Everett

FARMING SYSTEMS IN THE BUI HIGHLANDS OF THE NORTH WEST PROVINCE CAMEROON

A RAPID RURAL APPRAISAL SURVEY

IRA/NCRE/TLU, IRZ/GTZ/LSR, MIDENO/PEM,
PAFSAT, CIP, CAMCCUL and JVS

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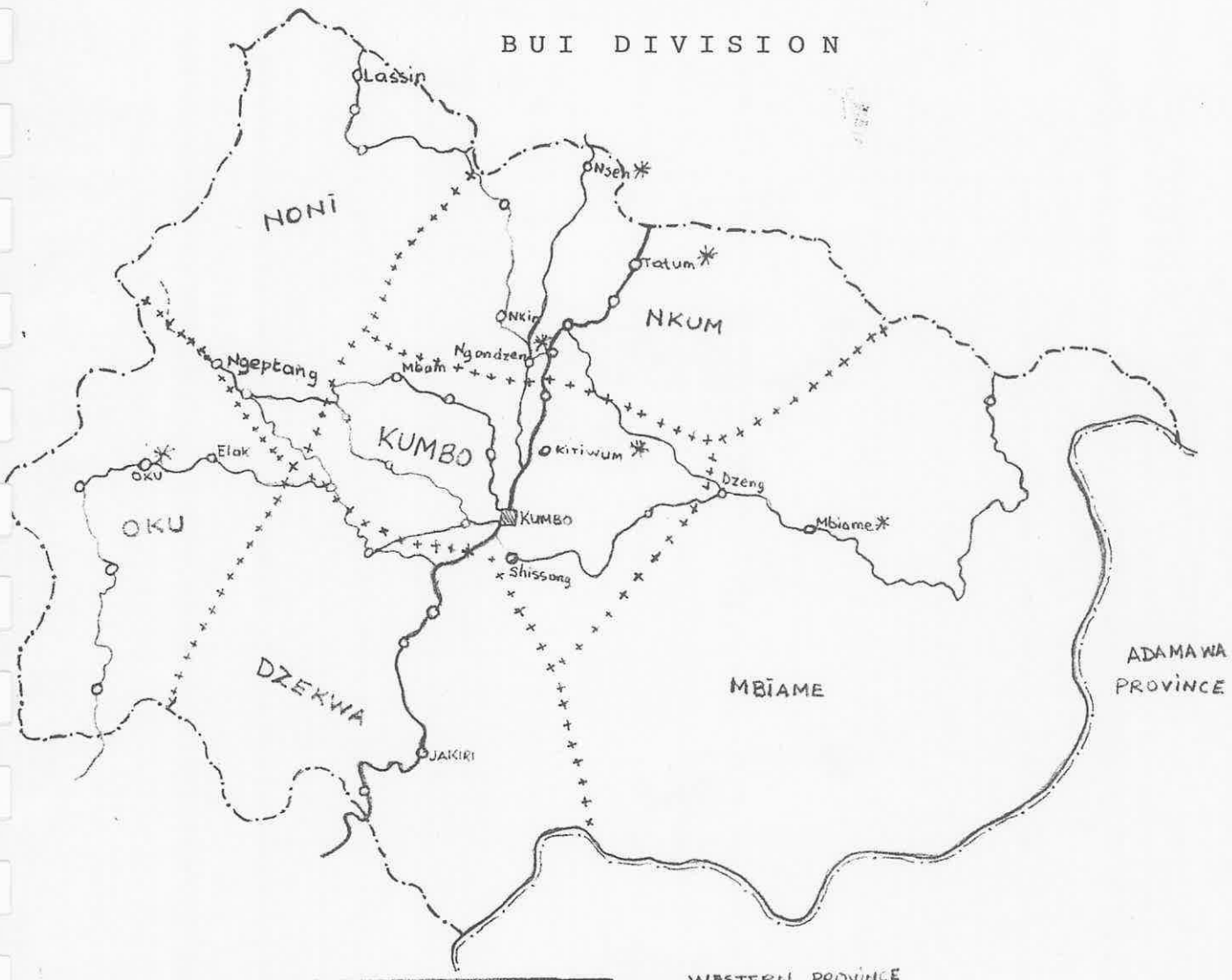
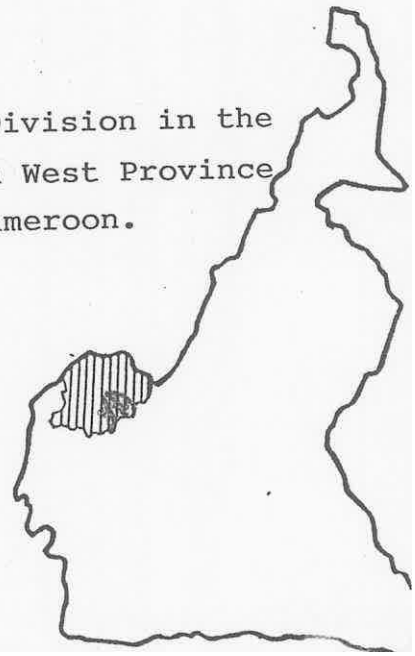
BUI DIVISION



KEY	
	PROVINCIAL BOUNDARIES
	DIVISIONAL BOUNDARIES
+ + + + + + + +	SUBDIVISIONAL BOUNDARIES
	RING ROAD
	ALL SEASON ROAD
*	VILLAGES VISITED

Cameroon in Africa.

Bui Division in the North West Province of Cameroon.



ABBREVIATIONS

MIDENO	North West Development Authority
MINEPIA	Ministry of Livestock, Fisheries and Animal Industries
IRA	Institute of Agronomic Research
IRZ	Institute of Animal Research
GTZ	German Agency for Technical Cooperation
CAMCCUL	Cameroon Cooperative Credit Union League
LSR	Livestock Systems Research
PEM	Program Evaluation and Monitoring
NCRE	National Cereals Research and Extension
TLU	Testing and Liaision Unit
CIP	International Potato Center
JVS	Jakiri Veterinary School
PAFSAT	Promotion of Adaptive Farming Systems based on Animal Traction
FSR	Farming Systems Research
MINAGRI	Ministry of Agriculture

FARMING SYSTEMS IN THE BUI HIGHLANDS

(Rapid Rural Appraisal - Bui, 1988)

1.0 INTRODUCTION

1.1 Survey Background

This Rapid Rural Appraisal (RRA) Survey is part of an ongoing collaborative study of livestock and cropping subsystems of the Farming Systems in the North West Province of Cameroon. The North West Province is divided into a number of farming system zones based on agro-ecological characteristics. The Bui Division was selected as the second zone (after the Ndop Plain) for investigation. The survey was concentrated on a region of higher altitudes (above 1.800 m) around Kumbo and Mount Oku.

The Objectives of this survey were to:

1) Gain an understanding of the farming systems (crops and livestock) in the Bui highlands from the perspective of the farmers themselves, i.e. their objectives, resources, problems and constraints.
2) Identify areas of possible intervention (crop and livestock research, development policy, etc.) by the institutions participating in the study.

1.2 The Bui Highlands

The Bui Division is one of five Divisions of the North-West Province of Cameroon. It covers an area of about 2.200 sq km. The Division is part of an ecological zone known as the Western Highlands, a rich agricultural region producing both crops of temperate and tropical zones. The high elevation and relatively cool climate also provide a good potential for raising animals, such as cattle and small livestock.

The area is essentially a high lava plateau with some lower plains and valleys. The lowest areas lie at an altitude of around 700 m, while high plateaus lie above 2.000 m. The highest mountain in the region is Mount Oku, at 3.011 m above sea level. The plateaus are hilly, traversed by mountains with steep slopes, and divided by deep valleys.

The high mountain region receives more than 3.000 mm of rainfall annually. Temperature ranges from an annual average minimum of 9.8°C and an average maximum of 17.8°C. An intensive rainy season, lasting from April to October, is followed by a fairly cool dry season in November and December, which then becomes warmer up to March.

The population of the Bui-Division is estimated at about 180.000. Average population density is 81 inhabitants per km2. From 1976 to 1983 the population increased by about 12% (SCHLEICH/STEINER, 1986). The most important ethnic group is the Tikar. Their local language is Lamnso, but many of them also speak Pidgin. The second ethnic group is the Fulani, who entered the territory in increasing numbers since the advent of British rule. They speak "Ful-fulde" and some Pidgin for communication with the "Banso-people". The Nso people are mostly crop farmers, while the Fulani are graziers.

The high population density and reduced soil fertility have forced farmers to extend into less fertile areas and even to cultivate on hills with steep slopes. In areas like Oku the "Banso-people" who formerly cultivated on the lower part of the hills are now cultivating food crops on steep slopes of more than 45%. As a result of such practices the fertile top soils are being washed down the hills by heavy rainfall (erosion) and the yields are rapidly reduced.

1.3 Socio-cultural Background

The North West Province is covered by an area commonly referred to as the " Bamenda Grassfields". In Bui Division, two groups of people with different social and cultural backgrounds can be found: the Nso and the Fulani.

1.3.1 The Nso People

The Nso people are organized in chiefdoms of various sizes. The chiefdoms range in size and complexity from small village chiefdoms to the expanding conquest-state of Nso. Normally the chiefdomship is hereditary and the chief represents a sacred symbol to his people. The most important chiefdoms of Bui Division are Nso, Nseh, Mbiame and Oku.

Within the chiefdoms men's secret societies are numerous and the distribution of power between the societies, chiefs, lineage and quarterhead varies from chiefdom to chiefdom. In Bui Division, as in the whole Province, there are both patrilinear and matrilinear hierarchies, but the most common is patrilinear; and any given chiefdom combines principles of descent and residence into an interwoven pattern of social organization.

Within these chiefdoms the compound is the basic unit, comprising a compound head, his wife(ves), children and other relatives. The number of people in a compound, and their membership and rank in the secret society, influences the prestige and power of an individual. The head of household is responsible for the production of sufficient food for home consumption and sale of any surpluses. Cultivable land is owned both individually and communally. The Fon or village head holds title to common land, but control is exercised to varying degrees by lineage and family heads.

Labor is divided according to sex. As a rule the women are responsible for growing all the food crops. They enjoy considerable autonomy in this sphere, and can decide when and for how long they will work in the fields, which crops are planted, and for what purpose the harvest will be used (i.e. how much is needed by the family and how much can be sold). Furthermore, they are also responsible for housework and for raising the children.

Men are also involved in cultivation but mainly in clearing, known as "bush clearing", and in growing permanent crops (i.e. coffee). They concentrate their labor in cash-earning activities and perform domestic activities only in cases of emergency, i.e. illness of the wife or children. However work with the hand-hoe like tilling and weeding is rarely done by men. On the other hand, women assist in "men's work". They help in clearing the

"fufu-corn and jamajama" (maize and vegetables). Instead of buying maize and vegetables from crop farmers, they are now growing the crops around their compounds. "Nso-people" are hired for land preparation, weeding and harvesting. Sometimes the Fulani women help with the harvest.

Milking of the cows, processing of milk (i.e. preparing butter or cheese) and sale of the milk are tasks of the Fulani women. They are also responsible for the household work and raising the children. However, compared to the wives of the crop farmers, Fulani women have less work.

1.4 Land Tenure

"In Cameroon, as in most of West Africa, agriculture is the matrix in which all other indigenous activity is set. The question of rights of allocation and control over land becomes a central issue as the population - both human and animal - grows, while the amount of arable land available remains static" (MAHAFFAY, 1980 p. 16). Involvement in growing cash crops to increase the monetary income of the family has changed the attitudes towards land ownership and access to land.

The Cameroon Government has developed new laws on land ownership to replace the traditional land tenure system. Nevertheless, there is still an interrelationship between the old and the new system.

Previously (pre-coffee period), the greater part of agricultural land was exploited for subsistence production only, whereas today it is being increasingly viewed and utilized as a source of cash income. Whereas labor used to be the prime limiting production factor, there is a general agreement now that land is more limiting. Wealth and power were formerly measured in terms of the labor force rather than land. Those who could demand fealty and labor from others were the most powerful men in society; while today land has become more important.

These changes have created a potential for conflicts. People fight over land for cultivation as well as for grazing. Disputes over land are usually settled by the traditional land authorities. At a higher level, disputes are handled by the administration and then by the Land Consultation Board. In every dispute, rights to land must be traced back to the former landlord or to a relative. There are frequent claims of bias and unfair practices.

At the present time, the majority of land conflicts are farmer-grazier disputes. In all the villages we visited these conflicts were reported by both sides: farmers and graziers. As population and the need for cash income increases, agriculture and cattle production compete for the same land. Traditional authorities often do not recognize grazier's rights to land. They may grant permission to indigenous farmers to cultivate land that has been grazed for decades. With this encroachment taking place, and no effective means of counteracting it, Fulani graziers have no incentive to upgrade pastures and invest in fencing, treatment crushes, night paddocks, etc.. Consequently, they have ignored MINEPIA's efforts to promote these improvements.

farms along with their husbands and work in the men's coffee farms.

Children who were formerly an important source of labor for the household economy now attend school, thereby increasing the women's workload.

Forced by the necessity for more cash income to meet school fees for children and other family needs, many women in Bui Division are growing potatoes and beans as cash crops. Men also raise a few animals for this purpose, although traditionally farmers only keep animals (goats, sheep and chickens) for death celebrations, marriages, gifts for visitors, etc.. Both the man's and wife's income go into a common purse to pay for larger family expenditures. The partners decide together on the expenditure and the purse is managed by the husband.

1.3.2 The Fulani People

There are two groups of Fulani in the North-West. These are the Mbororo and the Aku. The Mbororo settled in Bui in the early 1900's, and the Aku joined them in the 1950's. Many conflicts are reported between the two groups. The Mbororo accuse the Aku of having usurped their traditional rights and taken their dry season grazing areas. They also say that Aku cattle, which are more disease tolerant, infect the Mbororo cattle, and cause heavy losses to them.

The Fulani graziers are generally organized in blocks. Normally the members of one block belong to the same extended clan. Their most senior or respected member is the "Ardo". A specific grazing area surrounding the compound or "ruga" is given to each grazier. The rest of the grazing area is open to communal grazing for the herds of all graziers within the same block.

The Fulani graziers generally don't own the land on which they graze their animals. They obtain permission to graze from the Farmer-Grazier Service, a subdivision of MINEPIA. Grazing permission can also be obtained from the traditional authorities (Fon) in a given area. The boundaries between farming and grazing land are demarcated by the Farmer-Grazier Service.

