PN-ABF-294

POLICY ISSUES FOR RICE DEVELOPMENT IN THE GAMBIA

edited by Sambou Kinteh
and Joachim von Braun

International Food Policy Research Institute (IFPRI)
Planning, Programming, and Monitoring Unit for the
Agricultural Sector, The Republic of the Gambia (PPMU)

PN-ABL-294

POLICY ISSUES FOR RICE DEVELOPMENT IN THE GAMBIA

(Proceedings of a workshop in Banjul, The Gambia, July 1987)

January 1988
International Food Policy Research Institute
1776 Massachusetts Avenue, N.W.
Washington, D.C. 20036 U.S.A.

Planning, Programming, and Monitoring Unit for the Agricultural Sector, The Republic of the Gambia (PPMU)

TABLE OF CONTENTS

		Page
	ACKNOWLEDGMENTS	v
1.	EVOLUTION OF RICE POLICY IN THE GAMBIA AND CURRENT POLICY PROBLEMS (Sambou Kinteh)	1
	1.1 The Evolution of Rice Policy in The Gambia	1
	1.2 Current Policy Problems	5
2.	MICRO-LEVEL ISSUES: COSTS OF RICE PRODUCTION, COMPETITION WITH OTHER CROPS, CONSUMPTION, AND NUTRITION EFFECTS (Joachim von Braun and Detlev Puetz)	7
	2.1 Rice Production Technologies and Costs	7
	2.2 Labor Productivity in Rice versus Upland Cereals	7
	2.3 Competition for Scarce Labor	11
	2.4 Marketed Surplus Effects and Storage	11
	2.5 Income Effects	15
	2.6 Spending on Food and Calorie Consumption Effects	15
	2.7 Effects on Nutritional Improvement of Children and Mothers	20
3.	IMPACTS ON DIVISION OF LABOR AND THE ROLE OF WOMEN (Patrick Webb)	25
	3.1 Traditional Rice	25
	3.2 Jahally-Pacharr Rice	25
	3.3 The Changing Rice Production System	27
	3.4 The "New" Role of Women	28
4.	PRODUCTION AND CONSUMPTION TRENDS AND THEIR IMPLICATIONS (Ken Johm)	33
	4.1 Cereal Production	33
	4.2 Cereal Consumption	36
	4.3 Cereal Trade	36
	4.4 Questions in the Rice Policy Debate	36

TABLE OF CONTENTS

Page

5. SUMMARY OF LESSONS AND IMPLICATIONS FOR POLICY (Sambou Kinteh and Joachim von Braun) 44

5.1 Policies and Programs 44
5.2 Choice of Crops 45
5.3 Choice of Technology 46
5.4 Size of Scheme and Management Difficulties 47
5.5 Focus on Income of the Poor 47
5.6 Allocation Policies for Scarce Irrigated Land 48
5.7 Commercialization and Market Integration 49
5.8 Reinforcing Effects of Agricultural Development on Nutritional Improvement 49
5.9 Division of Labor and Role of Women 50
5.10 Trade-offs in Price Policy 50

ANNEXES:

1 - List of variables 52
2 - Definition of variables 56

REFERENCES 58

List of Participants in the IFPRI/PPMU workshop on July 21, 1987 in Banjul, The Gambia 60

LIST OF TABLES

		Page
Table 1--	Yields of major crops by season and variances of yields in the sample	8
Table 2--	Costs of production of clean rice, 1985	9
Table 3--	Profitability (farm level) of different rice technologies and major field crops: average gross margins (net returns) per labor day and per hectare in wet season 1985 and their variances, and variable costs per hectare	10
Table 4--	Use of harvest by crops and different rice technologies, 1984 and 1985 wet season	13
Table 5--	Sources of cereals available from own production in lowland and upland villages in the rice-scheme area 1984/85 and 1985/86 (in milled grain equivalents)	14
Table 6--	Changes in expenditures with increased income	16
Table 7--	Calorie consumption by expenditure quartiles in the wet season 1985 and dry season 1986	17
Table 8--	Prevalence of below recommended requirement levels of calorie consumption by income (expenditure quartiles) and season	18
Table 9--	Prevalence of below recommended requirement level of calorie consumption by access to the new rice fields and season	19
Table 10--	Prevalence of malnutrition by age groups of children	21
Table 11--	Women's (mother's) nutritional status in the wet and dry season by level of access to new rice land	22
Table 12--	Prevalence of malnutrition among children by income levels of households by season	23
Table 13--	Selected mortality and health indicators by level of access to new rice fields in scheme	24
Table 14--	New technology and women in rice	26
Table 15--	Gross margins (net returns) per person day in men's and women's fields in 1985 wet season	29
Table 16--	Crops grown on the first *kamanyango* fields of a random subsample of 131 farmers, by sex	32
Table 17--	Changes in the share of total paddy production of different rice types in The Gambia from 1975-1978 to 1984-1987	35
Table 18--	Selected indicators on production and consumption of rice and coarse grains in The Gambia	38
Table 19--	Cost price structure of imported rice in The Gambia	39
Table 20--	Cost price structure of domestic rice in The Gambia	41
Table 21--	Domestic and international rice prices for The Gambia	42

LIST OF FIGURES

Figure 1--Distribution of returns to labor by crops 12
Figure 2--The share of rice in total cereal production and consumption in The Gambia 34
Figure 3--The share of rice and cereal imports in total cereal consumption in The Gambia 37

ACKNOWLEDGMENTS

This document is based on a collaborative research effort by IFPRI and the PPMU during 1985-1987. The research was funded by the International Fund for Agricultural Development (IFAD, Rome) and the United States Agency for International Development (USAID). We are very grateful to both organizations for their support.

The findings were discussed during a one-day workshop in Banjul in July 1987. The participants in this workshop made a major contribution in further focusing the findings towards policy action.

The help of many colleagues, both at IFPRI and at PPMU, is gratefully acknowledged. Of our Gambian staff, Falankor Janneh, Yaya N'Jie, Musa Suso, Fatou Sarr, Faye Dambele, and Nyorta Sanko deserve special mention. Grateful thanks are also extended to the staff of the Jahally-Pacharr project itself, which provided invaluable assistance in the field.

Finally, this research could not have been successful without the patient support and friendship of the farmers (women and men) of The Gambia.

Joachim von Braun
Sambou Kinteh

1. EVOLUTION OF RICE POLICY IN THE GAMBIA AND CURRENT POLICY PROBLEMS

(Sambou Kinteh)

1.1 THE EVOLUTION OF RICE POLICY IN THE GAMBIA

Although rice has been an important staple food item in the consumption basket of rural Gambia, concerted public policy efforts at expanding its production are of recent origin. For a systematic historic account of the public sector involvement in accelerating increased rice production, consumption, and trade in The Gambia, three distinct epochs are discernible: (i) pre-independence, (ii) post-independence, and (iii) the economic recovery program period.

Pre-Independence Era

As part of the Ten-Year Plan of Development mandated by the Colonial Development and Welfare Act of 1945, the Commonwealth Development Corporation (CDC) initiated a project called The Gambia Rice Farm in 1951. The scheme attempted to develop a total of 2,000 hectares with anti-flood dikes in Jahally-Pacharr swamps. With a productivity of about 2,000 lb paddy per acre, the scheme registered an appreciable 32 percent improvement in national rice self-sufficiency. However, the scheme failed to establish a dependable and sustainable irrigation system and had to rely on the rains, thus limiting production to one crop per year. The scheme was terminated in 1956 on account of low economic returns and the swamps, which were drawn out on lease, reverted to traditional swamp rice cultivation under their original communal ownerships.

Henceforth, up to the dawn of independence in 1965, public sector policy in rice was cautious and facilitatory rather than adventurous. The Community Development Program of the colonial government facilitated community initiatives in opening up virgin rainfed and mangrove swamps for rice production in the lower reaches of the river through construction of access causeways and bridges. The Department of Agriculture maintained the farm machinery legacy of the CDC to initiate a rice land tractor ploughing service in MacCarthy Island Division. It also organized mangrove clearing in the Lower River and North Bank Divisions and selected, tested, and disseminated suitable rice seeds for all swamp ecologies. Parallel to these public sector efforts aimed at increasing rice production, the private commercial firms freely imported rice mainly for urban consumers. With a growing rural popula-

tion farming under traditional food production technologies, a seasonal food deficit (the hungry season) assumed importance. Communication difficulties combined with low rural purchasing power made the development of a rural rice market economically unattractive to the rice importing firms.

Post-Independence Era

One of the major public policy issues of enormous political importance with which the national government had to grapple during the dawn of nationhood, was the widening food deficit. The government espoused a policy of self-sufficiency in basic foodstuffs to confront this challenge. Over the two post-independence decades prior to the adoption of an Economic Recovery Program (ERP) in 1985, the government initiated and implemented programs and projects designed to increase rainfed food production and especially to develop irrigated rice production as an insurance against the vagaries of the climate. Concomitant with these developments, the government regularized the import rice trade, which was itself dwindling along with the volume of business of most commercial firms at independence. The government restructured the Gambia Oilseed Marketing Board and expanded its portfolios to become The Gambia Produce Marketing Board to assume monopoly control over the rice market, both domestic and imported.

Under a Taiwanese-Gambian Technical Assistance Agreement, the government mandated a Taiwanese Agricultural Technical Mission in 1966 to initiate systematic irrigation development in the regions of MacCarthy Island and Upper River Divisions, with marginal government involvement. The basic objectives of the scheme were import substitution and rice self-sufficiency. The scheme assumed that its objectives could be met by merely irrigating land during the dry season to grow rice at highly subsidized and/or free rates. The scheme proceeded with its task by promoting a highly subsidized innovation package that provided all basic services for the first crop.

At the termination of the scheme in 1974, it had developed a total of 607 hectares, irrigated by means of small-pumps in dispersed, autonomous perimeters. The positive impact of the scheme on the farming system was severely constrained by a failure to establish intensive double cropping; by farmers' lack of familiarity with machines, improved seeds, and water control methods; and by a lack of appropriate indigenous skills and agricultural workers. These many problems made any achievement of the project's objectives difficult.

Nevertheless, encouraged by the Taiwanese initiative, the government consolidated its rice self-sufficiency policy by concluding a project loan with IBRD-IDA in 1973 to reclaim 1,200 hectares of land in MacCarthy Island Division for rice production. The project was tailored along the Taiwanese model with a slight modification in the innovation package, which involved introducing a new credit element. The

capital investment was costed as a 5-year loan against the participating farmers who were organized into cooperatives (a concept which existed informally in the Taiwanese schemes). Unfortunately, the management failed to harness and exploit the cooperative spirit by formulating appropriate management systems and extension strategies that would have involved the farmers as a group. By the termination of the project in 1976, it had developed 1,000 hectares and had initiated a commercialization process in irrigated rice production without securing the institutional and attitudinal changes necessary to sustain these developments.

Notwithstanding the huge backlog of debts inherited from this World Bank experience, the government reaffirmed its commitment to a policy of rice self-sufficiency through irrigated rice production by negotiating, in 1976, a joint financing of a sectoral program with the People's Republic of China, under the title "Irrigated and Swamp Rice Project." The scheme aimed to expand irrigated rice by about 1,200 hectares in MacCarthy Island Division and Upper River Division. Given the fact that suitably irrigable land was becoming scarce and costly to develop (all the ecologically soft options having already been tackled by the preceding two schemes), and bearing in mind that effective utilization of the already reclaimed land was still questionable, this was an ambitious objective. However, the project fulfilled its target of 1,200 hectares, and it increased the mechanical stock of pumps, power-tillers (pedestrian tractors), and pedal threshers. Furthermore, in addition to these familiar implements, it also introduced motorized threshers, transplanters, and 4-wheel drive small tractors. The addition of these latter items upgraded the technological structure of irrigated rice production through increased sophistication, and it precipitated policy thinking in terms of alternative technologies to the 2-wheel Asian-type power-tillers. The project also made an impact on local mechanical skills by offering on-the-job training to a group of local mechanics and assisting in the training of a cadre of local blacksmiths.

Between 1966 and 1980, the government reclaimed and developed a total of 2,500 hectares in about 300 small-periphery schemes for small pump-irrigated rice production at highly subsidized rates. The accumulated experiences of these early initiatives (reinforced by the ravages of the Sahelian drought of the previous decade) further encouraged the government's rice policy emphasis on irrigated agricultural development. The government refined and articulated this strategy choice into a rice policy with the objective of: (i) reducing bulk imports of rice, which have assumed significance in recent years; (ii) improving food security through the increase and stabilization of rice production; (iii) achieving a high degree of self-sufficiency through the expansion of irrigation and the introduction of improved technology in swamp rice cultivation; and (iv) increasing farm incomes, of women in particular, through enhanced productivity.

