

**AN ANALYSIS OF THE EFFECTS OF CHANGES IN MARKETING INSTITUTIONS
AND POLICY ON CEREALS PRODUCERS AND MARKETING AGENTS
IN SOUTHEASTERN SENEGAL**

Executive Summary*

[DRAFT]

for the Senegal Applied Research Component of the Food Security
in Africa Cooperative Agreement Number DAN-1190-1-00-4090-00

Between

Africa Bureau, Office of Technical Resources, AID
Bureau of Science and Technology,
Office of Rural and Institutional Development, AID
Agricultural Development Office, USAID, Dakar, Senegal
Department of Agricultural Economics, Michigan State University

September 1988

Prepared by

Stephan J. Goetz
Eric W. Crawford
Bocar N. Diagana
John S. Holtzman
and
Michael T. Weber

* This is a summary of the in-country field work supported by the Senegal "buy-in" to the Cooperative Agreement. Funding through the core agreement will permit further in-depth analysis of the survey data at MSU. Opinions expressed in this report are the authors' and do not necessarily reflect the official views of ISRA or USAID.

ISRA/MSU FOOD SECURITY PROJECT IN SENEGAL TEAM MEMBERS

In-Country Staff:

Bocar N. Diagana, ISRA Researcher
A. Abdoulaye Fall, ISRA Researcher
Stephan J. Goetz, MSU Principal Researcher

MSU Faculty Backstop:

John S. Holtzman
Eric W. Crawford
James D. Shaffer
John M. Staatz
Michael T. Weber

ISRA Collaborators:

P. Leopold Sarr (Director, D/RSAER)
Jacques Faye
Ismael S. Ouedraogo
Ousseynou Ndoye

ACKNOWLEDGEMENTS

This research project is jointly funded by the Bureau of Science and Technology (Office of Rural and Institutional Development), the Africa Bureau (Office of Technical Resources), U.S. Agency for International Development, Washington, DC under Food Security in Africa Cooperative Agreement DAN-1190-A-00-4092-C0, and the U.S. Agency for International Development, Dakar, Senegal under the Sahel Policy Analysis and Support Project (PIO/T 625-0970-85-3-50124).

In addition, the project has benefited from numerous discussions with USAID/Dakar officials, particularly W. Nilsestuen (Head of ADO), M. Keita (Project Officer), L. Thiam, J. Balis (former Head of ADO) and R. Caldwell (former Project Officer).

TABLE OF CONTENTS

	Page
ABBREVIATIONS	i
1. INTRODUCTION	1
1.1. Guide to Readers of the Executive Summary	1
1.2. Research Context and Project Background	1
1.3. Research Method and Principal Project Activities	3
1.4. Project Outputs	6
2. PRINCIPAL FINDINGS AT THE FARM HOUSEHOLD LEVEL	7
2.1. Crop Production and Agricultural Inputs	7
2.2. Marketing Behavior and Food Security Strategies	12
2.3. Opinions of and Anticipated Responses to the NAP.	13
2.4. Conclusion	17
3. PRINCIPAL FINDINGS AT THE FARMER ORGANISATION LEVEL	18
3.1. Classification of Farmer Organizations	18
3.2. Resources of Farmer Organizations	19
3.3. Current Activities of Farmer Organizations	20
3.4. Opinions of and Anticipated Responses to the NAP.	21
3.5. Conclusion	23
4. PRINCIPAL FINDINGS AT THE CEREALS TRADER LEVEL	24
4.1. The Business Environment of Cereals Traders	25
4.2. Characteristics and Activities of Cereals Traders	28
4.3. Opinions of and Anticipated Responses to the NAP.	31
4.4. Conclusion	32
5. ISSUES INVOLVED IN FACILITATING INCREASED PRIVATE SECTOR PARTICIPATION	34
6. PROGRAM AND POLICY OPTIONS FOR STIMULATING FARM PRODUCTIVITY GROWTH AND PRIVATE MERCHANT ACTIVITIES IN SOUTHEASTERN SENEGAL	38
7. TOPICS FOR FURTHER RESEARCH: A PRELIMINARY LISTING	41
REFERENCES	43
ANNEX	44
A. Project Outputs: Working Papers, Seminars, Training	44
B. The Senegalese Farmer and the Food System	47

ABBREVIATIONS

- ABP -- Association de Base des Producteurs (Association of Producers, Organized by SODEFITEX)
- APS -- Agricultural Production Support (project)
- BAME -- Bureau d'Analyse Macro-Economiques (Macroeconomic Analysis Bureau)
- CFA -- West African Currency Unit
- CSA -- Commissariat à la Sécurité Alimentaire (Food Security Commissariat)
- FSP -- ISRA/MSU/USAID Food Security Project
- GOS -- Government of Senegal
- ISRA -- Institut Sénégalais de Recherches Agricoles (Senegalese Institute of Agricultural Research)
- NAP -- New Agricultural Policy
- ONCAD -- Office National de Coopération de d'Assistance au Développement (National Office for Cooperation and Development)
- SAED -- Société d'Aménagement et d'Exploitation des Terres du Delta et des Vallées du Fleuve Sénégal et de la Falémé (Senegal River Development Organization)
- SODEFITEX -- Société de Développement des Fibres Textiles (Textile Fibers Development Organization--Cotton)
- SODEVA -- Société de Développement et de Vulgarisation Agricole (Agricultural Development and Extension Organization)
- SONACOS -- Société Nationale de Commercialisation des Oléagineux du Sénégal (Oilseeds Marketing Organization of Senegal)
- SV -- Section Villageoise (Village Section)

1. INTRODUCTION

1.1. Guide to Readers of the Executive Summary

This executive summary is organized as follows. Chapter 1 outlines the context of the research project and summarizes the research method, principal research activities and project outputs. Chapters 2, 3 and 4 each begin with a short statement of the main research issues, followed by a presentation of principal research findings on the characteristics, resources and activities of farm households, farmer organizations and private cereals traders, as well as the stated responses of each group to the APS. Readers interested only in a summary of the main research findings are invited to consult the concluding sections on pages 17, 23 and 32 of this report. Chapter 5 discusses key issues we believe have to be addressed in stimulating private sector participation in the cereals input/output marketing system in Senegal. Chapter 6 provides program and policy options designed to stimulate farm-level growth and private merchant activities, while Chapter 7 presents topics for further research.

This executive report, intended for a broad audience, summarizes key research findings; readers interested in details of the research results and method are referred to the list of project working papers in Annex A. These papers are available in Senegal at ISRA/Dakar and USAID/Dakar and at USAID's Acquisitions Department in Washington.¹

1.2. Research Context and Project Background

In 1984 the Government of Senegal announced the goal of achieving 80% cereals self-sufficiency through local production by the year 2000. A strategy of import substitution of local cereals (mainly for rice) is being considered by the Government

¹Acquisitions Department, Agency for International Development, PPC/CDIE/DI, 209 SA-18, Department of State, Washington, DC 20523.

in large part to reduce the vulnerability and cost of assuring Senegal's food supply.² Pursuant to a feasibility study carried out by the FAO during 1983/4, the decision was taken to intensify and extensify coarse grains production in the higher rainfall areas of southeastern Senegal.³ Maize was identified as having a high potential response to mineral fertilizer and is therefore especially targeted under Senegal's New Agricultural Policy (NAP).

To further stimulate the production and marketing of coarse grains, the government in 1985 sanctioned private trade in cereals while also introducing a producer floor price to be upheld by a cereals parastatal (the Commissariat à la Sécurité Alimentaire, CSA).⁴ Under a new credit program--the Agricultural Production Support project (APS)⁵--to be implemented in the near future, private cereals traders will also be encouraged to distribute cereals fertilizer and improved seed to farmers.

Given the above policy context, the broad objective of the applied research program described herein was to help identify a combination of specific policies and programs to reduce the cost of achieving cereals self-sufficiency in Senegal by the year 2000.⁶ In addition, research results were expected to provide insights to USAID missions throughout Africa, where complementary studies were being conducted by MSU in four countries (Mali, Somalia, Rwanda and Zimbabwe) on the effects of changes in agricultural policy, institutions and technology. The specific research focus in Senegal was on the Government's decision to

²Estimates are that less than one-half of Senegal's food needs are currently being produced in-country.

³A concurrent goal is to stimulate irrigated rice production in the Fleuve area of Senegal.

⁴A consumer price ceiling of 90 F/kg was also announced.

⁵USAID's Agricultural Production Support project has three principal components: a. stimulating private sector multiplication and distribution of selected cereals seeds along with fertilizer; b. a credit program designed to enable traders to distribute and farmers to use these improved inputs and c. a multimedia campaign designed to explain the benefits of the new technologies to food system participants. See also Annex B.

⁶See also Annex 1 of the PIO/T document.

place more responsibility for input and output marketing and credit in the hands of private traders and farmer organizations.

In a broad sense the study was intended to inform agricultural decision-makers in three ways:

- a. by clarifying assumptions about farmer and trader behavior upon which the New Agricultural Policies are based;
- b. by surveying how farmers, farmer organizations and private cereals traders say they will respond to the APS in particular and the NAP in general; and
- c. by deriving alternative policy options using knowledge gained in a. and b., along with anticipated effects of each option.

To achieve these objectives, a unified set of field surveys was administered to producers and market participants, and agricultural product price data were collected in nine markets. These surveys are described briefly in the following section along with their objectives.

1.3. Research Method and Principal Project Activities

The conceptual framework used to guide the design of the surveys was that of the food system subsector, operationalized with a research planning matrix and a calendar of research activities (PERT charts).⁷ Principal research activities included:

- o a village level exploratory survey
- o a census of households, farmer organizations and traders
- o multiple-visit formal surveys of households, traders, farmer organizations and village chiefs
- o bi-weekly collection of market prices
- o multiple informal interviews with parastatal agents.

Using purposive sampling [8],⁸ a maximum of 215 farm households in 15 villages located in southeastern Senegal were selected for the study and stratified as "northern" and "southern"

⁷See also Crawford et al. (1988).

⁸Numbers in [] refer to project working papers listed in the Annex that address indicated topics in more detail.

