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ANNUAL ADMINISTRATIVE REPORT NO. 4

for the

GAMBIAN MIXED FARMING AND
RESOURCE MANAGEMENT PROJECT

October 1, 1983 - September 30, 1984

by

Jerry B. Eckert

Glen D. Fulcher

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Project No. CID/GAM-01

Submitted by

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I. INTRODUCTION AND HIGHLIGHTS

The Gambian Mixed Farming and Resource Management Project is now two-thirds completed and will terminate on March 31, 1986. The over-all goal of the project is to improve the well-being of the rural people through more intensified integration of crop and livestock production within existing Gambian farming systems.

During the first two and a half years major emphasis was placed on determining what could physically be produced in the Maize, Forage, and Range Components. During the same period the Socio-Economic Unit conducted Baseline and Intensive Farm Management Studies to determine existing farming activities, crop/livestock relationships and inputs and outputs for selected production-consumption units.

In March-April 1983 the project underwent a Mid-Project Evaluation and Redesign. In September 1983, the project agreement for the amended project was signed between the Ministry of Agriculture and AID reflecting the changes recommended in the evaluation. Dr. Jerry Eckert, Project Director at Colorado State University, and Bernie Henrie, Associate Director of the Consortium for International Development, came to The Gambia to develop the budget and the amended contract between CID and the Ministry. A draft amended contract was completed and was officially approved in November 1983.

In the first quarter of 1984 it became necessary to finalize a work plan for the final two years of the project. Considerable concern developed over the direction the program should take. In mid-March Dr. John Fischer, Executive Director of the Consortium for International Development, and Dr. Jerry Eckert came to The Gambia to review the project. At the culmination of their review, a consensus was reached on how the project should proceed and a work plan was drafted entitled "An Integrated Work Plan for the Final Two Years of the Mixed Farming Project." The project is now geared toward accomplishing the objectives of the plan.

During the period October 1, 1983 to September 30, 1984 many of the activities of the components have been pulled together into integrated village programs. It is at the village level where the total integrated program can be best tested as to its practicality and usefulness in meeting forage needs of livestock. It is in the villages that the project's goal of improving the well-being of the rural people through combined livestock/cropping systems can best be evaluated. This requires the integrated efforts of the physical and scientific disciplines of the MFP team.

During this year the first phase of the Boiram Livestock Feeding Trial was completed. Although results are tentative a great deal was learned by both the livestockmen and the MFP team. It is planned to continue the trials in the coming year with the same

animals but with a reduced period of feeding farm crop residues from April through June.

In addition, feeding trials have been initiated in four additional villages. One of these, Piniat, will be included in the intensive integrated study while the remaining three will merely involve harvesting and storing of farm crop residues which will be fed to the village livestock herds during the last two and one-half months of the dry season. Fencing materials to enclose eleven crop residue storage yards have been dispatched to the villages for their construction. Farmers have opted to store residues in community village areas rather than in the fields where harvested.

The MFP Maize Program has been successful beyond expectation. In 1983, there were 2500 hectares of maize planted under the MFP technical package. Even though yields were low due to the drought, farmers still thought this was one of their best crops. In 1984, even with the seed and fertilizer shortages, there has been 12 to 15,000 hectares of maize planted. Although there was a drought in some areas of MID and NBD, this affected only a small percentage of the fields and a bumper crop of maize is expected.

With this large crop of maize, storage could be a problem. The project has initiated a storage crib construction program supervised by the Marketing Specialists with the aid of the PCVs who are working with villagers to construct demonstration cribs. Proper storage at the compound level greatly reduces the loss from rodents and insects and allows farmers to hold their maize for later in the year when prices should be more favorable.

To date no serious maize marketing problems have developed as a result of the increase in commercial maize production. Although arrangements are being made for purchase through the Gambia Cooperative Union (GCU) there has been no big push by the farmers to sell to GCU since sales can readily be made through local buyers.

Additional livestock feeding trials using farm crop residues were carried out. Grazing preference trials for cattle, sheep and goats have been conducted and are being continued on a monthly basis. And maize intercropping with various legumes has been tested.

Data gathering for the Intensive Farm Management Study was completed in March and the final report is in draft form. Availability of the computers has greatly expedited data analysis. The herd study was started in June; evaluation of the MFP cultivator was initiated; and the marketing data gathering project on cereal crops and livestock is under way.

In general, it has been a productive year for the project. The maize portion of the program continues to be the most successful and is most widely recognized. However, harvesting and storage of farm crop residues is on the increase among farmers. In the remaining eighteen months most of the objectives of the project

should be met. It is believed the results of the program will have a lasting effect on improving the well-being of the rural population.

II. STAFFING AND STAFF ACTIVITIES

Field Staff Transitions

Several changes in long-term staff took place during the year. Only central, senior staff will be discussed in this report. Details of other staff changes can be found in the quarterly reports. Entries here are listed in chronological order.

Dr. Don Hedrick, Forage Agronomist, departed the project on 14 October 1983 at the end of his two-year contract. He was replaced by Dr. Sandra Russo who had arrived in September 1983.

Mr. Lawrence Bruce was employed as Administrative Assistant on 1 November 1983 to replace Ousman Marong.

Mr. Abdou Marimah was employed to replace Malick Sabally as Principal Accountant on 19 December 1983.

Mr. William Spencer arrived in The Gambia to begin a two-year tour as Marketing Specialist on 16 January 1984.

Mrs. Mam-Marie Sallah was employed as a Head Secretary on 16 March 1984. She replaced Miss Mary Faye.

Mr. Bambo Ceessay was assigned to the Project on 1 May 1984 to replace Mr. Amadou Jallow who resigned to accept a teaching position with Gambia College.

Miss Melanie Marlett formally joined the Project staff on 1 June 1984 to assist with the women's maize program. She had previously worked with the project as a Peace Corps Volunteer.

Dr. Neil Patrick arrived on 15 June 1984 to begin a two-year contract as Agricultural Economist.

Mr. Baboucar Gai was appointed Head of the Farm Economics and Rural Sociology Section of PPMU in June 1984. He will continue with MFP as counterpart to the expatriate Agricultural Economist.

Mr. David Spiro arrived in The Gambia on 6 July 1984 to serve as Maize Agronomist.

Mr. John Haydu, Agricultural Economist, departed Banjul on 20 July 1984 to begin a Ph.D. study program at Michigan State University. He was replaced on the staff by Dr. Neil Patrick.

Mr. Don Kidman, Maize Agronomist, departed The Gambia on 23 August 1984. He was replaced by Mr. David Spiro.

Mr. Kalamanlie Juwara was appointed as counterpart to the expatriate Marketing Specialist in early September. He will continue to hold a position with PPMU.

Mr. Momodou Jammeh returned to the project in mid-September, having completed his B.S. degree in Rural Sociology at the University of Missouri. He will be a counterpart to the expatriate Sociologist.

Short-Term Consultants

1983-84 was our busiest year to date in serving the project with short-term technical assistance. A synopsis of consulting visits follows:

Dr. Robin Cuany, CSU Agronomist, was in The Gambia from 28 October to 25 November 1983 to consult regarding the forage agronomy and maize programs.

Mr. William Spencer, CSU Extension Marketing Specialist, returned for a second visit from 1 November to 15 December 1983 to analyze data collected as a result of his earlier consultancy regarding maize marketing.

Mr. Alan Harney, CSU Computer Specialist, visited the project from 18 January to 8 February 1984 to install the new computers and train MFP staff in their operation.

Mr. Jim Layton, CSU Sociologist, worked with project staff from 17 February to 3 March 1984 to assist in the development of the final two year work plan.

Dr. Neil Patrick, Washington State University Agricultural Economist, was in The Gambia from 19 February to 27 April 1984 to assist with the work plan, assist in the structuring of economic analysis and an outline for the SEU's major report and to develop data collection procedures to analyze the MFP integrated program and other studies.

Dr. Melinda Burrill, California Poly, a Pomona Animal Scientist, visited MFP from 22 June to 7 August 1984 to develop a program to assist the owners of small ruminants, primarily women.

Dr. Dan Hilleman, CSU Communications Specialist, arrived 7 August 1984 to develop a video program documenting MFP activities and to assist in development of individual and project final reports. He will continue until mid-October.

Training for Staff Development

Training is a major part of MFP activities. The following is a review of training activities during the 1983-84 year involving Project staff. Training of non-project individuals and groups is included in Sections III and IV of this report.

Momodou Jammeh received his B.S. degree in Rural Sociology at the University of Missouri in August 1984.

Momodou M'boob received his M.S. degree in Animal Nutrition in August 1984 from West Texas State University.

Fasainy Dumbuya started work on a B.S. degree in Agricultural Economics (Marketing) at CSU in January 1984.

Omar Njai started work on a B.S. degree in Range Management at CSU in January 1984.

Musa Bojang started work on a B.S. degree in Agronomy at CSU in January 1984.

Baboucar Gai was at CSU from 24 September to 9 December 1983 for training on computer operation and data analysis and to attend a Farming Systems Research workshop.

Mr. Alan Harney conducted a computer operations training program at Abuko from 18 January to 8 February 1984. Lamin Jabang, Baboucar Gai and John Haydu participated.

The West Africa Farming Systems workshops was conducted at Banjul and Jennoi by The Farming Systems Support Project of the University of Florida from 12 - 20 March 1984. Those from MFP attending were:

John Haydu	William Spencer
Neil Patrick	Amadou Jallow
Scotty Deffendol	Solomon Owens
Manuel Alers	Alieu Joof

Three workshops were organized to train Range and Pasture Assistants during the reporting year. They were:

19-23 December 1983 - 23 Assistants participated.
 15-16 May 1984 - 7 Assistants participated.
 10-15 September 1984 - 23 Assistants participated.

A refresher training workshop was conducted 7-9 May, 1984 for the SEU Enumerators to prepare them for the new season's data gathering efforts.

Peace Corps Collaboration

The MFP continued its working relationship with the Peace Corps during the reporting year. Miss Melanie Marlett ended her tour with the Peace Corps in May 1984. She worked with the maize program in the Basse area up to her termination date. As

indicated above, she was subsequently employed by the Project to conduct women's programs regarding maize production and consumption.

In June 1984 three PCVs were assigned to the MFP to work primarily with the maize program. Mr. Chip Kolb will be stationed at Boiram/Njoben, Mr. Ray Gant at Piniai/Choya and Mr. Dick Schuman at Jorem Ba.

In September 1984 Mr. Paul Jakus was assigned to work with the Project in the areas of computer training and marketing. Paul is a PCV and holds a recent M.S. degree in Agricultural Economics from CSU.

The Project is very pleased with its continuing relationship with the Peace Corps. These volunteers have contributed much to the success of MFP.

Conference Attendance

The MFP staff attended and participated in several conferences and meetings during the past year.

Dr. Sandra Russo attended the CIMMYT Funded Workshop on Draught Power and Animal Feeding in Eastern and Southern Africa, 3-7 October 1983, Ezulwini, Swaziland.