In one cattle herd most of the animals belong to the family head, and only a few are owned by his wife(ves) and children. On special occasions the family head gives to each child one or more cows, so that at the date of marriage the son or daughter is already owner of a herd. When a Fulani woman gets married, she takes her own herd along to her husband, but maintains her ownership. She alone can decide when to give away or sell one of her cattle, and on how to spend the money received. However, the sale is transacted by the husband.

Fulani graziers often raise sheep as well, herded in groups of five to fifty animals; and many keep a few horses for their own use.

Within the settlement of the Fulani graziers, nutritional habits have changed. From a milk oriented diet they have changed to a more food crop oriented diet. Their staple dish is now

If in future cattle production is to be encouraged, grazing permits need to be replaced by certificates of occupancy, so that larger numbers of graziers will respond to the attempts to improve pasture management.

Regarding the fact that cultivators are also beginning to raise animals it is obvious that conflicts for grazing land will continue.

Another problem related to land scarcity and over-use is the reduced quality of crop and pasture land. Most pasture land has been invaded by bracken fern and other non-palatable species of grass. Overgrazing and erosion have reduced the soil fertility and yields are drastically diminishing.

It can be assumed that the problems mentioned above will increase in the future. Traditional values are increasingly being replaced by so called "modern values" leading to a more monetary oriented society, and therefore land pressure will continue to increase as farmers seek to augment incomes by increasing agricultural production.

From the forgoing description of the peoples of the Bui highlands, it is clear that the Banso people and the Fulani people have very different origins and cultures. For this reason, it was decided to consider their farming systems separately.

The Banso people, with their emphasis on crop production and the raising of small livestock, are considered as operating a "mixed cropping system". On the other hand, the Fulanis have a cattle dominated farming system, with crops only recently introduced. They live up in the grasslands, and have relatively little social contact with the majority Banso people. This system is termed the "grazier system" in the remainder of this report.

It should be noted that the Fulani population in the Division barely numbers a few thousand, which constitutes less than 5% of the people of Bui. However in terms of land utilization, a much higher proportion of the Division's land surface is devoted to grazing. Thus whilst the Fulani are a small minority numerically, they have a major role in the utilization of land, and hence are treated equally with the Banso people from the farming systems perspective of this report.

2.0 THE RAPID RURAL APPRAISAL SURVEY APPROACH.

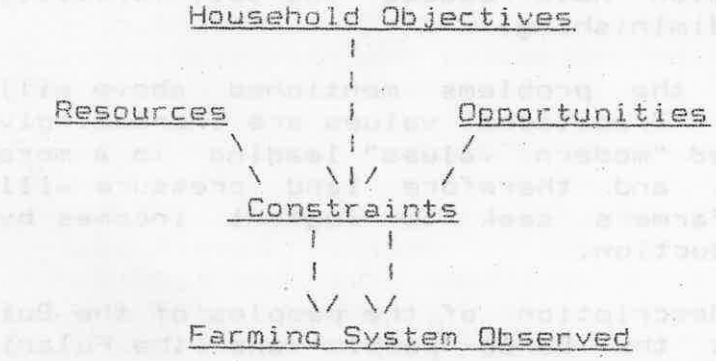
2.1 Methodology

RRA is primarily a tool of farming systems research. The basic unit of a farming system is the rural household, which has a given set of objectives and opportunities. The resources at the disposal of its decision maker(s) are utilized in such a way as to form a particular farming system. RRA assumes that within a given area, farming households will generally have similar objectives, resources, opportunities and constraints. Therefore, over time these give rise to a common farming system, which can be identified, and described for a particular zone. Such areas will frequently be determined by common sociological groupings or

environmental conditions.

The approach examines the whole range of activities as practiced by a farming household, not a single aspect or enterprise, which is the traditional focus of most agricultural research. The "farming system" includes cropping and livestock patterns and practices, resources, consumption patterns, post harvest aspects, marketing etc.

The farming system can be represented by the following model:



RRA has a number of objectives. It aims to understand and describe all the elements of the above model, and how they interact. This begins with a descriptive assessment of the farming system observed, goes on to examine the farmers' own objectives, available resources and opportunities, before finally discovering the key constraints which limit the development of the system. From this, relevant and timely research priorities can be drawn up, and recommendations for action can be made to policy makers and various institutions actively involved in rural development. One of the most valuable objectives though, is to train and orientate the researchers, often at the outset of a research project or programme, to the priorities of their target population, and encourage them to consider the farming system from a broader perspective than their own discipline.

Some of the distinguishing features of RRA are as follows. First of all the approach teaches the researchers to "stand in the farmers' shoes", and see the farming system from their perspective. This tends to be quite different from that of the researcher trained in a particular discipline, such as agronomy or sociology. This is accomplished in two ways. One is to adopt an open-ended approach to the survey, where the farmers are allowed to lead the discussion, raising the topics and problems which they think are most important. This overcomes the limitation of traditional research methods which narrow the discussion to the researcher's pre-conceived ideas of what the farmer's problems are, and to pre-set interview questions. These latter often exclude the whole realm of interactions between different elements of the farming system, at which point many key

constraints may lie.[1]

The second way the researchers broaden their perspective is by working together in the field, so that typically an agricultural and social scientist will team up (inter-disciplinary team). In this way they may learn as much from their colleague's different questions and observations, as from the farmers themselves.

Another distinguishing feature of RRA is that it does not produce any detailed statistical descriptions of the farming system, but rather builds up an in-depth picture of a rural population and its farming system. For this reason, repetitive questionnaires are unnecessary; instead each discussion or farm visit tends to build up or reinforce the overall picture. Repetition is used mainly to establish the homogeneity of the farming system and identify any substantial deviations from it.

The name of the approach indicates another important feature: the rapidity of the research process. After initial planning the team needs spend only a few days prior to departure to the field researching background information from literature sources and key local informants, before embarking to the field for one or two weeks. Following this, a concise report can be written within a week, as there is no data to analyze. Thus the whole process can be completed within a month. This permits senior practitioners and researchers with heavy work programmes to participate; it also enables immediate dissemination of the research findings, and subsequent action on the recommendations can be timely and effective. Too often in the past, research results have been published, often in very lengthy and detailed reports, one or two years after the survey was completed. Effectively, this causes the whole operation to be of little value to any one save the researchers themselves.

This leads to the fourth distinctive feature of RRA, which is its far-reaching scope. The research method can uncover constraints in any area of the farming system, and lead to important recommendations of direct relevance to existing or proposed research programmes, local development initiatives, government services, projects, and the farmers themselves, within the area covered by the farming system.

To sum up, RRA is a highly cost effective means of research into rural target populations, which can warn against irrelevant or untimely agricultural research; uncover the true elements, operations and constraints of a farming system; train and orientate researchers and development practitioners in the actual

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[1] A classic example of this comes from a research project in Bolivia, aimed at increasing rice yields: a RRA discovered that the best way to achieve it was to de-worm the farmers' pigs. The linkages ran thus: farmers knew about fertilizer for their rice farms which was available and desired to use it. However, at the time of application, farmers suffered from a cash shortage, and their recourse was to sell a pig or two to meet such cash needs. The pigs, however, were weak and sickly due to worm infestations, and so the price realized was low, preventing farmers from buying sufficient fertilizer. Hence rice yields were below optimum.

felt needs of the farmers, and give the farmers themselves a major part in the drawing up of development priorities.

2.2 The Survey Team and Itinerary

The survey team was both multi-disciplinary [including natural and social scientists - agronomists, an agricultural biologist, animal scientists, veterinarians, a sociologist and agricultural economists] and multi-institutional [including IRA/NCRE/TLU, IRZ/GTZ/LSR, MIDENO/PEM, CIP, PAFSAT, CAMCUL and the Jakiri Veterinary School].

The team included the following members:

Mr. Jonathan Tame	Ag. Economist,	MIDENO
Mr. Dermot McHugh	Ag. Economist,	IRA/NCRE/TLU
Dr. Tambi Emmanuel	Ag. Economist,	IRZ/GTZ/LSR
Dr. Ndi Christopher	Veterinarian,	IRZ/GTZ/LSR
Dr. Tarounga Beramgoto	Animal Scientist	IRZ/GTZ/LSR
Mr. Pone Kamdem	Animal Scientist	IRZ/GTZ/LSR
Dr. Ulrich M. Hoesle	Ag. Biologist	IRZ/GTZ/LSR
Mr. Nguemjom André	Dairy Scientist	IRZ/GTZ/LSR
Ms. Sylvie Linz	Sociologist	PAFSAT
Mr. Tientchu Jonas	Credit Specialist	CAMCUL
Mr. Peter Van Den Berg	Market Economist	CAMCUL
Mr. Ntonifor Charles	Agronomist	CIP
Mr. Njimbong Stephen	Veterinarian	J.V.S.
Dr. Wolfgang Daubenmerkl	Veterinarian	J.V.S
Mr. Ndemoffo Jean	Ag. Technician	IRZ/GTZ/LSR

The survey team met together on two occasions prior to the actual fieldwork in order to plan the survey and receive some training in the RRA approach. Some members also went to Bui in advance to arrange the visits with local agricultural staff in the different villages. The itinerary chosen was as follows:

Monday 24th October	Tatum
Tuesday 25th	Kitiwum
Wednesday 26th	Nseh
Thursday 27th	Ngondzen
Friday 28th	Mbiame
Saturday 29th	Elak-Oku

The team travelled in five vehicles and returned to Kumbo each evening; they met together to discuss the day's progress and findings, and to plan out the following day's meeting.

3.0 FARMERS OBJECTIVES AND RESOURCES

3.1 The Mixed Farming System

3.1.1 Objectives

Objectives of farmers in the mixed (Nso/Oku) farming system are similar to the objectives of farmers in other areas. The main goals are first, to fulfill family consumption needs for preferred food stuffs; and second, to earn a reliable cash income to meet miscellaneous family expenses, such as: supplementary household needs (oil, soap, salt, meat, fish),

medical care, clothing, school fees, hired labor and farm inputs (e.g. fertilizer).

It was observed that the relative importance attached to crops or livestock production is clearly shaped by farmers' objectives. Farmers, who keep a good number of livestock together with their crops, do so for a number of reasons: 1) the need for immediate cash to meet school expenses for children; 2) meeting emergency needs arising from deaths, births and other important celebrations and cultural activities; 3) payment of bride price; and, 4) insurance against possible economic crisis.

It was also observed that certain (mostly exogenous) factors are preventing farmers from achieving their objectives. The most notable are: a weak infrastructure for transport and marketing of farm produce; pressure on grazing land from increased demand for crop land resulting in smaller herd sizes; little or no use of crop by-products in animal feeding; and, serious nutritional and health problems particularly during the dry season.

3.1.2 Resources

From the experience gathered from other Rapid Appraisal Surveys in the North West Province, it was initially hypothesized that land is an abundant resource in the Bui farming system. It soon became obvious from the discussions with farmers, that land is a very limited resource in most of the villages surveyed. Where cultivable land is relatively more available, its extensive use is limited by a shortage of labor and capital resources.

3.1.2.1 Land

In general, most farmers reported land to be a major constraint to increasing output, both in quantity and quality. With the exception of farmers in Nseh and Ngondzen, farmers in the other villages have no access to additional land. Land shortages are the result of a number of factors: continuous cropping of the same piece of land for several years, depleting its natural fertility, and forcing farmers to seek more fertile lands; irregular and sometimes total lack of use of artificial fertilizers to improve soil fertility; fallowing practices; increased demand for crop land from graziers who require land not only for grazing but also for crop production; a weak road infrastructure and lack of transportation means to and from distant farm lands; and, a shortage of labor for land preparation.

Severe land shortages are evident in Kitiwum, Tatum and Oku where farmers have used up all available crop land and therefore have no where else to go for additional land. In Nseh, Ngondzen and Mbiame however, farm land is generally available, but in distant areas from the main village. These lands are mostly marginal lands and are at the periphery of the village. Because of lack of transportation and roads to and from these lands, it can be said that cultivable land is effectively scarce in these villages, as well.

Generally speaking, the majority of farmers in Bui who grow crops and raise animals own the land on which they work. Acquisition of the land owned is mostly by inheritance, although

land can be acquired on a permanent basis by consulting with and paying certain dues to the village council.

Most, if not all, of the land around the homesteads are privately owned lands, evidenced by the planting of permanent crops such as coffee, oranges, avocados, eucalyptus, and bananas, with intercrops of maize, beans and potatoes.

Most of the food crops (maize, beans and Potatoes) are cultivated on land located away (usually a few kilometers) from the homestead. These fields are located in common land areas and are not owned privately as such. Access to such land is granted by the village council and remuneration for the use of such land is through the remittance of part of the year's harvest. Quality improvement of crop fields located in common land areas is unusual owing to uncertain tenure arrangements.

Soil infertility is less of a problem for farmers in Kitiwum, Ngondzen, Nseh and Mbiame, but is acute in Oku and Tatum where continuous cultivation on the same piece of land has reduced the natural fertility of the soil. Crop yields in the former villages are moderate even without fertilizer application. In all villages surveyed except Oku, the most fertile soils are in the valleys. Farmers complained of fertile areas being lost to the expanding plantations of eucalyptus trees in Tatum, Kitiwum and Nseh. In Oku, the soil fertility problem is acute because of the increased incidence of erosion and land slides (one woman was killed by a land slide), which are caused by destruction of forests by humans and livestock.

3.1.2.2 Labour

The main source of labor utilized in food and cash crop production in the mixed farming system is family labor. Only occasionally do some cash crop (coffee) farmers utilize hired labor when family labor is insufficient to meet farm tasks. In general, work is done by members of the farm household-husband, wife(ves) and children. Labor on coffee farms comes mostly from the husband who does the clearing, pruning and nursing of coffee seedlings. The wife(ves) assist in weeding and harvesting as do the children after school hours. Usually coffee farms are intercropped with potatoes, beans and plantains and as the wife takes care of these crops the coffee farm is also taken care of.

Hired labor on coffee farms is used for pruning (some men do not know how to prune their coffee farms) and harvesting. Harvesting requires a large amount of labor for a relatively short period of time, and this must be done in a timely manner to avoid rotting of the berries. The wage rates for hired labor vary depending upon individual arrangements. But in general, a price is fixed for a specific task at the time of employment. An advance is given prior to beginning the job, and the remaining amount paid upon completion of the task. Because of the lateness of coffee payments by the marketing cooperatives, the inability to pay for hired labor becomes a constraint when family labor is insufficient.

Labor needs for food crop production is mostly satisfied by family members. The women are largely responsible for food crop

cultivation, although recently some men have become involved in food crop production as well. Land preparation is done by both the husband and the wife. The husband and wife do the clearing together, while the wife prepares the land for planting. Planting is done by the wife, husband and children, and the weeding by the wife. The whole family participates in the harvest.

