INITIAL RESULTS OF INFORMAL SURVEY
COFFEE PRODUCING AREAS OF MANNA AND GOMMA WOREDAS
KEFA REGION

WORKING PAPER No. 4/88

Department of Agricultural Economics and
Farming Systems Research
February 1988
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Preface

The Department of Agricultural Economics and Farming Systems Research has initiated departmental publication of a working paper series in the area of agricultural economics and farming systems research. Working papers are made available in limited numbers for comments and discussion and to inform interested colleagues about work in progress in the department's area of research.

This report describes the informal survey work undertaken by a group of researchers and local extension personnel in the coffee producing areas of Manna and Gomma woredas, in the Western Agricultural Development Zone, Kefa Administrative Region. It is expected that these initial results will help in the design and development of research programs for the Jima Agricultural Research Center. Furthermore, this report should be useful for policy makers, planners extension staff, and other organizations involved in agricultural development in the region. Subsequent formal surveys will be launched in the region to verify and quantify the initial findings of the informal survey and will be made available.

The Department would appreciate receiving comments and suggestions and they should be directed to the author(s).
Acknowledgements

We would like to acknowledge the invaluable participation of the following researchers in our survey: Ato Tsagai Gidey, Ato Yacob Edjamo, Ato Tesfa Bogale, Ato Tilahun Tadlos, and Ato Gebre-Egziabher Ande from Jima Agricultural Research Center and Ato Legesse Dadi and Ato Gemechu Gedeno from Bako Agricultural Research Center.

We would also like to extend our gratitude to Ato Mulugetta Mekuria, head, Department of Agricultural Economics and Farming Systems Research and Dr. Mesfin Ameha, Center Manager, Jima Agricultural Research Center, for their unfailing leadership, technical advice, and administrative support. We are also grateful for the insightful comments we received on the draft of this report from Ato Paulos Dubale, Jima Agricultural Research Center and Ato Kibru Mamusha, Coffee Improvement Project (CIP), Addis Ababa. Thanks also go to W/t Guenet Ayalew for typing this report.

We also would like to thank the many extension agents of the Ministry of Agriculture and CIP who assisted us in conducting our field work. Finally, we are grateful to the farmers in the survey area who so willingly and generously shared their time, views and experiences with us.

The views expressed in this working paper do not necessarily reflect those of the Institute of Agricultural Research or the persons and organizations mentioned above.
Summary

In late 1986 and 1987, an informal survey was conducted in the coffee producing areas of Kaffa, Wollega, and Gomma woredas, Kefa Region. The objective of the survey was to develop an understanding of the farming systems in the area and to plan technological innovations and policy recommendations for increasing productivity in ways compatible to farmers' preferences and resources. During the survey researchers interviewed about 50 farmers from 9 peasant associations as well as others knowledgeable about the farming system.

The survey zone's altitude ranges from 1650 m to 1850 m and the topography is hilly. Average rainfall is 1525 mm with most rain falling between March and September. Soils are red-brown to dark brown clays, slightly to strongly acidic, and high in nitrogen but low in phosphate.

The survey zone's population is about 128,827 and Muslim Oromos predominate. The area has a relatively well developed road network, and includes 21 pulping stations for processing washed coffee. Individual farmers farm about 88% of cultivated area, with peasant association common holdings accounting for 9% of cultivated area and producer cooperatives (PCs), 3%.

Farmers' major crops include coffee, the principal cash crop, and maize, enset, and sorghum, the principal food crops. Farmers use coffee earnings to purchase a substantial proportion of their food needs. Most farmers do not own oxen; oxen are few due to the lack of grazing area and the limited area which needs to be plowed. Cows are more common than oxen, while other livestock, such as sheep, goats, and equines, are few in number.

Farm size averages about 0.5 ha, with over half of the area allocated to coffee production. Family labor is sometimes supplemented by exchange labor or hired labor; busiest periods of the year are September through November (coffee and maize harvesting) and May and June (coffee and maize weeding). Farmers are obligated to provide two days per week working on the peasant association common holdings, as well as unpaid labor to PCs and state farms. For the last ten years, farmers have worked on the common holdings without being paid; payments began in 1987 but are extremely low, averaging 9 birr per farmer per year.

Smallholder coffee is characterized by unpatterned spacing, uncapped, free growth, and tree populations over 6,000 per ha. Shade percentage is about 30%, fertilizer use is unknown, and planting of new, coffee berry disease (CBD) resistant varieties is rare. CBD is the farmer's primary production problem. The Coffee Improvement Project (CIP) is mandated to provide technical advice and training for coffee farmers. Nearly all CIP assistance is reserved for the peasant association common holdings and producer cooperatives; improved varieties, fertilizer, credit, tools, and technical assistance are provided.
Maize is planted in March, after three to four plowings. Maize seeds are broadcast and intercropping is not practiced. Rotations are not common since most of the land under annual crops is allocated to maize. There is no fallow, due to land shortage, and fertilizer is unavailable. Some farmers practice doublecropping, planting maize in January in bottom fields followed by teff in August. Maize management on the producer cooperatives is similar to that of individual farmers, except that oxen are more available and fertilizer is used.

Livestock production is inhibited by lack of grazing areas, which is a problem throughout the year. Management is fairly intensive, leading to higher calving rates and weaning percentages than in other areas of Ethiopia. Blackleg and internal parasites are the primary health problems.

Principal trends in the farming system include (1) increasing population pressure on land, (2) decreasing coffee production at the expense of increasing food production, (3) declining livestock numbers, (4) declining farm incomes, and (5) a shift in staple food from teff to maize.

Coffee production is declining sharply for several reasons. First, food prices are increasing relative to coffee prices, causing a shift in production to food. Second, production and marketing restrictions on coffee discourage production. Third, there are excessive demands on the farmer's time working off the farm on the common holdings, PCs, and state farms; farmers are thus shifting to food crops because they are less labor intensive. Fourth, there is no secure land tenure; farmers are thus not interested in making long term investments. Fifth, CBD is increasing in severity. All farmers interviewed said they were more interested in receiving assistance in maize production than in coffee production.

Farmer problems and proposed solutions to these problems are divided into four groups: policy issues, resource constraints, coffee production problems, and maize production problems.

1. Policy issues

CIP approach: CIP should modify its target dominated approach and adopt, instead, a smallholder based approach, as is practiced by the Ministry of Agriculture throughout Ethiopia. CIP should provide inputs to farmers and advise them on how to use them; farmers should not be required to follow recommended practices as a condition for obtaining inputs.

Common holdings: The common holdings are mismanaged; productivity and distributions are extremely low and farmers are so alienated from working on them that it is not advisable to maintain them in their present form. Given the acute land shortage in the area, expansion should be halted immediately. The government should consider redistributing the common holdings among peasant association members and producer cooperatives.
Land tenure: The reallocation of coffee fields among farmers should be stopped; farmers will only invest in their coffee farms if they have confidence that they will be able to reap the benefits of their investment.

"Campaign" labor: Farmers should not be required to supply unpaid labor to producer cooperatives and state farms.

Importation of foodstuffs: The importation of foodstuffs into the study area is restricted, driving up food prices. As a result, farmers are increasing the area under food crops at the expense of coffee production. Allowing foodstuffs to enter the area will permit farmers to focus on coffee production.

Coffee prices: Coffee prices paid to farmers should be increased to offer the farmer greater incentive to invest in coffee production.

2. Resource Constraints

Principal resource constraints are the shortage of arable land, grazing area, and peak period labor. On-farm trials proposed to help alleviate the arable land constraint include maize/teff doublecropping using early-maturing maize varieties, and relay cropping of haricot beans into maize. An on-farm trial testing the feasibility of planting forage legumes under coffee is proposed to address the grazing land constraint. On-farm trials of herbicides to control weeds in maize and coffee are needed to help solve labor shortages during the weeding period.

3. Coffee

Whereas current research and extension efforts emphasize developing complex technological packages to maximize yield, simple, modified packages are needed that farmers can adopt on their own farms to increase yields. CBD-resistant varieties should be made available to farmers for filling in gaps in their plantations. Improved access to sprayers and fungicides is also needed. On-farm trials are proposed to test partial stumping and pruning methods from other countries under farmers' conditions.

4. Maize

Principal maize production problems include lodging, weeds, low plant population, and low soil fertility. Varietal improvement and ridging experiments are proposed to help alleviate the lodging problem. The above-mentioned herbicide experiment addresses the weeding problem. Studies are needed to measure plant populations and to assess the impact of "shilshullo," oxen cultivation, on plant population. On-farm fertilizer experiments should be started to determine fertilizer levels that can maintain soil fertility and be affordable for small farmers. Early maize varieties are important for doublecropping as well as for providing early maize to farmers, thus shortening the "hungry season" before harvest.
INITIAL RESULTS OF INFORMAL SURVEY:
COFFEE PRODUCING AREAS OF MANH'A AND GOMHA WOREDAS,
KEFA REGION

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Steven Franzel [2]
Tesfaye Kumsa [3]

1. Introduction

The interest in Farming Systems Research (FSR) has increased considerably during the last ten years, with the expectation that FSR could contribute much to the effectiveness of agricultural research. FSR views farms in a holistic manner and considers interactions of the technical and human elements in identifying problems and proposing solutions. This requires a multidisciplinary group working in an interdisciplinary manner.

The farmer is a central figure in the FSR process. Conducting research on farmers' fields increases the farmers' role and helps assure the appropriateness of the research output. This process facilitates the "bottom-up" approach, oriented towards understanding the circumstances small farmers are operating in. Understanding of farmers' circumstances (economic, natural and institutional) assures that problems will be better identified and prioritized and that research goals will be clearly specified. Thus improvements can be proposed which really address the farmers' needs and can be easily adopted. Furthermore, FSR can assist in identifying policy problems and modifying policies to solve the problems.

It is in this context that Farming Systems work began in the Division of Agricultural Economics and Farming Systems Research at Jima Agricultural Research Center (JARC). This paper

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[1] Assistant Research Officer, Division of Agricultural Economics and Farming Systems Research, Jima Agricultural Research Center, Institute of Agricultural Research.


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reports on secondary information and on an informal survey [1] carried out between September and November, 1986 in a selected target area in Manna Woreda, Jimma Awraja and Gomma Woreda, Jimma Awraja, Kefa Region as shown in Map 1.

1.1 Objectives

The principal aim of the survey was to

1. improve the understanding of farming systems in the target area.
2. Define production problems and constraints.
3. Identify opportunities for improved productivity.
4. Obtain information required for design and execution of a formal survey and on farm experiments.

1.2 Defining Study Area and Recommendation Domains

The selection of the area for study was influenced by IAR research priorities at Jimma Agricultural Research Center, especially the desire to (1) work with farmers near to the research station and (2) work in areas with a high production potential for coffee. The study area is known for its coffee production.