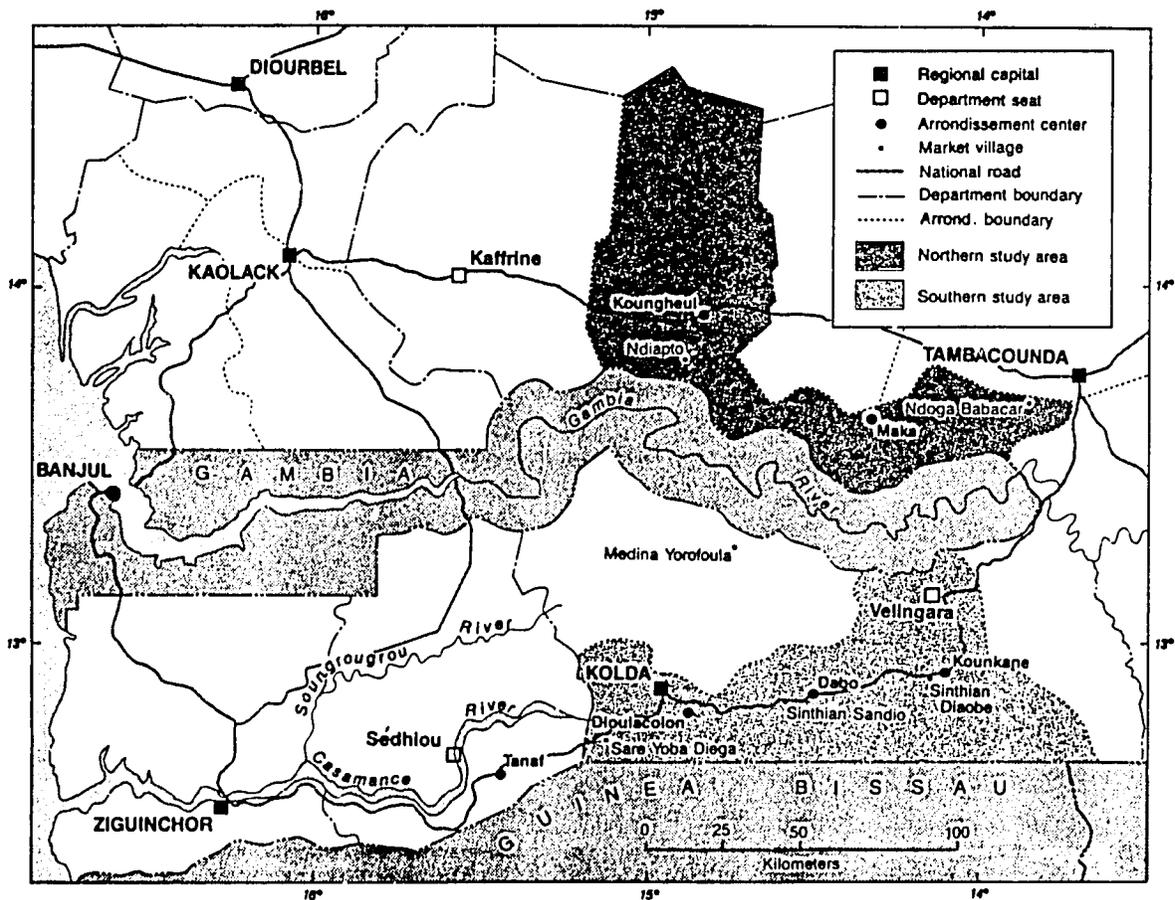
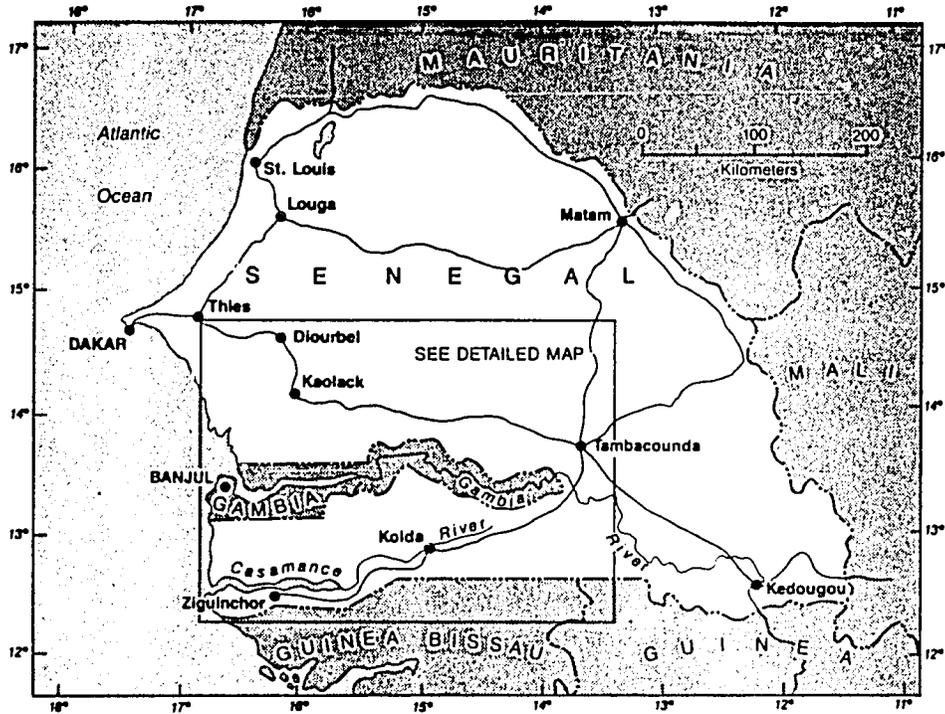
research areas (see map).⁹ The research areas were chosen based on two principal criteria: (1) southeastern Senegal was to play an important role under the NAP, owing to its relatively high agricultural potential and (2) southeastern Senegal has been under-researched; hence the research would complement on-going ISRA and BAME studies in the Lower Casamance and Central Peanut Basin. Farm households were surveyed on: Crop production activities differentiated by crop and technology employed [9,11,12]; farm-level acquisition and use of selected farm inputs [9,11,12]; perceptions of constraints on agricultural production and the benefits of improved technology [6,12]; strategies for assuring family food supplies, including cereals purchase and sales behavior [6,14, 17]; opinions concerning recent changes in policies toward the organization of marketing and the pricing of inputs and outputs, and concerning possible alternative policies [13]. Relevant price data were collected over a period of at least 14 months in 9 markets in the research areas [7] using the BAME collection method (Ouedraogo and Ndoye, 1988).

In addition, formal surveys were administered to 45 cereals traders [5] and 35 farmer organizations [1] in the research areas during 1986/7. Selected analysts and officials in rural development agencies were also interviewed during the course of the field survey. The information on current activities, resources and constraints for all food system participants is used, along with responses about future events and hypothetical situations, to determine principal constraints to implementing the APS. Policy options that hold potential for lowering the cost of achieving food self-sufficiency in southeastern Senegal are subsequently identified.

As the field surveys evolved it became clear that private sector participants in the research areas had not been provided with the officially anticipated means to distribute improved

⁹The northern areas (arrondissements of Maka and Kounghoul), representing two-fifths of the total sample, received an average annual precipitation of 550 mm during 1983-86, while the southern areas (former Haute Casamance) received around 900 mm. Working Paper [9] provides a general description of the research areas.

MAP OF THE ISRA/MSU FOOD SECURITY PROJECT RESEARCH AREA



inputs.¹⁰ In effect, parastatals remained the principal suppliers of such inputs, making it impossible to gauge "with and without NAP" behavior. This in turn required adjustments in the research design towards greater use of hypothetical, forward-looking questions to anticipate constraints to and prospects for private sector participation in the food system.

A further analytical modification of the research involved the crop budgets. Preliminary budgets were developed using data from three broad case studies and 20 detailed interviews during which crop areas were measured. These were compared to budgets developed by Martin (1988) and revealed no significant differences in the costs and benefits of producing crops under alternative technologies. Instead of developing new budgets the project therefore focused more effort on understanding prospects for expanded maize production and consumption.

1.4. Project Outputs

These include (see Annex A for a detailed listing): (a) timely written reports containing data and analysis useful to officials of GOS, USAID and other donors for developing policies and programs dealing with food security in Senegal and other African countries; (b) oral presentations and seminars in Senegal designed to stimulate discussion among GOS and other analysts and to initiate policy dialogue with key decision-makers; (c) an improved capacity within ISRA and USAID to provide analysis on food security issues. In addition, commodities purchased by the project (cars, motorcycles and mobylettes, computer software and hardware) were turned over to ISRA at the end of the field survey period (December 1987) to increase the Institute's capacity for conducting applied research. In terms of human capital formation resulting from the project's technical assistance, some of the Senegalese research staff receiving on-the-job training under the project have been hired by ISRA.

¹⁰Traders received neither credit nor supplies of inputs.

2. PRINCIPAL FINDINGS AT THE FARM HOUSEHOLD LEVEL

This chapter presents principal findings from southeastern Senegal on current household use of improved inputs, production activities and perceived constraints to expanded agricultural production, as well as strategies for achieving food security and household heads' opinions of the new policies. Key questions examined are the impact of an effective floor price for cereals on rural food security, farmers' perceptions of the profitability of fertilizer use on cereals, and prospects for substituting maize for millet and sorghum.

2.1. Crop Production and Agricultural Inputs

A variety of crops are grown in southeastern Senegal: millet, sorghum, maize, rice, cotton and peanuts, and to a lesser degree, cowpeas, fonio and cassava. There is little evidence of complete crop specialization, with the majority of households growing both cash and subsistence crops. As discussed in Section 2.2., many rural households pursue a variety of economic options, beyond food and cash crop production, to generate income for the purchase of food and other consumer items.

Household heads, responsible for the food security of other household members, are the principal growers of coarse grains (millet, sorghum and maize), while other male members of the household tend to grow traditional cash crops (peanuts and cotton). In the southern study areas (see map) females primarily grow paddy rice. Virtually all of the cereals seed came out of carry-over stocks, while a large portion of the peanut seed and all of the cotton seed was obtained from parastatals in 1986.

Less than 50% of the households sampled used mineral fertilizer in 1986.¹¹ Most of the fertilizer was obtained from parastatal sources on a credit basis, with "private" fertilizer

¹¹Our sample included a large proportion of SODEFITEX farmers; for all farmers in southeastern Senegal, the proportion using mineral fertilizer is likely to have been lower.

coming primarily from the Gambia at a substantially lower (subsidized) unit cost. Some farmers were willing to travel to the Gambia, pay cash for the fertilizer and expend additional efforts to avoid being arrested by the border police. While mineral fertilizer was applied mainly to cotton and field maize in both research areas and to a lesser extent to millet and peanuts in the northern areas, our data show a marginal increase in the number of households applying fertilizer to cereals over the period 1985-1987. Herbicide, used by less than one-quarter of the southern households, was applied exclusively to maize and cotton, while over half of the northern households used fungicides on peanuts in 1986.

A major research finding is that virtually no change was observed in the input distribution system in 1987/88.¹² SODEFITEX remained the primary source of improved technical inputs to farmers in the 1987 dry season. Among the 80% of households not having received mineral fertilizer as of June, 1987, only 33% (N=56) indicated they did not plan to buy fertilizer that season. To the extent that farmers prefer to apply fertilizer only after their crop has emerged, late delivery of fertilizer may not have been an important issue. Only one-half of the farmers reported eventually receiving fertilizer in 1987 (a percentage similar to that in 1986), and fertilizer was not available in some areas (eg. Sare Yoba Diega). Furthermore, we estimate 20% of the households received 80% of the fertilizer volumes delivered in the areas in 1987. Farmers did purchase fungicides, equipment and draft animals from private traders¹³ during the 1987 dry season, but quantities of fertilizer bought from these merchants were insignificant (we estimate traders handled only 4% of the total fertilizer sold during the entire input delivery season).

Due in large part to the legacy of the Programme Agricole, which was operative mainly in Senegal's Peanut Basin and the Lower Casamance, three-quarters of the northern but only one-

¹²One major change was the reduction in peanut seed distribution (on credit) to farmers by SONACOS.