Farmers were unanimous in saying that their major constraint on farm output is the amount of labor needed to prepare large pieces of land before planting and for weeding and harvesting. For most, family labor is just enough to cultivate two fields which just satisfies subsistence needs. Expansion of crop output to include a saleable surplus from the cultivation of additional land requires hired labor which is difficult to come by given the limited finances.

Some farmers join womens' farming (cooperative work) groups to help out on each other's farms. This is done on a rotational basis for land preparation, weeding and harvesting.

3.1.2.3 Capital

The main source of capital or cash available to the mixed farmers of Bui is from the sales of farm produce. The main cash crop from which income is expected is coffee which is sold to the Marketing Cooperative on credit. The prices paid per kg of coffee is determined by the cooperative and vary depending upon the grade of coffee supplied by the farmer. Payment usually is not immediate, but during the past year farmers have not been paid for their 1986/87 coffee harvest. For farmers who depend on coffee as a main source of income, this slowness in payment creates a cash flow problem. This hampers the farmer's ability to purchase farm inputs such as fertilizers, fungicides, insecticides and seedlings; as well as, meeting other family needs for household items, school fees, health care, etc..

Farmers have tried to resolve this cash flow problem by joining informal credit organizations such as "Njangi" and other savings groups, in addition to their regular membership with the credit union (CAMCCUL). The credit union exist in every village except in Oku where it not yet registered. It serves as a savings and loans association to members. Membership is free to every person and the amount of money saved depends on the individual member's willingness to save. The maximum amount of money a member can borrow is limited to two times his share savings and usually a second party surety (cosigner) is needed to guarantee the loan. The interest rate charged by the credit union is low relative to the bank's interest rate (1% per month).

Savings or contributions in the "Njangi" also depend upon individual capability, and withdrawals are made on a totative basis although members can apply for small loans. Since incomes from farm sales are low, savings or contributions in these credit institutions are small, making them inadequate as a source of income for meeting family cash needs.

Farmers of the mixed farming system have also tried to resolve their cash flow problems by searching for other sources

of income. In Tatum, Kitiwum, Nseh and Ngondzen, many farmers are moving towards the cultivation of eucalyptus as a cash crop. This is a rather long term investment venture, while more immediate cash needs are met from the sale of food crop surpluses after subsistence needs have been met. Maize, beans and potatoes are the main food crops grown. Sales of surpluses of these crops are made at any time the need for cash arises irrespective of the going market price.

In addition to these sources of income, some farmers diversify their farm operations by keeping small livestock such as goats, sheep and poultry. The numbers kept are fairly small and usually they are allowed to roam in the yard. For these farmers raising livestock is not a profession as such, but a source of cash for emergency needs or when income is not forthcoming from crop production. This is evidenced in the style of management practiced and from the low financial return realized from livestock.

Usually, money obtained from the sale of animals and poultry is used to pay school fees, purchase farm inputs and for other small family needs. This practice of meeting emergency cash needs from the sale of livestock was observed in all the surveyed villages.

However, some farmers are keeping goats not for financial gain, but for their social and cultural usefulness. There are some who keep them for prestige and as a sign of wealth. This is the case with some farmers in Oku who take pride in their herds and will rarely sell a single animal even when faced with a vital cash need.

3.1.2.4 Feed Resources

For the farmers who keep some livestock in addition to their crops, feeding these animals is a major problem because of inadequate supplies of animal feed. The main source of feed for most farmers is green grass which is abundant during the wet season but scarce in the dry season. The use of agro-industrial by-products such as cotton seed cake, groundnut and soybean cake as a feed resource is non-existent, while the use of crop residues such as corn stover, bean leaves, etc. is rare.

The use of these conventional feed resources could go a long way in overcoming the problems associated with dry season feeding of animals, and at the same time reduce the amount of labor required for fencing of farms to prevent damage to crops.

In Oku, unlike in the other villages, the most common grazing vegetation for small ruminants (goats) is deciduous tree seedlings, shrubs and herbs found in the Kilum forest. Crop farming occupies large areas of land, forcing sheep and goat farmers to send their animals to the forest. The little available land for browsing in the forest has been overgrazed, leading to forest destruction and soil erosion.

The problem of insufficient grazing land and crop destruction by animals exists in all the villages. Graziers and farmers attempted, in the past, to regulate grazing by constructing fences separating cropland from grazing land. It

appears, however, that with recent increases in population, much grazing land has been encroached upon and taken for cropping, which, combined with the graziers' movement away from a nomadic life-style towards permanent settlement, has resulted in a severe reduction of grazing land for animals.

3.2 The Grazier Farming System

3.2.1 Objectives

The first goal of the grazier family is to own cattle. Their whole culture and lifestyle revolves around keeping cattle, and this remains their primary objective, even after they ceased to be nomadic. For this reason, they appear not to be very responsive to alternative sources of income or production activities. They will also go to considerable lengths to continue cattle rearing, and remain resident in the upland grazing areas.

Cattle also fulfil other objectives of the Fulanis. As well as being the main source of cash, they are important for social traditions and obligations such as: gifts for children, especially upon marriage; and, slaughtering at feasts such as Ramadan, and other large family gatherings.

3.2.2 Resources

3.2.2.1 Land

The economic resources at the disposal of the Fulani graziers hinge on the availability of land. The grazier system is completely dependent on there being sufficient grassland to maintain herds during the wet and dry seasons. As no concentrate feeds are used for cattle, nor any conservation of fodder, the herd is dependent on fresh grass alone for dietary intake. The quality of grazing lands seen was reasonably good, although some areas were invaded by bracken fern. The potential for improving productivity of the grassland is high, as the current level of pasture management is very low.

Regarding tenure, almost all grazing land is considered as publicly owned. Grazing rights were traditionally acquired from the "fon" or chief, but now the livestock and veterinary services are playing an increasing role, along with Fulani Chiefs (Ardos), in allocating land. However, virtually no examples of sole grazing rights were found, despite repeated attempts particularly under the Meat Plan credit scheme operated by FONADER.

3.2.2.2 Labour

Labor used in the farming system is almost all drawn from the family with one or two exceptions. Hired Fulani shepherds (gynako) are sometimes employed to run with the herds or to walk with them to market. They are paid in cash (10,000-15,000 CFA/month), or in kind (one young cow every 5 months). These salaries do not include feeding, clothing and pocket allowances. The other exception is for crop farm labor. Since the Fulanis are traditionally graziers and buy food in the market place, they are ot experienced in cultivation methods. Thus they hire Banso people to come and work their farms, particularly operations of

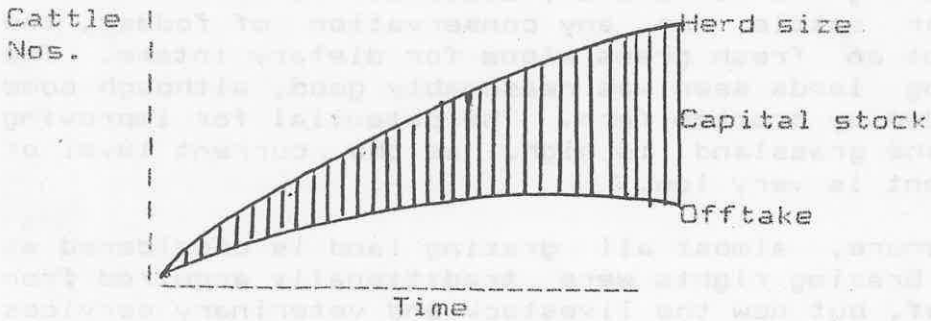
land clearing, tilling and weeding. The family tends to perform actual planting and harvesting of the crop. One case was found where the hired Banso workers failed to come and prepare the Fulani's farm in time for planting. The result was that there was no food crop production that year and the family had to return to the market to purchase all their food requirements (although they had some second cycle crops growing.) However, this appears to be an exception. There is generally enough surplus labor in the mixed farming system practiced by the Banso people to supply the Fulani system, which supports the hypothesis that land is the binding constraint in the mixed system, not labor.

Men and boys are engaged in herding the cattle, whereas women and girls are responsible for milking the cows, butter-making, and household tasks. They keep their compounds tidy and spotlessly clean.

Specialist tasks such as vaccination, treatment for sickness, and castration of bulls are carried out by veterinary staff from MINEPIA.

3.2.2.3 Capital

Capital is held almost entirely in the form of cattle. Offtake from the herd is generally in proportion to the needs of the family, and the remaining stock act as the store of wealth. There seemed to be no voluntary limitation of herd sizes and the rule "bigger is better" seemed to apply unconditionally. The relationship between herd size and offtake might look like:



Other assets include fencing, although in the case of wood or raphia sticks this deteriorates after about two years, through termite damage. Few farmers appeared to use permanent wire fencing. Some storage structures had been built for maize in particular - mainly the Donga-Mantung Barn.

The only form of credit encountered was one grazier with a FONADER loan under the World Bank "Meat Plan" programme. The sum involved was around 3.5 million CFA francs, of which 865,000 was the grazier's own contribution. The main item of purchase was new stock amounting to 2.4 million, and the remaining credit went towards fencing posts and barbed wire, pasture improvements, fire breaks, veterinary expenses etc.

4.0 DESCRIPTION OF THE FARMING SYSTEMS

4.1 The Mixed Farming System

4.1.1 General Characteristics

The mixed (Nso/Oku) farms in the Bui highlands are variable in size, specific enterprise mix and level of management. However, they have a commonality that justifies their being treated as a single farming system. A typical enterprise mix might include the following:

- 1 to 3 foodcrop farm(s), between 0.1 and 1 hectares each, and as much as 5 km from the compound/dwelling [maize + potato + bean]
- Cash crop farm(s) [1 to 2 coffee farms and 1 eucalyptus plantation]
- optional small livestock [goats, pigs and/or poultry]

The nucleus of the system is the foodcrop farm, where the principal crop is maize, which is almost universally intercropped with potatoes and/or beans. Maize [Zea mays] is the staff of life for the Nso and Oku, who eat it daily, if not twice a day, as fufu (a starchy porridge eaten with vegetables). Potatoes [Solanum tuberosum] are also eaten, but are mainly produced for sale. Beans [Phaseolus vulgaris] are equally grown for consumption and sale. Most farms contain other less important foodcrops at lower densities (e.g., huckleberry Solanum nigrum, cocoyam Colocasia esculenta, cowpea Vigna unguiculata, banana Musa spp., sweet potato Ipomoea batatas, sugar cane Saccharum officinarum and miscellaneous garden vegetables), also grown for home consumption and/or sale.

Coffee [Coffee arabica] is the primary cash crop. In the past, farmers depended on coffee revenues to pay for school fees, medical care, clothing, household incidentals (oil, meat, etc.) and fertilizer. Recently, low prices and late payments for coffee have forced farmers to look elsewhere for revenue. Eucalyptus [Eucalyptus globulus] plantations have provided limited income from the sale of roofing poles and lumber. However, most of the revenue shortfall has had to be made up through the sale of foodcrops (potatoes, beans and maize, in that order).

Many among the mixed-farming population have small numbers of livestock. The most common is poultry; usually a few free ranging chickens left to scratch for food around the compound farm, and only fed waste maize from fufu processing (corn chaffs). Some keep a few goats, who are tethered (in principle, but too frequently not in practice) to prevent crop destruction, and fed a salt supplement. Fewer farmers have what can be called "intensely managed" livestock systems requiring the enclosing and controlled feeding of the animals. These include pigs and rabbits.

4.1.2 Food Crops:

The food crop system in the Bui highlands, perhaps more so than in any other zone in the Western Highlands (North West and West Provinces), can be characterized by a single dominant crop

association: maize + potatoes + beans. There are slight variations in this system, e.g. the absence of either potatoes (where soil conditions are not favorable) or beans (in farms near the compound where free ranging chickens will eat the flowers), or the presence of other less important crops (e.g., cocoyams, bananas, vegetables).

In many farms, the first (rainy) season maize/potato/bean crop is succeeded by a follow-on second (dry) season potato and/or bean crop. Some farmers plant late potatoes/beans on separate fields from the rainy season crop. In a few areas, free roaming goats and cattle effectively prevent late season cropping.

Land scarcity has forced continuous cropping of foodcrop fields for as long as 20 years or more; as well as, cropping of marginal land. The inability of farmers to fallow the land or use crop rotations has precipitated a steady and accelerating decline in soil productivity, only partially mitigated in recent years by the increasing use of fertilizers on foodcrops. Albeit, a few farmers have sufficient personal land to practice short fallow periods after many years of cropping.

Maize (Zea mays):

Maize ("corn" in pidgin/"ngwasang" in Nso/"esang" in Oku) is the staple food for the people of Bui. It is eaten at least once a day in the form of fufu (a stiff porridge called "kiban" in the local dialect), usually with jamajama (a green leafy vegetable made from huckleberry and called "noseji").

Maize yields in this zone are relatively low (from less than 1 tonne to 2 t. grain yield per hectare) when compared to yields in the mid-altitude zone (e.g., Ndop Plain). This is probably due to continuous cultivation and cropping of marginal lands. More and more farmers are using fertilizers on maize to sustain acceptable yield levels on the rapidly degrading soils.

Farmers identify two varieties of maize in Bui: the local variety and the MIDENO or Agric variety.

The local variety is apparently derived from a synthetic variety (Kitale II) introduced to the area from East Africa (Kenya) in the 1960's. It is variously called "Kenya white", "Kitale" and "Gona". The characteristics are: white-flinty grain, tall plant, long growth cycle.

The MIDENO/Agric or "improved" variety is COCA (and in a few cases MLC), a composite variety developed by Dr. Ayuk-Takem at IRA. It has been extended to farmers in the zone by MIDENO/PDA since 1984. It is sold pre-treated in 5 kg packages at 200 CFA/kg. The characteristics of COCA are similar but not identical to those of the local variety: white-denty grain, tall plant type, long cycle, disease resistant (to highland blight and rust). A shortcoming of COCA noted by farmers is its softer grain type that makes it vulnerable to rapid storage losses from weevils. Furthermore, COCA was developed in the mid-altitude zone (1000 to 1500 m.a.s.l.) where it does exceptionally well. At altitudes above 1600 m, normal in this zone, farmers have had mixed experiences with COCA. Many farmers abandoned COCA after 1

or 2 years to return to the local variety. This experience is confirmed in on-farm testing by the TLU and MIDENO-TDC trials, in which no significant yield differences were discerned between COCA and the local variety.

Land clearing: Done on old farms in October/November by the women, with some assistance from the men. The maize stalks and weeds are removed from the ridges and stacked in the furrows. Some farmers admitted to burning the crop residues in the furrow after 1 or 2 months to promote potato production. [New farms are cleared in December by men, using a cutlass.]