Mr. Baboucar Gai attended the Farming Systems Research Symposium 31 October - 2 November 1983, Manhattan, Kansas.

Dr. Glen Fulcher attended the USAID sponsored Agricultural Development Conference for Africa, Second week of December 1983, Harare, Zimbabwe.

Mr. Solomon Owens attended the Third Meeting of the National Scientific Committees of the CILSS Regional Project for the Improvement of Maize, Millet and Cowpeas in the Sahel, 8-10 February 1984, Bamako, Mali.

Mr. Solomon Owens attended the Semi-Arid Food Grain Research and Development (SAFGRAD), IITA Joint Review and Evaluation Meeting, 5-9 March 1984, Ibadan, Nigeria.

Dr. Glen Fulcher attended the USAID sponsored Livestock Development in West Africa Conference, 27-31 March 1984, Dakar, Senegal.

Mr. Solomon Owens, Dr. Sandra Russo, and Don Kidman participated in the National Agricultural Research Advisory Board Meeting, 16 and 17 May 1984, Cape St. Mary, Banjul, The Gambia.

Administrative Visits

The following administrative meetings were held during the reporting year:

Dr. Jerry Eckert, Project Director, was in The Gambia 16-30 March to assist in the development of the Integrated Work Plan and to tend to various administrative matters.

Dr. John Fischer, Executive Director of the Consortium for International Development, Tucson, Arizona was in The Gambia to meet with Project staff and various GOTG and USAID officials regarding Project progress and other administrative matters.

Dr. Glen Fulcher, Chief-of-Party, visited Colorado State University, Ft. Collins, Colorado 14-15 August 1984 to meet with the campus support staff and the Project Director regarding project business, and he also met with CID office staff in Tucson, Arizona, 17-18 August 1984.

Miscellaneous

Progress toward the integration of SEU with the PPMU was substantial during the 1983-84 reporting year. At the conclusion of the year, three Gambian counterparts hold joint positions with both organizations. These are Baboucar Gai, Agricultural Economist; Kalamanie Juwara, Agricultural Marketing; and Momodou Jammeh, Sociologist.

To further the integration goal, the annual work plan for the Farm Economics and Rural Sociology Section of PPMU and the relevant portion of SEU were developed to be identical. The staff of SEU began in August to hold office hours on Thursday through Saturday at the downtown PPMU office while the Gambian counterparts spend Monday through Wednesday at the MFP offices at Abuko. The Gambians attend MFP staff meetings every Monday morning and the SEU expatriate staff attend the PPMU staff meetings every other Saturday morning.

Assistance was provided to Dr. Hector Vega, of PPMU, in his efforts to develop a linear programming model of the Jahally-Pacharr irrigated rice project. Dr. Vega is involved in the monitoring of that project.

In conjunction with PPMU staff the SEU was heavily involved in developing data from the Baseline and Intensive Village Studies to assist the FAO Coarse Grains Team during August and September. This team was in The Gambia to develop a policy document regarding the development of the coarse grains including maize, sorghum and millet. Several meetings were attended by SEU staff and their final report was orally presented on September 18.

Members of SEU were involved in a PPMU review during August. SEU staff members are presently working with a USAID team that is giving assistance to the Gambian Produce Marketing Board (GPMB).

III. THE INTEGRATED RESEARCH PROGRAM

Conceptualization

The 1982-83 Annual Report briefly discussed preliminary efforts toward the development and implementation of an integrated package of practices to be tested and demonstrated at several sites in The Gambia. The following outline was published in "An Integrated Work Plan for The Last Two Years of the Mixed Farming Project", dated April 1984.

A. Purpose

Integrate all MFP field activities through a common objective.

B. Background

1. The MFP developed several interventions relative to increased productivity of agriculture in The Gambia. These are increased cereal and livestock productivity and better use of resources (especially range) already present.
2. Selected aspects of research have been on-going at Boiram for the past few years.
3. There has been no research conducted which involves a fully integrated program of activities.
4. USAID, CSU and the MFP scientists wish to test these interventions in an integrated manner under closely monitored but traditional management.
5. The Boiram and Piniat areas have been selected as sites in which to conduct this integrated test.

C. Objectives

1. To improve the economic well-being of agricultural households in The Gambia through improvements in maize production and improved management of range and forage resources.
2. Measures of "economic well-being" will be developed by social scientists in consultation with biological scientists.

D. Aspects of an Integrated Program

1. Farmers will plant a portion of their cropland to maize using the maize production package. Balance of cropland will be planted to traditional crops, primarily groundnuts (as a cash crop).

2. Several farmers will be identified to plant forage legumes into an anticipated fallow plot; the legume would be used as hay or pasture during the dry season.
3. At least one hectare in the proposed 10-hectare protected range area will be used as a forage bank (producing *Stylosanthes hamata*).
4. Corn stover, and groundnut top hay will be harvested and stored for use as dry season feed.
5. Corn grain will be harvested to be used as a food crop or sold to local markets.
6. Livestock will be handled in traditional manner during the rainy season.
7. An attempt will be made to introduce an unfenced deferred grazing area where local livestock owners achieve the deferment of grazing through group action.
8. After harvest, crop residues will either be stored in the field (maize stover, sorghum stover, groundnut hay) or near the compound (groundnut hay). These residues and the rangeland are traditionally used to feed the livestock over the dry season. The intervention to be introduced is time of feeding to best maximize nutritive value of the feeds.
9. Socio-economic studies will be conducted of a reconnaissance type and also to determine the farmers acceptance of technology.

Activities and accomplishments of the "Integrated Program" of the 1983-84 year will be discussed in chronological order in this section.

As indicated above, the concept of an integrated program of project activities began to develop late in the 1982-83 project year. Research had been accomplished concerning several interventions related to the overall objective of the MFP. Project scientists and administrators began to realize that although the various research activities had been conducted in a mutually exclusive manner, there existed a strong thread of interdependence upon which a package of practices could be developed which had a high probability of being complementary. The basic idea was that maize could provide considerable quantities of stover for animal feed while increasing grain production for human consumption. This stover supplemented by groundnut hay and sorghum stover would form the basis for a dry season feeding program for cattle if harvested and stored properly; forage legumes, planted either as pure stands on fallow land or intercropped with grain crops would provide increased quantities of high quality forage to improve the dry season diet

for ruminants; and selective, deferred grazing of native and/or improved range would increase the productivity of rangeland.

The explicit goals of the integrated program were:

1. To improve the diets of rural people by increasing productivity of maize grain for human food.
2. To increase productivity of livestock by improving the feed supply during the dry season thereby minimizing weight and death losses.
3. To increase incomes of rural families by producing a surplus of maize grain which could be sold as a cash crop and increasing livestock production.
4. To test these interventions in a few locations under closely monitored but traditional management.

Village Selection

After evaluation of a number of villages, the sites of Piniai/Choya and Boiram/Njoben were selected by Project staff for the implementation of the integrated program. Factors considered in making the selection were:

1. Existence of previous or on-going research in the area. Due to its substantial cost in terms of materials and time invested by village residents the existence or plans to construct a fence around a deferred grazing area was of primary concern.
2. Willingness of the village leadership and residents to participate in the program and to be monitored.
3. Year-round accessibility of the site.
4. The degree the farming systems at the site is representative of a relatively large area.

Boiram and Piniai were the primary villages chosen at each site. However, since villages do not constitute autonomous units, especially concerning livestock activities, the smaller villages of Njoben and Choya were selected to broaden the scope of program activities. Thus, Boiram/Njoben was considered one site and Piniai/Choya the second site.

On April 12-13, 1984 a rapid reconnaissance survey was conducted in the Piniai/Choya site and on April 17-18 in Boiram/Njoben. Three teams were selected from the MFP staff, each consisting of

an Agronomist, a Range/Livestock Scientist and a Social Scientist. Prior to the village survey, a meeting was held at Abuko to share current information regarding each site.

Interviewees were selected at random from a list of compounds provided by village leaders. An exception to the randomness was made so that certain village leaders would be interviewed. Each team interviewed five farmers at Piniai/Choya and six farmers at Boiram/Njoben. An attempt was made to have a wife present during all interviews.

Structured Data Gathering

The following is a suggested interview outline to be used by interview teams during a rapid reconnaissance. This structure was used in Boiram and Piniai by MFP reconnaissance teams.

A. Compound Information:

1. Size, composition by age and sex, education, persons available for field work.
2. Non-farm activities (income sources).
3. Food sufficiency over past 3-4 years.
4. Land access (ownership, rental).

B. Crops:

1. Types raised and approximate area:
 - a. Single cropped
 - b. Multiple cropped
2. Cultural Practices:
 - a. Purchased inputs
 - b. Use of animal power and implements
 - c. Yields
3. Constraints to production: Probe this aspect.
 - a. What keeps farmer from producing more?
Area vs. production per area
 - b. Labor shortages (other inputs)
4. Disposition:
 - a. Used in home, storage
 - b. Sold, to whom, price, where, what use of money
 - c. Crop residues harvested and/or consumed in field.

C. Livestock:

1. Types owned and approximate numbers

2. Husbandry practices:
 - a. Wet vs dry season
 - b. Feeding practices
 - c. Tethering practices
3. Disposition
 - a. Consumed in home, for what purpose
 - b. Sold, to whom, price, where, what use of money
 - c. Used for draft/pack
4. Constraints to production (probe this aspect)
 - a. What keeps farmer from increasing production. More animals vs more production per animal.
 - b. Weight losses and deaths during dry season. How does the farmer think these could be reduced.

Reconnaissance Findings

Following the reconnaissance survey, reports of findings were prepared by each team. The following is a summarization of these reports:

Piniai/Choya: The village of Piniai consists of 46 compounds with 37 of Mandinka and 9 of Fula heritage. Choya is much smaller with 17 Fula compounds. Compounds interviewed ranged from 3-31 members averaging about 17 persons. In all compounds farming was identified as the primary activity of a majority of members. A few supplementary business activities were found, such as petty trader (cigarettes and soap), blacksmith, carpenter, weaver, etc., but usually these were dry season occupations of isolated individuals. All compounds interviewed had children attending school, both boys and girls. The presence of a school in Piniai facilitated this high enrollment rate.

The area cropped generally was between two and four ha. per farm with early millet, groundnuts, maize and rice being the order of priority. Early millet is the basic subsistence food supplemented by maize. Groundnuts are a cash crop and rice is grown both as a food and cash crop. Due to recent poor harvests, late millet, sorghum and cotton are not planted in any sizable quantities. Crop production was very low in 1983 due to the drought. Most compounds were running short of food. Vegetables are grown during the dry season by some compounds but due to low water supplies in village wells, no vegetable production was attempted during the 1983-84 season.

Millet and maize are generally planted on the same land each year in pure stands. Some fields close to the village receive manure from overnight staking of cattle during the dry season. However, most of the manure is raked and burned prior to planting. This practice was explained as being traditional or to make the soil easier to work. Groundnuts are raised in pure stands, only

occasionally intercropped with millet. Groundnut fields are usually rotated with fallow or occasionally with sorghum. Rice is grown by women in swampland fields up to 12 km. distance from the village. Each compound maintains some communal land on which all able-bodied members work. Each adult family member also has at least one small plot on which groundnuts (by males) or rice (by females) are produced.