Two principal target groups of farmers or recommendation domains [2] were identified in the two target woredas based on the following factors:

1. Principal crops
2. Land availability
3. Livestock population and access to draft power
4. Marketing patterns (government institutions involved)
5. Altitude.

The two target groups are quite different with respect to the above characteristics and these variations influence farmers management strategies. Farmers in the coffee target group emphasize both coffee and maize. They have very limited access to draft power. Land shortage is the principal resource constraint. Food shortages occur over a large part of the year and farmers depend heavily on purchased food.

[1] An informal survey is a field study conducted by researchers in which informal farmer interviews, direct observations and existing information are used to develop an understanding of farming systems and to plan experimentation and other interventions.

[2] A recommendation domain is a group of farmers within an agro-climatic zone whose farms are similar and who use similar practices such that a given recommendation is more or less applicable to the entire group (Byerlee and Collinson, 1980).
Map 1: Manna-Goma study area.
For the second group of farmers, the foodcrop target group, maize is the dominant crop and there is little or no coffee production. Lower population density, availability of land and draft power, and self-sufficiency in food production are other factors which differentiate this group from the coffee target group. Due to the research center's priorities and resource constraints, it was decided to conduct the survey only in the coffee producing target group.

Producer cooperatives (PCs) are found in each of the target areas and constitute separate recommendation domains from the individual farmers. PCs make up about 2.5% of the population, and are treated separately in this report.

1.3 Survey Procedures

The team which conducted the survey consisted of two agronomists, an animal science specialist, three economists and a research-extension liaison officer.

All interviews were conducted informally with occasional notes taken by one member of the team. About 21 interviews took place involving about 50 farmers in 9 peasant associations. In addition 3 producer cooperatives were visited. Interviews were also held with traders in local markets, wives of farmers, and extension staff of the Ministry of Agriculture (MOA) and the Coffee Improvement Program (CIP).

2. Farmer Circumstances

2.1 Natural Circumstances

Rainfall

Average annual rainfall amounts to 1525 mm as recorded over a 17 year period (Figure 1-1). About 1241 mm, or 83% of total mean annual rainfall is received from March through September, the main season for crop production. Figure 1-2 shows the number of rainy days per month; the average number of rainy days per month during the rainy season ranges from 13 to 24. According to farmers interviewed rainfall distribution is reliable and presents no risks for crops grown in the main season. Statistical analysis confirms this view; the probability of receiving at least 60 mm of rainfall during each month from March to September is over 88% for each month, except for April, in which the probability is 76%.

Temperature and evaporation

Temperature and evaporation attain a maximum in the months of February to May during which land preparation and planting of maize and sorghum are usually begun (Table 1-1). Temperature and evaporation reach a low in July and August.
Average annual rainfall: 1525.2 mm
Average March to September rainfall: 1241.3 mm

Figure 1-1: Average monthly rainfall distribution, Jima 1969-85.
Source: Unpublished rainfall data from Jima Meteorological service.

Average March to September rainy days: 134

Figure 1-2: Average number of rainy days per month, Jima 1975-85.
Source: Unpublished rainfall data from Jima Meteorological Service.
Table 1-1 Monthly Temperature (1969-85) and Evaporation, Jima (1970-85)

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Source: Unpublished data from meteorological service of Jima Agricultural Research Center.

Topography

The altitude of the area ranges from 1600 m to 1850 m above sea level. The area is characterized by hilly, rolling lands and a number of streams cross the area. There are some low-lying bottom-fields with much heavier soils than the upland fields and a tendency towards waterlogging in the rainy season. Upland fields are covered by coffee, forest trees, and foodcrops.

Soils

The soils of the study area are classified as eutric nitosols according to FAO/UNESCO (1974). Murphy (1968) has described the characteristics of soils typical of the study area. The dominant soil is reddish brown to dark brown clay. The soils are acidic ranging from very strongly acid (PH 4.5 to 5.0) to slightly acid (PH 6.1 to 6.5) and are low or very low in available phosphorus. For traditional smallholder coffee, average total nitrogen for all soils (0.25%) is very high, but the availability needs to be investigated.

Coffee fertilizer trials at Gerra sub-station near the study area indicate that there is no significant yield response to fertilizer on coffee (Jima Agricultural Research Center, 1984). This is probably because the soils are already rich in inorganic matter.

2.2 Socioeconomic Circumstances

Population and settlement

Population pressure on land is evidenced by the increasing crop cultivation of forested land from year to year, the exodus of some of the farm labor force from the area, and the strong
The population is composed mostly of Muslim Oromos. Family members per household average 4.3. The Regional Planning Office's census for 1984 indicated about 291,066 people reside in Manna and Gomma Woredas. Out of this figure the target area population is estimated to be about 129,827 people. Average land area per household is estimated at about 1.7 to 2 ha including forest, marshy, and barren lands.

Recently, the settlement pattern of the study area has been changed by the villagization program and the resettlement of drought affected people from other areas. Whereas the population used to be scattered throughout the study area, new villages with about 250 to 500 houses per village are being established in clusters in each of the peasant associations. Locations of the villages are selected according to the convenience of the site for farming and future infrastructural development. The most distant farm field might be a 45 minute walk from the village according to interviewed farmers.

**Agricultural history**

Elders of the community have identified three historical periods concerning agriculture in the study area: pre-Italian occupation, post-Italian occupation and present status. In the first period, prior to 1936, food crop and livestock production dominated the agriculture of the study area while coffee had less importance in the system. Farmers followed a fixed system of shifting cultivation in which fields in the forest were cultivated for four to five years, left fallow for one year, and then planted with another crop or used as pasture, which slowly reverted to forest.

During the second period, after the Italians arrived in 1936, the coffee market became important. The elders noted that the high price Italians paid for coffee caused the community to grow more coffee while food and livestock production decreased.

The present period is characterized by declining coffee production and livestock activities while food crop production is increasing. The reasons for these trends are discussed later in this report.

**Land tenure and farmer organization**

The proclamation of the land reform of 1975 gave the farmers of Ethiopia cultivation rights on their land. The proclamation also declared that farmers can cultivate a land area up to 10 ha but have no right to sell, mortgage or rent land. Three forms of land tenure are present in the study area:

1. Individual land holdings. These range in size from 0.4 to 1.1 ha and constitute the largest proportion of area under cultivation, about 88% according to data from the Coffee
Improvement Project.

2. Producer cooperatives are relatively few; there are 13 in the 68 PAs in the study area or one PC for every 5 PAs. These account for about 3% of cultivated area.

3. Peasant association common holdings. These farms are fairly large, averaging 23 ha per PA or 9% of total cultivated area. Originally, they included expropriated coffee farms and uncultivated land. The PA farms expand every year, taking land that had been cultivated by individual PA members. These individuals are then reallocated land from other members.

The farmers of the study area are organized into 18 service cooperatives and 68 peasant associations, or 61% of the total number of PAs in both Manna and Gomma woredas.

The service cooperative deals with coffee processing activities including obtaining credit from AID Bank, constructing infrastructure and providing marketing facilities. All credit going to PAs and PCs is channeled through the service cooperatives.

Infrastructure

The study area is fairly well served by roads; one main asphalt highway and one gravel road cross the area and several laterite roads lead to pulping stations. Most roads to service cooperative offices are motorable during the dry season. Transport by pack animals is not important in the area.

There are 21 pulpery stations, all owned by the service cooperatives, with more to be installed in the future. Dry processing of coffee, the traditional method, is being overtaken by wet processing.

Markets

Coffee is the most important crop marketed in the area. Farmers are required to deliver quotas of red cherry to the service cooperative pulpery stations; the cherry is then processed into "washed coffee". The coffee is then sold to the Ethiopia Coffee Marketing Corporation (ECMC). Farmers receive a payment of 0.45 birr per kilogram of cherry as first payment. A second payment may be made to the farmer at a later time, based on the remaining profit from the coffee after export. For three selected service cooperatives, farmers had received second payments an average of only 3.7 times over the past nine years. Second payments ranged from .02 to .08 birr per kg. Prices paid for coffee are based on world market prices and changes cannot be anticipated by farmers.

In addition, farmers sell sun-dried coffee beans, "jenfel", to either the service cooperative, ECMC, private traders, or consumers. In 1987, farmers received 0.80 birr/kg for jenfel;
second payments ranged from .10 to .25 birr/kg. Farmers can also sell jenfel to private traders.

The Agricultural Marketing Corporation does not purchase grains in the study area, since it is a deficit area in terms of food production. Local market prices for maize, the most important food crop in the area, ranged from about 38 birr/quintal (November) to 114 birr/quintal (June) during the period November, 1985 to November 1986. These prices were significantly higher than maize prices in most of Ethiopia. Prices are high largely because the import of foodgrains from neighboring surplus-producing areas is prohibited.

In fact, food prices have increased greatly in comparison with coffee, the farmers' main cash source. For example, price data show that while in 1972, 1 kg. of coffee could be used to purchase 15 kg. of maize, in 1986 it could purchase only 3.6 kg. maize (Ministry of Coffee and Tea Development, 1984; Ministry of Agriculture, 1973).

Farmers purchase farm inputs from the SCs. However, the supply of inputs to SCs is dictated by the Agricultural Inputs Supply Corporation of the Ministry of Agriculture (MOA). Poor supply and untimely availability of inputs are two problems reported by farmers.

Credit and extension

The Coffee Improvement Project, begun in 1977 with assistance from the European Economic Community, is mandated to provide technical advice and training for farmers on coffee production technology. CIP also prepares demonstrations of fertilizer application, stumping, spraying, and raises seedlings of varieties resistant to Coffee Berry Disease (CBD) on common holdings and producer cooperatives. Until 1986, virtually all CIP assistance was reserved for common holdings and PCs, even though individual farmers accounted for about 90% of production. In 1986/87, CIP began supplying individual farmers with some inputs, for example, in that year, 5% of the area planted to improved varieties in Manna woreda and 17% in Gomma woreda were on individual farms (Coffee Improvement Project, 1987b). However farmers interviewed in this survey were not aware that CIP provided assistance to individual farmers, except for spraying against coffee berry disease.

Credit for farmers is provided by the Agricultural and Industrial Development Bank through the SCs. The credit is mainly disbursed for establishment of pulpery stations under the auspices of SCs. Loans are also given to individual farmers for purchasing oxen.
3. **Enterprise Pattern and Food Consumption**

3.1 **Enterprise Pattern**

The smallholder area consists of traditional coffee, food crops and pasture; these latter are usually alongside rivers and roads. About 54% of the smallholder area is allocated to coffee, 30% to food crops and 11% to pasture lands according to MOA data.