Land preparation: Done in December by women using short-handled, wide-blade hoes. The old ridges are split down the middle, with the soil on either side being used to cover the crop residues in the furrows. Thus new ridges are created where the furrows had been and vice versa. Ridges are constructed on the contour (across slope) on most farms to reduce run-off erosion; but on some very steep slopes (> 50%), farmers orient the ridges up and down the slope because it requires less labor.

In farms where a second season potato/bean crop is planted after the maize crop, farmers follow two approaches. In the first, the potatoes/beans aren't planted until the maize is harvested (Sept/Oct). The crop residues are laid in the furrows, the old ridges split, and new ridges formed. Then the potatoes/beans are planted on the new ridges. The same ridges are used for planting the next rainy season maize/potato/bean crop.

In the second approach, the potatoes/beans are planted in August/September before the maize harvest. The non-maize crop and weed residues are removed from the ridges and stacked in the furrows. Then the ridges are split, pulling the soil from around the standing maize stalks, to form the new ridges in the furrows.

This leaves the maize standing in the new furrows or on the opposite side of the new ridges. Then the potatoes/beans are planted in the new ridges. After the maize harvest, the maize stalks will be pulled up, laid in the furrows, and covered with a light layer of soil to foster decomposition. Again, the same ridges will be used the following rainy season.

Planting: Seed selection is done after the maize is dried and stored. The larger ears with fat, healthy grains are set aside, and only the grains in the middle of the ears are used. Small, deformed, cracked or diseased grains are discarded. The fact that the seed is selected after an extended period of storage, could explain the flinty-grain characteristics of the local variety. By selecting the ears with non-damaged (non-weeviled) grains, the farmer is practicing mass selection toward a flintier variety.

Immediately after the first rains in March, the women, men and children plant the maize on the same ridges used for the dry season potato/bean crop. The rains came at the end of February this year; so most farmers planted around the 1st of March rather than the normal March 15th. The only implement used is a cutlass, hoe or stick to open the soil before inserting the

seeds. The soil is not firmed after planting.

For all intensive purposes, maize is always intercropped with beans and/or potatoes, and often with other minor crops at lower densities. Maize is planted 2-3 seeds per hill in two rows on the edges of 1.5 meter wide ridges. Planting densities range from 15,000 to 30,000 per hectare. Farmers don't thin the maize. Because of the altitude and length of the growth cycle (180 days), maize is only grown once in a year.

Weeding: The maize/potato/bean intercrop is typically weeded twice (at the 4 leaf stage of maize in April, and again in late May); while the 2nd season potato/bean crop is weeded once (October/November). Weeding is done by women, often with the assistance of farmers cooperative work groups ("Njange group"). The weeds between the rows are scraped off with the hoe, whereas those within the row are pulled by hand.

The women begin at one end of the field and work across the farm. If the farm is large, the second weeding is begun immediately upon completion of the 1st weeding.

The most troublesome weeds are dense, creeping (rhizomatous) grasses and speargrass (Imperata cylindrica, called "Kiyon" locally). Bracken (called "Nkun") and a wide variety of broadleaf weeds are considered less noxious by farmers.

Applying fertilizer: Past surveys of farmers in the North West Province, including the 1984 Agricultural Census, indicated that only 20 and 25% of farmers used fertilizer on foodcrops. However, the impression we got during the RRA was that a much greater proportion are now using fertilizer on maize. This is probably due to the increased emphasis placed on foodcrops by the extension service of the PDA following the series of MIDENO extension training courses from 1984 through 1988.

Fertilizer was generally unavailable to farmers in Bui in 1988, or only available from traders at exorbitant prices (4000 CFA/bag). Farmers blamed the unusually low maize yields this year on this unavailability.

Fertilizer (20-10-10) is applied directly to the maize (to the base of the plant) during the second weeding in May. The rate of application varies directly with its availability and the farmer's means. Average rates, however, are very low, ranging from 50 to 100 kg per ha (i.e, less than 20 kg/ha of nitrogen). Women and men apply the fertilizer.

Harvest and transport from the field: The date of maize harvest is a direct function of planting date, variety and altitude. Harvest dates in the Bui highlands can be as early as the end of August at 1500 m.a.s.l., or as late as late October at 2200 m.a.s.l.. For most of the zone studied, maize is harvested from late September to early October.

Women do the harvest. But men help with the transportation. The ears are picked and dehusked. Then they are spread evenly on the floor of a raised drying platform with thatched roof (called a "Wuchum"), constructed on the farm when it is far from the compound, or in the compound when the farm is nearby. After 1 to 2 months of air drying, the maize is carried to the compound by

head, hand truck or vehicle, depending on the farmer's means and the proximity of roads to the farm. When the "Wuchum" is in the compound, the maize is carried directly from the field to the compound for drying.

In at least one area (Mbiame), farmers carry the maize from the field and dry it in the loft above the kitchen ("banda") with a fire below. Some ears are tied in pairs and hung from the eaves ("veranda") of the house for drying.

Storage: The dried ears are stored in a bamboo storage box (the "Shah") of variable dimensions (typically 1.5 m. cubed). Some farmers use actellic (2% powder), bought from the CAP, for weevil control in the "Shah". Others alternate layers of maize ears with the scented leaves of a local plant (called "Kindram").

Production problems (pests): Farmers reported that the stem-borer infestation was particularly heavy this year. Some blamed a three week dry spell that followed the early rains, immediately after the emergence of the crop. - The only disease noted by farmers was common and head smut. One farmer brought a smutted ear and tassel to the group discussion. Because the field visits were made after the maize harvest, the team was unable to evaluate the disease situation. However, visits by some team members during the growing season allowed them to identify other common diseases in the area (Helminthosporium turcicum and Puccinia polysora). Nevertheless, diseases appear to be of secondary importance. Soil infertility is apparently a much more serious constraint.

Consumption: Maize is traditionally a food crop. In recent years, however, farmers have been forced to sell maize to pay school fees and other expenditures formerly paid for out of coffee revenues. Nevertheless, Farmers still consume 75 to 95% of their maize. Most is eaten as fufu, as described above. Very small amounts are roasted green or fried with beans ("corn-chaff").

Sale: With the exception of a minority of farmers who grow maize specifically for sale, most farmers only sell small quantities (shelled maize in a 20 liter kerosine tin or 15 liter bucket) from the maize storage box, as needed to cover small expenses such as primary school fees (1500 CFA per child), oil for cooking, medical treatment, etc..

Maize is sold in the weekly village market (held every 8 days), or carried to a neighboring village market. As most villagers are self-sufficient in maize, the principal buyers are outside traders who often purchase all or most of the maize in a given market, to be transported by vehicle (often Toyota Stout pickup truck) to large towns (Bamenda and outside the Province).

Given the remoteness of Bui, and the poor condition of the roads, it's not surprising that farmgate maize prices are low. However, in most years there is a definite seasonal price trend that follows the maize production cycle. Prices are lowest (20 to 40 CFA per kg of shelled maize) shortly after harvest (to allow time for drying), or from October through the end of the year. Prices begin to climb in February and peak in June/July (often as high as 100 CFA/kg or more).

However, 1987/88 was exceptional. Maize production in 1987 was higher than usual, following the timely arrival and increased use of fertilizer and the extensive adoption of the COCA variety, that is very productive in zones below 1600 m.a.s.l.. There may also have been a decrease in demand for maize in the wake of the current economic recession in Cameroon. As a result, maize prices, which started at 20 CFA in October 1987, never rose above 35 CFA in 1988.

Foodcrop marketing in Bui, as in the whole Province, is informal. Farmers sell independently, and are at the mercy of traders who dictate the buying price. Imperfect knowledge, lack of efficient means of transporting produce and the absence of effective foodcrop cooperatives leave the farmers vulnerable to market forces completely beyond their control. [It would be useful to study the current foodcrop marketing mechanism to determine whether traders' marketing margins are in line with marketing costs, and whether they collude in fixing prices (effecting a quasi-monopsony).]

Potatoes (Solanum tuberosum):

First season potatoes are planted by the women at anytime between December and March in the dry soil of the ridges. [Land clearing and preparation are described above under maize.] Whereas maize is planted in rows on the edges of the ridges, potatoes are planted in the middle of the ridge in a seemingly random pattern. Of course, the farmer weeds the potatoes at the same time as the maize and beans in the intercrop, in April and May. The potatoes are harvested, by women sometimes assisted by men, in June/July (late potatoes in December). They are pulled out of the ground by hand, laid on the ground under the raised drying platform ("Wuchum") and covered with grass. Rough estimates of yields run from 2 to 3 tonnes per hectare.

After about 1 month, the potatoes are transported by head, hand-truck or vehicle to the compound, where they are stored on the floor of a dark room in the house. In a few villages, MIDENO has constructed potato stores to permit farmers to hold their potatoes and receive a better price later for their produce (e.g., 6 months after harvest).

Potatoes are grown twice a year. The second (dry) season crop is planted as early as August and as late as October. In many cases, potatoes are double-cropped on the same field. In others, they are planted on a field that was either left fallow in the first season, or planted to maize and beans. The late season potatoes are usually intercropped with beans. - Potatoes are also commonly seen under coffee in the dry season, intercropped with beans.

As with maize, potato seed is selected in the store. Small healthy looking tubers with at least 2 eyes are selected. This method does not allow the farmer to screen for diseased seed. In fact, the prevalence of bacterial wilt and late blight (Phytophtera infestans) observed in the field, and the farmers' avowed ignorance of control techniques, confirmed our suspicion that farmers are unknowingly propagating the diseases. Farmers observed that seed from the first season harvest produced a better crop than seed from the late crop.

Besides the disease problem, we observed black ants in large numbers on the potato plants, apparently cutting leaves at their base. No aphids were observed. Cricket damage in young plants was also reported. In storage, tuber rots and boring insects are the two most common problems.

The farmers we met distinguish 2 varieties of Irish potatoes: the relatively new "Madam" (white skin, spherical tubers) and the original "Tuh-Nan/Oku" (long narrow tubers). Another variety was noted by farmers in Vekuvi Quarter (Nkar Village) during earlier visits by 2 members of the team: "Kijam".

End-use: Farmers grow potatoes for consumption and sale, but mainly for sale. During harvest season, the roadsides in Bui Division are lined with women and children selling potatoes in kerosene tins. Traders come to buy potatoes in jute bags packed to overflowing with a white cap over the top to retain the overflow (~125 kg). Typical prices at harvest are 250 to 500 CFA per tin (12-18 kg) and 5000 CFA per bag.

Beans (*Phaseolus vulgaris*):

Beans are always intercropped with maize or maize plus potatoes in the rainy season. First season beans are planted at the same time as maize. They are planted by women, men and children within the maize rows on both sides of the ridges and among the potatoes in the middle of the ridge. Planting densities appear to be low (20,000-60,000 per ha). As with potatoes, farmers double-crop beans. The 2nd season crop is usually intercropped with potatoes or sole-cropped.

Farmers identify 4 varieties of beans: Spotted (bush/ determinate), red (semi-climbing/semi-determinate), white (climbing) and black. The most common are spotted and red. None of the farmers noted any negative effects of climbing beans on the associated crops.

Beans presumably benefit from the fertilizer applied to the maize in the intercrop. They are harvested in June/July (late beans in November), before the potatoes. The vines are pulled up and hung to dry on the drying platform under the roof or under the raised floor. After a month or so, they are shelled and carried in bags to the compound for storage (in the bags) or sale. Seed for the next cropping season are left in the vine, hanging in the "Wuchum". If the farm is close to the compound, the vines are taken directly from the field and stacked in drying racks against the back and side walls of the house.

Mean yields are low (between 400 and 600 kg/ha). The rainy season crop yields more than the dry season crop. Farmers complained of some disease problems not identified by the team. Another reported pest is chickens that eat the bean flowers. Because of the latter, beans are often not planted on farms near compounds where chickens are free roaming.

End-use: Like potatoes beans are grown for home consumption and sale; with increasing emphasis on sales, because of the deficiencies in the coffee market. Immediately after harvest, beans are sold for between 1000 and 1300 CFA per bucket (~15 kg).

Prices rise as the harvest date recedes, peaking at 2000 to 3000 CFA per bucket in April/May.

Other Foodcrops:

A number of other crops are planted on the foodcrop farms. Among the more important are:

- Huckleberry (Solanum nigrum): grown as a sole crop on small areas of the farm, usually near a stream or water (irrigation) source in the dry season; and, used as a spinach-like vegetable to be eaten with fufu-corn, or sold in the village market.

- Cocoyam (Colocasia esculenta): Originally, almost as important a food crop for the Nso/Oku as maize. Older farmers (60 to 70 years of age) remember cocoyams being as vital an element in their diet, when they were children, as maize. One actually expressed preference for cocoyam over fufu-corn. Apparently, as the original forest was felled, and the soil fertility began to decline, cocoyams, which demand fertile soil conditions, became less and less important in the crop association and the diet of the people. Now, colocasia are only seen at low densities; especially on the borders of fields.

- Cowpeas (Vigna unguiculata): Cowpeas are found in some fields in place of beans. Once in a while, they can be seen planted sole on small plots in the dry season. Although highly esteemed in the diet; insect and disease problems evidently limit production. The beans are used to prepare "Kokey" (a spongy like pudding often prepared with dried fish). [In fact, cowpeas are called "Kokey beans".] Additionally, the leaves are harvested, dried, and used to prepare a "dry season" soup. Therefore, despite frequent crop failures in which no beans are produced, the farmer is at least able to derive some benefit from the crop by harvesting the leaves.

- Soybeans (Glycine max): This is a new crop, introduced by the soybean project of the "Projet Haut-Plateau" in the West Province in the last 10 years. At this stage, a minority of farmers grow soybeans. The people who originally distributed the seed, promised to return to buy the harvest. However, in most cases, the promises were not kept. Farmers, nevertheless, have continued to grow soybeans, with encouragement from the soybean project operating out of Bamenda, and PAFSAT. Soybeans are regarded as a cash crop, although some farmers are learning to eat them. Soybeans are also being promoted as a soil improving component in the crop rotation.

- Miscellaneous Crops: Other crops observed in the foodcrop system include yams (Dioscorea dumetorum), cassava (Manihot esculenta), egusi (citrullus lanatus), sweet potatoes (Ipomoea batatas), sugar cane (Saccharum officinerum), banana (Musa spp.), wheat (Aestivum trit.cum) and a variety of garden vegetables (peppers,

tomatoes, cabbage, carrots, etc.). Small compound farms typically contain tree crops (avocado, oranges and kolanut), bananas, coffee and vegetables.