Fertilizers are not used in significant quantities or by large numbers of farmers. At most, one bag per ha. was reported and well over half of the farmers interviewed used none. Insufficient cash and inadequate credit were given as reasons for this minimal usage. Most farmers indicated they would not be able to buy fertilizer for the coming crop season.

Most compounds have access to animal traction and appropriate implements. Donkeys are the most popular with oxen a distant second and only a few owning a horse. Almost all farmers indicated that shortages of machinery and insufficiency of labor at certain times of the cropping season to be serious constraints to crop production.

About one-third of compounds interviewed owned substantial numbers of cattle. One farmer indicated he owned more than 50 head. The balance of the compounds own none or only a few cattle. Most compounds own a few (4-6) sheep and goats. Livestock generally run free around the village during the dry season and are herded (cattle) or staked out (sheep and goats) to keep them away from growing crops during the rainy season. Grain fields are grazed by all livestock types following harvest and groundnut hay is harvested, stored and fed to oxen, donkeys and infrequently to sheep and goats during the dry season. No one interviewed had harvested grain stover for livestock feeding in past years.

Other constraints mentioned by farmers interviewed were poor rainfall, insects, birds, monkeys, bush pigs and shortages of seed supplies. Many farmers were aware of past project activities in the area (primarily the deferred grazing fenced area), and most had supplied workers for the fence construction, but very few were acquainted with the reasons for the work.

Boiram/Njoben: Boiram is a village of 82 compounds and Njoben has 68. All residents are Wolof. Compound size ranged from 4 to 29 individuals. The compound structure is somewhat different from that found at Pini/Choya. As a generalization, some three to five compounds are affiliated under the leadership of an older man who, however, exerts little actual authority over the individual compounds. About half of the compounds have seasonal non-agricultural incomes derived from various dry season occupations. All families with appropriately aged children had some children in the Boiram school. In the sample taken there were more female children than males in school.

The average land holding is approximately 6 ha. Groundnuts are the most prevalent crop followed by early millet, maize, irrigated rice and vegetable crops. The current season is the

first rice crop to be produced on the Jahally-Pacharr Project. Most compounds in Boiram/Njoben have small plots on the project land which is about 10 km from the villages. In previous years rice production was the responsibility of the women. With the institution of the rice project, men are much more involved in rice production. Most crops are raised as compound crops but each adult is assigned a field on which groundnuts are produced.

Production of cotton and sorghum has been mostly discontinued in recent years. Groundnuts are rotated with millet but maize and garden crops are raised on the same land each year. There is very little fallow land around the village at present. All farmers interviewed indicated they used fertilizer purchased through the cooperative or obtained from the Agriculture Department at Sapu. Some farmers must purchase their fertilizer "secondhand" from merchants due to their failure to obtain credit elsewhere. In these cases interest rates approach 100% for only 4-5 months. Average fertilizer applications are 2 bags per ha. Crop production last year was very poor but the first harvest of rice from the irrigated plots should alleviate food shortages.

"Strange Farmers" are a popular source of labor for cropping activities. These men, usually from Guinea, arrive in the area in late May or early June and are employed by residents to work 3-4 days per week in exchange for lodging, food and a plot of land on which they grow cash crops.

All farmers interviewed own draft animals and have access to the appropriate equipment. Donkeys were the most prevalent source of draft power, followed by horses and oxen. Most farmers own cattle, sheep and goats in small numbers. Only one farmer interviewed owned a substantial herd (about 150 cattle). Livestock are handled in much the same manner as in Piniat/Choya. All farmers interviewed harvest groundnut hay to be fed during the dry season to draft animals.

All interviewees were aware of the deferred grazing experiment of 1983-84 and most understood its purpose. Some harvesting of grain crop stovers was done in the past year.

The farmers at Boiram/Njoben are generally more wealthy than those at Piniat/Choya but access to adequate credit is a major problem. Other problems mentioned are maintenance of farm implements and crop pests including insects and bush pigs.

Dry Season Feeding Program at Boiram - 1984

Forty N'dama heifers, one to three years of age, completed a farmer-managed feeding trial near the village of Boiram. Animals were from the villages of Boiram and Njoben and were divided into two groups: 20 were fed on crop residues and deferred rangeland and 20 head were left to roam about in search of food and water. The fed group was confined throughout the 182-day trial.

Feeding of crop residues started on 28 December 1983 and animals were returned to their respective owner's herd after the final

weigh-in on the 27th of June 1984. Both groups were monitored at two-week intervals, at which time body weight and girth measurements were taken. Fourteen livestockmen had heifers in the program, ten from Boiram and four from Njoben. All animals were ear tagged and treated with an anthelmintic (Exhelm II) at the beginning of the trial.

On the 56th day of the feeding period all 20 heifers moved to the deferred Community Grazing Plot, also near Boiram. They remained for 56 days on the predominantly annual grass range, at which time they returned to the crop residue feeding area.

Nutritive salt blocks were provided both in the residue feeding and range areas. Participating stockmen were responsible for daily watering and feeding of the fed group. Crop residues were fed on the ground.

Drinking water is hand drawn from open wells by women, both for human and animal consumption. Water was generally hand carried to the residue feeding area and carted to the range area by donkey carts. Three hundred and twenty liters of water could be stored on site in converted steel drums, also serving as water troughs. Two 200 liter drums were provided for hauling water by cart to the two sites. Allowing for spillage and evaporation a minimum of 10 liters water per filling could be available per heifer; based on an average animal live weight of 108 kilograms. Water was not provided on a daily basis, and the lack of water limited the amount of dry residues and forage consumed. Maize and sorghum stover were 85% dry weight when the trial started and progressively got dryer. Rice hay and Panicum hay were nearly 100% dry matter as was the groundnut hay.

Table 1 Treatment Specifications: 20 Heifers in Feeding Trial at Boiram, 1984

Time	Days	Treatment	Kg Fed*	% Utilized
28/12-25/01	28	**Maize Stover	220 daily	40
25/01-22/02	28	**Sorghum Stover	220 daily	40
22/02-18/04	56	Deferred Range Plot	90 daily	100
18/04-16/05	28	+Sorghum Stover plus amounts of rice straw	220 daily	40
			*40 daily	60
16/05-13/06	28	++Panicum maximum hay plus Rice Straw	*90 daily	95
		plus Groundnut hay	*40 daily	95
13/06-27/06	14	Groundnut hay plus Rice Straw	*90 daily	95
			*40 daily	60

* estimates

** mainly leaf material eaten by animals, little stalk consumed.

+ sorghum stover gradually used up and rice straw became principal feed at about 90 kilograms/day.

++ combination of all three fed first, then rice straw and groundnut hay.

The results of the on-farm feeding trial are presented in three groups depending on body weight of heifer. The three groups are: 1) Yearlings; 60 to 70 kilograms; 2) 1 to 2 year olds, 90 to 100 kilograms; and 3) 3 year olds, 120 to 140 kilograms live body weight

Five groups were gaining weight when the trial started. The control group, at 90 to 100 kilograms, was losing. Only one group maintained weight throughout the trial, and one group actually gained weight. All others lost weight. The control 1 and 2 year olds started the trial losing weight and ended up maintaining their starting weight of 94 kilograms. The yearling fed group maintained weight throughout the first 168 days then in the last 14 days gained 3 pounds. The control group lost as a group 201 kilograms over the 182 day trial period, while the fed group lost 40 kilograms.

In general, animals lost a bit on the maize stover, gained it back with the sorghum stover, maintained their weight 56 days on the annual deferred Community Range Area. All but the older fed group gained on the sorghum/rice straw mix, the same group maintained weight on the Panicum maximum hay/rice straw/groundnut hay, and only the youngest group gained weight the final 14 days (see Table 1 for feeding treatments).

Starting 18 April the two younger fed groups were separated from the oldest group and put in with the crop residues, where they could eat what they wanted when they wanted it. Water was also

furnished separately. The youngest heifers gained weight, but the 90 to 100 kilogram group lost a net 4 kilograms the last 14 days.

The oldest fed group (130 to 140 kilograms) lost a net 10 kilograms the last 70 days of the trial, after coming off the range plot. Probable cause was irregular feeding and watering. When the younger animals no longer needed to be hand-fed because of their confinement inside the residue storage area, no one came around to feed the older heifers on a daily basis.

What happened to the control group? All three age groups gained weight to 18 April weigh-in, and some time thereafter they started losing weight rapidly. The oldest group lost 13 kilograms in 28 days, the mid group lost 9 kilograms, and the yearlings lost only 3 kilograms. The mid group recovered slightly over the final 42 days by gaining back 4 kilograms. The oldest and yearling groups continued to lose; the oldest lost an additional 2 kilograms, and the youngest lost additionally 7 kilos.

Heart girth measurements were taken at the same interval as the body weights. Generally girth measurements fluctuated radically over the 182-day period. The fed groups decreased in size when they went onto the deferred Community Range Area, and increased when they went back onto the crop residue. They never gained back their original girth measurements. This is attributed to the increase in exercise within the range plot, and lack of adequate water supply. Rather limited exercise is required in the 1/2 hectare crop residue feeding area, and water is close at hand.

Conclusions are tentative after one year of on-farm crop residue feeding. The same groups of heifers will undergo a similar trial next dry season, but starting in March and running through June for 112 days. Stockmen participants were enthusiastic in carrying out another year, but it is known that the women lifting and transporting water to the heifers are not. A similar trial will be conducted at the Pinia/Choya site during the 1984-85 dry season. The deferred grazing area, of 15.25 ha was fenced into 3 separate parcels seeded with Cenchrus ciliaris (1983-84), Stylosanthes hamata (1983-84), Stylo. guianensis (1983), Stylo. Scabra (1983) and root transplants of Andropogon gayanus (1983-84). Watering of the animals is not expected to present a problem since there is a well at the edge of the grazing area. Some repair is needed and is expected to be completed prior to the feeding period.

The Maize Component in the Integrated Study

The maize component entered into the integrated program of MFP with four main efforts:

1. The demonstration of field crop technology through farmer demonstration trials;

2. Evaluation of a fertilizer revolving fund program on a "Kafo" organization basis;
3. The demonstration of the MFP cultivator package in farm cropping;
4. The conservation of maize stover for dry-season feeding of farm livestock.

Farmer Demonstration Trials: Three crop demonstration trials were set up in each village of the integrated study mainly, maize, groundnuts and millet or sorghum. Seed and fertilizer for these trials were furnished by the F.A.O. Project through the D.O.A. and delivered to the villages. These crop demonstration trials are a part of a national demonstration program which consists of the following components:

1. the use of good quality seed, in this case variety NCB;
2. the use of 110 kg. N/ha and 46 kg P₂O₅/ha applied in split applications;
3. timeliness in carrying out the essential cultural operations especially weed control and earthing-up; and
4. conservation of stover for dry season livestock feed.

