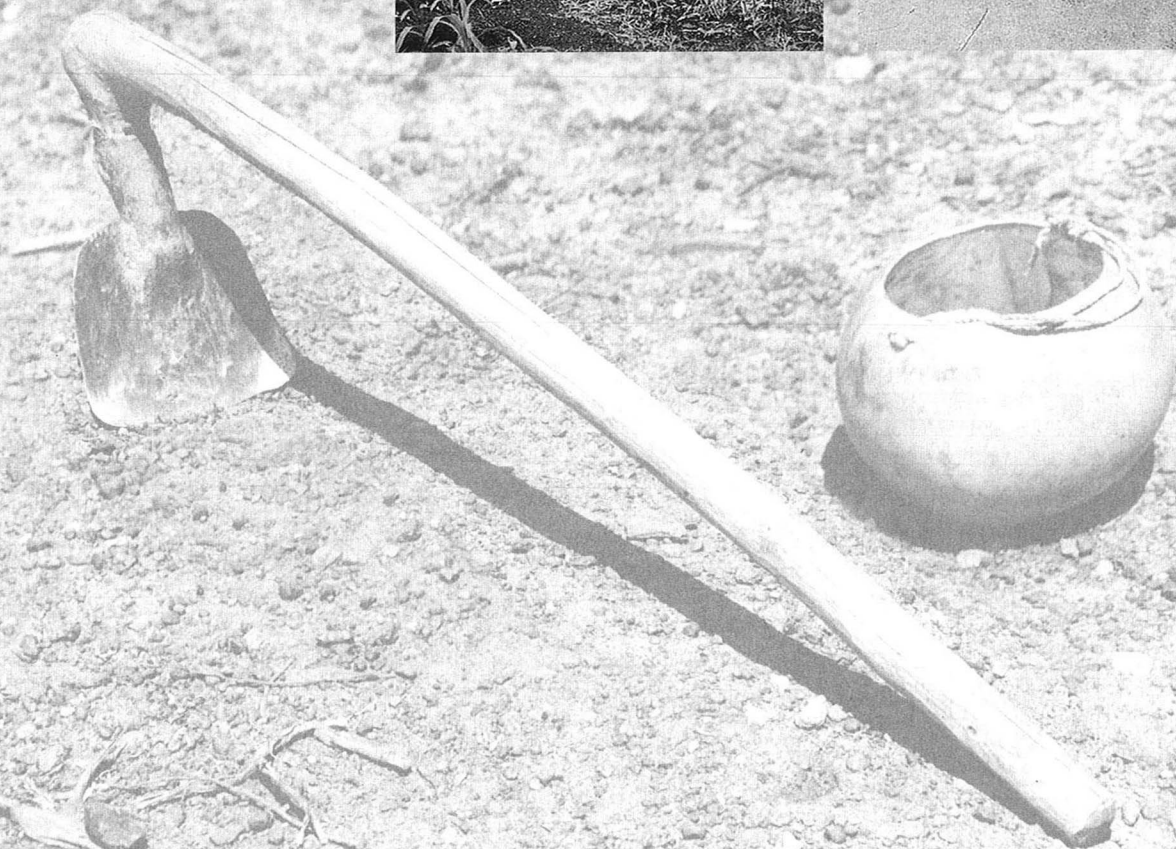


Agricultural Implements Used by Women Farmers in Africa



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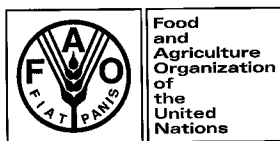
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Foreword

The present study was instigated by the Technical Advisory Division of the International Fund for Agricultural Development (IFAD). Members of that Division, particularly staff concerned with gender and household food security issues, were concerned that although some progress had been made in terms of providing post-harvest equipment – especially cereal mills – to women in Africa, little if anything had been done in respect of tools and implements for agricultural production up to and including harvesting. Attempts to introduce new tools for cultivating or other operations had been often rejected by rural people, but with more than 70% of all food production work now being carried out by women in Africa, and with household food security hanging in the balance in so many countries, increased productivity and reduced workloads for women could well be central to improving family welfare.

As a first step, a study was required to establish the social, cultural, economic and technical context of any attempt to improve the agricultural production tools and implements used on the land by African women. The Government of Japan agreed to finance the services of an international consultant to conduct such a study in Burkina Faso, Senegal, Uganda, Zambia and Zimbabwe over a period of three months.

The Agricultural Engineering Branch (AGSE) of the Food and Agriculture Organization of the United Nations (FAO) expressed interest in cooperating in the study, which coincided with that organization's increasing concern regarding the gender aspects of agricultural engineering and emphasis on all aspects of farm power – human, animal or motorized. To this end, AGSE agreed to: (i) finance the salaries, subsistence and travel of eight local researchers in the two West African countries covered by the study; (ii) arrange for the FAO/Swedish International Development Agency (SIDA)-supported Farm-Level Research Methods in Eastern and Southern Africa (FARMESA) Programme to assume similar costs in the three countries of eastern and southern Africa covered by the study; (iii) assign an Associate Professional Officer (APO) from the FAO Regional Office for Africa to assist in field work in the two West African countries; and (iv) assign an FAO Headquarters-based APO to do similar work in the three countries of eastern and southern Africa and to assist in processing the research results and writing the reports.

The team responsible for conducting the study and for preparing the present report comprised Messrs Colin Fraser of Agrisystems (Overseas) Ltd. (team leader and communications/participatory research specialist), Gert van der Meijden (agricultural engineer/APO stationed at the FAO Regional Office in Accra), and Josef Kienzle (agricultural engineer/APO at FAO Headquarters in Rome). For the countries of eastern and southern Africa, the team was joined on a voluntary basis by Ms Sonia Restrepo Estrada, communications/participatory research specialist,

who assisted in the training sessions, field work and subsequent analyses. Eight field researchers worked in each country. The field work took place between August and November 1997, and the report was presented at a seminar organized at IFAD in April 1998.

A qualitative research approach was adopted for the study. Rather than gathering statistical or numerical information from groups of rural people – for example, the number of days women spend in the field on various operations – the aim was mainly to ascertain their perceptions of the work involved and thereby identify which operations should take priority for improvement.

Abdelmajid Slama
Director
Technical Advisory Division

Acknowledgements

Particular thanks are due to the Government of Japan which agreed to fund the study through its special contribution for women-in-development.

The study team wishes to acknowledge the excellent preparatory work and support provided by the coordinators in each country. All the research teams showed an outstanding ability to learn the participatory research methods used and a remarkable commitment to ensuring that the field work was done properly.

Thanks are also due to staff of FAO country offices, IFAD projects and the FARMESA programme for their interest and support. Special thanks must go to Dr Mona Fikry, the IFAD staff member who launched the idea of the study and who supervised it, and to Dr Lawrence Clarke, Chief, AGSE/FAO, for his wholehearted support.

Contents

	Page
Foreword	iii
Acknowledgements	v
Executive Summary	ix
Findings and Recommendations.....	ix
Preface	xiii
Scope of the Study and Methods Used.....	xiii
Chapter 1	
Main Findings	1
Differences Between the Countries Reviewed:	
General Observations.....	2
The Role of Women in Agriculture.....	3
Tools.....	4
Working Posture.....	6
Draught Animals for Women.....	7
Small Tractors and Other Motorized Equipment.....	8
Women's Access to Land.....	8
Credit for Women.....	8
The Role of Women's Groups.....	9
The Institutional Sector.....	9
Ergonomic Studies.....	10
The NGO Sector.....	10
Blacksmiths.....	10
The Commercial and Industrial Sectors.....	11
The Oxen vs. Donkey Debate.....	13
Chapter 2	
What Women and Men Farmers Say	15
Women's Hardest Job.....	16
Differences in the Tools Used by Men and Women.....	17
Replacement of Tools.....	17
Blacksmith – vs. Industrially-Made Tools and Implements.....	17
Prices.....	18
Who Decides Which Tools to Buy?.....	18
Willingness to Work with Technicians to Develop Better Tools and to Pay More for Improved Versions.....	20

Chapter 3

Conclusions and Recommendations 23

 General 24

 Limited Resources Available to Women 24

 Weeding as Women's Hardest Job and as a Major
 Constraint to Increased Production 25

 Lack of Information Flow Between Importers/Producers of Tools
 and Farmers and the General Isolation of the Commercial Sector..... 26

 Lack of Training in Animal Traction for Women..... 28

 Lack of Research on Women's Production Technology 28

 Attempts to Introduce Exogenous Technology 29

Annex 1

Country Case Study

Burkina Faso 31

Annex 2

Country Case Study

Senegal 47

Annex 3

Country Case Study

Uganda..... 63

Annex 4

Country Case Study

Zambia..... 81

Annex 5

Country Case Study

Zimbabwe 95

Annex 6

Photographs and Descriptions

of Tools and Implements..... 115

Executive Summary

Findings and Recommendations

The study was conducted in Burkina Faso, Senegal, Uganda, Zambia and Zimbabwe. A qualitative research technique, known as Focus Group Discussions (FGDs), was used in a series of sessions with some 1 500 women and men farmers. These discussions were complemented by 52 interviews with key informants in the government, non-government and commercial sectors. The research took place in areas of relatively poor agriculture where women are assuming an ever-increasing role in farm work, mainly because the men migrate to towns and cities in search of work.

The poor socio-economic status of women in rural Africa impinges strongly on the production tools and implements they use. Women's direct access to cash from work on the family holding is usually minimal because, traditionally, men control most of the cash crop revenues. Credit is virtually unavailable to women. Indeed, it is rarely available to any small farmer – man or woman – in the countries covered by the study, although Senegal is about to relaunch credit schemes. However, for women farmers, the situation is even more difficult because land and cultivation rights are ascribed almost exclusively to men, and women can thus offer no collateral for loans. Furthermore, usually they are too burdened with farm and family chores to be able to spend time on the bureaucratic process of obtaining credit. And, finally, their literacy and numeracy skills are often lower than those of the men, which adds to their difficulties.

Under present circumstances, the only way that women can obtain land and credit is through women's groups. However, the land that community authorities allocate to women's groups tends to be far from the village and of poor quality, and the women are seldom allowed to use it for more than one or two years because otherwise they would acquire permanent rights to it.

In some of the countries covered by the study, there had been a backlash of resentment from men due to what they saw as an excessive and exclusive emphasis on women-in-development programmes over the last decade or so, and a similar backlash seemed to be building up in others. Some of the countries appeared to be avoiding the problem, or solving it, by developing a family focus for development rather than focusing solely on women. In some countries, women's groups were even inviting men to join.

In the past, there was a clear distinction between the role of men and women in farming. But this distinction has become blurred, with women handling all the work while their men are away. The improved status and recognition that women might logically expect due to their increased responsibilities and workloads has not yet materialized and, as a general rule, rural society still treats them as second-class citizens. For their part, most women continue to accept that it is natural for them to work ever harder, with little material benefit or improvement in status.

There were significant differences in the levels and types of production tools used in the countries under review. The lowest level of technology was found in Burkina Faso, where the few animal-draught implements and all hand tools seen in the study area had been made by blacksmiths using poor-quality scrap material. The best tools and implements were seen in Zimbabwe, where they were produced by

industrial concerns or blacksmiths, the latter having access to high-quality scrap – mainly from old ploughshares and defunct tractor-drawn implements.

The hand-hoe is still the farm implement most used in all the countries reviewed. However, the quality and durability of this implement are often poor, and little can be done to improve its design.

Many of the groups stated that the hand-hoe imposed strict limitations on production and that they would never make any progress without access to animal traction. Indeed, in every area where it was known, animal traction was widely seen as the solution to the farmers' problems. However, the spread of this technology is, at best, slow; and in some countries its use is blocked, or has actually retreated, because of animal disease, unfavourable weather conditions, lack of credit, and taboos against women working with cattle.

There were no taboos against women working with donkeys in the areas covered by the study. Since donkeys are seen as low-class animals which involve less initial costs compared with bovines, they are more accessible to poor women.

In all the countries reviewed, the axes, slashers and harvesting tools used were much the same, but there was wider variation among implements and tools for tillage, planting and weeding. The basic African hoe of the chop-down-and-pull type showed variations in the length of the handle, the width and weight of the blade and in the method of fixing the blade to the handle.

An entirely different type of weeding hoe was found only in Senegal. This was a very long-handled push-pull hoe that allows the user to stand upright and is widely used in the central part of the country: the short-handled, more traditional hoes that obliged the farmer to work in a squatting or crouched position had been almost totally abandoned.

In all probability, the traditional African hoe has evolved locally over time in accordance with the particular soil conditions and tasks involved. However, almost everywhere except Senegal, there is a widespread belief that work can be properly performed only if the worker is bent double and armed with a short-handled hoe. This type of cultural conditioning is an obstacle to the introduction of more comfortable long-handled implements, such as jab planters and the like, since working upright is perceived as laziness.

Among the groups consulted, it was generally felt that women needed different tools to men and that manufacturers should differentiate between the two sexes, as they do with bicycles. Unfortunately, as a general rule, manufacturers and importers of tools and implements undertake no market research, have no follow-up links with their clients, do little to ensure that the full range of their wares is available at sales points, and seem to ignore the fact that, nowadays, the main users of their products or imports are women. As a result, many implements, especially animal-draught cultivators, are too heavy for the women. People have to buy whatever they can find, without being able to choose, for example, a lighter model of hand-hoe that would make weeding easier for women. Nor is there any consultation between blacksmiths and their women clients that might lead to more suitable tools being produced.

Of all the women's tasks on the land, the consensus was that weeding with a hand-hoe was the most punishing and time-consuming and that it caused fatigue and back-ache. Passing an animal-drawn inter-row cultivator through a crop, thus leaving only the spaces between the plants in the row to be weeded by hand, can reduce the weeding time per acre from two-to-four weeks to two-to-four days. However, this obviously requires familiarity with animal-drawn planters or hand-planting in rows. Government services and institutions still concentrate their support on men. Thus, the majority of animal-traction training courses are aimed only at men, despite the fact that it is the women who really need such training.

In conclusion, there is no quick or simple solution to improving the production tools and implements used by women. However, to bring about any change in the situation requires action on the part of governments, development agencies and non-governmental organizations (NGOs). This might involve:

Organizational Issues

- Initiating specific, well-planned and sustained communication efforts to bring about greater awareness of the enormous role that women play in African farming and of their special needs in terms of production tools and implements.
- Continuing to promote women's groups, with the involvement of some men, and adopting a family development focus rather than focusing exclusively on women.

Market Issues

- Working in the closest possible cooperation with private sector producers or importers of tools and implements, inducing them to undertake market research and involving them in meeting farmers' needs, especially those of women.
- Accentuating the importance of production tools and implements in development projects, creating a demand-led environment for such items and establishing the necessary delivery/supply networks.
- Encouraging governments to pursue tax and duty policies favourable to local producers and distributors of tools and implements.

Training Issues

- Becoming proactive in ensuring women farmers' involvement in demonstration and training activities concerning, for example, animal traction.
- Intensifying training programmes for blacksmiths and promoting forums for consultation between blacksmiths and their male and female clients.
- Causing extension services to include advice on farm tools and implements in their traditional messages concerning production techniques, seeds, fertilizer, etc.

Research and Development Issues

- Promoting ergonomic research projects on women's use of energy with different types of tools, for instance, with varying hoe weights and blade widths in diverse soils, etc.
- Working in close consultation with potential users at all stages of the importation and testing of exogenous tools (for example, jab planters, seeders for attachment to ploughs, etc.), and investigating cases of non-acceptability.
- In cooperation with potential beneficiaries, making a careful study of the weeding problem; examining the possibility of promoting row planting and the use of donkeys with light-weight weeders; and taking into account the concomitant need for animal care and veterinary services.

Preface

Scope of the Study and Methods Used

The five countries covered by the study were selected on the basis of their providing a fair cross-section of sub-Saharan Africa and as the site of a number of IFAD and FAO-assisted projects that could provide field support.

The tools and implements used were reviewed from three main standpoints:

- the possibility of improving the tools used by women;
- determining why certain tools and implements were not always accessible to women; and
- identifying recently-introduced farm production techniques necessitating locally-available tools and implements.

The term *improvement* in respect of tools and implements can be taken to mean anything that will reduce the time or physical effort required to do a particular task; increase production and economic returns; and/or attenuate the health and safety risks.

Given the factors of culture and tradition surrounding the tools used by rural people, it was deemed unlikely that research based on normal interviews would provide the information required. People with little formal education are often reluctant to reveal what they really think and they tend to tailor their replies to what they think the interviewer wants to hear. This being the case, the team leader proposed using a participatory research technique based on separate FGDs for rural women and men.

The FGDs bring together eight to twelve people of similar educational, economic and social backgrounds with the same lifestyle and problems. The groups are segregated by sex in the event it is felt likely, as for this study, that the men might dominate the discussions. A facilitator and an observer are present at all times, and the aim is to create an informal atmosphere for group members to talk among themselves about the themes put forward by the facilitator. The speakers follow a basic question guide but are expected to pose follow-up questions that provoke deeper analysis of the issues being discussed by the group. This method has much in common with group therapy, but special techniques have to be used by the facilitator and observer if it is to function well as a process and faithfully record a group's ideas and opinions.

For the purpose of this study, the FGDs were backed up by interviews with persons working in the government, non-governmental and private sectors concerned with agricultural production, gender issues, and farm mechanization.

In each country, the team leader – supported by one of the APOs – trained eight local researchers in FGD techniques. There were always at least four or more women among the eight researchers. Almost all the researchers were staff of institutions working in the field of agricultural production systems and women's role therein. Each training workshop was of two-to-three day duration, followed by another two-to-three days of supervision and training in the field. In order to demonstrate the participatory research technique, the workshops began with a group discussion among the trainees – the latter, in effect, constituting a focus group.

Following the discussions, the APO – acting as observer – summarized the information that had emerged, using flip charts for the purpose. The trainees then held FGDs among themselves, analysing the way the facilitator and observer had performed, and thus the training was a highly practical learning-by-doing experience.

The discussion themes followed during the workshops related specifically to women and agriculture in order that the team leader and APO would be provided with a broad picture of the national situation.

For the two-to-three day training sessions in rural communities, the researchers worked under the general supervision of the team leader and the APO. This was followed by a review of the results of each FGD, which helped the facilitator and the observer to refine their command of the technique. The researchers then worked for another week in the field without the team leader and APO with a view to eliminating any possible distortions caused by the presence of foreigners.

The question guides for the FGDs, which were drawn up by the team leader prior to leaving for Africa, were discussed with each of the research teams; modified slightly to facilitate translation into local languages or to suit local conditions; and, if necessary, further modified after initial use in the field. Thus, the question guides changed to some extent, mainly in the first two or three countries, but the changes were of a specific nature and the overall thrust of the research remained the same for each country.

In all, 155 FGDs were conducted in the five countries covered by the study, including 119 with women and 36 with men, for a total of approximately 1 530 people. Local languages were used for all FGDs with rural people. Fifty-two interviews, conducted by the team leader, the APO and the study coordinators, were held with government staff concerned with agricultural development, gender matters, and mechanization; representatives of banking and credit services; university and research staff; representatives of NGOs; blacksmiths; and importers and manufacturers of tools and implements.

As a general rule, the study was conducted in areas of relatively poor agriculture where most of the men had left to seek work in the urban areas and women were thus assuming an ever-increasing role in farm work. The agricultural economy of these areas was mainly at the subsistence level, with consequent limitations on the availability of resources for investment in improved production technology.



Differences Between the Countries Reviewed:

General Observations

There were significant differences in the levels and types of tools and implements used in the five countries reviewed. Although there were strong similarities among the axes, harvesting sickles and slashers, some tools were not available in all the countries. For example, no wheelbarrowers were seen in Senegal; and there were no rakes or multiple-tined forks for composting in Burkina Faso although it was the only country which had a simple home-made row marker – like a large rake with three spikes set at the desired row-width – that could be pulled across the field by hand before planting. In countries of eastern and southern Africa, row-planting by hand is achieved with the much more cumbersome technique of stretching a marking wire or cord across the plot; and, in Uganda, women have adopted a flexible steel strip, normally used to tie roof timbers together, as a tool for weeding millet.

With the exception of the very practical row marker, the lowest end of the production technology scale was found in the Central Plateau of Burkina Faso. Most of the country's population live in that area, but conditions are so difficult that few farmers have anything but a hand-hoe as their main production tool. The few animal-

draught implements seen in the Central Plateau area were built by blacksmiths and were usually fitted with a duckfoot tine for inter-row planting. No industrially-produced implements were found in the area of the study in Burkina Faso, probably because such items cost about twice as much as those built by blacksmiths and no credit is available to buy them. Indeed, credit organizations that previously provided five-year loans for animal traction packages no

"In the past we used ox-drawn implements, but not any more.

The implements are worn out and most of our animals have died from tick-borne disease. The hand-hoe is the key to our farming now."

Women during group discussion in Zambia

longer do so on the grounds that this is no longer viable in the Central Plateau.

In Senegal, many animal-draught implements are still in use today thanks to major government/donor efforts to promote animal traction from the mid-1960s through the end of the 1970s. However, the credit schemes that made this expansion possible collapsed in 1980, and thus most of the implements are old and show signs of repeated repair. Even so, and as an example of the degree to which animal traction has taken over, hand-planting of crops has virtually disappeared in the study area. Old, single-row planters – usually horse-drawn – still serve their purpose, and women demonstrated how they used to plant with hand-hoes in the past. At the time of the study, plans were afoot to re-launch agricultural credit schemes which, with a repayment period of up to five years, would once again allow for the purchase of industrially-produced animal-draught implements. From 1980 to 1997, almost all new implements were built by blacksmiths.

In Uganda, animal traction is confined to the northern and eastern parts of the country. The reasons for this relate to history, culture and the presence of tsetse fly in other areas, although this pest is well on the way to being eradicated. Hoe farming is still the norm in central Uganda, where conditions for agriculture are very

favourable. But there is growing interest in animal traction, and a factory in Soroti is producing animal-draught implements.

The hand-hoe also predominates in Zambia. The spread of animal traction in the country has been impeded by several factors, including high import duties on raw materials that make it virtually impossible for the manufacturers to survive. The factories that existed in the country have collapsed over the last few years, and implements now have to be imported from Zimbabwe where both exports and steel are subsidized. In recent years, the tick-borne Corridor Disease has decimated the cattle population, including draught oxen, and as Zambia has no significant donkey population, these animals have to be imported from Zimbabwe or Botswana.

Of all the countries covered by this study, Zimbabwe has the highest level of farm production technology. Animal traction, mainly with oxen but also donkeys in some areas, is very widespread. One reason for this is the presence in Bulawayo of an impressive manufacturing facility for animal-draught implements, which has been in existence in one form or another since 1929. In addition, the general level of the Zimbabwean agricultural economy is superior to that of the other countries reviewed, and this obviously facilitates investment in tools and implements.

There is an interesting difference in the cultivation practices followed in the countries reviewed, particularly between those in West Africa, which are Sahelian countries, and those in eastern and southern Africa. Where animal traction is used in Burkina Faso and Senegal, mouldboard ploughs are hardly ever used, although they are the norm in Uganda, Zambia and Zimbabwe. In Burkina Faso and Senegal, a cultivator is usually run over the surface of the field, immediately followed by the mechanical or hand-planter. This difference is probably due to climate and soil types: during the dry season in the Sahel, the hard soils make it difficult to use the mouldboard ploughs and, given the very limited rainfall and short cropping season, planting must be done as soon as the first rains fall and soften-up the surface. A cultivator quickly loosens up the top few centimetres of soil so that the planter can be used, and thus it can be said that 'necessity is the mother' of decisions regarding low-till or no-till in the Sahel. Deeper primary tillage is used only for groundnuts and maize so as to retain more soil moisture in areas where the rainfall is barely sufficient for this purpose.

The Role of Women in Agriculture

In recent years, much has been written about the role of rural women in Africa. This being the case, the present report provides only the salient points that emerged from the study, placed in the context of how they relate to production technology used by women¹.

The agricultural systems and women's role therein were found to be similar in the five countries covered by the study. There is usually a family plot of land, typically

1. A complete picture of the situation of rural women in Africa and elsewhere can be obtained from such publications as: *IFAD's Strategies for the Economic Advancement of Poor Rural Women*, 1991; *The State of Rural Poverty*, IFAD, 1992; and *Household Food Security; Implications for Policy and Action for Rural Poverty Alleviation and Nutrition*, IFAD 1996. *Rural Women and Food Security: Current Situation and Perspectives*, FAO, 1997.

"If a woman starts to earn too much cash from her garden (plot) she will get into trouble with her husband."

Comment by member of field research team,
Zimbabwe

"Women work their individual plots very early in the morning or late in the afternoon, when they don't have other tasks such as cooking and when they are freed by their husbands."

Conclusions of research team, Burkina Faso

"Women do the work; men are in charge!"

Extension worker and field researcher,
Burkina Faso

ranging from 2 to 5 ha which is assigned to the male head of the family by the village leaders or local authorities. The man allocates a small piece of the land – usually about 1 000-5 000 m² – to his wife or to each of his wives, polygamy being very common in the countries concerned.

The principal cash crops are grown on the family plot; but in predominantly subsistence situations, such as in Burkina Faso, the staple family cereals are also grown there and the wife is responsible for producing items such as vegetables, pulses, groundnuts, etc., for home consumption and, to a limited extent, for sale.

The family plot takes absolute priority. The women are allowed to work their individual plots only very early in the morning or once their husbands free them after the day's work on the family plot is over.

In the past, there was a clear distinction between men's and women's role in agriculture. For example, in most countries, the men took care of clearing or tilling the land prior to planting, using ox-power when they had it. Where a mechanical planter was available, the men would also undertake that operation, otherwise the women and children would do the planting by hand. Thereafter, all the weeding and most of the harvesting operations were usually done by the women. Today, these distinctions have become blurred. Many men have left the land to work in the towns or neighbouring countries. The phenomenon is so marked in some areas that, according to reports available in Burkina Faso, women sometimes represent as much as 80% or more of the adult rural population. In these circumstances, women have been forced to take on tasks that were traditionally handled by men, over and above their own duties of hand-planting, weeding and harvesting. In the area of livestock, the men usually look after the cattle, but the women are responsible for the milking and for small ruminants and poultry.

Even when they spend most of their time working in town, men are still considered to be the main decision-makers about farming. In addition, they control all sales of farm produce and the family's finances.

Tools

The hand-hoe was seen to be the main farm implement in all the countries covered by the study. Uganda may be an extreme case, but in 1997, it was estimated that almost 90% of the farmers in that country used only hand tools and human labour to work their lands, and that animal-draught power and tractors were used on only 8% and 2%, respectively, of the cultivated land.

The hoe comes in various forms in Africa but invariably it is of the traditional chop-down-and-pull type, except for the long-handled push-pull hoe found in Senegal that cuts the weeds just below the surface of the soil (similar to the so-called

Dutch hoe used in Europe). This hoe, which can be used while standing upright, was introduced into Senegal in the mid-1930s and is known locally as the *bilaire*. It is always used for weeding in central Senegal, displacing the more traditional hoes.

The way the hoe's blade is fitted to the handle varies from country to country, but there are three basic methods: (i) the tang fitting, where a steel point, or tang, is burned through the bulbous end of a handle; (ii) the socket fitting, where the steel at the top of the blade is bent into a circular-shaped socket; and (iii) the eye-ring fitting, where the handle is inserted into a forged ring at the top of the blade. The tang and socket fittings can be made easily by blacksmiths, but an eye-ring fitting is usually a sign that the hoe has been produced industrially. Hoes with socket fittings are generally sold without handles, which the buyer makes from wood, whereas the tang-fitting version is usually sold complete with handle because the tang has to be heated and burned through the wooden handle. In some countries (e.g., Senegal), handle-making is the preserve of a certain ethnic group or caste which cooperate with the blacksmiths, another caste, in producing complete tools.

In Burkina Faso and Senegal, very few imported or industrially-produced hoes exist; almost all these tools are made by local blacksmiths from poor-quality scrap. In Zimbabwe, too, most of the hoes are produced by blacksmiths but, here, good-quality steel from old ploughshares or tractor-drawn implements is used. In Uganda, the hoes are almost always of the eye-ring type, and are either imported or made on an industrial scale within the country. In Zambia, there is a mixture of imported and locally-produced hoes, with the latter predominating, at least in the areas where the study was conducted. As in Zimbabwe, the steel used by blacksmiths in Zambia is often recovered from old ploughshares or tractor-drawn implements.

Burkina Faso was the only country where a special planting tool was seen. Known as the *pioche* (pick), this tool looks like a small, short-handled hoe with a narrow blade made from a car spring. In other countries, small hoes, or worn-down larger hoes, were used for hand planting.

In Burkina Faso, the farmers use a tool for marking the rows in the soil prior to planting. This resembles a very large rake with three teeth set at the desired row-width, and it is made either of tree branches (by the farmers) or of steel (by the blacksmiths). Pulling it across the field by hand is a quick way of scratching the row marks in the soil. In no other country was such a tool to be found and, in most places where hand-planting followed by animal-draught inter-row cultivation is common, the planting rows are marked by stretching a wire or cord tightly across the plot.

Various types of cutting and harvesting tools were found in all the countries reviewed, the most common being axes and pangas, or slashers. The axes were usually made by local blacksmiths, but the pangas were produced locally or imported from countries such as Brazil, India and China. Locally-made and/or imported sickles were found in all the countries reviewed. In Uganda, the farmers use a knife fixed to a small branch for pruning plantains, and women use small strips of flexible steel, normally used for tying roofing timbers together, as a tool for weeding millet.

Locally-made rakes and forks, mainly for compost-making and preparing seed

beds in vegetable plots, were found in all the countries reviewed except Burkina Faso. Although compost-making has become quite common in Burkina Faso in recent years, the farmers are forced to use normal hoes – which are certainly not as convenient as rakes and forks – for this task.

Knapsack sprayers were being used for horticultural production in some communities in the eastern and southern African countries covered by the study, as were watering cans, wheelbarrows, ox-carts, etc. In the West African countries, carts were either donkey- or horse-drawn.

No tractors, power tillers, irrigation pumps or similar motor-powered implements were found in any of the countries reviewed.

Working Posture

One would logically suppose that hand-hoes, especially the length of the handles, would have evolved over time depending on local soil conditions, type of work involved and the user's physique. In general, this evolution – if indeed it is an evolution – has led to the use of short-handled tools that oblige users to bend double,

thus causing fatigue and backache. Some groups of women expressed the view that, despite the punishing toil involved in using them, the short-handled hoes were more effective and faster than those with long handles, but some groups expressed interest in testing or acquiring longer-handled hoes.

The salient fact that emerged from the group discussions was that ideas about the length of the handle and the working posture have become enshrined in people's minds in accordance with their culture, tradition and ethnic group. In the majority of the countries reviewed, it was generally felt that to work standing upright with a long-handled tool was a sign of laziness.

This perception was, however, completely absent in Senegal, where almost everyone uses the long-handled push-pull *bilaire* hoe, and it is becoming less widespread in Uganda. However, in Burkina Faso, Zambia and Zimbabwe, the connection between standing upright to work and laziness is deeply rooted in people's minds.

The Fulani people in the north of Burkina Faso use long-handled hoes. However, they are mainly nomadic herders, and sedentary farmers in many parts of Africa believe that nomads and herders work less than those who till the land.

In the area of the study in Zambia, migration from different parts of the country brought in ethnic groups with different traditions about handle lengths; but even after integrating into a single community and living and working harmoniously together, each ethnic group retains its traditions with regard to the length of its hoe handles.

“Hoes with short handles make weeding easier and faster, but they give us backache. There is nothing we can do about that, because if we just complain and don't work, we'll starve!”

Women's group in Zambia

“The short-handled hoe is for hard workers while the long-handled hoe is for workers on white commercial farms. They don't shake the soil off the weeds, so after a week they will be there again and the workers can go back and weed again and get money for it.”