4.1.3 Cash Crops

Coffee (*Coffea arabica*):

Coffee has been the principle cash crop in Bui for decades. Most of the coffee plantations observed date from more than 20 years ago. Recently, the government (PDA) has been sponsoring a coffee regeneration program, promoting the replacement of the old plantations with a new variety (Java). However, farmers complain that promised financing for those participating in the program has not been forthcoming. Many farmers are hesitating to cut down the old plantations, despite their age, diminishing productivity and severe disease incidence.

Coffee is planted in a nursery, usually in polyethylene bags; followed by transplanting in the farm at about 2.5 x 2.5 m spacing. Shading is provided by trees, including avocado (*Persea americana*) and kolanut (*Kola spp.*). As the plants come into production (3 years), management entails weeding (done by women and men), pruning (done by men with guidance from the MINAGRI extension staff) and fertilizer application (by men). Pruning and fertilizer application are both carried out in September/October. Fertilizer is applied as a ring around the stem, normally at very low rates (less than 100 kg 20-10-10 per ha). Harvest is done by hand by men and women in November/December. The berries are harvested, pulped, fermented, washed and sun-dried on mats or on the bare soil.

It is not uncommon to see potatoes and beans under the coffee trees. Even maize stalks were seen in coffee plantations, although maize yields were very low, as might be expected with all the shading from the coffee and trees. Bananas are also planted in coffee plantations.

The chief production problem cited by farmers is coffee berry disease (Anthracnose). The team observed heavily infested farms with as many as half the berries discolored brown and black. Farmers claim that fungicides presently recommended by the MINAGRI extension service (e.g., SANDOZ-DACOB) are ineffective. The Village Extension Workers concurred with this assessment.

Coffee is strictly a cash crop. The dried beans are delivered in jute bags to the local cooperative store on consignment in December/January. Payment is expected shortly after delivery; but in recent years has been delayed by as much as one year, forcing farmers to seek other revenue sources (e.g., foodcrops).

Eucalyptus (*Eucalyptus globulus*):

Eucalyptus was introduced into the area as a forest species by Europeans, perhaps 50 years ago. As the original forest was cut down, Eucalyptus was planted to provide a fast growing tree for firewood and lumber. Presently, it is virtually the only forest tree throughout most of the Bui highlands. For many,

Eucalyptus is a secondary cash crop.

Eucalyptus is seeded in a nursery and transplanted after 2 months. It is either planted in solid plantations or along the borders of other fields. Planting distances are extremely variable, ranging from 0.5 to 3 meters between trees. There is apparently very little management of the plantations, except for selective harvesting to provide poles of specified characteristics or to thin out the stand to allow the remaining trees to more fully develop.

Eucalyptus is an extremely hardy species. There were no observed or farmer-noted production problems. However, farmers did indicate that crops grown near eucalyptus stands did poorly. The root system is extensive and quickly depletes the soil of nutrients. It may also exude substances antagonistic to other species. [The ground beneath a eucalyptus stand is usually bare of other plants.] Nevertheless, one farmer said that after clearing a eucalyptus plantation, the land is very fertile.

Eucalyptus is used by farmers for firewood, roofing poles and lumber. The leaves are used by some to repel weevils in the maize storage box. Eucalyptus is sold as roofing poles, lumber and electric power-line poles (SONEL). Farmers were encouraged to plant it in hopes of a ready market for poles. However, market demand has not lived up to expectations.

Raphia Palm (Raphia hookeri):

Raphia palm groves are found in wet bottom lands and along the banks of streams. It is strictly a man's crop. Most groves are decades old. Management involves tapping wine from the base of individual canes, followed by cutting of the cane.

The palm wine is harvested for consumption, use in traditional ceremonies (death celebrations, marriages, etc.) and for sale. It's not uncommon for a farmer to tap 5 liters per day from a grove. Besides the wine, raphia palm provides bamboos used in construction of the maize storage box, the "banda" (kitchen loft), animal housing (for chickens, rabbits, etc.), fencing, etc.. The leaves (fronds) are also used for thatched roofs.

4.1.4 LIVESTOCK

Cattle

The Nso native population, in general, is not familiar with cattle rearing practices. Their experience derives from positive contacts with the Fulani. Consequently, most if not all of their management practices are close to those of the Fulani who are cattle graziers by tradition. For the Nso people, cattle are a long term investment, used to meet large expenditure needs.

Initially, Nso natives started as "Gynako" (Cowboys) within the Fulani community whereby they built up their own herds progressively. Presently, some are directly buying small herds (40-50 animals) so as to go into the business. Preferred breeds are white Fulani (meat), Gudali (milk) and Fulani x Gudali crossbreeds. Herd sizes vary from 10 to 120 animals.

The day-to-day management of the animals (feeding, breeding, transhumance, etc.) is carried out by a "Gynako", who is hired and paid according to Fulani tradition [i.e., 8000 to 15000 frs CFA per month (or one cow every five months), including free food, clothing and housing]. The Gynako lives in a fenced compound within the animals' sleeping paddock, where he can grow food crops for his personal use. A Gynako is generally a fulani, although more and more Nso natives are being hired.

The cattle owners are mostly concerned with the availability of grazing land, fencing, the total herd size, sales and routine contacts with extension staff (MINEPIA). The owners do not stay with the animals in the grazing area, as do the fulani. Instead, they live in the village and visit their herds once or twice a week.

Cattle owned by both Fulani and Nso natives graze on communal grazing land where pasture management is rarely practiced. However, dry season burning of grazing lands in areas surrounding the Gynako's residence is practiced. This is done to kill ticks and parasites and also to stimulate regrowth.

Because of an increase in diseases, thieves and the extra costs for bonuses to caretakers, the transhumance phenomenon to Mbaw, Sabungari and Lassin plains is becoming less popular among cattle graziers. The tendency has been to maintain animals on the same pasture year-round, and only move them from time to time to valleys, near streams and springs where fresh grass (mostly Elephant grass) is abundant during dry season. Salt is provided on a regular basis (once or twice a month).

Sporobolus africanus, Pennisetum clandestinum (kikuyu grass) and "Nseuh" (in the Nso dialect) are the predominant grass species found in the grazing lands. However, the invasion of grazing lands by Bracken fern (Pteridium aquilium) is a persistent problem, as bush fire is being routinely applied. There is a growing interest in the use of guatamala grass (Tripsacum Laxum) as a dry season fodder grass.

Breeding is done naturally. There are about 2 to 5 bulls per 30 cows. Cows in heat are easily mounted at the beginning of the rainy season when fresh grass is abundant. This explains the occurrence of most calvings in early dry season. Bull exchanges are a common practice among graziers. Calving rate was reported to be satisfactory but only about 50% of the calves reach weaning age. Excess young males are castrated for fattening (steers). The Fulani breed is preferred for fast growth.

Local cattle markets are available where animals are sold on the hoof to butchers. Prices are highest in dry season (90,000 frs CFA/bull). However, prices are considerably lower than they were in previous years (i.e., 110,000 frs CFA). Culling and selling is done for unproductive or old animals (a bull will perform from the age of 4 to 9 years before being sold). In general, many sales (about 10% of herd size yearly) are transacted when the graziers urgently need cash, especially for school fees, marriage of a son or daughter, salary for the Gynako etc.. There is no organized milk market for the Nso graziers. Thus many of them use milk for home consumption (fresh boiled milk, cheese, and butter).

An extremely limited veterinary service and drugs unavailability are both serious constraints to cattlemen. Vaccinations are carried out by MINEPIA staff once or twice a year, usually before transhumance. Prevalent diseases encountered include the following: Black quarter ("Laba"), Rinderpest ("Pettu"), foot and mouth disease, Babesiosis ("Pial"), streptothricosis ("Ngunya"), Diarrhoea ("samore"), Ticks infestation ("Kotti"), Heart water ("Carru") and heifer sterility problems.

Goats and Sheep

Most Nso graziers prefer to keep goats (Dwarf forest goat) while the Fulani graziers prefer to keep sheep (Fulani ouda, Dwarf sheep). Goats are used to satisfy inconveniently timed cash needs and also for traditional ceremonies. Sheep are kept alongside or separately in small units mostly for sale during Moslem religious feasts when demand is highest. In the present section, only goat rearing systems will be discussed.

Goat farming is generally not a planned activity. A farmer starts by buying one or two animals which are daily tethered. As time goes by, depending on prolificity (1-2 kids/year) and survival rate (low in rainy season), the farmer may get up to 10 animals. As this population increases (between 10 to 20) the farmer will build night paddocks (fenced enclosures) including a roofed shelter (3x2.5m2), but will continue to tether the animals outside the sleeping paddock where fresh grass is found in dry season.

In Oku village it was traditional to keep goats in the Oku mountain forest (it is now prohibited). One farmer was able to keep hundreds of goats considering the little attention given in feeding. In other locations where grazing paddocks are provided, the main grass species encountered are Njii (Melenis Mintiflora), Imperata cylindrica, kikuyu grass, "shii bank" (in Nso dialect) and Bracken fern. Animals are supplemented during dry season with some ground corn and salt. The feeding troughs are made of carved wood. Farmers found that salt increases the goat's appetite for hay. Guatemala grass is being adopted by many farmers as a dry season fodder for their goats. Goat transhumance was noticed on a small scale from hill slope to valleys where fresh grass is easily found. In this respect, goats are tethered during the day (from 8.00 am) and taken back to sleeping paddocks at night (5.00 pm). Labor involved is family: father and sons mostly.

Inbreeding is routinely practiced and the number of bucks in a herd is not dependent on a desired male:female ratio, but is conditioned by the timing of expenditures that require the sale of goats (e.g., school fees, Xmas time, medical services, cry-dies, ceremonies, etc.). Few male goats, not intended for breeding, are castrated so as to eliminate their repulsive odor when cooked.

Goats are easily sold on the hoof in local markets. Prices range from 5000 to 13000 frs, while sheep sell for 4000 to 10000 frs CFA.

Among the many constraints reported on goat rearing are the following:

- Diseases ("Peste de Petits Ruminants" or PPR, and diarrhoea).
- Thieves
- Predators such as dogs and Baboons (Oku Mountain)
- Lack of drugs
- Lack of permanent fencing materials.
- Lack of feed for the dry season period.

The laxity of goat owners in tethering or enclosing their goats has provoked the wrath of crop farmers. Goats left loose not only damage crops, but also dirty community buildings and disturb vehicle movements on the roads. In Oku, the problem of stray animals can be expected to intensify as the Government has banned forest browsing.

Pigs

Pigs are primarily kept for cash when the need arises; although some farmers are going commercial by fattening piglets to market weight, or by breeding sows so as to sell weaners. Large white and Bershire were the most common breeds found. Herd size varies from 2 to 12, with an average of 9 pigs per farm.

The housing system is more or less uniform throughout the zone, with a sun/rain shelter in each piggery pen covering 1/4 or 1/3 of the surface area. Pen size varies from 6 to 10m2 and might contain up to 6 growers or a maternity made up of a sow and up to 10 piglets. The floor is either suspended (eucalyptus plank) stony (with packed stones) or just earth. Eucalyptus poles are the main fencing material.

Feeding is poorly managed, a hodgepodge combining concentrates (SPC) and grasses (kikuyu, "kembis and kintohton" in the Nso dialect). Due to the high cost of pig concentrates, farmers often substitute with rice bran and ground corn. Burnt cow bones are ground and given from time to time. In addition, fruits (avocados), cooked cocoyam corms, and other crop and kitchen wastes (fufu chaff) are provided, when available. Except in the case of suspended pens, a single utensil (pot) is used as feeder and drinker. Pigs are fed once a day and grass freely provided when available. Feeder types observed were of carved wood or a fufu pan/tray. Grass is thrown on the pen floor. Generally there is much feed wastage.

One boar is usually maintained by those farmers who raise weaners for sale, because they are costly to feed and maintain. Average litter size is 9 (6-12) and the number weaned averages 8 (6-11). The success in pre-weaning survivability (90%) is followed by a poor growth pattern (approx. 20 kg in 5 months). Poorly managed feeding is the main contributory factor, coupled with the unavailability of drugs for de-worming and iron injection. Swine diseases include dermatosis (crocro, jiggers) and anemia.

A weaned piglet (1 1/2 months old) is sold at 4000 frs CFA. Marketing is not a problem, but market price is low. Local consumption of pork is still low. Traders come to buy from Bafoussam and Yaounde. Purchase prices vary from 350 to 400 frs per kg live weight. Pig raising is a male-run enterprise. But labor is provided by the whole farm family.

Rabbits

In nearly all the Bui Villages visited, rabbits were being kept by young men (20-30 years old), mostly for cash, although home consumption is increasing for lack of a reliable market.

Herd size averages 25 rabbits: made up of New Zealand white, California and crossbreeds (gray, black, silver, etc.). Common housing practices encountered are bamboo cages (sometimes with wire floor), elevated above floor level (1-1.5m) and located either at the side or behind the farmer's residence. The use of drinkers is rare. The bottom of a margarine can or sardine tin is used as a feeder for fufu chaff. Farmers are reluctant to give water to rabbits because it "causes diarrhoea".

Rabbits are caged singly, except for lactating does and young weaners which are caged 4 or less in a cage. For breeding, females are taken to the male cage in the evening (4-5 P.M.), although a case of taking the male to the female cage was reported without breeding problem. Gestation period is about 31 days. A doe will kindle and wean on average 8 kids and 5 fryers, respectively. About 95% of the mortalities occurred during pre-weaning period (8 weeks). Many rabbitries lacked separated kindling boxes for expecting does. Hay was put at one corner of the doe's cage.

Rabbit concentrate/mash is not available locally. The main grain fed is corn provided in the form of "fufu chaff", or unshelled in the ear. Crop by-products and grass species fed included the following: "Foftah" (Black jack), mouse ear, banana leaf, "Kaya", Carrots and Cabbage leaves, kikuyu grass, elephant grass, sweet potato leaves, "Eghaw", "Nsahr", fig tree leaves and ripe whole bananas. Fresh grass is harvested by noon and fed in the evening or the next morning. One farmer in Kitiwum reported that lettuce caused diarrhoea and death. At the same time we learnt that African iodine ("kighavirl" in the Nso dialect) was an effective medicine against diarrhoea. Salt is provided from time to time.

An adult rabbit is sold at 2500-3000 frs CFA. Buyers are mostly schools and Europeans. Due to the lack of a profitable market, many farmers prefer to breed only few females. Many farmers expressed willingness to expand their rabbitry or to begin raising rabbits if the market was there. Many prefer rabbit meat to beef.

No medication is routinely provided although cases of coccidiosis among rabbits were reported by the Jakiri Veterinary school during a routine check up in the area.

Rabbit manure and left over forages are used to fertilize vegetable gardens.

Chickens

For the Nso people, the primary objective behind the keeping of chickens is for sacrifices (country fashion) and gifts for unexpected "important" guests. Chicken is also a secondary source of cash income to cover miscellaneous expenses.