Evaluating a Fertilizer Revolving Fund on a "Kafo" Organization Basis: In a cooperative effort with F.A.O. and with the Maize Growers Association (MGA) six Kafos were organized and issued fertilizer on a revolving fund basis to grow maize beginning with the 1984 crop. The Kafos were composed of ten farmers each, who will grow one ha of maize each. The ten farmers from among themselves elected a Kafo Head who represented them in administrative responsibilities of the Kafo. Each farmer member was issued the fertilizer supplied by F.A.O. to grow one ha. of maize. He agreed to pay back to the Kafo head this same quantity of fertilizer in-kind or equal value at harvest time. This fertilizer will be reissued to him prior to planting the 1985 maize crop.

After marketing the produce, the farmer will:

1. Pay the loan principal in full.
2. Contribute 25% of loan principal towards the FAO revolving loan account with the ADB for a period of 4 years only.
3. Pay a service charge of 5% of the loan principal, and
4. Deposit with the ADB not less than 25% of the principal for the credit of the unit's savings account.

The amount recovered under points (1) and (4) above would be credited to the unit's account and would be made available for purchase of farm inputs for the following season on a revolving credit basis. The amount under (2) would be used to start new credit units.

This scheme is currently being tested on a pilot basis by the MFP in its integrated program areas of Piniái/Choya and Boiram/Njoben. At the former, 2 units of 10 members each were formed and in the latter, 4 units of 10 members each. Each member had a hectare of maize and got all his fertilizer requirements on time. Of the 60 hectares, 56 are doing well and 4 failed in the Piniái/Choya area due to lateness by the farmer in carrying out cultural operations. In addition, 50 ha. of seed multiplication on a contract basis in the NBD were put under this scheme. On the national basis, the scheme got a late start and most of the fertilizer did not get to the farmer on time due to transportation problems. For example, in the URD, only 2,000 bags of fertilizer were received whereas there were 2,600 farmer members of the MGA waiting for the fertilizer. Thus, most of them received less than a bag of fertilizer. However, plans have already started to improve on the program for next season. Co-operating agencies in this scheme are the MFP, FAO, DOA and ADB.

Demonstrating the MFP Cultivator: An MFP cultivator and attachment was delivered to one farmer each in the villages of Boiram and Piniái. The farmers were selected and attended a workshop held at Yundum, Tuesday, May 22, 1984. At the workshop, they became familiar with the MFP package through personal use of the cultivator in crop planting and cultivating for weed control. They also received instruction in "tool set-up" for various crop cultivation needs. Personal on-farm training was given them using their own animal traction on their own farms prior to planting time.

The farmers were asked to use their MFP cultivators to plant and cultivate all of their 1984 farm crops, and to share its use with neighbor farmers when possible. A more complete description of this activity can be found in Section IV.

Conserving Maize Stover: The maize growers in the villages of Boiram, Njoben, Piniái, and Choya were encouraged to conserve maize stover for dry season supplemental feed. The farmers who are members of Kafos received demonstrations in conservation and storage methods and will be encouraged to participate as a Kafo in an all-out forage conservation program. Two specially selected Agriculture Demonstrators, one at Boiram and one at Piniái, provided day-to-day direction for all of the above efforts.

Peace Corps Volunteers (PCVs): Since the inception of the MFP, the maize component has used the services of PCVs in its extension and demonstration activities. During the past year,

one PCV completed her two-year assignment but three new ones joined the program. Two were assigned to the MFP integrated programs. Chip Kolb at Boiram/Njoben, and Ray Gant at Piniyai/Choya. They gave general assistance and direction to all on-site activities in connection with MFP's integrated study component. These PCVs serve as Assistant Agronomists and they work with the project while living among the farmers. They have been an important aid in quickly diagnosing field problems and in spotting misunderstandings in the MFP/farmer relationship thereby effecting needed changes in strategy necessary to improve farmer acceptance of the component parts of the program.

Evaluation Process

The Socio-Economic Unit of MFP began an evaluation study of the Integrated Programs at Piniyai/Choya and Boiram/Njoben. Six enumerators are collecting data using the FMDCAS instrument and other means from a total of 36 farmer compounds. Nine farmers at each site were selected who had indicated a willingness to participate in all phases of the integrated program and nine who would not participate. Data collection began in June with the intent of evaluation of the socio-economic benefits and costs resulting from the program. Problems with input supplies have hampered the program to some degree. The development of the "Kafo" system to assist in the existing credit impasse will be closely evaluated in the near future. This study will probably continue to the end of the project contract.

At the time of preparation of this report, the maize harvest has just begun. Maize yields appear to be approximately 3 tons per ha. at all sites except Boiram where a severe mid-summer drought has reduced yields substantially. Maize stover harvest has also begun with farmers bundling the stalks and standing them in the field for drying and later transport to the feeding areas.

In general, cattle owners are anxious to participate in the stover feeding/deferred grazing experiment at both sites. However, water delivery problems at Boiram and water supply problems at Piniyai must be solved. Neither problem presents a substantial hurdle and MFP scientists are confident they can be corrected.

The utilization of the MFP cultivator at Piniyai was disappointing in that the farmer to whom the machine was assigned failed to use it as a unit. He indicated the training he received was not sufficient to make him confident in its set-up and use. The Agricultural Demonstrator was of little help.

At Boiram the cultivator was used on maize plus other crops. However, some operations were not accomplished as intended according to the design of the machine and the training program. Socio-economic studies will continue regarding this intervention.

IV. SUPPORTING ACTIVITIES

Although a great deal of effort has been made this year to integrate all of the programs, there are still large portions of component research and extension that do not, as yet, fit into the integrated program.

Forage and Range Components

The forage unit has concentrated its efforts primarily on research on legume introductions, use of crop residues and evaluation of legume and crop residues through feeding and grazing trials.

Plantings of introduced legume cultivars were made in 1982 and 1983 at Yundum, Sapu and YBK. The purpose of the plantings was to identify legumes that would be adaptable to Gambian growing conditions. By 1984, it became obvious that several legumes were not going to make it, either because they could not survive the long, dry season, they could not compete with weeds, they did not re-seed successfully or some combination of these reasons. Twenty-six accessions are currently growing at the three sites. Four additional legumes are being used in maize intercropping experiments: pigeon pea (Cajanus cajan), lablab (Dolichos lablab), cowpea (Vigna unguiculata), and groundnuts (Arachis glabra).

There is a noticeable preponderance of Stylosanthes accessions (more than 50%). Although a relatively small genus, it accounts for over one-third of the sown pastures in the tropics and sub-tropics. The genus has a wide climatic adaptability; cultivars represented here were chosen specifically from climatic homologues with The Gambia. Of the initial Stylosanthes plantings, only one cultivar completely failed (Stylosanthes sympodialis), while several others are not competitive enough with weeds to be useful for Gambian conditions (Stylosanthes guianensis, all accessions, and Stylosanthes capitata).

The two most productive Stylo cultivars are S. hamata and S. humilis. S. humilis is an annual or short lived perennial. S. hamata is a short-lived perennial. Both establish quite easily as can be evidenced by their spread into all the other legume plots. They remain green into January and recover rapidly after the first rains. The third species, S. scabra, is a strong, woody perennial and is the most productive in terms of dry matter, reaching heights of more than one meter. It, too, remains green into the dry season and recovers rapidly after rain.

Earlier emphasis had been placed on Leucaena, a leguminous tree. Leucaena can be a very productive legume and has been found useful in situations where feed is cut-and-carried to livestock. However, the genus requires more rainfall than occurs under normal Gambian conditions and production is far below what was hoped for. At the YBK site, an adapted local variety is

moderately productive but that variety does not perform well at other sites in the country. *Leucaena* is a prolific seeder but the seeds must be treated (hot water, clipping, or sandpaper) to get even minimal germination. *Leucaena* does not compete well with weeds or hares and requires constant weeding and fencing during the first year. Despite its value in other settings, it does not appear valuable, under current management practices, for Gambian farmers.

Evaluation of legume introductions is done by animal preference trials. The ultimate judge of forage quality is animal performance. A forage may be highly productive for dry matter, protein and energy but if livestock do not eat it nor perform well on it, the forage has no value as animal feed. With this in mind, large plots of legumes were planted to be evaluated by animals grazing on three sites.

Table 2. Locations of Legume Evaluation Trials

Legume Cultivar	Yundum	Sapu	YBK
<i>Stylosanthes hamata</i> -Australia	x	x	x
local	x	x	x
CIAT	-	x	x
<i>Stylosanthes humilis</i> -local	x	x	x
<i>Stylosanthes guianensis</i> -Australia	x	x	x
<i>Stylosanthes scabra</i> -Australia	x	x	x
<i>Stylosanthes syndialis</i> -Australia	-	-	x
<i>Leucaena leucocephala</i> -local	x	x	x
Cameroon	x	x	-
Philippines	x	x	-
Australia	x	x	x
<i>Aeschynomene histrix</i> - CIAT	-	x	-
* <i>Macroptilium atropurpureum</i> -Australia	x	x	x

* 1984 planting

The pastures were grazed by oxen for two days at each site in February, during the dry season. The trials began again in

August using oxen, sheep and goats. The trials are now being conducted every four to five weeks. The length of time spent grazing and the number of bites are recorded. Not much variability is seen in plant selection between the dry season and the wet season at each site. The greater difference is seen between sites. At Yundum, the oxen prefer the two accessions of *Stylosanthes humata*. The sheep spend most of their time eating grassy weeds and a few minutes eating *S. humilis*. The goats concentrate on escaping and will take a few bites of *Leucaena* when tied to a post.

At Sapu, in the dry season, the oxen completely grazed down the *Aeschynomene histrix* plot, spending almost twice as much time there as in any other plot. The next preferred species was the local variety of *S. hamata* which became the preferred species in the wet season. The sheep and goats at Sapu spent some time grazing *S. hamata* and sampling the young (less than 25 cm. height) *Leucaena* but again, concentrated on weeds outside the fence and on escape.

At YBK, the local varieties of *S. hamata* and *S. humilis* were most preferred by all species. Oxen grazed the local *Leucaena* as well in the dry season while the goats sampled it in the wet season. The sheep and goats spent more time grazing legumes at YBK than those animals did at Yundum and Sapu.

Overall, it is the local varieties which are preferred by livestock. A next step would be to analyze the plants to determine what the animals are selecting. In any event, it is fortuitous that the local varieties of *Stylo* and *Leucaena* are preferred as it makes dissemination of these varieties to farmers much simpler. These trials will be continued for at least another year on a monthly basis.

As in previous years, maize, sorghum and groundnuts were grown in 1983 to provide crop residues for feeding trials. Harvesting of the crops and storage has been described by Hedrick and Bojang (1983). In brief, the grain was harvested from the maize and sorghum and the stalks were stacked upright in the field for a few days to dry. The stover was then transported to Yundum where it was stored under polyethylene until time for feeding. The groundnut tops were cut about 20 centimeters from stem bases to facilitate later lifting of the nuts. The tops were stacked and dried for several days, then taken to the Yundum farmyard for storage. Gamba grass was cut in October at the airport, partially dried in the field, then removed to the farmyard where it was stored in loose stacks for final drying.