The principal crops grown in the area in order of importance are coffee, maize, ensat (*Enset ventricosa*) and sorghum. Some teff is also grown. Finger millet, wheat and barley are grown by a few farmers. Home gardens area a distinct characteristic of the area; they include many minor crops such as oranges, sugarcane, yams (*Dioscorea esculenta*), bananas, taro (*Colocasia esculenta*), cha’t (*Catha edulis*) and vegetables. Ensat is also grown in the garden. Garden crops are an important source of income and food for farmers.

The livelihood of all farmers in the study area depends on coffee. Cash from coffee is used for purchase of food and clothes, for taxes, and for contributions to the militia and community organizations. Also, drinks are prepared from roasted beans, dried, roasted coffee hulls and dried crushed leaves.

Responses from the survey showed that no farmer actually knows the coffee varieties he has. The only coffee varieties known are the 15 CBD resistant lines introduced recently by the Jima Agricultural Research Centre. PA common holdings and PCs are propagating these varieties while nearly all smallholders maintain their own varieties.

Maize is the most widespread and important of the commonly grown food crops. However, it should be noted that a substantial proportion of maize and other foods consumed are bought in the market. Maize has different uses: as an ingredient in unfermented flat bread "kitta", various kinds of porridge, "enjera", roasted green cobs, and for brewing local beer. The stover is sometimes used for cattle feed and less often for firewood.

Livestock kept include cows, oxen, goats, sheep and poultry. Donkeys are rare. The chief objective of the livestock enterprise is to secure savings which can be liquidated during critical food shortages. In addition, oxen are used for draft power and cows for providing milk.

3.2 **Food and Food Consumption**

The satisfaction of family food needs is the first priority for farmers. They secure food mainly through earning cash from coffee. The weak food crop production from their holding is far short of the supply they require to feed their families. Thus most relishes and starch staples are bought from the market.
Farmers' second priority objective is to earn cash to meet other basic needs, including farm inputs, clothes, taxes and contributions to the militia and other government organizations.

**Principal dishes and trends**

The dominant starch staple is maize made into "kitta", unfermented flat bread. "Genfo", porridge made of maize or sorghum, comes second to "kitta" in importance. "Enjera" is also prepared. "Mifro", (boiled grain of maize), roasted green cobs or "kolo" (dried, roasted grains of maize), are used as a filler. "Kocho", bread of ensat, is another starch staple usually eaten during the rainy season when farmers face serious food shortages.

Relish is prepared in the form of "wot" or local stew. The most preferred and commonly eaten relish crops are pulses, such as lentils, field peas, faba bean and haricot bean which are also purchased in the market. "Gomman", a kale-like cabbage, and taro leaf have become important relishes due to the high prices and unavailability of the preferred relish foods. Pepper, salt, cooking oil and spices are other constituents of "wot"; these are bought from the market.

Although livestock are kept by only a minority of farmers and livestock numbers are declining, milk and milk products are often used in the diet, especially during the coffee picking period. Meat is a luxury and most families cannot afford to eat meat except on important feast days, weddings and religious festivals.

Drinks are brewed from maize and sorghum, including "tella", a thin beer, and "bourde", a thick beer. These drinks are used mostly at the time of religious festivals. The most common beverage is coffee. Twice or thrice each day every family drinks coffee, from roasted beans, hulls or leaves.

Farmers of the study area usually eat two meals per day. Lunch is less often served because of the increased shortage of food.

"Enjera" of teff, a traditional starch staple, has been almost completely displaced by bread made from maize, ensat and taro. Farmers used to purchase large quantities of teff in the local markets but due to lower incomes, higher prices, and poor availability of teff, they no longer do so. Maize is now the most common food staple; ensat and taro also are appreciated for their high productivity per unit area.

"Enjera" and "Genfo" made of maize are being displaced by "kitta", unfermented bread, for two reasons: (1) the labor and time required to prepare "enjera" and "genfo" are much greater than for "kitta"; since women are becoming more involved in community activities (meetings, work on common holdings, etc.) they have less time available for cooking; and (2) "enjera" is
preferred only if eaten with "wot" produced from pulses, but pulse consumption is declining due to lower incomes, high prices, and unavailability.

**Food availability and shortages**

Farmers in the study area secure their food supplies through cash from coffee. Even though the trend is towards producing more food, dependence on the market remains strong. Figure 3-1 shows the availability of principal foods from farmers' holdings in the study area.

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<thead>
<tr>
<th>Major local food stuff</th>
<th>Jan</th>
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</tbody>
</table>

Available period
///     Sometimes available
Rarely available

Figure 3-1: Availability of food from smallholders' production.

Maize is available from home production from late August through November. Maize is supplemented by sorghum, which is available from November through January, and taro in December and January. Maize and sorghum are sometimes purchased to stretch the reserve over the months of March, April and May.

Ensat is harvested two months before the time of consumption to allow complete fermentation. It is usually eaten starting from late May through August, the critical period for food shortages.

Shortages of relishes are very serious, especially from January to May. Consumption of taro leaf has recently begun, especially among poor families. Potatoes and yams are sporadically produced and are thus available only in small quantities.

The overall shortage of food is recurrently observed from late May through August. During this period, many families' reserves are exhausted and their income has completely dried up. Farmers have several strategies for overcoming food shortages.
First, "Kenya" maize, a short cycle variety, is planted in early March to obtain a green cob harvest in late June. Second, ensat is harvested or purchased from other farmers. Third, some farmers sell oxen after land preparation and planting of maize is completed in April. They use the cash for buying food and then purchase oxen after the coffee harvest. Other classes of livestock may also be sold. Fourth, farmers engage in casual labor, coffee slashing, for cash or ensat processing in exchange for a share of the ensat. Fifth, they borrow food or money from relatives and, in a few cases, from service cooperatives. Sixth, they may buy maize during the coffee harvest (September to November) when prices are low and reserve it for the critical period.

4. Resource Availability and Use

4.1 Land

Land is the most important constraint in the study area. Land is distributed among members of the PAs on the basis of family size, as shown in Table 4.1. Large families above 7 members get about 4.5 fechassa (1.11 ha), medium sized families (4-5 members) get about 2.5 fechassa (0.61 ha), and smaller families get about 1.75 fechassa (0.44 ha). About two-thirds of the land allocated per family is under coffee and one-third is for food crops.

Average farm size is about 2.75 fechassa (0.69 ha.) including about 0.25 fechassa of garden. The holdings are usually divided into 3 to 4 individual parcels; fields average about 1 km from the homestead. The only grazing fields are along river banks and roadsides.

Table 4.1: Area allocated by peasant associations to individual farmers *

<table>
<thead>
<tr>
<th>Family size</th>
<th>Area coffee fechassa (ha)</th>
<th>Area foodcrops fechassa (ha)</th>
<th>Total fechassa (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large (7+ members)</td>
<td>3 (0.75)</td>
<td>1.5 (0.36)</td>
<td>4.5 (1.11)</td>
</tr>
<tr>
<td>Medium (4-5 members)</td>
<td>1.5 (0.36)</td>
<td>1.0 (0.25)</td>
<td>2.5 (0.61)</td>
</tr>
<tr>
<td>Small (2-3 members)</td>
<td>1 (0.25)</td>
<td>0.75 (0.19)</td>
<td>1.75 (0.44)</td>
</tr>
</tbody>
</table>

* A fechassa is a local land measure equivalent to 0.25.

Land was distributed to farmers ten years ago at the time of the land proclamation. Since then, land has not been allocated to new families except for a few forested or marshy areas and areas of deceased farmers.
Fertile, gently sloped, and shaded fields are allotted to coffee although none of the interviewed farmers had established new coffee holdings for the past 10 years. Whenever new land is opened priority is given for maize followed by sorghum. Teff is preferred on less fertile soils to avoid lodging. Bottom fields are allotted for "Kenya" maize variety; its earliness in maturity allows for availability of early food, double cropping, and for maize to escape waterlogging during the heavy rains. However, most families do not have access to bottom fields.

4.2 Labor

The family is the major source of labor in the study area. Coffee farming is labor intensive. Farmers in the study area seek to have large families so as to be able to grow more coffee. The majority of families include 4-5 family members. The farmer does most of the work in his farm with the help of his wife and children. Though women are involved in almost all operations, their main contribution is in coffee picking, maize harvesting, weeding, and milking. They are also involved in marketing activities, food preparation, enset processing and threshing of teff. Children contribute to the family by guarding crops against wildlife, collecting fallen coffee beans, herding, collecting firewood and sometimes plowing, weeding and harvesting of maize.

Hired labor and exchange labor among neighbors are used during peak periods especially at coffee picking and slashing periods. Food crop farmers migrate into the survey area to work on coffee farms. Those farmers who hire labor are either old, physically weak, or financially well off.

A critical issue for farmers is the great amount of time that they are required to devote to unpaid work off the farm, working on common holdings, producer cooperatives, and state farms. The Coffee Improvement Project (CIP) Joint Evaluation Team Phase 1 and 2 Evaluation Report claims that farmers work only one day per week on PA common holdings based on data from CIP (Coffee Improvement Project, 1987a). However, our data, from farmer interviews, showed consistently that interviewed farmers in 9 PA's work 2 to 3 days per week, depending on the season. Although they have been working on the common holdings since the mid-1970's, they have not been paid for their work, nor, until 1987, did they receive any distribution from the harvests. Some peasant associations are now distributing returns to their farmers but these are extremely low, e.g., returns per farmer for 1986/87 in Manna averaged only 9.40 birr (Coffee Improvement Project, 1987c). Assuming two workdays per week for one year this comes to a daily rate of .09 birr per day, or less than one-twentieth of the government's minimum daily wage.

A CIP report claims that 45% of total labor availability is required to adequately maintain the common holdings, even though they account for only 10% of cultivated area (Coffee Improvement Project, 1986). Farmers claim that their inability to devote
sufficient time to their own farms is a main reason for the low yields obtained.

Table 4.2 shows the timing of major agricultural activities. By virtue that coffee and food crops activities are spread throughout the year, farmers in the study area claim there is no slack period. Some of them distinguished two relatively busy periods – September through November and May through June. During September through November, coffee, maize, and sorghum are harvested. In May and June coffee and maize weeding are the primary activities. During the busy periods, farmers must also supply labor to the common holdings, state farms, and producer cooperatives, which require more of the farmers’ labor than at other periods.

January to April operations are: land preparation, weeding and slashing of weeds in the maize field, and sorghum planting. Relatively speaking, January to April is a slack period.

Other labor activities not included in the chart include guarding of food crops against wildlife damage from March onwards, managing garden crops and rearing livestock.