¹³These were not necessarily cereals traders.

quarter of the southern households were fully equipped with traction equipment and draft animals in 1986.¹⁴ Most of the equipment in the areas was acquired by farmers prior to 1983/84, and with the exception of credit sales of ex-ONCAD equipment stock by SO-DEFITEX, little net new investment is taking place. When investment does occur, it tends to be in households already owning equipment. It is also noteworthy that non-family workers, sorghas and navetaans, are more prevalent in the northern areas (in 45% of the households). This may be related to the more widespread ownership of equipment: there is a strong correlation between the number of active workers and the value of hoes, plows and seeders owned in the northern research area. In the northern areas nearly all farmers use animal-drawn hoes and seeders on traditional cereals and peanuts, with a lower tendency to use draft equipment on cotton. In the southern areas, peanuts and cotton tend to benefit more than or equally to coarse grains from traction equipment in households where such equipment is used.

Survey results shown in table 1 indicate that households with access to draft equipment produced higher quantities of crops per active worker than households not using equipment.¹⁵ Land tends to be a constraint in some of the northern but not in the southern villages surveyed, and initial regression analyses suggest farmers facing land constraints in the northern areas tend to grow more peanuts and cotton and less cereals, ceteris paribus. Yet some farmers sold off equipment during 1986, raising the important question of households sustain equipment ownership.

An estimated 45% of the households--mainly in the southern areas--produced insufficient quantities of coarse grains and rice in 1986 to last them until the 1987 harvest. Lack of suitable land, labor and peanut seed were the principal reasons given by household heads in the northern areas for not expanding area cultivated in 1986. In the southern areas, lack of equipment,

¹⁴A fully-equipped household owns both a draft animal (horse or oxen) and an implement such as a hoe or or a plow.

¹⁵According to official estimates per hectare yields tend to be slightly higher in the southern than in the northern areas.

Table 1: Per Producer Crop Production^a by Equipment Use and Ownership and Region: Southeastern Senegal, 1986, in Kgs

Region and Eqment. ^b Level	House- holds(%)	Production per Worker by Crop (kgs)			
		Coarse Grains	Rice ^d	Peanuts	Cotton ^e
North					
Borrower	23%	545	0	478	107
Fully Eq	77%	629	0	699	23
Avg North	[65]	614	0	655	35
South					
Non-User	25%	234	69	260	62
Borrower	47%	265	51	200	89
Fully Eq	28%	546	65	302	257
Avg South	[97]	343	56	233	140
Avg Sample	[162]	439	29	415	90

Notes:

- a. Minor crops such as fonio, cowpeas and cassava are excluded. According to official 1986 estimates, these crops occupy less than 1% of the land in the research areas.
- b. Non-users neither own nor use a (draft) hoe or a plow. Borrowers do not own but use either a draft hoe or a plow, or own either a hoe and/or a plow or a horse and/or oxen, but not both the equipment and the traction animal at the same time. Fully equipped households own both a hoe and/or a plow and a horse and/or oxen.
- c. Weights used in calculating adult-equivalent producers: Males 15-60 years = 1.0; Females 15-60 years = 0.8; boys 5-14 years = 0.5; girls 5-14 years = 0.25; active workers older than 60 = 0.5 adult-equivalents. Only active individuals are included in the calculation of the index.
- d. Paddy rice is converted assuming a 35% conversion loss.
- e. In Thioubouk (Kounkane, Velingara) 8 fully equipped households produced an average of 2,950 kg of cotton each (equivalent to 640 kg/AEP).

labor and (to a lesser extent) cereals seed were the primary perceived constraints to extensification (Table 2). A lack of food was a concern for one-half of the households at the beginning of the 1987 growing season, and indications are that the cereals production situation observed in 1986 did not change substantially in 1987: 65% of the southern and 12% of the northern household heads indicated they had not seeded an area to cereals sufficient to cover household consumption needs.

Table 2: Principal Reason for Not Expanding Area Cultivated in 1986
In Percent of Responses, Rows Sum to 100%

Research Region	Resource Constraint				Other
	Land	Labor	Equipment	Seed*	
North [64 Households]	35	26	5	35	
South [107 Households]	11**	30	40	15	4

* This is peanut seed in the north, cereals seed in the south.

** In most of these cases the land is perceived as being "too remote to be worth cultivating".

Ninety-nine percent of the farm household heads believe that growing enough food for subsistence is preferable to relying on markets for food. Most (96%) reported that the expected cereals needs of the household were the primary determinant of the area seeded to cereals in 1987, followed by the relative expected price of cash and food crops as a second major determinant (39%), and among 113 southern households giving a third determinant, the availability of cereals seeds (43%).

Many households reportedly increased areas cultivated to millet, sorghum, field maize and/or peanuts in 1987 relative to 1986. The most frequently given reason for such increases was the availability or lack of peanut seed in the northern study areas, and the need to meet household food consumption needs in the southern areas.

2.2. Marketing Behavior and Food Security Strategies

The cereals production deficit in the southern areas was made up for through net purchases of cereals and rice (Table 3), using income from cash crop sales, off-farm activities and live-stock sales. Barter trade of livestock and services for food was also observed.

Table 3:
Farm Household Cereals Situation Before and After Transfers,
1986 Season (10-months) by Equipment Level and Region,
in CPE^a Kgs per Adult-Equivalent Consumer^b

Region & Equipmt. Level	1986 Production			Transfers			Stock July 1987 (7)	Estim. Utili- zation [10-mths] (8)
	Coarse Grains (1)	Rice (2)	Total Cereals (3)	Net Sales		Net Other Out (6)		
				Coarse Grains (4)	Rice (5)			
North Average	293	0	293	16	-18	36	70	189
South Average	148	34	183	-18	-20	19	28	173
Avg.Smpl.	207	21	227	-4	-19	26	45	181

Data are for a subset of 109 valid households

Notes:

- a. CPEs are "consumable product equivalents", assuming a 22 % transformation loss for millet, sorghum and maize (FAO, 1984).
- b. Adult-equivalent consumers are computed using the following weights: Adult 15+= 1.0, Child 5-14=0.5, and infant 0-4 = 0.25. Nawetaans and their family members = 0.4 (4.8 months per year) adult consumer equivalents.
- (2) Milled rice-equivalents are obtained assuming a 35 % conversion loss between paddy and consumable rice.
- (3) = (1) + (2).
- (6) (barter, gifts and loans) and (7) include millet-sorghum-maize and rice.
- (8) Production - all net transfers out - stocks as of July 1987 = estimated utilization over 10-months. The calculation assumes no carry-over stocks from 1985.

The averages in Table 3 mask important differences among the households sampled. During the 10-month survey period forty percent of the households sampled neither bought nor sold coarse grains; one quarter either only bought or only sold, and only one-tenth both bought and sold coarse grains.¹⁶ Significantly, each household surveyed on average purchased 100 kgs of rice (most, if not all, of it from the Gambia). During the same period an estimated 7% of the households sold 50% of all the coarse grains marketed. The hypothesis of forced grain sales at harvest is not confirmed by the data.

Important strategies pursued by households to generate entitlements¹⁷ for the purchase and barter of food included the raising and trading of livestock (both barter and sales); off-farm activities (bana-bana, artisanal, etc.) and borrowing of cash in the private sector (mostly from friends and relatives), as well as sales of cash crops.

2.3. Opinions of and Anticipated Responses to the NAP

Farmers generally appreciate the value of improved peanut seed and recognize the need to renew their stock periodically. They have less experience with improved cereals seed, since cereals seeds are generally obtained from their own production (Section 3.1). Some farmers have had poor experiences with improved seed distributed either by SODEFITEX (bird attacks on millet) or the Seed Service in Kolda (sorghum). Farmers indicated they are eager to try improved cereals seeds and would increase areas sown to cereals but our survey suggests that the high cost (210

¹⁶Differences by region in the proportions are also significant: In the northern areas the respective percentages are 20, 48, 12 and 20%, while in the southern areas they are 53; 8; 36 and 3%.

¹⁷Following A. Sen (1987) entitlements include both cash and assets such as livestock which can be traded for food.

CFA/kg) will reduce demand,¹⁸ and some households may be forced to consume the improved seed during the hungry season.

Virtually all household heads are convinced that mineral fertilizer can increase cereals yields, with no significant differences reported on average for different types of cereals (eg. field maize). With an average expected cereals yield increase of 75% under 1987 rainfall conditions, farmers' predictions are more optimistic than those used in APS calculations. The expected benefit-cost ratios obtained using farmers' expectations are of course sensitive to price assumptions used and decline rapidly at lower output prices, especially in the northern areas. Average cereals market prices will fall to below 70 F/kg if marketed surpluses increase significantly under the APS. Less than one-quarter of the respondents (mostly in the North) are not prepared to buy fertilizer at a price of 100 CFA/kg, even if it is provided on credit.

Overall, only 52% of the northern and 9% of the southern farmers indicated that they would use both improved seeds and the fertilizer at current prices. The low proportion of farmers willing to use the package in the northern areas tends to reflect more profitable investment alternatives (especially peanuts), the lower expected profitability of fertilizer use given more variable and less plentiful precipitation, and the cheaper availability of Gambian fertilizer.

Forty-one percent of the northern household heads are convinced manure is "better" for cereals (compared to 30% in the southern areas), referring to beneficial effects in subsequent years but also a larger yield-increasing effect. More agronomic research appears necessary to better understand the interaction and complementarities of mineral and organic fertilizers in the sandier northern soils.

In the southern areas, where 5 household heads were also convinced that cattle urine acts as a natural herbicide, all

¹⁸Farmers were also curious to know why they should pay 210 F/kg of seed when they received only 70 F when selling to the government (i.e. the CSA).

farmers using chemical herbicide (from SODEFITEX) were convinced its use was "worthwhile". Relaxing the labor constraint by promoting herbicide has the potential to significantly increase production, particularly in the South. More farm-level research on the profitable use of this technology is needed, however.

In the northern areas a lack of fertilizer was a commonly cited reason for not growing field maize (50% of the responses for this group).¹⁹ The unavailability of fertilizer was also cited by 6 out of 9 northern households dropping field maize from their crop mix in 1987. Also, most farmers responded they would not substitute maize for millet and sorghum production due to consumption preferences ("millet/sorghum is our principal staple", a response given by 44% of those not willing to substitute) and because maize production is perceived as "risky" (31%), particularly in the South. Farmers expressing a willingness to substitute indicated they would need fertilizer (51%) and, especially in the South, more maize seed to do so. Thirty-three percent of the northern household heads would engage in the substitution if the price of maize rose relative to that of millet and sorghum.

There are also indications that market prospects for maize in rural areas are weak. This is due to consumer preference for other cereals, problems of home-processing and storage of maize, and the fact that most farmers grow their own maize for consumption during the hungry season. A potentially important role for the public sector is to fund research and pilot projects to expand maize utilization (for example, consider joint ventures between commercial food manufacturers and private traders).

Since the CSA did not intervene in rural markets in the southern research areas, it is not surprising that the majority of southern respondents (76%) were unaware of the official cereals floor price (70 F/kg) in 1987.²⁰ For a variety of reasons

¹⁹Only 12 (14%) of the northern households did not grow field maize.