Hitherto, the rice policy investment strategy neglected the development of other rice production systems (upland rice and the three swamp ecologies; rainfed, fresh water-deep flooded, and tidal with or without mangroves), and concentrated on fully water-controlled irrigation development. Although the three earlier initiatives did not register phenomenal success in the achievement of their common basic objectives--rice self-sufficiency and import substitution--they did provide thoughtful experiences on some critical rice policy issues, such as the social organization of production, institutional arrangements for effective farmer participation, effective organizational management of project implementation and appropriate irrigation design to suit the available technology.

The government set out to test its new experiences. With joint financial assistance from the International Fund for Agricultural Development, the Government of the Netherlands, the African Development Bank, the Federal Republic of Germany, and World Food Programme, the government commissioned the Jahally-Pacharr Smallholder Rice Project in 1983 as a nucleus of future irrigation development. This project was designed within the framework of the newly established rice policy objective of broadening the investment strategy focus on irrigation to include tidal and rainfed swamp development. The project developed a total of 560 hectares for fully water-controlled irrigation with high-lift pumps, and 950 hectares of swamp land for tidal and improved rainfed rice production in the Jahally-Pacharr swamps. This expansion brought the fully water-controlled irrigated land to 3,000 hectares, the maximum hectarage supportable by the water resource base without irreversible environmental consequences. In addition to the highly subsidized fertilizer, seed and concessionary credit facilities available to all farmers, the government provided mechanical services for ploughing and irrigation to rice farmers in the scheme.

Economic Recovery Program (ERP) Period

Since the mid-1970s, the government has been experiencing a difficult balance of payments position due to a variety of reasons, including soaring rice import bills. Of even more relevance to its domestic rice production efforts were the accentuating impact of this overall economic malaise on foreign exchange scarcity, rural poverty, and rural-urban drift. The public debt burden escalated from U.S. $158 million in 1979 to U.S. $312 million by June 1985.[1] To counter this deteriorating economic situation, the government formulated an Economic Recovery Program in June 1985 with the fundamental objectives of stabilizing the economy in the medium term and generating growth in the long term through a reversal of over-extended government administration

---

[1] Government of the Republic of The Gambia, "Medium-Term Agricultural Sector Policy," presented at the conference of donors on agriculture, Banjul, October 21-22, 1987.

and public sector activities, and by stimulating private productive activities through an elimination of exchange rate and pricing distortions.

As part of these overall ERP objectives, the government's new agricultural development strategy emphasizes: (i) improved incentives for agricultural producers; (ii) transfer of input and output marketing responsibilities to the private sector; (iii) elimination of pricing distortions in both inputs and outputs; and (iv) improved public sector services. Since the inception of its ERP, the government has implemented a number of radical policy reforms including a liberalization of the agricultural markets. In the specific case of its rice policy, the government decontrolled the retail price of rice and lifted all restrictions on its import as a GPMB monopoly. The decontrolling of the retail rice price was calculated *inter alia* to encourage domestic cereals production by making the coarse grains (sorghum, millet, and maize) more competitive with rice. While the subsidized rice and coarse grain prices were almost the same prior to June 1985 (one Dalasi per kilogram), after the decontrol the retail rice price exceeded that of the coarse grains by 15 to 20 percent. The retail price of rice rose temporarily to 3 Dalasis per kilo in early January following the floating of the exchange rate and temporary supply shortage but has since stabilized at about 2 Dalasis per kilogram. The private sector has rapidly taken over import and domestic rice markets since the implementation of the ERP.

1.2 CURRENT POLICY PROBLEMS

During the last two decades, the government's food security policy has been articulated in, and pursued through, the context of a rice policy with public investment in domestic rice production and this is mainly for irrigated rice development. Although irrigated rice production grew by about an average of 20 percent annually in absolute terms, its relative share in total paddy production grew by only 2.3 percent per annum over the period 1975/86.

The contrast in the production/consumption relationships of rice at the national level for the same period is disturbing. Although the total share of rice in total cereal consumption declined by an annual margin of 0.7 percent, rice consumption in absolute terms grew by an annual rate of 6.0 percent, and commercial rice imports grew by an alarming annual rate of 10.0 percent. Domestic rice production, on the other hand, declined by an annual rate of about 2.0 percent and the share of rice in domestic cereal production also declined by an annual 2.2 percent rate between 1975 and 1986.

While this national rice picture is consistent with observations on changing food patterns in the Sahel,[2] it points to a need, amid the turmoil of the government's ERP policy reforms, shifts in strategy emphasis, and changes in the priority order of objectives, to refocus the overall agricultural strategy, and rice policy in particular, of The Gambia.

The aim of this paper is to assess the impact of the government's rice policy on cardinal socioeconomic indicators and to provide insightful policy guidance in the light of prevailing economic difficulties that face the government, its ERP goals, and the new agricultural development objectives and strategies required for appropriate policy reorientation.

The main rice policy problems of today are both in the micro- and macroeconomic fields. Key problems at the micro level are:

- The cost of rice production under various technologies, including their respective foreign exchange cost, and how to reduce cost of production per unit of incremental output;
- The competition of rice versus upland cereals and the related policy choice problem--what mix of programs and policies to promote for stimulated growth in overall cereals production;
- The distributional effects of alternative policies and programs in rice, especially their implications for women farmers;
- The implications of alternative policies for household-level food security and for nutritional improvement of the rural poor.

At the macro-level, the major problem is:

- The foreign exchange and fiscal effects of rice policy and, inseparable from this, the pricing of rice (both at the consumer and producer level).

The following sections focus on these and related issues. While substantial in-depth information is provided in this volume on these critical policy issues, collaborative research by IFPRI and PPMU is ongoing and specifically addresses the cost of production issue, and the choice of technology question in the context of household-level consumption and nutrition effects of policies.

---

[2] Christopher L. Delgado and Thomas A. Reardon, "Policy Issues Raised by Changing Food Patterns in the Sahel" (Washington, D.C.: International Food Policy Research Institute, January 27, 1987).

2. MICRO-LEVEL ISSUES: COSTS OF RICE PRODUCTION, COMPETITION WITH OTHER CROPS, CONSUMPTION, AND NUTRITION EFFECTS

(Joachim von Braun and Detlev Puetz)

2.1 RICE PRODUCTION TECHNOLOGIES AND COSTS

In the rice scheme under investigation, production takes place under fully water-controlled conditions (pump-irrigation producing two crops per year) and also under partly water-controlled conditions (one crop in the rainy season only). Yields in the fully water-controlled perimeters were 6.5 tons per crop per hectare in 1984/85, but these dropped to 5.1 tons in 1985/86. In the same two seasons, the partly water-controlled rice yielded 2.2 and 2.8 tons, respectively. Traditional rice (predominantly a women's crop) yielded 1.3 tons (Table 1).

Investment costs per hectare of irrigated land stood at U.S. $9,000 and total establishment costs, including support structures, were approximately U.S. $14,000. Production costs in the scheme at shadow prices of inputs, excluding recovery of investment costs, were roughly U.S. $171 per ton of milled rice in 1985 in fully water-controlled rice, $235 in partly water-controlled rice, and $256 in traditional rice (Table 2). With investment costs included, the cost of production in the scheme was 89 and 74 percent higher than these figures in the two technologies and by far exceed the cost of imported rice. Great variance in costs and net returns is observed between the technologies and between individual farmers (Table 2).

2.2 LABOR PRODUCTIVITY IN RICE VERSUS UPLAND CEREALS

Net returns per labor day were highest in the fully water-controlled rice production (Dalasi 14.70), followed by coarse grains (D 9.00), groundnuts (D 8.70), rice in the partly water-controlled fields (D 7.40), and traditional swamp rice (D 5.70) (Table 3).[3] Twenty-three

---

[3] It should be noted that as a result of an unprecedented fertilizer shortage during the growing season of 1985, fertilizer use in the study area was down by roughly 64 percent (see Joachim von Braun and Detlev Puetz, "An African Fertilizer Crisis: Origin and Economic Effects," Food Policy, November 1987). Consequently, returns to labor in the upland crops are somewhat below the level of "normal" years.

Table 1--Yields of major crops by season and variances of yields in the sample

Crop	Yield in Kilogram Per Hectare[a]			
	Wet Seasons		Dry Seasons	
	1984	1985	1985	1986
Fully water-controlled fields in project	6,552 (0.24)	5,171 (0.27)	6,488 (0.27)	5,072[b]
Partly water-controlled fields in project	2,187 (0.73)	2,797 (0.54)	...	
Pump irrigated in old schemes	2,862 (1.03)	2,362 (0.97)	2,471 (0.59)	
Traditional rice	1,274 (0.77)	1,277 (0.77)	...	
Early millet	855 (0.82)	1,103 (0.80)	...	
Late millet	760 (1.16)	1,127 (1.14)	...	
Sorghum	197 (1.17)	259 (0.92)	...	
Maize	402 (1.56)	616 (1.16)	...	
Groundnuts	1,244 (0.73)	1,214 (0.65)	...	

Note: Coefficients of variation in parentheses.

[a] The yields are from fields harvested; yields per hectare of land sown are less in case of upland cereals and groundnuts, especially in 1984, due to drought effects.

[b] Based on a subsample of 10 percent of households only.

Table 2--Costs of production of clean rice, 1985

	Fully Water-Controlled Rice[a]	Partly Water-Controlled Rice[b]	Traditional Rice
		(in Dalasi)	
Costs per hectare			
Annualized investment cost per hectare (10 percent interest, 30 years)[c]	5,370	1,497	...
Annual operation costs/hectare (land preparation, water)	1,785	432	...
Other variable production costs/hectare[d]	1,860	527	160
Opportunity cost of unpaid (family) labor/hectare[e]	1,427	756	718
Milling, transport, handling[f]	937	286	121
Rice yield/hectare (in tons of clean rice, dry and wet season 1985)[g]	6.96 tons	1.68 tons	0.772 tons
Total costs/ton	1,635	2,082	1,297
Total costs/ton (in U.S. $)[h]	(323)	(411)	(256)
Total costs/ton, excl. investment costs (U.S. $)	(171)	(235)	(256)

[a] Jahally-Pacharr (pump-irrigated, double-cropped, dry and wet season).

[b] Jahally-Pacharr (tidal irrigated/rainfed, wet season 1985).

[c] Total investment costs are based on appraisal report figures; they exclude monitoring and evaluation, social services, and personnel (personnel costs, including expatriates, account for U.S. $3.2 mio. in the initial four years of the project; costs of pumps and related structures are assumed to amount to U.S. $1.3 mio for fully-water controlled rice; other investment costs are distributed proportionately per hectare across fully and partly water-controlled fields; and same land development costs/hectare are assumed in fully and partly water-controlled fields (pumps excluded).

[d] Including fertilizer, seed, hired labor, and interest on working capital.

[e] For both fully and partly water-controlled rice, wet season: D 3.5/person day; dry season: D 1.5/person day; for traditional rice, wet season: D 3.5/person day.

[f] These costs are assumed as 10 percent of value of total output.

[g] For fully water-controlled rice, wet season yield: 5.2 tons/hectare unhusked rice (paddy); dry season yield: 6.4 tons/hectare; for partly water-controlled rice, wet season yield: 2.8 tons/hectare unhusked rice (paddy); 60 percent milling ratio.

[h] U.S. $1.00 = Dalasi 5.06 at 1985 parallel exchange rate.

Table 3--Profitability (farm level) of different rice technologies and major field crops: average gross margins[a] (net returns) per labor day and per hectare in wet season 1985 and their variances, and variable costs per hectare

Crops and Rice by Rice Technologies	Average Gross Margin[a] and Coefficient of Variation: Per Person Day of Family Labor	Per Hectare	Variable Costs Per Hectare
	(in Dalasi)		
Fully water-controlled fields in project	14.7 (0.87)	2,938 (0.46)	1,766
Partly water-controlled fields in project	7.4 (0.96)	1,371 (0.72)	925
Pump-irrigated in old schemes	3.8 (1.48)	1,720 (1.20)	538
Traditional rice	5.7 (0.75)	1,041 (0.81)	122
Millet, sorghum	9.0 (0.89)	731 (0.97)	45
Maize	6.6 (1.30)	495 (1.29)	50
Groundnuts	8.7 (0.87)	943 (0.77)	266
Cotton	3.2 (1.38)	375 (1.47)	92

Source: IFPRI-PPMU Survey, 1985/1986.

Note: Coefficients of variation in parentheses.

[a] Gross margin is calculated as the difference between value of (marketable) output minus variable costs (including for hired labor).

percent of upland cereal farmers and 17 percent of groundnut farmers exceeded the average labor productivity in the fully water-controlled rice (Figure 1). Marginal labor productivity in rice production in the scheme was lower than in upland crops.