“A woman who cannot bend her back to weed is lazy.”

Women during discussion groups, Zimbabwe

Some years ago, an attempt was made to introduce jab planters in Burkina Faso. However, of the 1 000 specimens distributed to farmers, 840 had to be taken back. Unfortunately, no attempt was made to determine why the planters were rejected, but it may well have been that since the planter could be used in an upright position, it seemed like a lazy solution.

In Zimbabwe, some groups claimed that long handles were only used by lazy people, such as prisoners and paid workers on commercial farms. Recent attempts by a German-financed project to introduce a wheeled push-hoe, which is very common in Asia, have been unsuccessful to date and one of the main obstacles to its adoption may be that it can be used in an upright position.

Without doubt, even though they are back-breaking to use, short-handled weeding hoes have the advantage of allowing the farmers full control of the hoe while he/she works around the plants, leaving the other hand free to pull out the weeds and shake the roots free of soil. In Zimbabwe, the advantages of short-hoes were explained more cogently than in other countries, even if the groups complained about the pain and fatigue they caused. In Burkina Faso, one women's group said that although they would like longer handles on their hoes, their husbands would never allow it.

Other than the above-mentioned cases in Burkina Faso and Zimbabwe, there were no other instances where the rejection of new tools might have been due to cultural conditioning about the working posture. On the other hand, no cases were found of new tools being introduced that involved a change in working posture, with the exception of the *bilairé* hoe in Senegal. However, the Senegalese have been consistent travellers for decades, even if only as members of the French Army, and it could be that this helped to develop an openness to the outside world and a readiness for change. In addition, the relatively light soils in Senegal facilitate the use of push-pull hoes.

Draught Animals for Women

There were considerable differences in women's use of animal traction in the countries covered by the study. In some regions, for example, in parts of Uganda and Zambia, there are taboos against women working with cattle. In other parts of Zambia, women can work with cattle but they are not allowed to fetch them from their *kraal* or fenced compound. But even where taboos do not exist, men tend to monopolize animal traction when they are present in the community because, traditionally, it is a man's technology. The same applies to animal traction with horses in Senegal, where men justify the prohibition against women by saying that the implements are too heavy and that the women have not been suitably trained. In point of fact, however, the implements for inter-row work are much lighter in Senegal than

“Standing up is lazy.

The social issues are stronger than the engineering issues!”

Interviewee at the Agricultural Engineering and Soils Department, University of Zimbabwe

Whatever the reasons for Senegal being the only country of the study where long-handled push-pull hoes are used, it is clear that working posture has implications for any attempts to introduce new tools to Africa in the future.

in other parts of Africa and even small boys use them. It seems, therefore, that the men's arguments are unfounded.

In countries where there has been a high level of rural male exodus, women are fully involved in using draught oxen or donkeys; and there are no taboos against women using donkeys. It is difficult for women to use the ox-drawn implements found in countries of eastern and southern Africa because of the weight of such implements and the height of the handles.

Small Tractors and Other Motorized Equipment

In Zambia, one women's group had lobbied so successfully that they were to be provided with a tractor in the near future. However, it was only in Zimbabwe that there was any serious intention of introducing motorized mechanization for such groups. A development specialist and an NGO working with women felt that the time was ripe to introduce tractor power for women. Their hypothesis was that private entrepreneurs in rural areas should be helped to set up machinery hire services. Staff of FAO/AGSE believe this might be possible in a country such as Zimbabwe because something similar was planned for Tanzania.

Women's Access to Land

According to the research teams, the national legislation of the countries normally specified equal access rights to land for women and men. In practice, however, society does not honour women's rights. Land is assigned almost exclusively to men and, if a husband dies, his male relatives take the land for themselves and force the widow to return to her parents unless she agrees to marry one of her brothers-in-law who has taken over the land. Normally, it is only the older women with adolescent male children who are allowed to continue using their deceased husbands' lands. Divorce may also leave a woman without land. Women's groups can usually obtain the right to use a plot of land but often it is far from the village and of poor quality. Even worse, the group is usually only allowed to use the plot for one, or at most two, seasons because if they use it for three seasons they acquire permanent rights to it.

"A woman is a foreigner in her husband's family."

Comment by researcher during Focus Group Discussion training in Zambia

Credit for Women

Agricultural credit for all small farmers, whether women or men, is in a state of crisis in the countries covered by the study, mainly because of structural adjustment programmes. For women, it is even more problematic because the lending institutions normally require guarantees in the form of land rights, which women almost never have.

Formally-constituted women's groups are better placed to obtain credit, but there are many obstacles to obtaining it. For example, obtaining a loan usually means lengthy visits to the nearest town which may be several hours' journey away;

it means being able to pay for the cost of transport and for accommodation in the town for one or more nights; and men do not look favourably upon women travelling to town. With their heavy workloads and family commitments, it is difficult for most rural women to be absent from their homes for long periods of time although, in the case of a leader of a women's group, the other members might be able to step in and help her out. Finally, women's literacy and numeracy levels are usually much lower than those of men, and thus women may not be able to handle the bureaucratic aspects of obtaining loans.

The Role of Women's Groups

Women's groups or clubs existed in all the countries reviewed, and indeed they were considered to be a priority area by government services and projects. The policies and practices relating to women's groups were not, however, the same in all countries. For example, in West Africa, the thrust of creating and supporting women's groups tends to be to the exclusion of men. In Uganda, the policy is to include a few men in the women's groups so that they can act as spokesmen and advocates for other male members of the community, and even put up land rights as collateral for group credit. In Zambia, too, some women's groups include men. In Zimbabwe, the emphasis on support to women was so strong in the 1980s that it provoked a backlash of resentment from men. Today, therefore, the focus for support is on the family as a unit. A similar backlash may occur in Senegal, where the men feel that women are being 'privileged' by the development policies of government and the donor community.

Women's groups are of fundamental importance in all the countries covered by the study. Pending a drastic change in men's attitudes and behaviour towards women in rural Africa, groups represent the only avenue for their empowerment and advancement and for giving them access to, and management of, the means of production they need.

The Institutional Sector

Many interviewees recognized the importance of doing much more in terms of the gender aspects of agricultural engineering. However, in the countries reviewed, no government institutions or universities engaged in research or services such as extension appeared to be giving particular attention to the specific needs of women as far as farm production technology was concerned. Furthermore, the agricultural extension services do not appear to have done much to inform farmers about the tools and implements now available.

"Men think women are spendthrifts and may believe that, if they go into town, they will spend money on silly things such as having their hair plaited. And they might also pick up bad town habits."

Member of field research team in Zambia

"Men worry that if women go to town alone they will spend money on petty or frivolous things, or elope with another man."

Member of field research team in Zimbabwe

"We women will win against you men and we'll bury you!"

Women member of research team in Senegal to male colleagues during training in Focus Group Discussion techniques

Ergonomic Studies

Ergonomic research has been carried out in a number of countries, especially in Asia, to ascertain the energy requirements of hand tools. As a general rule, this is achieved by measuring the oxygen uptake of a person while he/she is working and relating it to the area of ground covered and the quality of the work done. Makerere University in Uganda – the only country covered by the study where there was any experience of this type of work – has undertaken research on people's work capacity in relation to their diet. The University would be interested in resuming ergonomic studies on the use of hand tools if it were provided with the means to do so.

The NGO Sector

Few of the NGOs working with rural women had done, or were doing, much in the area of production technology, despite their awareness of its importance. One NGO in Zambia was planning to import donkeys and implements for the use of women's groups, but this was the most advanced example found in the NGO sector.

Blacksmiths

Blacksmiths are much more numerous and active in Burkina Faso and Senegal than in the other countries covered by the study. One reason may be that the early colonial regime in southern Africa imposed a ban on village blacksmiths because, apart from simple farm implements, they also made arms. The village blacksmith trade has never truly recovered from that ban. However, in West Africa, although the blacksmiths produced arms and farm tools that were dangerously competitive to their colonisers, the more cohesive social structures in the area made repression against blacksmiths less effective. Or, again, it may be that the particularly strong commercial and trading nature of British colonialism caused the blacksmiths to lose out against industrial interests, just as they did in Europe.

Whatever the historical background, today, the blacksmiths in Burkina Faso and Senegal are central to the rural economy, as they make a variety of tools and build animal-traction implements. As part of a caste system that distinguishes certain trades and occupations, the blacksmiths are at the very bottom of the social order. This lowly status appears to create social cohesion among them, with the result that they often work together as groups in the villages, sharing forges and cooperating rather than competing. This gives them a certain degree of power in their relations with the other villagers, who prefer to buy their tools from the blacksmiths rather than from outsiders. This not only promotes social harmony, but it also makes it easier to obtain follow-up repairs and maintenance.

The blacksmiths' level of technical competence varies considerably. Some who have attended blacksmith training programmes seem to work no better than those with more experience and a family tradition. All the blacksmiths interviewed in West Africa complained that it was difficult to obtain scrap steel for their work and that what they did find was of low quality. In the other countries covered by the

study, there appeared to be more availability of spare parts from old ploughshares and tractor-drawn implements.

None of the countries reviewed had any tradition for, or regular practice, of consultation between blacksmiths and their clients with a view to improving the tools they made. Very few cases were found of farmers requesting modifications to the normal line of tools and implements produced by blacksmiths.

The Commercial and Industrial Sectors

Importers and manufacturers are potential providers of tools and implements that really meet women's needs. Unfortunately, none of those interviewed had ever paid much attention to the fact that women are now by far the largest users of their products. These enterprises do no market research into women's needs; they do little, if anything, to provide information on the various models of tools and implements they import or make; and they do nothing to ensure that the full range of their goods is available at sales points. In the main, farmers have to buy whatever they can find.

This problem is illustrated by the experience of one member of the study team who visited a major tool factory in Uganda (Chillington of Jinja) producing a range of hoes of different weights, including a light 1.5 lb. version. The management of the factory stated that it was going to drop that particular model from its range because 'there was no market for it'. Since this contradicted the information emerging from the FGDs, where women repeatedly stated that they wanted a lighter hoe for weeding, the study team member took one of the 1.5 lb. hoes to the countryside and showed it to a group of women. Although they had never seen it before, and had not known of its existence, the women were interested in obtaining this particular model.

The situation is similar with the Chinese hoes (Cock brand), a vast number of which have been imported into countries of eastern and southern Africa. Several weights of this hoe exist, but the farmers are unaware of it and buy whatever they find at their local sales point. In the area of Zambia covered by the study, people previously bought the Cock brand hoes from a local Chinese rice development project; but, when the project closed down, so did the sales point for the hoes. People said they were very good and that they would like to be able to buy them again: they did not know that they were easily available in Lusaka, about 70 km away.

In Uganda, the SAIMMCO factory in Soroti produces animal-draught implements that are generally very good but too heavy for women to use comfortably, especially the cultivator. The general manager of the plant dismissed the problem as being only a matter of proper training.

The most important manufacturer of draught implements and other tools in Southern Africa is Zimplow Ltd. of Bulawayo. According to the management of the factory, it made no distinction between men and women farmers. Zimplow's main

"The weight [of the cultivator] is not a major problem. People just have to be trained properly to use it."

The expatriate Managing Director of SAIMMCO shortly before a field trial that clearly demonstrated the difficulty, even for men, of lifting the implement to turn on the headland or to clear it of weeds

product line – especially the five-tine cultivator – is too heavy for women. The company also makes a lightweight three-tine cultivator and recently launched a donkey plough. However, since these implements were never mentioned in the discussion groups, it may well be that no one even knew they existed. The donkey plough was not launched with women in mind: it was only after the serious droughts of the last few years killed huge numbers of cattle that Zimplow thought such a plough could put the country's donkey resources to good use.

It is almost as if Zimplow (which has existed for almost half a century) and other manufacturers, too, are unaware of the changes that have taken place in African

“We don't normally bring gender issues into our business. We just look at the farmer as such.”

“We are just manufacturers. We don't have animals or our own farms.”

Remarks by Zimplow management team

“Most tools for farming were originally meant for men, but circumstances now force women to use them.”

Men's discussion group in Zimbabwe

“Manufacturers should differentiate their implements in the same way they differentiate bicycles for men and women.”

Men's discussion group in Zambia

farming. They do not appear to realise that it is now women who do by far the most work on the land. It cannot be said that it is the manufacturers' market that has changed because, in effect, it is usually the men who buy tools and implements. Even if the men say that their women need lighter tools and implements, when it comes to buying them, they decide on the implements they have always known, regardless of the fact that they may be too heavy for their wives.

What is certain, however, is that none of the manufacturers or importers have any systematic contact with their clients or undertake any real market research. The study team found only one exception to this, the company known as URPATA Sahel in Senegal which grew out of a development NGO. The name is an acronym for the French version of 'Unit for Research, Production and Assistance for Appropriate Technology Adapted to the Sahel'. It has established regular links with farmers, discusses its imple-

ment designs with them, and ensures that its new products meet farmers' needs.

Going back to the issue of the weight of implements: to be fair, the manufacturers are doubtless concerned with the strength and durability of their products. It is also true that, to make them lighter and durable, they need higher-quality steel. This is the problem that Zimplow has run into with its new donkey plough: to make it light yet strong calls for a beam made of imported high-carbon steel, and thus it is almost as expensive as the traditional ox-plough. As a result, it has not sold well so far and the management of Zimplow does not seem overly interested in promoting it.

The point of most concern, however, is that the commercial and industrial sectors dealing with farm tools and implements appear to be out of touch with their clients. As a general rule, they do not appear to recognize that almost all farming operations are done by women today and that women have special needs with regard to the tools and implements they use.

The Oxen vs. Donkey Debate

In all the countries covered by the study except Senegal, cattle and draught oxen are seen as belonging to the men. Women use draught oxen only when their men are not available – very often nowadays – and where there are no taboos against women handling bovines. Women's use of draught oxen is thus really a case of 'necessity being the mother of invention' because it is not part of their cultural tradition. Senegal is an exception, because the horse provides the main source of draught power in that country; and horses are as equally the preserve of men in Senegal as oxen are elsewhere.

Donkeys have certain advantages and disadvantages. On the positive side, they are much cheaper to buy than oxen or horses; they are easier to train than oxen; they are hardy and survive droughts much better than oxen; they mainly fend for themselves, browsing on any sort of shrub or plant even in the dry season; and there are no taboos against working with them – women, children and men all doing so with equal ease.

Some development specialists, however, argue against using donkeys (see the Zimbabwe country report). The disadvantage of donkeys is that there is no prestige attached to them: you cannot buy a wife with them; you cannot give one away as a wedding present; you cannot eat them; and, when they die, you have to bury them like a human being. Their only use, therefore, is as a source of power; but as they are lighter than oxen, they do not even develop much of that. Donkeys are for the poor and, even if you own 40 of them, you are still considered poor. In short, it is better, or so the argument goes, to concentrate on improving cattle because they have a social and economic value in rural life that goes far beyond merely providing draught power.

The authors of this report do not share this negative view of the donkey. It is precisely because they have no prestige, are cheap and hardy, require little looking after, and have no taboos governing their use, that they are *a priori* more accessible to poor women.



Women's Hardest Job

Almost unanimously, the feeling among rural people was that hoeing is the hardest and most time-consuming job that women do on the land. In Uganda, some groups considered land clearing and preparation to be the hardest task, while others

"We push ourselves to finish weeding a big field in a few days.

Most women lose weight during the weeding season."

Women's group, Zambia

"We really overwork ourselves when we are weeding."

Women's group, Zimbabwe

"Without weeding do not expect any harvest. The back has to ache to conquer the weeds!"

Women's group, Zimbabwe

"Oh, weeding is the most taxing job, both in energy and time, because you have to bend down and work carefully not to damage the crop, pull out the weeds and shake them. At the same time, you want to finish the operation before the weeds outgrow the crop."

Women's group, Zimbabwe

"It is weeding that almost kills women!"

Men's discussion group, Uganda

in Zimbabwe felt that planting and harvesting were harder because there was greater pressure to get these tasks completed. However, weeding was never ranked lower than the second-hardest job and, overall, there can be no doubt that it is enormously taxing on women's energy and time. It was only in Senegal, where inter-row cultivation with animal-draught traction is the norm, that weeding was given less prominence in the discussions, possibly because long-handled push-pull hoes are used for this task.

In every country reviewed, weeding took up more days in the field than any other operation. Minimum estimates of the days spent weeding were 60, even in Senegal. In Uganda, this figure increased to as much as 120 because of the country's two cropping seasons. In Zambia, with a single cropping season, the estimated time spent weeding was in the 90-120 day range. Land preparation, when done by hand in Uganda and Zambia, was not far behind in terms of numbers of work days, but nowhere did any operation take longer than weeding.

The most significant findings were in Zimbabwe, because the research team in that country found it easier to discuss how long was spent **per acre** on the different farm operations, rather than the total days spent per year. The groups immediately differentiated between the days spent hoeing an acre, with or without passing an animal-drawn cultivator down

the inter-row space. The difference was truly staggering: for maize, it was two-to-four **days** of weeding per acre after animal-draught inter-row weeding, compared with two-to-four weeks if the entire job had to be done by hand. Randomly-planted groundnuts required three-to-four **weeks** of hand-weeding per acre, while broadcast millet called for one-to-two **months** of thinning and weeding per acre.

The importance of this finding and of the fact that most women see weeding as their hardest and most time-consuming task, is that weeding naturally emerges as a priority area for trying to bring about improvements in production technology.

Differences in the Tools Used by Men and Women

The traditional gender connotations attached to tools – for example, that axes, ploughs and cultivators belong to the men while hoes, sickles and other harvesting tools belong to women – have largely disappeared. While, of necessity, women have been forced to use all available implements and tools, they still tend to use lighter hand tools. This is often achieved by a man passing his hoe to a woman once much of its original weight has been lost through wear.

Replacement of Tools

In Burkina Faso and Senegal, hoes need to be replaced every year because the blacksmiths use poor-quality scrap steel. In Uganda, Zambia and Zimbabwe, where there are more supplies of industrially-produced hoes, or of hoes made by blacksmiths using high-quality steel from worn-out ploughshares or tractor-drawn implements, the life of a hoe was calculated to be anything from two to 15 years. Pangas or machetes were said to last four to six years on average. Ploughshares were changed at least once a year, and the landside and land wheels on ploughs were said to wear out almost as quickly. In Zambia, breakage, theft and loss, rather than wear, were often mentioned as the reasons for replacing tools.

Blacksmith – vs. Industrially-Made Tools and Implements

A choice between these two classes of tools and implements was not always available in the countries reviewed. However, the general consensus of the discussion groups was that the industrially-produced tools were much more expensive. In some countries, the industrially-produced tools were considered to be of better quality and to last longer, except in Zimbabwe, where blacksmiths provide excellent tools.

In Uganda, where the Cock brand hoes from China dominate the market, rural groups – and key informants – stated that fakes or copies of the original Chinese hoe were being imported, some from India. However, none were as good as the original.

In countries where there was a choice between industrially-produced tools and/or animal-traction implements and those made by blacksmiths, most groups expressed a strong preference for the latter. Lower prices were a major consideration: for example, animal-draught implements produced by blacksmiths in Senegal and Burkina Faso cost about half those produced on an industrial scale, and the hand tools produced by blacksmiths in Zambia and Zimbabwe are about 30% cheaper than those made in the factories. However, apart from the price, people said they could negotiate credit and discounts with blacksmiths; that they could barter farm produce for tools; and that it was easier to get them repaired. There was also a sense of community solidarity when buying from local blacksmiths, as already mentioned in connection with the caste system in West Africa.

Prices

The prices of tools and implements in the table below provide a general picture of the situation. The highest prices cited were in Zambia, and the lowest in Burkina Faso and Senegal.

Tool or Implement	Prices in US \$	Remarks
Traditional hoes made by blacksmiths	1.00-4.25	Cheapest hoes in West Africa, most expensive in Zambia.
Imported/industrial hoes	2.50-8.00	Normally \$3-4. Most expensive: hoes from South Africa and Zimbabwean hoes imported into Zambia.
Animal draught cultivators/ploughs built by blacksmiths – Burkina Faso and Senegal	38-40	Mainly for donkey or horse draught traction.
Rigid three-tine cultivator built by factory in Senegal	65	For donkey or horse draught traction.
As above, but spring tine cultivator	108	
Ox-ploughs industrially-built in Uganda and Zimbabwe	65-105	
Five-tine ox-cultivator	85-110	
Zimbabwean plough in Zambia	145	
Zimbabwean cultivator imported into Zambia	240	
Single row planter	165-208	Lowest price is for Zimbabwe, the highest for Senegal.

Who Decides Which Tools to Buy?

In the countries of eastern and southern Africa covered by the study, most people said that although a husband and wife may discuss the matter, it was usually the man, or the head of the household (man or woman), who took the final decision.

Although the responses which emerged during group discussions in West Africa were quite different, everyone stated that it was the men who took the decisions. It is likely that this response was given for socio-cultural reasons, because in some societies it is not acceptable for women to state openly that they share with their men in making decisions.

Caution must be exercised, however, regarding the idea that men are responsible for all decision-making. This could lead development staff to concentrate their efforts on men despite the fact that women are just as important, even if less obviously so, in any process of change under discussion.

Most groups felt that, while little could be done about the basic design of their hoes, there was great scope for improving their quality and durability. In Uganda, there was

much praise for the so-called 'Finland hoe' imported by an early IFAD project. Its lightweight and sharp edge, even over long use, are characteristics that all women required of their tools, quite apart from effectiveness and durability. In Uganda, where the Cock and Chillington hoes are most widespread, most women were using the 3 lb. version and knew nothing about lighter models.

Many women's and men's groups directly or indirectly expressed the view that the hand-hoe, however good, could never significantly increase production. Several interviews with specialists confirmed that it was impossible for any woman to keep more than about 1 ha free of weeds in a typical cropping season. This fact alone pointed-up the limitations of the hand-hoe. In this connection, it should be borne in mind that there is an ever-increasing shortage of labour in many rural areas of Africa.

In short, even when other outputs such as fertilizer and improved seeds are available, it will be difficult to raise agricultural output much above subsistence level as long as the hand-hoe remains the primary means of tillage and weeding.

In countries where women's use of animal traction was very limited – Burkina Faso and Senegal – the women's groups generally felt that their problems would be solved if they could only have access to this technology and be trained to use it. They also believed that donkey-powered traction would be the most suitable for their needs. In the areas of Uganda where women use animal traction to some extent, they wished for greater access and training. And, in areas where it is not used, there was great interest in knowing more about it and in seeing how it worked.

In Zambia and Zimbabwe, where women are much more involved in working with animal traction, there were many complaints about the weight of the implements, especially the five-tine cultivators built in Zimbabwe. The women claimed that they found it impossible to handle these cultivators when turning on the headland, and some even claimed that they fell over when trying to turn.

There were complaints about the difficulty in moving the lever for adjusting the working width of the cultivator. What was required was an easier system for adjusting the width, because the row spacing is never as precise as it should be.

In Senegal, where the working width of most hoes can only be adjusted with a spanner or clamps and bar screws, it was suggested that it should be possible to do this by closing and opening the normal steering/lifting handles. In other countries, it was suggested that 'something like a bicycle brake-lever' on the handles should be invented. Such mechanisms may not be feasible from the engineering

"As long as hand hoes are used by human power, there can be no increase in production."
 "Improving hoes will not increase production. The only solution is replacing them with ox-drawn tools."
 Women's and men's groups in Zambia

"Animal traction makes the difference between night and day!"
 Women's group in Burkina Faso

"We don't use the cultivator. We just watch it lying there."
 Women's group, Zambia

"Some marriages have broken down because women failed trying to work with the existing and heavy animal drawn implements."
 Men's group, Zambia

standpoint, but easier adjustment of the working width is most definitely required. Ideally, it should be possible to make such adjustments while moving along the row.

Many women said that the handles of the Zimbabwean implements were too high and were not adjustable; whereas in Senegal and Burkina Faso, the handles of most implements can be adjusted. Women also had trouble in lifting the zigzag harrows around obstacles, and it was suggested that the harrows should have a lifting handle at the rear.

The ox-carts used in Zimbabwe came in for much criticism. The pneumatic tyres do not last very long; women find it difficult to repair punctures; and both sexes said they would much prefer solid rubber tyres. The lack of brakes on the carts makes it difficult to control them and can lead to accidents.

Many women's groups said it was hard work to carry water to their vegetable plots in watering cans or buckets and expressed the desire for small hand-operated irrigation pumps for this purpose. A demonstration of one such pump made a very positive impression on women in Zimbabwe, but they felt it was beyond their means (approximately US\$ 110).

Many groups said tools and implements were expensive. In Burkina Faso, even the blacksmith-produced hoes that cost about US\$ 1.75 but need to be replaced every year, were found to be too expensive for people in the Central Plateau.

It was only in Zimbabwe that any women's groups mentioned small tractors as a solution to their problems.

Willingness to Work with Technicians to Develop Better Tools and to Pay More for Improved Versions

In all the countries reviewed, both men's and women's groups were interested in cooperating with researchers and specialists to develop better tools and implements.

"If they are easy to discuss with we are willing to work with them."
Comment about working with researchers and designers to improve implements during women's discussion in Zimbabwe

In some countries, particularly Zimbabwe, the possibility of holding talks with manufacturers and technicians was received with enthusiasm. However, one women's group was doubtful about working with technicians, claiming that men were often difficult to work with because they were insensitive to women's feelings and needs.

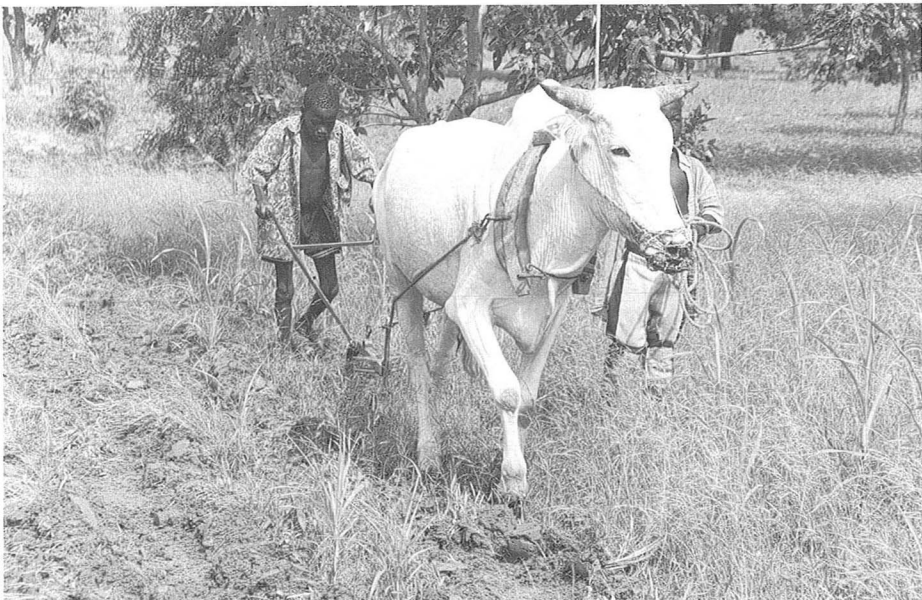
"Good things sell themselves."
Men's group in Burkina Faso

In all the countries reviewed, there was a general willingness to pay more for tools if they were truly better and more efficient. It is clear that there are limits to what the poor farmers can pay for their tools and implements – as witnessed by the comments regarding the water pump in Zimbabwe, which was desired by the women's group but was far beyond their financial means.



Zimbabwe

Women harrowing with donkeys. Harrows were not seen in other countries of the study. There are no taboos anywhere on women working with donkeys.



Senegal

Inter-row cultivation with a single ducksfoot tine in a very poor crop. Working with cattle is traditionally a man's task, though where no taboos exist against it, women are increasingly taking over. Women in all the countries of the study want more access to animal traction.

Agricultural Implements Used by Women Farmers in Africa



Zimbabwe

Women harvesting vegetables. The baby they frequently carry on their back while in the fields hardly makes their work any easier.



Burkina Faso

Women considering their tools during a Focus Group Discussion.



General

In the authors' opinion, there is no 'quick fix' for improving the production tools and implements used by women farmers in Africa. However, over time and with appropriate action by governments, development agencies, NGOs and the private sector, the situation could be very much improved. The constraints, and actions necessary to overcome them, are described below.

Limited Resources Available to Women

The main constraint faced by women is the limited amount of resources available to them – a direct consequence of their low socio-economic status in society. With

“Men don't really appreciate all the work that women do, even when it is increasing all the time. It is normal, traditional, and expected, just like a dog is expected to bark and is not appreciated any more if it barks more!”

“Men just marry more women to have more free labour on the land. Women are used as income-generating resources.”

Field researchers, Zambia

“Among themselves, men will often praise their women and their work, but no man will ever praise a woman to her face. He thinks that doing so would spoil her and weaken his position of power.”

Male field researcher, Burkina Faso

little access to cash income, even less access to land and credit, men who generally consider that it is quite normal for women to do so much work and for that workload to increase, there are formidable barriers to women being able to take matters into their own hands and invest in better production technology. Even donkeys and lightweight cultivators to go with them are beyond the reach of most women, unless their husbands cooperate in the purchase.

It is true that men's groups talked positively about the need to improve women's production technology, but for them to do anything practical about it may be a different matter. The societal norms are based on a centuries-old perception of male dominance and control, and individual men may see their power at risk if they start behaving differently. In addition, any man in a rural community who has progressive attitudes towards women risks being criticized and ridiculed by his more traditional peers.

The work already done to promote women's groups is remarkable, and provides almost the only way to help women gain access to status and production inputs. However, care must be taken to avoid creating a backlash from men by giving the impression that women are especially 'privileged', as has already happened in some countries and is now beginning to happen in others.

Recommendations

- Governments, NGOs and religious organizations should make deliberate, intensified and well-planned efforts to create fuller awareness about the role of women farmers in the economic and social life of the country and their special needs in production technology. Target audiences should be male heads of household, private sector importers and manufacturers of tools and implements, extension and other development workers, government research

institutes, and policy makers in the area of mechanization, etc. Mass media and interpersonal communication should be used for these efforts.

- Work with women's groups should not only continue but be expanded. However, in order to reduce any backlash of resentment among men, governments, NGOs and international development agencies should follow the examples already set in some countries where the new focus is on the family unit, and where a few men are included in women's groups – but not enough to dominate the situation!
- Changes in women's access to input resources, e.g., land and credit, will take time, even with good and persistent communication activities to change attitudes and behaviour in society because the present situation is rooted in the culture and traditions of the people. In the meantime, governments, development agencies and NGOs should focus more attention on women's production tools and implements in their development programmes. They should study the socio-economic and technical environment for responding to demand-led interventions for credit, tools, implements and draught animals. (The study and assessment of demand should be conducted with qualitative research methods similar to those used for the present study.)

Weeding as Women's Hardest Job and as a Major Constraint to Increased Production

While women see hand-weeding as their hardest job and as a major constraint to increased production, it also offers the greatest opportunity for improvement. The information obtained from Zimbabwean women about the difference in the time required to weed after a first pass, with and without an animal-drawn cultivator, appears to offer a major opportunity for saving time and effort and improving production.

Light-weight three-tine cultivators for donkey draught could be one answer. Obviously, however, their introduction and use would depend on wider application of planting in rows. The relatively cumbersome way of marking rows with a wire or cord, generally used in the eastern and southern African countries, could be substituted easily by the simple home-made row marker, like a large rake, found in Burkina Faso. It is certainly faster and easier, for it marks three rows at a time and can be pulled across the plot by one person.

A further consideration would be the need to ensure proper animal care and health services for the donkeys.