4.3 Capital and Draft Power

As was noted, the livelihood of study area farmers depends on cash from coffee; less important cash crops are chat, tobacco, oranges, sugarcane, banana and sweet potato. Another cash source is from sales of livestock, including oxen, goats, sheep and poultry. Livestock are sold primarily at times of food shortages, May through August. Maize is sold by a few farmers who are too old or weak to pick coffee and need cash to hire labor for doing so.

Generally cash problems are observed during the months of May through July. By this time cash from coffee and food reserves are exhausted.

Few purchased agricultural inputs are used, except fungicides and local seed. ‘Cheki’ (handhoe), ‘Gegera’ (bushman knife), sickles, and local plows are the major purchased farm tools.

Farmers in the study area noted that the number of farmers without oxen exceeds those who own even a single ox. One ox may be owned on a share basis between two or more farmers. The few numbers of oxen is primarily due to the shortage of grazing area, and the small areas available for annual crops. Oxen are less important to the farming system than as reported elsewhere.

A farmer who does not own oxen can borrow from friends or relatives for whom he is required to plow for two days for each day he uses the oxen. There is also a possibility of hiring oxen in exchange for payment in kind for a season or more, the payment per ox varying with the type of crop to be paid. If the crop is
Table 4.2: Crop calendar in the Manna-Gomma study area *

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<th>Jan</th>
<th>Feb</th>
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<td>Sorghum**</td>
<td>H-H</td>
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<tr>
<td>Teff</td>
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</table>

* This table does not include crops planted on bottom lands; these are usually planted and harvested earlier than upland crops.

** most important crops in terms of labor use

<table>
<thead>
<tr>
<th>Coffee</th>
<th>Foodcrops</th>
</tr>
</thead>
<tbody>
<tr>
<td>W - Weeding/Slashing</td>
<td>O - oxen cultivation</td>
</tr>
<tr>
<td>T - turning soil/digging hole</td>
<td>L - land preparation</td>
</tr>
<tr>
<td>P - picking</td>
<td>P - planting</td>
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<tr>
<td>B - buni collection</td>
<td>W - weeding/hoeing/slash</td>
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<tr>
<td>Tr - transplanting</td>
<td>H - harvesting</td>
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<tr>
<td>Sp - spraying</td>
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</tbody>
</table>

Source: Informal survey

maize, for instance, the price is two quintals per ox per season. There is also a 'Mekenajo' system in which families that each own one ox share the use of the oxen for plowing.

5. Crop Husbandry

This section describes production activities on coffee, maize, and teff, the three crops for which the Jima
Agricultural Research Center can have the most impact.

5.1 Coffee Management

Nursery and main field establishment

Traditionally farmers establish new coffee plantings in two ways: selecting volunteer seedlings or, less commonly, establishing nurseries:

1) Volunteer system. Volunteer seedlings emerge in the coffee fields or forest and are selected and maintained there. They are later transplanted to open spaces in existing coffee.

2) Nursery system. Seeds are selected by gathering ripe cherries from strong, healthy trees. These cherries are squeezed to separate the beans from the pulp. The beans are mixed with ash to protect them from decay. Selection is done in late September and the cherries are stored for about 8 months until May when the seeds are sown in nurseries prepared near rivers or homesteads. In June of the following year, the seedlings are transplanted to the main field.

Currently farmers transplant seedlings into already established coffee fields, wherever there are large spaces. Thick, strong-branched seedlings are ideal for transplanting according to farmers interviewed. The seedlings are pulled by hand, a hole is prepared and seedlings are planted, one per station. Transplanted coffee takes about 4 to 5 years to bear its first fruit under the farmers' management. Recently a few individual farmers have been able to get seedlings from CIP, but the quantity supplied is far short of the demand.

There are a number of operations undertaken after a new crop is established including: (1) turning the soil in May to control couchgrass (*Digitaria scalarum*), (2) mulching, and (3) weeding and slashing twice or thrice, June through September, according to weed infestation and labor availability. The last slashing is done in September, just before the coffee harvest begins. This slashing has two objectives: weeding and clearing the ground for later bunji collection.

Coffee spacing and canopy management

Results from the survey confirm that smallholder coffee is characterized by unpatterned spacing, uncapped, free growth and tree populations of over 6000 per hectare. Greater increases in productivity can be obtained from improved canopy management than from the use of fertilizer. (Yilma Yemane-Ehrane, 1986).

None of the interviewed farmers were knowledgeable about coffee pruning. However, there is indication in a few instances of a system of "Agobido" pruning used to reinitiate growth of new suckers. Agobido is a Latin American pruning method for the rehabilitation of old coffee trees, in which main stems of old
Coffee trees are bent to allow new suckers to grow on the concave side of the bent stem. These new suckers will substitute for the old branches and stem. By the time new suckers come into production, old branches and the tip of the main stem are removed to allow production from the new suckers. The advantage of this method over the complete stumping method advocated by CIP is that production is maintained throughout the conversion period. In complete stumping, the tree is cut near ground level and production does not resume for several years.

Stumping, or any alternative method of changing the cycle of old coffee, is not frequently practiced. Stumping is unpopular because farmers lose income from the tree during the period of conversion. As was noted from interviews, farmers would accept stumping of old coffee only if their food supply was secure over the period of conversion. Most of them understand the advantages of stumping, and a few of them would adopt the measure if they were permitted to intercrop maize until the new suckers become productive. However, this method is not permitted by CIP extensionists.

Shade trees and other inputs

The shade percentage on coffee fields visited was estimated at 30%. There are about six common shade trees namely, *Cordia africana*, *Millitiea* spp., *Eritrina* spp., *Albizia* spp., *Accacia*, and *Croton myrcotah*. *Cordia africana* generates income to farmers by providing timber. *Albizia* increases soil fertility and conserves moisture but coffee shaded by it ripens late, according to farmers interviewed.

Except for the shade trees, no other perennial crops or annuals are interplanted with coffee. Farmers gave two reasons for not intercropping. First, controlling weeds through slashing would be much more difficult. Second, guarding the coffee against wild animals would be less effective.

Despite the importance of the shade trees for shading coffee, farmers are cutting them down to use for construction and fuelwood purposes. Perhaps, this has contributed to the trend away from coffee production.

Few inputs are used in smallholder coffee production. Purchased inputs include "gegera" (bushman knives) and fungicides; farm inputs include manure and mulch. Fertilizer and herbicides are not available for use by individual farmers. Soils under coffee appear to be fertile.

Pests, Diseases, and Their Control

Coffee berry disease (CBD) is the number one problem on coffee and was mentioned by all farmers interviewed. The principal constraints to solving the CBD problem are (1) the height of trees on smallholders' farms which prevents effective control through spraying, (2) unavailability of fungicides at the
proper time, and (3) shortage of sprayers. CIP sprayed
individual farmers' fields against CBD in 1986 but both CIP staff
and farmers reported that the spraying was not effective.
Possible problems included improper timing, difficulties in
spraying tall trees, and dilution of spray. Wildlife damage,
especially by baboons, porcupines and monkeys, is also a serious
problem.

Harvesting, processing and storage

Dry harvesting methods have been overtaken by wet
processing, because of the construction of wet-processing pulping
stations and the establishment of quotas of cherries, which
farmers must deliver to the stations. The quotas take the bulk
of peasant production; remaining coffee is dried and sold to the
service cooperatives or private traders. Red cherries are picked
from late September to late October and are delivered to pulpery
stations the day they are picked. Two to three pickings per week
are done on each farm and farmers are paid immediately for the
cherries they deliver. Farmers who do not meet their prescribed
quota may be punished. Farmers collect the dropped beans "soon" in January.

Farmers dislike the present system of coffee marketing for
two reasons. First, they resent the quota system. Second, they
prefer selling dried coffee rather than red cherry, because they
can sell dried coffee in large quantities at one time, thus
obtaining money in lumpsum for large investments, e.g., purchase
of oxen.

5.2 Maize management

Site selection

Maize is the second most important crop in the study area
and the primary food staple. Since land is constraining, fields
are cropped continuously and most land under annual crops is
allocated to maize. This eliminates the possibility of
practicing crop rotation. Some farmers rotate maize with
sorghum, but only on a small portion of the maize area.

Farmers in the study area select sites for maize based on
soil moisture conditions and the maize variety being planted.
Bottom-fields are mostly allotted to Kenya variety, a short
cycle variety, to (1) avoid waterlogging late in the season, (2)
get an early green cob harvest, and (3) permit double cropping.
Some farmers plant Oromo variety, a long cycle variety, on bottom
fields in late January and harvest after 5-6 months. Uplands are
mostly allotted to Oromo to take advantage of the moisture
available in the main rain season. A portion of the upland
fields are also planted to Kenya to obtain an early green cob
harvest.
Land preparation and planting

Land preparation commences in early January on bottom-fields. In late January, after 3 to 4 plowings, Kenya variety is sown. Plowing of uplands then starts and Oromo variety is sown in mid-March after 3 to 4 plowings. The Jimma Agricultural Research Center recommends 3 plowings. Planting on uplands extends to April if oxen power is short.

All power for land preparation is provided by oxen. The oxen drawn plow is set at a narrow beam and chisel for the first plowing to reduce the power required to break the hard soil. After the first plowing, the chisel and beam are widened and in subsequent plowing, furrows are opened in the opposite directions. At planting time, seed beds are fine and crop residue and weeds are removed.

Broadcasting seed and covering with an oxen drawn plow is the only planting method used by farmers in the study area. Row planting is not used because farmers reported that it requires extra labor. Planting on bottom fields starts before the rain begins while uplands are planted only after rainfall begins and is assured of continuing.

Seed selection in most cases is done at harvest. Large ear size and large grains are the two most commonly cited criteria. Only the larger grains at the bottom of the cob are used for sowing. Cobs are stored by hanging them under the roof over the chimney to get protection from insect damage and disease.

Weeding and thinning

Weeding practices are as follows:

1) Hoeing and hand pulling of weeds follows about 15 days after planting or after two leaves have emerged. The implement used for hoeing is the "Cheke", a local hoe.

2) Oxen cultivation, "shilshallo", is undertaken when the plant reaches knee height, about 35 days after emergence. Farmers claim that cultivation heaps the soil around the seedlings, thus protecting them against lodging.

3) Fifteen days later, about 50 days after emergence, farmers thin to obtain a lower population and fill gaps with transplanted maize.

4) The second oxen cultivation then follows, about 60-70 days after emergence. Farmers claim that a principal purpose of this cultivation is to increase soil fertility by burying residues and dead plants. They also claim that the heaping of soil increases the stiffness of stems against lodging.

5) The last operation of weeding is slashing. This is done when maize nears the tasseling stage in order to (1) clear weeds
that attract wildlife, and (2) facilitate harvesting.