2.3 COMPETITION FOR SCARCE LABOR

There is an excess supply of land for upland crops and traditional rice in the region, but labor is scarce in the wet season. The expansion of modern irrigation has pulled labor away from the upland crops. Thus, every ton of paddy incrementally produced by the scheme in the wet season resulted in a combined reduction of 201 kilograms of upland cereals production, 110 kilograms of traditional rice, and 241 kilograms of groundnuts. Dry-season rice does not compete directly with upland crop production and is thus produced at low opportunity costs.

It is found that men's overall labor input to agriculture is reduced when the household has more land in the scheme, but that women's labor input is not. Hired labor accounts for 25 percent of the work in the fully water-controlled rice. This increased use of hired labor is a new phenomenon associated with commercialization.

2.4 MARKETED SURPLUS EFFECTS AND STORAGE

Less of the new rice crop is sold for cash than expected--12 percent from fully water-controlled and 7 percent from partly water-controlled land. This compares with women's traditional rice, of which 21 percent is sold (Table 4). This pattern of women selling more than men is explained by the different institutional arrangements under which the crops are grown and is dealt with in detail in the following chapter by Webb.

The dry-season project rice grown in the fully water-controlled perimeters plays a large part in helping households avoid the common seasonal depletion of food stocks which leads to the "hungry" season problem (Table 5).

Figure 1--Distribution of returns to labor by crops

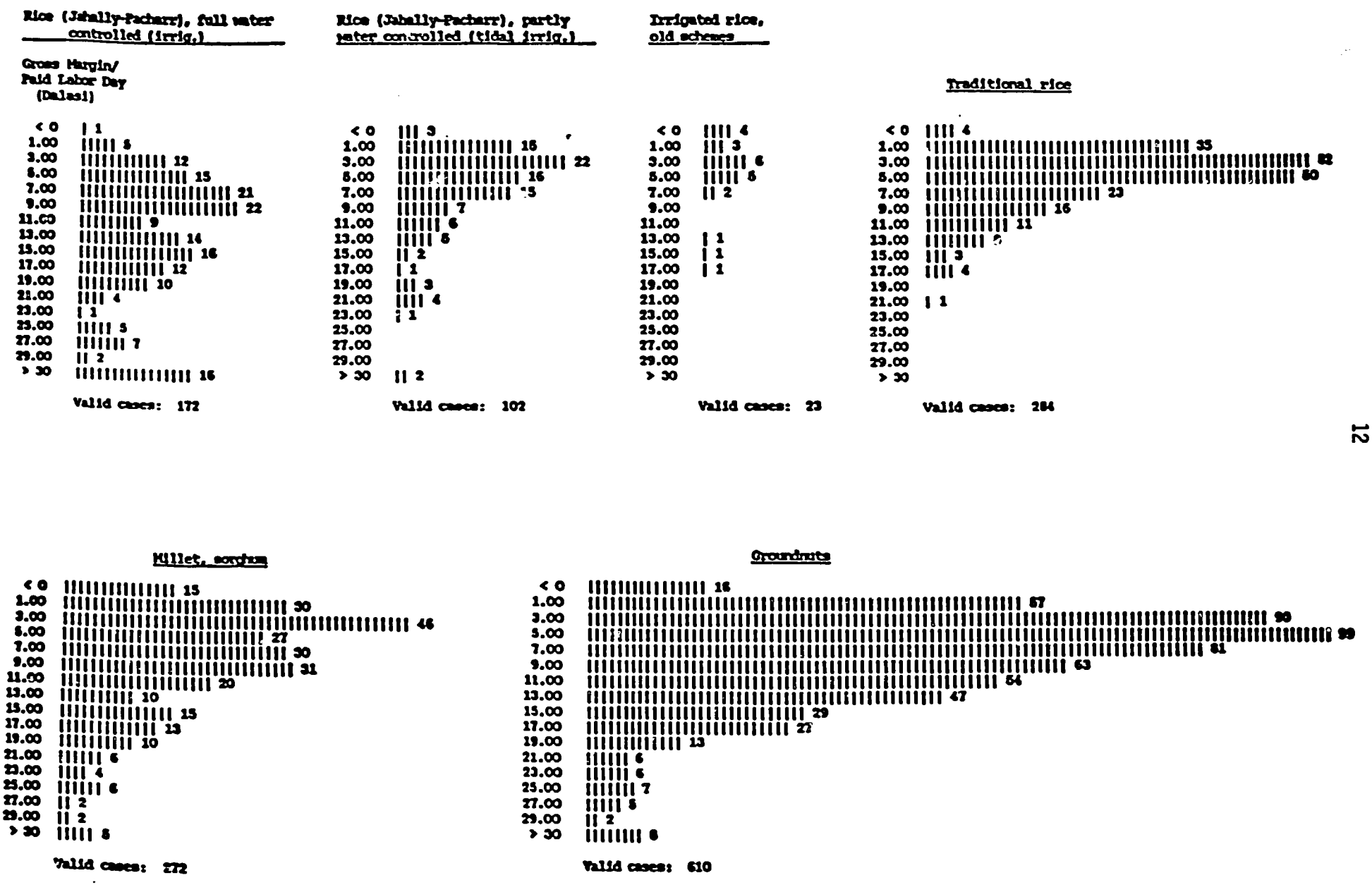

Table 4--Use of harvest by crops and different rice technologies, 1984 and 1985 wet season

Uses for	Rice: Fully Water Controlled 1984	Rice: Fully Water Controlled 1985	Rice: Partly Water Controlled 1984	Rice: Partly Water Controlled 1985	Rice: Pump Irrig. Old Schemes 1984	Rice: Pump Irrig. Old Schemes 1985	Rice: Traditional 1984	Rice: Traditional 1985	Early Millet, Sorghum 1984	Early Millet, Sorghum 1985	Maize 1984	Maize 1985	Groundnuts 1984	Groundnuts 1985
	(in percent of total production of each crop)													
Loan repayments	30.1	18.3	34.2	27.2	5.7	4.4	0.4	0.8	0.0	0.2	0.4	0.0	2.5	1.7
Labor hired and rents[a]	1.4	0.7	1.6	2.7	3.1	2.5	2.6	1.5	0.4	0.3	0.1	0.2	0.4	1.2
Gifts, donations	6.5	9.4	5.8	10.7	9.3	11.5	10.7	15.4	10.4	12.7	13.1	12.5	3.5	2.4
Sold[b]	7.3	12.2	15.5	6.9	8.2	2.1	19.1	20.7	2.9	0.9	3.6	1.8	71.1	65.7
Consumed[c]	54.7	60.2	42.9	52.5	73.7	79.5	67.2	61.6	86.3	85.9	82.8	85.5	22.5	29.0

[a] For implement rentals (in-kind repayments).

[b] Including those given as loans for later payments (0.1 to 0.4 percent per crop) and exchanged in-kind (barter, 0.0 to 0.2 percent per crop).

[c] Including retained seed (1.3 to 5.4 percent of cereals, 10.9 percent of groundnuts) and storage losses which are negligible on average.

Table 5--Sources of cereals available from own production in lowland and upland villages in the rice-scheme area 1984/85 and 1985/86[a] (in milled grain equivalents)

	Lowland Village		Upland Village	
	1984/85	1985/86	1984/85	1985/86
	(kilogram per adult equivalent)			
Rice from fully water-controlled (wet season)	103	106	40	32
Rice from partly water-controlled (wet season)	20	29	6	9
Pump-irrigated (old schemes) rice (wet season)	6	-	1	1
Traditional rice	21	47	3	3
Rice (dry season)	118	125	40	35
All rice	268	307	90	80
Millet, sorghum	32	37	132	179
Maize	9	13	11	18
TOTAL	309	357	233	277

[a] Dry and wet season of respective year.

2.5 INCOME EFFECTS

Agricultural income contributed 77.5 percent to total income in the surveyed households.

Rice production has relatively greater importance for the poorest households. The crop contributes 43 percent of income to the bottom income quartile versus 26 percent in the top quartile. The poor households thus benefit relatively more from the rice scheme than do the upper-income groups in the area. At the sample average, the rice in the scheme increased real incomes by 13 percent per household.

2.6 SPENDING ON FOOD AND CALORIE CONSUMPTION EFFECTS

An additional 10.0 percent of income leads to a 9.4 percent increase in food expenditures and a 4.8 percent increase in calorie consumption. The households spend an average of 66.0 percent of all expenditures on food (including the value of own-produced food), 17.0 percent on frequently purchased nonfood items, and 17 percent on (semi-) durables. A 10 percent increase in total expenditures raises spending on housing and household goods by 24 percent (Table 6). Favorable multiplier effects may result from the increased rice income in the long run.

The seasonal fluctuation in per capita calorie consumption is a problem of the poor and not of the total rural population (Table 7). In the bottom income quartile calorie consumption is 15 percent lower in the wet ("hungry") season than in the dry season, but it remains sufficient and constant in the top quartile. In the "hungry" season, 49 percent of households in the bottom quartile consumed less than 80 percent of calorie requirements. Only 2 percent of the top quartile fell below that level in the same season (Table 8).

The effect of increased income on calorie consumption is particularly strong in the wet season. The favorable income effect of the scheme, especially from the second rice crop, thereby translates into a positive food consumption effect.

It is not so much having rice in Jahally-Pacharr but it is having income--in-kind, for instance, from rice or in cash from rice and other sources--which increases calorie consumption (Table 9 versus Table 8). Income from rice production does not affect food consumption differently from income from traditional cash crops, such as groundnuts, as multivariate analysis shows. However, a reduction in the share of cereals produced by women does reduce calorie consumption. Women's relative loss in command over rice thus reduces the favorable income effect of new rice for calorie consumption. Nevertheless, the overall income effect for calorie consumption is stronger at least at sample

Table 6--Changes in expenditures with increased income

	Lowest Expenditure Quartile		Highest Expenditure Quartile		Change from Lowest to Highest Quartile	Change for 10 Percent Increase in Total Expenditure
	Dalasi/adult equiv./person	Percent of Share	Dalasi/adult equiv./person	Percent of Share		
					.....(in percent).....	
Total expenditure	854	100.0	2,086	100.0	+144.3	+10.0
Food (including snacks)	585	68.5	1,348	64.6	+130.4	+9.0
Daily nonfoods	142	16.6	343	16.4	+141.5	+9.8
Semidurables	128	15.0	396	19.0	+209.4	+14.5
Housing and household goods	26	3.0	90	4.3	+346.2	+24.0

Table 7--Calorie consumption by expenditure quartiles in the wet season 1985 and dry season 1986

Expenditure Quartiles	Per Capita Calories Per Day			
	Wet Season 1985		Dry Season 1986	
	Sinkiro food	Snacks	Sinkiro food	Snacks
Lowest quartile	1,724	169	2,006	170
Second quartile	2,009	213	1,981	245
Third quartile	2,402	220	2,526	285
Fourth quartile	2,616	301	2,648	324
Total averages	2,159	221	2,269	253

Source: IFPRI/PPMU Survey, 1985/86.

Table 8--Prevalence of below recommended requirement levels of calorie consumption by income (expenditure quartiles) and season

Expenditure Quartiles	Below 80% Requirements		Below 60% Requirements	
	Wet Season	Dry Season	Wet Season	Dry Season
	(percent of *sinkiros* [households])			
Lowest quartile	49.1	21.2	15.1	3.9
Second quartile	17.3	18.5	0.0	5.6
Third quartile	5.6	5.7	0.0	1.9
Fourth quartile	1.9	0.2	0.0	0.0
Total	18.4	13.7	4.2	3.3

Source: IFPRI/PPMU Survey, 1985/86.

Table 9--Prevalence of below recommended requirement level of calorie consumption by access to the new rice fields and season

Access to New Rice Fields (Land in Scheme in Irrigated Equivalent Per Adult	Below 80% Requirements		Below 60% Requirements	
	Wet Season	Dry Season	Wet Season	Dry Season
No land in scheme	20.7	27.6	6.9	13.8
Lowest quartile	17.0	8.7	6.4	0.0
Second quartile	22.2	8.9	0.0	0.0
Third quartile	17.8	11.4	6.7	2.3
Fourth quartile	15.2	17.0	2.2	4.3
Total	18.4	13.7	4.2	3.3

Source: IFPRI/PPMU Survey, 1985/86.

mean values than this effect from reduced access to new rice fields by women.

2.7 EFFECTS ON NUTRITIONAL IMPROVEMENT OF CHILDREN AND MOTHERS

In the wet season, 35 percent of children under 5 years were found to be underweight (less than 80 percent of standard weight-for-age). It was even higher (52 percent) in the age group of 1 to 2 years (Table 10). Lack of food, infectious diseases and, related to these, unclean water are identified as important determinants of the nutritional status problem in multivariate analyses.