Finally, row planting and inter-row weeding with animal traction might allow for more general use of push-pull hoes, such as the Senegalese *bilairé* or longer-handled traditional hoes, even in soils that are heavier than those in Senegal. The study team watched women weeding with very short-handled hoes in a field of randomly sown groundnuts, and it was evident that the short handle allowed them to make circular movements around the base of the plants that they could not have made with a long handle. The short handle, and their bent backs, also allowed them to exert more power. However, if they were only weeding the inter-plant space in the row, these

circular movements would be less necessary; and, furthermore, if most of the soil had been loosened by the animal-drawn weeder, it might not have been necessary to exert the same amount of power. Therefore, longer handles or push-pull hoes may allow the worker to take a more erect and less fatiguing posture without reducing too seriously the effectiveness of the weeding task.

At all costs, the situation prevailing in some countries where animal traction was used only for primary tillage, creating even larger areas for women to weed by hand, must be avoided because animal-draught ploughing is senseless unless it is possible to follow it up with animal-draught weeding.

Recommendations

- Development programmes supported by governments, NGOs and international agencies should, with the participation of project beneficiaries (especially women's groups), study the possibility of introducing donkey traction, especially for inter-row cultivation.
- If conditions appear favourable for donkey traction and it would meet a felt need, the development programmes should provide credit, implements, donkeys, training, spare parts and any other supporting services required, particularly in the area of animal health and care, bearing in mind the problems that occur if credit is provided and the animals then die.

Lack of Information Flows Between Importers/Producers of Tools and Farmers and the General Isolation of This Commercial Sector

The study brought out a serious lack of consultation and information flows between the importers/producers of tools and implements and their users. The same problem also exists, albeit to a lesser extent, between blacksmiths and farmers. As long as these problems persist, it will never be possible to offer tools that meet the felt needs of today's mainly women users. The private sector that imports or manufactures tools and implements seems to have a captive market and a take-it-or-leave-it attitude. In most commercial activities in industrialized countries, a prerequisite for success is market research to know one's customers and systems of follow-up with them, whereas the tool importers and manufacturers in the countries of the study seem largely to ignore this aspect. And they are able to do so because farmers, uninformed, passively buy whatever they find available in their local store. Nor do extension services become significantly involved in issues of tools and equipment, since their main concern usually is to provide advice on other inputs and on production techniques.

Another problem is that the commercial sector involved in tools and implements is generally isolated from policy and development issues and is not seen as an essential partner by governments, NGOs or donor agencies. Indeed, the private sector is often considered by government and development institutions as being merely money-oriented and crassly commercial, whereas if it is properly

approached and involved, synergy can be created with the private sector for the benefit of all.

A negative example is the way development projects often procure tools and equipment from outside the country or area and thereby damage local suppliers' interests. Working with them in a constructive way would strengthen their long-term capacity to provide more appropriate tools and services.

In many countries, blacksmiths are the main providers of tools and implements, but their knowledge and skills are often too limited to enable them to provide the necessary designs and quality. In addition, frequently they encounter problems in obtaining adequate supplies of good-quality raw material.

Recommendations

- Governments, NGOs and the donor community should work much more closely with the importing and manufacturing private sector. Most countries now have bodies concerned with policies for agricultural mechanization or rural technology. One such body in each country could be made responsible for creating a working group on agricultural production technology, with special reference to the needs of women. This working group should, of course, include the private sector; and it should provide a forum for ensuring that the private sector pays more attention to gender issues in the tools and implements that it imports or manufactures, undertaking market research and creating follow-up links with customers. The aim should be to seek the private sector's constructive involvement and, at the same time, increase its capacity to meet farmers' needs, particularly those of women.
- Blacksmith training programmes should be expanded to provide guidance in the design of tools and implements. Issues such as implements for different sizes and types of animal also should be covered.
- The extension services should go beyond providing their traditional type of advice and give farmers the type of information that will help them take the right decisions about tools and equipment.
- In the context of donor-supported projects, the question of production technology for women should be accentuated. Studies and discussions with women and men in the project area(s) to determine the demand for production technology should be followed by the setting up of a project-level working group that includes women and men farmers, blacksmiths, technicians and vendors of tools/implements. These discussion groups should meet every few months for the purpose of exchanging information and taking joint decisions on the tools and implements required by the women in the project area.
- Major programmes concerned with participatory agricultural development and the generation and adoption of appropriate technologies in the countries of eastern and southern Africa should take a leading role in creating a

demand-led environment for improved production tools for women, and for creating the awareness and linkages necessary to help deliver them.

- International agencies should encourage governments to pursue tax and duty policies favourable to local manufacturers and distributors of tools and implements. They might also provide assistance to governments in formulating demand-oriented, private sector mechanization policies that take account of issues of gender in agricultural engineering.
- Rather than supporting the supply side of the market through providing subsidized tools and equipment – which distort local markets – donor agencies should consider supporting the demand side by providing credit to rural clients so they can purchase what they feel they need from the private sector and at an adequate and realistic market price.

Lack of Training in Animal Traction for Women

Women's and men's groups in many countries stressed the need for more training in animal-traction for women. There seemed to be an implicit and lingering belief in the institutional/government sector that it was the men who needed such training, because animal traction is traditionally the men's preserve. Thus, the vast majority of those who attend training courses or field days are men, whereas it is women who really need to be trained rather than having to be the self-taught practitioners they mainly are today.

Recommendation

Training institutes (e.g., the Palabana Farm Power and Mechanization Centre, Zambia, and the Institute of Agricultural Engineering, Zimbabwe) and services organizing field demonstrations in animal traction should be pro-active in seeking women's involvement. They, and any international donors supporting them, could set parameters for the proportion of women to be included in their courses².

Lack of Research on Women's Production Technology

Although all interviewees said they believed that research into production technology for women was necessary, little or none was actually in progress. Women almost everywhere said they wanted lighter tools, but there is no scientific research into the benefits of lighter tools in terms of the energy required from their users and the effectiveness with which the work is done. The only institution in the countries of the study with the necessary experience and capability for such research is Makerere University in Uganda. An interesting research activity could be to measure

2. The initiative to seek women's participation in animal-traction training should come from the institutions, not from rural men, for women must not see it as an initiative by men to make them do even more work. Rather, it must appear to be the institutions that are trying to help women to better assume a task which is, in any case, coming more and more their way, and to reduce their workload with hand tools.

the oxygen uptake of women while weeding with 3, 2.5 and 1.5 lb. hoes and set the energy requirement against the effectiveness of the work done. Properly used, the results of such research could provide an important basis for future manufacturing and marketing policy for tools.

Recommendations

- A small project should be designed and funded to help Makerere University become involved in ergonomic studies of women using various sorts of farm tools, beginning with hoes of different weights and different blade widths in different soils, etc.
- If the results of such research show that there are practical applications that could make women's work easier, seminars and workshops should be organized with government services (especially extension), blacksmiths and the manufacturing/importing sector to disseminate the findings and facilitate their being put into practice.

Attempts to Introduce Exogenous Technology

This is the trickiest area of all because of the human and social factors involved. Moreover, it is frustrating, for it is also the area that could provide the quickest results because production tools and implements used in other developing countries could have a major impact on reducing the African farmers' working time and discomfort if they would only adopt them. However, there have been numerous examples of failed attempts to introduce some model of a tool, usually based on a design used in another country. This report has cited the case of the jab planter in Burkina Faso, and the wheeled push-hoe that appears to be failing in Zimbabwe. Another case, also in Burkina Faso, involved pedal-operated water pumps for wells which were never accepted³. These initiatives are usually the idea of a technician. While these tools or implements may be perfect from the technical standpoint, and even economically viable, too often certain social or traditional factors are ignored and they are rejected. Unfortunately, in addition to the early research that could avoid such mistakes, there is seldom any post-failure investigation to see what went wrong. There is only conjecture, based perhaps on a few isolated comments. This is frustrating, too, because research into the reasons for failure could help technicians to make modifications or, at the very worst, teach them lessons for the future. In general, where exogenous tools have been successfully adopted in various countries worldwide, this has only been achieved after working closely with rural people and after these same people have conducted comparative trials between traditional tools and the proposed new items.

3. No research was ever done to find out why these pumps were not adopted, but anecdotal evidence suggests two reasons: it was thought to be dangerous for pregnant women to use a foot pedal; and small children do much of the water pumping and the force required on the pedal was too great for them, even standing on it with their full weight.

Despite the human, social and cultural factors involved, the benefits of introducing exogenous technology warrant further attempts to do so, but only under carefully controlled conditions and with the participation of the potential beneficiaries.

Punch or jab planters, planter attachments to ploughs or cultivators, push-pull hoes, hand-pushed cultivators and weeders, hand-drawn planters, row markers, harvesting tools such as serrated sickles, hand pumps for irrigation, water-carrying carts: these are just some of the possible candidates for testing and evaluation with people in Africa⁴. The idea should be to import just a few of a selected type that appears to have potential in Africa and to test them carefully with farmers. If accepted, they could be copied by blacksmiths or small-scale industries locally, but incorporating any modifications that the trials demonstrate as being wanted by the users.

In respect of push-pull hoes, it would be particularly interesting to try them for the hand-weeding that remains to be done after an animal-drawn weeder has passed along the inter-row space.

Recommendations

- In the context of projects, and after full consultation with a group of potential beneficiaries and their expressed willingness to try new tools, some of the tools should be brought in and simple participatory field trials conducted.
- If the tools are not found acceptable, a thorough investigation should be made of the reasons for such non-acceptance. Modifications might be possible, and at least some of the obstacles to adoption would be discovered to help similar initiatives in future.

“For a woman, having time left over is called ‘laziness’.”

Member of research team in Zimbabwe

“If a man comes home and finds his wife sitting resting, he will say ‘Why aren’t you doing something?’”

Member of research team in Zambia

Finally, it is encouraging to imagine a future in which Africa’s overworked women will be using tools and implements that save them time and effort, and give them the chance to rest and relax a little. However, before this is likely to happen, men’s attitudes towards women will have to change considerably.

4. I. Carruthers and M. Rodriguez, eds. *Tools for Agriculture: A Buyer’s guide to Appropriate Equipment for Smallholder Farmers*, Intermediate Technology Publications, London, 4th ed., provides descriptions of hundreds of tools and implements and the names and addresses of their manufacturers.

Burkina Faso



A. The Scenario¹

Context of the Study, Its Scope and Methods

The study was conducted within the context of the IFAD Special Programme for Soil and Water Conservation and Agroforestry which is operating over a broad area (seven provinces) of Burkina Faso's Central Plateau. This is the most densely populated part of the country and, as a result, much of the land has suffered, and is continuing to suffer, severe degradation.

The area is extremely poor. According to the IFAD project document of December 1994 for Phase II of the Programme, per capita income is approximately US\$ 75 per annum, about half the poverty threshold level of US\$ 147.

Soils in the Central Plateau are problematic. They are mainly lateritic, of a complex gravelly texture and of generally low fertility; and, when dry, they harden and become difficult to work.

The field research for the present study was conducted with a team of eight people – five women and three men – made available by the IFAD project. The team received two days of formal workshop-type training and two days of supervised work in the field, after which it divided into two groups of four. One group remained in the area around Yako, in Passoré Province, while the other went to work in the area around Koudougou in the Province of Boulkmiende.

Although the maximum number of participants in an FGD should not normally exceed 12, this proved difficult to maintain in the area around Koudougou. Despite having requested the development agents to limit the groups to 20, which would be divided into two groups of 10 for the discussions, many more women turned up. When this happened, the groups were further divided and, on some occasions, the facilitator had to double as the observer. However, it was the only solution in the circumstances, and it does not appear to have unduly influenced the results of the discussions because there was a remarkable degree of homogeneity in, and between, both areas where the research was carried out.

In all, 41 group discussions were conducted, 35 with women and six with men, for a total of 370 participants. The group discussion participants were always asked to bring their production tools to the meeting.

After the training and supervision of the field researchers, the team leader and the APO held detailed discussions with groups of blacksmiths in Zougoungou, Ouahigouya and Kombissiri. In addition, interviews were conducted with various people in government concerned with planning, research, farm mechanization,

1. The introductory and descriptive opening sections of this report are based on information gathered during training sessions in qualitative research methods with the national staff who were to conduct the study (all of whom had deep knowledge of the rural situation), on information collected during individual interviews, and on available literature. Some general information has also been lifted from the results of the FGDs with rural people when it was considered that it would best fit in these opening sections.

women's extension services and credit. A meeting was also held with a women's NGO. Finally, a round-up meeting with the field researchers was held to review, discuss and note the results of their work.

The Agricultural Production System and Women's Role Within It

Agricultural production is essentially at subsistence level, with significant quantities of produce for sale only in years of favourable rainfall. The situation, and the pressure on the land, are such that migration towards more fertile areas, especially in the east of the country, is on the increase.

The land resources used by each family in the Central Plateau are divided into different plots. The *family plot* is where the principal crops are grown, usually staples such as millet, sorghum or maize for home consumption and sale. Part of the family plot is close to the village (*champs de case – house plot*) but the rest of it may be some distance away (*champs de brousse – bush plot*). In all, the family plot averages about 3 ha in the Central Plateau and is invariably under the complete control and management of the head of the family, who is usually male.

Each woman is allocated an individual plot, usually of some 500-1 000 m², on which she grows various crops, mostly to provide ingredients for sauces to accompany the family's cereals but also for sale. The women's plots are usually adjacent to the family plots.

Formally recognized women's groups may be allocated a *collective plot* to work.

Many women walk one-to-two hours to reach their family or individual plots. Seen in this context, a bicycle virtually becomes a 'production tool' in the sense that it could save women many hours of walking time in a typical cropping season. However, bicycle ownership is very rare among women in the poorer areas. Indeed, whenever a discussion group was held with men, almost all of them came on their bicycles, whereas the women nearly always turned up on foot.

The women are involved in all the family's agricultural work. Priority is given to work on the family plot, and women help their husbands with all operations on this plot before turning to their own. Furthermore, it is usually the women who transport any produce to be sold to markets. They are also responsible for the poultry and small ruminants normally kept by the family and for looking after the children and the household chores. It is generally accepted, and by the men, too, that women work much harder than men.

According to a Ministry of Agriculture and Animal Resources paper of May 1994, entitled *Femmes, Agriculture et Développement Rural*, women account for 86% of the adult rural population. However, within a typical rural family, the men control the finances and the women's only direct income comes from the sale of surpluses from their individual plots.

"Women work their individual plots very early in the morning or late in the afternoon, when they don't have other tasks such as cooking and when they are freed by their husbands."
Conclusion by field research team

"Women do the work; men are in charge."
Statement by extension worker

It is difficult to obtain figures on the use of animal traction in the Central Plateau. Field staff of the IFAD project estimate that about 5% of families own animal-draught equipment and animals while, according to a government spokesman, about 20% of the land in the Central Plateau is cultivated with animal traction. The above-mentioned 1994 paper on women, agriculture and rural development estimates that, nationwide, some 27% of farm families own animal-traction equipment. However, this includes agricultural areas that are much richer than the Central Plateau.

When animal traction is available, it is controlled by the men and used mainly for primary tillage and inter-row cultivation. When it is not available, direct planting without primary tillage is the norm except in the case of maize and groundnuts which need a loose, deep seedbed for water retention and growth. Once the annual rains start, there is great urgency to complete planting for the short cropping season. There is seldom time for land preparation, hence the common practice of direct planting.

The Production Tools Encountered and Their Use

The tools found in every group that were basically the same (details and photographs provided in Annex 6) were as follows:

- The *daba* (hoe), made by local blacksmiths from scrap metal, is used for cultivating, bund building and weeding. The handle is invariably short-to-medium in length, which obliges the user to bend almost double when working with it. In most cases, the handles are cut from trees by the farmers themselves; but in some areas, where the blade is fixed to the handle by a tang that is heated and driven through the wood, the *dabas* are sold by blacksmiths as complete tools.
- The *pioche* (pick), also produced by local blacksmiths, has a narrow chisel point made from old vehicle leaf springs. The handle is always short. It is used for planting, held in one hand while a gourd or calabash containing the seed is held in the other. Bent double, the user drives a hole in the soil with the *pioche*, flicks a seed from the gourd into the hole with the fingers of the other hand, and then presses his/her foot over the hole to fill it.
- **Harvesting tools.** These involve a variety of knives, sickles and machetes, most of which are made locally. However, the machetes are usually imported from Ghana and Côte d'Ivoire.

Other tools found, but by no means in all groups, were:

- **Animal-draught implements**, produced by local blacksmiths and fitted with a duckfoot tine for inter-row work. Plough and ridger bodies are also manufactured locally but, at the time of the study, only duckfoot tines were seen mounted. The design and quality of these animal-draught implements varied considerably. Only implements built by blacksmiths were encountered in the field, despite the availability of industrially-produced or imported models. However, these generally cost about twice as much.

- **Row markers**, pulled by hand. Most of these are made of timber cut from trees and left as roundwood. They have three steel spikes driven through the cross member at the desired row spacing so that, when dragged across the field, they mark the lines for seeding, thus enabling inter-row weeding using animal traction. Other row markers were made of steel and had the marking spikes set at different distances on the top and bottom of the cross member. Thus, by turning the whole marker over, different line spacings can be marked in the soil.

According to verbal reports, these row markers are just beginning to be used in only one part of Burkina Faso (Manga, in the south). They first mark up and down and then across the plot at right angles so that planting can be done on the square. This allows inter-row cultivating with animal traction in both directions, and virtually eliminates the considerable *daba* work that is still required for weeding between the plants in the rows when lines are marked in one direction only.

Of the 41 groups that participated in the research, only three mentioned that they owned an **animal-drawn seeder**, but one had been broken down for a long time.

Additional items mentioned by groups were: wheelbarrows, donkey carts, two-wheeled hand-carts known as *pouses-pouses*, and bicycles for transport. These items were secondary to the main emphasis of the study and thus they were not deemed worthy of special attention.

New Production Techniques That Require New Tools

In recent years, it has been found that local placement of farmyard manure and compost, and planting in that mixture before the rains arrive, gives far better results – in terms of plant survival and yield – than traditional planting methods. Known locally as the practice of *zai*, it involves digging a hole about 10 cm deep by 10 cm², filling it with well-rotted manure and compost, and planting the seed to await the rain. The results are so dramatically visible that the practice is being increasingly adopted in the Central Plateau.

According to mechanization specialists, however, to practice *zai* more efficiently calls for a number of tools that are not yet generally available. First, **rakes** would be useful for gathering the crop residues that are added to the manure in the pits where it is placed to mature and rot; secondly, **forks**, preferably with steel tines, for extracting the manure from the pits; thirdly, wider use of existing **donkey carts** would help in the transport of the manure to the planting holes in the field; and, finally, it would be easier to dig the planting holes speedily, and to the appropriate shape, depth and size, with a **spade** rather than with a *daba*. With the exception of the donkey cart, which costs some CFAF 200 000 (about US\$ 330), the other tools are not generally available in Burkina Faso.

It should be stressed that these ideas did **not** emerge from the discussion groups with farming women and men in Burkina Faso, but rather from government and specialist staff.

Cultural and Socio-Economic Considerations

Working Posture

The cultural tradition of the Mossi people of the Central Plateau is to cultivate, plant, and weed with short-handled tools that cause them to work bent double. No doubt, the short-handled tools of the Central Plateau have evolved to meet the general needs of working the difficult and often hard soils in the area, especially weeding when sowing has taken place with no seedbed preparation. However, the people recognize that they work in an uncomfortable posture and complain of the back-ache it causes.

"If a woman has not worn out her *daba* during one season, her husband will think she is lazy."
Comment from a group of blacksmiths

In some parts of the country, people work standing up with long-handled hoes. This is particularly the case of the Peul people in the north, where the soil is lighter. While soil conditions have certainly affected the evolution of tools and related working posture in the Central Plateau, it is also true that there is today an established cultural attitude that work in the field can only be done properly while bent double. Anything less is laziness. According to one interviewee, the fact that the Peul people, who work standing up, are primarily herders may add to the perception that it is lazy to work upright, for it is common for farmers in many parts of Africa to think of herdsmen as being work-shy.

The Influence of Polygamy

Polygamy is very common in rural areas of Burkina Faso, and it has an effect on the production technology available to women. For example, when a man has only one wife and he uses animal traction, it is very common for him to work his wife's plot for her. But if he has several wives, he seldom works any of their plots, fearing that if he does not finish all of them there would be family strife. Only if the wife of a polygamous husband is going to grow groundnuts on her plot is there any significant chance that he will plough it for her.

"Sowing is not a problem for me. I have two wives and seven children."
Farmer replying to mechanization specialist talking about the advantages of a hand seeder

To what extent polygamy has an influence on the willingness of a farmer to invest in new technologies is a very interesting – but so far unanswered – question. In simple words, if given the choice, will a farmer 'invest' in another wife or in animal traction? In one scenario, he would marry another wife as a cheap source of labour; in another, he would only marry another wife when he had the real means to do so; and if those means derived from his successful farming, say through using animal traction, more women might benefit from this technology.

Credit

With agriculture mainly at the subsistence level and with low cash incomes, credit is a crucial issue for improving production technology. However, credit is only granted to a farmer when he or she has cultivation rights on a reasonably-sized

plot of land. In this, women are at a disadvantage: they are seldom recognized as having cultivation rights because the *land chief* in a village apportions these rights only to men.

In general, unless women have grouped together for a cash crop activity – as they have for horticultural produce in a few areas – or for a commercial activity, such as the processing of farm produce for sale, they have no chance of securing credit. Furthermore, unless women have formed a group for an activity, they have virtually no say in the financial matters of their family. The result is that individual women will almost never seek credit, for they know they would have no control over reimbursing the loan. In fact, if their husbands needed cash when a credit repayment was due, they would be forced to default.

However, there is a broader issue of credit to farmers in the Central Plateau, regardless of whether they are men or women: in such a subsistence-based economy, in difficult soil conditions seriously aggravated by erratic rainfall, not enough regular cash is generated to be able to service and pay back loans. Indeed, a spokesman for the National Agricultural Credit Bank (CNCA) reported that loans for such items as animal traction in the Central Plateau were not economically viable.

CNCA – National Agricultural Credit Bank – was founded in the mid-1970s as part of an FAO-supported animal traction project which had three components: the manufacture of implements, training, and credit. Thus, CNCA began life as part of the Ministry of Agriculture and devoted its main attention to credit for animal traction. However, it was later moved to the Ministry of Finance and it has since virtually abandoned credit for agricultural production, mainly confining its activities to financing commercial operations. In 1996, only about 1% of its total loan portfolio was for activities by women's groups. Overall, according to the above-mentioned 1994 paper on women in agriculture and rural development, less than 5% of rural women had benefited from credit, compared to more than 95% of men.

Mechanization Policy and Institutional Factors

In general, the question of manually-operated tools for agricultural production has not attracted significant attention in Burkina Faso. The Agricultural Mechanization Service of the Ministry of Agriculture and Animal Resources is working in the areas of motor-powered mechanization and animal traction, but it has never dealt with manually-operated equipment and has no plans to do so in the future.

In connection with animal traction, the above Service is developing a cheap seeder – copied from a Bolivian model – that can be attached to the plough beam. It is also working to introduce a single-point ripper – copied from Zambia – which, the staff believe, could bring significant benefits in the difficult soil conditions of the Central Plateau. For example, working a plot up and down and across, at the appropriate planting distance between runs, would create a deep planting hole at each intersection, and manure or fertilizer could be applied at each planting point.

The emphasis on animal traction is understandable in the country's circumstances. However, as already mentioned, there are serious constraints to its expansion in the poorer regions due to physical, economic and credit conditions. Indeed,

staff of the Agricultural Mechanization Service confirmed that, generally speaking, animal traction in the Central Plateau is not viable in strict economic terms. It may reduce drudgery, but the returns in terms of reliable increased production are insufficient to pay for the investment.

Although there may be other experiences, notably among the numerous NGOs at work in Burkina Faso, the only institution encountered by the team leader and

The CNEA made available 1 000 hand-operated plunger-type planters to farmers, and had to take back 840 of them. When asked why this was so, the Director speculated that it might have been because the planter was not suitable for the soil conditions, or that perhaps it was because it could be used standing upright, and that this was contrary to the work tradition of the Mossi people.

the APO that has attempted to do anything about manually-operated equipment was the National Centre for Agricultural Equipment (CNEA). This is a State-run operation that produces animal-draught implements, carts, pumps and other tools. Its several attempts to introduce manual seeders and plunger type-planters have been unsuccessful.

Attempts to introduce foot-operated water pumps were also unsuccessful. In neither case was there an investigation into the real reasons for the rejections, although it seems from anecdotal evidence that the foot-operated pumps were considered dangerous to women's health during pregnancy, and the force

required on the pedal made its use impossible for small children.

There are no institutions in the country with capacity in fields such as ergonomics that could assist the mechanization specialists in developing improved manually-operated tools.

Producers of Agricultural Production Tools

Burkina Faso has no industry that produces tools on a significant scale. Although CNEA produces animal-traction implements, carts, etc., sales are decreasing and none of their ploughs or cultivators were seen in the field (most in evidence were the donkey carts made by CNEA). As mentioned above, CNEA's efforts to introduce manually-operated planters were unsuccessful.

The sole providers of hand tools are local blacksmiths, and all such tools encountered in the field were made by them. Blacksmiths are often concentrated in villages where clusters of them – up to 12 in number – work together.

Blacksmiths are also the main producers of animal-traction implements. All ploughs/weeders seen in the field were produced by blacksmiths, rather than by industrial producers. One imported plough from the Tamale Implement Factory (TIF) in Ghana was seen at a roadside outlet in Yako, but again, none were seen in the hands of farmers.

The only hand tools that are mainly imported are machetes from Ghana and Côte d'Ivoire and smaller knives from various countries, mostly China. The imported items were not common to all groups.

Quality and Technical Considerations

Blacksmiths use traditional techniques: they work kneeling or squatting on the ground, using a traditional forge and a heavy piece of metal – such as a truck crank-shaft or half-shaft – driven into a heavy log in the ground to serve as an anvil. By means of these traditional techniques, many blacksmiths manage to produce hand tools that are rather well made and sell for a low price.

The build-quality of hand tools varies from blacksmith-to-blacksmith and seems to depend more on their experience and skills than on the tools and technology available. Thus, the introduction of improved (raised) forges, and items such as Western anvils under a project, does not ensure production of higher build-quality. One group of blacksmiths working with such improved technology was producing tools of a significantly poorer quality than those found in the more traditional forges. The surfaces of their *daba* blades were rough and the thickness was irregular. Greater skills were seen in other blacksmith groups who were producing better-quality items with a lower level of technology.

There are also design deficiencies in animal-traction implements. One group of blacksmiths was making plough bodies to be mounted on the same toolbar as the duckfoot tine. It was not evident how this could be done but, in any case, the toolbar clearly lacked the rigidity needed for ploughing. The construction, dimensions and proportions of the plough bodies were not in accordance with basic requirements for efficient ploughing and would certainly result in poor performance and high draught. There were cases, too, where the bolts used to mount the shares to the frog were not countersunk.

Even if the quality and durability of the tools depend partly on the skill with which they are made, the mild steel plate used for soil-engaging parts is bound to give them a relatively short life. Blacksmiths consider their main constraint to be the limited availability and accessibility of raw materials of appropriate quality.

Overall, for the production of more complicated tools and implements, such as those for animal draught, the village blacksmiths' techniques, equipment, skills and knowledge are insufficient. For instance, they depend on workshops in major towns/villages for welding frames for animal-traction implements. The blacksmiths produce only the soil-engaging parts, mostly duckfoot tines and even wheels.

In short, if blacksmiths are to produce better animal-traction implements, or tools that are more complicated than existing hand tools, and on a large scale, the upgrading of skills, knowledge and equipment is still needed; and even for the hand tools that they are currently producing, improved skills could be beneficial. Past training programmes for village blacksmiths need to be improved, intensified and expanded. However, the fact that animal-traction implements are now being produced, used and repaired without external support shows that the supply and repair chain is viable as it is now, even if the implements are of low quality.

B. What Women and Men Farmers Say

The Practice and Perceptions of Rural People Regarding Production Technology

Some of the factual information that came out of the FGDs was combined with information from interviews and available literature to provide the foregoing general description of the agricultural production scene in Burkina Faso. In addition, the following specific points emerged from the group discussions:

Time Spent by Women Working in the Field

Work	Days/year
Application of compost and manure	15-30
Land preparation	20-30
Weeding	60
Harvesting	30

Many groups stated that they frequently needed to repeat their planting twice, and even three times, when early rains were not followed by full rains.

When groundnuts are grown, the harvest period can extend to as many as 60 days. No specialized groundnut lifters were seen, but a few groups mentioned that they used a duckfoot tine for the purpose.

Renewal of Tools

Hand tools such as the mild steel *daba* are generally renewed on a yearly basis and, in some cases, even twice a year. The *pioche*, made from leaf springs, lasts two-to-three years but needs to be sharpened annually. Locally-made ploughshares are normally replaced every other year. Sickles last up to 10 years, but with several changes of the wooden handle. Knives often 'get lost by the children', but if not, they are replaced every two-to-three years.

Where Tools are Purchased and At What Cost

Tools are almost invariably bought from local blacksmiths. The figures in the following table provide an overview of the prices paid by farmers for their tools, as well as prices obtained from dealers and industrial producers. Prices in the area around Koudougou were generally somewhat higher than those in the Yako area, although there were also differences associated with the particular type of implement. For example, the most expensive *daba*, ironically dubbed the 'deluxe model' by the research team, was more curved in the blade and it was made from heavier-gauge material.

Hand Tools

Type	Source	CFAF
Plough/cultivator	Built by local blacksmith	20 000-24 000
Plough/cultivator	Imported from Ghana	28 000
Plough/cultivator	Built by CNEA	54 000-56 000

Animal Draught (Donkey)

Tool	CFAF²	Tool	CFAF
<i>Pioche</i>	250-500	Sickle	600
<i>Daba</i> (hoe)	500-1 000	Machete	500-750
Knife	100-150	Row Marker	750-2 500

Other Tools and Implements Known by Groups but Seldom Owned by Group Members

Groups identified seeders, long-handled hoes for removing manure/compost from pits and for digging the holes for it in the fields (*pioche de zai*), power-tillers and tractors.

The only variation on a traditional implement – being used in a different part of the country and mentioned by groups – was the long-handled hoe of the Peul (Fulani) people in the north. No value-judgement on this was expressed by the groups, but from numerous conversations with people who had an intimate knowledge of the country, it seems that the Mossi people believe it is impossible to work properly standing up. The same people also commented that the soil in the north is lighter, calling for less effort and not needing the purchase that is available through a short-handled hoe.

Who Decides What Tools to Buy

The groups invariably stated that it is the man who decides on the tools to be bought and in most cases that he buys them. Some women said they might help with the purchase, especially if they had some income from their individual plots. However, it is quite possible that there were socio-cultural reasons for people saying that the full responsibility for decision-making lay with the men, for in many societies it would be indecorous for women to state openly that they played a role in decision-making with their husbands. This would be the case even when, behind closed doors with their husbands, they contributed significantly in the discussions leading to decisions.

2. US\$ 1 = CFAF 600 approximately (September 1997).

Improvements That Women Would Like for Their Tools

The women stated that their hand tools were heavy, fragile and tiring to use. They complained of pains in the back and rib-cage during and after their use, to the point where, after a long day in the field, they had difficulty sleeping. Of the 36 women's groups involved, only one said they would like longer handles on their tools. When pressed as to why they did not have them since they were made in the village, they replied that their husbands would think them lazy if they worked standing up straight. The women also complained that hand tools were slow and time-consuming compared with animal traction.

"Animal traction makes the difference between day and night!"

Statement during a women's discussion group

Overall, the women did not identify any practical improvements to their hand tools or propose that improvements might be possible. Rather, they almost unanimously stated that their problems could only be solved through widespread use of animal traction with donkeys. During several discussions, the women stated that they would need three animal-traction packages per group. With these, they would be able to service the needs of all their members.

Willingness to Pay More for Better Tools

"Good things sell themselves."

Statement by men's discussion group

There was a general willingness by groups to pay more for better tools. However, it was stressed that they would really have to be better.