²⁰This compares with 77% of the northern household heads who were able to report the floor price correctly.

the majority of farm household heads (75%) favor a floor price and free cereals trade but disagree on a desirable price level (those not seeding an area to cereals sufficient to cover household consumption needs favored a lower price, which was on average lower in the northern than in the southern areas). Nevertheless, over two-thirds of the household heads, including those in the northern areas who had experienced floor prices in 1987, indicated they would not change the area seeded to cereals if the floor price were abolished, raised or lowered. Some farmers favor a floor price policy because they believe cereals would be more available and they anticipate buying cereals, suggesting strongly that markets are currently perceived as unreliable both as a source of and an outlet for cereals.

In response to a reduction in peanut prices (to 70 CFA/kg from 90),²¹ half of the northern household heads indicated they would increase their area seeded to peanuts; 67% of these reported they would not change the area seeded to other crops. In the southern areas, 32% of the household heads indicated they would reduce the area seeded to peanuts and grow more cereals instead.

Finally, the majority of household heads (87%) believe it is not a good idea for the government (parastatals) to withdraw from input marketing, and most (67%) doubt private cereals traders will be able to quickly fill the void left by state withdrawal. One-quarter of the respondents believe farmers do not have a moral obligation to repay fertilizer credits in the case of a crop failure. Most farmers (85%) would prefer to buy fertilizer and seeds through a farmer organization, but sell their cereals surpluses individually (58%), Existing sections villageoises, in the opinion of many farmers (56% in the north, 22% in the south), should not distribute the improved cereals inputs unless they are reorganized so as to reduce patronism. Two frequently cited organizations which could, in the opinion of household heads, distribute inputs are L'Association des Jeunes Agriculteurs de la

²¹A price of 70 F/kg for peanuts was announced in 1988.

Casamance and L'Association Villageoise, i.e. farmer-organized groups (see Section 3.1.).

2.4. Conclusion

Contrary to common perceptions, many rural households in southeastern Senegal are food deficit producers and--in the short-run--will have difficulty expanding output in response to higher cereals prices alone. Cereals deficit households already face higher prices and are unwilling and/or unable to currently expand the output of cereals. Understanding the full set of factors and alternative economic options that affect farmers' willingness and ability to expand cereals production is essential. The ability to obtain and retain animal traction appears to be critical. To the extent that production is constrained by the ability to weed (and sow) effectively, promoting fertilizer and improved cereals seeds alone is unlikely to have a strong effect on coarse grains production (especially in the Casamance).

Since fertilizer is currently not physically available in some rural areas of Senegal, promoting private fertilizer distribution by providing credit will be important. Similarly, relaxing the cereals seed constraint can have high pay-offs, especially in the southern study areas. However, despite the fact that most southern farmers are convinced they can profitably use fertilizer in a year of average rainfall, the price level of fertilizer and the terms and conditions of credit repayment remain important issues, as do problems of policy coordination with the Gambia.

Many farmers are still wary of private cereals traders. A privatized system that bears the full costs of input distribution will result in higher costs of inputs delivered at the farm in the short-run, further curtailing farmers' demand. At the same time farmers do buy durable agricultural inputs (i.e. equipment) from private traders (not necessarily cereals traders) and it will be important to build on and strengthen these relationships within the context of the NAP.

3. PRINCIPAL FINDINGS AT THE FARMER ORGANIZATION LEVEL

Farmer organizations are supposed to take on an important role under the NAP and APS. Aside from possibly being a choice based on the government's philosophy (Crawford, et. al, 1987), the underlying assumption for this decision may be that, by acting as facilitators between cereals traders and farmers, the organizations will allow the achievement of sizeable economies of scale, thereby reducing food marketing costs. To the extent that the organizations are farmer-managed they may lead to more equitable distribution of the benefits of the APS and reduce problems of debt repayment. More importantly, perhaps, they will enhance the bargaining power of farmers relative to private traders. Empirical questions addressed in the research and reported in this chapter include information on the characteristics, resources and activities of existing farmer organizations, along with opinions, anticipated constraints and responses of these groups to the APS, as evident from survey responses of the leaders of the groups.

3.1. Classification of Farmer Organizations

Given the heterogeneity of farmer organizations in southeastern Senegal, it is essential to stratify them by key characteristics in order to evaluate their potential response to the incentives provided under the APS. Two major categories are defined by the mode of creation: a) Organizations created by the State or a parastatal agency; and b) grass-roots organizations created at the farmer level and managed without outside intervention. In the 15 villages surveyed by the Food Security Project these groups are represented with the following frequencies:

A. State or parastatal organization:	
Village Section (Section Villageoises--SONACOS)	14
Association de Base de Producteurs (SODEFITEX)	8
B. Grass-roots organizations	
Associations de jeunes	8
Groupements féminins	2
Groupements villageois	2

Village sections have been much studied and maligned in Senegal, due largely to the politicalization of the peanut seed distribution process as well as problems of debt management and recovery. To some extent these problems are caused by the large number of villages--often of different ethnic groups--regrouped within village sections (8 on average in the sample) and with large distances between the villages.

In sharp contrast, SODEFITEX's ABPs tend to have fewer members, generally only comprising single villages, and benefiting considerably from logistical support (storage facilities, delivery of a wider range of inputs and services) by the cotton parastatal, which also promotes literacy training and encourages its members to manage the marketing of agricultural outputs. A further desirable feature mentioned by farmers is the flexibility SODEFITEX provides by allowing farmers to repay maize inputs either in-kind or in cash. This, for example, makes SODEFITEX's maize package more desirable than that provided by SODEVA, which forces farmers to repay in-kind. These results show the importance of not "lumping" all farmer organizations together, but to instead study the unique features and structures of each in order to assess their underlying performance characteristics and potential contribution to the NAP.

3.2. Resources of Farmer Organizations

A minimum of material resources and human skills is necessary for an organization to play the roles envisioned under the APS/NAP, that is to act as an intermediary between cereals traders and farmers. These include scales, transport, storage and cereals processing facilities as well as the ability to maintain accounts in the form of basic book-keeping.

An inventory of physical resources owned by farmer organizations presents a fairly dismal picture. Only six organizations have storage facilities (mostly rudimentary constructions put in place by SODEFITEX), only two organizations own commercial scales, and none own transport and cereals processing facilities.

Given their multi-sectoral and -functional mandate, the village sections, too, are therefore restrained from becoming more effective food system participants by a lack of physical resources.

Similarly, the organizations surveyed show only a weak ability to generate and accumulate capital internally, making it difficult to pursue productive investments. Existing financial resources stem from member contributions (ABPs), and in the case of grass roots organizations, revenues from wage labor and proceeds from sales of collectively grown products. In addition, the groups may benefit from marketing mark-ups (SV) or loans received from their sponsors to construct storage facilities and boutiques²² (ABP).

With the exception of two village sections, all organizations rely on outsiders to maintain lists of members (where these exist). These outsiders include the chief of the CERs, the cooperative agent from SONACOS or extension agent of SODEFITEX. Nevertheless, the efforts of SODEFITEX and the Association des Jeunes Producteurs de la Casamance to provide literacy and management training are worth mentioning. SODEFITEX has installed 144 literacy centers in 228 ABPs affecting 4229 producers.²³ Given the public goods nature of literacy and management training it is unrealistic to expect the private sector to provide these services, and it suggests an important role for the government, perhaps through the media campaign.

3.3. Current Activities of Farmer Organizations

Despite the multi-sectoral and -functional mandate officially attributed to the village sections, they are primarily responsible for peanut seed (and fungicide) distribution and the marketing of the peanut crop. The ABPs mainly distribute cotton and/or maize inputs on credit, receiving technical and logistical support from SODEFITEX, a "Sécurité Alimentaire Villageoise"

²²These are small retail outlets for consumer goods.

²³See Le Soleil, March 3, 1987, p.2.

village-level cereals storage program, and the marketing of cotton and surplus cereals (mainly maize).

In comparison, grass-roots village organizations are involved in growing collective fields (vegetables, cereals and fruits), reforestation efforts, combatting brush-fires and wage labor activities. These groups are organized around not only agricultural activities but also social (entre-aide) and religious pursuits.

Having established the heterogeneity of existing farmer organizations, and the general insight that they tend to be under-capitalized and rather narrowly focused in the scope and scale of their activities, we now turn to how they believe they may be able to respond to the APS/NAP and the major constraints they perceive to becoming effective food system participants.

3.4. Opinions of and Anticipated Responses to the NAP

The success of a policy designed to give more responsibility to farmer organizations will depend largely on how these organizations are perceived by farmers in rural areas (discussed earlier) and, given the constraints they currently face, their willingness to take on these roles and to increase their capacity, as established in the responses of their leaders.

Table 4 suggests farmer organizations believe it will be easier for them to manage and distribute improved cereals seeds than fertilizer at currently proposed prices. The higher current

**Table 4: Willingness of Farmer Organizations to Become Intermediaries under the APS/NAP
(% Willing to participate)**

	SVs		ABPs		Grass Roots		Sample	
	N	%	N	%	N	%	N	%
Sell Seed	13	100	5	63	12	86	30	86
Sell Fertilizer	9	69	3	37	9	64	21	60

price of fertilizer relative to prices charged by SODEFITEX and the availability of cheaper Gambian fertilizer in areas close to the border are probably important reasons discouraging farmer organizations from becoming actively involved.

Further concerns raised by the organization heads refer to storage constraints, which would necessitate immediate turn-around of stocks (43% of responses) and a lack of transport facilities (83%) which would force them to purchase inputs and sell outputs only at the village level. In terms of the conditions for credit receipt and reimbursement, most group leaders would prefer to implement a one-season production credit, repayable at the moment of harvest (86%). In addition to carefully selecting credit-worthy farmers, the groups would demand collateral and use sanctions against defaulters (57%), generally in the form of exclusion from future credit.

In the case of a crop failure, most of the leaders indicated they would prefer the option of deferring the credit until the subsequent season, while others would insist that the losses be spread among traders, farmers and farmer groups in the same season. None of the leaders responded that they believe the debt should be forgiven entirely (as has happened more than once in the last 20 years in the case of peanut credit). This is to a large extent motivated by the leaders' desire to maintain the credibility of their groups in the eyes of traders.

In contrast to their willingness to participate in input distribution, group leaders responded they would prefer farmers to sell their own products rather than carry out the assembly, processing, storage, transport and sales functions for farmers. This result is not surprising, given the groups' resource limitations, and it implies continued low-scale and high-cost operations for private cereals traders.

3.5. Conclusion

The farmer organizations studied in southeastern Senegal are under-equipped in terms of material resources and human capital

skills, posing a serious impediment to their taking on the roles envisioned under the APS and NAP. Their current activities are limited in terms of volumes handled and geographic coverage. A certain willingness exists to take on more responsibilities in input marketing; this is offset, however, by the reluctance to take on cereals output marketing functions. Learning more from and building on a SOLEFITEX-type ABP model can lead to potentially successful organizations but will require considerable external public assistance at least in the near term.

4. PRINCIPAL FINDINGS AT THE CEREALS TRADER LEVEL

Why the emphasis on private traders in the APS/NAP? The general argument is that prior parastatal programs have led to high-cost and untimely distribution of sometimes incorrect formulations of fertilizer.²⁴ It is argued that private actors will carry out these functions more competitively and deliver fertilizer at the right time, in the right form, and at the right place, since their precuniary incentives will depend on the quality of the services provided.