Many of the children's nutrition problems are also mediated through their mother's nutrition and health status which is considerably affected by seasonal stress, as indicated by weight fluctuations. With increased access to new rice fields it is found that these seasonal weight fluctuations of mothers are significantly reduced (Table 11). This appears as a major benefit of the scheme.

Calorie consumption is found to be a powerful factor in explaining the differences in the nutritional status of children. Multivariate analysis shows that a 10 percent increase in calorie consumption at the household level improves the nutritional status measure (weight/age) by 2.4 percent at the sample means. The effect is even more significant for children with a particularly bad nutritional status. To the extent that the program increased income, and thereby calorie consumption, in the households, and to the extent that mother's (seasonal) health stress was reduced, the nutritional status of children has been improved by this scheme. This tendency is also visible in the income-nutrition tabulation (Table 12), but came out more clearly and statistically significant in multivariate analyses.

On the other hand, with greater access to the rice scheme, mothers take their children more frequently with them to the rice fields, and these are malaria prone (Table 13). This poses a disease problem that requires attention in complementary program components.

Policy conclusions based on these findings are developed in the final section of this volume.

Table 10--Prevalence of malnutrition by age groups of children

Months	Height/Age Dry Season <90%	Weight/Age Wet Season <60%	Weight/Age Wet Season <80%	Weight/Age Dry Season <60%	Weight/Age Dry Season <80%	Weight/Height Wet Season <80%	Weight/Height Dry Season <80%
	(Percentage of children <__% median)						
1 - 6	2.6	-	10.9	-	5.1	-	-
7 - 12	10.3	2.0	51.0	2.6	28.2	19.6	2.6
13 - 24	21.3	5.3	52.0	2.5	32.5	7.9	2.5
25 - 60	16.9	1.2	31.0	0.5	27.3	3.7	1.5
61 - 120	5.2	1.0	25.7	-	16.3	4.3	1.4
Total	10.9	1.5	31.1	0.6	21.1	5.3	1.5
1 - 60	15.6	1.9	35.0	1.1	26.3	6.0	1.7

Source: IFPRI/PPMU Survey, 1985/86.

Table 11--Women's (mother's) nutritional status in the wet and dry season by level of access to new rice land

Access to New Rice Land	Change in Mean Weight from Wet to Dry Season	Level of Weight for Weight in Dry Season	Change in Weight Height from Wet to Dry Season
	(kilogram)	(kilogram/100cm)	(percent)
Lowest quartile	+2.9	34.6	+5.4
Second quartile	+2.6	33.5	+4.8
Third quartile	+1.7	33.2	+3.0
Fourth quartile	+1.1	34.1	+1.8
Average	+2.2	33.9	+4.0

Source: IFPRI/PPMU Survey, 1985/86.

Table 12--Prevalence of malnutrition among children by income levels of households by season

Indicators	Age Group	Season	Income Quartiles				
			Lowest	Second	Third	Fourth	Average
	(months)		(percentage of children below respective standard)				
Height/age <90%	6-59	Wet	30.1	13.8	13.1	14.3	17.1
Weight/age <80%	6-59	Wet	40.5	37.9	36.9	39.3	38.5
Weight/age <80%	6-59	Dry	28.3	30.1	36.3	20.8	28.8
Weight/ht. <80%	6-59	Wet	9.3	6.0	5.9	7.1	6.9
Weight/ht. <80%	6-59	Dry	5.7	1.0	2.7	0.0	2.0
Height/age <90%	60-120	Wet	11.0	5.6	7.7	3.0	6.9
Weight/age <80%	60-120	Wet	32.8	29.2	24.3	15.2	25.8
Weight/age <80%	60-120	Dry	16.7	19.0	20.6	10.5	16.7
Weight/ht. <80%	60-120	Wet	4.1	5.6	2.6	4.6	4.3
Weight/ht. <80%	60-120	Dry	0.0	1.3	2.7	1.3	1.4

Source: IFPRI/PPMU Survey, 1985/86.

Table 13--Selected mortality and health indicators by level of access to new rice fields in scheme

Indicators	Access to New Rice Fields				
	Lowest Quartile	Second Quartile	Third Quartile	Fourth Quartile	Average
Percent of women[a] that experienced death of her child (aged <5 years) during last 5 years	26.3	28.4	23.9	21.1	25.4
Percent of children 6-120 months sick[b] with:					
- diarrhea (wet season)	19.3	31.9	20.9	19.4	23.4
- fever (wet season)	24.8	28.7	34.9	32.3	28.6

Source: IFPRI/PPMU Survey, 1985/86.

[a] Only mothers with children under 10 included.
[b] During the preceding four weeks' health-recall period.

3. IMPACTS ON DIVISION OF LABOR AND THE ROLE OF WOMEN

(Patrick Webb)

3.1 TRADITIONAL RICE

Rice is conventionally referred to as a "woman's crop." In practice this means that traditional rice is grown in rainfed and tidal swamps, that yield an average of 1.3 tons per hectare, and of which 95 percent are controlled by women (see Table 14). Women decide how much of the area will be allocated as *maruo* (communal) versus *kamanyango* (private) land. They control operations in the fields. Typically, women also store most of the produce in their own individual stores.

In the survey area it was found that most swamp fields are defined as *kamanyango* fields: 83 percent *kamanyango* compared with 17 percent *maruo* (Table 14).[4] Interestingly enough, the women themselves report that while they put in an average of 77 percent of total family labor to traditional rice, men in this sample provide the other 23 percent of required labor. Men generally help most with activities like weeding, threshing, and transport. Thus, rice should not be called a woman's crop merely on the assumption that women do all the work in the swamps; they do not. Even Haswell's classic study of 1953 showed that men in 19 of her Genieri sample compounds together provided a total of 488 days to women's swamp rice production. Instead, the key issue is one of control over the crop. Because the bulk of traditional rice is regarded as *kamanyango*, women look after its storage mostly by themselves, and they alone have the right to decide on its disposal. In 1985, the marketed surplus of female-controlled traditional rice (the proportion of the rice harvest sold and given as gifts) was 36 percent.

3.2 JAHALLY-PACHARR RICE

The introduction of new, high-level production technology, improved input packages, and centralized water control, has changed the traditional rice farming system.

---

[4] These percentages vary from one swamp area to the next, but there was a consensus that the *kamangyango* portion of swamp rice has historically constituted at least 50 percent of the total.

Table 14--New technology and women in rice

Technology Level	Pump Irrigated	Partly Improved	Traditional Swamp Rice
Days labor required (days/hectare)	349	262	217
Yield (tons)	5.9	2.5	1.3
Women's control (percent)	10	77	95
Maruo portion (percent) (communal)	99	89	17
Women's work (percent family labor)	29	60	77
Hired labor (percent total labor)	25	11	5
Marketed surplus (percent)	22	18	36

Source: IFPRI/PPMU Survey, 1985/86.

In 1987 there are 560 hectares of fully water-controlled pump irrigation, roughly 180 hectares of tidal irrigation and 450 hectares of the improved rainfed land. The fully water-controlled plots are yielding roughly 5.5 tons per hectare, twice per year. However, this input is achieved under very new production arrangements. For example, women today control only 77 percent of the partly-improved rice fields, and only 10 percent of the highest-yielding pump-irrigated fields. In other words, as rice yields and output increase (along with the progressive upgrading of the rice production technology) the proportion of land under female control decreases.

By "control," we do not mean official registration as a field owner. Fifty-two percent of women in the survey sample reported that they are registered as the official tenant of a plot (or portion of a plot). But only half of these have real control over a parcel of project land, in the sense that they have decisionmaking authority over the use of the harvest and over activities in the field. The question is, why have women apparently lost the control which they once had over rice, and what happens to their role in crop production as a result of such a fundamental change?

3.3 THE CHANGING RICE PRODUCTION SYSTEM

Let us deal firstly with the "why." Men today control 90 percent of the highest-yielding rice land. However, this transfer of authority from women to men involves more complex changes in the system than a simple switch in the status of rice from being a women's crop to becoming a men's crop. Although various writers, such as Dey and Boserup, have argued that there is a tendency for men to monopolize the best land and farm technologies for their own private benefit, this has not happened in the survey area.[5] Table 14 shows that the new, improved rice farms have been made 99 percent *maruo*. The compound heads have therefore decided that the new technology is to be used primarily to feed the household. This is corroborated by the last line of Table 14 which indicates that the marketed surplus of the new rice (now under male control) has fallen to only 22 percent. Thus, proportionately <u>less</u> rice is sold now that it is in men's hands, than when it was in women's hands.

At the same time, the proportion of female labor provided to rice production has fallen from 77 percent of total family inputs in tradi-

---

[5] Jennie Dey, "The Social Organization of Production," Annex 2.C of <u>The Rice Industry of The Gambia: An Economic and Financial Analysis of the Rice Industry with Recommendations for its Strengthening</u> (Rome: FAO, October 1983), pp. 79-106; Ester Boserup, "The Position of Women in Economic Production and in the Household with Special Reference to Africa" (Wageningen, 1980), p. 12.

tional rice, to 29 percent in the fully pump-irrigated fields. There are, of course, many cases where women provide considerably more than 29 percent of total family labor to the new rice. It should also be understood that this *relative* decline in the proportion of female labor to rice is not necessarily caused by an *absolute* decline. It is simply that the new technology requires roughly 60 percent more labor inputs than traditional rice, and that most of this additional labor is provided by men who are often transferring their time away from upland cereals and groundnuts. However, it is important to recognize the fact that men are generally contributing almost twice as much labor to communal agriculture (all food crops) as are women.

Although perhaps somewhat surprising, most of these adjustments to traditional arrangements of production are perfectly rational and consistent with the compound head's obligation to ensure food security for the household. Firstly, given the drought conditions of recent years, it is appropriate to turn to the water-controlling technology as a main source of food, since irrigation provides a security of harvest that upland cereal farming cannot guarantee. The reassignment of pump-irrigated rice as a communal food crop, rather than as a mixed food and cash crop, improves food security for the entire household.

Secondly, Table 15 shows that pump-irrigated rice is the most productive of the local crops in terms of net returns to labor. If the compound head can secure the compound's food needs by means of this particularly cost-effective crop, then he (and the rest of the household work force) will have to spend less time on producing upland food crops. This gives the head and other workers time to expand their own groundnut *kamanyangos*, or to spend more time in off-farm activities. The latter does in fact seem to occur. When an average farm unit or *sinkiro* (9.2 people) gets access to an average-sized share of land in the project (0.29 hectares), then that farm family unit spends 32 fewer days in agriculture (all crops) than does a household with no land in the project. Most of this reduction in labor is made by men. The difference seems to be made up by the significant increase in hired labor use shown in Table 14.

3.4 THE "NEW" ROLE OF WOMEN

It is clear that women have indeed lost control over the high-yielding rice crop in the project. But is this in itself an issue of concern?

It is true that despite the registration effort, most women are controllers of pump-irrigated land in name only. Legal regulations on paper mean little in the field. There is naturally some variation even in this distribution. For example, higher status women, such as compound heads' first wives, do have disproportionately more control over project land than do junior compound women. Some women have therefore

Table 15--Gross margins (net returns) per person day in men's and women's fields in 1985 wet season

Crops and Rice Technologies	Average Gross Margin (Net Return) Per Person Day	
	Men's Fields	Women's Fields
	(in Dalasi)	
Fully water-controlled fields in project	13.9	-[a]
Partly water-controlled fields in project	-[a]	7.8
Traditional rice	8.9	5.4
Millet, sorghum	9.1	8.0
Maize	6.7	-[a]
Groundnuts	10.0	6.5
Cotton	3.9	2.0

[a] Less than 25 observations and is, therefore, not listed.

done better than others, and it is dangerous to talk in general terms of improving the welfare of "women," as if this were an homogeneous group.

Yet overall, women do not control the best project land. Therefore, the question is, does loss of control over rice necessarily have a negative impact on women, and on the compound in general?

The answer has two sides to it. On the one hand, the reassignment of rice as a *maruo* crop under male control has led to an absolute increase in the burden of communal agricultural work for both men and women. However, the increase is relatively more for women. In compounds with little access to project land, men spend 54 percent of their farm labor time in communal food production, compared with 30 percent by the women. In compounds with three times as much project land, the men spend 68 percent of their time in communal food production, an increase of 14 percent, while the figure for women is now 49 percent, an increase of 19 percent.

Secondly, it was found that a reduction in the amount of cereals produced under female control reduces household-level calorie consumption in the wet season (once income levels are controlled for). A drop in the female-controlled share of cereal production from 30 percent (the sample mean) to 10 percent (the share of cereals produced by women in compounds with the greatest access to pump-irrigated land), reduces average calorie consumption per capita by 64 calories, or 2.2 percent of wet season consumption. This shortfall is more than made up for by the overall increase in household rice production made possible by the project. However, the result does indicate that average per capita consumption might have been further increased had more of the rice remained under women's control.