C. Conclusions

Constraints and Opportunities

The determining factors governing improved production technology for women in Burkina Faso fall under three main categories: socio-cultural, economic and technical.

Socio-Cultural Factors

Women's lowly place in rural society brings with it many related problems. Especially important is women's lack of formal access to land rights: they do most of the work, but they are basically unpaid farm labour on the land assigned to their husbands and thus have very limited access to cash or credit. In addition, they are seldom part of any decision-making in the community, and men even take the final decisions regarding the farm tools to be used by the women.

This situation seems to be so entrenched that it is beyond the ability of individual women to change it. Empowering women through effective groups would appear to be the only solution, especially since recognized groups obtain access to land, even if it is not the best.

It is important to note, however, that men were found to be generally in favour of seeking improvements in the production technology available to women, so any attempts to do so would not necessarily be working in a hostile environment.

The work already being done by NGOs and various institutions in the area of women's groups clearly must be continued and expanded. These groups recognize that access to resources, e.g., land and credit, is crucial for their success, as is education to mobilize and empower them and to sensitize men to women's capacities and needs.

Women see animal traction as the solution to their production problems. However, the only avenue for making it available to them is through the promotion of viable women's groups, especially when such groups have an activity in cash crops, such as horticulture, as in some parts of the Central Plateau. Animal-traction packages could be made available to groups on credit; and if the group responsibility concept pioneered by the Grameen Bank in Bangladesh were followed, there would be a high probability of good loan recovery rates. It would be worth carrying out a more detailed study on how animal traction could be made more accessible to women in Burkina Faso.

Whatever the specific and independent access by women to animal traction in the future, the tradition of giving first priority to the family field will surely remain in force. This means that animal traction for weeding, even if used by men, could considerably reduce women's workload in the family plots. In general, farmers who use animal traction in Burkina Faso cultivate up to four times more land than those using hand tools only; so unless animal-draught weeding is part of the technology used, the hand-weeding task for women is greatly increased. Conditions in the Central Plateau may not lend themselves at all times and in all places to the use of animal-drawn planters but, where they generally do, any promotion of animal traction should include these planters and inter-row cultivators. Where they do not, expansion of the existing practice of hand-planting along lines scratched by simple row markers should be energetically encouraged so that animal-draught weeding can follow.

The issue of longer handles for hoes – often assumed by outsiders to be the key to improved posture and less fatigue – appears to be decided by cultural conditioning and tradition in the Central Plateau. The people seem to believe that work can only be done properly if they are bent double and use a short hoe. Given the relatively heavy and stony soil conditions, this may in fact be true but can only be verified through practical experiments with women in the field. A project such as the IFAD-supported one that provided the field research for this study could easily bring in a few long-handled hoes from the Peul areas to the north, or long-handled push-pull hoes of the sort widely used in Senegal, and conduct comparative field trials with women's groups. It seems possible that a long-handled hoe might be suitable for overall weeding and for inter-row weeding after an animal-drawn cultivator has been used.

Economic

At least in the Central Plateau where most of the country's farmers live, the agricultural economy is so poor that hardly any investments in production technology, other than traditional hand tools, can be envisaged. The situation may be different in the cash crop (mainly cotton) areas in the west of the country, but the general conclusion must be that extreme poverty, coupled with erratic rainfall, makes any improvement extremely difficult if it involves higher costs. This is especially so given the widespread opinion that even credit for animal traction is not economically viable in the Central Plateau, at least for individual farmers.

Hard Work but Effective

Watching women weeding with *dabas* in crops not planted in rows showed that the short handle allows them to make circular, sweeping movements around individual plants. It would be more difficult to get this precise control with a longer handle. And since the user was already bent double, she could use her other hand to shake soil from the roots of the weeds pulled out by the *daba* or to remove any soil that had been piled on to the plants.

In such a situation of subsistence agriculture with almost no cash income, even when a farmer recognizes that a tool is of higher than normal quality and will perhaps last twice as long, he simply cannot afford the initial outlay. This could be the reason

why virtually all animal-traction implements seen in the field during the study were the relatively cheap ones built by blacksmiths, although it is not certain that farmers would buy better-quality items even if they had the money available.

Technical

The request from women that their hand tools be lighter does not seem practical because blacksmiths already use as little steel as they can when making them. And higher-quality steel that could be forged into thinner, stronger blades is not available.

The potential for improving the design of hand tools, in terms of their shape and form, appears limited. However, the same is not true for their quality and durability. Certainly, the lack of quality raw materials is a major constraint, but even without them, better production techniques could improve the working efficiency and durability of tools.

With regard to the possible introduction, production and maintenance of improved or more complicated tools, the blacksmiths' skills and their present technology would be generally insufficient to support them. Hence, any attempt to introduce new tools would need to be entrusted, at least initially, to a semi-industrial concern such as CNEA, working closely with the Division of Mechanization of the Department of Crop Production.

Both for improved hand and animal traction tools and possible new tools and implements, past training programmes for village blacksmiths need to be improved, intensified and expanded.

With regard to the possible introduction of hand-operated implements such as planters, wheeled hoes and the like, the Division of Mechanization might devote some resources to this. As the Department is testing and copying animal-drawn

equipment developed in other countries, it could do the same with manual equipment. Just to cite a few examples, plunger or jab-type hand-planters, manually-drawn seeders and wheeled hand-hoes are in production and use in many countries, including Thailand, Zimbabwe, India and Brazil³. However, for this approach to be successful, the field tests and any modifications to the equipment would need to be done in the closest collaboration with the intended users. Participatory qualitative research techniques, such as those used for this study, would be essential.

3. See, for example, the Buyer's Guide on Tools for Agriculture, produced regularly by Intermediate Technology Publications Ltd, 9 King Street, London WC2E 8HN, UK. This catalogue describes simple equipment produced by hundreds of manufacturers all over the world.

Appendix

Members of the Field Research Team

The coordinator for the study was **Mr Fimba Julian Lompo**, Director of the IFAD-supported Special Programme for Water and Soil Conservation and Agroforestry in the Central Plateau.

The research team was made up of the following persons, all of whom are field staff of the Special Programme:

Mr Mamadou Barry
Ms Noëlie Bauda
Mr Joseph Kiendrébéogo
Ms Sié Orokia
Ms Fousséïna Ouédraogo
Ms Rosalie Ouedraogo
Mr Jean Chrysostome Pizongo
Ms Blandine Tiemtoré

Senegal



A. The Scenario¹

Context of the Study, Its Scope and Methods

The study was conducted within the context of two IFAD projects in Senegal: the *Village Organization and Management Project*, and the *Agro-Forestry Development Project*. Field work was conducted in the areas around Kaolack and Diourbel, to the south-east and east of Dakar, respectively.

Both areas are in the country's groundnut basin, where the soils are generally light and even sandy. According to IFAD project documents, this is the part of the country most threatened by environmental degradation and desertification. It is densely populated and annual rainfall declined from 700 mm in 1956 to 400 mm in 1985.

The field research for the study was conducted with an eight-member team – four women and four men, field workers from the Agro-Forestry Development Project and Village Organization and Management Project. The team received two days of formal workshop-type training followed by two days of supervised work in the field around Kaolack, after which it divided into two groups of two couples each. One group remained in the area around Kaolack and the other went to Diourbel.

In all, 25 FGDs were conducted, 18 with women, and seven with men, for a total of more than 250 people. The participants in the group discussions were always asked to bring their production tools to the meetings.

After the training and supervision of the field researchers, the team leader and the APO held detailed discussions with blacksmiths in Kaolack and with others encountered on the roadside. They also held interviews with industrial producers of animal-draught equipment and hand tools; NGOs, government staff concerned with agricultural development and women's interests; the Senegalese Institute for Agricultural Research (ISRA); the National Agricultural Credit Organization (CNCA), and an importer of agricultural equipment.

The Agricultural Production System and Women's Role Within It²

The agricultural economy in the area of the study is based on groundnut production as a cash crop, with millet, sorghum and maize as the staple grain crops. Minor cash crops are water melon and sesame.

Typically, there is a *family plot* of land, controlled by the head of the household, on which all the members of the family contribute their labour. In addition, women normally have smaller individual plots allocated to them by their husbands on which they grow produce for home consumption and sale. They may also have

1. The introductory and descriptive opening sections of this report are based on information gathered during training sessions in qualitative research methods with the national staff who were to conduct the study (all of whom had a thorough knowledge of the rural situation), on information collected during individual interviews, and on available literature. Some general information has also been lifted from the results of the FGDs with rural people when it was considered that it would best fit in these opening sections.

2. The information provided here is only an outline. For a more detailed account, see the Senegal Case Study On Gender and Agricultural Engineering, FAO/AGSE occasional paper, December 1996.

small vegetable gardens for year-round cropping when water is available. In some cases, it is the male head of the household who determines what the women grow on their plots.

The whole family must give priority to working on the family plot, and if there is another male member of the household, for instance, an adult son, his plot is second in line; and it is only after this that the women's plots may receive attention. The men prepare and seed the plots with animal traction, starting with the plot of the first wife when there is more than one. This system means that, in effect and when timeliness is so important in the short cropping cycle, the women's plots may be worked later than would be ideal.

Formally recognized women's groups may be allocated a *collective plot* to work. However, they are normally assigned poor land that may be distant from the village; and it is only allocated to them for a season or so at a time for were they to cultivate the same plot for three seasons they would acquire the right to do so permanently.

More than half the farming families cultivate land holdings in excess of 6 ha. On average, there are 10 people in each family and the size of family holdings is decreasing because of population pressure. In recent years, farm incomes have been declining because of poor and irregular rains.

Concerning the contribution of women in farm production, according to several interviewees, there are 'two Senegals': in the south, the women are far more active than the men, whereas in the centre-north, men play the predominant role. In the south, rice growing is the exclusive domain of women. However, even in the centre of the country where the field research took place, women were also very much involved and their role is constantly increasing as a result of an accelerating male exodus from rural areas. Some 15% of rural families are estimated to be headed by women.

There is generally a division of labour between the sexes. Land clearing is carried out by the men for it is seen to call for greater strength. Seedbed preparation – which normally involves a single pass with a cultivator to scratch the surface – and seeding are done by the men using animal traction. Inter-row cultivation is done by men or male children, while the hand-hoeing that follows is done by both men and women. However, from general observation in the central part of the country, men appear to predominate in this work.

Women play a particularly important part in the harvest, especially of groundnuts. After a man passes an animal-drawn groundnut lifter, the women gather the crop into small piles for collection by the men. Once it has been left to dry for some time, the women thrash and winnow it by hand, a particularly arduous task which also depends on there being a suitable wind. In addition, the women spend further time gleaning in the soil with their hands for any groundnuts still left. These gleaned groundnuts are theirs to consume or sell.

As an example of unexpected and unwanted reaction to the introduction of new technologies, there is the Senegal case of an improved groundnut lifter that left less groundnuts in the soil. This implement was resisted by the women because it would reduce their income from gleaned groundnuts.

As is usual in Africa, women are also responsible for the poultry and small ruminants normally kept by the family.

Within a typical rural family, the men control the financial resources, and the women's only direct income is from the sale of surpluses from their individual plots or from groundnut gleanings.

The Production Tools Encountered and Their Use

The tools encountered in each group were basically the same (photographs are provided in Annex 6).

Animal Traction

All groups had animal-traction implements that included hoes, seeders and groundnut lifters. In the main, unless they had been built by blacksmiths, they were extremely old, for reasons that will be explained in the next section.

Two basic types of cultivators are the most common: a spring-tine cultivator, known as the *houe sine*, fitted with either chisel points or duckfoot sweeps; and a rigid-tine cultivator fitted with duckfoot sweeps, known as the *houe occidentale*. In the area where the study was conducted, only horses and donkeys are used as draught animals whereas, in the south, oxen are also used.

Hand Tools

Among the hand tools, three types of hoes were encountered:

- ***Hilaire***³. This is by far the most common hoe. It has a kidney- or heart-shaped blade attached to a very long handle, and is used standing upright and with a horizontal pushing and pulling movement. It is used exclusively for weeding in light sandy soils and is seldom used in the heavier soil conditions of the south. According to verbal reports, the *hilaire* was introduced to Senegal some 55-60 years ago. Before that, all weeding was done, bent double or squatting, with short-handled tools.

The handle for the *hilaire* is the only one made by the farmer with wood from a suitable tree. Virtually all the other hand tools have crafted wooden handles that are made by the country's carpenter caste, known as the Laobé. Tools, apart from the *hilaire*, are therefore bought complete with handles.

- ***Sokb-sokb***. This hoe is used in a deep squatting position or bent double. It has a horizontal action like the *hilaire* but it has a very short handle with a crafted pistol-like grip at the end. The flat blade is oval. This hoe is used exclusively by men, particularly the weaker and the elderly, because the squatting position is not considered suitable for women. The *sokb-sokb* is considered effective for dense weed growth. Today, it is far less common than the

3. It was not possible to determine the origin of this name. One might speculate that it is a French spelling of the English hiller, which is used to describe a certain type of tine fitted to cultivators. The other local names provided in this report are in Wolof.

bilaire; in fact, while travelling around the countryside, only one person was seen using a *sokh-sokh*, whereas hundreds of people were seen using *bilaires*.

- *Ngos-ngos* is a small hoe in the form of a traditional African hoe but with a very short handle, usually made of wood. The blade of the *ngos-ngos* is fixed to the handle by a spike (tang) that is heated and driven through the wood. Some *ngos-ngos* are made with handles of steel tube welded to the blade. There is a tendency to fit longer handles to the *ngos-ngos* so that it can be used in a more upright position. It is then usually called a *daba* or *larmet*, and it is also used for building bunds.

Axes/Cutting Tools

Traditional axes (*kebep*) in varying sizes are used for cutting shrubs and clearing fields before planting. Machetes (*coupe-coupe*) were also found, and these are imported, usually from Brazil.

Harvesting Tools

These include a variety of knives and sickles, most of which are made locally.

Rakes and Five-Tined Forks

These tools, produced by local blacksmiths, have come into use in recent years with the expanded practice of compost-making, although they are also used for raking groundnut haulms during harvesting. The rakes are made from a piece of mild-steel plate from which the gaps between the teeth are cut with a hammer and chisel. The forks are made from round-steel rod duly worked into points. According to some reports, the rakes are especially prone to breakage, although during the group discussions it was said that they could last up to ten years.

Miscellaneous

In one village, an imported European scoop shovel with a D-shaped handle was found, such as that used for coal in Northern Europe. There were also an imported digging hoe and a pick-axe, but neither appeared to have been used much. Similar implements were not seen in any other village.

An animal-draught rake, to be mounted on the frame of a spring-tined cultivator, was seen in one village. It was 75 cm wide, with teeth 45 cm long, and was made by a local blacksmith, from steel reinforcing rod, at the request of the farmer.

Mechanization in Senegal – Past and Present Developments

Animal traction was introduced in the early 1960s and is the basis for agricultural production in the country. A State-owned company, Siscomar, was created in 1963 to manufacture implements under licence from a French concern. Three sizes and weights of frame were produced for use with horses/donkeys on the one hand, and with oxen on the other. They were mounted with up to three or five tines for cultivating and with various sizes of mouldboard ploughs and ridgers. Seeders were also produced.

This range of equipment was made available to farmers under a credit programme launched by the government of President Senghor in 1970. About 800 000 units were produced and sold before the credit scheme was abandoned in 1980, by which time unpaid farmers' debts, reportedly in excess of CFA 20 billion, had accumulated. At that time, Siscomar had a production capacity of up to 150 000 units a year.

Siscomar was sold to a group of private entrepreneurs and its name was changed to Sismar in 1981. The Government assured the company that there would be credit for further purchases of equipment by farmers, but this did not materialize. Thus, from 1980 onwards, virtually no implements built by the company were sold in Senegal, except through externally-funded development programmes. The company survived thanks to exports, mainly to Côte d'Ivoire, and through diversification into other fields such as the production of school furniture.

Meanwhile, blacksmiths began to repair and renovate existing Siscomar implements, so most of them seen in the field were ancient and had been repeatedly patched up. In rarer cases, blacksmiths also build complete implements. Those encountered showed considerable variation, tending to be copies of copies and mixtures of different models, all produced from scrap metal.

However, at the time of the present study, there were prospects for a considerable improvement in the mechanization scene, because in 1997, after some 16 years with practically no credit available, the Government launched its 'Agricultural Programme'. The Programme aims to revitalize this seriously depressed sector, which occupies over 70% of the population and provides about 30% of export earnings.

With support from World Bank and other lending institutions such as the West African Development Bank, credit and other farming support services are to be re-generated. In the specific field of farm equipment, credit for five years at 7.5% interest is being introduced. This should open new horizons for updating and improving the implements park, and for making animal traction more available to women.

However, the situation is still complicated by several factors, which in essence are as follows:

- The credit system is based on CNCA providing coupons to farmers who in turn give them to the manufacturer in exchange for new implements. The manufacturer, once he has delivered the implement to the farmer, presents the coupon with the invoice to CNCA which pay him directly. This is a satisfactory system for the very few industrial manufacturers, but it is not yet clear how blacksmiths, who seldom become involved in paperwork and invoices, can be included in the scheme. According to one interviewee among the manufacturers, CNCA may also be reluctant to provide credit for equipment made by blacksmiths, which is usually made of scrap material and for which there is no guarantee of quality.
- Implements are invariably purchased just before the rainy season, and at no other time. This means that manufacturers have to build the implements over a period of several months earlier, say between January and June, and

have them ready for delivery in a very concentrated period around July. In 1997, there was a delay in announcing the funds that would be available, and Sismar and another major manufacturer, URPATA Sahel, could not start building implements in time to meet the demand.

For 1998, there was a further problem. Sismar believed, from a market survey it had conducted, that it could sell 30 000-40 000 animal-draught units for the cropping season, worth about CFAF 1.5 billion. However, to produce these implements, Sismar needed to order the raw materials in Europe (to a value of about CFA 500 million) in October-November 1997 for delivery in December. CNCA does not begin paying manufacturers on the basis of their coupons for sold implements until about two months into the cropping season, i.e., around September. Thus, even with 90-day terms of payment to the European suppliers of the steel, there would be a credit gap of several months. In September 1997, Sismar was looking for the CFAF 500 million it needed to buy its raw materials, and it seemed that this aspect had not been taken into account in the Government's plans. Unless a solution is found, the potential market for new implements might not be satisfied; credit would be available to farmers, but not the implements.

Cultural and Socio-Economic Considerations

Working Posture

Senegal does not have the cultural conditioning found in other countries to the effect that work can only be properly done with a short-handled implement and while bent double. The introduction within living memory of the long-handled *bilaire*, and its almost total adoption in the areas of the centre and north – where it is particularly suitable because the soils are relatively light – testifies to this openness. In addition, while travelling in the countryside, the study team noted that the very short-handled and traditional *sokh-sokh* was hardly being used for hoeing, and this was confirmed in the discussion groups – another change that testifies to a level of flexibility and interest in adopting less tiring tools. Animal traction was also adopted very readily and widely in the years after its introduction.

The Senegalese have been consistent travellers for decades, even if only as members of the French Army. Perhaps this helped to develop an openness to the outside world and a readiness for change, even if it happened under duress.

The System of Economic Interest Groups

Senegal has a system of Economic Interest groups, known as GIEs. Under this, two or more people can get together to create a GIE and, once the group is formed, it gives them formal status, access to credit, and the like. The capital required to create a GIE is about CFAF 45 000. Women's groups normally form themselves into GIEs.

Access to Land and Credit

As mentioned earlier, credit for agricultural production was basically unavailable during the period 1980-97. Even now, obtaining it depends on an applicant's being able to provide certain guarantees, the most usual of which is demonstrating his/her

"There is not much point trying to improve production technology for women if they don't have access to land."

Member of field research team during Focus Group Discussion training

access to a reasonable area of cropland. Unless they are heads of households or form a GIE, women's lack of access to land automatically debars them from obtaining credit. For this reason, as in many other African countries, women have benefited from credit to a much lesser extent than men.

Although women's lack of access to land is the main reason for their ineligibility for loans, it was also pointed out by one interviewee that, compared with men, they have less availability of time or other resources and it would thus be difficult for them to embark on the long bureaucratic procedure involved in obtaining credit. For example, a woman living in a rural area would have to journey to the nearest major town and possibly spend one or more nights there. This would involve costs that she may be unable to meet, as well as an absence from her home and children that may be difficult to organize. Thus, it is extremely difficult for an individual woman to obtain credit: only by working through a GIE, sharing costs and relying on group support, can a member undertake the procedures on behalf of the rest of the group and provide the necessary guarantees.

The Caste System

Certain occupations in countries of West Africa are subject to a caste system. For example, castes exist for blacksmiths, carpenters (the Laobé mentioned earlier), leather workers, story-tellers/singers and jewellers. Blacksmiths are on the lowest rung of the social ladder.

That blacksmiths are a caste has importance in the village context, for, in effect, their caste is a group with a certain solidarity and commonality of interests. For example, they often share forges and seem to set common prices for the tools they produce. This gives them a degree of power in their relationships with villagers, who depend on them mainly for the tools they need. It also affects tool-buying habits, in that farmers prefer to buy from the blacksmiths – rather than buying industrially-produced tools – in the interests of harmonious relationships in the village and in order to more easily obtain follow-up repairs and maintenance.

Draught Animals for Women

Horses are the most commonly-used draught animals in the central part of the country where the study was conducted. A horse costs CFAF 80 000-120 000, whereas a donkey can be bought for CFAF 12 000-30 000. Prices are influenced by the time of year, for no one will sell draught animals during the cropping season and when fodder is abundant.

Unlike donkeys that manage to survive by browsing on almost any available vegetation, horses are less hardy and are generally fed with peanut straw. This makes it very difficult for women to own horses, for peanut straw belongs to the men and it is expensive to buy. Thus, if a woman manages to acquire a horse, she has to rely on her husband to provide peanut straw, thereby relinquishing much of her ownership rights to the horse. For this reason, as well as for their lower initial price, donkeys are generally considered to be more suitable for women.

Institutional Aspects

Government Research

The Mechanization Section of ISRA is based in Bambey. However, at the time of the visit by the study team, the Section had no professional staff. The head of the Section had been posted elsewhere, and there was no indication of when he might be replaced.

For this reason, it was difficult to obtain precise information. However, it seems that the area of manually-operated or animal traction tools for agricultural production has not attracted significant attention. On the other hand, considerable attention seems to have been given to post-harvest technology. This was also confirmed by URPATA Sahel, initially a manufacturer of grain mills before becoming involved in animal-drawn implements, which stated that it worked closely with ISRA's Mechanization Section in developing their products.

There are no institutions in the country with capacity in fields such as ergonomics that could assist the mechanization specialists in developing improved manually-operated tools.

Blacksmith Development and Training

A project called *Projet Artisans Métal et Cuir* (PAMEC) is supported by French bilateral aid and is located in Thies.

Government Programmes for Women

The Ministry for Women, Children and Family is very interested in technology for women, but so far its programmes and projects in the rural sector have concentrated on post-harvest operations and on reducing women's work and drudgery on the domestic front, for example, through devices to lift water from wells and pumps.

Producers of Tools and Implements

Sismar

This company has already been mentioned in connection with the new credit situation. It has the largest production potential in the country and employs about 100 workers. At its peak in the 1970s, it employed about 1 000 persons.

URPATA Sahel

This organization, which produces animal-draught implements, mills, thrashers and the like, merits a short description; for, unlike Sismar, which is a commercial operation only, URPATA Sahel is also a development organization. Its name is an acronym for the French version of 'Unit for Research, Production and Assistance for Appropriate Technology Adapted to the Sahel'. It was founded in the early 1990s as a GIE by a group of people who had worked in local NGOs. In addition to manufacturing and selling equipment, it provides training and follow-up services and has received funding from a number of international NGO donors. This enabled it to set up its production plant and create a revolving fund that provides three-year credit to purchasers of its products. The plant was deliberately established in a village – N'guekhokh, about an hour's drive from Dakar – where it has created about a hundred jobs. The operation is now commercially viable, with a turnover of CFAF 418 million in 1995, CFAF 496 million in 1996, and an estimated CFAF 600 million in 1997.

Sorex-Chim

This is one of two or three small companies in and around Dakar that manufacture and sell hand implements such as hoes, shovels, pick-axes, and manure forks copied from European models.

The hoes seen at Sorex-Chim's sales outlet were long-handled but, instead of having the flat blade for a horizontal push-pull action like the *bilaire*, they had a blade set more or less at right angles to the handle. The user chops downwards into the soil and pulls the hoe towards him/herself. These were lightweight hoes and made of new, good-quality material, but they cost more than twice as much as a *bilaire* produced by a blacksmith.

According to a Sorex-Chim interviewee, the hoes have only been on the market in quite recent years, and so far they have not been bought by farmers directly – most sales having been to NGOs which, in turn, distribute them. However, none of these hoes were encountered during field work for the study.

Blacksmiths

Blacksmiths in Senegal fall into two broad categories: those working where electricity is available and who have been able to buy an arc welder, and those in the more remote villages who have only a forge and hand tools. The former can and do produce animal-traction implements and forge hand tools, but the latter are confined to making only hand tools.

The blacksmiths generally use scrap material for the implements, although some, working within the context of the French-supported project based in Thies, are reportedly using new material.

The animal-draught implements are generally copies of those built by Sismar, but with considerable variation.

B. What Women and Men Farmers Say

The Practices and Perceptions of Rural People Regarding Production Technology

Some of the factual information that came out of the FGDs has been combined with information from interviews and available literature to provide the foregoing general descriptions of the agricultural production and social scene in rural Senegal. In addition, the following specific points emerged from the group discussions:

Time Spent by Women Working in the Field

Work	Days/year
Weeding	60
Harvesting, including hand-thrashing and winnowing	90-120

Differences in Tools Used by Women and Men

The only tool used generally by women in the fields is the *bilairé* hoe, although a few may use the *ngos-ngos*, the traditional African hoe. A few men still use the *sokh-sokh*, but the squatting position needed for it is generally seen as being uncomfortable and tiring, hence its tendency to disappear.

It was difficult to obtain a coherent picture of the situation regarding the use of animal traction by women. Some interviewees among government staff stated that women made extensive use of animal traction, but the contrary was stated in group discussions with women and men farmers. Indeed, the discussions showed that animal traction was the exclusive preserve of men, but with boys also using it for inter-row weeding. It is possible, however, that the situation varies in different regions of the country.

Discussion groups with men revealed the opinion that animal-traction tools were too heavy for women and that they were not trained in their use. However, the most common hoe, the rigid-tine *houe occidentale*, is in fact quite light. And if boy children can use it, as the consultant and the APO saw for themselves, why not women, too?

A possible interpretation of the opinions expressed by the men is that they want to continue to monopolize animal traction, and/or that for historic and cultural reasons it is seen to be their preserve.

A few group discussions with women showed that they wanted access to animal traction, but they repeated the view of the men that the implements were heavy and that they were not trained to use it. When asked for her views on the issue of animal traction for women, a spokeswoman in the Ministry for Women, Children and Family said she thought that women would almost certainly like to use it if given the chance.

Time and resources only allowed a short period of orientation and training for the research team in the objectives of the study and in the qualitative research

method to be used. Overall, they did a truly outstanding job, but they did not delve sufficiently into the issue of women and the use of animal traction during the FGDs.

Renewal of Tools

The hand tools are generally renewed annually, although handles may break and need replacing more frequently. Rakes were said to last up to ten years. Tools are almost invariably bought from local blacksmiths.

Preference for Industrially- or Blacksmith-Produced Tools

The groups all recognized that the quality of industrially-produced tools was superior, that they performed better and lasted longer, but that they were much more expensive. Furthermore, as mentioned in the earlier section on the social relationships surrounding the blacksmith caste, farmers prefer to buy from blacksmiths in the interests of harmony within the community and follow-up repair and maintenance.

Changes That Have Taken Place in Hand Tools and Implements in Past Decades

The only spontaneous change mentioned by the groups was the tendency to fit longer handles to the *ngos-ngos*, and the issue of handle-length was evidently recognized as being of importance in the interests of comfort and reduced fatigue.

“When animal-draught planters arrived and some people started to use them, the others laughed at them and said that they were throwing their precious seed away. But it was not long before everybody wanted one.”

Statement by a participant
in a discussion group

New tools that were identified as having been brought in from outside were the *bilaire* hoe and animal draught. The animal-draught seeder was mentioned as having made the greatest difference to the production systems. Some women got up from their groups to demonstrate how, prior to the arrival of the seeders, they had planted by making each hole by hand. They showed the action used with a *ngos-*

ngos, but mentioned that there had been a special small planting tool, even smaller than the *ngos-ngos* and known as a *konko*, which had disappeared with the advent and spread of the seeder.

Other Tools and Implements Known by Groups but Seldom Owned by Group Members

No other hand or animal-draught implements were known by the groups, but some mentioned tractors, and ploughs and seed-drills for them, that they had seen elsewhere.

Who Decides What Tools to Buy

According to group discussions and to the research team, it is invariably the man who decides on the tools to be bought, and in most cases he buys them. It was said

that he may consult his eldest son, but the women are not involved in the decision-making although they may contribute to the cost if they have income from their plots. However, the study team felt it was quite possible that people said this for socio-cultural reasons; for, in their society, it could well be unseemly to state openly that women play a role in decision-making, whereas behind closed doors with their husbands they may well contribute significantly to the decisions taken. This was declared to be the case in most of the other countries of the study.

Improvements That Women Would Like for Their Tools

Longer handles for the *ngos-ngos* was a common request. These tools are generally bought complete with their handles, and thus to obtain longer ones would call for more dialogue between the producers and their clients. Some groups said that they would like to have wider blades on them, and also on their *bilaires*.

With regard to animal traction, both men and women's groups identified an improvement they would like in the cultivators/weeders: they would like

to be able to alter the working width on the move, as and when the space between the rows becomes narrower or wider, and they would like to be able to do this by simply opening or closing the handles on the implement.

"We had never really thought about trying to improve the tools that we and our women use, and we have no dialogue about this with technicians or blacksmiths."

Men's discussion group near Kaolack

Willingness to Pay More for Better Tools

There was a general willingness by groups to pay more for better tools, provided they in fact performed better. Some men's groups said that they would like women to have access to credit so they could buy better tools.

C. Conclusions

Constraints and Opportunities

The determining factors governing improved production technology for women in Senegal fall under two main categories: socio-economic and technical.

Socio-Economic Factors

Women's lack of access to land title, and the fact that most of their work is not remunerated, gives them very limited cash or possibilities for obtaining credit. In addition, they are seldom part of decision-making processes in the community, and even decisions regarding the farm tools to be used by them seem to be taken mainly by the men.

This situation seems to be so entrenched that it is beyond the ability of individual women to change it. Thus, empowering women through effective groups and GIEs seems to be the only solution. Furthermore, recognized groups obtain access

“We would like our women not to have to work in the fields at all. We would like to be mechanized so that we can do all the field work and come home in the evening to our wives who would only have to look after our homes and children. In that way they would not get old so quickly.”

Comment during a men's discussion group

to land even if it is not the best and is not granted for more than one year at a time.

It is important to note, however, that men were found to be in favour of seeking improvements in the production technology available to women, so any attempts to do so would be working in a favourable environment.

The work already being done by projects, NGOs and various institutions in the area of women's groups clearly must be continued and expanded. Women's groups recognize that access to resources, e.g., land and credit, is crucial for their success, as is education to mobilize and empower them, and to sensitize men to women's needs and capacities.

Technical

The only opportunity for improving hand tools lies in the area of quality and handle length. For reasons explained earlier, people prefer to buy their tools from the local blacksmiths and thus these artisans are the key to improvements.

In addition to the obvious area of blacksmith training and development, which needs further reinforcement, it would be certainly worth trying to create more technical dialogue between blacksmiths and their customers. (The case of the customer, cited earlier, who had asked a blacksmith to make him an animal-drawn rake, was a rarity because normally there is no significant consultation.)