Why the emphasis on cereals traders? Presumably they are well-connected with cereals producers, understand the problems and requirements of cereals production, and could therefore more effectively distribute cereals inputs. A parallel notion is that flows of credit, fertilizer and cereals are intimately related so that marketing costs can be reduced by simultaneously delivering inputs and buying up resulting surpluses. Further, high-volume cereals traders are conceivably in a better position to absorb production risks, carry credit losses over from one season to the next and yet be insistent enough to recover credit from farmers.²⁵ Cereals traders may also have the savvy to seek out more credit-worthy farmers.

Against this background the Food Security Project surveyed private cereals traders in southeastern Senegal during 1986 and 1987, assessing their willingness and likely ability to respond to opportunities granted by relaxed liquidity constraints. All traders from the region involved in the cereals subsector during the study period were included in the survey (on average about 45 traders, depending on the season). This chapter presents the principal research findings on the business environment, opera-

²⁴See Kelly (1988b, pg. 251) for a succinct summary of this criticism. A study on fertilizer distribution in 1984 found late delivery of fertilizer to be a common problem (see Crawford et. al, 1987). Note, however that SODEFITEX, a principal actor in southeastern Senegal, was not included in that study.

²⁵This would circumvent past problems of public debt forgiveness, a much-criticized issue.

tional characteristics and management opinions on the willingness and ability of private cereals traders to respond to the NAP.

4.1. The Business Environment of Cereals Traders

To understand and predict trader behavior it is essential to examine the business environment in which they operate. Important questions are to what degree do rural households participate in the market as sellers and/or buyers, and how are private traders affected by official floor prices and parastatal "crowding out"?

In 1986/87 most households in both the northern and southern FSP research areas purchased [mostly imported] rice for household consumption. The average quantity purchased was 106 kgs per household over a 10-month period. A significant number of households neither bought nor sold traditional cereals (millet, sorghum and maize) in the same 10-month period. The proportion is higher in the southern zones (53%) than in the northern zones (20%). In the northern research area about one-half of the households only sold, while another 20% both sold and bought, traditional cereals (see the subsector maps). Thus the northern area is estimated to have produced, on average, a surplus of traditional grains which was transferred by private merchants to the town of Tambacounda and other areas of the Peanut Basin.

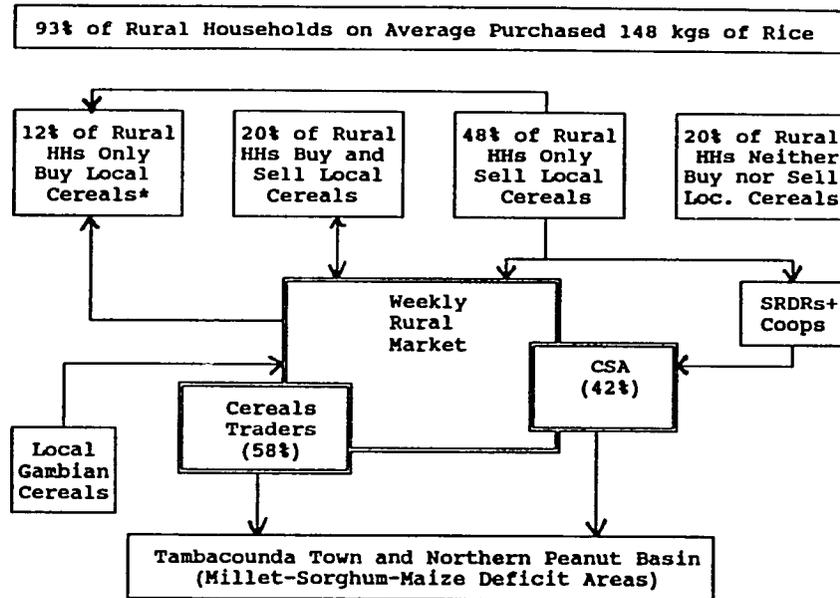
The CSA,²⁶ an important actor in the market of Ndogo Babacar, was a potent competitor for private traders, purchasing traditional cereals at a price above that prevailing in local markets during its period of intervention (January-July, 1987). The CSA thus tended to reduce margins obtained by private traders for transferring cereals between Maka and Tambacounda.²⁷ This

²⁶Created from the CAA, the CSA (Commissariat à la Sécurité Alimentaire) is charged, among other duties, with implementing the Government's cereals floor price policy. We estimate the CSA purchased 42% of the cereals sold by farmers (mostly sorghum) in Ndogo Babacar during the period January-July 1987.

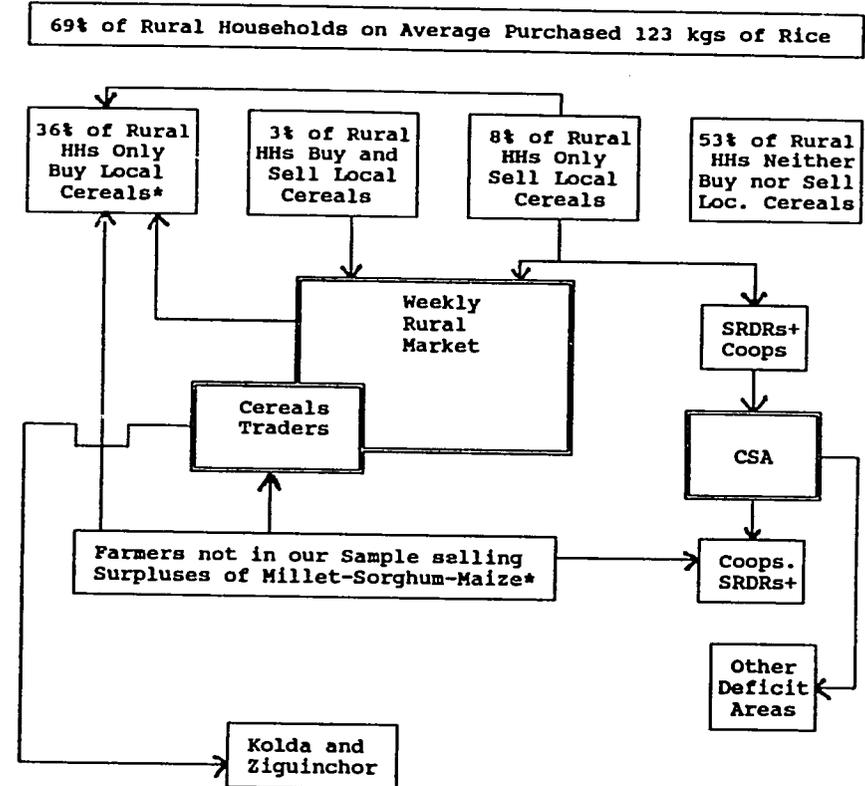
²⁷One of the strategies used by traders to circumvent these problems was to appear at markets early in the morning before the arrival of CSA purchasers and/or to assemble cereals in non-market villages.

FOOD SYSTEM SUBSECTOR MAPS

Northern



Southern



* These are mainly millet and sorghum, some maize. Note that data refer to a 10-month period.
 + SRDRs are the rural development agencies.

* Medina Yoro Foulah and other areas of the Upper Casamance. Note that data are for a 10-month period.
 + SRDRs are the rural development agencies.

organization intervened more sporadically in the market of Ndiapto (Koungheul), due in part to financial and market access problems.

In the southern research areas (Koukane, Dabo and Dioulacolon in the Casamance), in contrast, few surpluses of traditional cereals were generated for export from the area (mainly to Ziguinchor). Only 11% of the rural households sold, while 36% only bought traditional cereals during the 10-month post harvest survey period, leaving the CSA with little grounds to intervene in weekly markets.²⁸ In the study areas only small quantities of cereals were moved by traders through weekly markets and we suspect the majority of transactions took place at the village level directly between farmers (see southern subsector map). Nevertheless, traders in the Kolda market did indicate the CSA's presence prevented them from raising consumer prices substantially above 90 F/kg.

More generally, an important constraint placed on private cereals traders in both areas appears to have been the seasonally invariant official floor price and ceiling, which tended to inhibit normal seasonal price increases reflecting returns to storage. This is shown in figures 1 and 2 on the following page.

As of 1987, parastatals--particularly SODEFITEX and SODAGRI--were active in the distribution of improved technical inputs. This, combined with the fact that fertilizer was not generally available to them, has discouraged private traders from selling fertilizer. In areas where parastatal intervention is less prominent (eg. Koungheul), the availability of subsidized Gambian fertilizer tends to discourage private sector sales of (less-subsidized) Senegalese fertilizer.²⁹ In yet other areas (eg. Sare

²⁸The area of Medina Yoro Foulah poses an important exception. Here well-equipped farmers, who had migrated with their equipment from the Peanut Basin, produced surpluses of cereals in 1986. The CSA failed to intervene here because there was evidence of local cereals moving in from the Gambia and prices generally averaged around the official floor price (70 F/kg).

²⁹According to informal information, less subsidized fertilizer was available in Gambian markets during the 1987 production season than in 1986.

Figure 1: Prices of Millet, Sorghum and Maize
 in Tambacounda Grand Marche and Ndogo Babacar
 June 1986 - November 1987, in CFA/kg