Thirdly, the increased number of days that women have to spend in the project rice fields means an increased number of days spent in the fields for their smallest children. This poses an increased risk of malarial infection and skin diseases for such children. In compounds with little project land, 25 percent of children aged 6 to 120 months were sick with high fevers during a four-week health-recall period in the wet season. In compounds with greater access to project land (and therefore living much closer to the swamps), the figure was 32 percent.

On the other hand, the transfer of control over rice from women to men has not generally resulted in a loss of private income or status for women. Firstly, women from traditional rice-tilling villages that are now involved in the project, receive an average of nearly two kilograms of paddy from the compound head in return for each day of labor that they spend working in the new project rice. This constitutes a remuneration for a loss of income from traditional rice.

Secondly, most women who lost access to a swamp rice *kamanyango* have shifted their activities to upland *kamanyangos*. Forty percent of

all groundnut fields and 40 percent of all cotton fields in this area are controlled by women for the production of private *kamanyango* crops. Given the increasing price of groundnuts, this has resulted in a net increase in the personal income of many women, compared with their former rice income.

However, this is not to say that women have only recently adopted upland *kamanyangos*. In this regard, it is important to underline the finding that the role of women in upland cash cropping has probably been under-emphasized for many years. An indication of this is given in Table 16 which shows that 53 out of 71 women interviewed (of various ages from 15 to 65) reported that their very first private *kamanyango* crop was not rice, but groundnuts. Consequently, the concept of a "woman's crop," the development of which has to be focused on specifically if women are to be helped, appears to be redundant in this area. Control over, and provision of labor to, the main crops of The Gambia, by sex, is much more flexible than has formerly been acknowledged. Women do not have to be confined to cultivating what has traditionally been labelled as "their" crop. Women are, in fact, as vulnerable to export crop taxation, as are men, and would similarly benefit from more free trade, and by improved technologies and input provision in the upland crop arena.

Table 16--Crops grown on the first *kamanyango* fields of a random subsample of 131 farmers, by sex

	Groundnuts	Sorghum	Millet	Cotton	Rice	Total
Men	49 (83%)	4 (7%)	6 (10%)	1 (2%)	-	60 (100%)
Women	53 (75%)	-	-	-	18 (25%)	71 (100%)
Total	102 (78%)	4 (3%)	6 (4%)	1 (1%)	18 (14%)	131 (100%)

Source: IFPRI/PPMU Survey, 1985/86.

4. NATIONAL PRODUCTION AND CONSUMPTION TRENDS AND THEIR IMPLICATIONS

(Ken B. Johm)

4.1 CEREAL PRODUCTION

While total paddy production has slightly declined over the past decade, overall cereal production has increased significantly due mainly to the considerable increases in coarse grain production. Figure 2 shows that the share of rice in cereal production decreased sharply in the last decade (1977-87). The relative decline in paddy production has been accompanied by a shift in the share of different types in local paddy production, from swamp rice to pump-irrigated rice. As shown in Table 17, upland rice production has remained fairly constant while swamp rice has fallen by about a quarter and the share of irrigated rice in total rice production has tripled from 1975/78 to 1984/86. The marked increase in the share of irrigated rice in total rice production is due to the substantial investments made in the irrigated rice subsector, such as the Jahally-Pacharr smallholder rice project.

In aggregate terms, changes in total crop production are due to changes in hectarage or yield. In the case of The Gambia, coarse grain production increases of the past decade are due mainly to a significant annual 1.7 percent expansion in hectarage, while irrigated rice production increases are due to considerable yield improvements. Cereal hectarage as a whole increased by 0.9 percent per annum in the last decade. In the same period, expansion in coarse grain hectarage exceeded the decline in the rice hectarage. The expansion of coarse grain production was partly at the cost of groundnut production. Groundnut area dropped by 26 percent from 1974-76 to 1984-86. The changes in patterns of production of cereals are paralleled by changes in prices. The index of millet prices increased by 26 percent over groundnut prices from 1975/76 to 1985/86. Also the producer price ratio of rice versus millet shifted in favor of millet. Both of these relative price changes contributed to the shift toward increased coarse grain production.

Figure 2--The share of rice in total cereal production and consumption in The Gambia

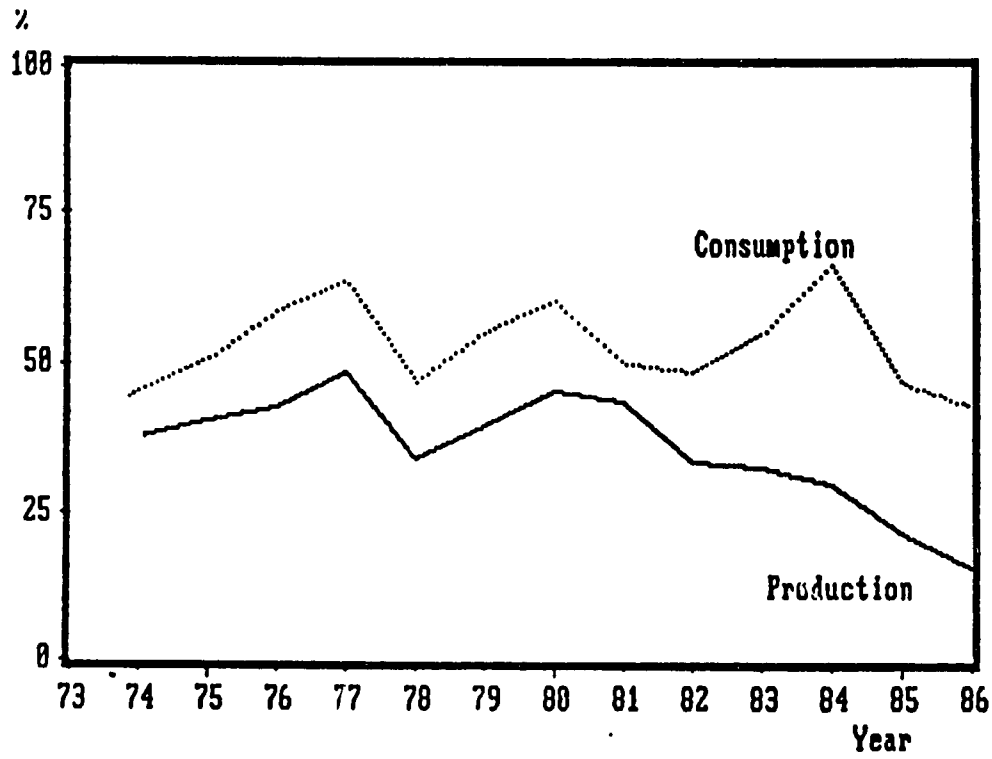

Table 17--Changes in the share of total paddy production of different rice types in The Gambia from 1975-1978 to 1984-1987

	1975-1978		1984-1987	
	Quantity	Percent	Quantity	Percent
	(in 1,000 tons)		(in 1,000 tons)	
Upland paddy	3.4	12.0	3.2	13.0
Swamp paddy	22.1	76.0	12.9	51.0
Pump-irrigated paddy	3.6	12.0	9.2	36.0
Total paddy	29.1	100.0	25.2	100.0

Source: PPMU national agricultural sample surveys.

4.2 CEREAL CONSUMPTION

Total cereal consumption is mainly comprised of the traditional coarse grains (millet and sorghum) and maize, wheat, and rice which account for more than 50 percent of total cereal consumption in most years. Overall, cereal consumption has increased over the last decade from 173 kilograms of milled grain equivalents in 1977-79 to 185 kilograms in 1984-86. The share of rice in total cereal consumption declined slightly from an average of 55 percent in 1977-1979 to 52 percent in the last three years. This change in consumption patterns appears largely as a result of the change in production patterns in favor of millet, since the price ratio between consumer price of rice and millet was changing in favor of rice from 1.25 to 1.02 between 1979-81 and 1984-86.

4.3 CEREAL TRADE

Cereal imports play a significant and increasing role in meeting the gap between total cereal consumption and domestic production in much of West Africa.[6] In The Gambia, an interesting change in the development of cereal trade to be observed is that while the share of imported cereals in total cereal production increased dramatically in the 1970s, it declined in the 1980s. As shown in Figure 3, the year 1978/79 was the turning point of departure with only the drought year of 1984 being an exception to this tendency. The share of cereal imports in total cereal consumption fell from 42 percent in 1977/79 and to 35 percent in 1984/86 (Table 18). In the mid-1980s, rice imports account for over a quarter (29 percent) of total cereal consumption in The Gambia. The level of cereal self-sufficiency in The Gambia has increased somewhat, mainly due to increased local coarse grain production. This has, however, come at the cost of declining groundnut production. These tradeoffs are evaluated in detail below at the program and farm level.

4.4 QUESTIONS IN THE RICE POLICY DEBATE

Do rice consumers in The Gambia face a tax or subsidy? Table 19 sheds some light on this question. From 1977 to present, rice consumers in Banjul have had to pay a tax over and beyond the import duty on each ton of rice purchased. This is with the notable exception of the 1984 drought year when consumers were subsidized to the tune of D

---

[6] See C. Delgado and C. Miller, "Changing Food Patterns in West Africa, Implications for Policy Research," Food Policy 10 (No. 1, February 1985).

Figure 3--The share of rice and cereal imports in total cereal consumption in The Gambia

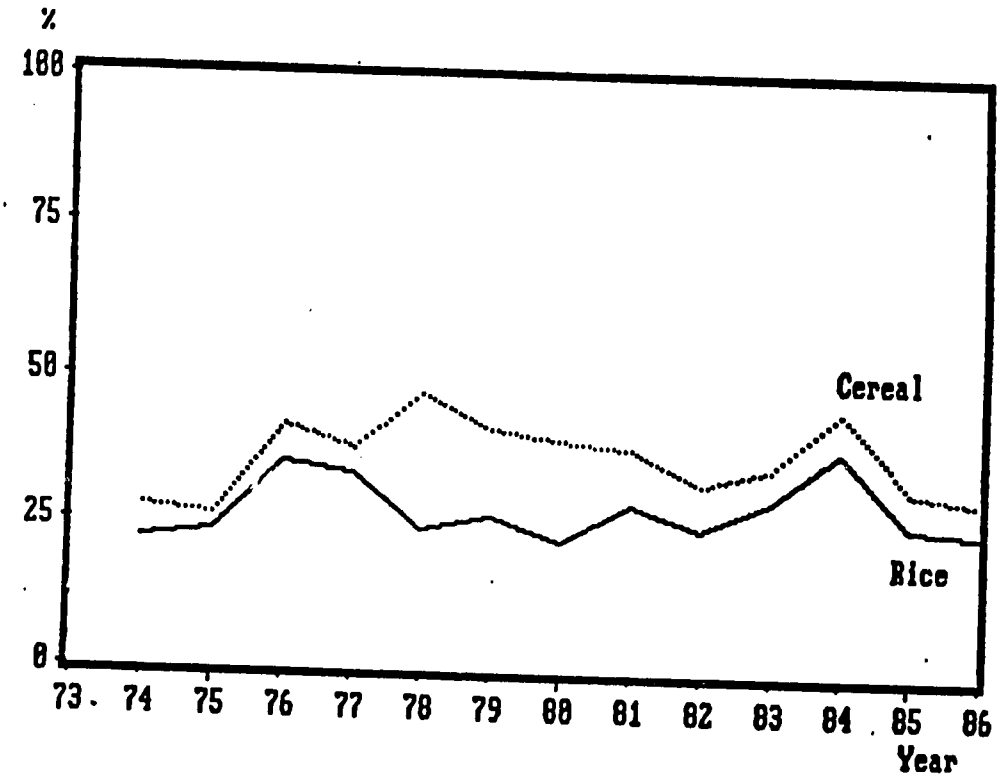

Table 18--Selected indicators on production and consumption of rice and coarse grains in The Gambia

Item	1977-1979	1984-1986
Total cereal consumption (tons)	101,589	135,808
Rice consumption (tons)	55,400	70,680
Coarse grain consumption (tons)	32,166	39,600
Total cereal imports (tons)	42,870	48,168
Rice imports	28,000	40,085
Per capita cereal consumption (kg)	173	185
Per capita rice consumption (kg)	94	97
Share of rice in cereal consumption	55	52
Share of cereal imports in total cereal consumption (percent)	42	35
Share of rice imports in total cereal consumption (percent)	28	29

Source: National Agricultural Sample Survey reports, 1975-1986, PPMU, Banjul.