Development projects – such as the two IFAD projects the team worked with in Senegal – and government extension services could quite easily organize forums in which blacksmiths, farmers and technicians could meet and discuss tools, handle length and the like. Women's groups formed by NGOs and development programmes could be encouraged to enter into discussion with the blacksmiths supplying their tools. This would be the most obvious way to meet the desire for longer handles and wider blades which emerged in the discussion groups.

For women who grow vegetables, lifting water from wells by hand and carrying it in buckets to the plots is time-consuming and tiring. Animal-powered pulley lifts and simple pumps are made in Senegal under the aegis of the French-supported artisan development programme (PAMEC). It should be possible to instal a pipe or channel system to take the lifted water by gravity to the plots. However, the introduction of such improvements reverts us to the underlying issue of women's access to credit. Once again, it is only women's groups that have formed into GIEs that have any opportunities in this direction; and, even then, there may be serious problems for it is not uncommon to find a group of 100 women who have been allocated one hectare of land. Again, the economic viability is so low that credit would not be granted.

Credit is also the factor that limits women's access to animal traction although, for reasons explained earlier in connection with peanut straw, in practice women would not be able to use horses independently. They would, however, be able to use donkeys.

The groundnut harvest is certainly labour-intensive and tiring for women, as are their hand-gleaning operations. One interviewee stated that he had seen women gleaning in the soil with a tablespoon. The issue was not specifically raised by the groups, but one is forced to wonder whether it would not be possible to develop a hand tool that would make this task easier and quicker.

Furthermore, even if threshing and winnowing is technically a post-harvest activity, and therefore beyond the scope of the present study, this operation is considered to be gruelling for women and enormously time-consuming. Some years ago, a Brazilian machine – similar in some ways to a combine harvester – was imported. After the groundnuts had been lifted in the normal way and allowed to dry, the machine moved along the row, gathering up the groundnuts and their haulms, thrashing and winnowing them and depositing the haulms or straw back on the field. Quite apart from the cost of such a machine, it was not suitable because the peanut straw is so valuable as fodder in Senegal.

What is really needed, but does not exist in Senegal, is a stationary groundnut thrasher that could be bought by groups or contractors.

Appendix

Members of Field Research Team

The coordinator for the study was **Mr Wally Ndiaye**, Technical Director of the IFAD-supported Village Organization and Management Project based in Kaolack. The field researchers named below were drawn from this project and from the IFAD-supported Agro-Forestry Development Project based in Diourbel. All the men in the team were from the project based in Kaolack, while the women were from that in Diourbel.

Mr Balla Moussa Dabo
Ms Arame Fall Dieng
Ms Thioro Ba Fall
Ms Aminata Ndiaye Ka
Mr Babacar Seck Mbaye
Mr Baba Mboup
Ms Fatou Kane Ndiaye
Mr Mamadou Sane

Uganda



A. The Scenario¹

Context of the Study, Its Scope and Methods

The field work for the study was coordinated by the Agricultural Engineering and Appropriate Technology Research Institute (AEATRI), which is part of the National Agricultural Research Organization and the government facilitating body for the FAO/SIDA FARMESA Programme.

The field work for the study in Uganda was conducted in two different parts of the country: the District of Mubende in central Uganda (to the west of Kampala), and the District of Soroti in the north-eastern part of the country.

There are distinct differences in the two areas' farming systems. Mubende is favoured by rainfall throughout most of the year, and by heavy rains in the periods March-April and September-November. The high altitude near the Equator provides a favourable climate, with temperatures in the 23-29°C. range. About three quarters of the population of 580 000 are involved in agriculture, which is mainly at the subsistence level. The soils are generally of medium texture but are also stony in some areas. The morphology of the District is varied: much of it is hilly, with small sloping plots, but other areas are flat. The average size of holdings is about 3 ha.

The main food crops in Mubende District are plantains (for the staple *matooke*), finger millet, maize, sweet potatoes, Irish potatoes and groundnuts. The main cash crops are coffee and tea, although some cotton, vanilla, sunflowers and soya beans are also grown. Although livestock exists, it is not an integral part of the farming system.

The District of Soroti is larger in area than Mubende, but it has a smaller population (about 431 000 according to the 1991 survey). It is generally drier than Mubende, but it also has two rainy seasons – March-May and August-October. The main crops include sorghum, cassava, sweet potatoes, groundnuts and cow peas, with rice and maize as minor crops. Until the late 1970s, cotton was a very important cash crop in the area but its role has declined drastically due to high production costs and poor marketing infrastructure. In recent years, sunflower, soya beans and a number of what used to be traditional food crops have been assuming increasing cash-earning roles.

The average size of land holdings in Soroti District is about 8-12 ha, but the amount of land actually under cultivation has declined significantly as a result of internal strife in the area in the years 1986-92. More than 80% of households depend on agriculture, usually at subsistence level, for their livelihood. Livestock has always

1. The introductory and descriptive opening sections of this report are based on information gathered during training sessions in qualitative research methods with the national staff who were to conduct the study (all of whom had a thorough knowledge of the rural situation), on information collected during individual interviews, and on available literature. Some general information has also been lifted from the results of the FGDs with rural people when it was considered that it would best fit in these sections.

formed a strong part of the farming system in Soroti District, although during the insurgency of recent years in the north, the cattle population has been seriously depleted through rustling by marauding tribes from neighbouring areas. However, there are still an estimated 77 000 head of cattle in the District.

The field research for the study was conducted with a team of eight people – five women and three men. Two of the team were from AEATRI, two were from the Department of Women’s Studies of Makerere University, and the other four were from the extension services in Mubende and Soroti.

Care was taken to choose people who were fluent in the main local languages of the Districts in which the study was to be conducted. However, given the number of languages in Uganda, and the fact that several may be used in one community, problems could have been expected. Fortunately, only two facilitators reported some language difficulties in one group in Mubende and in one in Soroti.

In all, 26 FGDs were conducted and, of these, 17 were with women and nine with men for a total of about 245 people. The participants in the group discussions were always asked to bring their production tools to the meeting.

The Agricultural Production System and Women’s Role Within It

The agricultural production system varies considerably across Uganda’s different regions. For example, animal traction, first introduced in Tororo District in the eastern part of the country in 1909, spread from there into the northern regions around Soroti. However, it was subsequently prevented from spreading further west by the tsetse fly and by the shortage of bovines, which were not part of the farming system further west. In the extreme south-west of the country, cattle are so highly prized and regarded that to use them for draught tillage would be considered unseemly.

Recently, there has been a draft proposal to FAO to create an animal traction development centre in the country. This proposal states that only about 27% of Uganda’s arable land is under cultivation, and that almost 90% of the cultivated land is worked by human labour with hand tools. Only 8% is tilled with animal power and 2% with tractor power.

In most parts of the country, the men play an active role in the clearing of land before primary tillage and, if they have draught animals, they usually do the ploughing. They also help out with most operations for labour-intensive crops such as potatoes. Although women may also participate in land clearing, it is usually after this operation that they become fully involved and, indeed, often take a leading role.

In Mubende District, planting in rows is not common. For example, groundnuts are planted randomly and millet is broadcast, which naturally means that weeding

“People in the south-west look upon cattle like the Hindus in India.

It would be an insult to use them to pull a plough!”

Comment by member of field research team

“For a man, a crop means income.

For a woman, a crop means food.

Whenever cash is involved, men also become involved.”

Comment by member of field research team

“Men only wait for the end results

[of our work] – food at the dining table!”

Comment by a women’s discussion group in Mubende

can only be done with hand-hoes. Nor is planting in rows universally applied in Soroti District; but where it is, inter-cropping is quite common, which again complicates the control of weeds.

Typically in Uganda, there is a *family plot* of land, controlled by the head of the household, on which all the members of the family contribute their labour as a priority. In addition, women normally have smaller individual plots allocated to them by their husbands on which they grow produce for home consumption and sale. Women are also responsible for most of the poultry and small ruminants normally kept by the family. They also assist with cutting and carrying forage for zero-grazing. The men are generally responsible for selling farm produce.

Women's groups have been forming in quite recent years. They may borrow land, but they have to pay for it. On occasion, they are granted government land. A feature of women's groups in Uganda, and a difference compared with some other countries, is that they usually include a few men. This is generally a positive step because the men become involved in the group, know what is going on, and can plead the group's causes with other men in the community. In addition, it may open the door to credit for the group, in that men may be persuaded to put up their land as collateral.

The Production Tools Encountered and Their Use

Photographs of the tools encountered are provided in Annex 6.

Animal-Traction Implements

No animal-traction implements were found in the Mubene District, but in Soroti they were fairly widespread. Some were imported from India or Brazil. The country's factory producing animal-traction implements, the Soroti Agricultural Implements and Machinery Manufacturing Company (SAIMMCO), founded in 1990, is now the main source.

"In the days when we used an A-H² seeder for planting, weeding was easy and the yields were higher."

Comment during a women's discussion group, Soroti

the Soroti Agricultural Implements and Machinery Manufacturing Company (SAIMMCO), founded in 1990, is now the main source.

Animal traction is mainly limited to ploughing, with relatively little use of animal-drawn planters or cultivators/weeders. Some groups mentioned that there were some broken-down planters, weeders and ploughs imported from Brazil in the area but that no spare parts were available to repair them.

Hand Tools

The hoes encountered were all of basically the same, traditional, chop-down-and-pull type. Curiously, there were few made by local artisans for it seems that, in Uganda, blacksmiths are relatively rare in the rural areas compared with other

2. A-H were the brand initials for an engineering company in Soroti which was mainly concerned with equipment for the cotton ginning industry but which also produced animal-draught implements.

countries. The majority of hoes seen had been imported from China – the Cock brand. Some others seen – Crocodile brand – were made in a plant at Jinja owned by Chillington of the United Kingdom.

The Cock brand Chinese hoe has an industrially forged eye-ring fitting for the handle, and comes in at least two different weights: 2.5 and 3 lb. There may be additional weights in the range, but these were the only variations actually found. People generally do not know that different weights exist: they simply buy what they find available at their local store or market. In general, the Cock brand hoes were well thought of, although a number of damaged and broken ones were brought to the discussion groups.

It was stated by one interviewee that there were as many as five ‘fake’ Cock brand hoes sold in Uganda and that these were not as good as the originals. One of these ‘fakes’, or ‘duplicates’ as they are more politely termed, is said to be made also in China and another is thought to be made in India. The appearance of them all is identical but, according to the opinions heard, the quality of the steel varies.

One particular type of hoe that was much praised in the Mubende area was known as the ‘Finland hoe’. It is not clear exactly how it got this name, but according to one source it was brought into Uganda under an IFAD project and distributed at a subsidized price. This tool has a socket fitting for the handle, created by folding the same steel plate that forms the blade. It does not look like the product of industrial production techniques, which mainly turn out hoes with forged ring fittings. However, the Finland hoe was particularly appreciated for the quality of its steel, and many groups commented that they were sorry it was no longer available. They particularly liked it because it was light yet robust, and maintained a sharp cutting edge over time.

“We women often go out as hired labour to well-to-do neighbours in exchange for borrowed tools instead of cash.”
Statement during women’s discussion group in Mubende

Some tools that were shaped like a hoe, but had three or more teeth in place of the hoe blade, were seen. These were said to be excellent for some weeding operations, particularly where there were infestations of couch grass; but they were also expensive. Such ‘fork-hoes’ are quite often lent, or in effect hired out, from one family to another.

Handles for tools are either made by the men of the family or bought from specialist handle-makers. Tools are very seldom bought complete. The handle length is dictated by personal preference but, in general, handles tend to be of medium length.

Small weeding hoes with very short handles were found in some communities, especially in Soroti District. In addition, for the fine task of weeding millet, the commonly-used tool is a strip of flexible steel normally used as a strap for fixing roofing timbers together. It is about 18-20 cm long and about 2-3 cm wide, and can be bent into whatever shape is required for scratching around the millet plants. Some groups mentioned that, in the extreme north of Uganda, specially-shaped pointed sticks are used for this tedious and back-breaking task.

Axes/Cutting Tools

- Various sizes of axes are used for cutting shrubs and clearing fields before planting. The axes tended to be very heavy and were used mainly by men. Pangas, or machetes, were also found: the best were said to be those imported from China while those from India were considered to be of lower quality. The Chillington plant in Jinja also makes machetes but they cannot compete on price with the Chinese imports.
- Traditional curved knives and modern straight-bladed knives were seen. The curved type is a multi-purpose tool that is used for various agricultural practices and for basket-weaving. Today, however, it is being replaced by modern straight-bladed knives, many of which are made locally.
- “The heavy axes have turned out to be tools only for men. Children, especially, cannot use them.”
Women's group in Mubende
- “Our traditional curved knife used to be given to a girl when she got married, and also to any heir as a blessing. It was believed to increase our harvests.”
Comment during women's discussion group in Mubende

Pruning Tools for Plantains

The tool for cutting old fronds from plantain and banana stems is usually improvised by cutting a small branch from a tree, making a slit through it near one end, pushing a knife through the slit so that the blade protrudes at a right angle to one side, and tying it in place. Reaching up with the stick, the worker places the blade of the knife on the top side of the frond, close to the main stem, and, by pulling downwards, cuts it off. The tool can also be assembled so that it cuts when pushed upwards against the base of the frond. Locally-made tools for this task do exist, but very few were seen.

Tools for Removing Suckers from Plantains and Bananas

Hoes are generally used for this task which, curiously, was never mentioned as a time-consuming and tiring chore during group discussions. It was only later, when the study had been completed in Uganda, that FAO's Sub-Regional Representative for Southern and Eastern Africa based in Harare (Ms. Victoria Sekitoleko, a Ugandan) mentioned that this operation was tedious and that a special hand tool existed for it in Australia.

Harvesting Tools

A variety of knives and sickles were seen; and for harvesting sweet potatoes and yams, a variety of pointed sticks and old spear points fixed to handles were encountered. The traditional hand-hoe is also an important tool for the harvesting of tubers and root crops.

Miscellaneous

A few of the groups had rakes, but they were not common.

Cultural and Socio-Economic Considerations

Working Posture

Uganda does not have the profound cultural conditioning that is found in some countries, to the effect that work can only be done properly with a short-handled implement and while bent double. Indeed, although no-one actually works upright in the areas of the study, it was generally found that people do in fact choose handle lengths that they believe will be the most appropriate for them and for the task to be done. This has not always been so, for in the Soroti area, groups commented that, in the past, hoes always had short handles. Even so, there is a generalized feeling that women should work with shorter handles than men but there was no rational explanation of why this should be so, and the opinion is probably based on cultural conditioning.

In the north of Uganda, the Langi tribe are reported to use long-handled push-pull hoes. Opinions about these hoes varied between the groups in the Soroti area. Some stated they would like to have them but that they were not available in their area. Most were less positive, however, saying they were not used to such hoes and that the handles would be difficult to maintain.

“The old hand hoes of the past were not wide enough, had short handles, and caused back pain. That is why most old people from those days have bent backs. Today, you can fit a comfortable handle, and the tools are wider and more effective compared to the old ones.”

Comments during a women's discussion group in Soroti

Land Tenure and Credit

Women have virtually no access to land rights, although in theory they can inherit land. Since land rights are the usual collateral requested by credit institutions, the result is that individual women cannot obtain loans for investment in agricultural production technology. Once again, this confirms the importance of the women's group approach; and, with the Ugandan practice of including some men in the groups, there does appear to be at least some opportunity for obtaining credit by offering the men's land rights as guarantees.

Draught Animals for Women

In much of western Uganda, there are taboos against women working with cattle, and thus they would be automatically debarred from using animal traction with oxen. In the Soroti area, where animal traction is relatively common but is mostly used by men, there is no bar against women using it. The main constraint here seems to be the weight of current animal-drawn implements which are too heavy for the average woman. For this reason, AEATRI has initiated work on implements which are light enough for women to use, and with draught requirements that can be met by the small East African Zebu and by donkeys.

Institutional Aspects

AEATRI has been in operation for just over two years. Its overall work programme is determined by a task force of nine people appointed by the Director-General of the National Agricultural Research Organization. Staff of AEATRI have visited similar institutions in Eastern and Southern Africa, Egypt, India and The Philippines in order to gain ideas for their own work. They have not, however, been to Senegal, which could provide interesting examples of implements and of strategies for their development.

AEATRI is developing a range of new hand- and animal-drawn tools for tilling and sowing and for weeding in paddy fields. Staff state that their designs are adaptations from promising technologies seen during their visits to other countries. However, to an outside observer, it appears that quite a lot of original design work is in progress, involving time and effort that could probably be avoided by closer copying and subsequent modification, if necessary, of equipment from other countries.

The Institute has one woman engineer who is to initiate attention to gender matters in designs. Initial field testing of equipment is conducted in conjunction with other institutions in the country and, if the results are positive, the equipment is then passed to farmers in different areas for trial and appraisal. Limited resources often hamper the production and distribution of sufficient numbers of the prototypes for farmer evaluation.

Possibilities for Conducting Ergonomic Tests on Hand Tools

Uganda is the only country covered by the study that has the capacity to conduct ergonomic tests on people while they are actually working. In the early 1980s, the Agricultural Engineering Department of Makerere University did precisely this to determine men's and women's energy output in relation to their diet. To this end, oxygen uptake was measured during hoeing in the field. The Department would be willing and able to resume such work, provided it were provided with the necessary resources – mainly equipment. Since it is a training institution, it would be able to continue the research, without further assistance, once it had been set up to begin. It would be extremely worthwhile to have data on, for example, the difference in energy expenditure with different weights of hoe, and relate them also to job performance.

Mechanization Policy

An interviewee from the Agricultural Engineering Department of Makerere University stated that his Department had not so far paid any specific attention to women's needs. However, he stressed the importance of those needs being taken into account, especially by manufacturers. He said that the national agricultural mechanization strategy now in preparation did include gender issues, but that manufacturers would need to be influenced in the right direction. This might be done by the Ministry of Agriculture, or through such existing bodies as the National Council of Science and Technology, or by creating a national task force on agricultural mechanization that would include manufacturers.

The same interviewee mentioned that the Ministry of Agriculture and its extension services had hitherto downplayed mechanization; but that when they had taken any initiatives in that area, they had been focused on tractors rather than taking a broader perspective that included animal draught and hand tools. Since more than 80% of all farming operations are still carried out with hand tools, this should be a priority area. Research geared directly towards women's needs was also lacking. The interviewee stated that current designs of implements and tools were not based on ergonomic principles, and that research in this area would be important.

Producers/Importers of Agricultural Production Tools

Chillington of Jinja (Crocodile Brand)

The Chillington plant in Jinja that makes the Crocodile brand of hand tools is up for sale. It is possible that a consortium, including Zimplow of Zimbabwe and Magric (Uganda) Ltd., will buy it. The plant has closed down one of its production lines but the remaining line can produce 5 000-6 000 hoes per day in two shifts. Normal production, however, is about 3 000 per day.

The hoe range produced by the Chillington plant includes 1.5, 2.5 and 3 lb. models. The staff of the plant stated that there was no market for the smallest of these tools and that they intended to discontinue production. This is curious because most women's groups said that they would like lighter hoes for weeding.

SAIMMCO (Soroti Agricultural Implements and Machinery Manufacturing Company)

This company was originally founded in 1990, and a full programme of rehabilitation and development of its plant was begun in 1993 with support from the United Nations Development Programme (UNDP)/UN Capital Development Fund (UNCDF). At present, it is owned by the Government and UNCDF, but it is up for sale as part of the Government's privatization programme. A Dutch development project working in the Soroti area was a potential buyer, but the Government would prefer a commercial venture to take it over.

SAIMMCO's production consists of ox-drawn ploughs, a tool bar system which allows for the interchange of plough or cultivator bodies, ridgers, harrows, ox-carts, etc.

SAIMMCO has no system of direct contacts with farmers: its distributors throughout the country and for export are Magric (Uganda) Ltd. The majority of implement sales are to NGOs, development agencies and projects. These buyers pass them on to farmers, usually under special credit arrangements.

"Weight [of the cultivator] is not a major problem. People just have to be trained properly to use it."

The Managing Director of SAIMMCO, an expatriate, shortly before a field trial that clearly demonstrated the difficulty, even for men, of lifting the implement to turn on the headland or to clear it of weeds

"If you have nothing, anything is expensive!"

Managing Director of SAIMMCO

Many farmers complained that the SAIMMCO cultivator was too heavy, a view not shared by SAIMMCO's Managing Director. Neither did he agree that lighter implements were necessary for women, saying that it was only lack of training that prevented the women from using them. When they were trained, he added, they were often better at steering them than men. (The authors wish to emphasize, however, that the main problem is turning the implement on the headland, not controlling it while it is working.) Despite the complaints about the heaviness of SAIMMCO implements, they are highly regarded for their quality and performance. Indeed, when one project bought a batch of ploughs from SAIMMCO and imported a similar number from India, there was difficulty in selling the Indian ones.

In the past, the price of an ox-plough was about the same as that of an ox, but the shortage of cattle in the area has brought the price of an ox well above that of a plough. Even so, the plough, costing about UGX 115 000 (US\$ 105), is beyond the reach of many farmers.

B. What Women and Men Farmers Say

The Practices and Perceptions of Rural People Regarding Production Technology

In addition to the foregoing general information, the FGDs produced the following specific information:

Time Spent by Women Working in the Field

The two cropping cycles in both Mubende and Soroti made this information more difficult to obtain than in countries with a single rainy season, and there were wide variations in the figures that the groups came up with. The information provided below is based on an attempt to reach some sort of average indication, for which the more extreme figures – on one occasion totalling more days than there are in a year – have been discarded.

Mubende District – two cropping cycles

Work	Days/year
Land preparation ³	60-90
Planting/Sowing	60-90
Weeding	60-120
Harvesting	40-100

3. It is possible that some of the days for land preparation and for sowing/planting overlap, in the sense that the two operations are, to a certain extent, conducted concurrently.

Soroti District

Figures provided by groups in Soroti were often for the number of days for a group of people rather than individuals. For example, they stated for cultivation: group work (11 persons), seven days; and, for weeding millet, group work (12 persons), seven days. Extrapolating from this information shows that the figures do not vary significantly from those obtained in Mubende District, with the exception that when animal traction is available there is a significant reduction in the time taken for land preparation (primary tillage). For example, after considering the time taken for land preparation, one group stated that it took one person 60 days and that she might 'even fail to finish and abandon part of the plot', whereas, with an ox-drawn plough, 'it would take three days'.

Women's Hardest and Most Tiring Tasks in the Field

The majority of interviewees in both Mubende and Soroti Districts stated that, if using hand tools, land preparation prior to seeding was their hardest task, mainly because of the large tough grasses, such as couch, that had to be removed. A commonly-expressed opinion was that, when animal traction was available, there was major relief in the drudgery of land preparation.

"It is weeding that almost kills women!"
 Comment by men's discussion group
 in Soroti District

Weeding the crops was identified as the next most arduous job, although harvesting, especially of cereals, was also rated by many groups as being about as tiring and time-consuming. Many men's groups mentioned weeding as being particularly hard on the women.

Differences in Tools Used by Women and Men

The men generally made greater use of axes and pangas (machetes) than women because of their responsibility for land clearing. In Mubende District, there were no significant differences in the hoes used by men and women, although children generally use hoes that have become smaller through wear. In Soroti, there was a marked tendency for women to use smaller, lighter hoes, and men generally stated that women should have lighter tools. An exception, and a minority opinion, appeared in one men's group which did not support the need for any difference between women's and men's tools, saying that it would double the expense for the men, who buy the tools.

"We buy the same hoes and tools and, when they get worn, we pass them on to the women."
 Comments by men during discussion groups
 in Soroti

In Mubende District, people knew very little about animal traction although there was much interest in learning more about it and in seeing it in practice. Some groups expressed doubts about the possible effectiveness of animal traction on their stony land.

In the Soroti area, a significant proportion of women are already involved in animal traction. All groups were positive about it, saying, for example,

"Our men never know or learn of our [farm] needs."
 Women's group in Mubende

“We have seen pictures of animal traction in our children’s school books, but that is all we know about it.”

“We do not know about draught animals. We have never seen them or the implements, and we cannot say how useful they might be to lighten our work.”

Comments during women’s discussion groups in Mubende District

“Where animal-draught power is available, there is food: there is no famine!”

Comment by women’s group in Soroti

that it allowed larger areas to be opened up; it was faster; it reduced women’s workload by transferring the effort to the animals; it needed fewer people and therefore saved human labour; it turned the soil well and deep; it increased production, and so on.

Many groups reported shortages of suitably trained oxen for animal traction, which made it necessary to carry out many farm operations by hand. People said they could not wait to hire the few oxen available; they had to work by hand to catch the rainy seasons properly for their crops.

One women’s group identified fear of oxen as a limitation they must overcome. Many groups expressed the need for planters and cultivators/weeders in addition to ploughs.

Overall, women want to become more involved with animal traction. This is supported by the men in the area, who stress the need to train women in animal-draught power. However, some men also felt that this proposal should not come directly from them, for the women might take it as an attempt to get them to do even more work. Men’s and women’s groups also felt that women should not use animal traction when they are pregnant or when there are tree stumps in the ground, because they might be injured. Support for using donkeys as opposed to oxen was also expressed.

Renewal of Tools

In the Mubende area, about half the groups stated that they bought new hoes every year. The other half said they did so every one-and-a-half to three years. New pangas were generally bought every four-to-five years. Smaller tools such as knives tended to get lost and were replaced every one-to-two years.

The situation in Soroti District was very similar, but the groups were more specific in saying that, after the one-to-three years’ initial use of a hand-hoe, it was worn to the point where it became a weeding hoe.

With regard to the animal-traction implements, the soil-engaging points of the ploughs have a relatively short life; shares and landsides may need to be replaced every one-to-three months, and even the land wheel may need replacing as frequently. Some groups said such items lasted a year or so, depending on soil type.

The ploughs have no rear wheel to help transport them to and from the field, which may be a considerable distance away. Farmers cannot hold the plough in a raised position for long periods, so they lay the plough over to the right and it simply drags along. This rapidly wears out the right handle. Government extension agents have recently started to promote the transporting of ploughs on wooden sledges to avoid this problem.

Where Tools are Purchased and at What Cost

Tools are usually purchased at the stores or markets in the nearest town. Their costs are as set out in the table below.

Preference for Industrially- or Blacksmith-Produced Tools

As most communities in Mubende District had no blacksmith, all the tools were industrially-produced or imported. In those that did have blacksmiths, it was stated that they only made knives which were inferior to the imported goods. Only one group expressed a preference for locally-produced knives because the imported items were too expensive.

In Soroti District, more tools are produced by blacksmiths but people had a strong preference for the imported ones. In the case of hoes, they said that those made by blacksmiths often had parts that were riveted together. The heads of rivets snagged grass and, in addition, they often broke.

Hand Tools

Tool	UGX ⁴	Tool	UGX
Cock brand hoe (China)	3 000-4 000	Local hoes (Soroti)	2 000-2 500
Forked-type of hoe	5 000	Pangas (machetes)	2 500-3 000
Crocodile brand, Chillington		Axe	2 500
Bought in shop/market	3 000-3 500	Small weeding hoe (locally made)	500-800
As distributed by Magric Ltd.	2 800	Hoe-handle – hard wood	400
Bought at factory gate – 3 lb.	2 300		
-ditto- – 2 lb.	2 000		
-ditto- – 1 lb.	1 800		

Animal Draught

Type	Source	UGX
Plough	SAIMMCO	115 000
Toolbar tillage system	-ditto-	175 000
Dimond spike harrow	-ditto-	17 500

Changes That Have Taken Place in Hand Tools and Implements in Past Decades

In the past, hoe blades were tied to the handle using rawhide thongs, sisal or old banana fronds. The locally-made hoes had a long tang so that they could be affixed

4. US\$ 1 = UGX 1 100 approximately (September 1997).

to the handle in this way. Many groups mentioned the improvement brought by today's eye-ring or socket fittings and the firmly-fixed handles that result. Curiously, Uganda was the only country where no hoes were seen that were fixed to the handle by burning a hole through it for the tang, although axes built on this principle were previously quite common in some parts of the country. Perhaps the relatively few numbers of village blacksmiths have limited this method of fixing the steel part of implements to their handles.

Some groups mentioned that knapsack sprayers had been introduced in recent years. These sprayers are still rather expensive and few in number and they are generally used by men. Wheelbarrows were also mentioned as an innovation of fairly recent times, with people saying that they made transport work much easier and quicker than in the days of using traditional baskets carried on the head.

Other Tools and Implements Known by Groups but Seldom Owned by Group Members

Although people in Mubende District had some knowledge of animal traction and expressed serious interest in it, they were not using it at all. In the five countries covered by the study, this was the most significant case of an appropriate production technology that was known but was not being used. For the rest, people usually mentioned tractors, sprayers, and watering cans as items they knew of but did not use themselves.

Who Decides What Tools to Buy

The final authority for making decisions about the purchase of tools generally rests with the head of the household, regardless of whether that person is a man or a woman. However, since the head of the household is usually a man, men tend to lead in the decision-making. In a majority of groups, it was stated that the wife would make suggestions about what to buy, but it was the man as the head of the household who made the final decision. In any event, it is usually the man who actually buys the tools. In the case of buying animal-draught implements, it is the man who normally takes the decision, for men dominate the animal traction scene.

"I have never yet seen a woman
in a shop or the market buying a hoe!"
Man during discussion group in Soroti

Improvements That Women Would Like for Their Tools

The issue of the weight of hoes was frequently raised. Basically, women would like to have lighter hoes. Two women's groups stated that they wanted 2 lb. hoes instead of the 3 lb. ones they used at present. (They apparently did not know of the Cock brand 2.5 lb. hoe; the Crocodile brand 1.5 lb. hoe was never mentioned by anyone.) Some groups also said that axes should be made lighter so that women could use them more easily.

In Mubende District, some groups felt that blacksmith technology should be introduced so as to allow them to have tools that better fitted their needs. There was

also widespread nostalgia for the Finland hoe. In effect, this means that the people want a lightweight hoe made of high-quality steel.

The issue of quality and the ability of tools to maintain their cutting edge was raised by many groups. A number of groups stated that tools broke easily and did not last as long as they should.

With regard to animal traction, women and men in the Mubende area were greatly interested in it, and wished to know more about it and see it in action. In the Soroti area, greater access to animal traction was desired and it was felt that women should also use it more. For this, and as a first step, women would need training.

Willingness to Pay More for Better Tools

There was a general willingness by groups to pay more for better tools, provided they in fact performed better.

“If the hoe is too heavy, you try to fix a lighter handle to it.”

“If the hoe is too heavy, you give it to the man to use first.”

“In the old days, if you prepared a local brew, and a man bought it on credit with a view to paying for it by digging, you gave him a heavy hoe so that when he used it, its weight would be reduced in the process.”

Comments during women’s discussion groups, Soroti

“If you have two hoes, one heavy and the other light, the woman will always want the light one.”

Man during discussion group, Soroti

C. Conclusions

Constraints and Opportunities

The determining factors governing improved production technology for women in Uganda fall under two main categories: socio-economic and technical.

Socio-Economic Factors

As is the case elsewhere in Africa, women’s lack of access to land rights, and the fact that most of their work is not remunerated, gives them very limited access to cash or credit. In addition, they seldom have any real power in family or community decision-making.

This situation seems to be so entrenched that it is beyond the ability of individual women to make any impact towards changing it. Thus, empowering women through effective groups, which include men so that the door to credit may be opened through using the men’s land title as collateral for loans, seems to be the best strategy.

It is important to note, however, that men appeared to be in favour of seeking improvements in the production technology available to women, so any attempts to do so would be working in a favourable environment.

The work already done by projects, NGOs and various institutions in the area of women’s groups clearly must be continued and expanded. Women’s groups recognize that access to resources, e.g., land and credit, is crucial for their success,

as is education to mobilize and empower them and to sensitize men to women's needs and capacities.