Under traditional management practices the flock size is not fully known except for the cocks and brooding hens (5-20). Growing chickens are difficult to control, as they are not confined. The birds are allowed to range freely, scavenging for food. Little care is provided except during the first week of brooding, during the planting season (March-May), or when disease treatments are administered or the chickens are sold. At night, chickens roost along the wall of the kitchen or house, either on old boxes or maize storage boxes ("shah") or simply on stands made of bamboo sticks. Other birds, for security reasons, are forced to sleep in trees or on coffee plant branches.

Very little effort goes into the feeding of chickens. They are generally fed waste by-products of the household and cropping system. Fufu chaff is a commonly used feed, as well as rotten or weeviled corn. These are supplemented by insects and worms found by scratching in the soil around the compound.

In most backyards, it is common to see an exotic or related blood chicken. Farmers believe they give a plus in the performance of their local birds. Hens usually brood eggs in the compound farm (mostly in between banana stems). Suddenly, the farmer finds the hen moving about the compound with 5-15 chicks. Often the mother hen is caught and confined for 3 to 7 days to allow her chicks to develop strong legs, and also to minimize losses and competition with other backyard chickens. A hen can lay between 6 and 18 eggs, and hatchability varies from 80 to 90%. Survivability of chicks (2-3 months) is low (30 and 60%).

Apart from routine losses due to diarrhoea and predators, frequent epidemic diseases kill 70 to 80% of the flock at the onset of the rainy season (March-May) and just after maize harvest (September). Farmers could not explain why there is so little loss at other times. An adult cock sells at 1500 or 2000 frs CFA and 2500 to 3000 frs CFA at Xmas, depending on size. Female chickens are usually sold below 1500 frs CFA.

Few commercial poultry farmers were identified. These were mostly experienced farmers maintaining flocks of between 50 and 500 layers. They buy day-old chicks in July, so they can start collecting eggs in December when there is a high demand for small size eggs (a tray of 30 eggs sells for 1250 to 1300 frs CFA wholesale).

Chicks are either brooded in suspended bamboo houses or on deep sawdust litter using bush lamps (one lamp for 10-15 chicks). The birds are grown and reared in suspended bamboo floor houses. Routine vaccination is usually followed thanks to S.P.C. drugs. Nevertheless there are frequent disease outbreaks during the egg production stage. Cases of prolapsus and whitish or greenish diarrhoea were reported.

Egg production curves are typically sinusoidal with 3 to 4 peaks during the first year of hen productivity (10-12 months). Reasons attributed to this kind of egg production curve are numerous, among which disease outbreaks, poor feeding and poor follow-up. Feed supply from feed dealers is irregular and expensive because of high transportation costs. Farmer are then forced to switch over from layer mash to ground corn. Insufficient capital is available to buy feed stock for a 2 to 3 month

period. Drugs too are not available when farmers need them most. There is no O.V.P. office at Kumbo. And it is not feasible for farmers to obtain drugs and feed from Bamenda or Bafoussam. A farmer's records at Oku indicated a peak production of 80 to 90%, which dropped to about 10% in just 4 weeks.

In general, farmers are complaining about losses in their poultry enterprise, due to the high cost and irregular supply of feed and drugs. The future of poultry farming in the area is questionable if this situation is not put right. Farmers are ready to abandon the enterprise after selling the old layers at 1900-2000 frs CFA per bird. Day-old chicks reach the area at 450-500 frs CFA. We did not see a single farmer with replacement stocks. It is unfortunate for the poultry industry in Bui.

Other Livestock Species.

A few ducks, guinea pigs, horses and donkeys were noted on the mixed farmers' farms. However, they appear to be of minor importance as livestock and poultry enterprises.

4.2 The Grazier Farming System

4.2.1 General Characteristics

Livestock activities in the Bui Highlands involve cattle raising primarily. Secondary to this are sheep, goats, horses, and poultry. There is a striking homogeneity of husbandry practices. This is parallel to the homogeneity of the population group involved. Livestock is the prime activity of the Fulanis. Recently, natives have increasingly been moving into this activity. However, it remains secondary to cropping. They hire Fulani and some non-Fulani herders to take care of their cattle.

The Fulani graziers within a particular block tend to be members of the same extended family or clan, and the Ardo is their most senior/or respected member. A majority of Fulani graziers acquire cattle beginning from a very young age, even from the time of birth. Cattle are usually offered to Fulani children when they marry. The male children usually receive more cattle than the female, and later on in life if the father thinks that his son will grow up to be a responsible man, more cattle are added to his herd. Some Fulani acquire cattle by working as herdsmen to other Fulanis. They are called "gynako". They may receive cattle as payment instead of cash. When they have assembled enough cattle to establish themselves, they then quit their "masters".

Each grazier is granted a specific grazing area surrounding his compound or "ruga" but the rest of the grazing block is reserved for open grazing. As long as graziers do not trespass upon the grazing area around the rugas, they are free to graze their cattle anywhere on the common pasture. However, the situation is fast changing as more and more Fulanis are already obtaining land title for the grazing lands which they occupy.

The Fulani herd size is difficult to determine but it may range from 20 to 700, with the Ardos usually having the largest numbers. They hire gynakos to care for the herd. The children

also help in keeping the herd. During transhumance to dry season grazing areas (15-50 km from the permanent ruga), the Fulani graziers periodically pay them a visit and inspect the cattle. Food, money and clothing are brought along to the herdsmen.

There is an underlying desire by Fulani graziers to incorporate new technology into their production system as long as this offers substantial improvements over traditional methods. The Fulani graziers usually raise small ruminants (sheep, goats) horses, and chickens. Goats are raised almost exclusively for cash needs. Sheep are raised for cash needs and meat for household consumption.

Most Fulanis own small crop farms around their compounds, the crops mostly found being maize, beans, huckleberry, and Irish (Solanum) potato. The Fulani graziers usually fence their crop farming area which was normally the area occupied by a former night paddock. The increase in food crop farming by the Fulanis has apparently created discontent among native crop farmers who formerly sold their food crops to them.

Crops: It is only in the last 30 years or so that the Fulani people began to grow crops, and now the practice is almost universal. Prior to that, their diet was possibly more meat and milk dominated, and other food starches and vegetables were purchased from the Banso people. Now, however, food crops are grown for subsistence purposes only, not for sale (although one or two cases of Fulanis selling potatoes were found.) This has reduced their dependence on the Banso people for their food supply, and consequently reduced their need for cash per se . At first the Fulanis hired the native population to work their farms for them as they did not know about cultivation. Recently, they have even begun to carry out some of operations themselves, as they have learned the art of growing food crops. A few have started to grow coffee and other tree crops as well.

The expansion of the farming system to include crops is most probably linked to the Fulanis becoming more and more sedentary over the last two generations or so. It is also possible that declining herd sizes have constrained the graziers into looking for some means of reducing expenditure, and the cost of hired labor per unit of foodcrops grown is far cheaper than the market price of the same foodstuffs. Whatever the reasons, there is now a clear cropping sub-system within the overall Fulani farming system, and this is described is the next section.

There was a considerable homogeneity in the range of crops being grown on the Fulani farms. Maize was predominant, followed by potatoes, beans and huckleberry. Cocoyams, vegetables, bananas and plantains were minor crops, but still quite common. Apart from these, no other crops were observed, reflecting the preferred diet of the Fulani people, as all foodcrops were grown solely for household consumption.

The only crop grown solely for cash was coffee, a recent addition on a minority of farms.

The cultural practices very largely followed those of the Banso mixed farming system, (as described in section 4.1.1) from which the labor was drawn. Land clearing and tilling into ridges

was done by hired labor; on some farms the ridges were larger than average, with flat tops for the growing of huckleberry, it seemed. Planting was carried out by the family at the beginning of the rains, and repeated for the second cycle crops towards the end of the wet season (around September). One farm had been re-ridged whilst 1st cycle maize was still standing, leaving the plants stranded in the new furrows! First cycle associations were based on maize, beans and potatoes. Maize was spaced at around 60cms x 30cms. The planting arrangement seen in the field (during the second growing season) was commonly as follows:

```
--B---B---B---B---B---B---B---B--      B = Beans
     P     H      H     P              P = Potatoes
 H      P      P     P                 H = Huckleberry
     H      H      H      H
        P         P
  P      H    P  H        P        Ridge direction>>>
--B---B---B---B---B---B---B---B--
```

Weeding was carried out one or two times by hired labor mainly, with the family returning to work on the farm at harvest time. Wages paid to hired labor were cited at around 20,000 CFA to clear and ridge half a hectare, and 10,000 to weed the same area. Pests and diseases affecting crops included stem borers in growing maize, some weevils in harvested maize and beans, potato rot, and some damage from chickens and sheep. Coffee was affected by coffee berry disease, which reduced the yield of one farmer from 3 bags from 0.2 ha (300 stems), to only one bag. Coffee was sold by the tin to Banso farmers, at a price of around 3000 f CFA per tin.

Yields of the foodcrops could not be estimated. However, it was gleaned that one farm of 3/4 ha produced enough food to feed 5 adults and 10 children, and another of 1 1/2 ha provided for a compound of 30 people, both for a whole year.

At harvest, maize was de-husked and stored in Donga-Mantung type barns, on the farm itself or in the compound, and in kitchen ceilings ("bandas"). No insecticides were used, but the incidence of weevils was not widespread, probably because of the isolation of the Fulani farms from those of the Banso people lower down in the cropping areas. Potatoes were stored in the houses but eaten fairly quickly due to rotting. Longer periods of storage were achieved by one farmer through burying the potatoes in a pit and covering then with soil and grass. Beans were dried, removed from the pod and stored in calabashes (gourds) or in sacks. Cocoyams, bananas and plantains were harvested when required. Planting material was selected from the previous harvest.

The end-use of these products was almost entirely domestic consumption. Corn is eaten as fufu, along with vegetables or meat, as the staple dish. The sauce is normally cooked in butter, rather than oil. The preferred dishes after fufu are beans, potatoes and then cocoyams.

Almost all the Fulani farms visited were located within the boundary fence of the compound. These fences were partly live, partly wood or bamboo, and had to be animal-resistant. Farm sizes varied between 1/4 and 1 1/2 ha, with small areas of

permanent crops such as coffee, plantains/bananas, and fruit trees. Three means of maintaining soil fertility were observed:

1) The farm was worked continually for 7-10 years, and then moved around to another side of the compound, usually where the night-paddock for the cattle formerly was. Thus soils were very rich on the site of the new farm, and the old farm was enclosed to become the night paddock for the following years.

2) An annual rotation was commonly practiced as well. Once all dry season crops were harvested, cows were allowed to come and graze on the farm land for around a month. They consumed all the remaining crop residues, which removed the need for clearing before the next planting season, and fertilized the soil with their manure. One Fulani man claimed that this method resulted in consistently higher yields than a Banso farmer.

3) A third practice seen around Mbiame was to ensure that where the cultivated section of the compound was on a slope, the night paddock for the cattle should be located directly uphill from it. Then channels were cut to direct the surface run-off rain water from the paddock into the farm, washing the manure down with it. The water was diverted into the furrows between the ridges in turn. This primitive irrigation is an excellent example of positive interaction between the livestock and cropping sub-systems of the main grazier farming system.

4.2.2 Livestock Practices

Cattle

Breeds and breeding: There are 3 main breeds of cattle in the Bui highlands: The Red Fulani (RF), the White Fulani (WF) or Aku and a few Gudali (G) breed. Additionally there are crosses from these breeds (RFxWF; RFxG; GxWF). Gudali, Red Fulani and crosses of these 2 breeds are preferred to WF for their larger size and relative resistance to dry season stress. However, the WF seem to be more resistant to diseases. These breeds are all mixed in herds with sizes varying from 30 to 70 animals per herd. There are one or two breeding bulls per herd. Young bulls (3-4 years old) with no breeding potential are castrated.

The Fulani graziers are apparently knowledgeable about the selection of breeding bulls. Factors such as physical fitness, parental traits (e.g., size and growth rate of the progeny, milk yield of the dam, etc.) are considered when selecting the breeding bull. However, success is limited by the high incidence of inbreeding.

Although there is an expressed preference for calving at the beginning of the rainy season (May), breeding is not controlled and is spread throughout the year. Age at 1st calving is 3-4 years. Breeding cows calve once every two years. The delay between calving is primarily due to a long calving-to-conception interval (1 year). Calves are self weaned at about 1 year of age. If weaning does not occur, the Fulani may intervene for the purpose of inducing resumption of oestrus by the cow. It is believed that continuous calf suckling prevents the bull from

mounting the cow or causes refusal of the cow to accept the bull.

Lactation period for milking cows varies from 7 to 12 months. It is considerably reduced in the dry season as a result of feed scarcity and environmental stresses. Calving rate is about 70 - 80% and calf mortality rate is 20 to 50%. Long calving intervals, low milk yield and high calf mortality can be partly explained by the milk offtake for human consumption, as it affects reproduction rate in 3 ways:

1) Slow growth rate of calf, hence late puberty and age at first calving. This is also exacerbated by post weaning nutritional stress.

2) Lactational anestrus may partly explain the long calving intervals of 2 years.

3) Milk restriction may also be a factor in calf mortality rate.

Housing and feeding: Contrary to the native graziers who live in the village area and visit their cattle from time to time, Fulani graziers live close to their animals. They are part of their everyday life. Most families are settled on hills earlier occupied by their parents or grand-parents. They themselves believe they own the land they occupy now and are not ready to move or reduce their grazing area. Their compounds are usually large (more than 2 ha), usually with a well-fenced cropping area where food crops are grown. Around the compound is a sleeping paddock where animals are brought every evening. Some Fulanis make use of this sleeping paddock for crop cultivation later on as during their night stay, cattle drop manure continuously, thereby fertilizing the soil.

Feeding is related to season. Transhumance is commonly practiced in the dry season (December - April) when good pastures and water sources are scarce. Prior to going on transhumance, the herd is split: lactating cows and their calves are left to graze on the remaining grasses from the rainy season. The lactating cows will also provide milk for family consumption. The remaining herd is taken down to the plains or valleys some 15 to 50 km away (Mbaw, Lassin). Despite the common practice of transhumance by graziers, there is a willingness to limit it, provided that there is alternative feed supply for the dry season. Concerns expressed against transhumance were accidental death of cattle, diseases and theft.

In the rainy season (April - November), feed is less of a problem as water is available and grasses are abundant. The main grass species on the pastures is Sporobolus africanus. Near the compounds where cattle spend the night, kikuyu grass (Pennisetum clandestinum) is abundant. Little is done to improve pastures. Half of the grazing area is invaded by bracken fern and shrubs throughout the year. As a consequence, total grazing area is decreased, resulting in a high stocking rate. Pastures are burned off at the end of the dry season to kill ticks and other parasites, and to encourage regrowth of fresh grass.