Table 19--Cost price structure of imported rice in The Gambia

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
CIF price Banjul											
At official exchange rates (D/ton)	477.24	359.32	351.05	434.04	363.40	401.52	506.49	452.23	686.38	766.83	1010.93
At parallel exchange rates (D/ton)	550.33	373.26	368.78	482.52	428.90	481.01	701.46	518.15	1024.60	982.32	1060.42
Costs from harbor to store (D/ton)	76.00	92.00	109.00	103.00	110.00	127.00	86.00	106.00	117.00	129.00	142.00
Costs of tax-free rice in Banjul											
At official exchange rates (D/ton)	553.24	451.32	466.05	537.04	473.40	528.52	592.49	558.23	803.38	895.83	1152.93
At parallel exchange rates (D/ton)	626.33	465.26	477.78	585.52	538.90	608.01	787.46	684.15	1141.60	1111.32	1202.42
Import duty (D/ton)	22.00	77.00	118.00	126.00	146.00	164.00	145.00	177.00	192.00	215.00	283.06
Cost ex-store Banjul											
At official exchange rates (D/ton)	575.24	528.32	584.05	663.04	619.40	692.52	737.49	735.23	995.38	1110.83	1435.99
At parallel exchange rates (D/ton)	648.33	542.26	595.78	711.52	684.90	771.01	932.46	261.15	1333.60	1326.32	1485.48
Consumer rice price in Banjul (D/ton)	600.00	600.00	600.00	700.00	700.00	700.00	840.00	880.00	1090.00	1448.00	1793.00
Consumer tax (subsidy) (D/ton)	57.65	-111.48	-98.30	-85.20	-134.16	-61.59	-13.17	-161.64	108.68	-281.11	-530.46
Consumer tax (subsidy) (in percent)	9.00	-24.00	-21.00	-16.00	-25.00	-10.00	-2.00	-24.00	10.00	-25.00	-44.00
Marketing costs to provinces (D/ton)	6.00	8.00	8.00	8.00	11.00	20.00	24.00	24.00	28.00	37.00	40.00
Rural cost of imported rice											
At official exchange rates (D/ton)	581.24	536.32	592.05	671.04	630.40	712.56	761.49	759.23	1023.38	1147.83	1475.99
At parallel exchange rates (D/ton)	645.33	550.26	603.78	791.52	695.90	792.01	956.46	885.15	1361.60	1363.32	1525.48

Notes:

1. CIF (Banjul) rice prices for 1976/85 are the unit price/ton import costs computed from trade statistics of the Trade Division of the Ministry of Finance, The Gambia. The 1986 CIF Banjul rice price is derived by taking the dollar equivalent of the 1985 unit import cost at official exchange rates and applying the world price shift in 1986.
2. Official and parallel exchange rates come from the Ministry of Finance, Banjul. The parallel exchange rate for 1986 was taken at D 7.50 per dollar.
3. Harbor to store costs for 1976/1983 have been computed by the FAO study of "The Rice Industry of The Gambia," 1983. The 1984/86 harbor to store costs reflect an annual 10 percent increase. These costs include marketing, handling, overhead and inventory loss costs.
4. Import duty figures for 1976/1983 are taken from the FAO study of "The Rice Industry of The Gambia," 1983. The import duty figures for 1984/86 reflect a constant 28 percent import tax on the CIF (Banjul) rice price.
5. Consumer rice prices in Banjul are actual market prices collected by the Central Statistics Department of the Ministry of Economic Planning and Industrial Development.
6. Marketing costs to the provinces include freight, handling, and distribution costs and were computed for 1983 by the FAO study of "The Rice Industry of The Gambia," 1983. The marketing costs for the other years have been computed on the basis of transportation rates given in Christine Jones, "The Domestic Groundnut Marketing System of The Gambia," Harvard Institute for International Development, 1986.
7. Consumer subsidies are computed by taking the difference between the cost of tax-free rice in Banjul plus a 5 percent marketing margin minus the consumer price of rice in Banjul. Taxes are indicated as negative and subsidies are positive.

108.68 per ton. In most years it can thus be said that consumers in The Gambia pay more than the cost of tax-free rice and that the level of tax/subsidy varies from year to year.

Are rice producers in The Gambia subsidized? Table 20 sheds some light on this question. In general producers do get a subsidy, equivalent to the difference between the milled equivalent of domestic rice and the rural cost of imported rice. Such a difference in percentage terms has nearly exceeded 50 percent and has been as low as 5 percent in 1982. This subsidy does not, of course, take into account the quality difference that exists between the imported and domestic rice. At the official exchange rate the level of protection becomes higher. A notable exception is the drought year of 1984 when producers were taxed and consumers subsidized. This is likely due to the massive amounts of food aid that dampened the real price of rice.

What are the sources of subsidy/taxation in rice consumption? Rice consumption in The Gambia is in principle subsidized from two fronts. First, if a difference exists between the c.i.f. cost of rice in Banjul at parallel and official exchange rates, then consumers enjoy a subsidy in that the full economic cost of rice is not paid due to an overvaluation of the Dalasi. This form of subsidy has prevailed for a long time until the adoption of flexible exchange rates. Consumers also enjoy a second type of subsidy when the Government decides to support the price of rice at the wholesale end by maintaining steady supplies to keep the consumer price below the c.i.f. cost of importing the rice. On the other hand, consumers are taxed from the imposition of an import duty that raises the final cost of rice at the market. The magnitude of this taxation has been steadily increasing as the volume of rice imports has increased over the decade. The net effect depends on the level of overvaluation, price support, and import duty. In The Gambia, the net effect for most years has been a tax on rice consumption, with the exception of 1984 (a drought year) when consumers were subsidized through the large volume of food aid entering the country.

Domestic and international rice prices. Most of rice consumed in The Gambia is of the 100 percent broken type and Table 21 shows that the difference between the higher quality 5 percent broken rice and the 100 percent broken rice over the decade averages 65 percent; that is, the lower quality rice is generally 65 percent less than the higher quality imported rice. This is contrary to the FAO study estimate of a 50 percent price difference. A second point of observation is that consumer price movements in The Gambia are generally not reflective of changes in the world market prices. For example, the price of rice in the world market has generally been declining from 1980 onwards, while the nominal consumer price of rice in The Gambia has shown a steady increase. This can only be explained if freight rates have increased, or the level of taxation has increased significantly, or if domestic inflation outpaced the international inflation. The likely situation is that all three factors bear upon the observed difference in price

Table 20--Cost price structure of domestic rice in The Gambia

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Producer price of paddy	353.00	347.00	441.00	463.00	492.00	492.00	510.00	510.00	510.00	900.00	945.00
Marketing costs to mills	31.00	28.00	39.00	39.00	39.00	39.00	43.00	43.00	43.00	57.00	60.00
Net milling costs	35.30	34.70	44.10	46.30	49.20	49.20	51.00	51.00	51.00	90.00	94.50
Sub-total	419.30	409.70	524.10	548.30	580.20	580.20	604.00	604.00	604.00	1047.00	1099.50
Equivalent rice price at 60 percent conversion rate	698.83	682.83	873.50	913.80	967.00	967.00	1006.67	1006.67	1006.67	1745.00	1832.50
Rural cost of imported rice											
At official exchange rate	581.24	536.32	592.05	671.04	630.40	712.50	761.49	759.23	1023.38	1147.83	1475.99
At parallel exchange rate	645.33	550.26	603.78	719.52	695.90	792.01	956.46	885.15	1361.60	1363.32	1525.48
Producer subsidy/tax (D/ton)	54.00	133.00	270.00	194.00	272.00	175.00	50.00	122.00	-355.00	382.00	307.00
Producer subsidy/tax (percent)	8.00	24.00	45.00	27.00	39.00	22.00	5.00	14.00	-26.00	28.00	20.00

Notes:

1. Producer prices for paddy were obtained from the Marketing Division of The Gambia Cooperative Union.

2. Marketing costs to mills and to Banjul include transportation, handling, inventory, storage, assembly, and interest costs and were computed from estimates in the FAO study of "The Rice Industry of The Gambia," 1983, for 1976/83. The marketing costs to mills for 1984/86 were computed on the basis of transportation rates estimates in Christine Jones, "The Domestic Groundnut Marketing System of The Gambia," Harvard Institute for International Development, 1986.
3. Milling costs are less net of sales of bran and include inventory and interest costs in mill and for 1976/83 were computed on the basis of estimates in the FAO study of "The Rice Industry of The Gambia," 1983. Milling costs for 1984/86 were estimated on the basis of fuel costs.
4. The producer subsidy equivalent in percentage (indicated in parentheses) was derived by taking the difference between the equivalent price of domestically produced rice and the rural cost of imported rice at parallel exchange rates over the rural cost of imported rice in percent. For example, the producer subsidy/tax for 1985 was:

$$\frac{1745.00 - 1363.32}{1363.32} \times 100 = 28$$

Table 21--Domestic and international rice prices for The Gambia

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
White Thai rice 100 percent broken, FOB Bangkok ($/mt)	177	183	222	199	254	247	198	194	214	173	126
White Thai rice 5 percent broken, FOB Bangkok ($/mt)	255	272	368	334	434	483	293	277	252	216	210
White Thai rice 100 percent broken, FOB Bangkok (D/mt)											
At official exchange rate	393	425	473	374	437	487	473	495	591	683	901
Unit price/ton import cost, CIF Banjul 100 percent broken (Ministry of Finance, The Gambia)											
At official exchange rate	477	359	357	434	363	402	506	452	686	766	1011
At parallel exchange rate	550	373	369	483	429	481	701	518	1025	982	1060
CIF Banjul Thai 100 percent broken, FAO study	437	392	398	429	426	530	602	562	n.a.	n.a.	n.a.

Notes:

1. White Thai 100 percent broken, FOB Bangkok, rice prices for 1976/83 are from FAO and World Rice Statistics and 1984/86 prices are from the Board of Trade of Thailand.
2. White Thai 5 percent broken, FOB Bangkok, rice prices are from the World Bank, Price Prospects for Major Primary Commodities (Washington, D.C.: World Bank, 1986).
3. Unit import cost figures are from the Trade Division of the Ministry of Finance, The Gambia, for 1985/86. The 1986 unit import cost is derived by taking the dollar value of the 1985 unit cost and applying the world price and foreign exchange shifts.
4. The CIF Banjul rice price for 100 percent broken rice is from the FAO study of "The Rice Industry of The Gambia," 1983.
5. n.a. refers to figures not available.

movements between world and domestic rice markets, but general inflation reflected in the exchange rate dominates.

A third point of interest is the observed difference in the price FOB Bangkok and the unit import cost figures of the Ministry of Finance. Where the unit price import cost figures are less than the price FOB Bangkok, then clearly the Government was making a loss and consumers were being subsidized, or a discrepancy exists between the reported value of rice and what was actually paid for. However, it is more likely that imported cost figures include some concessionary purchases from donors and not direct commercial imports.

Finally, there is the difference between the hitherto given FAO figures for c.i.f. Banjul rice prices and the unit import cost figures as well as the FOB Bangkok rice prices at official and parallel exchange rates. Where the FAO figures are lower than the FOB Bangkok rice prices, then a discrepancy exists.

5. SUMMARY OF LESSONS AND IMPLICATIONS FOR POLICY

(Sambou Kinteh and Joachim von Braun)

5.1 POLICIES AND PROGRAMS

With the current situation of difficult economic adjustment, programs are to be rigorously designed toward saving or generating foreign exchange, not creating a fiscal burden. Furthermore, in view of rising urban unemployment, there needs to be a focus on expanding rural labor demand combined with increasing labor productivity in agriculture. These criteria may not necessarily be compatible with a narrowly defined focus on food self-sufficiency at the national level.

Agricultural growth is a powerful force able to contribute toward the fulfillment of the above objectives and ultimately to the alleviation of poverty.[7] While a strong positive relationship was established in this research between increased income, rising food consumption (out of deficit levels), and nutritional improvement, there exists ample scope for agricultural program design to maximize these welfare effects of agricultural growth by the appropriate choice and combination of program components. An effective system of research-based monitoring and evaluation would be the tool for this.

In the case of the rice project studied here, the research highlighted the fact that a narrowly focused promotion of output in one crop, through subsidized irrigation, did achieve increased production, but only at high costs of investment, operations, and opportunity costs of labor in the wet season. The opportunity costs, resulting from considerable output foregone from competing crops (traditional cereals, groundnuts), were frequently overlooked.

Furthermore, it is shown that an understanding of the wider context of nutrition deficiency problems and their causes is required in order to target programs at nutritional improvement. The results stressed that this should include paying more attention to seasonality in income and food supply, to work load, to the health situation, and

---

[7] John Mellor, Christopher Delgado, and Malcolm Blackie, Strategic Issues in Food Production in Sub-Saharan Africa (Baltimore, Md.: Johns Hopkins University Press, 1987), pp. 3-22.

to sanitation. Double-cropped irrigated rice assists the rural poor in coping with seasonality.