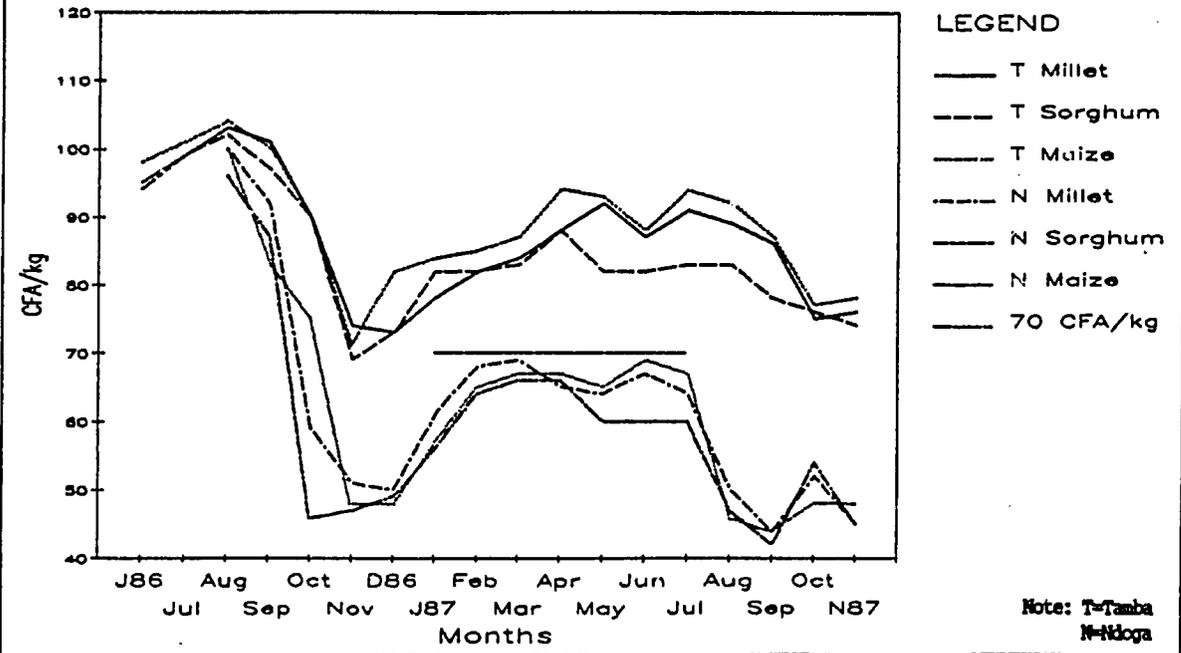
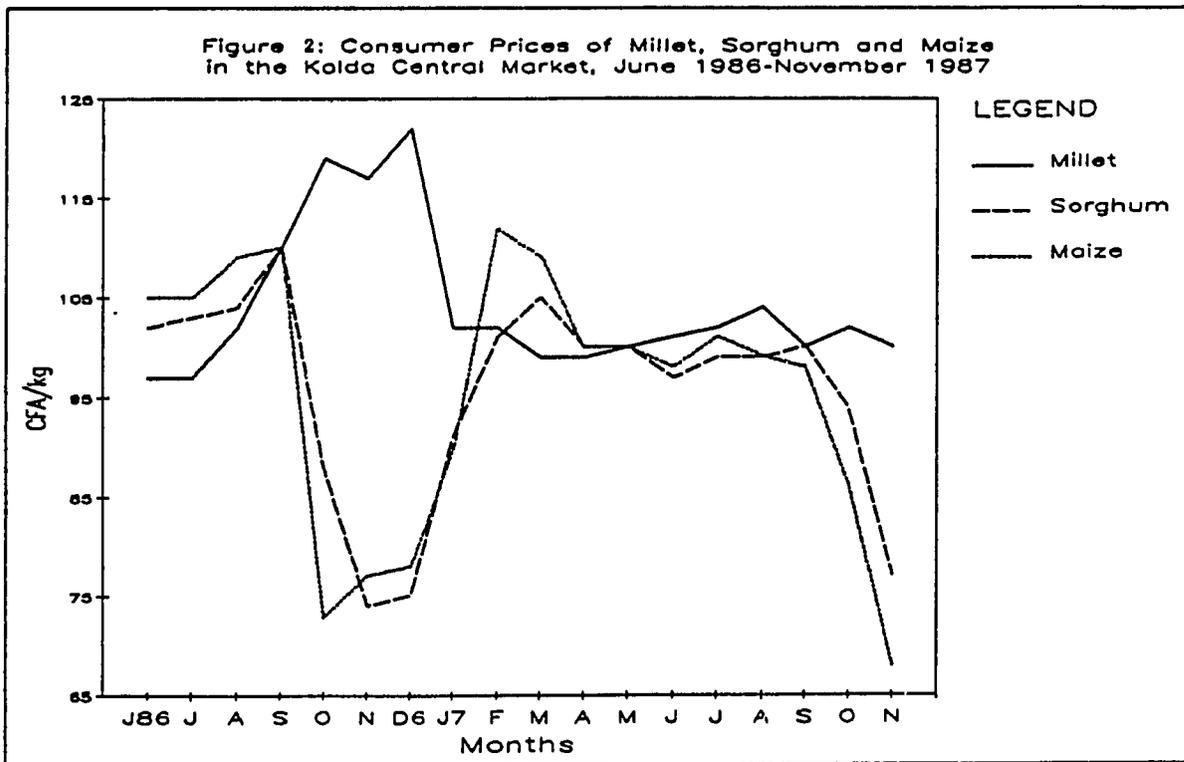


Figure 2: Consumer Prices of Millet, Sorghum and Maize
 in the Kolda Central Market, June 1986-November 1987



Yoba Diega), fertilizer is now available in Kolda town on a cash basis, but there is little effective demand at current prices.

4.2. Characteristics and Activities of Cereals Traders

Traditional cereals markets in the research areas tend to be poorly developed, more so in the Casamance than in the Peanut Basin and Tambacounda areas, due largely to low levels of marketed surpluses. This is true even in a year of adequate rainfall (1986). The fact that only a total of 44 traditional cereals traders were found in 8 markets is indicative of this phenomenon. Most of the larger traders, handling more than 100 tons of cereals in 1986/87 were located in the northern research areas (Table 5).

Table 5: Geographic Distribution of Traders by Cereals Volumes

Millet-Sorghum-Maize Volumes Handled:1986	North		South		Total	
	N	%	N	%	N	%
Less than 30 tons	11	48%	12	57%	23	52%
30-100 tons	6	26%	8	38%	14	32%
More than 100 tons	6	26%	1	5%	7	16%
Total	23		21		44	

Traders in the southern research areas on average handled less than one-half (estimated at 42 tons or 115 kgs per day) the volume of northern traders (95 tons) during 1986/87. While symptomatic of cereals market conditions in the two areas, the averages mask the fact that a small number of traders handled most of the volumes. Large traders, representing 16% of the population, handled 62% of the total (3,100 tons) quantities marketed, while small traders (52% of the population) accounted for less than 10% of the total volume, implying there is considerable concentration in the private cereals market. This does not necessarily imply that small cereals traders have lower incomes than larger ones

since they may successfully deal in non-cereals commodities. It does, however, suggest a possibly skewed distribution of benefits from the APS among traders.

There is little evidence of vertical specialization among traders, as found in the rest of the Peanut Basin.³⁰ Especially in the southern areas, many traders carry out collection and retailing activities themselves, mostly in local markets (Table 6). The large traders in the northern areas tend to assemble cereals for larger traders in the Peanut Basin.

Table 6: Relative Importance of Clients for Cereals Sales (in Percent of Volumes Handled) and Mobility of Traders

Cereals Volume Handled	Type of Client (Buyer)				Avg. # of mkts. visited*	Avg. km travelled /month**
	Consumers		Traders	CSA		
	Urban	Rural				
< 30 tons	40	40	15	5	1	391 km
30-100 tons	32	44	23	1	3	1266 km
> 100 tons	10	5	80	5	3	464 km

* For purchases of cereals (millet, sorghum and maize)

** Traders in the southern areas travel larger distances

Most traders (62%) rely on their own funds to engage in trade, while 19% each obtain funds from relatives and other traders. Large traders are more likely to receive funds from other traders (40% of the cases, we suspect from even larger traders located in the Peanut Basin proper). Only a handful (10%) claimed to be completely specialized in cereals trade during the entire year, with most dealing in other commodities (peanuts, cowpeas, agricultural inputs, consumer items, etc.). The official floor price policy and the thinness of markets and related risks of trading only in cereals leads to product diversification as an

³⁰This refers to functions such as collecting, bulking, wholesaling and retailing cereals, which in more developed marketing systems are carried out by separate actors rather one actor, permitting scale economies to be achieved. See Newman et al. 1985, for a characterization of Peanut Basin cereals traders.

important strategy for survival. The traders tend to turn their cereals stocks over rapidly, often within a month or two of purchase (southern traders tend to hold stocks for a longer time).

Spatial arbitrage is an important and socially valuable marketing function, yet less than five traders owned transport vehicles. The majority rely on public transport (bush taxis and trucks), reporting that this form of transport is not always available at prices they are willing and able to pay. Similarly, most of the traders interviewed do not own equipment such as mechanized processing facilities which would permit them to expand volumes handled. Some do own or rent storage facilities and boutiques.

As recently as the 1987 agricultural season, trader involvement in fertilizer distribution was minimal in southeastern Senegal.³¹ Not surprisingly, cereals traders are unaware of fertilizer doses, compositions and timing of application for the soils of the areas they work in. SODEFITEX extension agents living in villages provide such information to farmers in their programs. This raises the issue of who will provide such knowledge to farmers under privatization?

Traders did sell equipment, draft animals and fungicides to farmers on a cash basis during the 1987 dry season. Why are these products purchased with cash and not fertilizer? On the one hand, fertilizer has not been available historically for distribution by private traders. On the other, equipment and draft animals are more durable and can be sold for food if there is a drought. Once applied, fertilizer is gone (except for marginal second-year benefits) and cannot be resold to buy food. Fungicide has a more or less proven record of effectiveness for farmers, is relatively inexpensive (and more necessary in the farmer's mind?), and is used on a crop which has assured market outlets at known prices--peanuts. This partially explains why there is effective cash demand for these inputs in the areas, but not for fertilizer.

³¹As reported earlier, we estimate private traders handled 4% of the fertilizer volumes sold to farmers during 1987. Part or all of this fertilizer may have come from the Gambia.

Our surveys show cereals traders have little experience with granting production credit (in-kind or on a cash basis). Most credit is destined for consumption purposes--one can argue this is a form of production credit since it increases the ability of the recipient to work in his or her fields, and/or to attract agricultural wage labor.

4.3. Opinions of and Anticipated Responses to the NAP

There is evidence from the research areas that a) more private individuals were participating in cereals trade (6 traders had only recently begun trading in cereals) and b) existing traders were handling larger quantities (in 75% of the cases)³² in 1986/87 relative to the 1984-1985/86 period. Among existing traders 54% cited the recent official sanctioning of private cereals trade as a reason for expanded operations, while 36% indicated more supplies were available from farmers (at prevailing prices) in 1986/87. Ninety-three percent of the traders cited a lack of cereals sold by farmers (at prevailing prices) and insufficient funds as primary constraints to further expanding volumes handled during 1986/87.

Virtually all of the traders indicated they would be willing to sell improved cereals inputs under the APS. Three-quarters of the traders believed a market potential exists for fertilizer and improved seeds to farmers on a credit basis at prices of 90 F/kg of fertilizer and 210 F/kg of improved cereals seeds. However, only 56% believed they could sell fertilizer on a cash basis at these prices. Overall, 75% of the traders felt the price of 90 F/kg was too high, and those claiming to be able to estimate farmers' price response indicated they could double volumes handled (from 15 to 30 tons of fertilizer) if the price were reduced to 60 F/kg.

³²Traders reporting decreases in volumes handled since 1984 cited increased competition among traders and working capital constraints as main causes.

We furthermore estimate traders will charge a minimum per unit mark-up of 10% as compensation for their time and management. To this must be added storage and transport costs (estimated at 10-15%) as well as a premium for the risk of non-reimbursement of credit by farmers if the traders are held responsible for defaults. In fact, 42% of the traders responded "uncertainty of debt recovery" was a major concern (these were mostly in the southern areas), followed by 39% who indicated the availability and cost of transportation would be a constraint. Other concerns raised were the lack of technical knowledge about the inputs; poor knowledge of fertilizer demand; late delivery of the inputs to the trader; high cost of the input (especially fertilizer) as well as doubts that the trader would obtain sufficient quantities of the input.

In the event of a poor harvest most traders responded that they believe farmers should not be expected to repay loans until the following year. If pressed by the credit-granting agency, however, traders would persuade farmers to sell off assets, particularly livestock and equipment to repay the credit, and/or seek legal recourse. Most traders (88%) would prefer to work with farmer organizations rather than individual producers in distributing inputs on credit, citing as reasons lower transactions costs, greater ease of input distribution, and more certainty as to credit repayment. When asked if they would be willing to work through existing farmer organizations, however, 76% indicated they would prefer to organize farmers into groups themselves. Three-quarters of the traders are willing to provide inputs to women on credit. However, approximately half of these traders would do so only if the womens' husbands guaranteed repayment of the credit, or if the women belonged to a producer organization.