Supplemental feeding is limited to salt. Salt lick structures are built near streams as animals can readily drink

after licking salt. Salt ration varies with season. The rate is 3-4 kg/herd/week in the rainy season and a little over 5 kg in the dry season. Salt is believed to increase the animal's appetite and consequently result in increased weight gain. Changes towards new feeding practices have consisted of Guatemala grass planting for cut and carry feeding in the dry season. Although this perennial grass has done well and has gained popularity among the graziers, one set back to its intensive cultivation has been a lack of fencing to prevent cattle from invading the planted area. Invasion of Guatemala planted areas by cattle results in destruction and slow regrowth of the plant.

Calf rearing: Calving is distributed throughout the year, From birth to one month of age, calves are left with dams throughout the day and separated from their mothers at night. From one to 2 months of age. calves are permanently restrained. Restriction of the calf during this period is to prevent the calf from being too wild and also to prevent it from sucking the dam at night so that milk is available in the morning for family consumption. There are usually two de-wormings at one and two weeks of age.

After the second month, the calf joins the herd during the day but is still restrained at night until it is 4 months old. Self weaning occurs at approximately 11 to 12 months of age.

Health: One of the main constraints in cattle production encountered by the graziers in the Bui highlands is the quasi-absence of Veterinary services and drugs, despite their willingness to pay for such services. They allege that most of the diseases affecting their cattle are acquired from Aku cattle during transhumance. The major diseases observed in the system are (with local names):

Babesiosis	"Pial"
Blackquarter	"Laba"
Diarrhoea	"Samore"
Foot and mouth disease	"Mbooru"
Heart water	"Carru"
Rinder pest	"Pattu"
Streptothicosis	"Ngunya"

Ticks and tick-borne diseases are common in the dry season. Deticking is done by hand as often as possible either when cattle are brought back in the evening or in the early morning before they are sent out. Vaccination on the entire herd is done once a year prior to going on transhumance.

End-use: Cattle are sold generally between August and September to pay school fees. They are sold along with goats and sheep during celebrations (Moslem holidays, Christmas, New Years), when demand is highest. Sales of goats and sheep may be made occasionally to purchase food for household consumption.

Cattle serve also as gifts to family members on special occasion such as birth and marriage. The head of the family may also give one or more cows to his children as building stock for a future herd.

Slaughtering cattle for household consumption is rare and

will only occur on special events. Instead, sheep are frequently slaughtered for family consumption. It is eaten fresh. Extra meat may be dried or smoked for future use.

Milk is consumed daily within the Fulani household. Women and/or children milk cows every morning before they are sent out to pasture. Milk is consumed alone or with boiled tea. Fulanis in the Bui Highlands do not milk sheep and goats. When extra milk is available, they make cream and butter which are used for cooking. Cream is obtained by keeping fresh milk for two days in cold environment. This allows the cream to rise, and it is then collected from the surface and the milk is discarded???. Milk is obtained for family consumption exclusively. The Fulani graziers do not sell milk. The reason may be two fold:

1) low yield of local breeds (less than 1 litre/cow/day)
2) lack of market for milk because most Nso natives do not consume milk.

Sheep and Goats

Sheep and goats are secondary to cattle among the Fulani graziers. Herd size varies between 10 and 80 animals with the largest number in favor of sheep. Among the herd, there are 2 to 3 breeding bucks. Factors such as testicle size, twinning in the breeding line and growth rate affect selection of the breeding stock. There are two main breeding seasons for sheep (May and October) and consequently 2 lambing periods. The graziers expressed a clear preference for the May lambing as it falls within the rainy season when grasses are abundant. The flock is kept around the compounds or left to wander in the pasture alongside the cattle. Housing structures are sometimes built to keep them in at night. This practice is increasing because of a high incidence of losses due to stray dogs which occasionally devour the young animals. There is a limited incidence of health-related losses except for the recent outbreak of "Peste de Petits Ruminants (PPR)".

Horses

Most Fulani graziers raise horses. Herd size varies between 2 and 40 animals. They are mainly kept for transportation. As there is a very limited market for horses, Fulani sell their horses usually on demand. Therefore horse keeping represents more of a tradition than a lucrative activity. Common diseases are ticks and tick-related diseases. Like in the case of cattle, deticking is done by hand.

Poultry

Many graziers keep chickens. Fowl number per household ranges from 5 to 20. They provide eggs and occasionally meat for family consumption. They are also sold occasionally or offered as gifts to visitors.

5.0 INTERACTIONS BETWEEN CROP AND LIVESTOCK SYSTEMS.

Most of the interactions between the crop and livestock sub-systems of the mixed-farming system in the Bui Highlands can be characterized as negative. In all of the villages visited farmers emphasized the destruction of crops by animals. For their part, graziers complained of increasing encroachments by crop farmers on grazing land.

The Specific complaints raised in the general discussion group included the following:

- Destruction of food crops and coffee plants by goats, pigs, cattle and chickens.
- Many goat owners, particularly those who have only few goats, either refuse or are careless in tethering their animals, which are left free to roam about the village destroying crops.
- Animals owned and managed by men (husbands) are destroying the food crops cultivated by the women (wives). This is apparently a bone of contention between women and men, where the men are clearly culpable (evidenced by the men's unwillingness to defend their actions).
- Loose animals in the dry season preclude the cultivation of dry season crops (vegetables, potatoes and beans) and perennial crops (cassava, bananas) in certain areas (Tatum, Ngondzen).

There is no longer a clear demarcation between grazing and crop land as fencing has not been pushed through. This is due to a lack of cooperation between crop farmers and graziers to share fencing costs using local materials like bamboo, eucalyptus poles and others. Consequently, some crop farmers are planting crops on official grazing land, probably in search of more fertile soil. On the other hand, authorities (both traditional and administrative) are failing to enforce sanctions against the owners of animals who destroy crops or crop farmers who encroach on grazing lands.

A growing tendency towards mixed farming practices among farmers was observed. The Nso people already familiar with crop farming and small livestock rearing are now moving into cattle raising. At the same time, many Fulani graziers believe that cattle raising alone is no longer a viable alternative. Therefore, cropping activities are being carried out with the use of cow dung for fertilizer and Nso hired labor. Motives associated with this progressive shift from both types of specialized farming are as follows:

a) For the mixed farmers, the Fulani are foreign to the land. Previously, the Fulani were nomads, moving about with their cattle, and not regarded as competitors for land. Now, many if not all of them are settled, occupying large tracts of land in conjunction with their land-extensive style of cattle management. The feeling of the Nso/Oku is that they have lost control of the land at a time when they most need it to cope with increasing population pressure and declining soil fertility. One possible way to compete with the Fulani is to own cattle and gain access to grazing land. Whether or not those "conquered" lands will one day be

converted into cropping land can only be guessed at this point. However, as cattle owners, they are still paying the services of Gynako (mostly Fulani)) as caretakers. They know that keeping cattle is a way of saving for long term investment.

b) For the Fulani, land is becoming less and less available for extensive cattle management. As they settle down to secure full control on a given piece of land, they are also trying to minimize their dependence on Nso/Oku farmers for food crops by growing their own crops for subsistence, while still using Nso/Oku paid labor. Futhermore, problems of thieves, disease contamination and frequent losses within transhumance herds have given Fulani good cause to settle down and improve their management practices (Pasture improvement, use of feed supplements, vaccination, culling, etc.).

Both parties are feeling cheated, especially the natives. The farmer-grazier problem is primarily the result of a rapidly growing population and the consequent shortage of land. Furthermore, soil infertility and unavailability of inputs (fertilizers, improved seed/grass species..), poor pasture management, low market prices for foodcrops, a poor road infrastructure for easy marketing and Government inability to enforce existing rules and regulations contribute to the continuing and escalating conflicts between farmers and graziers.

On the positive side, a number of farmers have combined small livestock and poultry enterprises with vegetables and tree crops within the compound farm. The animals are fed crop products (fufu chaff, avocado, bananas, cocoyams, cabbages etc.), and in turn provide manure for the crops.

Crop by-products, such as corn stover, are used by some of the farmers to feed cattle and sheep. This is not widespread, as most graziers are not familiar with the practice. Other crop by-products such as bean leaves are left on the farm and consumed by cattle when brought in from pasture in the evenings.

Manure, gathered in the goat and sheep confinement structures, are used to fertilize soils where grain legumes and vegetables (lettuce, cabbage, carrot, huckleberry etc.) are cultivated. Rotation of the sleeping paddock for cattle allows an efficient use of cattle manure for crop cultivation as described above.Also, goat feces mixed with mud and rubbed on coffee plants prevent goats from stripping the bark.

Sheep, goats, and sometimes cattle are sold occasionally to purchase food for family consumption or other needed household goods.

A particular case of positive livestock-crop interactions is the PAFSAT oxen farming, which involves a complete integration of the two sub-systems. The cropping system benefits from labor saving animal traction and manure , while the oxen are fed from the crops (guatamala grass, crop residues etc.).

6.0 FARMERS' PROBLEMS, STRATEGIES AND KEY CONSTRAINTS TO DEVELOPMENT.

Farmers in the six villages of Bui Division were eager to share their problems with the survey team. The problems are presented in this report along with strategies and solutions attempted by some farmers. Key constraints to development, identified by the team, are also reported.

6.1 Crop Farmers

Crop farmers complained about the deterioration of soil fertility, unreliable distribution channels for farm inputs (especially fertilizer and pesticides), and low crop yields. Fertilizer was not available this year, resulting in a drastic decline in maize yields. The introduction of fertilizer in the past encouraged farmers to plant maize on poor land. When fertilizer is not available, yields on these marginal lands drop precipitously.

Poor marketing conditions, low prices and bad roads are sources of great concern to farmers. Some farmers move from village to village or to Kumbo town in search of high prices for their products. There is a tendency to minimize risk and insure a steady income by adopting mixed farming and planting new high value cash crops; thus diversifying the sources of revenue. Unfortunately, high value cash crops are usually more dependent on imported inputs. Farmers expressed a desire for an organized foodcrop marketing system.

It was reported that crop land is now inadequate with the rapidly growing human population. This situation further aggravates the traditional conflict between the Fulanis (Cattle herders) and the Bui Natives (crop farmers). Some Natives have even suggested relocating the Fulanis. A few are learning and applying intensive farming techniques in order to cope with the situation (e.g., PAFSAT farmers).

Problems of pre- and post-harvest crop destruction were also raised. Among the maize pests and diseases mentioned were: head and common smut; crickets and cutworms attacking young maize plants; destruction of older plants by stem-borers; ear rots in the field and on the drying platform; and, large losses of stored maize to weevils and rats.

Late blight (*Phytophtora infestans*) and bacterial wilt were the major diseases of potatoes reported during the survey. Crickets destroy potato seedlings, while black ants attack potato plants cutting leaves at their bases. The use of wood ash to prevent damage by these insects did not work. One farmer tried an insecticide called "Gamatol" with some success. Rotting potato tubers in storage is also a common grievance.

Bean flowers are eaten by straying chickens. Consequently, farmers don't grow beans near the living quarters. Late beans (planted in August/September) are susceptible to disease. Weevils cause significant post harvest losses.

Farmers who grow unconventional crops had their share of problems. This year's soybean crop failed for most farmers

participating in the soybean program. For vegetable farmers, cabbage was infested with aphids. A concoction of kerosine, soap, hot pepper and ginger is being used against aphids with mixed success. Banana, kolanut, orange and avocado trees, which represent substantial sources of income for farmers, are frequently affected by diseases.

Coffee, the major cash crop in the area, has become a source of more worry than cash to farmers. The berries have turned brown and black from coffee berry disease (anthracnose). Spraying with Sandoz - Dacob has proven ineffective. In addition, farmers did not receive payment for the small quantity of coffee they could harvest. With all these disappointments, farmers are reluctant to adopt the coffee regeneration scheme consisting of cutting down old trees and replacing them with the Java variety. Moreover, the Government has failed to make promised payments to those who participated in the program.

The planting of Eucalyptus trees on scarce fertile crop land did not bring the profit expected from SONEL, the National Electric Company, which uses the poles to support power lines. Farmers have planted too many trees for a very limited market. Furthermore, they are complaining that Eucalyptus is causing soil infertility. Some of them are suggesting the introduction of a more benign tree species.

Table 1 summarizes some of the causes and effects of problems raised by crop farmers, and attempted solutions.

6.2 Livestock Farmers

The general complaints of livestock owners center around the conflict with the crop farmers caused by land scarcity, lack of adequate veterinary services and unreliable distribution channels for veterinary products. The deficiency of drugs last year resulted in the loss of many goats and sheep to an epidemic disease. A few of them were saved by vaccination in areas affected last and close to local veterinary posts. In one village, the traditional healer tried unsuccessfully to treat the conditions by putting palm oil into the nostrils of affected animals. Goats are also attacked and eaten by stray dogs in most villages and baboons in the Oku forest. Catching straying dogs and killing them are the only solutions attempted by farmers.

It appears that no species of small animals raised in Bui Division is without problems. Commercial poultry production units using exotic breeds are also suffering from the inability of veterinary extension workers to provide adequate services. Large numbers of chickens died from a disease for lack of drugs. Individuals operating these units complain of a shortage of compounded poultry feed. Some farmers offered ground corn to layers with no success, because the feed was incomplete.

Lack of compounded feed and drugs was also the concern of one farmer who has just started raising pigs. The high cost of complete pig feed acquired from a distant market is making the operation unprofitable. Fish production, introduced by American Peace Crop Volunteers, is suffering from lack of technical support. One farmer reported that his fish are not reproducing despite all his management efforts.

Cattle, the most important animal for the Cameroon livestock industry and traditionally raised by Fulanis, are increasingly being introduced into the mixed farming systems of the Nso/Oku peoples. Black quarter, foot and mouth disease and ticks are the major cattle diseases in the area. These conditions are aggravated by the nomadism practiced by Aku herders, transhumance necessary in the dry season for most if not all cattle breeders and finally by the inability of veterinary extension workers to provide proper assistant.

Poor feeding also makes animals more susceptible to infectious diseases. Animals have access to Sporobolus pasture only, known for its poor nutritional quality. Feed supplementation consists of salt offered to animals to stimulate appetite. Poor feeding worsens with the scarcity of green forage in the dry season, and now with the decrease in designated grazing land forcing cattle mens to reduce the size of their herds.