Two feeding trials were run in 1984. The first feeding trial used maize stover, sorghum stover, gamba grass hay and groundnut hay (Trial 1). The second feeding trial used groundnut hay (1:1, two replications, Trial 2). In both trials 20 two-year old heifers weighing an average of 149 kg. were divided into four groups of five each per feed (or per pen).

In Trial 1, there was an overall gain in body weight on all feeds. A sharp drop in weights was recorded at the third

weighing for all feeds except groundnut hay. Average daily intake (ADI) slightly dropped for sorghum stover and gamba grass hay but more drastically for maize stover. The latter was due to inadvertent feeding of moldy stover for a short time. The groundnut hay was the most efficacious feed, as was shown in previous experiments, producing an average gain of 19 kg. per animal.

In Trial 2, animal weights fluctuated considerably which may have been partially due to the stress of weekly (rather than bi-weekly) weighings. In this trial, 11 of the 20 heifers showed an overall loss of weight on all feeds. Intakes were uniform and somewhat higher (excepting groundnut hay alone) than intakes in Trial 1.

In order for an animal to gain weight, they must consume more than their maintenance requirements to put them into a production phase. In Trial 1, only groundnut hay was consumed in enough quantity to more than meet maintenance requirements. This was reflected in the much greater weight gains on groundnut hay as compared with other feeds. In Trial 2, only replication 1 of groundnut hay and gamba grass hay produced weight gains; animals lost weight on the other feed and on the replication of groundnut hay and gamba grass hay. In that case (rep.2), the animals were consuming far more as a percent of their body weight than other animals in other pens, suggesting a possible health problem in that pen, probably parasites. Animals in that treatment lost more than the animals on the other treatments.

Results from these trials corroborated, for the most part, earlier feeding trials. The exception in 1984 was the maize stover, again probably due to lowered intake when offered moldy stover. From the first weighing on 2 March to the final weighing on 14 May, 16 out of 20 animals gained or maintained their weight, 3 animals lost 3 kg. or less, and one animal lost 17 kg.

In general, a brief period of crop residue feeding six to eight weeks toward the latter half of the dry season should keep cattle from experiencing drastic weight loss every year.

In 1984, the village level feeding trial at Boiram became an area where all MFP activities could be integrated. This integration was described in Section III. The trial involved the feeding of crop residues and the use of deferred range land for grazing. Four additional programs are under development for the 1985 dry season, one (Piniái) which will be an integrated program like Boiram, two (Sukuta and Makamasserí) will combine deferred range and feeding of crop residues, and the fourth (Garowal) will use only crop residues. Also villages around Garowal and Boiram are being encouraged to store their crop residues for dry season feeding.

The three sites of Piniái, Sukuta, and Makamasserí have had community range management areas developed during 1984 as follows:

- A. Pinal (MID, south bank), range area 15.25 hectares, fenced with 3 separate parcels, operational in dry season 1985. Seeded with Cenchrus ciliaris ('83-'84), Stylosanthes hamata ('82, '83, '84) and root transplanting of Andropogon gyanus ('83-'84).
- B. Sukuta (MID, north bank), range area is 13.27 hectares fencing is currently being finished, operational in dry season 1985. Seeded with Cenchrus ciliaris ('83-'84), Stylosanthes hamata ('83-'84), Stylo guianensis ('83), Stylo scabra ('83), and root transplanted Andropogon gyanus ('83-'84).
- C. Makamasseri (URD, north bank), was a very remote area, range area 10 hectares, fence complete with some improvements needed, two parcels, operational in dry season 1985. Some seeding with Cenchrus ciliaris ('83), Stylo. hamata ('83-'84), Stylo scabra ('83), Stylo guianensis ('83), and seeding of Andropogon gyanus ('83-'84).

Some of the Demonstration plots have been expanded from the two hectares to Range Management Areas of 10 plus hectares. This expansion has occurred in IOAs showing continued interest in improving livestock feeding during the dry season. The Range Management Areas are deferred to late dry season and used in rotation with the crop residue feeding program. The first attempt to defer a managed area was at Boiram in 1983-84.

There is also a 5 hectare Range Management Demonstration Plot at the Livestock Marketing Board's holding ground at Kabakorr that was fenced in 1983. The plot is an old fallow that had been taken over by regrowth Terminalia microptera (tree). The Terminalia was killed by injecting 2,4-D into the root crown of the dense regrowth stand. Andropogon gyanus was root transplanted into the plot during the 2,4-D treatment in August 1983, and again in 1984, 1/2 hectare of An. gyanus roots were transplanted into an experimental area inside the plot where Graslan was used to kill broadleaf weeds. The transplant was made one month after the Graslan was applied. Evidently, all of the herbicide did not leach out of the soil because many of the transplants did not survive, and some of those living are still showing herbicide stress. The remaining 4.5 hectares will be under limited use in dry season 1985.

Small seeding plots were established in each of the 18 fenced areas. Cenchrus ciliaris, Stylosanthes hamata and Stylosanthes scabra were planted into 10x20m plots in June/July 1982. In 1983, the reseeding was expanded by imported seed of the same cultivars plus S. guianensis. Revegetation by transplanting live shoots of Andropogon gyanus was attempted for the first time on a large scale in August 1983. Although biomass production is not measured on these demonstration plots, an experimental plot at Kabakorr containing A. gyanus, C. ciliaris, Panicum maximum and S.hamata showed an increase in dry season forage production by 250 kg/ha in the second year (1983).

Due to drought conditions, limited progress was made last year in collection of field data for the Range resource inventory in MID and URD. Kantora District and the eastern half of Fulladu East District was completed. In two short years of data collection, only 39 percent of the total 488,040 ha. has been sampled. See Table 3 for completed districts and those yet to be sampled.

Table 3. Status of Range Resource Inventory as of 9/30/84

Administrative District	(Location)	Hectares Completed	Date	Hectares Proposed	Date
Niamina Dankunku	(MID,s.bank)	13,030	1982	-	-
Niamina West	" " "	14,130	1982	-	-
Niamina East	" " "	31,690	1982	-	-
Wuli	(URD,s.bank)	53,730	1982	-	-
Kantora	(URD,s.bank)	33,075	1983	-	-
Fulladu East	" " "	40,185	1983	40,185	1984
Sandu	(URD,n.bank)	-	-	32,985	1984
Sami	(MID,n.bank)	-	-	46,868	1984
Fulladu West	(MID,s.bank)	-	-	79,055	1985
Niani	(MID,n.bank)	-	-	42,455	1985
Niani ja	" " "	-	-	12,010	1985
Upper Saloum	" " "	-	-	27,760	1985
Lower Saloum	" " "	-	-	16,985	1985
	-	189,740ha		298,300ha	

Limited numbers of forage plants and other plant life have been collected, identified, pressed, and dried for mounting as herbarium specimens. Identification is by Latin Nomenclature. The mounted specimens so far number 178; 81 of those have been exported for positive identification and should be returned to MFP shortly.

The collection and pressing of plants have been accomplished by Pasture Assistants and senior staff while collecting weight data on the Range Inventory. Collecting is done from October through January.

The seed multiplication/plant materials centers at YBK and Giroba Kunda were expanded this year; YBK reached maximum ground occupancy. Species present are A. guyanus, C. ciliaris, S. hamata, S. scabra, P. maximum. For the 1985 rainy season root transplanting of A. guyanus, adequate quantities will be available from YBK and Giroba Kunda, obviating the need to transport rootstock from Yundum.

Where possible, the Range Unit has tried to assist villages in improving their livestock watering capabilities but not to the extent of digging new wells. In collaboration with the LOA at Sukuta assistance in the form of an MFP lorry transported necessary rock material to the river bank where an already existing access road needed paving. The rocks are now in place and will be dressed in the dry season, then topped with concrete. A similar offer was made to the LOA in Sambatako but failed when members never collected the stone.

Maize Component

Following a near disastrous '83 growing season due mainly to a nationwide drought but also due to a lack of production inputs, the 1984 season started with a lot of promise and is ending with a reasonable amount of success. The total hectareage under maize shot up astronomically despite pre-season constraints; the national average yield per hectare has nearly doubled and the institutionalization of the maize program is progressing very satisfactorily. The Maize Component of the MFP has the leading role in the national maize program but during the year, other MFP components, the Department of Agriculture, volunteer organizations, farmer organizations and various individuals contributed to the program.

Approximately 2,600 hectares of maize were grown in 1983. Severe drought throughout most of the country, but especially in the north banks of MID and URD, was reflected in average yields of a little under 1.5 MT/ha. Highest maize yields were 4 MT/ha while lowest yields recorded in the MID and URD were hardly measurable. In the 1984 cropping season, an estimated 15,000 ha. were grown under this program with the project assistance in inputs, extension, organization and supervision. This figure is broken down per division as follows:

URD	-	5,500	ha
MID	-	4,500	ha
NRD	-	800	ha
LRD	-	600	ha
WD	-	2,500	ha

A lot more maize would have been grown had it not been for the short supply of inputs, specifically seed and fertilizer. However, the above figures reflect a large increase in the maize hectareage over last year. The 1984 maize harvest season is currently in progress, and it appears that, despite serious drought in the eastern half of the MID and certain other microclimatic regions, yields in most areas of the country should

exceed those of 1983. The nationwide yield sampling is still to be completed but a visual assessment of fields shows that yields of up to 2 MT/ha will be realized in 25-30% of the fields. However, an area in the MID comprising about 2% of the total hectareage experienced total crop failure due to drought which hit the area at the crop's tasseling stage.

Two serious constraints faced the National Program this year - seed and fertilizer. Due to the 1983 drought, seed supply became scarce as the maize seed being held by farmers was consumed for food. The anticipated seed requirements were 150 tons of maize seed of the variety NCB. The Minister of Agriculture was advised that maize growers were unwilling to sell their seed but would trade it for rice. Money was made available to purchase rice for this type of exchange but rice did not become readily available until the first of June. By the time the program was mobilized consumption of maize had reduced the availability of uncommitted NCB seed to about 30 tons. This seed was not of the best quality but the amount obtained together with what was held over from last year by farmers and the 2 ha. grown under irrigation at Sapu made up the seed supply for the 1984 crop.

After the problems encountered in 1983 with obtaining fertilizer, the Government arranged with Senegal this year for fertilizer which started arriving in March. The suppliers assumed the responsibility for distributing the fertilizer across the country to major storage sites. Still, problems were encountered by individual farmers.

Credit-Worthiness: This year the GCU, the major production credit agency, took a tough stand against farmers who failed to pay back loans from previous years either because of a poor harvest the previous years or just refusal to pay back. As a result, the number of "credit-worthy" farmers was a very small fraction of the total farming community especially in the major maize growing areas. Through repeated negotiations and Government intervention, fertilizer credit was extended to most of the farmers based on an 80% loan repayment capability. However, this decision came a little late for some farmers.