4.4. Conclusion

In the higher potential FSP research areas, where farmer perceptions suggest the use of mineral fertilizer on cereals is on average profitable, important factors discouraging the private

distribution of fertilizer are the lack of effective farm-level demand, the dominance of parastatals (especially SODEFITEX), transport costs and constraints, and--to a lesser extent in 1987--the availability of cheaper Gambian fertilizer.³³

The price level of fertilizer remains a thorny issue. Until traders gain experience, economies of scale and a better foothold in input markets, prices of fertilizer delivered to farmers will be up to 30% above the current price of 90 CFA/kg. At fertilizer prices of 110-120 F/kg, fertilizer use by farmers will remain limited, making it difficult to achieve the objective of expanded use (and higher coarse grains yields).

With rare exceptions private cereals traders in southeastern Senegal currently lack the resources, product knowledge, and management skills necessary to market improved inputs effectively. Diffusing such knowledge--for example through the APS media campaign--will be essential. Organizing farmers into effective groups has a number of potential pay-offs, including more equal bargaining power vis-a-vis traders and reduced marketing costs. The potential for using existing groups, however, remains limited as also confirmed by the traders surveyed. More thought needs to go into structuring, and setting the incentives within, these groups if they are to play the roles envisioned in the NAP.

In the southern research areas, finally, cereals markets are poorly developed (in comparison to the Peanut Basin). In large part this is due to the small volume of cereals entering commercial channels. A primary hypothesis is that traditional cereals markets in the areas are underdeveloped because of a low-level equilibrium trap: few marketable surpluses are produced because markets are thin and uncertain, and markets remain thin and uncertain because few marketable surpluses are produced.

³³See Kelly (1988a) for a detailed analysis of factors influencing farm-level fertilizer purchase decisions in the Peanut Basin.

5. ISSUES INVOLVED IN FACILITATING INCREASED PRIVATE SECTOR PARTICIPATION

It is important to reiterate that the results presented here pertain to southeastern Senegal where, relative to the rest of the country, markets are under-developed despite the (on average) high rainfall potential and relatively high soil quality and availability of unexploited lands. To a large extent this is explained by the fact that improved labor-saving technology, especially draft equipment, has not been easily available to all farmers.

There can be little doubt that a resilient private sector exists in Senegal which is potentially capable of carrying out more functions as envisioned under the NAP. Private actors (not necessarily cereals traders) are already distributing certain types of agricultural inputs, and seeking out profitable trading opportunities (peanuts and their derivatives, consumer goods, Gambian rice and fertilizer). Cereals traders are "cautiously" willing to participate in fertilizer distribution and see some opportunities in this area. Morris (1987) has demonstrated for the Fleuve that the private sector can effectively compete with a parastatal if certain market-wide preconditions exist, and if private agents are not expected to bear all of the initial (start-up) risks of input distribution.³⁴

The government has taken an important step by sanctioning private cereals trade; however, the "vacuum theory of privatiza-

³⁴private rice milling operators in the Fleuve found reliable market outlets for rice. Small-scale rice processing technology had been developed and made available to the private sector, and its use was profitable given relative prices of inputs and outputs. Irrigated rice production, less susceptible to climatic uncertainty, assured private processors of reliable supplies over time (reducing the risk of investing capital in processing technology). Despite SAED's official monopoly on rice processing, the government did not attempt to prohibit small-scale processors from operating their mills. The high price of rice set by the government was probably an important factor in increasing the profitability of using mills in the private sector. An interesting research question is, how are private millers responding to the recent reduction in official rice prices?

tion", under which private traders can immediately fill in the void left by state withdrawal, is not supported by these research findings. Especially important are the infant industry-type activities traditionally carried out by the public sector which are necessary to overcome start-up risks and establish longer-term economic viability. These research and development investments can often only be borne by public actors, since private participants are unable to capture the benefits resulting from such investments. Consider the example of road construction, the introduction of rice milling technology by SAED in the Fleuve or the development of more fertilizer responsive cereals varieties which are developed under farmer conditions.

This section summarizes key issues involved in facilitating greater private sector participation in input and output marketing in southeastern Senegal. The overriding challenge is that of nurturing and coordinating input-output markets in an uncertain environment. Ideally, this means economically viable inputs are distributed competitively, at the lowest possible costs, by private traders to farmers who provide reliable sources of demand and in turn produce goods (both food and cash crops) for which consumers have reliable effective demand, and that mechanisms exist to absorb the risks of agricultural production in years of poor rainfall so that farmers are not forced to disinvest productive resources.

In the current environment of the Upper Casamance in particular, where traders are often by-passed in the transfer of traditional cereals from producers to consumers, they will have less incentive to participate in the distribution of inputs used in producing these cereals. This is more true if the inputs are distributed on credit, since traders then have less control over the utilization of the output and their debt recovery prospects are diminished.³⁵

³⁵Notice the fundamental advantage SODEFITEX and SONACOS have over private sector distributors of cereals inputs. Farmers have virtually no alternative to selling cotton and peanuts to the parastatals, but cereals can either be consumed or sold to

While relaxing cereals production constraints is important, it is essential to not neglect the cereals demand side. One way of dealing with the demand issue is to raise official prices sufficiently to increase the profitability of fertilizer for the average farmer. Experience shows this leads to higher costs of production and lower consumer demand over time, which clearly is inconsistent with policy objectives. Instead, alternative approaches have to be sought that will, among other things, increase the productivity of fertilizer and other inputs so farmers are motivated to use them at market-clearing output prices.

A further important issue is how to develop additional market demand for maize. This could be done by developing new processing facilities, introducing more efficient stoves, new product forms (especially for urban areas), and possibly using maize as livestock feed. Again, these developments are unlikely to materialize without some initial guidance and support from public sector research and development organizations.

Output markets could become more stable if traders are given a timely and reliable idea of the quantities that the CSA and other agencies plan to buy and sell. It would also help to keep the state's role in the market in proportion to objectives of promoting private sector competition and protecting against very high and very low prices, but to not eliminate all opportunities for traders to earn reasonable expected returns to their capital and labor invested. Rigid floor prices, which are constant during the marketing season and throughout the country, often make it unprofitable for traders to carry out assembly, storage and transport functions. In this sense, workable and effective markets would provide reasonably profitable opportunities for traders to carry out arbitrage over time and space, increase

other end-users. The difficulty of debt recovery poses a fundamental constraint, inherent in the nature of the good--cereals, to input distribution activities designed to stimulate the production and marketing of cereals.

their scales of operation, and be in a better position to absorb one-year credit losses, should that be necessary.

In conclusion, the challenge for Senegal is to stimulate national consumer demand for traditional cereals by reducing their cost and increasing their attractiveness to consumers over the long run. Our surveys provide evidence that this requires paying close attention to coordinating both input and output markets. Policy-makers are dealing with a complex food system. It is important to anticipate risks and problems of project implementation, and to maintain flexibility in project design to deal with these problems and potentially adverse consequences as they arise. For example, will the APS project provide the flexibility for distribution of draft equipment as well as fertilizer, and will it reduce efforts to distribute new draft equipment on a large scale when fertilizer rather than equipment becomes a key production constraint?

More generally, policy reform is not a one-time activity, although privatization is frequently billed as such. It is important to develop local data collection and analysis capability to monitor and inform policy reform as well as program and project design and implementation. Micro-level empirical knowledge is needed to test the assumptions on which policies are based; as this knowledge increases, so does the ability to anticipate effects of policies on various incidence groups as well as constraints to the implementation of development programs.

6. PROGRAM AND POLICY OPTIONS FOR STIMULATING FARM PRODUCTIVITY GROWTH AND PRIVATE MERCHANT ACTIVITIES IN SOUTH-EASTERN SENEGAL

OPTION 1: Include agricultural equipment (and weed control chemicals?) in the set of inputs distributed by private traders.

Disadv.: - Initially increases managerial and administrative demands on APS/GOS staff.

Adv.: - Equipment is proven to increase production, mainly by increasing area cultivated per worker.

- Build on and strengthen existing relationships between traders and farmers.

- More difficult to alter equipment (as compared to mixing in sand with the fertilizer).

- More equal rural income distribution in long-run.

Note: In the medium run, consider promoting local capacity for maintaining equipment, producing spare parts, and/or manufacturing the equipment locally.

OPTION 2: Enable private traders to provide fungible (food consumption) credit to farmers during the growing season.

Disadv.: - Loan recuperation may be difficult.

- Without adequate competition among traders, costs of this type of credit to farmers may be high.

Adv.: - Increase labor availability and productivity by relaxing the food constraint at the beginning of the rainy season in both areas.

- Reduces probability of consuming improved seed.

- Private traders are much more likely to actually implement such a program, and extend it widely.

- Potential carry-over effects may reduce farmers' need to sell early after harvest, therefore placing less pressure on local cereals prices in that period.

OPTION 3: Since private traders are unlikely to be effective initially in distributing fertilizer to all regions, be prepared to supplement that distribution to meet short-run requirements. Overall costs of distribution can be lowered through continued distribution by parastatals under rules which allow for fair competition with private traders.

Disadv.: - Not consistent with original APS objectives.

Adv.: - A realistic assumption for the near term.

- Monitor and learn from smaller-scale experiments how to encourage other farmers to use fertilizer.

OPTION 4: Broaden the scope of the APS by focusing not just on private cereals traders. Give those currently in agriculture and relying on off-farm income opportunities the choice to become more specialized in such activities or to exit agricultural production, thus raising the productivity of those choosing to remain in agriculture.

Disadv.: - Requires further survey work on broader range of potential private distributors.

- It is questionable whether current levels of farm income can support more specialization in off-farm activities in the short-run; requires coordination/guidance.

Adv.: - Represents ultimate path for agricultural and rural development.

- Reduces tendency for rural-urban migration

OPTION 5: Look for ways to use public sector resources to encourage more risk averse farmers and merchants to experiment with fertilizer. Aggressively fund and encourage more agronomic research on varieties (and herbicides) to raise the productivity--cost effectiveness--of the fertilizer.

Disadv.: - Not a short-run solution--requires patience.

Adv.: - This is an appealing alternative to subsidizing either the cost of fertilizer or the cost of its delivery.

OPTION 6: Deemphasize the role of farmer organizations in the APS.

Disadv.: - Conflicting with government's philosophy.

- Possibly higher prices of inputs for farmers.

Adv.: - Invest freed public resources in other activities (eg. in developing cereals processing technology).

OPTION 7: Reduce cereals market uncertainty for both buyers and sellers of local cereals through a system of indicative minimum (producer) and maximum (rural consumer) prices, which would be set by a formula based on regional supply and would rise during the post-harvest period to provide reasonable returns to storage to private individuals. Manage this system through targeted buying and releasing of cereals stocks, drawing on the independent regional price reporting system currently planned under the APS to increase market information for traders.

Disadv.: - Continued costs (and problems associated with) public intervention.

- System more complicated to administer than single price.

- Tendency for public buyers to over-react and discourage private traders.

Adv.: - Ameliorate price extremes; more market stability and assured sources of supply of local cereals will lower farmers' need to purchase imported rice (Gambia); more assured demand, in turn, will raise the incentive for some farmers to grow cereals as "cash crops".

- Experience in Africa shows assured market outlets are as (or more) important as (than) high prices in stimulating farmer responses.
- Protect cereals deficit farmers as they begin to respond to input market incentives.
- Indicative and variable prices will require less exaggerated accumulation of stocks in years of good production.
- Feature of monthly price increases is appealing since it stabilizes markets between harvests.