The station's recommended weeding practice is (1) hoeing, (2) hand weeding, and (3) slashing at flowering stage. Farmers in the area have never tried herbicides since they have no access to them.

**Pests, diseases and fertility maintenance**

Principal problems are weevil on stored maize and in the field, stalk borer, and wildlife problems. Strategies adopted to control weevils are quick consumption, storing maize before its moisture is lost, and storing in local stores, "Gotera", constructed from mud, dung, sticks and bamboo. Wildlife damage is an important problem and will grow worse under villagization, since farmers will no longer be residing near their fields. Currently most families guard their maize fields against animals from sowing until knee height and from tasseling up to harvest.

None of the interviewed farmers reported using fertilizer; none is available in the area. Farmers rarely use manure either due to few livestock kept or because soil fertility is sufficient. If manure is available, priority is given to enset and then to maize. Crop residues and slashed weeds are left on the field. Household refuse is used on enset and maize fields near the homestead.

Maize fields observed during the survey did not show signs of nutrient deficiency, except for some fields on steep slopes. However, fertility will decline as cropping continues with no fallow, rotation, or fertility maintenance practices. Jima center's fertilizer recommendation is 150 kg. diammonium phosphate, broadcast at planting time.

**Harvesting, storage and disposal**

The green cob harvest starts in late June for the early variety, Kenya, and in late August for Oromo variety. The main harvest commences in late September and finishes in late October. Nearly all maize produced is used for home consumption.

Farmers principal harvesting operations are to:

1. Cut stover at a level just below chest height and pile,
2. Leave stover piled for a week until moisture is reduced,
3. Dehusk and dry maize cobs for 4 to 5 days in front of the house,
4. Store unshelled cobs in local storage bins outside of the house.

There is some problem with weevil damage on stored maize, but this is not considered to be a high priority since maize supplies are exhausted fairly quickly. However, the problem requires more investigation.
5.3 Teff Management

Teff is grown either on infertile soils or on bottom fields. Farmers growing teff usually have their own ox and a large family, since cultivation is labor intensive and requires frequent plowing. Labor is required for packing the soil at the time of sowing, frequent weeding, and other operations.

For upland fields, farmers start plowing in April. After 4 to 5 plowings, the sowing is done in late June. Harvesting is in November.

On bottom fields, teff is planted as a second crop after the harvest of maize in early August. The field is plowed twice following the maize harvest and teff is sown in early September. Red teff, the short season variety, is used in this case, and is harvested in late November.

At harvest, teff is tied and baled without threshing and is stored in a locally prepared store. When farmers want to consume some teff, they thresh it, and take it to a local mill for milling.

6. Livestock Husbandry

Though the study area is much more renowned for its coffee production than its livestock, there are a substantial number of animals in the area. A livestock population census of Manna and Gomma Woredas taken in 1976 (Ethiopian Calendar) by the Ministry of Agriculture estimated 31,531 Cattle, 10,262 Sheep, 5,609 Goats, 4,142 Chicken and 3,232 Equines, respectively.

Livestock are acquired through purchase, breeding and/or loans. The numbers of cattle kept by most households range from 0 to 2 for cattle. The majority of farmers do not own oxen. There are cases where 2 to 3 households own one ox in common.

6.1 Reproduction

Breeding

Age at first mating of heifers is on average 5 years but some farmers emphasized that it could be reduced to 3 years if the animals receive proper care. The calving interval ranges from 1-2 years whereas the productive life of a cow is about 12-16 years during which she can produce about 8 calves.

There is no control over the mating of animals; they breed the year round even though the peak mating period is related to the availability of adequate feed. This period, as reported by most farmers, is just after crop harvest when animals graze crop residues in situ. There is a variation among farmers with regard to the preferred time of calving as half of the farmers indicated the period to be September to February (dry season) while the
remaining half said that they prefer calvings between April and September (wet season). The reason in both cases is, however, similar, i.e., feed availability.

**Calf management and milking**

Farmers in the surveyed area exercise an intensive calf management system as compared with most traditional livestock production practices in Ethiopia. This has contributed to a high weaning percentage which ranges from 67 to 100. The number of farmers interviewed was too small to validate this figure and it needs to be established during a formal survey.

Cows are left to suckle their calves for the first 20-30 days of parturition and thereafter two teats alone are milked, the others being left for calves. This continues until it is believed that calves have started consuming adequate bulk feed. Once milking has started precautions are made so as to not hurt the calf before it is capable of making full use of roughages. Besides exercising partial milking as indicated above, there are two plant types, locally known as "Karba" and "Hidda Jabl", that are crushed in water, warmed in the sun, and then given to calves. Farmers believe that this drink will keep calves in a healthy condition. Starting from the age of 7 days they are also fed certain grasses, e.g., Cemolina and Bermuda species locally referred to as "Alelea" and "Chekorsa" respectively. Starting from this same age calves are exercised outdoors in the morning and afternoon when the temperature is not too high.

In the traditional milking procedure, farmers let the calf suckle for a few minutes to initiate milk let down before milking. The calf is kept in front of the cow while milking is underway. Milking is done twice a day.

The calf is permitted to suckle at intervals during milking to cause further milk let down. This intermittent suckling followed by milking is meant to squeeze out as much milk as possible from the cow, and is purposely overlooked by farmers during the first few weeks of milking for the welfare of the calf.

Calves are weaned at the age of 5 to 12 months; nevertheless, the lower range can go down as low as 3 months in the case of fast-breeding cows. These cows are milked for only 3 months, after which they begin their pregnancy period. Despite their tendency to produce a calf every year, cows that breed quickly are not appreciated because of their low milk production. There is little uniformity among farmers in post-weaning calf management practices; some let calves run with the herd whereas others keep them for a time in a separate group around the farm yard.

Cows are milked twice a day once in the morning before 9 a.m and once in the evening at about 7 p.m. Milking is normally done by women. Milk yield per cow per day ranges from 0.7 kg during
the dry season to 2.0 kg during the wet season. Farmers in the area believe that milk quantity is influenced more by the level of management than the season.

Milk is consumed at home in the form of either whole or skimmed milk or butter with little discrimination in its use among household members. When milk is short, priority is given to children. There is a local market for both whole milk and butter, the price of milk varying from 50 cents per litre during the wet to 70 cents per litre during the dry season. The major causes for the price rise in the dry season are the reduced milk supply and cash availability from coffee sales.

6.2 Feeds and Feeding

As already noted, there is a shortage of pasture due to land scarcity and crop competition. The community selects a site to serve as a grazing land which is used according to a communal herding system based on firm social regulations. In the dry season, animals graze for longer hours and walk longer distances to grazing areas than in the wet season. Farmers do not plant any fodder crops, nor do they attempt to improve their natural pasture land. Dry season feeds consist of crop residues, shrubs and tree leaves, in addition to natural pasture. Water is not a problem in the area since there are many rivers; animals are watered twice per day.

There is a controversy among farmers as to whether the feed problem is more severe during the wet or dry season. Some argue that the wet season, May-November, is a greater problem because grazing areas are more limited as crop fields are plowed and planted. During the dry season, crop residues are available. Others argue that the dry season feed shortage is more serious because crop residues do not last long and pasture condition deteriorates. For much of the dry season, livestock must rely on leaves from trees and shrubs.

Feeding priority is given to milk cows and draft oxen. Priority for milk cows is restricted to the period of milk production and for oxen, to the period of field work. During these periods these animals may be fed fresh mowed grass, local brewery by-product, green stover following green cob harvest, salt, and tobacco. A few high income farmers feed their milk cows and oxen barley and faba bean.

6.3 Diseases and Disease Control

The two major animal health hazards in the area are blackleg and internal parasites. The Ministry of Agriculture is responsible for livestock disease control but discussions with the woreda development agents confirmed that there is no regular vaccination program against any disease. Vaccinations and treatments are carried out in response to reported cases and in most cases the agents run short of drugs. This is particularly
true of antihelmintes, which have a very high demand.

Vaccinations are free of charge while treatments are paid for, the prices varying according to the type of medicine used. Traditionally, farmers wash their animals with crushed fresh tobacco leaves as a treatment against external parasites like ticks and lice. The use of acaricides is now becoming popular.

6.4 Livestock Husbandry Practices and Marketing

Animals are herded communally by men and there are firm regulations to be strictly followed by each member. The turn of herding rotates everyday among the group members whose number is about 15. A person responsible for herding on a particular day goes to a fixed grazing place at 8:30 a.m. in the morning where individual members bring their animals. In case he fails to be there at the exact time he will have to herd for an extra day and in the event of his absence he may be required to herd for 5 continuous days. The herdsman is responsible for any animals lost or for damage to surrounding crops. Members are required to collect their animals at the end of the day at 6:00 p.m. A group leader is appointed by members to see to it that these rules and regulations are strictly observed and any member who violates them may be expelled from the group.

All animals are housed at night. They are separated by species and tied individually in their respective places within a partition in the farmers' own house. These places are cleaned everyday, usually by women. The manure is carried off to crop fields; priority is given to enset followed by maize.

Marketing of animals

Animals are disposed of through sale and slaughter. The husband and wife decide the type of animal to be sold. Cattle are normally sold except in situations where oxen become too fat to plow and thus may be slaughtered on a share basis among neighbors.

The amount of cash needed by the household is what determines which category of animals to sell. But farmers tend to sell oxen more frequently than others; the reason given was that they command better prices. Just after planting ends in April, some farmers sell their oxen and buy again before land preparation in December. Ox prices reach their peak in December, just before land preparation begins, since demand is high and cash is available from coffee sales.

7. Producer Cooperatives (PCs)

Producer cooperatives are farmer organizations established by volunteer farmers who pool their resources for common use. The aim of PCs is to improve the living standards of member farmers and to implement the socialist principle "from each
according to his ability, to each according to his work". The government gives strong support for establishment of PCs, as was clearly indicated in the 1974 land proclamation. This section highlights the general features, management and production problems of PCs in the study area. Three cooperatives were selected purposively for this study: one strong, one medium and one weak cooperative, according to information from MOA staff. Table 7.1 shows the general features of the 3 selected PCs.