This is not to argue that individual projects, such as Jahally-Pacharr, should singlehandedly attempt to be "do everything projects." Quite the contrary, given the failures of many past broad-based rural development programs in Africa. The research results stress, however, the importance of comprehensive *policy coordination* for rural poverty alleviation. Effective nutritional improvement, as a result of agricultural development programs, requires a compliment in the form of health and nutrition-related policies that combine long-term development concerns with a targeted short-term impact on nutrition. Successful agricultural programs and policies probably have to provide the resources to fund such complementary measures, and to make them sustainable in the rural sector.

5.2 CHOICE OF CROPS

Much speaks for a focus on rice in agricultural development programs in this setting: the irrigation-seed-fertilizer technology to promote rice is well known; rice is the main marketed cereal in rural and urban Gambia; the import-substitution effect is favorable for the foreign exchange situation; rice is particularly important as an income source for poor farmers, and the rural poor consume more calories from rice than do the upper-income groups.

The analysis of labor productivity by crop suggests, however, that considerable scope exists for a *multi-crop* focus rather than for a *single-crop* focus. The analysis of the productivity of upland crops underlines the potential of a fertilizer cum labor-saving implement program, coupled with an effective rural credit scheme (explicitly open to women farmers or to a specific women's branch).[8]

As impressive as the technical achievements in rice production at the Jahally-Pacharr scheme may appear, they were achieved at high costs. An additional labor day allocated to rice in the scheme achieves a lower incremental output at the margin than does one in upland cereals in the wet season. Nevertheless, participation in the scheme was beneficial for local farmers because for D 100 earned from rice cultivation in the scheme, only D 71 was lost from other crop production. Rice, however, is highly subsidized, both through the output price and through the irrigation investment cost which is not fully recovered by charges to the farmers.

---

[8] More detail in this issue is provided in Joachim von Braun and Detlev Puetz, "An African Fertilizer Crisis: Origin and Economic Effects," Food Policy, November 1987.

Program planners must be aware that the promotion of crops that compete with rice for labor and other resources (millet, maize, groundnuts) will further increase the opportunity cost of rice production. If one designs a program aimed at increasing the labor productivity of upland crops, it may be necessary to accept lower yield levels in wet season project rice as a consequence of labor shifting more back to the upland farms. Such a balance would increase overall labor productivity. This calls for more attention to competition between crops over scarce labor resources, and less of a narrow focus on physical output growth in rice.

5.3 CHOICE OF TECHNOLOGY

Rice is produced under a variety of technologies. There is, therefore, great variety in the area in patterns of organization of production, control of crop output, marketed surplus, labor input by gender, and production cost per unit of output. Given scarce water resources in the dry season, more emphasis on the partly water-controlled rice technology appears appropriate. However, this is only justified if production costs for schemes with partly water-controlled fields (tidal-irrigated) can be drastically reduced. Even if this type of rice does not have the positive smoothing out effect on seasonal cereal supplies that is provided by a dry season crop, it is still a more secure means of producing cereals than the purely rainfed upland farms. Women are more involved in this partly water-controlled technology, which appears second best in terms of returns to labor from a farmer's perspective. Yet, this is largely because of the differential subsidies embodied in irrigation infrastructure allocated to the two rice technologies.

The choice-of-technology issue in rice is, however, not simply a question of choice between technology X versus Y. In each type of technology, there are farmers who produce rice competitively, and others who do not. Mean values can only provide a rough guide. A key issue is to identify, through efficient monitoring, the technical constraints that keep certain farmers at the lower end of the distribution scale, and thereby find ways to move them upwards. Again, this means rejecting the narrow approach of measuring yield levels per unit of land, instead of focusing on returns per unit of labor.

The potential for expanding dry-season rice cultivation should not be neglected, given its highly favorable impact on smoothening out seasonality in income and food availability at the household level. On equity grounds, further development of dry-season irrigation should be spread throughout the country (especially further upstream) by means of small schemes. This can, of course, only be done up to the limits of water availability during the dry season. To avoid the risk of salt-water intrusion into schemes downstream, careful selection of scheme sites--partly new, partly rehabilitated ones--would be crucial.

5.4 SIZE OF SCHEME AND MANAGEMENT DIFFICULTIES

Akin to the question of choices of crops and technology is the relevance of size of individual holdings and associated overall project management problems. Sustained double-cropping pattern is essential for an economically viable irrigated rice production system. Favorable climatic conditions which make rainfed crop production attractive in The Gambia will invariably increase the opportunity cost of wet season irrigated rice considerably. Under erratic favorable rainfed conditions, small irrigated rice plot owners with substantial upland crop enterprises are caught up in a difficult farm production decisionmaking process because of increased competition for their scarce labor resources. With labor productivity-increasing measures in upland crops, this competition is likely to be further intensified as noted in (5.2) above.

The climatic difficulties of wet weather in July/August and cold weather in November/January require, for profitable double-cropping of irrigated rice, a high degree of timeliness in the management functions of farmers and schemes for accurate sequencing of the cropping program, and organization and mobilization of production support services and inputs. The difficulties in these management functions are compounded by complex crop mix patterns. Although these accentuating forces impinge directly on the wet season irrigated crop more than on the dry season crop, their effects are transmitted through the crop sequencing process into the dry season crop. Once the proper crop cycle gets out of sequence, it can be reinstated by management only at a certain cost. (For instance, decision not to grow a crop for one season so as to reset the crop sequence or by running the risk of one crop season with a major crop failure.)

Given the foregoing natural limitations and associated management difficulties, four alternative strategies are possible: (i) choice of rice varieties should emphasize adoption of short duration types which may be of lower palatability and production potential; (ii) change in the irrigated rice cropping pattern by searching for and introducing cultivation of less labor-intensive crops in the wet season;
(iii) developing a class of specialized irrigated rice farmers; and (iv) employing a combination of these options.

5.5 FOCUS ON INCOME OF THE POOR

This study stressed that the substantial differences in per capita income between households in rural Gambia are of a more long-standing nature than frequently believed. A focus on the poor is thus called for in programs aimed at nutritional improvement through economic development.

Additional income generated by the poorer households translated into more food energy consumption and more nutritional improvement than in the rest of the population. The nutrition problem, evinced by the widespread prevalence of underweight children, is largely confined to the lowest 25 percent on the income scale. These 25 percent are forced to adjust their calorie consumption downward in the "hungry" season, while the rest of the population does not.

Low income is caused mainly by low labor productivity in agriculture which, in turn, is a result of inability to acquire productivity-enhancing inputs and tools. Any additional income, derived either from traditional cash crops (such as cotton, groundnuts), from staple foods or from nonagricultural income and transfers (remittances), is expended equally on food and nonfood consumption, regardless of the income source. Whether the income comes in the form of cash or food does not make any difference to changes in the food energy consumption of households. This suggests that agriculture-based programs for poverty alleviation and nutritional improvement in this area do not need to be limited to food crop promotion, but need to focus on the most effective way of promoting income growth among the poor, which may well be through technological change in food production.

5.6 ALLOCATION POLICIES FOR SCARCE IRRIGATED LAND

Complex land tenure issues arise when highly valued irrigated land is developed in an area where there is abundant land supply for rainfed agriculture. Who should get access to the new land, to what extent, for how long, and under what conditions? An auctioning approach to land distribution cannot be recommended on equity grounds because the poor do not have effective access to capital markets. Any rationing criteria have to be complex. Rights to land taken over by the scheme and relationships to the labor resources that cultivated the land are key factors, and these were indeed taken into consideration by the project.

The distribution of new land among large numbers of villages and among many compounds within each village had a favorable effect in this case of the Jahally-Pacharr Project. The benefits of the dry-season crop for reduced calorie deficiency during the "hungry" season were well spread among the local communities through the sharing of small plots. There are no indications that potential returns to scale were lost by this approach.

Traditional acquaintance with irrigated agriculture is not necessarily a recommended criterion for land distribution, since farmers from villages who had little experience in rice production obtained the highest yields in this scheme by carefully following production recommendations.

In the final outcome, the distribution of new rice land benefited those households in the medium range of the income scale more than those in the lowest and highest income brackets, although the poor gained relatively more. The analysis also showed that women in poorer compounds with plots in the scheme had a higher likelihood of gaining access to those plots than women in higher-income compounds.

5.7 COMMERCIALIZATION AND MARKET INTEGRATION

The main commercialization effect of the new rice crop is driven on the input side by loan repayment requirements for fertilizer, seed, water charges, and land preparation services. The second effect is an expanding market for hired labor. Third is the marketed surplus from the new crop, which was found to be surprisingly low. While marketed surplus was found to be output- and price-elastic as expected, local infrastructure (that is, proximity to the road/markets) had a favorable effect over and above these elasticities. This stresses the potential role to be played by infrastructure in improving integration into the exchange economy.

5.8 REINFORCING EFFECTS OF AGRICULTURAL DEVELOPMENT ON NUTRITIONAL IMPROVEMENT

Increased income, especially income held by women, was found to be a powerful force for nutritional improvement of malnourished children in The Gambia, particularly among the poor. However, the complex web of nutrition and health interactions suggests that the improvement of health should be a direct target linked with raising consumption levels through income. Rural health services need to be upgraded and moved closer to areas of demand/need. Unclean village water supplies (found to be a significant factor in nutritional deterioration) should be a priority focus of complementary programs of rural development. The increased prevalence of malaria close to the scheme should be coped with by preventing the buildup of unnecessary standing water. The burden on mother's time for child care in the wet season, increasingly strained by extra work in rice, requires a creative village-based response. Child-specific interventions, parallel with agricultural development, must focus on children of low birth weight and the factors causing a nutritional deterioration of children aged 1 to 3 years old.

As confirmed in this study, agricultural programs and policy may impact directly on the symptoms and patterns of malnutrition. The positive effects of agricultural development may, however, be strengthened by effective public health services. These services must coordinate in a strong national system that is designed to tackle, as a priority, the preventative and curative needs of the rural poor. A

project-by-project approach to health delivery can easily lead to inefficiency and injustice.

5.9 DIVISION OF LABOR AND ROLE OF WOMEN

The introduction of new rice production technology in this Gambian setting has led to profound changes in the status of the crop, and in the arrangements for its production and disposal. The study has shown that bureaucratic attempts to preserve the traditional production system on the one hand, while changing the very nature of that system on the other hand, have been largely ineffective. The selection of a so-called "women's crop" for promotion, in order to try and improve the welfare of women, has not directly benefitted women more than men, as described in Chapter 3.

Consequently, a more appropriate way of helping a broader spectrum of women might be to move away from the promotion of a single crop (rice), and away from the isolationism of seeking a sex-specific crop, to the promotion of improved labor productivity in both rice *and* upland crops, for both women and men. Women are much more successful as upland cash croppers than has generally been acknowledged. While the role of women as food crop producers has generally been over-emphasized, their skills as cash crop producers has long been under-emphasized. But the access of women to productive resources (credit, fertilizer, tools) is much less than men's. There is, therefore, great potential for women to be included directly into the mainstream of agricultural development through the improvement of upland crops, and the provision of equal access of women to required inputs. Such an approach is justifiable not just on overall productivity grounds (as a general growth target), but also on improved equity grounds.

5.10 TRADE-OFFS IN PRICE POLICY

Following the decontrol of rice retail prices and the concomitant step to relieve a government monopoly in rice importation, there has been an active response in the private sector to take up the rice import business. The long-term effect of these measures on consumer rice prices and consumption are yet to unfold. In the immediate term, however, there has been substantial movements in the price of rice.

The continued imposition of an import tax can be justified as a means to stem high rice consumption and generate government fiscal revenues. Table 19 showed that consumers pay a higher implicit tax on rice consumed following the decontrol and relaxation of the rice import market. It would appear that profit margins in this activity are quite high and new entrants to the market should be forthcoming. While consumers are taxed, Table 20 showed that rice producers continue

to enjoy a subsidy in that the milled rice equivalent of domestically produced rice is higher than the rural cost of imported rice.

The argument for an import tax is to generate government revenue, save on foreign exchange spending with lower rice consumption, and to provide a subsidy to rice and cereal producers as the equivalent price of domestic production goes up. However, an import tax on rice, a staple complement of the diet of Gambians, both urban and rural, is regressive in that it taxes the poorer section of the population more as they spend a proportionately higher share of their income on food, in general, and rice, in particular. This equity question must thus be considered against the fiscal gains that may be desired. An import tax on rice also leads to a loss of foreign exchange as producers shift from groundnuts, the major foreign exchange earner, to cereal production, whose value appreciates. An import tax also raises the cross-border price ratios and, where excessive, may lead to a lower re-export trade that generates foreign exchange.