Insufficient Quantities of Fertilizer: Even though GOTG should be commended for providing fertilizer credit for the upland cereals for the first time ever, the amount of fertilizer imported was far short of the total requirement of cereal farmers.

Fertilizer Cost: Farmers complained of the increased cost of fertilizer over last year even though the price of fertilizer is highly subsidized by the Government.

The FAO fertilizer credit revolving fund pilot scheme was designed to help farmers overcome fertilizer constraints and has been described in Section XII. On a national basis, the scheme got a late start and most of the fertilizer never got to the farmers on time. Plans have already started to improve on the program for the next season. Cooperating agencies are MFP, FAO, DOA and ADB.

Maize is seeded at the rate of 25-30kgs/ha. and with the rapid increase in the maize hectareage combined with the drought of the two previous cropping seasons, farmers have been unable to meet their seed requirements. To help alleviate the problem, the MFP cooperating with the Seed Multiplication Unit (SMU) of the DOA launched a seed multiplication program starting with the dry season of 1983/84.

Two hectares of high quality maize variety seed were planted at the Sapu Experiment Station under irrigation. This was in cooperation with the Crop Improvement Officer who provided supervision. Plantings were carried out in mid-February and all cultural operations were carried out on time. Yield was 5 tons/ha. The program was successful and the purity of the seed was maintained since no other maize was growing in the vicinity at the time. Although the quantity of seed realized was very small (10 tons) when compared to the national requirement, it went a long way towards solving the seed crisis. From this crop 1.5 tons was made available for the wet season seed multiplication program.

The objective of this program is to assure a supply of certified seed for the 1985 season to cater for farmers coming newly into the maize program as well as to provide for those already in the program but who are unable to keep their own seed. Approximately 50 ha. of seed from the dry season program was grown in Chamen (GOIC) in the NBD under contract between the DOA and 50 volunteer farmers with the MFP taking the lead in supplying all inputs and providing supervision.

The Certifying Officer of the SMU estimates that there will be about 40-50 ton of certified seed produced. The farmers were encouraged to plant maize by a promise that the crop would be purchased at a premium price by the DOA after consultations with the MOA and the National Seeds Council. However, negotiations have not yet resulted in the announcement of a price attractive to the producers. On the basis of the current recommendation of 25 kg seed/ha., the certified seed obtainable could be expected to be enough to plant about 1600 ha. Generally, it is advisable to renew the seed source on about 25% of the area planted each year in order to maintain the seed purity. Based upon the estimated 15,000 ha. planted this year under the MFP programs, we may be a little short of certified NCB seed next year even if there is no increase in the area planted.

Strong consideration is being given to multiplication of seed under irrigation during the 1984/85 dry season. Also, the multiplication of seed at each of the agricultural experiment stations will be considered for the 1985 growing season.

The maize component conducted four research trials at Yundum and Sapu in 1984. These were:

- Expt. MFP 1 - Maize/Multiple Legume Intercropping Trial
- Expt. MFP 2 - Rotational Bush Fallow vs. Legume Fallow
on a succeeding Maize Crop

Expt. MFP 3 - Maize/Cowpea Relay Cropping Trial
Expt. MFP 4 - Soft Maize (zea mays, amylaceae)
variety adaptability trial.

Experiments 1, 3, and 4 were carried out in Yundum and 1 and 2 in Sapu. Harvesting of the trials are expected to begin soon and a separate report will be written on the results.

At Yundum, the trials are very satisfactory and meaningful results are expected. There have been many visitors, both local and international, to the trials site and a National Research Open Day was also organized there. The latter involved the bringing together of researchers, extension officers and key farmers from all over the country to discuss the trials and offer suggestion for further research. The occasion was very significant because it was the first time ever the three have been brought together to discuss common agricultural problems and suggest research directions. The farmers were very impressed with Experiment MFP 1 and some have volunteered their farms to be used for on-farm trials next year.

At Sapu, however, it was a far less successful story with trials. Due to the long dry spell that was experienced mid-way through the season, the trials did not do well. Nonetheless, some useful information is still expected from them.

Another serious constraint faced by farmers is the lack of suitable farm equipment. The biggest yield reducer in maize fields is weed competition. Many farmers have simple weeders (sine hoe and occidental hoe) but a sizable number still weed with hand hoes. In a year with reasonable rainfall, the weeds become more than a farmer can control and many fields were abandoned this year due to weeds.

Realizing these problems, the MFP initiated a farm mechanization program which developed into an important component during the year. With the assistance of SISMAR, a farm machinery and manufacturing company in neighboring Senegal, and in cooperation with the DOA's principal agricultural engineer, a prototype over-the-row cultivator named the "MFP cultivator" was developed to be drawn by a pair of oxen. The rectangular frame (120 x 30 cm) is fitted with cultivator sweeps and half sweeps, ridging cultivation disks, mouldboard ridgers, depth gauge wheels and two complete seeder units. After conducting training including field practice for six specially selected demonstrator teams consisting of one AD and one cooperating farmer, nine sets of cultivator equipment were sent to the field where these demonstrator teams were supposed to demonstrate the equipment on their own farms and to allow other farmers in their localities to use them. The objective was to familiarize farmers with the concept (over-the-row cultivation as opposed to between-the-rows cultivation) and equipment, test the prototype at the farm level, and to get feedback on design changes that would improve the effectiveness.

Farmer acceptance of the equipment has been overwhelming this first year of testing and the demand for the prototype for

testing has been very high. An on-going program of evaluation of the equipment is being conducted. Six simple trials were put out in which time studies were carried out comparing the new MFP cultivator and the conventional practice with other equipment now in use by the farmer. Each trial was one-half hectare planted to maize. On half the area the cultivator was used for all operations and on the other half, the conventional sine hoe. Results analyzed thus far show that the MFP cultivator required only 50-70 percent of the time to perform the operations done with the sine hoe. Moreover, a far better job is done with the MFP cultivator.

On-the-job training of the demonstrator teams in the field on the use of the cultivator continued during the season. Two regional and one national field demonstrations were organized during July and August to show the MFP cultivator uses on all upland crops. Farmers and extension personnel were brought in to observe the demonstrations, and joint evaluation sessions were held afterwards to solicit the comments of those present. Farmers' suggestions and constructive criticism have resulted in several modifications of the equipment to improve its performance and its widespread acceptance. Another season of evaluation will be necessary to finalize the design. Then the cultivator equipment will be recommended for mass production and sale to interested farmers or groups of farmers.

The maize component devotes a great deal of time to training of extension workers and of farmers. For the extension workers, the approach this year was to use the local training units as much as possible to give on-the-job training to small groups rather than to lengthy training programs involving large groups. The In-Service Training Unit completed the following training programs during the past year.

- A. Refresher Course for Ox-Ploughing Staff Based in Mixed Farming Centers: Fifty senior ox-ploughing instructors, in two batches, participated in the five day program. Participants got an understanding of the husbandry practices of the major crops grown in the country, were familiarized with the use of ox-drawn implements, and trained on the care of work oxen.
- *B. Basic Course for Local Training Units: Fourteen local training unit staff located in the five divisions participated. Participants were exposed to the principles and practices of effective extension supervision, trained to conduct effective training programs, given skills in program planning and had their knowledge of recommended crop production principles and practices up-dated.
- C. Basic Course for Agricultural Demonstrators: All demonstrators involved in extension were given small group training in their own localities by the LTUs on crop production principles and practices.

- *D. Basic Course for Agricultural Assistants (AAs):
Eighty AAs in four groups of 20 each were trained for one week in various agricultural extension topics.
- *E. On-the-Job Training for Village Extension Workers (VEWs): All VEWs were trained in small groups for two days at the MFCs on crop production practices and extension methods.
- *F. On-the-Job Training for VEWs and Contact Farmers:
Two such training programs were held whereby the VEW and 10-15 contact farmers per VEW were trained together in joint sessions.
- *G. Food Demonstrations for Farmers and Extension Workers: This program was designed to expose participants to the different recipes that can be prepared from maize; demonstrate the preparation of some local dishes using new maize recipes; improve the ability of male extension workers to prepare their own food; and help participants acquire knowledge in the preservation of some local food items.

(NOTE: *Denotes courses in which the MFP participated fully.)

In addition to the above training programs, the MFP is writing a comprehensive "Maize Production Handbook for Extension Workers" expected to be in circulation before the next cropping season begins.

A total of about 600 farmers participated in one form of training or the other at various times during the past year. These training sessions took the form of field days where representative groups of farmers were brought to a particular site to see some new technology associated with maize production. Most of these were localized and centered around the on-farm demonstrations. However, two regional field days at Giroba Kunda (URD) and Boiram (MID) and two national field days (at Medina Sancha and Yundum) were organized during the 1984 cropping season. These sessions were very beneficial and farmers were impressed with the proceedings. Each session started with an introduction followed by a brief lecture, an observational field tour, a "Question and Answers" session, and finally a general meeting. It should be mentioned that it was at one of such sessions held in Mamut Fana (in MID) that the National Maize Growers Association was born. All farmer training sessions during the year were organized and sponsored by the MFP maize program.

In addition to the above programs, a total of 32 maize cookery demonstrations were carried out in the URD, LRD and NBD. These provided training in maize preparation for food for over 600 women.

Communicating with the farmers in local languages has often been difficult, because extension agents occasionally must use foreign words and for other reasons as well. As a result, lack of understanding or improper use of the introduced innovations ensued. In an effort, therefore, to help the agents to communicate better with their clientele the Extension Aids Unit (EAU) and the ISTU have found it necessary to introduce adult literacy in the local languages in extension programs.

The MFP Maize Component cooperated during the past year in this venture. Two Mandinka language primers on maize production were prepared and released for use by both farmers and VEWs. The primers contain step-by-step instructions in simple Mandinka orthography on the Maize Technology Package and on cultural operations associated with maize production. In addition, two two-week sessions for fifteen selected demonstrators/facilitators were carried out to familiarize participants with the primers and to prepare them to be able to train farmers in the use of the primers.

One of the biggest constraints to effective extension work in the country is the poor mobility of extension agents. To help alleviate this problem the MFP cooperating with the FAO Fertilizer Project was able to supply all the 350 Agricultural Demonstrators in the country with pedal bicycles. This exercise was completed in February well in advance of the start of the 1984 cropping season. In addition, the MFP has continued to assist extension supervisors with new motorbikes and to service those that were issued earlier.

Through its extension efforts the Maize Component also encouraged the formation of the National Maize Growers Association (MGA) which began organizing at the village level in URD and MID in December 1983. From that beginning "Mixed Farming Centre Area" local MGAs made up of representatives at the village level were organized. This was followed by the establishment of divisional MGAs. In May 1984 the divisional units affiliated into a National Maize Growers Association and elected Alhagi Babou Ceessay, a pioneering maize grower, their National President. The MGA has since been registered with the Attorney General's Chambers and Ministry of Justice, and has also opened a deposit account with the Agricultural Development Bank (ADB). Members pay a membership fee of D0.50. To date there are 4,800 registered members in the URD and MID. Membership from the other division has lagged behind but is now picking up in the LRD and NBD.