Table 7.1: **Characteristics of three producer cooperatives in the study area**

<table>
<thead>
<tr>
<th>Name of PC</th>
<th>Aleta</th>
<th>Haro</th>
<th>Chedero</th>
<th>Suse</th>
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<tr>
<td>Year established</td>
<td>1981</td>
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<td>1979</td>
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<td>Members</td>
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<td>Beginning</td>
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<tr>
<td>Current</td>
<td>51</td>
<td>34</td>
<td>101</td>
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<td>Capital (birr)</td>
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<tr>
<td>Beginning</td>
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<td>1452</td>
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<tr>
<td>Current</td>
<td>26433</td>
<td>13381</td>
<td>81193</td>
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<td>Landuse (ha)</td>
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<tr>
<td>Coffee</td>
<td>13</td>
<td>10.7</td>
<td>54.3</td>
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<tr>
<td>Food</td>
<td>23.2</td>
<td>10.2</td>
<td>58</td>
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<tr>
<td>Other</td>
<td>4.3</td>
<td>3.7</td>
<td>35</td>
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</table>

The study area comprises 13 PCs, which produce both coffee and food crops. Members account for about 2.5% of the target population. Membership in cooperatives will increase significantly in the future, according to the governments' ten year indicative plan.

7.1 **Enterprise Pattern**

The enterprise pattern of most PCs is similar to that of individual farmers, i.e., coffee is the most important crop. Coffee occupies 37% of arable land, foodcrops 43%, and 20% is for forest, grazing and homesteads. A few livestock are kept, particularly oxen for draft power. PCs are increasing their area under both coffee and foodcrop cultivation from year to year.

Other crops grown include sorghum, teff, taro, ensat, potato, pepper and cabbages. Some PCs have begun producing vegetables and fruits.
Working organization

PC members are organized into work teams of about 15 members based on the type of work and directives given from the PC management body. Each member is supposed to work eight hours per day, six days per week. Each working team has its own team leader who is appointed by the PC executive committee. The team leader records each member's performance and awards them work points according to the work they have done. At the end of the year dividends are distributed among members according to the work points each has accumulated during the year. Food produced by the PC is sold to the members.

The decision concerning which crops to grow and the area allocated to each is made by the PC executive committee. The executive committee is assisted by CIP and MOA extension personnel. The plan is then ratified by the general assembly of PC members.

7.2 Resource Availability and Use

Land

In general the target area is constrained by shortage of arable land. However, in order to promote PC development, the government has given them the right to expand if they so desire. PCs increase their size through three methods:

1. obtaining land of new members joining the PC.
2. expropriation of individual holdings. Individuals who lose their farms are then reallocated land from other farmers.
3. bringing uncultivated area under production.

Members of PCs have no land of their own except 1000 m.sq. allocated for homesteads and foodcrop gardens.

Crop rotation is usually practiced in the PC farm in contrast to individual farms. Maize is rotated with sorghum or teff.

Labor

The main source of labor for PCs is the members. Unlike individual farmers neither family labor nor hired labor are used. Occasionally, especially during coffee picking and slashing, PCs get free labor from youth and women's associations or from PA members. According to the interviews labor shortages are felt from March to November. There is strong overlapping of activities for two reasons:

1. Overlapping of food crop and coffee operations.
2. PCs hold more land than they can effectively manage; management is thus extensive rather than intensive. This is
inefficient; since land in the area is generally scarce, land use should be intensive rather than extensive.

**Capital**

Coffee is the main source of income for PCs. Registration fees and contribution by members makeup the initial source of capital when PCs are established. AID bank and CIP are the two sources of credit.

7.3 **Crop Management**

**Coffee Management**

Coffee fields in PCs are managed under the close supervision of extension agents. Table 7-2 summarizes the major operations conducted on PC coffee farms throughout the year. The calendar is drafted by CIP and is strictly adhered to.

Coffee on PCs is better managed than coffee on the PA common holdings, according to CIP staff and our own field observations. The spacing and fertilizer rate on PC farms are based on recommendations given from CIP. Urea and Nitrogen-Phosphorus-Potassium (NPK) are the two types of fertilizer used. Two times per year, 50 gm urea and 50 gm NPK are applied per tree by banding. Much more weeding labor is required on the PCs than on the individual farms because coffee is more widely spaced, shading is less, and because CIP recommendations call for intensive weeding. In fact PC leaders interviewed claimed that the extra labor required to manage coffee according to CIP recommendations, as compared to traditional coffee, was not worth the extra coffee produced. Recently, herbicides have been introduced.

Seedlings are usually supplied by CIP. Nursery establishment and maintenance are the mandates of CIP. PCs are supplied with seedlings for planting in July. Seedlings are supplied on a long term credit basis at a cost of 0.04 Birr per seedling. Other items supplied on credit by CIP include slashers, spades, sprayers and fungicides.

The routines followed in picking, processing and marketing are similar to those of individual farms.

**Maize management**

PCs follow the same cropping calendar as individual farmers. Land preparation is done from January onwards. There is no draft power shortage, as is found among individual farmers. Frequency of plowing and quality of seed bed are similar to those of individual farmers. Maize is always planted in pure stands.

Maize varieties, principally UCB, are supplied by MOA, at a price of 60 birr per quintal. The PCs complain that delivery is sometimes delayed and that the price is too high.
### Table 7.2: Planting, stumping and field management schedule for Producer Cooperative coffee farm

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<tr>
<th>Activity</th>
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*Figures below months indicate weeks*

Source: Coffee Improvement Project Manna Woreda Office
All maize fields are fertilized at the rate of 100 kg diammonium phosphate per hectare at planting. Manure is never used for fertilization because little is available and members do not want to carry manure to the fields. Crop residues are usually collected and burned on the field.

Weed control is achieved by hoeing, hand pulling, shishalloo, and slashing. Fields are shishallooed two to three times depending on the weed infestation level and the crop’s growth stage. The PCs practice shishallo for the same reasons as do individual farmers.

Maize fields observed were characterized by low plant populations, high ear setting, poor soil conservation, and lodging problems.

There are two methods employed in harvesting maize, i.e., stoking and husking. In the stoking method, farmers cut down maize stalks and stook them to dry. This method is especially popular for PCs that doublecrop allowing them to quickly plow for the second crop. Maize fields harvested in August may be planted to potato, teff or barley.

Husking involves harvesting the cobs and leaving the maize stalks in the field. Shelling, weighing and bagging follow and after a few weeks the maize is dehusked. A few of the PCs have their own diesel-powered mechanical shellers. The harvested maize is distributed among members for consumption.

7.5 Livestock Production

Aside from oxen, livestock production is on a very small scale. Only one of the PCs observed has begun a dairying operation and it is very small. The reasons why cattle are not produced on a large scale are: (1) shortage of grazing areas, (2) competition for labor and time, and (3) lack of knowledge of intensive management.

8. System Trends

Five major trends may be distinguished in the system:

1. Increasing population pressure on land.
2. Decreasing coffee production at the expense of increasing maize, enset and taro production.
3. Declining livestock numbers.
4. Declining farm incomes.
5. Shift in food consumption from teff to maize.

These trends and their causes are discussed in the sections
8.1 Increasing Population Pressure on Land

Increased population pressure has resulted in forested areas, bottom fields, and small unutilized patches of land to be brought under more intensive use than previously. Moreover, marginal lands, such as very steep sloping lands previously considered unsuitable for cultivation, are also now being cultivated. Inspite of the measures farmers are taking to increase their holdings, farm size is decreasing. Furthermore, the increase in size of PA common holdings and producer cooperatives at the expense of individual holdings is aggravating the problem.

8.2 Decreasing Coffee Production and Increasing Maize, Enset and Taro Production

Coffee area and production are declining sharply. For Kefa region, coffee area declined 44%, from 114,812 ha to 64,436 ha, between 1977, the first year of the Coffee Improvement Project, and 1985 (Ministry of Coffee and Tea Development, 1977;1985). The decline in coffee production, and coffee's replacement by food crops, has several causes, as shown in figure 8-1. In summary, the principal causes are:

1. There is a shortage of food, related to increasing population and pressure on land. Continuous cropping, the lack of fertilizer, manure and crop rotations all exacerbate the problem.

2. The price of food is increasing, relative to coffee. Data presented earlier show that in the last 14 years maize prices have more than quadrupled relative to coffee. This is caused in part by the governments' restrictions on the entry of foodstuffs from neighboring areas. Previously, cheap food grains were available from these areas; now these food grains are no longer permitted to enter the area. The increasing price of food relative to coffee leads to a decline in coffee production; as food prices increase, food production becomes more profitable relative to coffee and so farmers allocate more resources to food production.

3. Coffee Berry Disease (CBD) infestation is increasing, discouraging farmers from growing coffee.

4. There are excessive restrictions on coffee production and marketing activities. Farmers are discouraged by the government established quota and the penalties of not fulfilling the quota. Moreover they do not like to supply coffee in cherry form, preferring to sell sun-dried coffee.

5. There are excessive demands on farmers' time off the farm that is, working on common holdings, producer cooperatives, and state farms. Since food crops are less labor intensive than
Figure 3.1: Principal trends in farming system of individual farmers.
coffee, the diversion of the farmers' labor away from his farm promotes the farmer to shift from coffee to food crop production.

6. Lack of secure land tenure. Common holdings increase in size every year at the expense of individual farms; farmers losing land are reallocated land from the fields of other farmers. Moreover, farmers forming producer cooperatives select land from individual farmers, those farmers losing land are then reallocated land from other individual farmers. The result of these policies is that many farmers exchange land every year. This has a very negative effect on investment; farmers are unwilling to invest in coffee production because they lack assurance that they will be able to reap the benefits of their investments.

The factors limiting coffee production are mostly a result of policy constraints; in the existing policy environment, technological change will have a very minor effect on production.

This situation is threatening the foreign exchange earning potential of the coffee industry. It would appear difficult to reconcile the government's wish to advance coffee production with that of the farmer's, to increase food crop production at the expense of coffee, unless certain policies are modified.

8.3 Decline in Livestock Enterprise

The increase over the last several decades in coffee production and more recently, food crops, has caused a decrease in available grazing land and thus numbers of livestock. Increased population pressure on land has played an important role in exacerbating these trends. Currently, there exists a high competition for land and labor between crops and livestock production. This has led many farmers in the area to decrease their numbers of animals or to abandon livestock production altogether.

The decline in cattle numbers has resulted in some delays in land preparation. However, most farmers do not perceive the shortage of draft power as a major constraint, since the land available per farmer is small. Food crop production will continue to increase at the expense of coffee and grazing land; thus the demand for oxen can be expected to increase.

8.4 Decline in Family Incomes

There has been a sharp decline in family incomes in recent years. Farm size has decreased as population has increased and more land has been allocated to peasant association commonholdings. Moreover, the increase in food prices relative to coffee prices has reduced the purchasing power of coffee earnings. Since farmers purchase most of their food with earnings from coffee sales, a decline in coffee prices relative to food prices results in a decline in real incomes. The reduction in livestock
numbers has also had a negative impact on farm income.