Technical

With regard to hand tools found in central Uganda, there is little scope for improvement. Most tools are industrially-produced or imported and are of reasonable quality. On the other hand, the design, quality and durability of tools produced by blacksmiths in other parts of the country, such as Soroti District, certainly could be improved through intensified blacksmith training programmes.

One basic problem is that rural people are not aware of the different models of industrially-produced or imported tools that exist, for the manufacturers or importers seem to make no effort to inform people or even to have all their different models available at sales points. Thus, people are forced to buy what they find; whereas, in fact, lighter hoe models would be more suitable for women to use while weeding and the heavier models would be more suitable for tillage and bund-building. For example, although the Chillington 1.5 lb. hoe is generally unknown, it is being taken out of production for 'lack of demand'. This contradicts the often repeated request for lighter weeding hoes from the women's groups.

Something valuable certainly could be done to try to better match tools available in the market to women's needs. For example, the manufacturers and importers should be cajoled – and if necessary helped – by government, development projects and NGOs into doing market research. This would allow them to improve their range of tools and their distribution systems so that the tools on offer include weights and sizes best adapted to women's needs.

The need for this is illustrated by what happened after the APO visited the Chillington plant in Jinja. He was given a 1.5 lb. hoe, the model for which the factory staff said there was no demand, and in the following days he showed it to women in the Soroti area. They had not known of its existence before but expressed interest in having it. On the other hand, and to be fair to Chillington, it is also possible that men always buy the heaviest hoe they can find because they think it is better value for money and because they know that, in due course, it will be worn down into a lighter hoe that women can use comfortably. Nevertheless, if more effort had been made to inform people about the various hoe models available, it is hard to believe that there would have been 'no market' for the smallest in the range.

Development and relief programmes are also implicated in this failure to match tools to people's needs. They tend merely to order a large number of, say, hoes of the most common weight. They could improve people's awareness of the range available by working more closely with the local commercial operators in the tool trade and by supplying at least two different weights.

It also would be worth taking advantage of the capacity of Makerere University in ergonomic studies to ascertain the human energy requirements of working with hoes of different weights and of different blade widths in different soils. If, indeed, it was found that there are significant advantages to certain hoe weights and blade

widths for women, this could help to define manufacturers' policies, product lines and sales promotion efforts.

Uganda most certainly needs to make major efforts to improve and expand animal traction. Progress in eradicating control of the tsetse fly means that animal traction may now be possible in much wider areas of Uganda than its traditional homelands in the east and north of the country. But, as shown by this study, even there it needs to be expanded.

There can be no doubt that there is great scope for increasing agricultural production through the use of animal traction; and this study shows that women and men farmers are seriously interested in it and see it as the solution to their farming problems. However, any initiatives to expand animal traction must take account of women's needs, especially in terms of lightweight implements and training. This study has identified land preparation and weeding as the hardest tasks that women do in the fields. Wider use of animal traction could make a major impact in reducing this drudgery.

However, even if this study has shown the desire among both women and men for the wider use of animal traction by the former, and even if there are no taboos against women using oxen in many parts of Uganda, bovines traditionally belong to men. Some cultural resistance to women's full involvement in – and even taking over of – animal traction with oxen may be expected. Especially important, therefore, would be research into animal traction with donkeys in Ugandan conditions, with special emphasis on lightweight and low-draught cultivators/weeders to reduce the time and effort spent by women with hand-hoes in this operation.

Inter-row weeding with an animal-drawn implement naturally implies planting in rows. But, even without row planters, this can be achieved by marking the field prior to sowing or by using a cord. The extension services need to promote row planting as a prerequisite for inter-row weeding with animal traction, and thus take a first step towards reducing women's workload.

With regard to the work of AEATRI, while it is taking a number of praiseworthy initiatives it could also learn from countries in West Africa, particularly Senegal, with a long experience in animal-traction implements. AEATRI could also achieve speedier progress in bringing new implements to the market if it gave almost exclusive emphasis to the copying of successful designs from elsewhere, testing them thoroughly in Ugandan conditions, and only modifying them if necessary.

In respect of feedback from farmers who have been lent implements to use, this evaluation must be done by totally disinterested parties, using qualitative research techniques similar to those used for this study. If not, it will be difficult to obtain the farmers' truthful and reliable assessment of the field performance of the implements, for they might provide information to please the engineers. Serious mistakes could be made on the basis of this information, as has already happened in other countries.

Appendix

Members of Field Research Team

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Zambia



A. The Scenario¹

Context of the Study, Its Scope and Methods

The field work for the study was conducted in two separate areas of Chibombo District – Keembe and Muswishi – in central Zambia, and coordinated by the Palabana Farm Power and Mechanization Centre.

Chibombo District, which covers about 10 000 km², is bisected by the main road and the railway that join the capital with the Copper Belt to the north. The Lukanga swamps lie along the north-west boundary of the District, while the Mulungushi dam forms part of the north-eastern boundary. To the west of the railway line, the District is relatively flat; to the east of the railway, it is undulating; and the south-west part is hilly. The whole District has been affected by deforestation. The soils in the Muswishi area are mainly sandy, while those in Keembe are sandy loam.

Climatic conditions in Chibombo District make it the part of Zambia with the highest potential for arable farming. Rainfall ranges from 800 mm to 1 000 mm per annum, mainly falling in the period October-April/May. However, in recent years, rainfall patterns have departed significantly from the norm and there have been serious droughts.

Although the Lenje people are said to be the original inhabitants of the District, its fertile and abundant land and reliable rainfall attracted many other tribes in the past. Most of the tribes that moved into Chibombo come from the south. Many of these are pastoralists and one of the reasons they moved was to escape from the drought and cattle diseases which have even more seriously affected the southern part of Zambia. But in the Chibombo area, too, soil fertility and reliable rainfall are in decline today.

The mixture of different tribes living in the area was evident from the very first FGD, because in that and later discussions as many as three languages were being used. However, this was not the major problem one might have expected, for normal social intercourse in the District is multilingual and almost everybody understands the various common languages, even if they often prefer to express themselves in their own.

The field research team was composed of eight women and one man. One of the women was from the Palabana Farm Power and Mechanization Centre, while the other researchers were field staff from various institutions working in Chibombo District.

In all, 33 FGDs were conducted. Of these, 25 were with women and eight were with men, for a total of about 340 persons. The participants in the group discussions were always asked to bring their production tools to the meetings.

1. The introductory and descriptive opening sections of this report are based on information gathered during training sessions in qualitative research methods with the national staff who were to conduct the study (all of whom had a thorough knowledge of the rural situation), on information collected during individual interviews, and on available literature. The latter included briefing material prepared by Mr Martin Bwalya, Director of the Palabana Farm Power and Mechanization Centre. Some general information has also been lifted from the results of the FGDs with rural people when it was considered that it would best fit in these sections.

The Agricultural Production System and Women's Role Within It

There are large-scale commercial farmers in the District, but the study was conducted in traditional-subsistence and smallholder-commercial areas, where maize is still the most widely grown crop. However, even if maize is the staple food, farmers are tending to grow less of it here and elsewhere in Zambia because of the low prices it commands and its high demand for fertilizer. Some traditional white maize is being replaced with yellow maize – or ‘pop corn’ maize as it is known – because, according to the farmers, it fetches a higher price and requires less fertilizer; and traditional maize is being replaced with more cotton, sunflower, tobacco and groundnuts than were grown in the past. In the Muswishi area, there is a network of perennial streams that allow widespread gardening to produce fruit and vegetables. Normally, a household will have access to more land than it can cultivate.

Small farmers are typically agro-pastoralists but, in very recent years, tickborne (Corridor) disease has killed off very high numbers of cattle – as many as 60% of the cattle population, according to one informant in the Keembe area. However, judging from the information that emerged from the group discussions, the loss of livestock could be even higher because many participants mentioned that animal traction had virtually disappeared from their communities because the cattle had been wiped out. Thus, they had been forced back to farming exclusively with hand-hoes.

“In our tradition, men were not allowed to be involved in weeding groundnuts. It was said that if a man became involved, the crop would develop a lot of pop, and that would seriously affect the yield.”

Women in Chibombo

Women play an increasing role in all aspects of agricultural production. Some verbal estimates were heard to the effect that women now do as much as 80-90% of the work on the land, and that about 60% of all Zambian farmers are women. However, among the farming operations, destumping and land clearing remain largely men's work. Where animal traction is available, the men tend to do most of the ploughing as well; and planting is done at the same time, with women and children dropping seed into the furrow bottom behind the plough.

However, even where animal traction is available, its use is mainly confined to ploughing and harrowing. Cultivators/weeders, ridgers and planters are more rarely found.

The land available to a household is normally divided into men's, women's and children's plots. The children's plots are often collective but, as they get older, they may be allocated individual plots. The men's plots are mainly given over to cash crops, whereas the women's main concern is for the family's food crops. However, groundnuts are regarded as a woman's crop and all the income from it usually goes to them. Cassava, too, is considered to be a woman's crop.

Work on all the plots is normally done collectively but, after the harvest, the produce goes to the ‘owner’; and even if there is often some consultation, it is the ‘owner’ who decides what to do with it or with any income it provides.

When animal traction is available in a household, a man is generally willing to use it to plough the women's and children's plots. However, in practice, this often fails

to work out, for once the man's plot or plots have been tilled, it is quite often too late to do the others in time to make best use of the rains. Rather than wait, the women and children have to resort to hand-hoes. Overall, the hand-hoe remains the basic cultivation tool in the area.

Despite the generally low socio-economic level of women, they are becoming increasingly important in the District, not only in agricultural production as their husbands seek off-farm work but also in local leadership. Each village has a head

“Men just marry more women to have more free labour on the land. Women are used as income-generating resources.”

“Men don't really appreciate all the work that women do, even when it is increasing all the time. It is normal, traditional and expected, just like a dog is expected to bark and is not appreciated any more if it barks more!”

“Men don't let women use fertilizer because they are afraid they will steal some of it for their own plots or gardens instead of applying it to the family plot.”

“Men think women are spendthrifts and, if they go into town, they will spend money on silly things like having their hair plaited. And they might also pick up bad town habits!”

Comments by members of research team during training sessions

person and, of the seven encountered during the study, three were women. In fact, people in the District have become more gender conscious in recent years, often deliberately choosing women for leadership roles. Nevertheless, many of the traditional attitudes towards women are still well entrenched.

Unofficial estimates put female-headed households at 25% of the total in the District. The local perception is that the death of men from Acquired Immune Deficiency Syndrome (AIDS) has been a major factor in increasing the roles being assumed by women. Women-headed households usually have to hire men to help with certain farm tasks, such as land clearing or ploughing.

Most rural women in the District are now organized into groups, or clubs as they are usually called in Zambia. In this respect, they are more advanced than the men. After initial suspicion of women's groupings, men in general now appreciate them and some of the women's clubs include a few men. The relatively high illiteracy levels among women makes it difficult for them to use modern farm inputs, such as pesticides, because they cannot read the instructions on the package.

The men generally take the responsibility for selling the family cash crops. Many women stated that their men stay on in the towns and squander much of the proceeds on high living, seriously prejudicing their family's financial capacity to meet school and other costs for the rest of the year. Women also accuse men of selling too much of the family's food resources, thereby jeopardizing their food security in return for some quick cash.

Some men, however, are well aware of the women's heavy workload and believe they should be given less to do in the fields. They recognize the efforts made by women in drawing and carrying water, collecting and transporting firewood, looking after the house and children, cooking and working in the fields, usually 'while the men sit under a tree'.

The Production Tools Encountered and Their Use

Photographs of the tools encountered are provided in Annex 6.

Animal-Traction Implements

There are ploughs, harrows, ridgers, cultivators, planters and ox-carts in the District, although by far the most common implements among these are ploughs and harrows. Many of these implements are not used now because of the death of so many animals.

The majority of the animal-draught ploughs are imported, for reasons that will be explained in the section below dealing with producers/importers of production tools. Most of the implements seen were very old, and all of them were for ox-power.

Hand Tools

The hoes encountered were all of the same traditional chop-down-and-pull type, many produced by local blacksmiths. The best had been made from the discs of scrapped tractor-drawn disc ploughs or harrows. Hoes imported from Malawi, the United Republic of Tanzania, South Africa, Zimbabwe and China were also seen or mentioned. The Chinese Cock brand hoes were much appreciated. In the past, they had been sold by a store connected to a Chinese rice development project in the area but, with the termination of the project, they were no longer available. People said they would like to be able to buy them again. In fact, Cock brand hoes are available in Lusaka, but it seems they are not being distributed to Chibombo District and the people think they are no longer being imported.

The locally-made hoes had a tang for fitting the blade to the handle. In most countries using tang fittings, this tang is burned completely through the handle which has been chosen because it has a natural thickening, such as a knob, at one end. In Zambia, however, there was a variation on this theme in that, when a handle is being cut from a tree, a side branch is chosen as the shaft but a small piece of the main trunk is left at the end to form a perpendicular appendix somewhat like a golf club. The tang is burned upwards into this appendix to fix the blade to the handle.

The locally-made hoes were of various sizes, with the smallest used as weeding hoes. The length of handles varied considerably.

Axes/Cutting Tools

Axes of various sizes are used for cutting shrubs and clearing fields before planting. The axes tend to be heavy and are mainly used by men. Some pick-axes, also used in land clearing, and slashers (pangas) were seen.

Harvesting Tools

A variety of knives and sickles was seen, some of the latter imported. The handles had often broken and been replaced with a rag wrapped around the steel.

Miscellaneous

Shovels with a D-shaped handle were quite common. Some were very old and had been imported from the United Kingdom. As in the case of the sickles, some of the handles were broken. A few of the groups had rakes, but they were not common.

Cultural and Socio-Economic Considerations

Working Posture

The length of hoe handles is specific to different tribal groups. In Chibombo District, where there are many different tribes, a variety of handle lengths was found and there was a wide range of different opinions on the subject.

“No matter what size of handle there is on a hoe, what matters is the hoe blade as it’s the one that does the work.”

Women’s group in Keembe

“Hoes with short handles make weeding easier and faster, but they give us backache. There is nothing we can do about that, because if we just complain and don’t work we’ll starve! If the day comes when different tools are brought here, we’ll throw our hoes away!”

Women’s group in Muswishi

“With short handles, a person gets tired faster but weeding is done nicely.”

Women’s group in Keembe

In general, it was said that the people from the Eastern Province use long handles, and that those from the Southern Province use short ones. In Chibombo District, this translates into the Tongas using short handles and the Lenje using longer ones, and both are found in single communities.

For weeding, especially of groundnuts, most people agree that short-handled hoes, which can be used with one hand while the other hand picks up the weeds and shakes the soil off the roots, are faster and more effective. Long-handled hoes are considered to be slower for this work, and one group claimed that long handles were ‘for lazy people’.

With regard to user fatigue and pain according to different handle lengths, most groups said that long handles caused less back pain, but this was not a unanimous opinion and a few groups said the opposite. These opinions seem to be deeply entrenched in the culture of particular tribes. Only one group said that, ideally, one should have hoes with different handle lengths for different tasks.

Land Tenure and Credit

Married women do not own land and, if a husband dies, it is quite normal for his land to be taken back by his family. The widow usually goes back to her own parents, although she may marry a brother-in-law. Only when a woman is middle-aged and has achieved a certain standard of respect is she allowed to stay on her husband’s land, thereby becoming a female head of household.

“A wife is a foreigner in her husband’s family.”

Comment by a field worker during qualitative research training session

Agricultural credit in Zambia is in crisis. The government institutions that were previously involved in the sector have folded or suspended their

activities, and government policy is now to privatize credit for farmers. This is functioning in some outgrower schemes where the company contracting to buy the produce provides credit for inputs. However, at present more generalized agricultural credit is not available to either women or men. With women's lack of access to land as collateral for loans, they will be disadvantaged even if such credit becomes available.

Some Ministry of Agriculture staff concerned with women's and youth programmes felt that future credit schemes should be based on the household and not on women or men. These schemes should be properly explained to people from the beginning and accompanied by training, extension and monitoring.

Draught Animals for Women

In Chibombo, there is no taboo against women using draught oxen. In fact, many do, or did until the massive destruction of the bovine population by disease in recent years. According to verbal reports, such taboos exist in other parts of Zambia; but even in Chibombo, men are the main users of animal traction. The principal reasons for this are that oxen traditionally belong to men and the implements are seen as being designed for men, so that animal traction has generally gained the image of being a man's field of work. This image has been greatly reinforced by past policies that have neglected women in animal-traction training courses and have not invited them to field demonstrations.

One NGO, Women in Agriculture, is very active (and successful) in promoting women's groups. At the time of the interview with the head of this NGO, one of her groups had just succeeded, through lobbying at a very high political level, in obtaining a tractor as a gift. The tractor had still to be delivered, and the head of the NGO was very concerned about its economic and technical viability. She expressed her strong preference for the introduction of animal-draught traction using donkeys, but since there is no significant donkey population in Zambia she intends to import a batch of donkeys from Zimbabwe or Botswana.

Institutional Aspects

Despite the need to better exploit Zambia's agricultural potential and the fact that women do the lion's share of the work on the land, so far little has been done to cater to their needs in terms of production technology. Even in efforts to promote animal traction, little attention has been paid to women: some have attended training courses at the Palabana Farm Power and Mechanization Centre, but they have been very few compared to the men. The Palabana Centre, originally founded with assistance from The Netherlands, trains extensionists, NGO staff and a few farmers. It also undertakes field research and is currently developing a groundnut lifter and a donkey plough for women.

Until recently, the accepted wisdom was that women were not really interested in animal traction. The present study, as well as one on animal traction for The Netherlands-supported NGO programme, *Smallholder Agricultural Mechanization*

Promotions (SAMeP), show the contrary: women are indeed very much interested in using animal-draught power.

The serious reduction in the cattle population caused by Corridor Disease in many areas, and the concomitant reduction in animal traction, is blamed by some NGO spokesmen on an ineffectual government veterinary service.

With regard to the local manufacture of implements and tools, government policy on import duty has created many difficulties. Higher duty is payable on raw materials, e.g., steel, than on complete manufactured items imported from abroad. This has forced Zambian manufacturers of animal-draught implements out of business for they cannot compete with imported implements, especially from Zimplow in Zimbabwe. In addition, the Government of Zimbabwe subsidizes steel and exports, thus making it even more difficult for Zambian industry to compete. It is hardly surprising that, in these circumstances, two major producers of implements in Zambia, Northfront Engineering and Lusaka Engineering Company (LENCO), have closed down. Only SAMS (Smallholder Agricultural Services), which evolved from LENCO, has managed to continue but this is because it is receiving external support. In fact, it is basically a donor project and not yet a commercial operation. Its sustainability will be problematic once donor support comes to an end, especially in view of the tradition in Zambia of importing implements from Zimbabwe and given the import duties to be paid on raw materials.

Government Programmes for Women

The Government's extension services have a women's and youth section. People working in this section say that men extension workers are now concerned about women farmers. Each District Agricultural Office has a committee on which women farmers are supposedly represented, but quite often they are not; and there are still few women extension staff in the field compared to the number of men.

Producers/Importers of Agricultural Production Tools

Local Producers of Hand Tools

The area of Lusaka where most farm tools are sold is in Cha Cha Road. Hoes from China, South Africa, Zimbabwe and Malawi are on display, together with locally-made ones. The price range, including handles, is from ZMK 5 500 (about US\$ 4.25) for locally-made hoes and up to ZMK 10 500 (about US\$ 8) for hoes imported from Zimbabwe and South Africa.

Information obtained during an interview with a blacksmith making hoes in Lusaka was that, in all, there were three such artisans in the town. The materials they use are mainly offcuts from industrial steel companies. The handle-makers are a separate group and they come together with the hoe sellers in the market, where they fix and adjust the handles to the steel part.

The blacksmith interviewed stated that he made a standard hoe but had no direct contact with his customers. However, his son travelled widely to sell hand tools in

the Provinces and he knew their customers well. This particular blacksmith's output was about 500-1 000 hoes a year. He felt he had a successful business because, even if the quality of his hoes was not comparable with the imported ones, there was a good market for cheaper goods. Blacksmiths are also present in rural areas and many people buy tools from them.

SARO AGRI Equipment Ltd

This company is one of the main importers of agricultural and other equipment in Zambia. It is the main importer of Zimplow animal-draught implements from Zimbabwe, and it produces items such as hammer mills, hullers and water tanks, but no hand-hoes, ploughs or cultivators. At the time of the study, the company had imported 350 ploughs for the next cropping season, which would sell for about the same price as 10 bags of maize or a bicycle. In addition to the ploughs, SARO AGRI had imported 48 Zimplow cultivators/weeders for the coming season, and a limited number of hand-hoes (350) from South Africa. According to the company's General Manager, Zimplow implements are much appreciated in Zambia but, as already noted, there is no real local competition. The company pays no particular attention to the needs of women farmers when importing tools.

B. What Women and Men Farmers Say

The Practices and Perceptions of Rural People Regarding Production Technology

In addition to the foregoing general information, the FGDs produced the following specific information:

Time Spent by Women Working in the Field

This information was not easy to obtain in a standard format because while some groups still had access to animal traction, others were using only hand-hoes. Most of the groups said they combined land preparation with planting, whether by walking behind the plough and dropping seed or hand-hoeing for part of the day and then spending the rest of the day seeding the area just cultivated. Therefore, land preparation and planting are taken as a single operation.

The groups mentioned that in the time they spent in the field depended on the crops being grown. They singled out cotton as the most demanding in terms of weeding and harvesting time.

"In the past, we used ox-drawn implements, but not any more. The implements have been worn out and most of our animals have died from tick-borne disease. The hand-hoe is the key to our farming now."
Women during group discussion in Keembe

Work	Days/year
Land preparation/Planting (with animal traction)	79-30
-ditto- (by hand)	30-90
Weeding	90-120
Harvesting	30-120

Women's Hardest and Most Tiring Tasks in the Field

Almost every group said that weeding was by far the most tiring and tedious job, but a small minority claimed that land preparation was the hardest. Weeding was said to be particularly tiring because it required bending and concentration in order to do the job properly and thus caused backache. If there were frequent rains, weeding was a never-ending task. In cotton, particularly, one might have to go through the field as many as four times.

"We punish ourselves to finish weeding a big field in a few days. Most women lose weight during the weeding season."
Women during group discussion in Keembe

Differences in Tools Used by Women and Men

There were no significant differences in the tools used by women, men or children although women and children tended to use lighter hoes with shorter handles. The discussions in the women's groups showed that it was mainly – but far from exclusively – the men who used animal-traction implements. One group stated that women in their community used the animal-draught implements better than the men did.

Renewal of Tools

Almost all the groups mentioned breakage of tools as a common cause for replacement. For this reason, it was not easy to reach a conclusion about the normal life of tools. Nevertheless, it was often said that a hoe would last one-to-three years, depending on its quality and how it was used. Ploughshares were changed every one-to-two years.

Several groups mentioned that the loss or theft of tools was quite common, and this was another reason for replacement.

Where Tools are Purchased and at What Cost

Tools are usually purchased at the stores or markets in the nearest town, from itinerant vendors, or from local blacksmiths, with the latter predominating. Their costs are as set out in the following table.

Hand Tools

Tool	ZMK²	Tool	ZMK
Prices in rural areas			
Blacksmith-produced hoe (price depends on size)	2 500-5 000	Imported hoes (N.B. Not all brands available)	7 000
Prices in market, Lusaka			
Cock brand Chinese hoe	7 500-8 500	Malawan hoe	8 500
Zimbabwean hoe	10 500	South Africa hoe	10 500
Locally-made hoe	5 500	Locally-made small weeding hoe	400

Animal Draught Implements

Type	Source	ZMK
Ox plough	Imported from Zimbabwe (Zimplow)	190 000
Ox cultivator	-ditto-	314 000
Plough share	-ditto-	3 000

Preference for Industrially- or Blacksmith-Produced Tools

The majority of the groups said that industrially-produced tools were of much better quality than those produced by local blacksmiths. However, one group expressed the opposite opinion, perhaps because their local blacksmith worked better than most or had access to higher-quality scrap.

Without doubt, the shortage of cash is such that people will often choose the lowest priced tool they can find. However, in addition to the lower prices, tools made by blacksmith are attractive because usually they can be bought in exchange for chickens or groundnuts, whereas this does not apply to tools sold at commercial outlets. One big chicken or two smaller ones will buy one big hoe; one average sized chicken will buy an axe; one small chicken will buy a small weeding hoe, and so on.

There is seldom, if ever, any consultation between women and blacksmiths regarding the tools the women need or the modifications they would like.

Other Tools and Implements Known by Groups but Seldom Owned by Group Members

Apart from the length of handles on hoes used by different tribes and in different parts of the country, and the different weights and sizes of hoes, no other tools were mentioned by the groups. Nor had there been any changes in living memory in their own tools.

2. US\$ 1 = ZMK 1 300 approximately.

Who Decides What Tools to Buy

Behaviour patterns with regard to decision-making about the tools to be bought are not uniform. In most cases, the man and wife consult each other. In a small number of cases, men take the decisions without consulting their wives, or wives take the decisions without consulting their husbands. When the women do this, they usually barter chickens for their tools.

In a female-headed household, the woman takes the decision alone or consults with her eldest children. In a very few groups, the women said their husbands were too busy drinking beer or fishing to become involved or that they had no interest in farming, so they were forced to take the decisions alone.

Improvements that Women Would Like for Their Tools

Zambian women and men farmers are fully aware of the limitations on production imposed by the hand-hoe. Alone among people in the countries covered by the study,

“As long as hand-hoes are used by human power there can be no increase in production. What we want is hoes powered by batteries or electricity!”

“Improving hoes won’t increase production. The only solution is replacing them with ox-drawn tools.”

“A hoe is not only a necessity but also an essential evil.”

Women during different discussion groups in Keembe and Muswishi

“Some marriages have broken down because women failed while trying to work with the existing and heavy animal-drawn implements.”

“Manufacturers should differentiate their implements in the same way they differentiate bicycles for men and women.”

Men’s group in Muswishi

Zambian women and men expressed the opinion that the only real solution to their problems was to replace the hand-hoe with different production technology, particularly animal traction. This might well be the case because previously, at least in the Chibombo District, the farmers previously used animal traction quite extensively. Now, following the death of so many oxen, people have been forced to revert to the hand-hoe and to the smaller cultivated area per family that this implies. This has made a deep impression on the people. Several groups mentioned the potential advantages of using donkeys as opposed to oxen. With regard to the animal-draught implements now available, women’s and men’s groups said that they were too heavy for women to use properly. Opinions in this regard were quite forcibly expressed.

With regard to hand tools, there was widespread discontent with the fragility and generally low quality of those made by blacksmiths. Stronger and more durable hoes were wanted and the interviewees said they would like to take broken hoes back to their makers to complain. They remembered with nostalgia the Chinese Cock brand hoe that used to be avail-

able in the area. The groups expressed their willingness to cooperate with blacksmiths and manufacturers to improve tools and implements.

Willingness to Pay More for Better Tools

There was a general willingness by groups to pay more for better tools, provided they in fact performed better.

C. Conclusions

Constraints and Opportunities

The determining factors governing improved production technology for women in Zambia fall under two main categories: socio-economic and technical.

Socio-Economic Factors

As elsewhere in Africa, women's lack of access to land and the fact that most of their work is not remunerated gives them very limited access to cash or credit. Fortunately, women are now beginning to assume leadership functions in rural communities, at least in Chibombo District, and this may help to bring about change.

The expanding women's group movement is another positive aspect, but it still has far to go. The generally rigid gender segregation into women's and men's groups (farmers clubs) may not be in the best long-term interests: having a few men in a women's group, but not enough to dominate the situation, can be useful, as has been shown in some other countries. Men were found to be in favour of seeking improvements in the production technology available to women, so any attempts to do so would be working in a favourable environment. However, when and if women were truly enabled to work with oxen, the question of men's real willingness to relinquish that role would be tested. It is difficult to predict the outcome although, in all probability, any residual cultural reluctance would vanish once men were faced with the reality of increased production through opening more land and through timeliness in mechanized ploughing and weeding. The risk for women would be that men would retire almost completely from farming, except at the moment when the produce was to be sold! Ideally, men's role in ploughing with oxen would continue – when the men are available – but women's work in weeding and transportation could be reduced enormously with appropriate animal-traction technology.

Technical

There would be few cultural problems with donkeys in Zambia. No prestige is attached to them, and they cannot be eaten. The main constraint is that Zambia, as already mentioned, has very few donkeys (an estimated 2 000 only). A number have already been brought in from Zimbabwe or Botswana and the NGO, Women in Agriculture, is planning to import more. The extension services in Chibombo District have been talking about doing the same, but if donkey traction is ever to take off for women in Zambia, lightweight implements will be needed. Such implements are being developed in Zambia and Zimbabwe but, so far, they are not generally available in Zambia.

With regard to hand tools, there is little scope for improvements in the tools themselves except in terms of their strength and durability, especially those made by blacksmiths. Better distribution systems for imported tools are needed, including local sales points, because buying in town is often difficult, even for men, and for women it is nearly impossible. Furthermore, as in other countries, market research and information about the availability of tools and implements would also improve the situation.

Appendix

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A. The Scenario¹

Context of the Study, Its Scope and Methods

The field work for the study was coordinated by Agritex, the Ministry of Agriculture's Department of Agricultural Technical and Extension Services. Agritex is also the Government's facilitating unit for the FAO/SIDA FARMESA programme.

The field work for the study in Zimbabwe was conducted in two different zones: first, the Chinamora Communal Area, sometimes known as Domboshawa, in Goromonzi District, about 30km north-east of Harare; and secondly in Manicaland Province, where work was conducted in Communal Areas in the Districts of Makoni North and Makoni South which are situated some 200 km to the south-east of Harare.

The farming conditions in the two areas are quite distinct. In Chinamora, they are more favourable, with about 900 mm of rainfall in most years, although in the drought years of 1991/92 and 1994/95 there were rainfalls of only 405 mm and 481 mm, respectively. Temperatures range from 22° to 30°C in the summer months, although some frosts occur in winter. In dry years, particularly, these frosts can be severe and cause major damage to the vegetable crops that are quite widely grown. In addition to vegetables under irrigation, maize, sunflower and groundnuts are the main crops grown in the area. The terrain is rugged and rocky and the soils are of the paraferalitic group or generally coarse-grained sands or sandy loams, and are inherently poor in the principal plant nutrients.

The average family cultivates about 1 ha for field crops and between one quarter and half a hectare of 'garden' for vegetables. Many men are away from their homes, mostly working in Harare, but – given its proximity – they can return often.

Conditions in Manicaland Province are drier and hotter. Rainfall in the Districts covered by the study ranges from 450 mm to 850 mm, but there are periodic seasonal droughts and severe dry spells, even during the rainy season. Temperatures reach 30°C. and beyond in the summer, and frosts in winter are almost unknown. The soils are mainly sandy loams or sandy clay loams. In such conditions, the farming system must, of necessity, be semi-extensive with livestock as its backbone. Some intensification is possible by growing drought-resistant fodder crops. There are, however, certain pockets with more favourable conditions in which maize, groundnuts, bambara nuts, sunflowers, millet, sorghum, cow peas, tobacco and vegetables can be grown; and, where water is available, vegetables are grown the whole year round. The average family cultivates between 1 and 3 ha per year. The phenomenon of absent menfolk seems to be even more accentuated than in Chinamora and, since Manicaland is more remote from urban places of work, the men return home less often and leave the more traditional male farm work (e.g., animal traction) to the women.

1. The introductory and descriptive opening sections of this report are based on information gathered during training sessions in qualitative research methods with the national staff who were to conduct the study (all of whom had a thorough knowledge of the rural situation), on information collected during individual interviews, and on available literature. Some general information has also been lifted from the results of the FGDs with rural people when it was considered that it would best fit in these sections.