The organization has been very active since its formation primarily in the area of input arrangements. Immediately following the first meeting of the URD and MID executive committee, they met with the Minister of Agriculture in his office. At that meeting, they informed the Minister that each of

the two divisions wanted to grow 7,000 ha. of maize and that they were concerned about the timely availability of inputs. The figures mentioned took everybody by surprise and created some uneasiness for MOA authorities. It was thought if 14,000 ha. of maize were grown in MID and URD, cash crop production would be greatly affected. GOTG was, at the time, promoting cotton production in those two divisions. To counter this perceived threat to cast crops, the Minister together with a strong entourage undertook a cotton promotion campaign within the two divisions and, at a series of meetings with farmers, a compromise was struck. The government would provide fertilizer credit to cereal farmers and farmers would, in turn, grow some cotton. (N.B. cotton production inputs are given out free of charge.) Thus the maize hectareage was reduced though only slightly and the cotton hectareage greatly increased.

The MGA continues to gather strength and is already an important segment of the Gambian farming community.

Maize production in The Gambia has become increasingly popular for a number of reasons but notably:-

1. The variety grown, NCB, produces a crop of roasting/boiling ears in about 70 days during a period of minimum availability for food in the second half of the rainy season. Maize grain for food is produced in about 90 days making it one of the two earliest crops, the other being early millet.
2. Maize cookery demonstrations have shown housewives numerous new ways to prepare maize for food. These demonstrations and the maize dishes have become very popular with rural households.
3. Maize as a cash crop has helped diversify the source of rural income.
4. There is a growing awareness of the feed value of maize stover among farmers and livestock owners.

In the coming year, continuity will also be given to the institutionalization of the program within the GOTG, the MFP cultivator program, seed multiplication, and our agronomic and cropping systems research program.

Socio-Economic Unit

The data collected during the Baseline Study in 1981-82 and the Intensive Village Study of 1982-83 was received from CSU in analyzed form in January through March 1984. It was decided to combine these two studies along with certain data from the Technology Transfer Study, and Family Goals and Decision Making Study into one major report to be titled "The Gambia Mixed

Farming Systems." Additional data analysis was requested concerning ethnic and geographic differences, degree of mechanization, size of land holdings and others. These analyses were completed by CSU in June.

Writing of the report was accomplished by Dr. Manuel Alers, John Haydu, Baboucar Gai and Lamin Jabang. A first draft of the report was completed in late September. The report includes data from the following sources:

Baseline Survey - 582 compounds in 89 villages
 Intensive Village Study - 46 compounds in 9 villages
 Technology Transfer Study - 65 compounds in 14 villages
 Farm Goals Study - 46 compounds in 9 villages

The report includes the following chapters:

<u>Chapter</u>	<u>Topic</u>
I.	Introduction
II.	Methodology
III.	The Rural Family; An Overview
IV.	Farm Production; Resources; Availability and Use
V.	Increasing Farm Production; Some Factors
VI.	Income, Consumption and Levels of Living
VII.	Portraits of Five Families
VIII.	General Summary and Conclusions.

Other studies in various stages of completion are:

- A. The balance of the Technology Transfer Study is in the process of analysis. A report will be forthcoming before the end of 1984.
- B. The second year's (1983-84) data from the Intensive Village Study is in final stages of coding and verification. The coded data will be sent to CSU for analysis in the near future.
- C. The Livestock Owner Association study data collection is completed and analysis begun. A report will be written in the near future.
- D. The first year's (1982-83) data from the Maize Study was returned from CSU in analyzed form in August. Time has not permitted any evaluation as yet. The second year's data is in the process of coding and verification.
- E. Data collection began in June, concerning market prices and transportation costs for 18 agricultural commodities at 16 market locations in The Gambia. This is designed to provide an understanding of market operation and a data base for a market news activity in the near future.

- F. A Herding Study was begun in June with four cattle herds at various locations in the country. Data is being collected by an enumerator, assigned to each herd, to allow a description of herd composition, inventory changes and management practices.
- G. In response to suggestions made by Dr. Melinda Burrill, short term consultant on small ruminants, an inventory study of sheep and goats was developed to begin September 1, 1984. The study will look at herd composition and inventory changes. Eight villages are involved in the study.
- H. As a part of the integration of SEU and PPMU the expatriate and Gambian Agricultural Economists were assigned responsibility for the field operations of a CILSS funded study involving 60 compounds located in 12 villages. Field data collection began in August with considerable time being spent organizing and instituting the study. Data is being collected regarding cropping practices and household consumption patterns. The study is expected to run for 12 months.

In the 1984 rainy season, SEU began research efforts to provide a socio-economic analysis along with biological/physical evaluation of proposed interventions.

Data is being collected from 24 farmers in four villages using a modified FMDCAS instrument and supplemental questionnaire to assess the socio-economic feasibility of the maize package. An attempt was made to involve 12 farmers who had accepted and were intending to employ the package and 12 farmers who raised maize but would not employ the package. Due to mis-communications with the Maize Section and continuing problems concerning distribution of seed and fertilizer the definitive outcome of this study is in question at this writing. It is intended that this study will continue through the 1985 rainy season.

As a supplement to the maize study, discussed immediately above, a socio-economic evaluation of the MFP cultivator is also being accomplished. At each of the four villages one farmer has been provided with a prototype of the cultivator and trained in its use (see Maize Section report for details). In addition to using the cultivator on any of his crops, each farmer was required to plant a 1/2 hectare plot, 1/4 ha. using his traditional methods and 1/4 ha. using the new cultivator. Detailed time studies were kept by MFP enumerators to allow comparisons of time used. Preliminary evaluations show a significant time saving when the MFP cultivator is utilized. However, no farmer in the study used the machine as he was trained. Further study will continue.

The herding study, discussed above, will allow an evaluation of cattle productivity and management practices. The current study will continue through May 1985 when an evaluation will be made to decide on possible continuation.

In January, an IBM/XT business computer and a Compaq portable computer were delivered to MFP in Banjul. This installation gives the project one of the largest capacity computers in The Gambia. Following on-site training, the computers were heavily utilized in analyzing data for "The Gambia Mixed Farming Systems" report.

This acquisition has provided project staff with much greater flexibility in handling data than before when all analysis was done at CSU with substantial time delays. Mr. Paul Jakus, PCV, will begin training additional operators and assist with more far reaching data analysis.

A proposal is in the formulative stages to convert the present FMDCAS system to one more relevant to The Gambia. When approved and developed the IBM PC/XT will be programmed to conduct the necessary data analysis in the country.

In August, approval was secured to purchase an IBM PC which when delivered, will be utilized primarily as a word processor. Local staff are in the training process for this activity.

Also in January, the long-term marketing program was initiated when Bill Spencer from CSU joined the MFP staff. The marketing program outline was developed from his two short-term consultant reports, the AID evaluation team report and the "Integrated Work Plan." Specific accomplishments through the integrated SEU program in marketing are:

The training of three MFP enumerators to be objective market reporters.

The collection of market price series in 16 rural and urban markets at the retail and wholesale levels on 18 commodities. This data is being analyzed for seasonal wholesale-retail and regional price differences.

The initiation of an extension education program using the Extension Aid Unit (EAU) of the MOA to help farmers and village traders be aware of market prices and other market information. Several radio programs using local languages have been aired.

Women's Program

A Women's Program as such was not part of past MFP activities. MFP supported a program of extension services which taught women's societies maize production technology, family nutrition, and preparation of food using maize meal (see 1983 annual report). Mrs. Amie Jallow, Agricultural Superintendent of LRD, headed the program. Her counterpart was Melanie Marlett, a Peace Corps Volunteer assigned to MFP.

In June of 1984, Melanie completed her Peace Corps assignment and became a full-time staff member. It was at this time that an MFP

women's program began to emerge. Registration of women's societies involved in maize production was done throughout the country. Over 300 hectares of maize were registered. FAO agreed to supply 100 hectares with fertilizer. An equal distribution of fertilizer was made to all five divisions in the program, which in retrospect was probably a mistake. The larger maize growing areas (MID and URD) were denied proportionately more fertilizer and the non-maize growing areas did not use the fertilizer that was distributed to them. Lack of seed in some divisions led to later re-channeling of fertilizer to those areas that had seed. Eighty-four societies were selected and supplied with 99 hectares worth of fertilizer (four bags of 15-15-15 and two bags of urea/ha.).

The distribution of societies and hectarage:

District	Number of Societies	Number of Hectares
URD	37	42.5
MID	24	31.0
LRD	12	12.5
NB	6	8.0
Western	5	7.0

The area of land planted in URD is much greater than the above figures show. Many societies planted up to four ha. but received only enough fertilizer for one ha. The repayment schedule is the same as that described for the Kafos.

Although the rains have been fair this year, a mid-season drought occurred in MID at the time of maize tasseling. Not one ear of maize could be harvested from the Women's Societies fields. Consequently, repayment of their fertilizer loan may be a problem.

The Women's Societies are registering with the Agricultural Development Bank (ADB). A D15.00 deposit is required to open a Society Bank Account. The bank account will provide the societies with: a secure place to save their money, a means of establishing and receiving credit, accumulation of interest on their money and independence as a separate entity, and working towards goals such as purchase of a grain mill.

Twenty maize growing Women's Societies, primarily in MID and URD were supplied with cowpea seed to be planted as an intercrop with their maize. Although research has just started on maize/cowpea intercropping, some farmers had already tried this planting in a sporadic manner. Planting was usually done at the second weeding. The cowpea intercrop is being promoted for several reasons. Cowpeas bring a high market price and sales could generate income for the Women's Societies. An intercropped field yields two crops (maize and cowpeas) while the presence of the cowpeas can control weeds. If not sold, the maize and cowpeas are protein complementary and could provide a high nutritional

value component to the rural diet. Research results from this year's maize/cowpea intercropping experiments will be used to formulate an appropriate package for use by the Women's Societies next year.

As far as the women farmers are concerned, their biggest problem is lack of milling machines. The pounding and processing of maize and other grains is one of the largest energy and time consuming tasks of women. In cooperation with FAO, the Women's programs will be looking at the problems of milling and machines. Ten hand mills (Atlas #1 with 7-9 kg/hr capacity) have been ordered but not yet received.

Because of the success of the Maize Cooking Demonstrations over the past two years, the Extension Aids Unit/Department of Agriculture/MFP have decided to continue with these. This year a total of 50 demonstrations (two per mixed farming center) will be held throughout the country. These demonstrations will involve female and male ADS AAs plus their supervisors. The demonstrations will be training for them and key village women who will later become teachers to other village women. The demonstrations will include the dishes prepared in the past plus some additions (i.e. tortillas, weaning food). Demonstration of one of the new hand mills will also be included.

In August the first demonstration was held at the field day at Medina Sancha in MID. MFP provided the funding for cooking ingredients while the villagers provided maize, cooking utensils, wood, labor, etc. The other demonstrations will start in November and continue through March.