8.5 Shift in Food Consumption from Teff to Maize

In recent years, maize has replaced teff as the primary food staple. In the past, farmers had used earnings from coffee to purchase teff, their preferred food staple. But declining incomes and increased teff prices, due to restrictions on cereal movements, have caused farmers to substitute maize for teff in their diet. Maize is lower priced than teff and, in addition, is higher yielding than teff. Other changes in consumption may also be noted. Local cabbages and taro leaves are replacing pulses as the main constituent of "wot", due to declining incomes and the inavailability and high prices of pulses. Their movement into the study area from neighboring areas is restricted.

The five major trends in the system are mutually reinforcing. Increasing population pressure contributes to increased food production, decreased coffee production and fewer livestock. Government policies contribute to higher food prices and more food production at the expense of coffee production. As farm incomes decline, farmers have changed their main food staple from teff to maize.

Agricultural research should assist farmers to intensify both foodcrop and coffee production to provide families with secure supplies of both food and cash. Halting the decline in livestock numbers can assist in improving the security of farm families as well as contributing to crop production through draft power and manure. All of these efforts can help to stabilize and increase family incomes. In the following two chapters specific farmer problems and possible solutions are discussed.

9. Principal Farmer Problems and Potential Solutions

Farmers in the study area face many constraints in meeting their objectives. They are aware of their major problems and are taking measures to solve them. The proposals listed in this section are aimed to help increase the productivity and security of small farmers in ways that are acceptable and feasible to them. Moreover, the proposals contribute to the government's objective of increasing coffee production in the study area by suggesting policy modifications, and ways to increase coffee yields and alleviate food shortages. The problems and proposals are divided into four groups: policy issues, resource constraints, coffee and maize.

9.1 Policy Issues

Approach of the Coffee Improvement Project

Smallholders, who are responsible for over 90% of Ethiopia's coffee production, are giving less attention to coffee. For example, virtually all farmers interviewed in the Manna-Gomma
study area, when asked whether they preferred receiving assistance in food production or coffee production, stated that they preferred assistance in food crop production. This trend endangers the future of coffee production in the area.

This problem, as alluded to in the Coffee Improvement Project's Joint Evaluation Team's 1987 report, is primarily a result of the approach the Coffee Improvement Project uses:

the farmers were unwillingly involved in the project activities... This target dominated approach appears to have been imposed upon the peasant farming system, rather than the project activities having emerged from it as an expression of the farmers desire, having been persuaded of the benefits (Coffee Improvement Project, 1987a)

Results of our interviews confirm the views expressed in this report. Farmers are obliged to contribute two to three days per week working on the common holdings. This has been continuing for up to ten years, and labor productivity is extremely low, due to the low morale of the farmers. Payments to some farmers have begun in 1987, but these payments average only 9.40 birr per farmer in Manna woreda (Coffee Improvement Project, 1987c). Even if we use CIP's assumption that each farmer provides only 50 person days of work per farmer per year (our findings were that they work over 100 days per year) the farmers are earning a daily wage of 0.19 birr, less than one-tenth of the average daily wage in the area. The returns from the common holdings are so low as to be of no significance at all. Moreover, farmers are receiving no compensation for the labor they have provided to the common holdings over the previous ten years.

The irony of this situation is that one of CIP's objectives in planting coffee on common holdings is to provide a demonstration to farmers of the benefits of improved technology. However, even if the total value of coffee sold in 1986/87 from the common holdings in Manna woreda was distributed to farmers (about 33% was withheld to cover costs of purchased inputs and investment), the total revenue per farmers would be only 13.89 birr per farmer per year. Obviously, there are extremely serious problems concerning either the management of the common holdings or the distributions of returns from them or both; these need to be investigated.

Moreover, the common holdings are increasing in size at the expense of individual farmers, who already face severe land constraints. Since farmers have no secure land tenure they are unwilling to improve their coffee.

Further, farmers lack time to work on their farms. In addition to providing labor on the common holdings, they are required to provide unpaid labor on producer cooperatives and state farms, and attend numerous meetings of their peasant
The Coffee Improvement Project is in charge of supplying inputs to the area. However, the informal survey confirmed that the emphasis is given to PCs and common holdings while the bulk of smallholders get none. Slashers, herbicides, fungicides, sprayers, and improved varieties are inputs for which supply is far short of farmers' demand. Moreover, coffee input price differentials between producer cooperatives and common holdings, on the one hand, and individual farmers on the other, are much higher than exist in the food crop sector. For example, whereas farmers in food crop areas pay 14% more for fertilizer than do PCs, farmers in coffee areas pay 100% more for seedlings than do PCs.

Further, CIP insists that individual farmers follow all CIP recommendations, otherwise no assistance is offered. For example, farmers who agree to clean stump their coffee are not permitted to intercrop their coffee during the period of regeneration. This approach is in marked contrast to the approach of the Ministry of Agriculture in Ethiopia, for example, when farmers receive fertilizer for their food crops no demands are made on the farmer as to how to grow their food crops. The approach with regard to coffee stumping is especially ironic since research from coffee has shown some food crops can be planted into stumped coffee with no negative effect on the coffee (Njoroge, 1986).

In summary, farmers are alienated from both coffee production and the Coffee Improvement Project, because of the expropriation of their land and labor for coffee development, from which they receive no benefit. The approach of the project, the target dominated approach, is in marked contrast to the persuasion approach, mentioned in the CIP evaluation report. The persuasion approach, which is used by the Ministry of Agriculture throughout Ethiopia, places emphasis on explaining and demonstrating new technologies to farmers and assisting farmers to adopt these technologies on their own farms. CIP, on the other hand, largely ignores small farmer development and instead promotes development on peasant association and producer cooperative farms from which the vast majority of farmers derive no benefit.

Proposal 1: The Coffee Improvement Project should modify its target dominated approach and adopt, instead, a smallholder-based approach, as is practiced by MOA and other development organizations in Ethiopia. CIP should not require farmers to follow the practices they recommend as a condition for obtaining inputs. Rather, they should provide inputs to farmers and advise on how to use them, as the Ministry of Agriculture does. For example, presently, farmers are unable to obtain improved seedlings unless they agree to plant them on a new field in the manner prescribed by CIP. Farmers should be permitted to fill gaps in their own farms with seedlings of improved varieties. Also, farmers should be permitted to intercrop food
crops into their stumped coffee fields if they desire. CIP should seek to persuade farmers to adopt improved practices rather than requiring them to do so as a prerequisite for obtaining inputs.

Proposal 2: Input price differentials between what individual farmers pay and what PC's and common holdings pay should be reduced to about 15%, the price differential prevailing in the food crop sector.

Proposal 3: Serious problems exist in the management of the common holdings; revenue earned, as reported, are extremely low. It is not feasible to maintain the common holdings in their present form; productivity is too low and farmers are too alienated from working on them. Given the acute land shortage in the area, the expansion of the common holdings should be halted immediately. In areas where the common holdings are poorly managed and land is short, the government should consider redistributing the common holdings among peasant association members and producer cooperatives.

Proposal 4: The reallocation of coffee farms among farmers should be stopped; farmers will only invest in their coffee farms if they have confidence that they will be able to reap the benefits of their investment.

Proposal 5: Farmers must be permitted to work on their holdings without being pulled off against their will to supply labor to producer cooperatives and state farms. Producer cooperatives and state farms should not be allowed to use "campaign" labor; rather they should be required to offer wage rates which allow them to secure the labor supply they require on a voluntary basis.

Restrictions on Importation of Foodstuffs into Area

Previously, farmers in the study area emphasized coffee production and purchased cheap food from neighboring surplus areas. They thus were dependent on the local markets for food. However, currently, the import of foodstuffs into the area is restricted, driving up food prices. As a result, farmers are spending more money on food and are increasing food crop production, at the expense of coffee production.

Proposal 1: Neighboring food-surplus areas should be permitted to supply foodstuffs to coffee-producing areas, such as the Manna-Gomma study area. This will allow coffee producing areas to farm coffee intensively, instead of substituting food crops for coffee.

Coffee Prices

The sharp decline in coffee prices relative to food prices in recent years has reduced farmers' incomes and the incentive to produce coffee. As stated above, during the last 15 years, food
prices have increased in price about 400% relative to coffee.

Farm-gate coffee prices are tied to world market prices but, in fact, farm-gate prices as a percentage of export prices are very low, about 40% for 1985 according to World Bank, 1987, using the government's official exchange rate. Assuming a shadow exchange rate of 3 birr per dollar U.S. to reflect the high value of foreign exchange to the Ethiopian economy, the farmer's proportion of the export price declines to 27%.

Proposal 1: Farmgate coffee prices should be increased to offer the farmer a greater incentive to invest in coffee production. Unfortunately, increased coffee revenues to farmers must come at the expense of export tax revenues to the government. However, as the price increase generates an increase in coffee production, some of the lost tax revenues will be recouped as the quantity of coffee exported and thus taxed increases.

9.2 Resource Constraints

Shortage of arable land

Farm size is decreasing as population increases and as the common holdings increase in area at the expense of individual farms. Farmers have abandoned fallowing and are devoting higher percentages of their holdings to maize production, in order to secure their main subsistence food. They have also begun using bottom fields for field crops and are clearing coffee and forested lands. Some farmers have started double cropping maize with teff or barley by planting maize in late January and harvesting in August. Farmers are interested in making more intensive use of available land.

Proposal 1: An on-farm double cropping trial using an early maturing maize variety (Katumani or Holdgreen) would be useful. The maize would be planted in March, the farmers usual planting time, and harvested in June-July, 1-2 months before the farmers' local varieties. The field could then be planted to teff. This technology could greatly increase the frequency of double cropping in the area.

Proposal 2: Relay cropping of haricot beans (climbing or bushtype) may help solve food shortages and improve the variety of relishes available. Research has been started on relay cropping of beans into maize on station; the result is not yet at the stage of recommendation. Research has to be geared towards identifying varieties of beans that fit into farmers' maize management practices.

Proposal 3: Greater emphasis should be put on using bottom lands more intensively. Even bottom fields that are currently doublecropped are out of production for four months per year.
Shortage of grazing area

Competition for land between food crops and coffee has imposed a downward pressure on grazing area. This in turn, has caused a decrease in livestock numbers. Farmers' response to this problem is to keep a limited number of cattle; priority is given for cows. Feed appears to be limiting in both the dry and wet season.

Proposal 1: Planting fodder crops under coffee is one strategy being tested in Sidamo province by the International Livestock Center for Africa (ILCA). Desmodium spp. perform well under heavy shade and appear to have little impact on coffee production. Aside from improving feed availability, the practice may suppress weeds in coffee, limit soil erosion, and improve soil fertility.