The field research for the study was conducted with a team of seven people – four women and three men. Some of them were extension staff of Agritex; others were from the Institute of Agricultural Engineering or the University of Zimbabwe (see the list of researchers at the end of this annex).

In all, 30 FGDs were conducted and, of these, 24 were with women and six with men, for a total of about 325 people. The participants in the group discussions were always asked to bring their production tools to the meeting.

The Agricultural Production System and Women's Role Within It

Four different categories of farmers are recognized in Zimbabwe:

- **Communal farmers**, who make up about 75% of the farming population, who live and produce on State land, and whose agriculture is mainly at the subsistence level. The majority of women farmers are in this category.
- **Resettled farmers** are on better land, with higher output and, usually, an increasing involvement in the cash crops.
- **Small-scale farmers** have formal land title and, as a result, greater access to credit. These farmers usually produce cash crops. Nowadays, land title is also assigned to women small-scale farmers, especially if they are heads of family.
- **Commercial farmers**, usually Asian or European, operate on a very large scale and may employ as many as 200 farm workers.

The present study was conducted among communal farmers only, for it is in this sector that the role of women predominates and where the production technology currently available to them is the poorest.

In many communal farming areas, it is the women who hold the main responsibility for farm production, for the agricultural economy is at such a low level that their men have had to seek work in urban areas. Nevertheless, even when the man has gone to work in a town, he generally retains the responsibility for decision-making with regard to the crops to be grown, the seeds to be bought, and so on. In such cases, it is said that the household is 'temporarily woman-headed'. Permanently woman-headed households happen when the husband has died or abandoned the family.

As elsewhere in sub-Saharan Africa, the land is allocated to the whole household. The man's plot is the largest and is mainly used for cash crops, while a smaller plot, predominantly for food production, is allocated to the wife or wives. The family's work priority is for the cash crops on the man's plot. Only when this work has been completed each day can the women tend to their individual plots, or 'gardens' as they are called.

Men's prime farming responsibility is for land opening and ploughing. When they

"The women is the forefront person in the home because in homes where the husband is away, she does almost everything."

Comment during men's discussion group in Manicaland

"If a women starts to earn too much cash from her garden she will get into trouble with her husband."

Comment by member of field research team

have animal traction, the men normally plough all the family plot, including the women's garden. If they are polygamous, they plough the favourite wife's plot first.

"Where there is money, men are involved."

Comment by field research team

"For a women, having time left over is called 'laziness'."

Comment by field research team

"Some women are now teaching men how to handle a plough."

Comment during a women's discussion group in Chinamora

"Men worry that if women go to town alone they will spend money on petty or frivolous things, or elope with another man."

Comment by field research team

After land opening and/or ploughing, the men normally take a back seat and leave the rest of the production process to the women, although the building of mounds for sweet potatoes and trellising of tomato plants is normally done by men. In addition, men will step in and help if there is a special need. The main difference in this pattern is with important cash crops, such as tobacco, for which the men keep a constant and watchful eye on things and direct the family labour accordingly. Other traditional men's activities in rural areas are building houses, re-thatching roofs, and the digging of latrines and graves (sadly, with the spread of AIDS, this last task occurs more and more frequently).

Given the growing absence of men on the land, women are assuming more and more of the tasks that were traditionally men's. Men now recognize women's expanding role and their ability to do almost everything they can: they sometimes even admit that

women do men's tasks better than they do, for example, ploughing with oxen. With regard to livestock, when men are available, they deal with the cattle, although milking is done by women. Women also look after small ruminants and poultry.

Women's work in the fields is facilitated in Zimbabwe by a traditional form of voluntary collective work, known as *Nhimbe* in the Shona language. On a rotational basis, beer and food are prepared by the person needing assistance, and the villagers do the work and eat and drink beer together. This, and the extended family approach, are of great assistance to women-headed households.

Women's groups for farming (or women's clubs, as they are known in Zimbabwe) have been actively promoted. They often have a man as their 'chairman' or 'spokesman', who goes to town to market or buy for the group since there is a reluctance on the part of men to allow women to go to town on their own. Women's clubs are not usually allowed to cultivate a particular plot for more than one season, and thus there is no incentive for them to build up its fertility.

Men market the family crops and take them to town for sale. It was stated that they often remain in the town for a period of time, leading a high life before returning home almost penniless. This is said to have led a number of women – faced with no cash until the next harvest – to commit suicide.

The Production Tools Encountered and Their Use

Photographs of the tools encountered are provided in Annex 6.

Animal-Traction Implements

One of Africa's major manufacturers of animal-draught implements is based in Zimbabwe (Zimplot Ltd.), so it was hardly surprising that ploughs, cultivators and harrows were widely encountered. Even though Zimplot also makes ridgers and planters, almost no groups possessed them.

The lack of planters was probably due to the fact that they are generally thought to be complex and expensive, and it is common practice to plant by following the plough and dropping the seed into the furrow bottom. Alternatively, lines are marked with a wire, a shallow furrow is scraped along them with a plough or cultivator, and the planting and covering of the seed is then done by hand.

When ridgers were mentioned, it was commented that inter-row work with them reduced the hand weeding required more than a cultivator.

Ox-drawn carts, known as 'Scotch carts' in Zimbabwe, were commonplace in most communities.

Hand Tools

A wide variety of hand tools was brought to the discussion groups. These included hoes, forked hoes, pickaxes, shovels, rakes, watering cans, wheelbarrows, slashers and sprayers. The main use for the forked hoes and pickaxes is to dig compacted manure out of animal compounds. Rakes are used mainly to prepare fine seedbeds in the vegetable plots.

Many hoes were made by blacksmiths from old ploughshares. In fact, it is common practice for farmers to take a worn-out plough share to the local blacksmith, thereby obtaining a hoe of high-quality material but only having to pay for the labour to make it. Some hoes are also made from old discs from tractor-operated implements.

The blacksmiths normally produce tools with a tang fitting, and they usually make the handles as well. For these, they use small trunks of the *munhondo* tree which have a naturally bulbous end through which the tang can be burned. Thus, tools made by blacksmiths are usually sold in complete form. Handles for ring-fitting hoes are either bought with the hoe or made by the farmers. The handles are usually of medium length, although shorter handles are fitted to smaller hoes for planting and weeding. Some large hoes with handles made of steel tube were seen. These are mainly used for the heavy work of building the mounds needed for growing sweet potatoes.

The shovels were mainly of the D-handled type commonly used in Great Britain. Some very old ones that had actually been made in Britain were seen; the D-shaped part of their handles had not stood the test of time.

Axes/Cutting Tools

Axes and adzes in varying sizes were found. Most of them were made by local blacksmiths, but industrially-produced versions also exist and can be bought in shops. Blacksmiths often use very basic production methods but turn out effective tools provided they can find the right type of scrap steel, such as vehicle leaf-springs.

One blacksmith-cum-farmer visited had no forge as such; he merely built a small fire on the ground, and his 'bellows' for blowing on the embers consisted of a plastic fertilizer bag with a piece of steel pipe connected hermetically through the bottom. Sitting with the bag between his legs, the blacksmith raised it and lowered it, opening the mouth on the upstroke so that it filled with air, and closing it on the downstroke to expel the air through the pipe.

Various types of sickle were seen: some were made locally but others were very old imported examples. The wooden handles on the latter usually had been broken and were replaced with a piece of rag wrapped around the tang. Slashers or pangas were commonly found, too.

Cultural and Socio-Economic Considerations

Working Posture

Zimbabwe has the same cultural conditioning as that found in most other African countries with regard to handle length and working posture: as elsewhere, working upright with a long-handled hoe is seen as laziness. However, this was rationalized

"The short-handled hoe is for hard workers while the long-handled hoe is for workers on white commercial farms. They don't shake the soil off the weeds, so after a week they will be there again and the workers can go back and weed again and get money for it."

"And long-handled hoes are for prisoners, too, because they are lazy and they want to work slowly."

"We women want short handles so that, when we weed, we can shake the soil off the weeds with the other hand and heap them somewhere."

"A woman who cannot bend her back to weed is lazy."

Comments during discussion group in Manicaland

"Standing up is lazy. The social issues are stronger than the engineering issues!"

Interviewee in Agricultural Engineering and Soils Department, University of Zimbabwe

more in Zimbabwe than in other countries, with people specifically mentioning the need, during hoeing, to shake the soil from the weeds of roots. They stated that this could only be done if people were working bent over and using a short-handled hoe.

Land Tenure and Credit

State land in the communal areas is normally assigned to men; and if a man with such land assigned to him dies, male members of his family, rather than his widow, take control of it. Only if a widow is already of a certain age and status, and with at least adolescent children, will she be allowed to assume her dead husband's land-use rights.

In the 1980s, there were major efforts to promote credit schemes for women. In those same years, a government ministry was created to attend to women's affairs but the concentration on women by government and donors backfired, in the sense that men became widely resentful. The ministry was disbanded, and today the policy is to concentrate development efforts on a family approach, to emphasize gender issues, and to integrate rather than separate.

Some women's clubs have formed savings groups and manage to obtain seasonal credit for farm inputs. It was reported that a women's bank is being founded

to give credit for women's projects but, at the time of the field work for this study, it was not yet operating. In addition to the legislative problems surrounding credit in communal areas, there are psychological barriers to credit for women: the women themselves are often reluctant to take on obligations they might not be able to meet, and their men are reluctant to let them take on obligations.

Draught Animals for Women

There are no taboos in Zimbabwe against women using draught oxen and they do their work routinely when their men are away, which they usually are. However, as will be noted later, women often have great difficulty in using the present range of ox-drawn implements. Donkeys are used as well in many areas, especially in the eastern part of the country where the severity of the droughts in recent years has reduced the cattle population more than elsewhere. Between 1990 and 1997, the price of a donkey increased twenty-fold in Zimbabwean dollar terms (from ZWD 20 to at least ZWD 600 today, or about US\$ 50). The loss of so many cattle during the droughts is certainly responsible for the increased market for donkeys, and the demand from Zambia, where donkeys are relatively rare, may also have played a role.

Oxen vs. Donkeys: A Debatable Issue with Cultural Undertones

There are opposing views about promoting the use of donkeys for animal traction. The Director of the Development Technology Unit of the University of Zimbabwe, Mr. W. Tungamirai Rukuni, said it would be a mistake to concentrate on donkeys and that a programme for the general improvement of livestock was required. Multi-purpose bovines play a crucial economic role in rural areas, whereas donkeys cannot be eaten and are not useful for dairy production; and breeding donkeys is not a worthwhile business.

Mr. W. Rukuni also claimed that donkeys were not culturally acceptable, in the sense that no one gives them as gifts for weddings and nobody has any regard for them. In his view, to promote them just for draught power when many women already work with cattle – which have much greater economic and social value – would be incorrect. However, he did mention the value of donkeys for transport, commenting that they even stop of their own accord at red traffic lights in the city.

Different opinions were expressed by a ruminant nutritionist and donkey researcher, Mr. Edward Nengomasha, at the Matapos Research Station in Bulawayo. He stated that donkeys have no utilization problem with women, and even children, and

"If you use donkeys, you are seen as the poorest of the poor.

Even if you have 40 donkeys, you are still considered poor."

The Director, Development Technology Unit, University of Zimbabwe

"Donkeys cannot be eaten, so you can't use them as a food store. And when a donkey dies, you have to bury him like a human!"

Comment during interview with staff of Zimplot Ltd

"A team of four donkeys is easier to handle than a pair of oxen. They are easier to train than oxen and once you have established the first furrow in a field, donkeys will go it alone."

Donkey Researcher at Matapos Research Station

that lightweight donkey ploughs that can be easily transformed into cultivators are available.

According to Mr. Nengomasha's research, oxen work faster than donkeys, but even though donkeys are slower they never stop. The weight of animals, whether oxen or donkeys, appears to be the key factor in the draught they can develop and in their ability to sustain it without tiring unduly. Tests with oxen and donkeys, working for four hours in the morning and for the same length of time in the afternoon, showed that there were large differences in the work output depending on the nutritional state of the animals. Mr. Nengomasha also commented that the weight of a plough makes little difference to animals; what matters is the draught force required by the plough. For donkeys, a 5-6 in. furrow width is usual, whereas for oxen it is usually 6-8 in.

It is difficult to decide which side of the oxen vs. donkeys debate should be supported in Zimbabwe, because both sides make valid points. The authors of this report tend to come down more on the side of donkeys, not so much for ploughing but more for inter-row hoeing. However, where there are no taboos on women using oxen, as in Zimbabwe, the case is clearer for soft-peddalling the donkey cause and promoting more efficient animal traction with oxen. Nevertheless, even if the authors take the point about the low social and economic status of donkeys and their users in Zimbabwe, as expressed by Mr. Rukuni, this situation has another side to the coin: the cash cost of donkeys is much lower than that of cattle and they are thus more accessible to poor women. And, finally, even when drought kills off bovines, donkeys usually survive.

And What about Mechanization with Small Tractors?

Mr. Rukuni stated that the increased agricultural production of recent decades in Zimbabwe had been mainly achieved by enlarging the area under cultivation, and that further increases must be based on higher yields per unit of area. This calls not only for more and better inputs of seeds and fertilizer but also of farm power, which would also improve the lot of women on the land.

Mr. Rukuni believes that animal traction has gone as far as it can go in Zimbabwe; and, while he acknowledges the disaster of State tractor-hire schemes in many countries of Africa, he believes that in Zimbabwe the time has come to encourage private sector involvement in motor-powered machinery hire services. The culture of hiring exists in Zimbabwe, and private hiring stations are a realistic option. What is needed are sober, honest rural people who, given support for start-up and appropriate technical and business training, could provide motor-powered services.

A women's NGO, Organization of Rural Associations for Progress (ORAP), based in Bulawayo and working in southern and western Zimbabwe, also believes that it is time to introduce motor-powered mechanization in the form of small tractors, rather than continue promoting animal traction. When reminded of the history of tractor schemes in Africa, and of all the support systems and factors that motorized mechanization requires (fuel, maintenance workshops, spare parts, tools, skills, ownership

clarification, responsibility and commitment), the ORAP spokeswoman said that, through their approach, all these aspects would be clarified beforehand.

After such a short period in Zimbabwe, the authors are not in a position to agree or disagree with these opinions about motor-powered mechanization, even if it is obvious that Zimbabwe has advantages – compared with many other countries in Africa – in terms of its general agricultural economy, its infrastructure, and its potential for organizing the provision of spare parts, maintenance and repair services in rural areas.

However, the authors wish to make the important point that, since weeding is the factor which limits farm production in much of Africa, any motor-powered mechanization services should not fall into the trap of concentrating only on ploughing. This was the experience of many State schemes in the past, when the area ploughed by tractor and planted was frequently more than could be kept weed-free by women with hand-hoes. Therefore, any attempt to promote motor-powered mechanization hire services by the private sector should include proper creation of awareness – through discussions and analysis with the potential entrepreneurs and their clients – of the need to take a broader view of motor-powered hire services than just ploughing. The tractor services should in all probability be integrated with the use of animal traction – which might also be part of the hire services – to ensure mechanization of the various crop production operations. Yet another reason to downplay the ploughing aspect is that specialists are increasingly advocating minimum and conservation tillage methods in Africa, and this means reducing the role of mouldboard and disc ploughs in the farming scene.

FAO is planning an *Agricultural and Rural Engineering Support Services Project* for Tanzania and this proposal sets some important criteria for private hire services that would be equally valuable in Zimbabwe. One of these is that the services should be demand-driven and that the choice of mechanical equipment to be offered should be made by the entrepreneurs and farmers after demonstrations in the field and a detailed analysis by them. Another important criterion is that, given the short cultivation periods that predominate in Africa, investment in machinery has to be made economically-viable by maximizing its utilization in off-season, non-agricultural work, such as transport, road and track maintenance, soil conservation, water pumping, rural construction, and the like.

If indeed private-sector mechanization hire services could be started up on a pilot basis in Zimbabwe and Tanzania, the experience could be invaluable for the rest of the continent. And if the services included inter-row cultivation and the mechanization of non-agricultural activities in the community, especially the pumping of water, the impact on women's workload could be phenomenal.

Institutional Aspects

The Institute of Agricultural Engineering at Borrowdale, on the outskirts of Harare, has an animal traction section (the head of the section, a woman, was one of the field researchers for this study). This section provides training in all aspects

of animal traction, including the making of harnesses. It also conducts research into the efficient use of animal traction.

Most of the trainees that come to the section are extensionists and trainers-of-trainers. Some of the extensionists are women but, overall in Zimbabwe, only about 10% of all extension staff are women for it is difficult to find women prepared to work in this field.

The Institute of Agricultural Engineering also has a rural technology centre which provides training in blacksmithing and other skills, such as fibreglass technology, leather tanning, production of rural transport devices, and the like. The blacksmith training operation is impressive, and the staff now talk about having increasing numbers of women blacksmiths pass through the centre.

Another important initiative is a German Agency for Technical Cooperation (GTZ)-supported project, *Conservation Tillage for Sustainable Crop Production Systems*, known as the 'ConTill Project'. Researchers, working closely with farmers, have been developing a series of low-draught implements with special focus on donkeys as an alternative to draught oxen. A tool that can be pulled by a single donkey has been developed. It can be adapted as a duckfoot weeder, rigid-tine cultivator, or tie-maker (to create small cross-dams between ridges as a way of conserving moisture). This tool is very light and easy for women to use. The project has also developed a ripper-planter, also for donkey use, and a disc ridger that can be pulled by donkeys or oxen.

In addition, a wheeled push-hoe, very similar to those made and used in India and other Asian countries, has been developed. (Nothing similar was found anywhere else in Africa during the course of this study.) However, a member of the ConTill Project team stated that there had been limited success in having this hoe adopted, mainly because the upright working position it allowed was equated with laziness but also because it was not as effective and fast in all conditions as a traditional hoe.

Producers of Agricultural Production Tools

Zimplow Limited

This company, which is based in Bulawayo, was established in 1939. After a series of transformations and mergers over the years, it is now one of the most important of its kind in Southern Africa. The latest merger was in April 1997, when Zimplow fused with the Bulawayo Steel Company (BST) which also manufactures animal-draught implements and other tools. The Zimplow trade name is 'Mealie Brand' and BST's was 'Master Farmer'.

Zimplow now makes a range of animal-drawn implements, some from its own designs and some that were formerly made by BST. About half of Zimplow's output is sold in Zimbabwe, the other half being sold in neighbouring countries of southern and central Africa. The range of Zimplow/BST implements is considerable, and the newly-merged companies are still in the process of rationalizing their product line and marketing strategy. In general, they have decided to continue with the models that were selling best before the merger, irrespective of who was making them.

As will be explained later in this report, there was widespread criticism from farmers, both men and women, of the weight of BST/Zimplow implements, especially the five-tine cultivator, although the ploughs were not excluded from the same criticisms. When asked about the weight of their implements, Zimplow spokesmen said that they were constantly concerned about the quality and durability of their equipment, and that greater weight was the inevitable downside of providing the high quality they aim for.

Zimplow has no direct contact with farmers and it does no market research or follow-up with clients. Many of their product lines have been in existence for years, with little modification, and they appear to find a ready market in Zimbabwe and other countries. An exception in terms of a new product is a donkey plough that BST was developing before the merger with Zimplow, and which has been brought to fruition with the help of engineers from Agritex and from Silsoe Research Institute in the United Kingdom. The initial rationale for developing a donkey plough had nothing to do with the needs of women; rather, it was provoked by the droughts of recent years and the consequent reduction in the availability of oxen. A donkey plough seemed to be a way of better utilizing Zimbabwe's donkey resources. However, Agritex research staff later informed Zimplow about the gender issue and the potential usefulness to women of a donkey plough.

The new donkey plough, despite weighing only 30kg compared to the 38kg of the normal ox-plough and despite winning medals at trade fairs, has not been a commercial success, at least to date. One reason is that, in order to lighten the plough and at the same time maintain its durability, high-carbon steel for the main beam has to be imported from South Africa. This extra cost brings the sale price of the donkey plough up to about the same level as the normal ox-plough, and therefore farmers have so far been reluctant to buy it.

However, it is also possible that there have been insufficient attempts to promote it since its fairly recent launch on the market, and that Zimplow essentially prefers to take the line of least resistance and continue to concentrate on selling its traditional ox-ploughs. This study showed widespread demand for lighter implements. Time alone will show whether the level of acceptance of the donkey plough confirms Zimplow's view that farmers prefer implements that have become traditional or whether women's complaints about the heaviness of those implements will result in a change in buying patterns. Needless to say, if farmers are not informed about the lighter tools that are now available, there can be no change in the *status quo*.

Zimplow also manufactures hoes of various shapes, fitting types and weights. The weights range from about 1 lb. (450 gr) to 3 lb. (1 361 gr).

"We don't normally bring gender issues into our business. We just look at the farmer as such."

"We are just manufacturers. We do not have animals or our own farms."

Comments by members of Zimplow management team

"If implements are going to be made lighter and smaller, and with less parts, they should be cheaper."

Comment during a women's group discussion

B. What Women and Men Farmers Say

The Practices and Perceptions of Rural People Regarding Production Technology

In addition to the foregoing general information, the FGDs produced the following specific information:

Time Spent by Women Working in the Field

The research team found it easier to obtain this information on a crop-by-crop and time-per-acre basis, rather than by calculating the total numbers of days spent in the field that were provided in other countries of the study. The authors would like to draw special attention to the enormous amount of extra time spent weeding when crops are broadcast or when no inter-row cultivation with animal traction has been carried out (see, for example, the figures for maize in the following table).

Time Spent on Various Field Operations

Crop/Operation	Time per Person per Acre
Maize	
Ploughing	1-2 days
Cultivating	1 day
Planting	1-2 days
Weeding (after inter-row cultivation with animal traction)	2-4 days
Weeding (by hand-hoe only)	2-4 weeks
Harvesting – cutting and stooping	2-3 days
Groundnuts	
Planting	1-2 weeks
Weeding (only by hand because groundnuts are broadcast)	3-4 weeks
Harvesting: pulling and cocking	3 days
Plucking	3 weeks
Rapoke/Finger Millet	
Cultivating	1 day
Planting (broadcast)	1 day
Weeding and thinning	1-2 months
Harvesting – cutting heads	1 month

The Hardest Job done by Women in the Field

Groups stated almost unanimously that weeding was the hardest and most time-consuming task they perform, as confirmed by the table. Most groups said they had to hoe a given field two-to-three times in a season. If a weed called *fende* is infesting a maize plot, it may need hoeing as many as five or six times.

The very few groups that did not put weeding first stated that ploughing/planting

was the hardest task of all, their reasoning being that there was enormous pressure to plant as quickly as possible to make the most of soil moisture and obtain a uniform crop by completing the planting in a short period of time. These few groups also said that weeding was less stressing because they could break off to do something else. Just one group mentioned harvesting as their most difficult task because it had to be done in a hurry to avoid thieving by baboons and cattle.

Differences in Tools Used by Women and Men

There is a gender perception attached to different tools: some are seen as being ‘men’s tools’ and others as ‘women’s tools’. Men’s tools are considered to be ploughs, cultivators, ox-carts, axes, adzes, pickaxes and shovels. Women’s tools are considered to be hoes, watering cans, sickles, and other lightweight items.

These perceptions date from the times when men and women were more equally present in rural areas and when there were certain men’s tasks and certain women’s tasks in agriculture. But today, even though the gender perceptions about tools still persist, even the men freely state that women now use all of them. Only the adze seems to have retained its exclusive male connection because of ‘the skills needed to use it’. Heavy axes are normally not used by women, although lighter ones are. Nowadays, therefore, there are few distinctions in practice between the tools used by women and men.

Renewal of Tools

Tools are replaced less often in Zimbabwe than in the other countries covered by this study, presumably because of their higher quality. Certainly, the old ploughshares generally used by Zimbabwean blacksmiths to make hoes are far superior to the scrap steel from old vehicles used in many countries. One hoe encountered in the field work had been in use since 1962, although this was hardly typical. It was more usual for hand tools to be replaced every two-to-fifteen years.

In respect of animal-draught implements, and especially when referring to the ox-carts that are available, there were numerous complaints about their quality compared with those of the past. The tyres fitted to ox-carts were said to last only about two years. There were also frequent complaints about the short life of plough handles and landwheels, which needed frequent replacement. Ploughshares and

“We really overwork ourselves when we are weeding.”

“Without weeding do not expect any harvest. The back has to ache to conquer the weeds.”

“Oh, weeding is the most taxing job, both in energy and time, because you have to bend down and work carefully not to damage the crop, pull out the weeds and shake them, while at the same time you want to finish the operation before the weeds outgrow the crop.”

“If you finish weeding all your fields, then you know you will harvest something.”

“Weeding shows your ability to grow a crop and it’s the hardest task which takes the longest time to finish.”

“Hunger will reign in your home if you don’t weed properly.”

“If you do not weed, then you are feeding all your fertilizer to the weeds and you may as well harvest those weeds!”

“To win a crop, you have to disregard the backache!”

A selection of comments during discussion groups with women

other soil-engaging parts are changed regularly. Ploughshares normally last one season but, if the soils are very abrasive, they may need to be replaced twice during a ploughing season. Mouldboards normally last four-to-five seasons.

Wheelbarrows came in for much criticism. Farmers said that the bottom of the supporting legs wore out very quickly and that they needed to have them modified by a blacksmith if they were to last any reasonable length of time.

Where Tools are Purchased and At What Cost

Hoes, axes and similar hand tools are mainly bought from the local blacksmith, although Zimplow hoes are also on sale in the Farmers' Coop – the Zimplow distributors – in the towns. Other items, such as wheelbarrows and animal-draught implements, are bought in towns, sometimes very distant from the village. Typical costs are laid out in the following table. Prices reported by groups in Chinamora were slightly lower than those reported for Manicaland, presumably because of the relative remoteness of the latter area.

Preference for Industrially- or Blacksmith-Produced Tools

Most blacksmiths in Zimbabwe only produce hoes, axes and adzes. Very few produce animal-draught implements, so this discussion topic was automatically restricted to those basic hand tools which are also made by industrial concerns such as Zimplow.

The groups all expressed their preference for buying tools produced by blacksmiths, stating that hoes produced industrially and bought in town were generally not as good as those made by blacksmiths and were more expensive. They came without handles and, if one bought the handle separately, it often did not fit properly and came loose in the field. Hoes, axes and adzes bought from local blacksmiths were generally considered to be stronger, and they came complete with handle. In addition, with blacksmiths, it was always possible to negotiate credit, provide one's own old ploughshares as raw material, or arrange to barter chickens, maize or whatever, in exchange.

Other Tools and Implements Known by Groups but Seldom Owned by Group Members

Planters were the most frequently mentioned implements that people knew of but did not possess. They were recognized as being very efficient and people would like to have them, but having money to buy them is the problem. In fact, Zimplow itself recognizes that its planter, at about ZWD 2 000, or more than twice the cost of a typical plough, is beyond the reach of most small farmers.

"The water pump they showed us costs ZWD 1 300. Where on earth can I get such an amount? Yet it is a good piece of equipment that would increase my production."

Woman during discussion group in Chinamora

One group in Chinamora mentioned that a meeting had been organized by their extensionist to

demonstrate a water pump suitable for irrigating small gardens. Although it worked very well, it was beyond the financial reach of the farmers.

Prices of Tools and Implements

Hand Tools

Tool	ZWD ²	Tool	ZWD
Blacksmith hoe (with handle) – depending on size	6-30	Industrial hoe – without handle (depending on size)	25-50
Axe – blacksmith (with handle)	10-30	Axe – industrial (no handle)	30-35
Adze – blacksmith	6	Sickle – industrial	15-25
Shovel – industrial	70	Watering can – industrial	100
Rake – industrial	70	Pickaxe – industrial	70
Wheelbarrow	400	Knapsack sprayer	900
Wheeled push-hoe (ConTill)	70		

Animal Draught

Type	Source	ZWD
Ox-ploughs	BST/Zimplow and others	750-1 000
Ox-cultivators	-ditto-	1 000-1 300
Diamond spike harrow	-ditto-, with price according to size	550-1 000
Ox-cart	Various	1 500-2 500
Single donkey toolbar/cultivator	ConTill Project/Auto and Engineering Services, Masvingo	175

Ridgers were also mentioned as being known to the groups, but they were not widely used because they were thought to require more draught power than their small oxen could generate.

Who Decides What Tools to Buy

Since it is the women who spend so much time on the land, it is usually they who take the initiative of mentioning to their husbands that a new tool is needed. This is usually followed by a discussion between husband and wife and, once convinced, the husband actually purchases the item. In the absence of their men, women may take independent decisions about buying small items such as hoes or watering cans. However, it is usually the man who makes the decision about a major item such as a plough or cultivator.

“A house where there are no disagreements is dead, because disagreements help progress towards reaching the right compromise, rather than saying yes all the time.”

Comment during a women's discussion group in Chinamora

2. US\$ 1 = ZWD 12 approximately (October 1998).

Improvements That Women Would Like for Their Tools

There was a widely-expressed opinion by farmers that implements made in the 1960s were much more durable than those being made today, even though they were

“Most tools for farming were originally meant for men, but circumstances now force women to use them.”

Comment during men's discussion group in Manicaland

lighter. Indeed, it was said that some items from those years were still in use. One group made particularly favourable mention of implements with the brand name ‘Sunshine’³. It was a widely held view that the ploughs and cultivators of those years were better than those on offer today.

By far the most common complaint – indeed it was voiced by almost every group of women – was about the weight of the BST/Zimflow implements. The standard five-tine cultivator came in for harsh criticism from women, one group even using a vulgar phrase in English to describe it and going on to say that it was dangerous to use. The men's groups also said that the implements were too heavy for women to use easily.

The criticism was not limited to the weight of the cultivator: both women and men said that the lever to adjust the row width was extremely difficult to use, although a few did say that if it was properly greased it was just about manageable. Women's and men's groups wanted the adjustment lever to be easier to use, and placed near or on the steering handles of the implement. Groups commented that their row widths were hardly ever constant and that easier adjustment of the cultivator was very important. Many women also said that the handles on the implements were too high for them (they are usually not adjustable).

Women have trouble handling harrows when there are rocks or other obstructions in the field. They would like to have a handle on the harrows to make it easier to lift them around obstacles.

Some groups said they would prefer to have a tool bar that they could convert from plough to cultivator, or ridger, rather than the mono-purpose implements generally manufactured. They clearly had not heard of the tool developed by the ConTill Project, as mentioned earlier.

In Manicaland, many groups said that the beam on new ploughs was too straight, with the result that they did not penetrate properly. Their local blacksmiths knew how to modify the ploughs to make them penetrate better, and people took their new ploughs to them as a matter of course to have the modification done.

One group knew about a planting attachment that could be fitted to a plough and said that, since they could not afford a planter, it would be very useful. They were critical about the lack of information available about the planter attachment.

The available ox-carts were criticized for their pneumatic tyres, which punctured frequently and did not last long. Women said it was very difficult for them to repair a punctured tyre and pump it up again, and this was echoed by men's groups. Both

3. Perhaps these implements were imported from Australia. Massey-Harris, later Massey-Ferguson, once had a subsidiary in Australia that used the brand name ‘Sunshine’.

women and men would far prefer to have their ox-carts fitted with solid rubber tyres. Many groups also complained about the lack of brakes on today's ox-carts, which made them quite dangerous to use. They mentioned that if their oxen had been dehorned, the cart pushing from behind forced the harness over the heads of the animals – in effect uncoupling them from the cart, with unpredictable consequences.

A very few groups said that they believed that mini-tractors would be the answer to their problems.

Finally, irrigation pumps were mentioned as a means that could save them a lot of time and heavy work in carrying water to their gardens in watering cans and buckets.

All groups, both women's and men's, said they would welcome a chance to talk and work with researchers and designers to improve their tools. Some were even enthusiastic about the idea, although one women's group expressed the view that men are often difficult to work with because they are not sensitive to women's feelings and needs.