7. TOPICS FOR FURTHER RESEARCH: A PRELIMINARY LISTING

The following is a preliminary list of 5 broad subject areas in which further socio-economic survey research could provide valuable policy-relevant information. The list will be finalized after the completion of further analyses at MSU.

1. Identify the potential implementation costs and likely benefits to farmers of the policy proposed in option 7 (reduced cereals market uncertainty through targetted buying and selling). This could build on the CSA's current production forecast and regional food sufficiency model. Combine this with more research on costs and benefits of improved price formation in uncertain and thin rural markets.
2. Once the APS has been implemented, and assuming farmer organizations are provided with resources to carry out the input distribution functions, monitor the interactions between private traders and these organizations. Through on-going evaluations (research on implementation problems, "success stories", etc.), identify functions which farmer organizations can carry out more cost-effectively than private traders.

3. Research the pre-conditions necessary for, and the distributional consequences (at the regional and household levels), of introducing improved, small-scale rural coarse grains processing technology. Combine this with surveys of traders to see how this technology may affect their operations (especially for maize).

4. Conduct rural off-farm employment studies.

a) Rural household-level surveys: detailed sources and uses of funds; farm and non-farm uses of labor and the competitiveness or complementarity of alternative activities; contribution of non-farm activities to agricultural productivity.

b) Subsector or industry-level studies searching for barriers to further rural growth and/or for promising new activities (see, for example, Boomgard et al., 1986), especially those promoting coarse grains production. Examples include:

1. Traction equipment manufacture and repair;
2. Traction animal marketing, training, custom hire;
3. Coarse grains processing and food preparation/sale.

5. Research on rural labor markets and their relationships to urban labor markets; there has been virtually no focused research on this important topic to date in Senegal. Important for assessing the supply of labor to agriculture over time; understanding the dynamic relationship between technology adoption and labor; and gauging the effects of recent and intended parastatal "deflation" measures.

REFERENCES

- Boomgard, J.J., S.P. Davies, S. Haggblade, and D.C. Meade, 1986, "Subsector Analysis: Its Nature, Conduct and Potential Contribution to Small Enterprise Development", MSU International Development Working Paper, No. 26, East Lansing, Mi.
- Crawford, E.W., J.S. Holtzman, J.M. Staatz, C. Wolf and M.T. Weber, 1988, "MSU Experience in Research Design and Data Processing/Analysis"; paper presented at the University of Zambia Food Security Research Network Workshop, Lusaka, Zambia, May 24-25.
- Crawford, E.W., C. Jolly, V. Kelly, P. Lambrecht, M. Mbaye, and M. Gaye, 1987, "A Field Study of Fertilizer Distribution and Use in Senegal, 1984: Final Report", MSU International Development Papers Reprint, No. 11, East Lansing, Michigan (originally published in 1985 in Senegal).
- Kelly, V., 1988a, "Farmers' Demand for Fertilizer in the Context of Senegal's New Agricultural Policy: A Study of Factors Influencing Farmers' Fertilizer Purchasing Decisions", MSU International Development Papers Reprint, No. 19, East Lansing, Michigan.
- Kelly, V., 1988b, "Factors Affecting the Demand for Fertilizer in Senegal's Peanut Basin", unpubl. PhD. Dissertation, MSU, Dept. of Agricultural Economics, E. Lansing, Mi.
- Martin, F., 1988, "Food Security and Comparative Advantage in Senegal: A Micro-Macro Approach", unpubl. PhD. Dissertation, MSU, Dept. of Agricultural Economics, E. Lansing, Mi.
- MDR, République du Sénégal, 1984, "Etude du Secteur Agricole: Plan Céréaliier", Dakar (Mai).
- Morris, L.M., 1987, "Rice Marketing in the Senegal River Valley: Research Findings and Policy Reform Options", MSU International Development Paper, No. 8, East Lansing, Michigan.
- Newman, M., P. Sow and O. Ndoeye, 1985, "Regulatory Uncertainty, Government Objectives, and Grain Market Organization and Performance: The Senegalese Case", BAME Working Paper 85-9 (August). Dakar: ISRA/BAME.
- Ouedraogo, I. and O. Ndoeye, 1988, "Guide de Collecte des Prix Agricoles en Afrique du Sud du Sahara: Leçons Tirées du Sénégal", paper presented at the Workshop on Research and Agricultural Food Policy, Dakar, Senegal, July 7-8th.
- Sen, A., 1987, "Poverty and Famines", pp. 198-204 in Food Supply: Integrating Supply, Distribution and Consumption, by J.P. Gittinger et al., EDI, John Hopkins/World Bank, Baltimore.

ANNEX A: PROJECT OUTPUTS

WORKING PAPERS, SEMINARS AND TRAINING

4.1. List of Working Papers Prepared

- [1] Diagana, B.N., "Les Organisations Paraétatiques et Paysannes dans le Sud-est du Sénégal", Dakar: Direction des Recherches sur les Systèmes Agraires de l'ISRA, Décembre 1987, 18p.
- [2] Diagana, B.N., A.A. Fall et S.J. Goetz, "Observations Préliminaires sur les Participants du Système Agro-Alimentaire dans les Régions Orientales du Sénégal", presented at the AADPA Conference March 29-April 1, 1987, Hotel de l'Indépendance, Dakar (Abstract published in FAO Etude Développement Economique et Social, No 71).
- [3] Diagana, B.N. et S.J. Goetz, "Les SRD et le Système de Distribution des Intrants en 1985 et 1986: Participation et Opinions des Producteurs au Sud-Est du Sénégal", Note d'Information BAME 87-2, Décembre 1987, 14p.
- [4] Diagana, B.N., "La NPA du Sénégal et la Responsabilisation des Organisations des Producteurs (OPs): Problèmes et Options Soulevées par une Enquête au Sud-Est du Sénégal", June 1988, forthcoming in the BAME series.
- [5] Fall, A.A. "Etude Descriptive des Marchés Céréaliers au Sud-Est du Sénégal", Dakar: Direction des Recherches sur les Systèmes Agraires de l'ISRA, Dec.'87, 21p. (87-3).
- [6] Goetz, S.J., "Observations on Prospects for Expanding Cereals Production in Southeastern Senegal", June 1988 (originally April 1988), forthcoming as a BAME/FSP Publication (also available in French); 22 p.
- [7] Goetz, S.J., "Agricultural Product Prices in Southeastern Senegal: Final Report for 1987", presented to USAID/Dakar, April 1988, 17p. (available in French in the BAME Series).
- [8] Goetz, S.J. et B.N. Diagana avec A.K. Diallo, "Le Projet Sécurité Alimentaire ISRA/MSU/USAID: Note Méthodologique", Dakar: Direction de Recherches sur les Systèmes Agraires de l'ISRA, Décembre 1987, 21p.
- [9] Goetz, S.J. with A. Dieng, "Characteristics of Agriculture and Farm Households in South-eastern Senegal", (unpubl. paper), presented to USAID/Dakar, March 1987, 32p. (forthcoming in the BAME series).

- [10] Goetz, S.J., A.A. Fall, B.N. Diagana and J.S. Holtzman, "Private Cereals Traders in Southeastern Senegal and the APS: Observations on Opinions, Prospects and Implementation Issues", Outline Paper prepared for Seminar and Discussion with USAID/Dakar, December 8th, 1987, 10p.
- [11] Goetz, S.J. and J.S. Holtzman with A. Dieng, "Crop Mixes, Agricultural Inputs and Parastatal Organizations: Reports from Farmers in South-eastern Senegal", May 1987, 30p. (forthcoming in the BAME series).
- [12] Goetz, S.J. and J.S. Holtzman, "Input Acquisition and Crop Mix Changes in 1987: A Farm-Level Report for Southeastern Senegal" (March 1988). Forthcoming in the BAME series, also available in French.
- [13] Goetz, S.J., "Farmer Perceptions, Opinions and the New Agricultural Policy: Results of a Survey in Southeastern Senegal" (Draft Working Paper, July 1988).
- [14] Holtzman, J.S., Goetz, S.J., and B.N. Diagana, "Strengthening Private Sector Input Distribution in South-Eastern Senegal: Issues and Options for Agricultural Policy" June 1988, forthcoming in French in the BAME series.

4.2. List of Seminars Held

1. Workshop on Research and Agricultural Food Policy (with Government of Senegal Policy-Makers), Dakar, July 7-8, 1988

Papers presented:

a. Goetz, S.J. "Les Stratégies d'Assurer la Sécurité Alimentaire au Niveau des Exploitations au Sud-Est du Sénégal: Implications pour la Politique Agricole".

b. Goetz, S.J., J.S. Holtzman and B.N. Diagana, "Renforcer la Participation du Secteur Privé dans le Système Agro-Alimentaire au Sud-Est du Sénégal: Problèmes et Options pour la Politique Agricole".

c. Diagana, B.N., "La NPA du Sénégal et la Responsibilisation des Organisations des Producteurs (OPs): Problèmes et Options Soulevées par une Enquête au Sud-Est du Sénégal".

d. Holtzman, J.S. "Le Bétail et la Sécurité Alimentaire" (outline of a forthcoming working paper).

2. FAO/USAID/ADAAPSO Conference on Food Policy in Francophone Africa, Dakar, March 30-April 3, 1987.

Paper presented: Diagana, B.N., A.A. Fall et S.J. Goetz, "Observations Préliminaires sur les Participants du Système Agro-Alimentaire dans les Régions Orientales du Sénégal". Computer demonstration on the use of MSTAT for price analysis.

3. Dakar Mission Briefings: November 1986, February, July, and December, 1987 and July, 1988, on various topics and preliminary research findings.

4. SID presentation (MSU Campus): "Farm Household Food Security Strategies in Southeastern Senegal," June 3rd, 1988.

5. AID/Washington Workshop on Cereals Policy in the Sahel, Africa Bureau, Office of Sahel and West African Affairs, Thursday, October 8, 1987.

6. Department of Agricultural Economics (MSU).

7. Rockefeller Foundation, USA.

4.3. In-Service Training of Senegalese Personnel

Bocar N. Diagana (M.Sc, Kansas State, 1985).
Researcher -- currently hired by ISRA.

A. Abdoulaye Fall (M.Sc., New Mexico State, 1985).
Researcher

Alioune Dieng : Computer/Statistical Analyst
Trained on SPSS/PC+ in data analysis.
Currently working in the BAME.

Faty Mbengue : Secretary/Data entry
SPSS/PC+ Data-entry and rudimentary analysis, word-processing (Word-Perfect). Currently working in the BAME.

Salamata Peterson : Administrative Assitant
Trained in accounting, project book-keeping (Lotus, Word-Perfect).

Project Supervisors:

- Abdou Karim Diallo (Region of Kolda)
- Pap Djibril Diack (Area of Kounqheul and Maka)

Project Enumerators:

- Godel Ba (Ndiapto)
- Ousmane Sakho (Ndogo Babacar)
- Djibril Diop (S. Diaobé) -- to be hired by the BAME
- Souleyeman Balde (S. Sandio)
- Youssef Camara (S.Y. Dièga)

ANNEX B: THE SENEGALESE FARMER AND THE FOOD SYSTEM