Many deaths in the dry season are attributed to accidents occurring when animals fall in pits in search of green grass. Cattle theft is frequent in communal and transhumance grazing lands. Low productivity characterized by low calving rate, long calving interval of two years, low calf survival rate and poor growth is a reflection of poor husbandry practices. General herd management and systematic breeding and selection are lacking.

In fact management efforts and the strategies of cattlemen are directly related to their objectives. For the major livestock owners, cattle and goats are stores of value or savings. They should be sold as infrequently as possible and allowed to multiply with a minimum of management and investment. Unfortunately our rapidly changing world is imposing new realities on livestock owners forcing the most conservative among them to sell their animals more often in order to meet the rising need for cash. We are presently observing unusually low cattle prices caused by more cattle owners selling more cattle in the market (increased supply) to pay the higher school fees, coupled with reduced demand resulting from the financial crisis being experienced by the country as a whole.

TABLE 1: Problems raised by farmers and attempted solutions.

PROBLEMS	CAUSES	CONSEQUENCES	SOLUTIONS ATTEMPTED BY FARMERS	SUCCESSFUL OR NOT
Soil Infert-ility	- Over-use of soil -Lack of fertilizer - Planting of Eucalyptus trees	-Low soil fertility -Tendency to increase cultivated land area -Low crop yield -Failed attempt to grow soybean	- Incorp-oration of crop residues and weeds in soil - Fertilizer application when possible - Rotation of leguminous and non-leguminous crops	- Limited success - Yes - Yes
Unavailabi-lity of Fertilizer	- Faulty Regulation of fertilizer import -High fertilizer prices charged by local traders.	- Fertilizer not available on time. -Low crop yield (maize particularly)	- Contact Agricultural Extension worker. - Request for community development agent	- Limited success. - To be communi-cated to authorities.
Unavaila-bility of pesticides	- Faulty regulation of pesticide im-port - Imported pesticide not always appropriate	- Pre- and post-harvest crop destruc-tion	- Contact agricultural extension workers. - Request for community development agent	- Limited success - To be communicated to authori-ties.

PROBLEMS	CAUSES	CONSEQUENCES	SOLUTIONS ATTEMPTED BY FARMERS	SUCCESSFUL OR NOT
Low prices for agricultural products	- Sales of perishable goods in saturated local market - lack of means of transport to reach distant markets - Bad road conditions - Lack of roads	- Lack of incentive to produce more cash crops - low farm income - Children thrown out of school for lack of school fees	- Diversification of sources of income - Attempt to build road by raising money - Appeal to Government for reduced school fees - Appeal to Government for permit to export food crops - Handicrafts to supplement income - Honey production to supplement income - Delayed sale of products while waiting for higher prices.	- Relative success - Insufficient funds - To be communicated to authorities - " - Relative success - " - Failure
Land scarcity	- Increasing population pressure - Increasing cash needs - Inefficient land utilization	- Conflict between crop and livestock farmers - Land disputes in villages - Decreasing soil fertility - deforestation - Oxen farming inappropriate - Planting crops on Grazing land. - Reduced grazing land area	- Adoption of mixed farming by crop and livestock farmers - Reduction of herd size	- Tentative adoption of intensive farming with mistakes due to inexperience

PROBLEMS	CAUSES	CONSEQUENCES	SOLUTIONS ATTEMPTED BY FARMERS	SUCCESSFUL OR NOT
Crop damage by Goats, Sheep, Cattle, Pigs, and chickens	- Crop planted on grazing land - Animals not tethered by owners - Unconfined Animals due to lack of fencing materials - Inefficient enforcement of law re: straying animals, as a result of 2 legal systems	- Destruction of crops (Maize, Potatoes, Beans, and vegetables) [especially serious for late season crops] - Planting of late season crops is prevented - Damage to coffee by goats which eat the bark	- Farmers smear a mixture of goat dung and red clay on coffee stems - Use of live fences (sisal, Eucalyptus, etc.) - Confining goats in fenced areas - Filing goats teeth - Catching goats which destroy crops	-Limited success -Limited success Relative success - Not a serious measure - Not successful because it further aggravates conflicts.
Government failed to meet loan commitment to young farmers	- Economic crisis	- Young farmers lose interest in farming	- Contact Agricultural extension workers	- Extension workers unable to provide adequate assistance
Non-payment for coffee crop and coffee regeneration programme	- Economic crisis and low coffee price in international market	- Farmers lose interest in growing coffee and refuse to participate in the coffee regeneration scheme.	- Contact Agricultural extension workers	-Extension workers unable to provide adequate assistance.

6.3 Key Constraints to Development

The key constraints to development identified by the survey team are both natural and human. Increasing demand for land caused by rapid population growth, short-term objectives and strategies that limit the achievement of long-term objectives, low agricultural prices and unsound institutional policies are all man-made. Limits on the availability of land, soil fertility and plant and animal diseases are of natural origin.

Farmers of Bui Division are now realizing that the amount of available land is fixed. Plots claimed by individuals in each

subsequent generation within the extended family are becoming smaller and smaller. The real challenge now is to work within this constraint to develop the area. This constraint calls for appropriate agricultural technologies designed to improve marginal value product of land so as to satisfy the needs of an increasing population.

Traditional family planning in this area favors large families. However, the limited land cannot support an ever growing population. Some of the young members forced to abandon school are likely to perpetuate the tradition of large families. Others, unable to cope with new conditions existing in the village will be drawn to cities in search of "easy" jobs. Without an education, it will be difficult for the next generation to exploit new technologies that might allow them to fulfill ever rising expectations for a better life.

Farmers short-term objectives and strategies constitute a real hindrance to development. The farmer's planning horizon is at the step of the gate to his compound. His objective is to feed his family one year after the other. Subsistence agriculture is justified by this attitude. Keeping as many goats and cattle around as permitted by natural selection represents enough savings for next year. There is no plan for the distant future, so there is no need to accumulate wealth today as a savings for tomorrow.

Low agricultural prices represent a nightmare for farmers. Low prices obstruct the modernization of agriculture which requires substantial amounts of financial inputs. Despite the potential for high earnings for exporting foodcrops, at the current level of local agricultural technology, farmers are not able to satisfy the demand of external and domestic markets as well. The challenge consists of financing agricultural development that will permit a sustained real increase in agricultural prices in the domestic market.

It was noticed during the survey that some institutional policies are slowing down the development process. The current centralized administration of agricultural policies is relatively harmful to agricultural development. It is understood that agriculture is the cornerstone of the national economy, but the fact that the government is involved in every aspect of agriculture is making the allocation of scarce resources difficult and its efforts inefficient.

7.0 CONCLUSIONS AND RECOMMENDATIONS

1. The problems related to goat crop destruction should be handled at the village council level without intervention of the central administration or forces of law and order.

2 A semi-intensive production system for goats should be initiated along with the introduction of improved forage species.

3. There should be improvements of husbandry practices especially fencing for goats in larger flocks.

4. The economics of different farming systems should be

carefully studied with the aim of suggesting profitable interventions.

5. Studies on livestock feeds with the aim of formulating feeds that use locally available materials (for sheep and goats, poultry, rabbits and cattle).

6. Studies on the possibilities of increasing meat and milk production.

7. Studies aimed at improving and stabilizing the maize-based cropping system at sustainable production levels.
   - Soil conservation studies on the use of contour ridges, leguminous shrubs, green manures and crop rotations to reduce soil erosion and improve/maintain soil structure and fertility.
   - Varietal testing: On-station screening followed by on-farm testing of new varieties of maize, potatoes and beans, with the following characteristics:
     - Maize: High yielding, short cycle, short stature, white-flinty grain, disease resistant (highland blight, highland rust, head and common smut), with good fufu making qualities.
     - Potatoes: High yielding, large tubers, disease resistant (late and early blight, bacterial wilt), with acceptable taste/cooking characteristics.
     - Beans: High yielding, shade tolerant, large seeded, red/spotted/white/black colored, bush (determinate), disease resistant.
   - Fertilizer trials to determine optimal application rates of nitrogen, phosphorus, potassium and possibly micronutrients for the maize/potato/bean intercrop.
   - Development of recommendation components (e.g., improved variety, fertilizer rate, cropping pattern, green manures, etc.) that can be profitably adopted stepwise (minimizing marginal cost while maximizing marginal value product) by farmers who are unable or unwilling to adopt a complete package.

8. Introduction of the use of the S(Z)OPP method for the study of farming systems in order to define the objectives of their various components and evaluate the consequences of the introduction of new proposals.

9. The land tenure system should be re-evaluated in light of population explosion. Reassessment of the demarcation between grazing and crop farming lands.

10. MINEPIA activities should be more efficient and useful to livestock farmers.

11. Studies of the foodcrop marketing system to determine whether middlemen benefit disproportionately, and to recommend innovations to improve the system.

12. A cash benefit analysis of coffee farming in Oku assuming the adoption of the coffee regeneration scheme and use of pesticides.

13. Research into the epidemiological situation of livestock

diseases in Bui Division.

14. Research into suitable handling and storage methods for food crops (potatoes, maize, beans, vegetables, etc.)

15. Investigation into the effects of extensive planting of eucalyptus trees on soil fertility in Bui Division.

16. Supply of fertilizers to farmers should be timely and in sufficient quantities (When payment for coffee is late, fertilizer might be given in lieu of part of the coffee payment).

17. Construction and approval of village Credit Unions, especially for villages far away from divisional headquarters which do not have banking facilities.

18. Investigate and assess the possibility of resettlement programmes for young farmers.

19. The government should honor their commitments to the coffee regeneration program and the young farmers' resettlement scheme.

20. Cooking demonstrations for new food products should be periodically carried out (e.g. Soya bean cooking).

21. Community development activities should be encouraged in order to foster local development.

REFERENCES

RAPID APPRAISAL SURVEY OF FARMING SYSTEMS IN THE BUI HIGHLANDS

- Topical Outline -

I. CROPPING SYSTEMS

Food crops:
- Crop:
- Varieties:
- Use:

Cash crops:
- Crop:
- Varieties:
- Use:

Cultural practices: (Decision makers)
- Land clearing:
- Land preparation (tillage):
- Planting: (timing, method)
  - Crop association:
  - Crop rotation:
- Weeding:
- Fertilization: (type, rate, timing, application method)
- Harvest & transporting:
- Other operations (transplanting, spraying, ridging, pruning, etc.):

Production inputs:

	Crop	Input	Purpose	Rate
Fertilizers/Manures:				
Pesticides:				
Insecticides:				
Fungicides:				
Herbicides:				
Other inputs:				

Production problems:

	Problem	Farmer Strategy
Soil fertility:		
Soil erosion:		
Pests:		
Disease:		
Insects:		
Weeds:		
Animals (birds):		
Other: (thieves, etc.)		

Output:
- Normal yield ranges:
  - Crop:
  - Yields:
- Causes of yield variations:

Processing of crops:
- Crop:
- Processing methods:

Storage of crops:
Crop:
Method:
Problems:
Controls:

Income from sales of crops:
Crop:
Quantity sold:
Revenue:
Timing:
Income belongs to whom?

II. LIVESTOCK SYSTEMS

Livestock:

	Animal	Breed	Use	Number
Cattle:				
Small ruminants:				
Swine:				
Poultry:				
Horses:				
Fish:				
Other: (donkey, rabbit,etc.)				

Order of importance of livestock enterprises:
1 _____ 2 _____ 3 _____

Ownership pattern:
Herd size:
Herd composition:
Ownership: (owned, leased, etc.)
How acquired:

Husbandry practices:
Breeding:
Animal:
Methods:
Housing/enclosing:
Animal:
Methods:
Feeding: Rainy season Dry season
Animal:
Method:
Feed:
Transhumance
Pasture management:
Output:
Meat/poultry:
Milk:
Eggs:
Other:
Other operations:

Processing and storage of animal products:

Production problems:
Feed availability: (Dry season, rainy season)
Water availability:

Health problems / Causes of losses:

	Animal	Cause	Treatment/strategy
Disease: (ticks, worms)			
Other pests:			
Lack of feed:			
Lightening:			
Other: (thieves)			

Income from animals/animal products:

Number of sales per year:

Animal / animal product:

Number:

Timing of sales:

Income from animals:

III. INTERACTIONS BETWEEN CROPS AND LIVESTOCK

Positive interactions:

Crops as feed for animals:

Animal manure for crops:

Animal traction:

Other: (e.g., sale of crops/livestock to purchase inputs for livestock/crops)

Negative interactions:

	Farmer strategy
Animal damage to crops:	
Labor conflicts:	
Loss of grazing land to crops:	
Other:	

IV. FARM RESOURCES

Land:

Availability:

Tenure:

Quality (fertility):

Labor:

Family: (Distribution of tasks)

	Operations
Husband:	
Wife(ves):	
Children:	
Other household:	

Farmers groups:

Size:

Operations:

Hired labor:

Seasonal availability:

Operations:

Wages: (seasonal variation)

Periods when labor is limiting: (enterprises, operations, months)

Capital:

Structures (storehouses, barns, etc.)

Machinery:

Livestock: (Oxen)
Tools:
Cash:
Other:

Management:
Decision makers (by operation/activity):

V. MARKETING OF FARM PRODUCE

Produce Sold
Produce:
Form Sold:
Where:
Price Range:

Markets:
Village markets:
Cooperatives:
Traders:
Other:

Transportation:

VI. PRODUCTION INPUT MARKETS (seed fertilizer, pesticides, animals, animal feed, drugs, etc.)

Input market	Production input	Availability	Cost
Cooperatives:			
MIDENO/PDA:			
MINEPIA:			
Traders:			
Others:			

VII. PRODUCTION CREDIT

Use:

Availability:

Sources: (credit union, FONADER, cooperatives, "njange", etc.)

Repayment: (payback period, interest, defaults, etc.)

VIII. FOOD PREFERENCES

Preferred foods: (in order of preference)

	Type	Seasonal availability	Cost
Starches:			
Vegetables:			
Meat/fowl/fish:			
Other:			

Staple dish: (e.g., fufu-corn & jamajama)
Primary:
Secondary:

IX. FARMER'S GOALS

Goals in order of importance: (e.g. subsistence, housing, clothing, education of children, medical care, etc.)

Timing of expenditures: (cash flow requirement)

Expenditure:
When:
Priority:

Risk & uncertainty:

Risk taking vs risk avoiding:
Sources of risk:
Variations in crop yields/animal production:
Physical (climate, soil erosion):
Biological (disease, insects, birds):
Economic (price variations, input availability):
Other (prolonged farmer illness):
Farmer strategies to minimize risk:

X. CHANGES IN THE SYSTEM

New developments

Old practices abandoned:

XI. SERVICES

Extension Service:

	MINAGRI/MIDENO	MINEPIA
Past contributions:		
Effectiveness:		
Potential contributions:		
Comments:		