“If they are easy to discuss with we are willing to work with them.”

Comment about working with researchers and designers to improve implements during women's discussion in Chinamora

Willingness to Pay More for Better Tools

There was a general willingness by groups to pay more for better tools, provided they in fact performed better or reduced the workload. However, there are obviously limits as to how much people can afford, as witnessed by the remark about the water pump.

C. Conclusions

Constraints and Opportunities

The determining factors governing improved production technology for women in Zimbabwe fall under two main categories: socio-economic and technical.

Socio-Economic Factors

Zimbabwe's agricultural economy is the most advanced of the five countries in which the study was conducted. The position of women is better, at least in the sense that they appear to have a greater level of decision-making about the farming activities for which they are, in effect, responsible, given the high level of male urban migration.

Despite this, however, women's lack of access to land rights, and the fact that most of their work is not remunerated, gives them very limited access to cash or credit. This, as elsewhere, is a major obstacle to improving the production technology used by women.

Animal traction with oxen is more widely used by women than in the other countries covered by the study. This is already a considerable advance. Furthermore, the way in which women have risen to the challenge of taking on tasks that were normally reserved for men, even with implements that are too heavy and difficult for them to use properly, is testimony to their remarkable will and determination.

Two professionals involved in development and interviewed for this study believed that the time was ripe for the introduction of small mechanized power units for farm work, and some women's groups were of a similar opinion. And perhaps, indeed, Zimbabwe's agricultural sector has reached the economic level where a private machinery hire service could be tried. A pilot initiative in an area where there was sufficient access to machinery skills and support services, and using machinery that had been selected after demonstration, evaluation, and study by the entrepreneurs and their potential clients, could make an interesting and worthwhile project for an NGO, or it could be an element in an IFAD-supported project.

An important aspect would be to ensure that the hire service was entirely private, and that the machinery provided to the carefully-trained entrepreneurs was on a credit basis. This would stimulate them to work well to pay off the loan – or lose the machinery – and also create a revolving fund to finance an expansion of the service through additional entrepreneurs.

The work already done by projects, NGOs and various institutions in the area of women's groups must clearly be continued and expanded, but taking a family approach rather than one restricted to women only. Women themselves recognize that access to resources, e.g., land and credit, is crucial for their success, as is education to mobilize and empower them and to sensitize men to women's needs and capacities.

Technical

The problem of the weight of the available implements warrants close attention. As already mentioned, the complaints about ploughs and cultivators were commonplace and almost unanimous – as they were also in Zambia, where implements are imported from Zimbabwe. However, these complaints were all in respect of the standard and most widely sold ploughs and cultivators, mainly produced by BST/Zimplow.

What nobody in the discussion groups seemed to know was that BST/Zimplow also make lightweight implements. For example, there is a Mealie Brand light cultivator with three sweeps, known as the Maun cultivator, which weighs only 25kg compared with the 36-42kg of the standard five-tine cultivators; and the cost of the Maun cultivator is two thirds less than that of the larger ones.

Thus, a basic problem is that rural people do not know that different models of industrially-produced tools and implements exist. For their part, the manufacturers appear to make little effort to inform people, or even to have all their different models available at sales points; and, overall, there is far too little contact or follow-up with farmers by major players such as BST/Zimplow. It is hardly normal that Zimplow staff say 'We do not bring the gender issue into our business'. Do they believe that, in the almost 60 years of their company's existence, nothing has changed in rural Africa? Do they not know that their 'farmer' is now usually a woman, not a man, and that she has special needs with regard to the implements she uses? All manufacturers of implements should undertake market research and follow-up with the users of their products.

Agritex is not blameless in this lack of knowledge among rural people about the implements that are available. Their extension staff should act as honest brokers in helping people make the right decisions about which implements to buy.

This study has shown that it is the men who normally take decisions about which animal-draught implements to buy; but, at the same time, men state that the implements are too heavy for women. So they are either so conservative that they would rather buy the implements they have seen around for years, whether or not they are too heavy for their women, or they are not informed about the alternatives.

The most striking result of the study in Zimbabwe is the enormous time saving in hand-hoeing that can be achieved when an animal-drawn cultivator goes through the crop first. It would seem, therefore, that this is the aspect that warrants the most attention. Whatever the lack of prestige of donkeys in Zimbabwe, a lightweight donkey-drawn cultivator that can be easily used by women and children might make a major impact in reducing women's heavy burden of hoeing.

This is not to say that time saved hoeing will be used by women for some well-deserved rest, for the common attitude among rural men in Zimbabwe, and in the other countries of the study, too, is that women must be doing **something** all the time! But at least the activity that could replace much of the hoeing might be less back-breaking and more productive.

Appendix

Members of Field Research Team

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Senior Extension Specialist, Agritex (study coordinator)

Ms Teclar Martinhira
Extension Specialist, Agritex

Mr Elijah Maengehama
Extension Specialist, Agritex

Mr Ephraim Mbanje
Agricultural Engineer, Institute of Agricultural Engineering

Ms Bertha Mudamburi
Chief, Animal Traction Unit, Institute of Agricultural Engineering

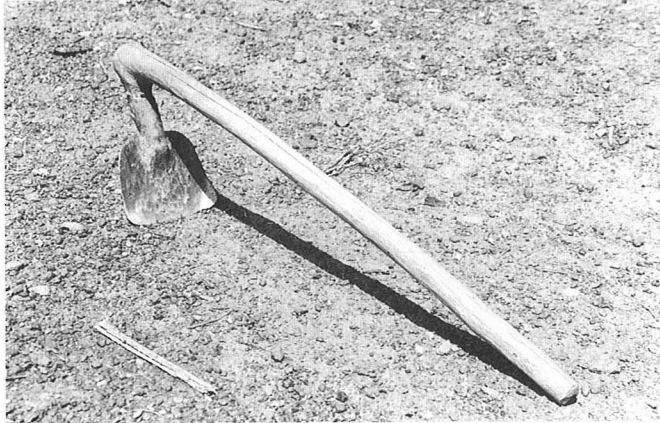
Mr Elijah Nyakudya
Agricultural Engineer, University of Zimbabwe

Ms Tecla Shoka
Evaluation Specialist, Agritex



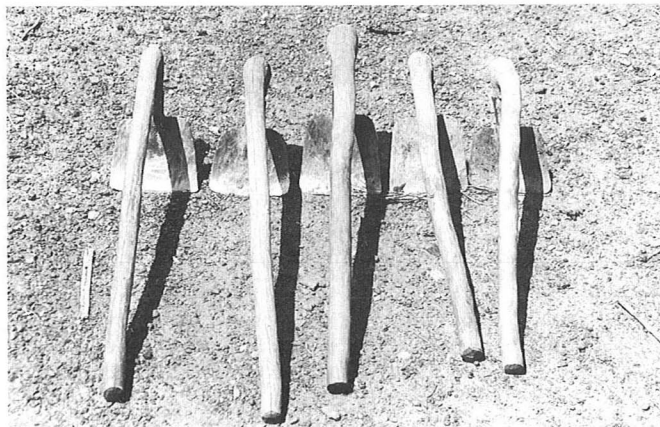
This photographic appendix includes only the tools and implements actually seen by the study team. It is, therefore, not an exhaustive representation of other tools and implements that may exist.

Cultivating and Weeding Hoes



Burkina Faso

A typical hoe made from scrap metal. The socket fitting and the natural elbow in the handle, formed by a branch and side branch, are the most common arrangement, especially in the Central Plateau.



Burkina Faso

Hoe handles are short-to-medium in length, usually 50-80 cm.



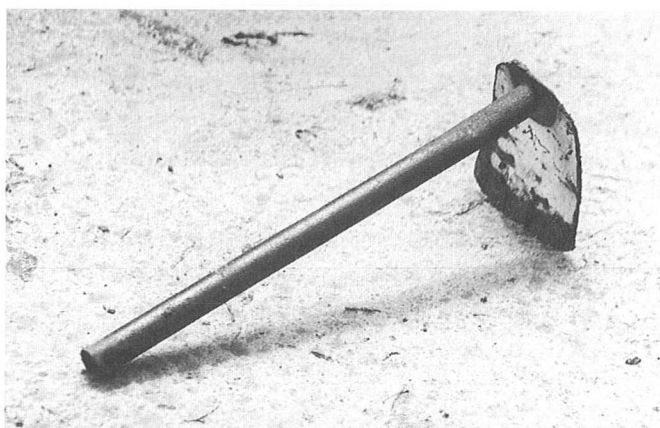
Burkina Faso

Hoes with an accentuated curve in the blade, designed by a blacksmith. The idea was copied from curved tines on animal-drawn cultivators. Note also the tang fitting, commonly found towards the north of the country. The curved handles are said to be preferred by men.



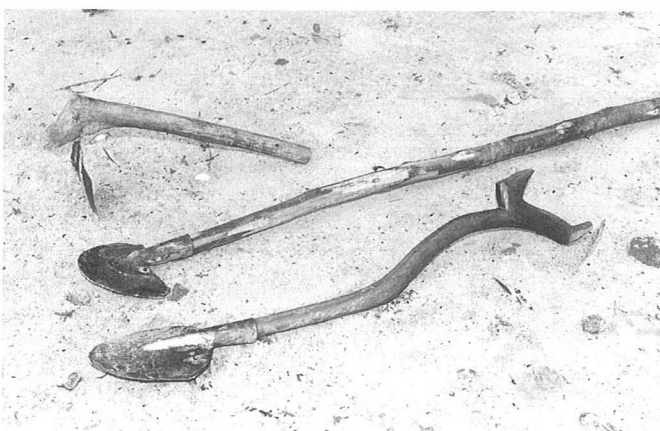
Burkina Faso

Hoes with slightly curved blades and with socket fittings for handles.



Senegal

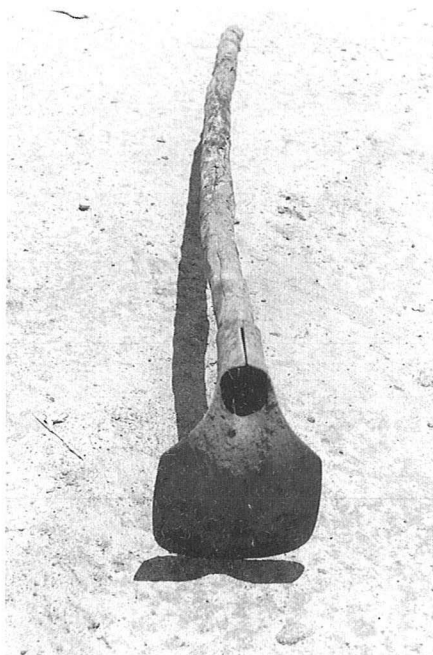
Heavy hoes with tubular steel handles, often longer than the one shown, are used in several countries for work such as bund-building or creating mounds for sweet potatoes.



Senegal

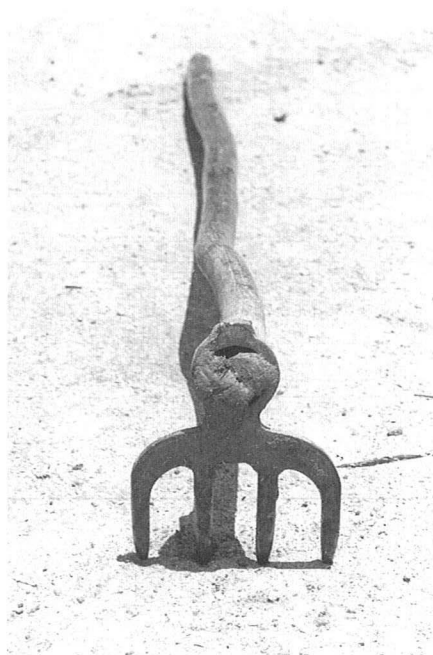
Top, the traditional planting hoe (ngos-ngos); middle, a long-handled push-pull sokh-sokh hoe which is used in a squatting position. The ngos-ngos has been largely replaced by animal-draught planters, and the sokh-sokh is now little used because of the discomfort of the working posture required.

Agricultural Implements Used by Women Farmers in Africa



Uganda

The 'Finland hoe', imported into Uganda by a past IFAD project, much appreciated for its quality and light weight. There is nostalgia for this type of hoe.



Uganda

A forked-type hoe quite commonly found here but not elsewhere. Said to be the best tool for removing couch grass.



Uganda

Cock brand hoes. The one on the right is so worn out that it has become a weeding hoe for women and children. Note the forged eye-ring fitting.

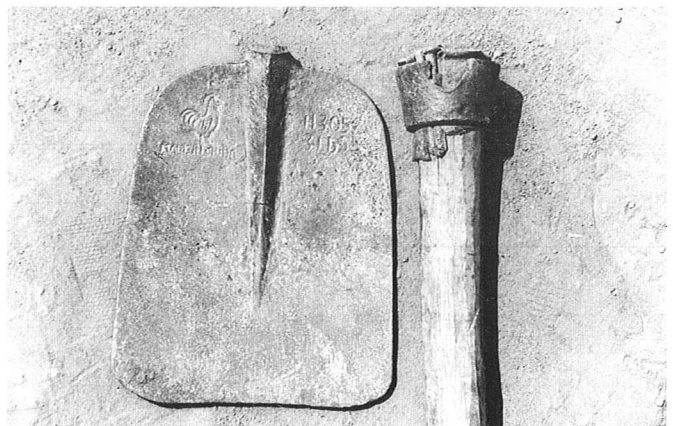
Zambia

A very old 2.5 lb. Cock brand hoe, worn to a fraction of its original size and repaired with a tang fitting in place of the original eye-ring.

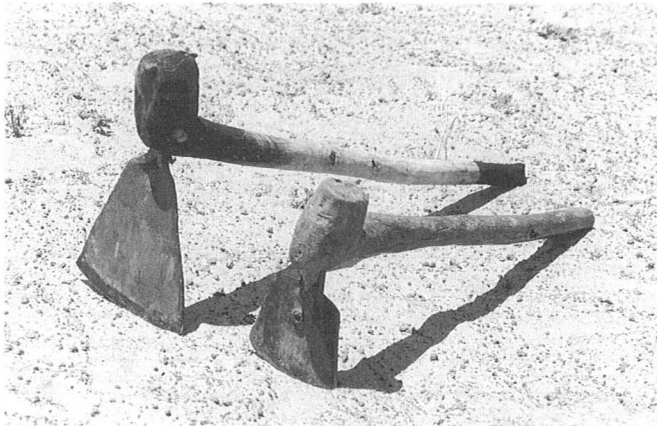


Uganda

It is said that 'fake' low-quality Cock brand hoes have been imported into Uganda. Perhaps both this hoe, with its piece of blade broken away, and the one in the other photograph, with the broken fitting, are examples of such 'fakes'.

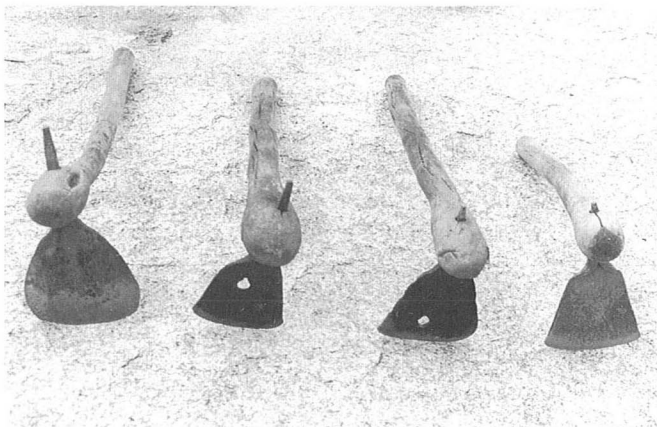


Agricultural Implements Used by Women Farmers in Africa



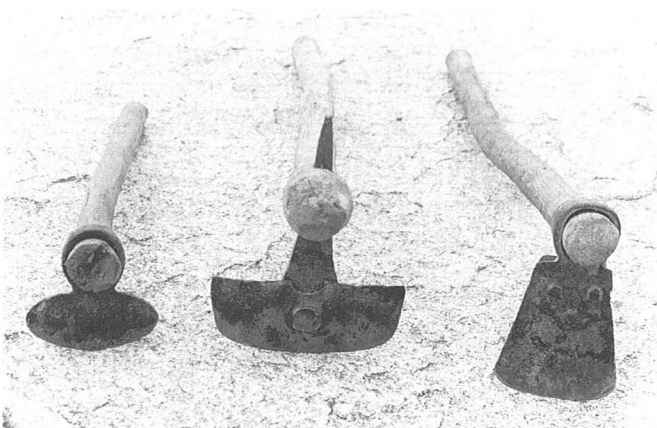
Zambia

These very short planting and weeding hoes were made by a blacksmith. Note the tang-type fitting, but with the local variation whereby the tang is driven into a knob formed by part of a larger branch or by a tree trunk.



Zimbabwe

Tang-type hoes made by blacksmiths. The holes in the blade are for the fixing bolts of the plough share from which the hoes were made.



Zimbabwe

There is considerable variation in the shapes of the blades made by blacksmiths. One can only wonder about the effectiveness for weeding of the rounded shape of the working edge, especially on the one at the left.

Annex 6 Tools and Implements

Zimbabwe

The largest number of European-type tools were found in this country.

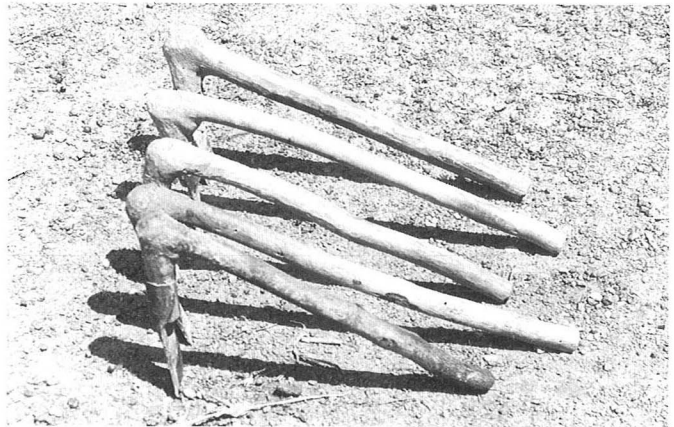
The D-handled shovel and fork and the sickle were all old imports from the United Kingdom.



Planting Tools

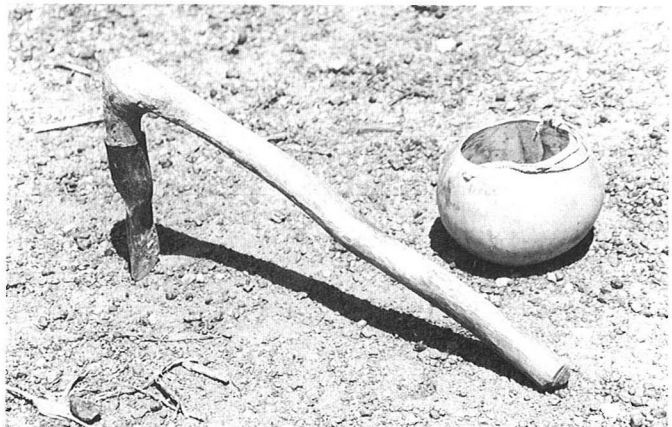
Burkina Faso

The pioche (pick) is a hand tool used for planting. It has a short handle of about 35-50 cm and a blade about 4-5 cm wide, usually made from a leaf spring. It has a socket fitting and the usual handle from a branch with a natural elbow.



Burkina Faso

A pioche and gourd in which the sower carries seed.



Agricultural Implements Used by Women Farmers in Africa



Burkina Faso

A simple home-made row marker with spikes to mark three rows at a time when the marker is pulled across the plot. Blacksmiths make similar markers of steel, often with two sets of spikes welded at different distances between them on the top and lower sides of the cross bar so that using it one way up or the other will give different row spacings.



Senegal

A woman breaks away from a Focus Group Discussion to demonstrate how she used to plant with a traditional ngos-hoe before animal-drawn planters became commonplace.

Axes, Cutting and Pruning Tools

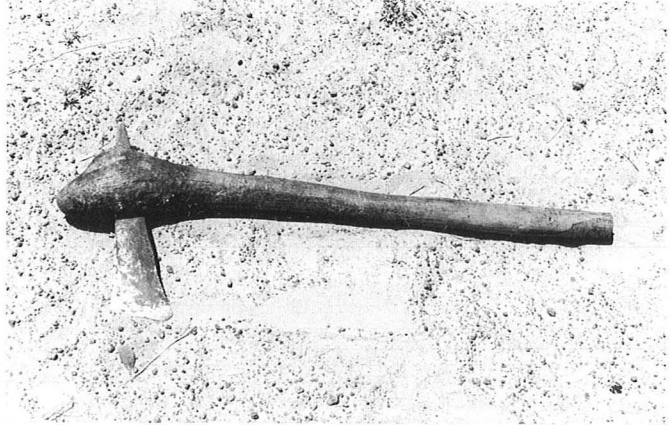


Senegal

Traditional axes with tang fittings, such as this, were common in every country. Blacksmiths produce them. The blade is normally made from vehicle leaf springs. Axes are widely used for clearing land of trees and bushes. They used to be considered men's tools only, but now women use them, too.

Zambia

Another traditional axe. The axes were remarkably similar in all the countries covered by the study.



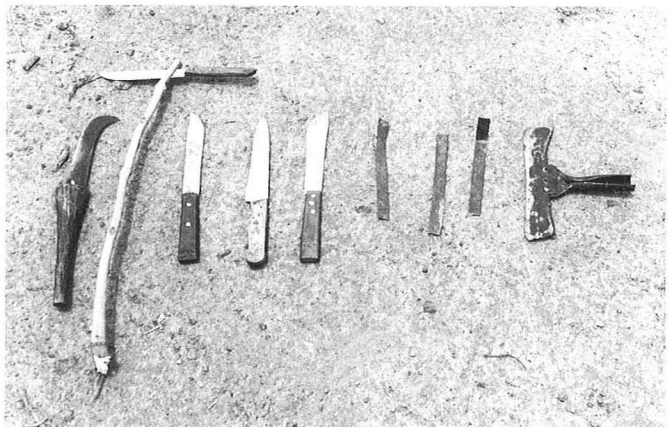
Burkina Faso

A selection of pangas and knives. These tools were found to be similar everywhere. Many pangas were imported from countries such as Brazil, India and China.



Uganda

A range of knives, pruning, and weeding tools. From left, a traditional multipurpose knife; next to it, a small branch being split open to improvise a tool for pruning plantain fronds; imported knives; three strips of flexible steel normally used for fixing roof timbers but adopted by women for weeding millet, and at right, a special tool for pruning plantains.

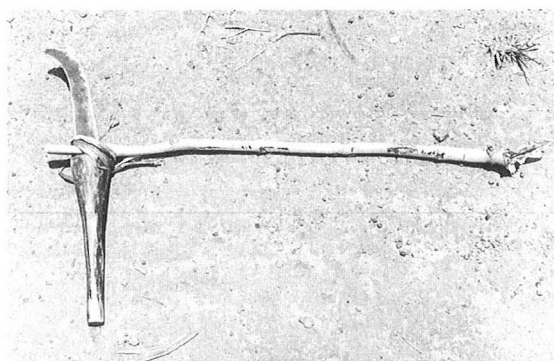


Agricultural Implements Used by Women Farmers in Africa



Uganda

A blacksmith-made slasher.



Uganda

Few people own special tools for pruning plantains so they improvise, with a traditional knife slipped through a split cut in a small branch that serves as a handle.



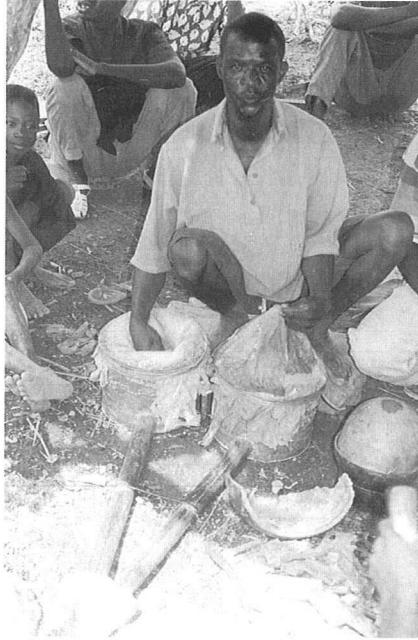
Uganda

The knife is mounted so as to be able to cut fronds by pushing up from below.



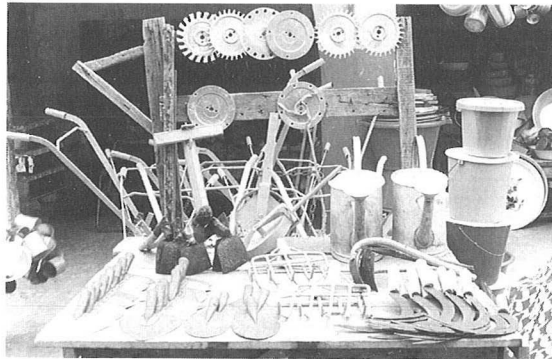
... or by pulling down from above.

Blacksmithing



Burkina Faso

Blacksmith using traditional bellows made of drums and animal skins.



Senegal

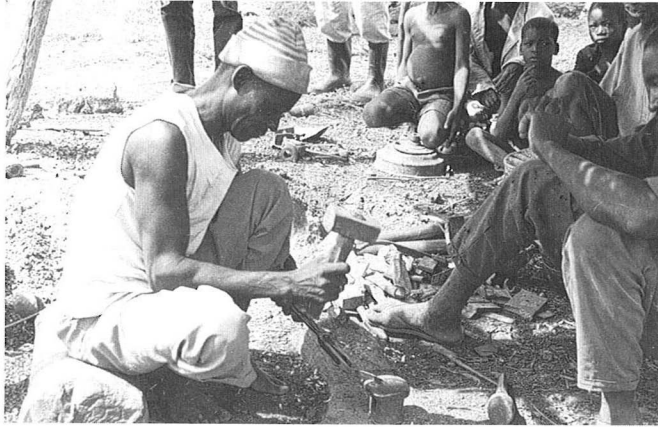
A range of blacksmith-produced tools in Kaolack market. Various hoes, sickles, multi-pronged forks and watering cans can be seen, as well as parts for animal-traction implements.



Senegal

Other blacksmith tools in Kaolack market. Various cultivator tines, groundnut-lifter bodies, rakes and parts for animal-traction implements are on view.

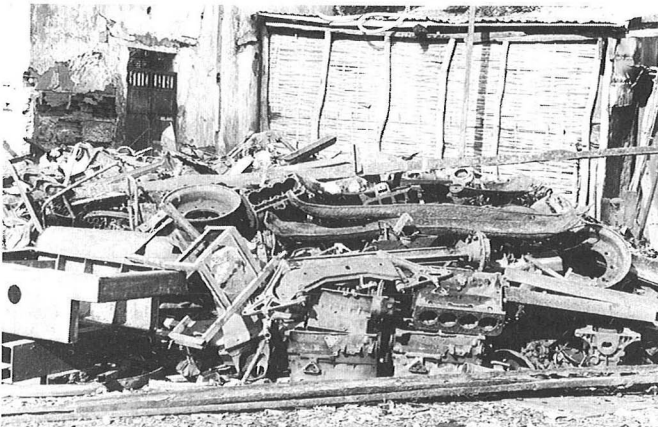
Agricultural Implements Used by Women Farmers in Africa



Burkina Faso

Blacksmiths here and in Senegal are a separate caste and often work in groups. There were several forges in one open area in this village.

They seldom have electricity in the more remote villages, so they cannot arc-weld.



Senegal

A heap of scrap, the blacksmiths' main raw material in the five countries of the study. In eastern and southern Africa, blacksmiths often have access to better-quality scrap from old ploughshares, etc., compared with those in West Africa.



Zimbabwe

A blacksmith using an old fertilizer bag to blow air onto the embers of his fire.

Annex 6 Tools and Implements

Zimbabwe

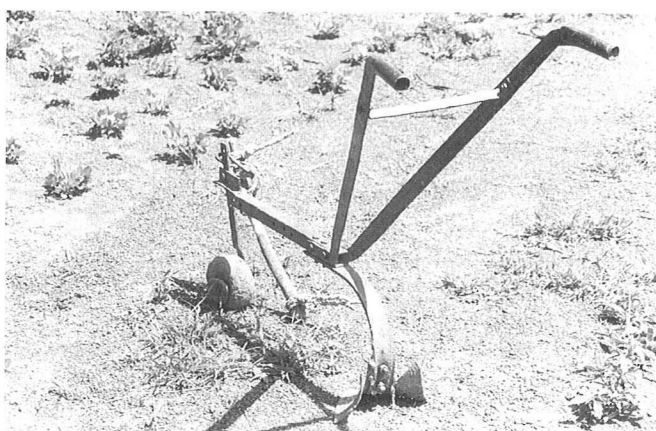
Water bellows and an improved forge at the blacksmith training centre of the Institute of Agricultural Engineering, Borrowdale.



Animal Traction

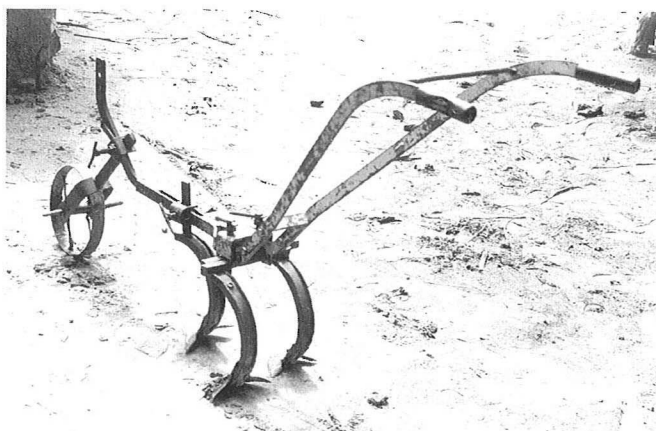
Burkina Faso

A blacksmith-built cultivator with a single ducksfoot tine for inter-row weeding.

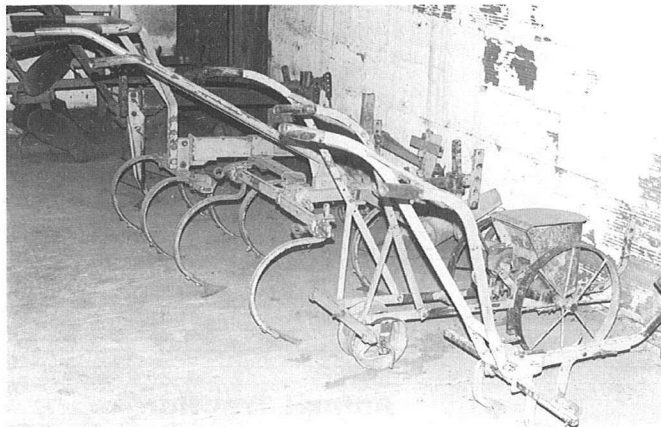


Senegal

An old Sismar three-tine cultivator which is still giving good service.



Agricultural Implements Used by Women Farmers in Africa



Senegal

A collection of old Sismar implements in the Senegalese Institute for Agricultural Research at Bambey. In its prosperous days up to 1980, Sismar produced a wide range of implements. Planters, like the one second from the right, are still widely used.



Senegal

A woman gets up from a Focus Group Discussion to make a point about a Sismar planter.



Zimbabwe

The five-tine cultivator produced by Zimplow/BST which, because of its weight, was the target of much criticism in Zambia and Zimbabwe.

Uganda

Prototype of a lightweight three-tine cultivator under development by AEATRI.



Uganda

Prototype of a lightweight plough under development by AEATRI.



Zimbabwe

The well-known and popular 'Mealie Brand' plough built by Zimplot.



BM 37272



ศูนย์ความรู้ (ศคร.)



BE37272

Agricultural Extension