More detailed knowledge on consumption patterns in urban and peri-urban areas of The Gambia is required to better assess the magnitudes of those trade-offs between fiscal, foreign exchange, and producer-consumer welfare effects of rice pricing.

ANNEXES

Annex 1--List of variables

Obs	QRPT	QURP	QSRP	QIRP	HATR	HASR
1975	28375	4000	21975	2400	21900	0
1976	30600	4000	22300	4300	22300	0
1977	35000	2800	27500	4700	27100	0
1978	22300	2700	16500	3100	20000	0
1979	33700	3600	26000	4100	23000	0
1980	29400	2600	17500	9300	17100	10300
1981	42700	1800	25300	15600	21700	17300
1982	39500	4700	27900	6900	27800	22300
1983	37200	4100	29600	3500	27200	22900
1984	26100	2600	18100	5400	14800	10200
1985	27200	2200	8900	16100	10600	
	6200					
1986	23010	3550	11690	7770	12100	
	7300					

Obs	HAUR	HAIR	QSMP	QEMP	QLMP	QSP
1975	0	0	26700	7000	11700	8000
1976	0	0	20300	3600	9300	7400
1977	0	0	20700	3000	8100	9600
1978	0	0	22700	4400	6400	11900
1979	0	0	32100	9600	10300	12200
1980	4900	1900	17500	1700	7000	8800
1981	1500	2900	29000	5400	9900	13700
1982	4200	1300	42000	14500	14700	12800
1983	4300	1300	49400	16900	16800	15700
1984	3300	1300	33200	14400	11700	7100
1985	1500	2900	46700	22900	15600	8200
1986	3100	1700	66200	43000	11600	11600

Notes:

1. All quartiles are in tons and area is in hectares.
2. FAO figures are adjusted from respective cropping years to calendar years (for instance, 1975 is cropping year 1974/75).
3. RCON = (QRPT x 0.6) + RAID + RIMP.
4. CERCON = RCON + [(QSMP + SMIMP + SMAID) x 0.8] + QMZP + MZIMP + WAID + WIMP.

Annex 1 (continued)

Obs	OMZP	HAS	HAEM	HALM	HASM	HAMZ
1975	4800	9082	4843	13987	27911	6250
1976	4500	7716	5246	13560	26522	4400
1977	7000	8760	3713	8784	21258	4000
1978	9500	11814	5166	11087	28067	6200
1979	6600	11171	8071	13049	32291	6800
1980	6300	9323	1372	7931	18627	5400
1981	12500	14300	6000	11600	31900	5900
1982	17000	11900	11400	11600	34900	7600
1983	8500	16300	13600	16000	45900	9400
1984	12500	6900	14100	11100	32100	6900
1985	26500	7300	19200	13700	40200	9200
1986	26540	12800	35400	14500	62700	16700

Obs	OGNP	HAGN	RIMP	WIMP	SMIMP	MZIMP
1975	156268	107400	17000	1648	47	1
1976	153461	98800	31000	4534	1093	5
1977	139446	1007600	28000	2964	450	0
1978	123493	106200	31000	8115	9000	0
1979	136735	106200	31000	8115	9000	0
1980	66900	67800	23000	8220	9000	0
1981	60200	68900	36000	8843	2500	0
1982	108900	80700	28000	7240	1000	0
1983	151400	95000	35000	5779	901	0
1984	113800	97200	54000	9150	500	0
1985	105100	91400	31550	7300	0	0
1986	75800	58500	34705	7300	0	0

Obs	WAID	RAID	SMAID	CERCON	RCON	OCERP
1975	2000	2000	8000	71311	36025	42225
1976	0	2000	8000	87972	51360	43160
1977	1000	4000	5000	83484	53000	43160
1978	2400	10300	8300	104188	48680	39140
1979	1900	13300	5500	117095	64520	51180
1980	4600	21000	0	102700	61640	38680
1981	15600	800	3800	125103	62420	58820
1982	2200	3000	1200	113100	54700	70900
1983	400	8000	500	118940	65320	68640
1984	400	24000	1900	141690	93660	52220
1985	0	10000	0	123730	57870	74880
1986	0	12000	0	142003	60511	87998

Annex 1 (continued)

Obs	SPRP	SORCON	SORHA	RIDCC	CIDCC	POP
1975	40	50	39	24	26	526000
1976	42	58	47	35	42	545000
1977	49	63	44	33	38	565000
1978	34	47	40	24	47	586000
1979	40	55	34	26	41	607000
1980	46	60	41	22	39	627000
1981	43	50	36	29	38	648000
1982	33	48	39	25	32	669000
1983	30	66	27	38	45	711000
1984	30	66	27	38	45	722000
1985	22	47	18	25	31	733000
1986	16	43	13	24	29	756000

Obs	CPR	CPM	CPS	PPGN	CPI	GDP
1975	0	0	0	310	--	--
1976	600	400	440	370	100	314
1977	600	560	520	408	116	345
1978	600	620	620	408	128	355
1979	700	560	560	421	136	336
1980	700	560	540	421	142	365
1981	700	640	640	460	152	371
1982	840	700	580	500	162	340
1983	880	700	700	520	178	373
1984	1090	1160	1110	450	209	427
1985	1448	1440	1360	640	249	396
1986	1793	1760	1660	1110	345	361

Obs	CERIMP	CCONPC	RCONPC	CERAID	SMCON	SMCONP
1975	18696	135	68	12000	27798	0.0528
1976	36632	161	94	10000	28474	0.0522
1977	31414	148	94	10000	20920	0.0370
1978	49082	178	83	21000	38298	0.0653
1979	48115	193	106	20700	37280	0.0614
1980	40220	164	98	25600	23200	0.0370
1981	47343	193	96	20200	28240	0.0435
1982	36240	169	82	6400	35360	0.0528
1983	41680	172	95	8900	40641	0.0589
1984	63650	199	132	26300	28480	0.0400
1985	38850	169	79	10000	37360	0.0509
1986	42005	188	80	12000	52960	0.0700

Annex 1 (continued)

Obs	SPIRP	SPURP	SPSRP	MZCON	PPR
1975	8	14	77	3841	0
1976	14	13	73	3604	358
1977	13	8	78	5600	403
1978	14	12	74	7600	448
1979	12	11	77	5280	463
1980	32	9	59	5040	463
1981	36	4	59	10000	460
1982	17	12	71	13600	510
1983	9	11	79	6800	510
1984	21	10	69	10000	510
1985	59	8	33	21200	900
1986	34	15	51	21232	945

Annex 2--Definition of variables:

CCONPC	=	Per capita cereal consumption in kilograms
CERAID	=	Total cereals aid in metric tons
CERCON	=	Cereal consumption
CERIMP	=	Total cereal imports in metric tons
CIDCC	=	Share of cereal imports in total cereal consumption
CPI	=	Consumer price index
CPM	=	Consumer price of millet (Dalasi)
CPR	=	Consumer price of rice in Banjul (Dalasi)
CPS	=	Consumer price of sorghum (Dalasi)
GDP	=	Gross domestic product per capita in U.S. $
HAEM	=	Total early millet hectarage
HAGN	=	Total groundnut hectarage
HAIR	=	Total irrigated paddy hectarage
HALM	=	Total late millet hectarage
HAMZ	=	Total maize hectarage
HAS	=	Total sorghum hectarage
HASM	=	Total sorghum and millet hectarage
HASR	=	Total swamp paddy hectarage
HATR	=	Total paddy hectarage
HAUR	=	Total upland paddy hectarage
MZCON	=	Maize consumption
MZIMP	=	Total maize imports in metric tons
POP	=	Population
PPGN	=	Producer price of groundnuts (Dalasi)
PPR	=	Producer price of rice (Dalasi)
QCERP	=	Total quantity of cereals produced
QEMP	=	Total quantity of early millet produced in metric tons
QGNP	=	Total quantity of groundnuts produced in metric tons
QIRP	=	Total quantity of irrigated paddy produced in metric tons
QLMP	=	Total quantity of late millet produced in metric tons
QMZP	=	Total quantity of maize produced in metric tons
QRPT	=	Total quantity of paddy produced in metric tons
QSMP	=	Total quantity of sorghum and millet produced in m. tons
QSP	=	Total quantity of sorghum produced in metric tons
QSRP	=	Total quantity of swamp paddy produced in metric tons
QURP	=	Total quantity of upland paddy produced in metric tons
RAID	=	Total rice aid in metric tons
RCON	=	Rice consumption
RCONPC	=	Per capita rice consumption in kilograms
RIDCC	=	Share of rice imports in total cereal consumption
RIMP	=	Total rice imports in metric tons
SMAID	=	Total sorghum aid in metric tons
SMCON	=	Sorghum and millet consumption
SMCONP	=	Per capita sorghum and maize consumption
SMIMP	=	Total sorghum and millet imports in metric tons
SPIRP	=	Share of irrigated rice in total rice production (percent)

Annex 2 (continued):

SPSRP	=	Share of swamp rice in total rice production (percent)
SPURP	=	Share of upland rice in total rice production (percent)
SPRP	=	Share of rice in total cereal production (percent)
SQRCON	=	Share of rice in total cereal consumption (percent)
SQRHA	=	Share of rice in total cereal hectarage (percent)
WAID	=	Total wheat aid in metric tons
WIMP	=	Total wheat imports in metric tons

REFERENCES

Boserup, Ester. "The Position of Women in Economic Production and in the Household with Special Reference to Africa." Wageningen, 1980, p. 12.

von Braun, Joachim and Puetz, Detlev. "An African Fertilizer Crisis: Origin and Economic Effects." Food Policy, November 1987.

von Braun, Joachim; Puetz, Detlev; and Webb, Patrick. "Technological Change in Rice and Commercialization of Agriculture in a West African Setting: Effects on Production, Consumption, and Nutrition." Washington, D.C.: International Food Policy Research Institute, 1987 (mimeographed).

von Braun, Joachim and Webb, Patrick. "Effects of New Agricultural Technology and Commercialization on Women Farmers in a West African Setting." Paper prepared for the Conference of the Association for Women in Development, Washington, D.C., April 15-17, 1987.

Delgado, Christopher and Miller, C. "Changing Food Patterns in West Africa, Implications for Policy Research." Food Policy 10 (1) (February 1985).

Delgado, Christopher L. and Reardon, Thomas A. "Policy Issues Raised by Changing Food Patterns in the Sahel." Washington, D.C.: International Food Policy Research Institute, January 27, 1987.

Dey, Jennie. "The Social Organization of Production," Annex 2.C of The Rice Industry of The Gambia: An Economic and Financial Analysis of the Rice Industry with Recommendations for its Strengthening. Rome: FAO, 1983, pp. 79-106.

Food and Agriculture Organization. "Rice Industry of The Gambia." Rome: FAO, 1983, p. 256.

Johm, Ken. "Rice Development in The Gambia in the Context of Production and Consumption Trends." Paper presented at IFPRI/PPMU workshop on policy issues for rice development in The Gambia, Banjul, July 21, 1987.

Jones, Christine. "The Domestic Groundnut Marketing System of The Gambia." Harvard Institute for International Development, 1986.

World Bank. Price Prospects for Major Primary Commodities. Washington, D.C.: World Bank, 1986.

LIST OF PARTICIPANTS

Workshop on
"Policy Issues for Rice Development in The Gambia"
July 21, 1987

Dr. Joachim von Braun
IFPRI

Mr. Mustapha Dabo
ADP II Coordinator
Ministry of Agriculture

Mrs. Ralphina D'Almeida
Undersecretary
Ministry of Health

Mr. Seni Dabo
Project Manager
Jahally-Pacharr Project

Dr. Elon Gilbert
Chief of Party
GARD Project

Mr. Sankung Janneh
Director
Department of Agriculture

Ken Johm
Deputy Director
PPMU

Mrs. Safiatu Kassim-Singhateh
Executive Secretary
Women's Bureau

Mr. S. Kinteh
Director
PPMU

Dr. Ronald Jones
Advisor
President's Office

Marcella Marcimino
Office of the Resident
Representative
UNDP

M. Sanyang
MEPID

O. Jammeh
MEPID

Bolong Sonko
Undersecretary
Ministry of W.R.E.F.F.

Detlev Puetz
IFPRI

Dr. F. Redar
Resident Representative
FAO

Mr. Johm
Parliamentary Secretary
Ministry of Agriculture

Ndey-Isatoo Njie
Department of W.R.E.

Momodou Njie
Department of W.R.E.

Mr. Amadou Taal
Permanent Secretary
Ministry of Agriculture

Patrick Webb
IFPRI

Barbara Bruns
The World Bank
Washington, D.C.