V. FACILITIES AND EQUIPMENT

Buildings

Office Space: In November two new office rooms and two restrooms were completed. The larger room became Fulcher's and Spencer's office, as well as conference room for staff meetings. With the arrival of the ITC team in February, all staff, excepting the Range and Forage Unit, were moved to the first office building. The Range and Forage Units will move as soon as the new office building (consisting of five offices) is completed by the end of this year.

Up-country Rest House: The conditions at the MOA guesthouse in Sapu became unacceptable this year, thus expediting the decision for MFP to build its own resthouse. A design for a typical round house was drawn up and modified so that two round rooms are bedrooms, connected by the sitting/dining area with attached kitchen and bath. As most of the materials had to be brought from Banjul, construction proceeded slowly. The house is now habitable, lacking only finishing touches like paint and curtains.

An arrangement was made with MRC to have use of their resthouse in Basse. This has proved quite satisfactory for MFP staff working in URD.

Vehicles

Two Nissan Patrols and one Nissan Four-Door Pick-up were received in December. These have been especially useful for up-country work. The original project vehicles are showing their age, some of them must be restricted to the immediate area for fear of breakdown. Maintenance costs have steadily increased. As mentioned by the Maize component, MFP purchased 150 bicycles for use by field workers.

Computer Facilities

The MFP received an IBM/XT business computer and a Compaq portable computer in January. In August approval was secured to purchase an IBM personal computer which will be used primarily as a word processor. The computers have greatly facilitated turn-around time on data analysis for the socio-economic surveys.

VI. ISSUES

There are several issues that are of concern regarding progress of the project. Many of these issues are of a continuing nature having been items that have restrained project development and accomplishment. Certain others relate to project termination now scheduled for 31 March 1986.

These issues are discussed briefly here in no particular order:

Periodic shortages of fuel supplies have hampered field work. Several times over the past year up-country trips by project scientists were curtailed for periods up to two-three weeks due to fuel shortages.

Vehicle maintenance continues to be a problem. This problem is amplified as the vehicles age. All types of vehicles are affected; motorcycles, trucks and automobiles. It is often impossible to obtain necessary spare parts in The Gambia. Some motorcycles have been out of running condition for periods up to four-five months.

The institution of a Herbarium depends on obtaining the short-term services of an experienced Taxonomist. The one selected and contacted later withdrew.

Delays in securing approvals from appropriate agencies of COTG have caused delays in implementing some project activities. Specific examples are:

Approvals for expatriate staff

Assignment of counterparts

Approval of The Integrated Work-Plan dated April 1984.

Establishing a purchase price for maize seed.

Rapid turn-over of Gambian staff causes unnecessary uncertainty in the development of project activities. One expatriate scientist has had three different counterparts over the past year.

Fluctuations in electrical current causes severe problems in the operation of the project's computers. At one such power surge a voltage regulator and one computer were burned out. The machines are now powered by 12 volt batteries which have solved this problem

Construction of the guesthouse at Sapu and office space at Abuko have been severely slowed by the inability to secure construction materials.

Delays in purchase, shipping and clearance through customs of needed equipment and supplies has slowed certain project activities.

Uncertainty regarding employment following project termination is causing concern among certain project staff. This is of particular interest to the 25 enumerators employed by the Socio-Economic Unit.

Finally, the project played host to an unusually large number of visitors, study teams and evaluations over the

past year. Although each has its own reason for requesting time of project staff, these requests do have a negative effect on productivity.

VII. PUBLICATIONS AND REPORTS

MFP improved its publication record this year, producing two end-of-tour reports, the Gambia Mixed Farming Systems report, an integrated workplan, several TDY reports, quarterly reports and other articles or papers presented or published by MFP staff. With some new staff this year, the interest in writing and publishing on research results has increased and it is anticipated that the publications record will continue to improve. A detailed list of written materials appearing during the past year follows:

MFP Reports

Don Hedrick and Musa Bojang, Final Report of the Forage Agronomist, Mixed Farming Project, Report No. 2.

Don Kidman and Solomon Owens, The Commercialization of Maize in The Gambia.

MFP Team. Integrated Work Plan for Final Two Years of Program.

Manuel Alers, John Haydu, Baboucar Gai and Lamin Jabang, The Gambia: Mixed Farming Systems.

Quarterly Reports. A quarterly report is submitted by each unit every quarter. From these a summary report is sent every quarter to MOA, DOH, DAHP, PPMU, AID and CSU.

TDY Reports

Robin L. Cuany, Report on The Gambia Mixed Farming and Resource Management Project, October 28-November 25, 1983.

Don A. Jameson, Report on The Gambia Mixed Farming and Resource Management Project, October 29-November 12, 1983.

William P. Spencer, The Gambia Maize Marketing Survey and Consultant Report, January 1984.

Melinda J. Burrill, Report of the Small Ruminant Consultant (WID Fellow) to The Gambian Mixed Farming Project. July 1984.

International Presentations

Glen Fulcher, 1984, Mixed Farming Project. Emphasis on Livestock Production. Seminar on Livestock Development in West Africa. Dakar, Senegal.

Sandra Russo, 1983. Feed production research for small holder agriculturalists in Western Kenya. CIMMYT Workshop on draught power and animal feeding. Ezulwini, Swaziland.

Sandra Russo, 1984. On-farm trials for mixed crop-livestock systems. West African FSR workshop. Yundum, The Gambia.

Publications

Russo, S., R. Hart, K. Otieno, J. Owins, and J. Onim, 1983. Feed production research for smallholder agriculturalists in Western Kenya. CIMMYT Workshop on draught power and animal feeding in Eastern and Southern Africa, October 1983. Networking Workshops. Report No. 2. Ezulwini, Swaziland.

Russo, S.L., R.D. Hart, J.F.M. Onim and H.A. Fitzhugh, 1983. Cropping systems research directed toward improving livestock production. Third Annual Farming Systems Symposium. November 1983. Kansas State University.

R. Hart, M. Onim, S. Russo, M. Mathuva, K. Otieno, and H. Fitzhugh, 1984. An analytical framework for feed resources research on mixed farms in Western Kenya. Winrock International Report No. 46. Morrilton, Arkansas.

VIII. EXPENDITURE SUMMARY

Tables 4 and 5 below contain a summary of expenditures for FY-84 as well as for the life of the project. As of September 30, 1984 the project had 30 percent of its chronological life remaining. Table 4 indicates that somewhat larger amounts of budget remain in each line item category. However, it should be noted that monthly expenditures for FY-84 ran higher than average levels from previous years. Preliminary estimates indicate that the Mixed Farming Project was accurately budgeted and that, barring unforeseen circumstances, the budgeted amount will be very nearly completely spent by the March 31, 1986 closure date.

TABLE 4

Gambia Mixed Farming and Resource
Management Project CID/GAM-01
1 October 1983 through 30 September 1984

Category	Total Expenditures FY-84	Total Expenditures to Date	Total Budget	Balance Remaining	
				Dollars	Percent
Salaries	409,450.89	1,171,117.13	1,812,892.00	641,774.87	35.4
Fringe Benefits	75,433.48	213,345.18	341,212.00	127,866.82	37.4
Travel	162,415.84	390,249.46	667,840.00	277,590.54	41.6
Allowances	82,629.54	187,190.09	406,850.00	219,659.91	54.0
Other Direct Costs	<u>173,340.04</u>	<u>293,721.73</u>	<u>583,225.00</u>	<u>289,503.27</u>	<u>49.6</u>
TOTAL DIRECT COSTS	903,269.79	2,255,623.59	3,812,019.00	1,556,395.41	40.8
G&A	89,423.71	223,641.28	341,816.00	118,174.72	34.6
Indirect Costs	<u>208,367.99</u>	<u>484,709.23</u>	<u>827,226.00</u>	<u>342,516.77</u>	<u>41.4</u>
GRAND TOTAL	1,201,061.49	2,963,974.10	4,981,061.00	2,017,086.90	40.5

TABLE 5

Gambia Mixed Farming and
Resource Management Project
Detail of Total Expenditures
1 October 1983 through 30 September 1984

Category	Total Expenditures FY-84	Total Expenditures to Date	Total Budget Amt.	Balance Remaining
SALARIES				
Home Office/CSU				
Project Director	15,273.84	56,692.43		
Prof. Staff	-	22,139.87		
Consultants	31,130.67	65,567.52		
Computer Programmer	8,703.14	19,829.05		
Secretarial	15,930.40	56,174.44		
Subtotal	<u>71,038.05</u>	<u>220,403.31</u>		
Field Office/Banjul				
Prof. Staff/CSU	190,291.64	506,169.90		
Prof. Staff/U. of Ariz.	76,205.27	252,710.73		
Prof. Staff/USU	43,197.00	146,143.50		
Prof. Staff/WSU*	21,038.98	21,038.98		
Secretarial	7,679.95	24,650.71		
Subtotal	<u>338,412.84</u>	<u>950,713.82</u>		
TOTAL SALARIES	<u>409,450.89</u>	<u>1,171,117.13</u>	<u>1,812,892.00</u>	<u>641,774.87</u>
FRINGE BENEFITS				
CSU				
Univ. of Arizona	43,563.42	121,174.56		
Utah State	15,059.41	48,156.01		
Washington State*	12,017.51	39,221.47		
TOTAL FRINGE	<u>4,793.14</u>	<u>4,793.14</u>	<u>341,212.00</u>	<u>127,866.82</u>
TRAVEL/PERDIEM/TRANSP.				
Int'l Tvl & Perdiem	80,019.11	211,109.79		
U.S. Tvl & Perdiem	4,802.79	9,809.76		
In-Cntry Tvl/Banjul	14,196.61	38,556.57		
Shipping/Storage	63,397.33	130,773.34		
TOTAL TRAVEL/TRANSP.	<u>162,415.84</u>	<u>390,249.46</u>	<u>667,840.00</u>	<u>277,590.54</u>
ALLOWANCES				
Post Differential*	47,378.93	126,509.96		
Cost-of-Living	-	11,199.53		
Education	30,818.61	43,519.61		
Temp. Lodging	4,432.00	5,960.99		
TOTAL ALLOWANCES	<u>82,629.54</u>	<u>187,190.09</u>	<u>406,850.00</u>	<u>219,659.91</u>
OTHER DIRECT COSTS				
Workmen's Compensation	7,509.43	41,996.81		
Passports/Medical	1,231.66	7,414.18		
Office Support/Supplies**	164,598.95	244,310.74		
TOTAL OTHER DIRECT COSTS	<u>173,340.04</u>	<u>293,721.73</u>	<u>583,225.00</u>	<u>289,503.27</u>
TOTAL DIRECT COSTS	903,269.79	2,255,623.59	3,812,019.00	1,556,395.41
G&A	89,423.71	223,641.28	341,816.00	118,174.72
INDIRECT COSTS	<u>208,367.99</u>	<u>484,709.23</u>	<u>827,226.00</u>	<u>342,516.77</u>
GRAND TOTAL	1,201,061.49	2,963,974.10	4,981,061.00	2,017,086.90

*Includes consultancy of Ag. Economist

**Includes all commodity expenses