Unavailability of cash in lump-sum

Traditional storage and sale of coffee in the form of bunl are no longer possible; farmers are required to supply quotas of cherries to wet-processing facilities at harvest time. The payment made for wet cherry is in many small amounts, which makes it difficult for farmers to save in lump-sum amounts. Farmers reported that this has created difficulties in making large investments and saving money for the critical period of shortage of food.

Proposal 1: CIP should consider establishing a system of saving money whereby farmers could receive credit for cherry delivered instead of being paid in cash. They could then withdraw cash when they so desire. Coffee cooperatives in Kenya have developed an effective savings system along these lines; the feasibility of such a system for Ethiopian coffee farmers should also be investigated.

Shortage of labor

There are labor shortages during peak periods, especially for coffee operations. The principal peak labor periods are May through June and September through November. During May through June, farmers are weeding their maize and coffee and are weeding coffee on the common holdings. During September through November, farmers are harvesting coffee, sorghum and maize, guarding their crops, and harvesting coffee on the common holdings.

Proposal 1: On-farm trials of herbicides should be conducted. Weed control using herbicides and supplementary hand weeding should be compared to farmers' current weeding practices. Farmers in the study area are very interested in the chemical control of weeds.

Proposal 2: Short-cycle maize varieties planted early will require weeding and slashing before the peak period for labor use
in May and June. Use of such varieties can permit the farmer to weed more effectively.

9.3 Coffee Production Problems and Opportunities

Research on coffee production should be directed towards improving management of coffee under the existing farming system. Current research emphasizes developing complete packages to maximize yields. However, researchers also need to develop simple, modified packages that farmers can adopt to increase yields on their existing coffee farms. Whereas current technology development focuses almost exclusively on physical productivity, improved technologies must also be acceptable to farmers and feasible for them to adopt.

Coffee berry disease (CBD)

Coffee berry disease is the most serious production problem. Resistant lines of coffee have been developed at the Jima research center. However, CIP is distributing the overwhelming percentage of these new lines to Peasant Association common holdings and producer cooperatives, not to individual farmers. CIP policy does not currently supply the new lines to farmers for infilling into their own fields. Farmers do not want to replace their coffee since this would deprive them of income until the new plantation comes into production. Instead of replacing their own coffee, they request fungicides. CIP sprayed the coffee trees of individual farmers in 1986 but there was general agreement among farmers and CIP staff that the spraying was ineffective.

Proposition 1: CIP should provide resistant lines to individual farmers for infilling into their own fields. If these trees perform well and resist CBD, farmers will be encouraged to request more of them and eventually susceptible varieties will be replaced. At the same time, efforts should be made to maintain the varietal heterogeneity of the area by not replacing all of the traditional coffee varieties.

Proposal 2: Concerning individual farmers, improved access to fungicides and sprayers has been overlooked by CIP. Only a few farmers are currently receiving fungicides and sprayers in sufficient quantity and on time. CIP has to reinforce the supply within the farmers' cash endowment capacity. However, CIP staff note that it is futile trying to spray coffee trees over 3 meters high, since those trees cannot be covered effectively.

Old age of trees

Almost all coffee farms in the study area consist of trees of more than 20 years of age. Most farmers have no method for regenerating new growth. They used to regenerate trees using the 'Agobido' system, and maintain them by removing old, dry branches and cleaning the stems against parasitic plants.
However, they have stopped these activities due to their lack of time. CIP and research station recommendations have directed farmers towards clean stumping. Interviewed farmers reject clean stumping because it deprives them of their income over the conversion period.

**Proposal 1:** Partial stumping demonstrations on farmers' fields are required. These will show farmers the advantage of partial stumping in which only one of the major coffee stems is cut. Thus the farmers can continue harvesting coffee from the tree while awaiting the regeneration of the cut stem.

**Proposal 2:** Pruning methods operative in other coffee-producing countries should be screened to test their effectiveness on Ethiopian coffee. These tests should be conducted on the coffee trees of typical farmers, in order to ensure that the methods are relevant under farmers' conditions.

**Uncontrolled growth**

Coffee trees in the study area have too many branches, are bushy, and have uncontrolled growth with many stems emanating from a single point. These limit yield, and contribute to insect and disease problems and increased competition for water, fertility and light. In general, farmers are not conscious of these problems.

**Proposal 1:** Cut-back and stand geometry control should be within the height of two meters according to station recommendations. Given that coffee on farmers' fields is distributed irregularly and the farmers prefer a high population of coffee, economic assessment of geometric control under different populations should be conducted. Research and demonstrations of cutting-up, shade control, and fertilizer application for rejuvenating trees should be conducted on farmers' fields.

**Declining number of shade trees**

Despite the importance of shade trees for shading coffee, farmers are cutting them down to use for construction and fuelwood purposes. Perhaps, this has contributed to the trend away from coffee production. Maintaining the shade trees and/or generating new technology that would help growing coffee in unshaded areas is desirable.

It is not clear from the survey whether farmers are aware of the declining number of shade trees. In Ethiopia research has not yet developed coffee growth for unshaded environments.

9.4 **Maize Production Problems and Opportunities**

**Lodging**

Lodging is commonly seen late in the season and is perhaps
both a varietal problem and a problem of high winds and rainfall. Farmers have several methods for controlling lodging. First they plant at low populations. Second, they claim that oxen cultivation (shilshallo) is effective in controlling lodging, since soil is heaped up around the stalk, strengthening it. Third, they thin to ensure that there is only one plant per station.

Proposal 1: A station trial is needed to test the planting of maize in rows (dibbling maize behind the plow) and ridging as a means for controlling lodging. This should be compared with the farmers’ practice of shilshallo and low plant population.

Proposal 2: New varieties that do not lodge are required. Desired varietal characteristics include stiff stalks, shorter height, and low ear placement. One possibility currently being tested is Sc 5522 x Holdgreen, Pop 43 x.

Weeds

As a result of high rainfall in the study area, weed infestation is a problem in coffee and maize. Farmers slash weeds under coffee twice or more and turn the soil during the dry season. In maize fields, they hand-pull weeds, hoe, cultivate by oxen twice and finally slash the weeds. The research center’s recommendation for number of weedings is much less than the farmers’ practice. Herbicides, as mentioned above in proposals under the section on resource constraints, can contribute greatly to limiting weed infestation.

Seasonal food shortages

Many farmers experience food shortages, especially during the rainy season from late May to August.

Proposal 1: Introduction of short-cycle maize varieties can provide farmers with early maize thus shortening their period of food shortage. Early maize varieties can also serve two other purposes: (1) spreading out the weeding work load over March through May, and (2) permitting doublecropping.

Low plant population

Maize plant populations are low due perhaps to shilshallo, and/or to low seed rates, which are farmer strategies to prevent lodging. The station’s recommended seed rate is 25-30 kg/ha giving a plant population of 44,000/ha. at a spacing of 75cm x 30cm.

Proposal 1: More information is needed on farmer plant populations. First farmer plant populations at different stages of growth, e.g., at emergence, before and after each shilshallo, and at harvest, need to be measured. Where populations are low, researchers need to identify the causes and find appropriate solutions. If the principal reasons for low populations are to
control lodging, then alternative means for controlling lodging
must be found to permit farmers to establish plant stands that
maximize yield.

Soil fertility problem

This problem is not generally observed, except on steeply
sloped fields. However, soil fertility is likely to emerge as a
problem in the future, as farmers continue cropping maize
without fallow, rotation, or applying manure or fertilizer.
Currently, only a few farmers express interest in fertilizer.

Proposal 1: On-farm experiments should be started to determine
fertilizer levels which can maintain soil fertility and that are
affordable for small farmers.

Storage Problem on maize

Some farmers claimed that weevils damage their maize in the
store, especially if it is stored for three months. Farmers
claimed that chemicals to control weevil damage in storage were
available in the past but are no longer available. Currently,
most farmers exhaust their supplies of maize soon after harvest,
so they do not suffer much from weevil attacks. However, if
maize production increases, this problem must be addressed.

9.5 Long-term Research Opportunities

In the long term, a number of opportunities exist for
increasing productivity in the area.

1. Intensive dairy farming seems to have some prospects even
though there is a shortage of grazing land. By introducing
 fodder and crossbred hozzo cattle, research can capitalize on the
farmers' tendency towards minimum grazing and preference for cows
over other classes of livestock. The feasibility of introducing
annual legumes and grasses intercropped with coffee should also
be investigated.

2. Research is needed to improve enset production.
Processing of enset is the principal labor consuming task in
enset production. Farmers in the study area are increasing enset
production to offset shortages of food during the rainy season.
They attribute enset's greater yield per unit area as its
greatest advantage over other food crops.

3. Improving cash earnings from oxen trade: Some farmers
in the study area sell their oxen just after planting ends and
buy again before land preparation. They do this to earn cash to
buy food and to relieve themselves of having to feed and care for
oxen when they are not using them. Advising farmers to condition
their oxen for a few months prior to selling could be one
intervention point, provided an economically feasible improved
ration is made available to them.
9.6 Producer Cooperatives: Problems and Prospects for Improvement

Many of the problems and constraints identified for the individual farmers are also applicable for the PCs, e.g., wildlife problems and food shortages. Problems mentioned below are those mentioned by the PC management bodies.

1. **Shortage of coffee washing stations.** The number of coffee washing stations is far short of the number required, according to PC leaders. There are about 21 washing stations under the service cooperatives. The distance that cherry travels from farm-gate to washing points requires a great deal of labor. Moreover, the long distance sometimes causes delays in cherry delivery which might reduce the quality of the coffee.

2. **Shortage of labor.** PCs hold more land than they can effectively manage. In addition, labor shortages are aggravated by the overlapping of coffee and food crop production activities.

3. **Input supply problems.** Requests for inputs pass through at least three stages: approval by AID bank, by MOA/CIP, and then by the Service Cooperative. Because of the bureaucracy, PC leaders claimed that there are sometimes delays in the supply of inputs.

4. **Member morale.** According to the PC leaders, some members are unwilling to devote themselves genuinely for PC development.

Ample opportunities exist for PC development. Their large areas and the strong support offered by the government can facilitate expanded production. PCs can make larger investments in production than can individual farmers. The following areas present important opportunities for increasing production:

1. **Establishment and introduction of new enterprises.** Family labor is by and large idle in PCs. Inclusion of new enterprises like bee keeping, dairying, and poultry could help to absorb the idle labor and improve the income of PCs.

2. **Crop diversification.** PCs concentrate almost exclusively on coffee and maize. Crop diversification could help the PCs better manage the risky environment they face. Moreover, a better nutritional balance could be achieved. Ensat, potato, vegetables and fruit crops could play an important role in this aspect. This objective could be achieved through double cropping and/or intercropping.

3. **Intensification of coffee production.** PCs can more easily adopt the recommended husbandry practices because of generous credit and access to inputs from outside sources.
References


